CARPENTRY AND BUILDING

VOL. XXII.—1900.

NEW YORK:
DAVID WILLIAMS COMPANY,
232-238 WILLIAM STREET.

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Carpentry and Building

WITH WHICH IS INCORPORATED

The Builders' Exchange

VOL. XXII. No. 1. NEW YORK, JANUARY, 1900. Ten Cents a Copy. One Dollar a Year.

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WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

JANUARY, 1900.

The Chicago Building Outlook.

The principal topic of discussion in building circles in Chicago the past few weeks has been the probable outcome of the present situation. Its phases have changed many times since the trouble began, but at the hour of going to press there seems to be a reasonable hope that there will soon be an adjustment of the labor difficulties which threaten to suspend building operations after December 31. The Building Trades Council, composed of representatives of the several workmen's unions, and the Building Contractors' Council, composed of employers, have at least reached a temporary understanding, both sides having accepted a plan for the arbitration of immediate controversies by a joint committee of 14 members, seven representing each body. The employers favored the appointment of a permanent board of arbitration, to consist of five members from each of these organizations, with a judge of some local court as the eleventh member, but the proposition was not regarded with favor by the labor representatives. Even the attempt to make a temporary adjustment of the controversy may fail, as doubt is cast on the abandonment of the sympathetic strike, which is one of the leading contentions of the employers. The situation is exasperating in the extreme to all interests connected with the Chicago building trade. They observe an opportunity rapidly passing for the transaction of profitable business, numerous enterprises being blocked by the extreme position taken by labor leaders. If exclusively Chicago interests were affected the matter would not be so important, but the baleful influence of this unfortunate state of affairs projects itself far from that city.

Is Cost of Steel Checking Building?

There has been a good deal of clamor in the newspapers about the alleged injury which high prices for steel and materials generally were doing to the building industry. Numerous instances have been cited of the abandonment of projected undertakings on account of advanced cost. It is probable that there have been many such cases, but it is only fair to state that really, after all, the advance in materials has not so enormously increased cost as many have been led to believe, and it is an open question whether other more potent influences are not more than offsetting what effect is undoubtedly produced in some directions. First of all it needs only mention of the fact to bring conviction that the demand for steel for industrial structures, for shops, plants, power houses, &c., has been enormous, and is going on at an extraordinary rate. The additions to old enterprises and the construction of new manufacturing and municipal plants in this country have shown no signs of falling off. The volume of new business in this direction is certainly large enough to more than counterbalance any decline in the consumption for small incidental buildings, in which every item of cost must be closely scrutinized in order to keep the total within predetermined limits. It has been claimed—and these claims seem plausible—that the high cost of steel must very seriously affect, adversely, the consumption of materials in that class of structures which may be designated as the modern skyscraper. To begin with, it may be stated that the experience in such cities as New York and Philadelphia, with the amount of work constantly coming up in architects' offices, does not bear out the fears expressed. The fact is that the cost of the steel entering into large modern office or dwelling structures is popularly much overestimated. In an interview in the New York *Times*, J. Hollis Wells gives an instance which illustrates the situation well. A year since his firm put up a building, the cost of which figured down to about 32 cents per cubic foot. He is now planning a structure almost exactly similar in size and construction, which at present prices will cost only 2.2 cents per cubic foot more. Another authority states that the value of steel in fire proof apartments varies from 8 to 12 per cent. of the total cost of the building, in office buildings from 8 to 15 per cent., and in commercial buildings from 10 to 15 per cent. Mr. Hill argues that since the cost of the building is from one to two times the cost of the lot, therefore the cost of the steel is in no case likely to exceed 7½ per cent. of the total investment. In many instances, of course, it is very much less. These data explain to some extent the fact to which we have alluded—that the amount of work coming up in such important markets like that of New York continues very large, and that while the advance in the cost of material must have its effect, it is not by any means as far reaching and as general as many profess to believe.

A Feature of Skeleton Frame Construction.

Since the "skeleton frame" idea was introduced in the construction of towering office buildings, business blocks, &c., there have been developed many novel features in connection with the work of erection, not the least important of which is the ability to carry on the mason work simultaneously at different levels. This plan has been in vogue in Chicago and New York for some time, a recent notable instance being the office building now in process of erection at the corner of Broadway and Chambers street, this city, and known as the "Broadway-Chambers." In this case after the stone work had been carried up nearly two stories the brick work was commenced at a higher level and the two carried forward simultaneously. The first instance where this feature of construction was adopted in Pittsburgh was in connection with the 12-story structure now in process of erection at Liberty avenue and Fifth street, estimated to cost nearly $400,000. The ordinary time for the completion of the masonry work of this building, according to the estimate of the senior member of the firm having the contract, would be 70 days, but by going forward with the stone work at the lower floors at the same time that a force of bricklayers was at work at the upper floors, just about half the time named, it was estimated, would be saved. This, as may be readily inferred, is an important consideration in the erection of lofty buildings, and while the practice is not universal, the ability to simultaneously carry on the mason work at different levels is an advantage which, under pressure for time, cannot be overestimated.

A Novel Apartment House.

The plans have recently been filed in this city for a 17-story apartment house, which, in design and appointments, will be different from anything heretofore put up in this vicinity, and probably unlike any building intended for dwelling purposes now in this or any other country. It will be located on the corner of Fifth avenue and Forty-fourth street, just across from Delmonico's, on the one hand, and from Sherry's, both famous restaurants, on the other. Perhaps the most novel portion of the undertaking is that which embraces the co-operation of the proprietors of Sherry's. The elevator shafts of the new house will be sunk deep into the ground, so that passengers at the low level will find themselves at the entrance to a tunnel extending under Fifth avenue and communicating with the system of elevators in Sherry's, which will be remodeled so as to reach the tunnel entrance. In this way the residents of the apartment house can by means of the underground passage reach the restaurant and return to their rooms without the necessity of going out of doors. It is stated that the tunnel will be handsomely fitted up so as to make it an attractive as well as a unique, passageway. The new apartment house will be known as the "Narragansett," and in the front of each of the 17 floors will be parlors and reception rooms looking out upon Fifth avenue. Another feature of the building will be a swimming tank of large area and luxurious accessories.

Convention of American Institute of Architects.

The annual convention of the American Institute of Architects, which was held in November in Pittsburgh, Pa., was a most interesting affair. A large representation was present, the deliberations and excursions of the delegates extending over a period of four days, were highly instructive, and the meeting was brought to a close with a banquet given to the visiting architects by the members of the Pittsburgh Chapter, at the Monongahela House. A number of very interesting papers were presented, these including among others: "Electricity in Buildings," by E. R. Hill; "The Influence of the French School of Design on Architecture in This Country," by A. L. Brockway of New York, and R. A. Cram and H. L. Warren of Boston; "The Legitimate Design for the Casing of Steel Skeleton Structures," by C. H. Blackall of Boston; "Architecture, the Sister Arts and Artistic Trades," by L. T. Scofield of Cleveland; "Sculpture in Its Relation to Architecture," by William Ordway Partridge of New York; "Mural Painting in Its Relation to Architecture," by E. E. Garnsey of New York; "The Hebrew in Architecture," by J. W. Yost of Columbus; "The Manufacture of Structural Steel," by F. L. Kindl of Pittsburgh, Pa., and "Competitions," by Prof. William R. Ware. These papers were discussed at considerable length by the delegates present, and much valuable comment developed.

Various reports were presented, that of the Board of Directors showing that 44 new members had been elected during the past year, and that 20 applications were pending. The secretary was instructed to call, for publication, for data of all important competitions held in this country. It was voted that the institute should hold its convention in Washington every alternate year, and that city was chosen for the next place of meeting, Cleveland being a close second in the choice.

The election of officers for the ensuing year resulted as follows: President, R. S. Peabody of Boston, Mass.; first vice-president, W. S. Eames of St. Louis, Mo.; second vice-president, Frank Miles Day of Philadelphia, Pa.; secretary and treasurer, Glenn Brown of Washington, D. C. Directors: Henry Van Brunt of Kansas City, Mo.; James G. Hill of Washington, D. C., and Normand S. Patton of Chicago, Ill.

COMMENTING on the advance in prices of various forms of building materials a late issue of *The Lumberman's Review* says: "We have seen mill cull North Carolina pine boards which sold hard one or two years ago at $3 to $4 per 1000 move up until accumulations have been absorbed at a price quite uniformly fixed at $8 f.o.b. cars at mills. Within a year spruce lath have actually doubled in price on the New York market, cargoes having sold as low as $1.45 in July and August, 1898, while $3 has been the basis here for several weeks past. Buffalo, in her effort to secure an adequate supply of lath with which to meet her immediate needs, has been going down into the Adirondack country and shipping spruce lath by rail to the big Lake Erie market, while Chicago cheerfully bids $4.50 per 1000 for a pine lath—admittedly inferior to spruce—which was sold one year ago in that market at $1.50 for straight cargoes and $1.25 for mixed white pine and Norway."

A Model Town.

The owner of a coal tract near Pittsburgh is building a model mining town, with the object of supplying to the 3000 employees in the mines every benefit possible at the most inexpensive cost. Each house, of brick and stone, will stand on a quarter-acre lot, with flower beds and a hedge in front. School buildings, reading room and club house, churches and stores will be provided. In order to prevent an unfortunate issue to the enterprise, such as has befallen other undertakings started on similar lines, it is arranged that the houses shall become the property of the individual miners, and they are to run the settlement themselves, as in the case of other villages. The stores are to be managed on the profit-sharing plan; club and reading room membership will involve the payment of dues, and the sale of liquor in or near the place will be barred. The outcome of the scheme will be watched with interest, in view of the fate which has overtaken Pullman, Dolgeville and other model industrial towns, managed on the "paternal" system.

Annual Dinner of the Builders' League.

The annual dinner of the Builders' League of New York was given on the evening of December 2 at their rooms in West 126th street. The affair was an enjoyable one in every way, and those in attendance voted it an entire success. In addition to the many speeches there was music, both instrumental and vocal, while the beautiful decorations added much to the charm of the occasion. President John P. Leo was master of ceremonies, while Lewis H. Gentles and D. D. Lawson constituted the Dinner Committee, the decorations being in charge of I. H. Bower.

Convention of Brick Manufacturers.

The Executive Committee, of which W. D. Richardson is president and T. A. Randall secretary, announces that the fourteenth annual convention of the National Brick Manufacturers' Association will be held in the city of Detroit, Mich., February 5 and 10, inclusive.

The headquarters of the convention will be at the Hotel Cadillac.

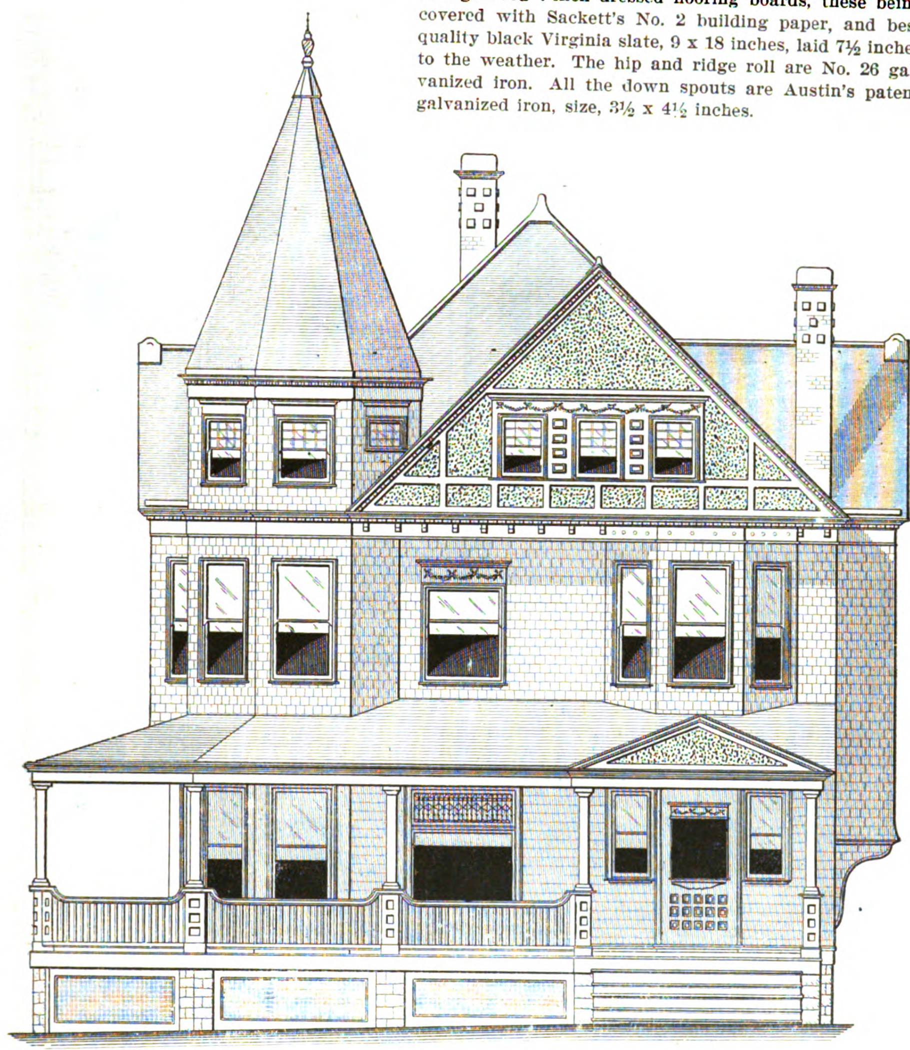
A Modern Japanese Palace.

Chicago engineers are designing an earthquake proof steel palace for the Crown Prince of Japan, for the construction of which the Japanese Government has appropriated a sum of $3,000,000. Around a steel skeleton will be built a house of granite and marble covering an area of 270 x 400 feet, and rising to a hight of 60 feet, which is designed to be the handsomest building of its kind in the Orient. American steel construction, with its rigid elasticity, it is thought, will revolutonize the building industry in Japan, where earthquakes have frequently destroyed structures supposedly solid. The new palace will rest on 400 deeply anchored steel columns imbedded in concrete piers, and the constructing engineers say the great pile will resist all shocks. The structural steel will be supplied by a Pittsburgh firm. Charles M. Wilkes of Chicago has been engaged to design an elaborate heating and ventilating system for the building.

RESIDENCE IN A CINCINNATI SUBURB.

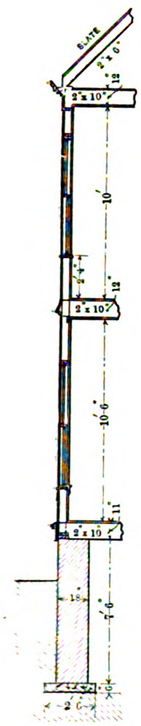
THE subject of our double half-tone supplemental plate this month is one of the many handsome residences erected in the recent past in a subdivision of McGregor Park, Mt. Auburn, Cincinnati, Ohio. The design possesses many features of interest, both as regards its external treatment and the arrangement of the interior. One view afforded by our double plate represents the completed structure, while the other shows the stairway and the mantel in the main hall. Some of the more notable features of construction and design are the wide verandas, the rear one being inclosed in glass in winter and used as a conservatory; the spaciousness of the rooms, the laundry arrangement on the first floor and the cement effects in the gables.

The cellar walls are 18 inches thick, 7 feet 6 inches high from the footing course to the bottom of the first floor joists, and are laid up in blue faced rock range work in regular courses of 5 and 6 inches. The footings of the cellar walls are 6 inches thick and project 6 inches on all sides. The hight of the first story is 10 feet 6 inches, and that of the second story 10 feet. The first story is sheathed, papered and weather boarded on the outside, and second story above the belt course is sheathed, papered and covered with California red wood machine cut shingles. The gables are covered with patent wire lath, which carries best Portland cement. The entire roof of the house including the porches is sheathed with tongued and grooved 7-inch dressed flooring boards, these being covered with Sackett's No. 2 building paper, and best quality black Virginia slate, 9 x 18 inches, laid 7½ inches to the weather. The hip and ridge roll are No. 26 galvanized iron. All the down spouts are Austin's patent galvanized iron, size, 3½ x 4½ inches.



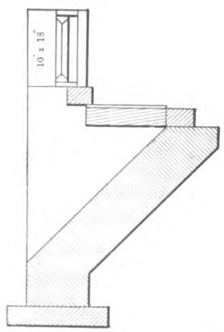
Front Elevation.—Scale, ⅛ Inch to the Foot.

Residence in a Cincinnati Suburb.—Bofinger & Hopkins, Builders.

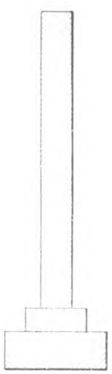


Section.—Scale, ⅛ Inch to the Foot.

The interior of the house is divided into reception hall, parlor, dining room, kitchen, pantry and laundry on the first floor, three bedrooms, bath, servant's room and den on the second floor. The third story is divided into three large bedrooms, and is plastered and finished complete. All lumber throughout, unless otherwise specified, is well seasoned pine. The joists of first, second and attick floors are 2 x 10 inches, placed 16 inches on centers, each tier having two rows of cross bridging. Rafters are 2 x 6 inches, placed 16 inches on centers, well spiked to 4 x 2 inch double wall plates. Ridge piece is 2 x 8 inches; valley rafters, 2 x 8 inches; tower rafters, 2 x 6 inches by 18 feet; joists are tripled under sliding doors. The entire trim, such as cornice, brackets, corner



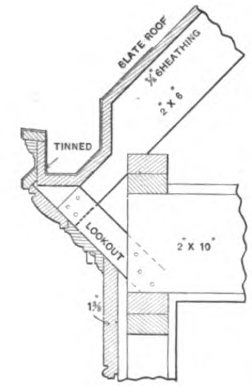
Section through Coal Chute.—Scale, ¼ Inch to the Foot.



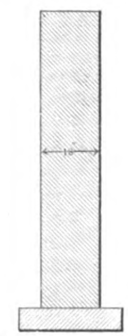
Section through Brick Wall in Cellar.—Scale ¼ Inch to the Foot.

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

Residence in a Cincinnati Suburb.—Side Elevation and Miscellaneous Details.

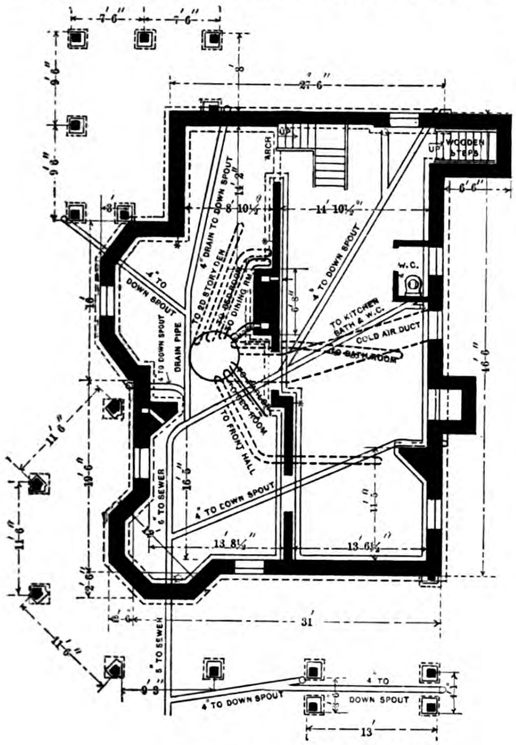


Detail of Main Cornice.—Scale, ¾ Inch to the Foot.



Section through Foundation Wall.—Scale, ¼ Inch to the Foot.

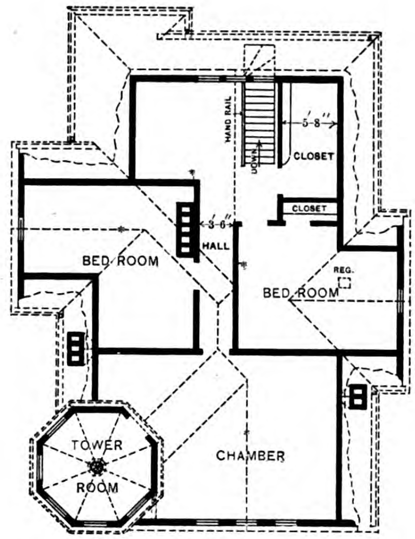
boards, is of best quality white pine. The plastering is three-coat work, the walls and ceilings of parlor, dining room, front hall of first and second story, front bedroom



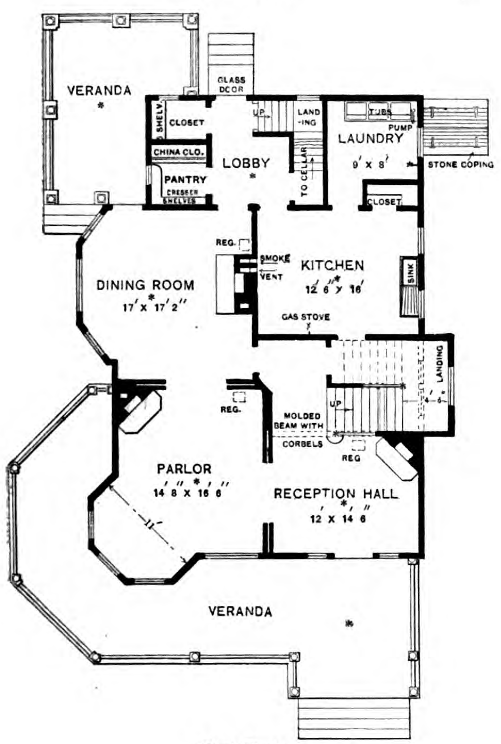
Foundation.

The cellar ceiling is plastered two coats. There is a cove mold in first and second story hall, parlor, dining room, front bed room, hall room in second story, bathroom and room over dining room. The glass for the entire first and second story is double strength French glass, excepting the window on hall stairs, glass in front room and side lights to front door and transom of front parlor window, which are in simple design of leaded beveled plate glass.

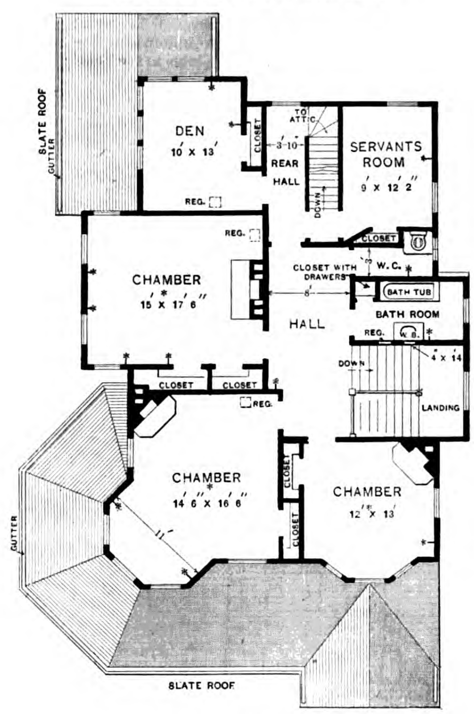
The main stairs, steps and risers, handrail, newels and balusters are quartered oak. The inside woodwork



Attic, with Outline of Roof Plan.



First Floor.

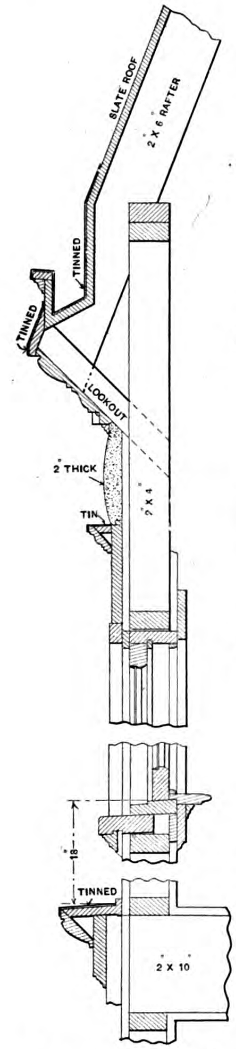


Second Floor.

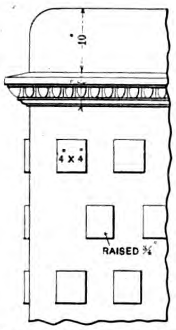
Residence in a Cincinnati Suburb.—Floor Plans.—Scale, 1-16 Inch to the Foot.

and bedroom over dining room are run with best quality of sand finish under the float. The balance of the house is finished white and gauged with plaster of paris.

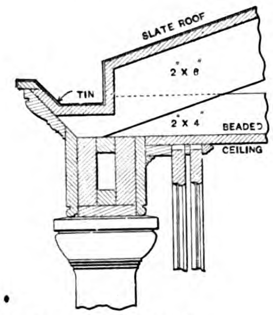
throughout the house is finished with one coat of shellac and two coats best copal varnish. The exterior woodwork is painted three coats of white lead and oil, tinted



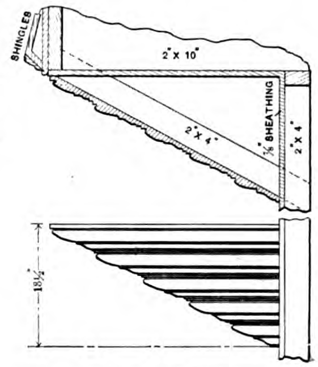
Section through Tower Cornice and Window Frame.—Scale, ¾ Inch to the Foot.



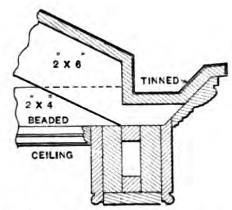
Partial Elevation of Chimney.—Scale, ½ Inch to the Foot.



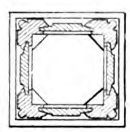
Cornice of Rear Porch.



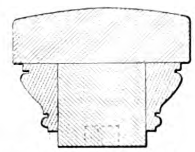
Section and Elevation of Corbeling on Right Side Elevation.—Scale, ½ Inch to the Foot.



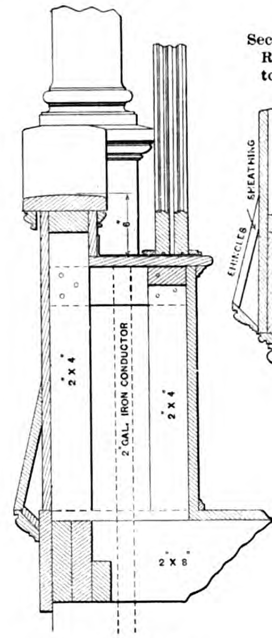
Detail of Veranda Cornice.—Scale, ¾ Inch to the Foot.



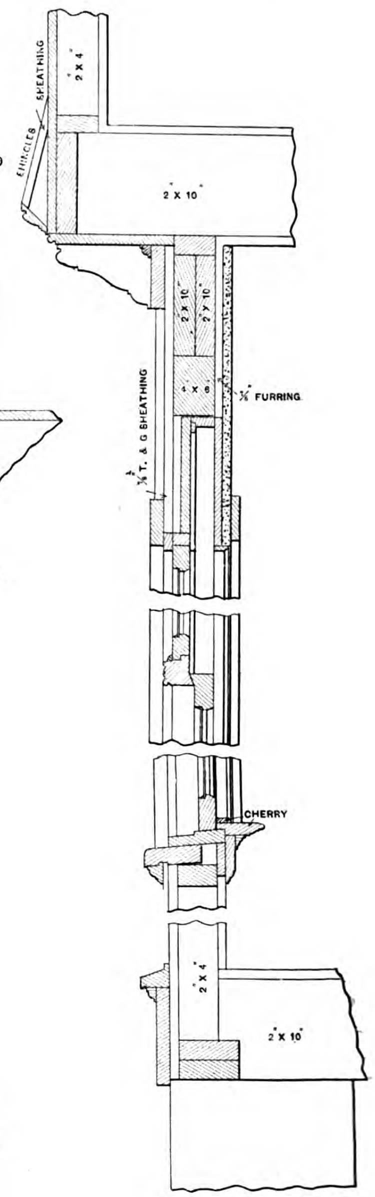
Section through Pedestal of Porch Column at B B.—Scale, ¾ Inch to the Foot.



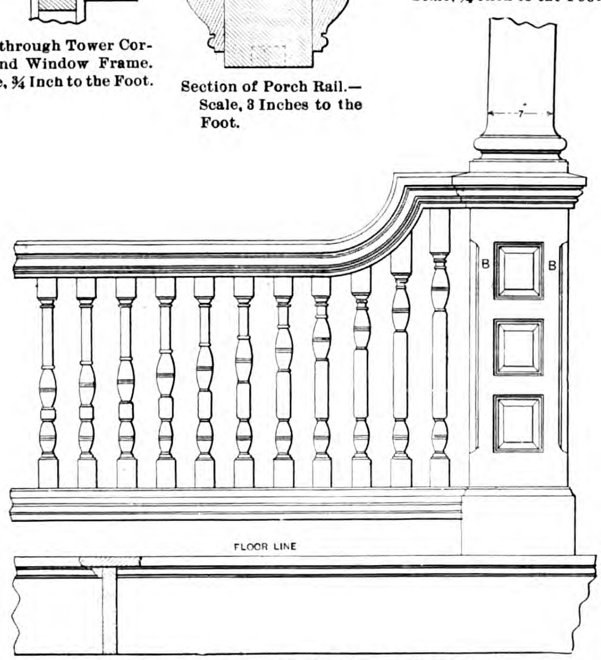
Section of Porch Rail.—Scale, 3 Inches to the Foot.



Detail of Rear Porch. Scale, ¾ Inch to the Foot.

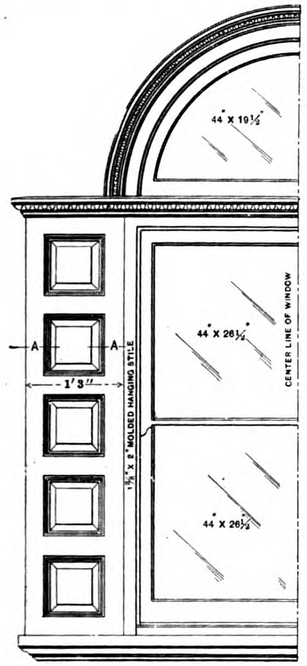


Section through Center of Left Side Bay.—Scale, ¾ Inch to the Foot.

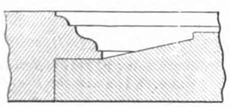


Detail of Front Porch.—Scale, ¾ Inch to the Foot.

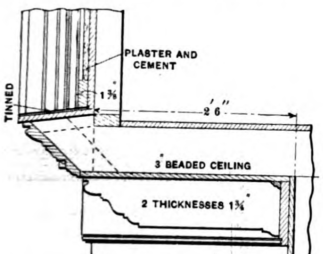
Miscellaneous Constructive Details of Residence in a Cincinnati Suburb.



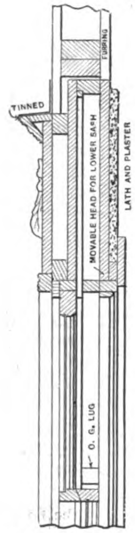
Half Elevation of Stair Window.—Scale, ⅛ Inch to the Foot.



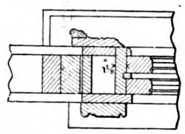
Section of Stair Window on Line A A.—Scale, 6 Inches to the Foot.



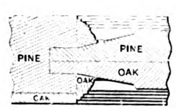
Section of Front Gable Cornice.—Scale, ⅛ Inch to the Foot.



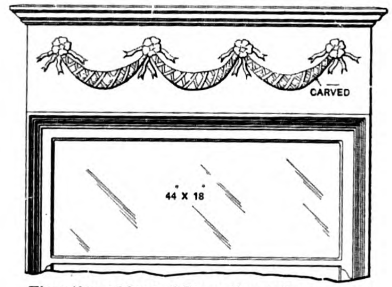
Detail of Second-Story Front Ornamental Window.—Scale, ¾ Inch to the Foot.



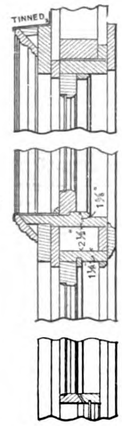
Horizontal Section through Window Frame.—Scale, ¾ Inch to the Foot.

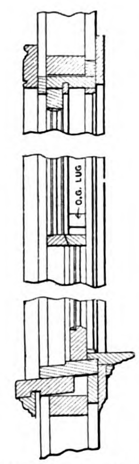


Detail of Front Door Stile and Panel.—Scale, 3 Inches to the Foot.

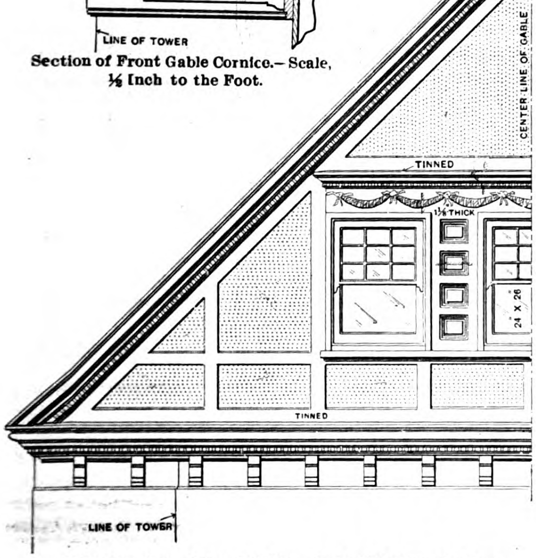


Elevation of Second-Story Front Ornamental Window.—Scale, ⅛ Inch to the Foot.

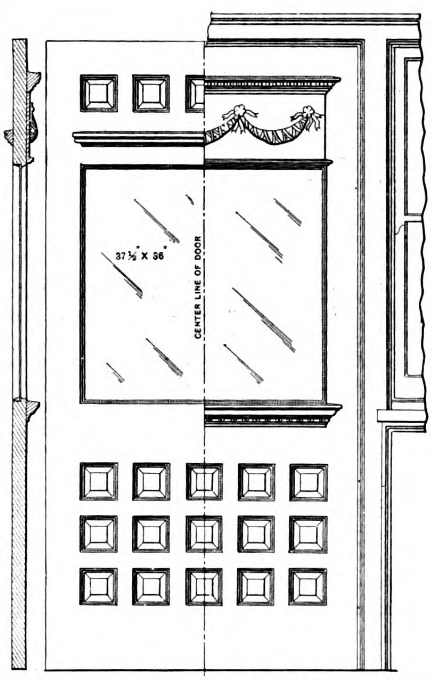




Detail of Stair Window. Vertical Section through Window Frame.
Scale, ¾ Inch to the Foot.

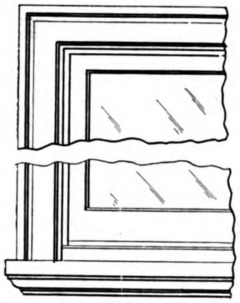


Half Elevation of Front Gable.—Scale, ¼ Inch to the Foot

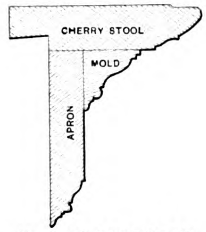


Section and Half Inside and Half Outside Elevations of Front Door.—Scale, ⅛ Inch to the Foot.

Miscellaneous Constructive Details of Residence in a Cincinnati Suburb.

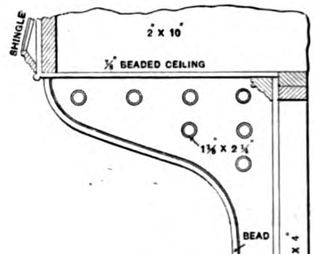


Partial Elevation of Window Trim.—Scale, ¾ Inch to the Foot.

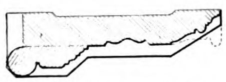


Stool and Apron for all Windows.

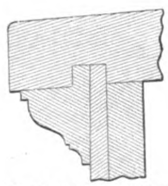
Base.



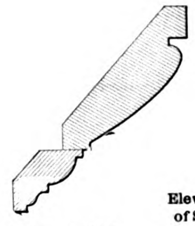
Elevation of Bracket of Stair Bay —Scale, ½ Inch to the Foot.



Finish for Entire House.

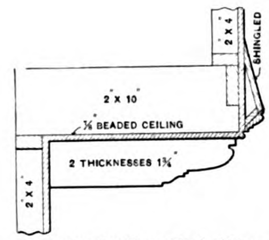


Mold under Subsill of Windows.

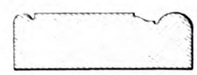


Porch Cornice Mold.

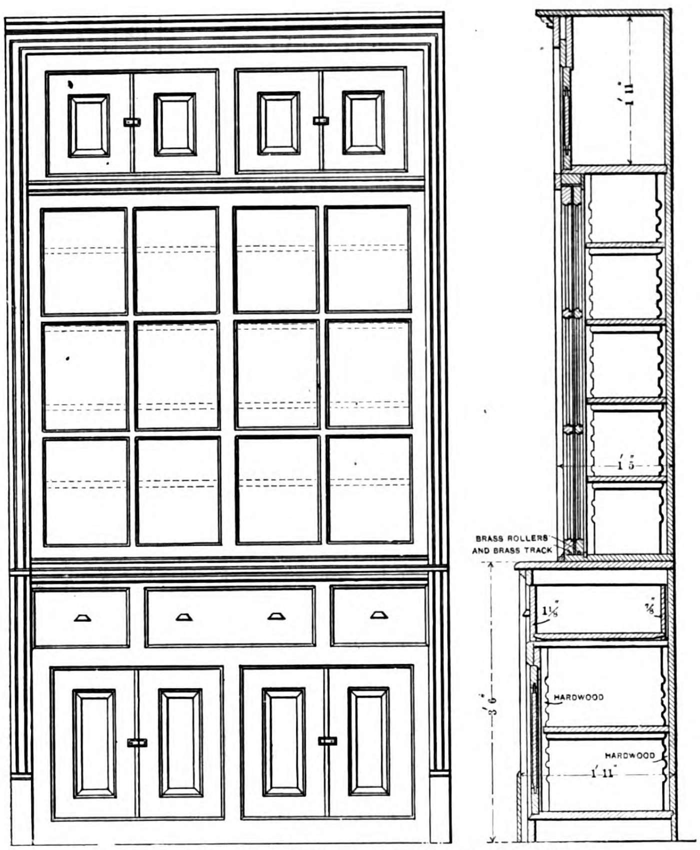
Scale, 3 Inches to the Foot.



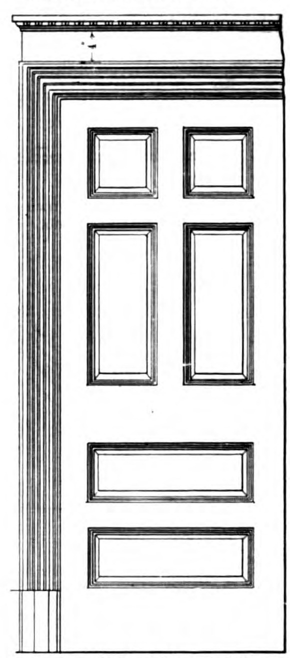
Bracket under Rear Projection.—Scale, ½ Inch to the Foot.

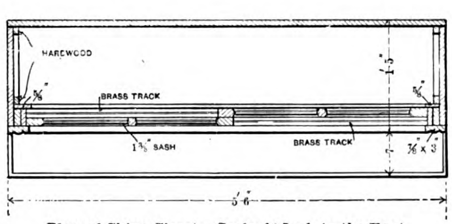


Detail of Outside Casings for Doors and Windows of First Story.—Scale, 3 Inches to the Foot.

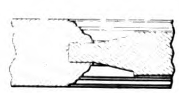


Elevation and Section of China Closet.—Scale, ½ Inch to the Foot.





Plan of China Closet.—Scale, ½ Inch to the Foot.



Section of Panel and Rail of First and Second Story Doors.—Scale, 3 Inches to the Foot.

Elevation of Door, Showing Trim on First and Second Floors.—Scale, ½ Inch to the Foot.

Miscellaneous Constructive Details of Residence in a Cincinnati Suburb.

in different shades. All exterior galvanized iron and tin work has two coats best metallic paint. The bathroom is wainscoted with beaded and fluted yellow pine with molded cap and floor strip, finished.

The plumbing is all open work. The bathroom has marble top washstand, iron porcelain lined tub and pedestal washout water closet, the latter resting on marble floor slab, with necessary flush, supply and vent pipes. The trimmings are nickel plated; the bathtub has plated combination bath cock, waste and supply. The cellar is divided in the center by a brick partition wall and contains necessary coal bins, vegetable cellar, water closet, &c. The entire house is heated by furnace and fitted with electric bells and speaking tubes. Gas fixtures are of handsome design, in cast brass, and mantels are all hard wood with tile hearths, tile grates, overmantels, and beveled mirrors.

This house was built by Bofinger & Hopkins, in their subdivision of McGregor Park, for A. G. Bofinger, in accordance with plans prepared under his personal supervision by W. E. Nickels, architect, of Cincinnati, Ohio.

BUILDING IN THE PHILIPPINE ISLANDS.

IN view of the relations existing between the United States and the Philippine Islands it may not be without interest to refer to some of the methods of construction employed in building, particularly in the city of Manila. To a recent issue of the *Record and Guide* F. B. Hinchman contributes a valuable article on the subject, from which we extract the following:

The buildings in Manila, excepting wooden sheds and bamboo houses, may, from a structural standpoint, be divided into three classes. First, the solid masonry wall construction with floors, either supported on masonry arches or timbers. This class includes almost all churches and ecclesiastical buildings and all important buildings erected previous to the great earthquake of 1863. In the second class, which includes the majority of city residences and the better class of houses throughout the country, the walls up to the second tier of beams are of masonry, of a local soft conglomerate, or of concrete. The second tier of beams projects and carries the frame second story and roof. The third class is the system of construction in vogue at present, and is supposed to be earthquake proof. This system is particularly interesting to an American architect, as it is in principle practically the same as the skeleton structure now in use for all the iron frame buildings in America. While a discussion has recently arisen in New York as to the invention of the system and the first building constructed on this principle in this city, it may be interesting to note that this style of construction has been in use in Manila for 20 or 30 years.

Ancient Buildings.

The ancient buildings which have survived to this day are naturally the most interesting from every standpoint of history, architecture and construction. The walls are enormously thick, having been successfully built to withstand earthquakes; they have also survived the many disastrous fires that have, from time to time, swept away whole sections of the city. With the exception of the Cathedral, the Convent of St. Augustin and the old Custom House, which are built of granite, most of the old masonry is of the peculiar soft conglomerate. It is cut into blocks about 2 feet 6 inches long by 10 x 10, and is readily hewn and fitted by means of a sharp hammer. Walls of this stone are generally covered with a coat of stucco. Heavy as is this style of construction, it is not always proof against earthquake, and was abandoned in favor of the new plan after the earthquake of 1863. Some massive ruins in the walled city show the failure of some buildings of this class, and great, indeed, must have been the fall of them.

Buildings of the second or mixed plan of construction were entirely of wood above the second tier of beams; in fact the Spanish law at this time was amended so that masonry walls, unless of excessive strength and thickness, could only be carried to a hight of 5 m. The frame of the upper part of the house was covered with a single thickness of broad matched planks, and the roof with broad overhanging eaves covered with heavy red Spanish tiles or, more recently, prosaic corrugated iron, unpainted. The street fronts and rears of these houses, on the second floor, are composed entirely of a series of sliding sash, so arranged that one slides behind the other until almost the entire front is open. The sash are about 3 feet 6 inches broad, and glazed with pieces of mother-of-pearl about 3 inches square.

The Regulation Building.

In the construction of the regulation modern building in Manila trenches about 2 feet deep and 2 feet 6 inches wide are dug for the main walls and lines of columns to rest upon. It may be said here that there are no cellars in Manila, for the ground is so low and the city so cut up with tideways and streams that at a depth of 3 to 4 feet water is struck. These trenches are filled with a footing course of the soft local stone, laid in a poor quality of lime and cement mortar. At intervals of from 12 to 15 feet the upright columns are then erected. They are about 10 x 10 feet. The lower part of the columns extending from 8 to 10 feet is of an incomparable native wood called Ypil, which will neither decay nor is eaten by white ants. This is neatly fished and spliced by a peculiar broken diagonal joint to the upper part of the column, which is of wood similar in appearance and almost as tough. Both of these woods look much like light colored walnut. The entire frame of the building is constructed of these two varieties with some mahogany for floors, rails, &c. This distance from column to column is spanned by two light girders (20 x 12 cm.) pinned on either side of the column, the pin running through the columns. Floor joists (20 x 12 cm. and spaced 50 cm. on centers) rest upon the girders and support the floor, which has to do duty often for the storage of considerable merchandise.

Both inside and outside walls and partitions are then formed by cross timbering and bracing, the outside curtain walls being then built up in the cross timbering with 9 inches of very good quality of molded brick with countersunk bed and top. Inside partitions are either brick filled or boarded. The roof consists of a number of primitive trusses with purlins, which are covered with corrugated iron, and the gable ends are also covered in same manner. The eaves are made very broad and ceiled on under side with galvanized iron with ornamental designs cut out for ventilation. The ceilings of the house are usually of painted and frescoed canvas, tacked to under side of beams above. Windows are of the mother-of-pearl glazed sliding variety, and the first floor windows protected by iron window guards let into the stout structural frame.

Plumbing.

Plumbing from the American standpoint is an unknown art. A few buildings owned by Spaniards or Englishmen have out of date washout closets improperly connected and unvented, but this is a great improvement on the average arrangement, which consists of an antique pan closet or more often of a hole leading most any old place! A few of the main streets have been sewered after a fashion by means of a brick arched, flat-bottomed canal. Where the street had even this arrangement a similar canal was constructed under the house and connected to the public sewer. In most cases, however, a private cesspool was located somewhere on the premises, while in the outlying bamboo districts, particularly the tough Tondo district, anything or nothing was provided. The lack of proper sanitation is undoubtedly the cause of much of the fever and the always prevalent small-pox.

With all these adverse conditions the salvation of Manila as a habitable city is the water supply. All parts of the city and even outlying districts are supplied with fairly good water brought in through cast iron mains from a pumping station 12 miles away on the river at San Tolan. All regularly constructed houses are piped, and public hydrants provided at intervals at the curb for the use of the general public. Fire hydrants are also found at intervals, but the supply is hardly adequate for this extra call, and the engines (such as they are) are often forced to run lines to the neighboring streams and tideways.

Native Construction.

The typical native construction which prevails throughout the country, and as far as permitted in the city, is worthy a passing glance. The frame of the house is entirely of bamboo, which is readily obtained in any size required, up to pieces 40 feet long and 6 or 7 inches in diameter. It has, of course, but little strength but answers perfectly for all requirements of the native house. The corner posts and intermediate uprights support the whole structure, the first and only floor resting upon girts pinned to the uprights about 4 feet above the ground. The joists are of 3-inch bamboo, and the floor itself made of strips of split bamboo about 1 inch wide, and lashed tight together. This makes a rather uneven and somewhat shaky floor, but has the advantage of allowing a free circulation of air. The roof consists of rafters resting on kingpost trusses. The openings are framed with bamboos, and lattice blinds swing out from lashings at the top. The entire sides and roof are usually thatched with dried palm leaves called "nipa," which are neatly tied to slight bamboo cross pieces which correspond precisely to "shingle strips." The whole structure has the advantage of being cheap, quickly constructed (in fact every Filipino is "his own architect and builder"), and particularly well suited to the climate. In the outlying districts some of the resident Englishmen have lived in these houses by preference, making only slight modifications in construction. As I have above mentioned, these cane houses were built in all manner of possible and impossible places in and about the city, and notwithstanding the endeavors of the building inspectors to limit their numbers, whole settlements of these shacks sprang up during the winter of 1898 and 1899.

When, at last, peace shall be established in Luzon, and the various departments can be firmly and properly organized, there should be a great opportunity for the introduction of American specialties and methods. Iron plumbing and drainage machinery and electrical plants, to say nothing of railroads, will be all needed, and needed at once, and the Filipino himself will not be behindhand in calling for them. No city could be more prompt to respond to favorable conditions, and its vitality and possibilities are enormous. But half a chance is needed to give to trade and general improvement such an impetus that this part, at least, of the sleepy East will see a growth, more solid, but as enlivening as the boom of a mining town in "flush times."

THE ART OF WOOD TURNING.—I.

(SECOND SERIES.)

BY FRED. T. HODGSON.

IN resuming these papers on the Art of Wood Turning, it is intended to go more deeply into the subject than was attempted in my former efforts and compilations, and to this end everything within reach relating to the subject has been obtained, with a view of making them as thorough and exhaustive as possible.

Wood turning seems to be an art which for some cause or other has not awakened much activity on the part of writers competent to discuss the subject with that practical knowledge demanded where accuracy and simplicity are the standards; and this condition, in a great measure, accounts for the paucity of literature on the subject. Apart from Holtzappel's excellent work, there is nothing in the English language that may be termed a "standard" on the subject, though there are several in French and German, and it is my intention, when suited to the purpose, to draw from these as well as from English and American sources. Having said this much by way of introduction, it will be in order to attack the subject at large.

Before pretending to work wood, ivory or the metals, it is necessary to have tools, the edge of which is suitable to the material to be cut. I have given some indications in the former series of papers of what their angles ought to be, but as I proceed I will endeavor to show what the exact angles of cutting tools ought to be when certain metals are under manipulation; for, as every turner knows, materials of different degrees of hardness require tools of different angles to properly work them. But whether or not a tool must have an acute angle to cut wood or nearly a right angle to cut brass, the angle must be truly acute or right—that is to say, being given the point *a* of a tool, Fig. 1, the line *b c* must be perfectly straight, and must not have the form of *c d*, Fig. 2. When the cutting angles of a tool become rounded on the basil by repeated sharpening of otherwise it becomes almost useless, as it will be impossible to make a clean cut with it, and pressure will have to be applied to it to make it cut at all. This pressure will involve an unevenness and untruthfulness in the work, which no amount of sandpapering or rasping will rectify, and it will be impossible to properly finish and polish the work. This defect in ordinary work will be very much magnified in spirals, spheres, oval and eccentric work. Whenever a cutting tool gets in a bad shape, no matter from what cause, it should at once be ground to the required angle on a suitable grindstone, either turned by an assistant or by other power. When a tool possesses the proper basil, and it is properly sharpened, there will be no difficulty whatever in keeping it up to its work; indeed, the moment the tool is presented to the work it will require considerable skill on the part of the operator to prevent its cutting more than was intended, but under proper conditions it will slide along the work gracefully and with ease and perform its duties in a masterful manner. This is a necessary condition, particularly in delicate objects, when an effort must not be made from the shoulders, but by a light pressure of the wrist. A workman is master of his tool and his work when the former cuts well, and, moreover, he never tires of using the tool, whereas, on the other hand, a badly sharpened tool tires and disgusts the operator, and spoils the work; it therefore pays from every point of view to have it sharp.

Among the many appliances required for doing ornamental turned or lathe work is a complete solid slide rest. These may be obtained from any of the manufacturers of lathes whose advertisements appear in *Carpentry and Building*, but if expense is not an objection it would be much better to purchase a lathe complete with iron bed, face plates and such other attachments as usually go with a so-called fully equipped wood turning lathe with a slide rest. For the turning of delicate objects, the workman should be prepared to make the most of the odd tools and chucks which he will find necessary in executing ornamental work. He must also cultivate the greatest amount of lightness of hand in order to obtain the best results. A slide rest is very useful in turning eccentric pieces, or such as present spaces, because the tool can be made to advance the distance absolutely necessary to cut well without fear of catching or breaking it. Slide rests for wood are not often found in the market, but in order that my readers may possess one if they so desire I submit diagrams from which they may be made to fit the lathe they may already own. This rest is quite portable and can be made adaptable to almost any ordinary lathe. By the examination of Figs. 3 and 4 the manner in which it is made may be readily understood. It is composed of a sole, A, of cast iron, of a brass wheel, B, resting free to revolve and held by a central pivot on the sole A. An endless screw, C, causes the wheel B to move, and this puts in motion every part of the slide rest fixed above. On the wheel B two quite different portions are fitted. One, D, is a slide which holds a saddle, E, which can receive at will one or two sliding pieces—either one with a tool holder or one with a small mandrel destined to turn at great speed for engine-turning. The other portion, H, Figs. 5 and 6, is put in place of the first. Drawn round by the wheel's movement, it describes round the point I a circle, of which the radius is 10 cm. (3.9 + inches), which allows a sphere of 20 cm. (about 7.9 inches) to be turned. One of the sliding pieces can then be replaced

geared connection drives the pulley mounted on the spindle or mandrel D, which turns in its frame at the extreme end of the bed of the lathe, and the poppet head E, which occupies a similar position near the other end of the bed. The mandrel has a protruding screw at the working end, so as to receive chucks of various forms, and has been fully described in previous papers, G showing a common hand rest which is used in some of its modifications for ordinary turning. So far we have the lathe in its simplest form; but for special and ornamental work the character of the lathe and its attachments must be greatly changed. The slide rest already described and shown at H becomes a very important factor, for with such a rest work revolving in the lathe can be cut and worked on the face, at the side, or at any angle between the two, and any number of circles of any fixed depth, and at any required distance from each other, may be produced with unfailing regularity, as the rest holds the tool wherever it is wanted. It now remains to explain how the work is held in place. Readers are referred to previous issues for a fuller description of the forked chuck F, which, with the end of the fixed point or center in the tail block or poppet head E, sustains long pieces. To turn ornamental face work,

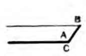


Fig. 1. — Correct Shape of Point of Tool.

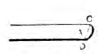


Fig. 2.—Incorrect Shape of Point.

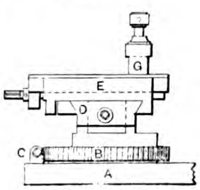


Fig. 4.—End View.

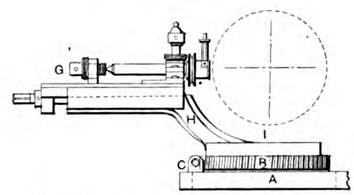


Fig. 5.—Another View of Slide Rest.

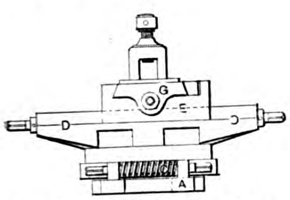


Fig. 3.—Front View of Slide Rest.

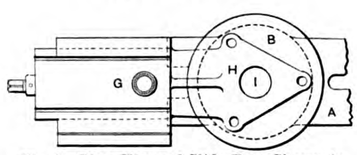


Fig. 6.—Plan View of Slide Rest Shown in Fig. 5.

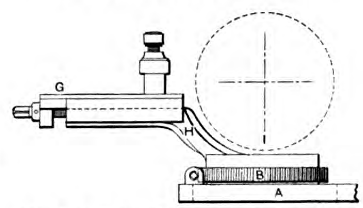


Fig 7 —Turning a Sphere in Hard Wood.

The Art of Wood Turning.

by the other on either of the sides, and after having roughly shaped a sphere in hard wood, similar to Figs. 7 and 8, by the regular turning tools, it can be engine turned without unchucking it. All the slides and guides are divided into fractions of an inch, the guides carrying spring index pointers, which render the slightest advance of the tool visible. Any workman acquainted with the construction of an ordinary slide rest will readily understand the construction of the one presented.

Perhaps, before proceeding further, it may be as well to describe what is generally termed by ornamental turners "an overhead lathe"—that is, a lathe having a shaft and pulleys hanging over the lathe, but in a line with the beams of the lathe, as shown in Fig. 9. It is not necessary that the upper shaft and pulleys should be a part of the lathe itself, as these may be hung from the ceiling of the workshop, or be swung on separate uprights, but it is essential that this upper work be in direct line and parallel to the two centers of the lathe.

The lathe shown in Fig. 9 is fully equipped for performing almost any kind of ornamental work, when the centers of revolution are fixed on one straight line, and disregarding secondary features, such as the large wheel outside the framing and all the arrangement of the top, parts of which will be dealt with later on. We find that the essential parts of a lathe—every lathe—are first the fly wheel A, with its axle and crank, B, set in motion by the treadle C, which by means of a belt, band or

hollow work, fancy work, or work out of the ordinary line, a number of chucks will be required, but they form, after all, only three or four groups; the ordinary ones have been well described and illustrated, and from these the workman may be able to form others that will answer for many special purposes, but when a large number of articles are to be turned in some special form or shape it is always best to make special chucks for the purpose, as they save time and insure uniformity. In addition to chucks for holding work, there must be chucks for holding tools, such as drill chucks, chuck and mandrel for small circular saw, &c. A small circular saw attachment to the lathe will be found very useful, both for cutting up stuff and for doing certain kinds of ornamentation. It should have a small table over it which could be raised or lowered as desired, allowing the saw to appear through it to a hight of one, two or more inches, as the case may be. On this table should be a gauge or guide made in such a manner that it can be set parallel with the saw, or at any angle to it. For cutting up hard wood, bone and ivory for turning the circular saw is invaluable, and the workman will find it extremely useful in cutting miters or any other nice work.

Thus far I have dealt with chucks intended for concentric work only, but it is frequently necessary to work out of the center; for insance, suppose a number of orifices have to be cut in a tray, disk, or any other piece of work at given distances around the center, it is obvious that the work must be made to revolve on a false center, in order to produce the work, or the orifices must be made by a tool revolving independently of the center of the disk or plate. The necessary arrangement for this work may be made by the eccentric chuck shown in Fig. 10, in which *a* is a socket for screwing to the mandrel; *b b*, the chuck formed in the same piece with the socket *a*; in front of the chuck is a dovetailed groove, formed by two pieces, *d d*, screwed to the chuck; in this groove is fitted a slide, *e e*, to which a center pin is fixed, and a circle, *f*, fitted to the center pin so as to turn round freely. A screw, *g*, projects in front of the circle for fixing chucks thereto. A screw, *k*, allows the slides to be gradually moved in the groove, but retains it firmly in the position in which it is placed. By means of this screw the center pin of the circle *f* can be made to coincide with the line of the mandrel, or it can be set with any degree of eccentricity from the mandrel, as

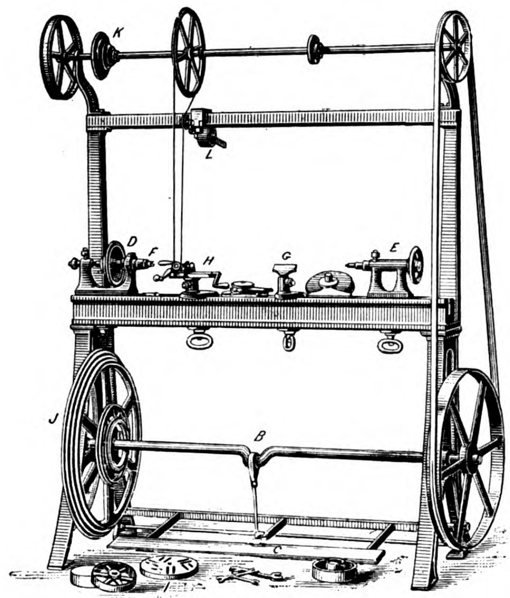


Fig. 9.—General View of an "Overhead Lathe."

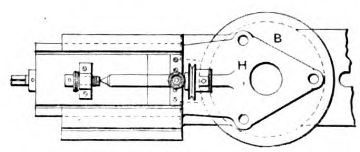


Fig. 8.—Plan View of Tool Shown in Fig. 7.

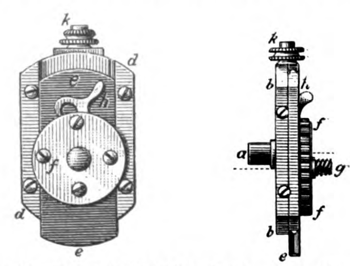


Fig. 10.—Face and End Views of Eccentric Chuck.

The Art of Wood Turning.

shown in the illustration by the difference of the lines shown at *a* and *g*. The circle is divided around the edge with equidistant notches or teeth; and a dog or catch, *h*, is fitted on the slides by a center screw, and has a lip which can be inserted into any of the teeth or notches at pleasure, so as to prevent the circle from turning round upon its own center pin. The work which is fixed to the screw *g* will evidently turn round with the mandrel. Now when this chuck is screwed to the mandrel by the internal screw at *a*, the screw *k* is turned until *g* is brought exactly into the line of the mandrel.

From this it is quite evident that if the slide of the eccentric chuck be drawn out 1 inch and the lathe set in motion, a tool presented to the work will strike a circle 1 inch out of the center of the work, the diameter of the work depending entirely on the position of the tool; then if the circular plate be turned, say half round, another circle will be struck also precisely 1 inch out of the center, but on the opposite side; and by turning the plate *f* a quarter, an eighth, or only a sixteenth of its circumference round each time, four, eight or sixteen circles will be struck all in a ring, 1 inch from the center. In short, by drawing out the slide a smaller or a greater distance, any circle or hole may be cut at that distance from the center of the work.

This is eccentric, but it is still circular work. Yet the lathe will produce oval or elliptical work as well, and this seemingly impossible feat is achieved by making use of an elliptical chuck, which will now be described.

Effect of the Increased Cost of Building.

Apropos of the great advance in price of about every kind of material entering into the construction of a building, the following views of one who has been associated with the erection of some of the towering office buildings in this city may prove interesting:

I figure the general increase in the cost of an average building to-day as about 40 per cent. The general public will understand better if it is put this way: A building that could have gone up last year for $200,000 would cost to-day $280,000. I was talking to the president of a large iron concern to-day, and he tells me that the price of iron is just double what it was a year ago. An advance of 120 per cent. is seen in fancy scroll work over the price 12 months ago. Those figures ought to explain the situation, but there are other things to be considered. A year ago I could go to the mills and order 1000 tons of beams, and they would deliver them to me whenever I wanted them. To-day they won't guarantee delivery.

Now, as to the question of the ultimate effect of this increased cost of building: If the conservative operator stops to think it seems to me the question answers itself. Building is certainly going to stop for the next year—of course, not absolutely—but it will not be in proportion to what other conditions would seem to justify. Rents have decreased for the last four years, and they are to-day fully 30 per cent. lower than they were. It is true that there has been a slight advance this season, owing to greater demand, but it will take a long time before they get back to the normal status, and they will have to get beyond that to make investment in building, at present prices, pay.

There are three ways in which things will equalize themselves. Material will eventually come down to a basis of safe calculation. I do not mean that building material is ever going to be as cheap as it has been in the past, but there will be a more uniform standard of price. Then rents will go up to a point where they will almost meet the increased cost of construction. Last, investors will have to be satisfied with a lower rate of interest. When things are equalized, then will come a building boom in large proportions. It will probably take two years, and it is certainly not on now. The figures of the building records are misleading, because they do not take into account the increased cost of materials; and while they give the number of buildings planned, they of course convey no idea of the projects that have been abandoned.

CORRESPONDENCE.

Polygons and a Six-Sided Tower.

From R. J. H., *Chicago, Ill.*—Replying to the inquiries of "A. S. W.," Shawnee, W. Va., in the December issue, I offer some comments which may be of interest. Referring to the sketches inclosed, Fig. 1 describes a short and easy method of laying out polygons. Scribe a circle; draw the diameter A B and divide it into as many equal parts as the polygon is to have sides—in this case six. From A to B with radius A B describe arcs meeting at C. Draw a line passing through the second division and cutting the circle in the point D. Draw D B, which will give one side of the polygon; then lay off E, F and G. Join these points, which completes the operation. Any polygon can be drawn by dividing the diameter into as many parts as the polygon has sides. Always draw the line C D through the second division, as shown.

In framing towers I have used the simple plan as represented in Fig. 2 of the sketches, where A B represents the hip rafter, C D the common rafter and E F the jack rafter. To obtain my lengths I lay off to some definite scale, in the present instance ¼ inch to the foot. By

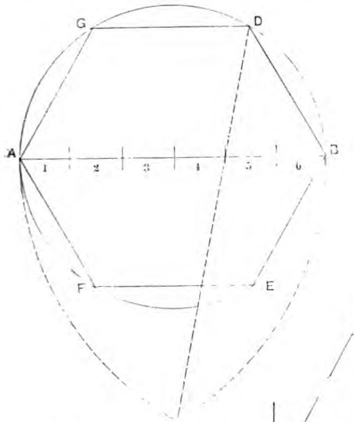


Fig. 1.—Method of Laying Out a Polygon.

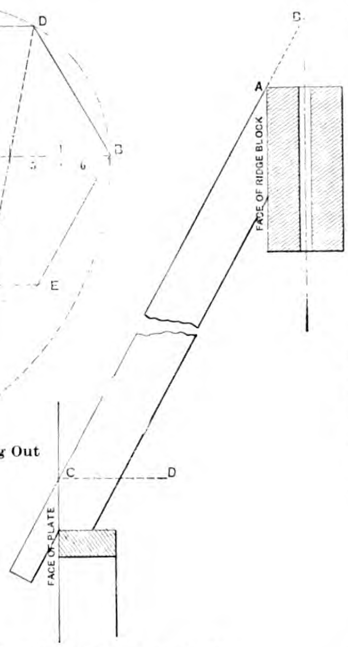


Fig. 3.—Method of Getting Length of Rafter when Ridge Bl ck is Involved

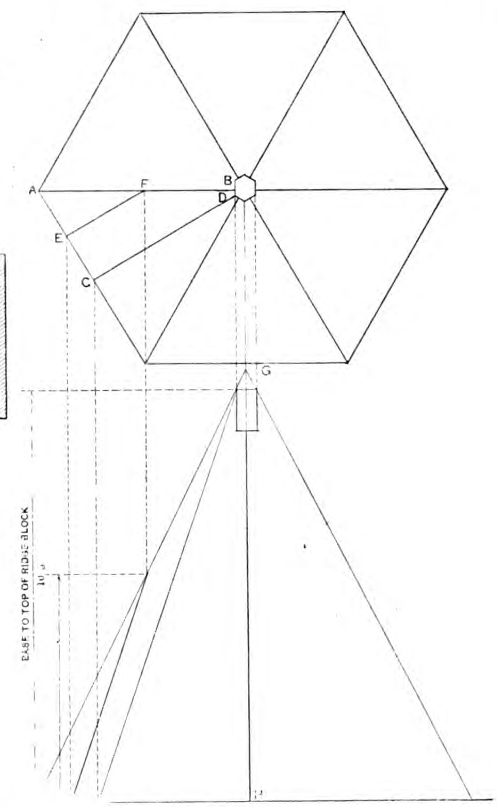


Fig. 2.—Diagram Showing Method of Framing a Six-Sided Tower.—Scale, ¼ Inch to the Foot.

Polygons and Framing a Six-Sided Tower.

base measure from A to B, the center of the polygon, is 5 feet, and the vertical is 10 feet 10 inches. I take the square and measure the hypotenuse 5 2-12 inches into 10 10-12 inches, which gives the length of the hip, 12 feet. The common rafter is 4 feet 6 inches on the line C D. The vertical is 10 feet 10 inches. Measure the hypotenuse, which gives a length of 11 feet 9 inches. Now the jack E F as laid off on the base is 2 feet 2 inches and its vertical is 5 feet 9 inches where it meets the hip. Measure the hypotenuse on the square the same as other rafters, which gives its length 5 feet 1½ inches. All these lengths are on the center of the rafter from face of plate to the highest point the pitch line would meet. The cuts of the different rafters are as shown on the square. The back cut of the rafter E F at F is easily obtained by setting the bevel square to the acute angle I G H. In Fig. 3 is shown the method of getting correct lengths where the ridge block is to be counted, also when the rafter projects over the plate. The hip and common rafters would cut off at A, so that the length from A to B would have to be subtracted from the lengths as given in connection with Fig. 2. If the rafter projects over the plate, strike the line for the face of the plate from the point C where the rafter would cut on the line, as represented by C D if it cut flush with the plate.

Hollow Walls and Brick Veneer.

From F. A. H., *Altoona, Pa.*—In answer to "C. H. M." of Perry, Okla., I beg to offer a few suggestions with regard to hollow walls and brick veneer. In hollow wall construction the outside and inside walls are often made of even thickness, although if any difference exists the outside wall should be the thicker. There should also be not less than a 2-inch air space in hollow walls. Dead air is all right for hollow walls, as it is not absolutely necessary to have them ventilated, although some do ventilate them. In building a hollow wall with a 4-inch outer wall and a 4-inch wall with a 2-inch air space a metal tie must be used. A Morse tie for hollow walls is found to give very good results, and these should be spaced every 24 inches and placed in every fourth course of brick. They should be dipped in hot asphalt before being put in place in order to keep them from rusting. In planning a brick veneered building there should be 6 inches allowed outside of the rough frame—1 inch for boarding, 1 inch for air space and 4 inches for veneer. The stone or brick foundation ought to project far enough beyond the veneer to well support it. Care must be taken to construct the frame in the best and most substantial manner, and the timber used in framing should be extra heavy, for it must be remembered that the brick veneer carries absolutely no part of the inside construction, and, in fact, has to be tied to the wood frame for support. After the framing is up it should be sheathed diagonally, and then covered with tarred felt. All the framing timber, particularly the sills, &c., should be as dry as possible. The frame should be perfectly plumb and straight, for if otherwise the brick veneer will not lay up properly. Brick can be tied to the sheathing most satisfactorily by the use of what is known as the Morse wire tie for veneer work. The ties should be placed on every other brick in every fifth course of brick work. The air space in veneered walls should have ventilation on account of the wood work. When the first story is brick veneer and the second story shingles it is necessary to fur out even with the brick when we come to the second story. This can then be shingled, as we usually do it with a small *cyma-recta* or crown mold, and a fascia springing the first few courses of shingles. If "C. H. M." wants further help in the matter he can secure it, such as it is, by making his wants known through the columns of the paper.

Finding the Number of Shingles Required for a Roof of Any Size.

From G. W. N., *Norristown, Pa.*—As I am a young chip and a reader of *Carpentry and Building*, I would like to see published in an early issue a rule that will enable me to ascertain the amount of shingles required for a roof of any dimensions.

Answer.—A very interesting reply to this inquiry will be found in the communication presented below, which came to hand about the same time our correspondent's letter was received.

From FREDERICK REISSMANN, *Foreman U. S. Military Academy, West Point, N. Y.*—The other day a young carpenter requested me to tell him how many shingles were required to the square foot, if laid 4 inches, 4½ inches or 5 inches to the weather. I explained to him the method, with which he seemed to be greatly pleased, stating at the same time that several carpenters with whom he had been working had informed him that 1000 shingles were required for every 100 square feet of roof surface, or 10 shingles to the square foot. Thinking that perhaps a number of the younger readers of *Carpentry and Building* may be interested in the same subject, I will endeavor to explain the method of obtaining the exact number of shingles required for any size roof.

Shingles are commonly laid 4, 4½ and 5 inches to the weather, so if a 4-inch shingle be laid 4 inches to the weather, 4 x 4 or 16 square inches will be exposed; if laid 4½ inches to the weather, 4 x 4½ or 18 square inches will be exposed, and if laid 5 inches 4 x 5 or 20 square inches will be exposed. Perhaps some of the readers may claim that this is wrong, as shingles are of different widths, and in a number of cases are wider than 4 inches. In order to explain this I will state that a bundle of shingles if taken apart and the shingles laid closely together lengthwise, irrespective of width, will cover exactly 1000 lineal inches. Dividing this number by 4 will give 250 shingles each 4 inches wide, the contents of one bundle. Wishing to know how many shingles are required to a square foot of surface, we simply multiply 12 x 12 inches, which is equivalent to 144 inches. If the shingles are to be laid 4 inches to the weather we divide 144 by 16, which equals 9 shingles to the square foot, or 900 shingles to every 100 square feet. If the shingles are to be exposed 4½ inches to the weather, we divide 144 by 18, which equals 8 shingles to the square foot, or 800 shingles to every 100 square feet of roof surface. If the shingles are to be laid 5 inches to the weather, we divide 144 by 20, which equals 7 2-5 shingles to the square foot, or 725 shingles to every 100 square feet of roof surface.

To illustrate this more clearly, we will suppose that a roof is 120 feet, and the full length of the rafters, or width of roof, is 27 feet. Now multiplying 120 by 27 will give the number of square feet for one side of the roof, but for shingling both sides it is necessary to obtain double the amount. We therefore multiply the length of roof by twice the length of rafters—namely, 120 by 54, which is equivalent to 6480 square feet of roof surface to be covered with shingles. Now if the shingles are to be exposed 4 inches to the weather, we multiply 6480 by 9, which equals 58,320 shingles. If the shingles are to be exposed 4½ inches to the weather, we multiply 6480 by 8, which equals 51,840 shingles, while if the shingles are to be laid 5 inches to the weather, we multiply 6480 by 7 2-5, which gives 47,925 shingles.

An extra allowance of shingles in addition to the above amounts will have to be made for the bottom row, which is always doubled. This is very easily obtained by simply dividing twice the length of the roof by the width of one shingle, 4 inches, or one-third of a foot, which would be equivalent to 720 additional shingles. This added to any one of the three amounts given above, makes the actual number of shingles required. No doubt some carpenter will say that I have made no allowance for the projection of shingles on the eaves and gable ends, but this is fully covered by the last upper row of shingles, which generally runs within 10 inches of the ridge board, and is covered by the roof saddle.

When using first-class shingles there is of course little waste, and one or two extra bunches in addition to the above estimate will be sufficient to make up for the waste. If, however, an inferior grade of shingles is used, it is always better to add from four to five per cent. in order to make up for waste and poor shingles. I have also noted that a good many carpenters are in the habit of laying shingles close together, which I believe is wrong, except where the shingles are green, and will shrink, but in most cases the shingles are pretty well seasoned when bought and as a rule when laid close together I observe that after the first heavy rain the shingles commence to swell, and, as there is no room for them to spread, the result is they climb up in the center and withdraw and loosen the nails or else pull away altogether from the nails, thereby causing a leaky roof. In my opinion all shingles which are seasoned should be laid ¼ or ⅜ inch apart in order to insure a good job. Another good idea, according to my judment, is to give every new roof a coat of roof paint (Prince Metallic), which is very cheap, and lengthens the life of a shingle roof several years.

Give the Young Men a Chance.

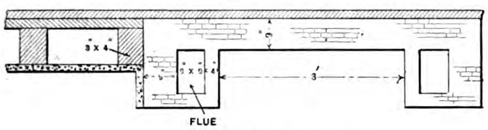
From C. W. B., *Reading, Pa.*—I shall be glad to have the editor publish the following in the next number of the paper so that it may reach the eyes of those boss carpenters who do not give their young and ambitious men a chance to advance themselves in the way of handling drawings. They say they have no one whom they can send out to take charge of work. Now I think it is all their own fault, as there are not nine out of ten boss carpenters in the business but have in their employ several young men who would like to advance themselves in this way if they were only given the opportunity. I think they should take their young men, one after the other, and give them a drawing—not too complicated to start with—and keep them at it until they had mastered it, helping them whenever they need help, and in a short time there will be plenty of men who can be sent anywhere and take charge of work. The lack of this is something I see every day, and I would like myself to take charge of a job once, just to get a more practical knowledge of taking off measurements from a blue print. If the boss carpenters would only do this I am sure we would not have so many inferior mechanics as we have to-day. It is a matter which I do not consider out of place in the Correspondence department, and I hope that others who are interested will take up the subject and express their views for the good of all.

Suspension Bridge of Fifty Feet Span.

From F. R., *Coalville, Utah.*—I have been a reader of *Carpentry and Building* for a year and cannot estimate its value. I write to ask of some of the readers of the paper as to the proper size of timbers to use in a suspension bridge of 50 feet span and a width of 16 feet, to be constructed on a county road. I refer especially to the stringers, top braces and sub-braces; also diameter of the iron rods necessary to employ. I hope to get the ideas of some of those who have had more experience in this line of work than myself.

Framing for an Open Fire Place.

From C. T. B., *Philadelphia, Pa.*—Will some of the readers please inform me how they would construct an open fire place in a frame house? I send a sketch indi-



Framing for an Open Fire Place.

cating my idea of the general arrangement, and would like to know if it is the right way to do the work.

Note.—This question affords an excellent opportunity for our readers to express their views, and we submit it to them for discussion.

Gas and Gasoline Engines for Wood Working Shop.

From J. S. M., *Beaver Falls, Pa.*—Noting the inquiry in a recent issue from a correspondent regarding experience with gas, gasoline or kerosene engines for light work, we beg to say that we have been running our mill, having ten machines, for 18 months, with a Champion 16 horse-power engine, made in this place. Our gas bills average about $4 per month, varying with the amount of work. Water costs us $5 per year. Our insurance rate was 8 per cent. with steam engine, but it is now 3 per cent. During 18 months' operation we have put in one new tube to replace one burned out, costing $2; otherwise we have not expended one cent for repairs. We consider it the safest, best and cheapest power for a small mill, and would state that it has more than fulfilled our expectations in every respect.

From H. W. H., *Unionville, Conn.*—In the December number of the paper I noticed an inquiry from "E. S.," Ithaca, N. Y., about power for small shop. In reply I would say that I have used a Fairbanks-Morse gasoline engine for a number of years and think it is about perfection. In size it is a 5 horse-power, and I have often started it in half a minute, when it is then ready to work. I consider it perfectly safe, as I use an electric igniter, and there is no open flame, all combustion being inside of the cylinder. There are no ashes and no smoke; the engine is perfectly regulated and, in my opinion, it is the cheapest power, as you only pay for just what you use.

The India Oil Stone.

From G. J. S., *Millersburg, Iowa.*—I have been taking *Carpentry and Building* for a number of years, and am well pleased with it. I have been much interested in the articles entitled "Requisites of An Oil Stone," which have appeared in the Correspondence columns, and with the Editor's permission I would like to make a few remarks in behalf of India oil stones. About four months ago I purchased of William P. Walters' Sons, Philadelphia, Pa., three of the corundum, or so-called "India" oil stones, of the following kinds: Fine, medium and coarse, of the size of 1 x 2 x 8. For general work I use the medium stone, but if the tool is very dull or nicked I use the coarse stone and finish on the medium one. Or if I want a very keen edge I finish on the fine stone. For general purposes, however, the medium stone is all right. After bringing the tool to an edge I give it a few strokes lengthwise of the grain on a soft pine board. According to my experience with the India oil stone, it should be kept in a moistened condition. I have mine mounted in a wood case, padded with felt to hold the moisture. I use plenty of kerosene, and keep the stone clean. I would further say that I have been using oil stones for 15 years, including most of those mentioned by "H. T. F." of Ontario in the October number of the paper. I would rather use the India stone, however, as I can put a tool in working condition very much quicker than with any other oil stone.

I think that the article in the November issue, entitled "How to Select and Use Oil Stones," is very good, and worthy of close study.

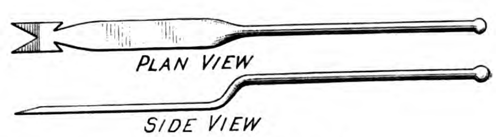
Durability of Wire Nails.

From S. F. B., *Wellington, Ohio.*—As showing the effect of the weather upon wire nails I send a few samples with pieces of the shingles through which they were driven. The shingles were laid four years ago on a shed, and now they are nearly all off, every strong wind sending them flying. One roof which was put on a blacksmith's shop three years ago has just been renailed all over. The wire nails in my estimation are no good on earth, the steel cut nails are not must better, but the good old iron nails are better than either.

Note.—The samples forwarded by our correspondent consist of a few small pieces of shingles in which appear what remains of the nails used in fastening them to the roof. The remnants of the nails are deeply rusted and measure from ¼ to ⅝ of an inch in length. Their appearance would seem to bear out the impression that they were of short life.

Repairing Leaky Roofs.

From S. A. W., *Havelock, Neb.*—I am a reader of *Carpentry and Building*, and take interest in the Correspondence department. I notice a good many questions with regard to repairing leaky roofs, and I send inclosed sketches of a shingle hook which I had made for the purpose of repairing old roofs. I took an old buggy spring



Repairing Leaky Roofs.

1¼ inches wide and 3-16 inch thick, and cut notches in it to fit a three-penny nail. I welded on ½-inch round iron for the handle, which gave a tool with which one can patch twice as fast as without it. The sketches which I send show plan and side views.

Drawings for a Coal Shed.

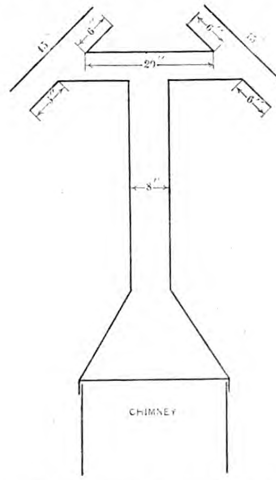
From W. E. M., *Champaign, Ill.*—Will some of the readers of the Correspondence Department furnish for publication a plan and elevation of a coal shed, dump and screen? Details regarding size of timber, method of framing, &c., will be welcome. Many years ago I saw such sheds along the line of the New York, Lake Erie & Western Railroad, and am now desirous of securing drawings of such structures.

Design Wanted for Stone and Frame Barn.

From D. S., *Belmont, Manitoba.*—I am interested in barn construction and would like to see published plans for a structure 44 x 64 feet in size with eight feet of the first story of stone. The barns usually built around here have stone for the first story, which is used for stabling horses and cattle, and on top of this is the frame construction. In the barn in question there should be one row of stalls for horses and two rows for cattle, the horses to be separated from the cattle by a partition. I would like very much to have an expression of opinion as to the easiest way of laying out the stalls for the cattle and horses and the most convenient way for tying the cattle—that is, what method is considered the best for the purpose. I have no doubt that many readers of the paper have had experience in this direction, and what they might be able to furnish would be interesting not alone to myself, but to a host of others. The subject is one which might be discussed with profit and I hope that many opinions will be published.

Trouble with a Smoky Chimney.

From C. H. R., *La Grange, Ill.*—I submit herewith a sketch of a galvanized iron chimney top, which I would commend to the attention of "W. B. B.," Ansonia, who



Trouble With a Smoky Chimney.

asked a short time ago for a remedy for his smoky chimney. I have had perfect success with this top and heartily indorse it, as the wind does not affect it.

Filing a Rip Saw.

From F. R., *Coalville, Utah.*—In a recent issue "E. H. A.," Pulaski, N. Y., asked for the proper way to file a rip saw. I suppose he means a hand saw. This subject has been discussed to my satisfaction before, but for his benefit I will just explain how I file a rip saw. In the first place after setting I note if all the teeth have a good face. If not, I go over them, filing the front of the teeth and filing from both sides, giving the same number of strokes to each tooth. I find this a great help in keeping the teeth all the same size. Then I finish by filing the back of the teeth, filing as square across the saw as possible. In my judgment it is immaterial at which end one commences to file. I always keep my saws rather full in the middle, not allowing them to get hollow through the use of some teeth more than others. I file a saw as if every tooth had to be used. I find this method of filing gives good results with Oregon and such native lumber as we have in this State. I will also say that when I retouch a saw when it has plenty of set I file on the back of the tooth.

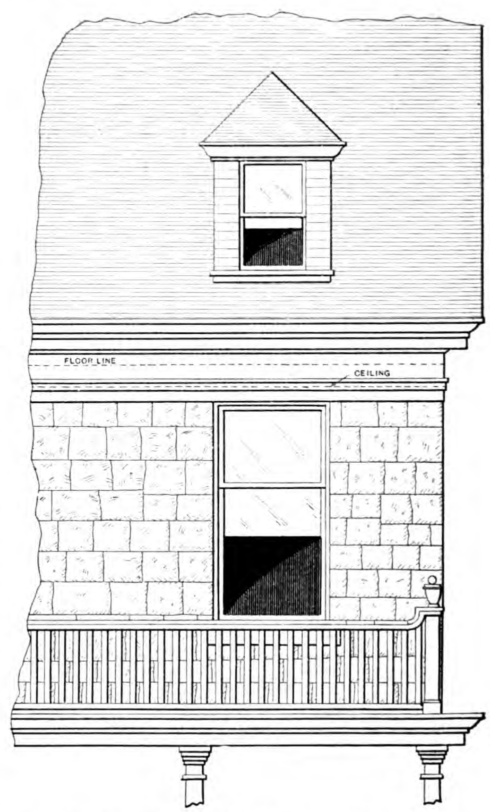
From J. P. C., *Jefferson, Col.*—I would suggest to "E. H. A.," Pulaski, N. Y., whose inquiry appears in the December issue of the paper, that he use a 28-inch rip saw. Joint it with an old file, then put it in clamp, with the point to his left hand, if he is a right handed man, and starting at the point file each tooth until it comes to a point, and all from one side. Give the teeth "hook" enough so that if a try square were applied the front of the teeth will be at right angles with the saw. For an eight-tooth saw use a 5-inch slim taper file. Hold the file square across the saw and level. A saw filed in this way will cut from $1\frac{3}{4}$ to $2\frac{1}{4}$ inches at each stroke in $\frac{7}{8}$-inch lumber. Never attempt to saw through a knot with a saw filed this way, as it feeds too fast, but use a cross cut saw. I have yet to find a saw that beats mine in cutting.

Paint for Galvanized Iron or Zinc.

From SEYON, *Portsmouth, Va.*—In answer to "J. A. N.," New Hampshire, who inquires in the May issue, I would say that paint does not adhere well to new galvanized iron or zinc, but after four to six years' exposure it will readily take paint. For making paint adhere to new galvanized iron, Trautwine gives the following: Take 1 part chloride of copper, 1 part nitrate of copper and 1 part of sal ammoniac. Dissolve in 64 parts of water; then add 1 part of commercial hydrochloric acid. Brush the zinc with this solution, which dries within 24 hours. The zinc turns black and may then be painted. Repainting every three or four years is sufficient afterward.

Sectional Drawing Wanted of a Box Head Window.

From ZIPP, *Baltimore, Md.*—I would like to know if some one will do me the favor to furnish for publication a drawing of a section (perpendicular) through a box head window, where both sash are to slide up into the boxing. I send a sketch showing the story in which the



Sectional Drawing Wanted of a Box Head Window.

window is located, together with a portion of the roof and cornice immediately above. The roof is of a pitch of 45 degrees, the sill of the window is 14 inches from the floor, and from the floor to the ceiling is 9 feet. The cornice projection is 1 foot 10 inches, the joist are 2 x 10 inches, the plastering 1 inch, and the flooring 1 inch. The top sash is 2 feet and the lower sash 4 feet.

Small Wood Working Shop.

Last month we presented in this department a very interesting account of a small wood working shop con-

RESIDENCE OF MR. A. G. BOFINGER, IN McGREGOR PARK, MT. AUBURN, CINCINNATI, OHIO.

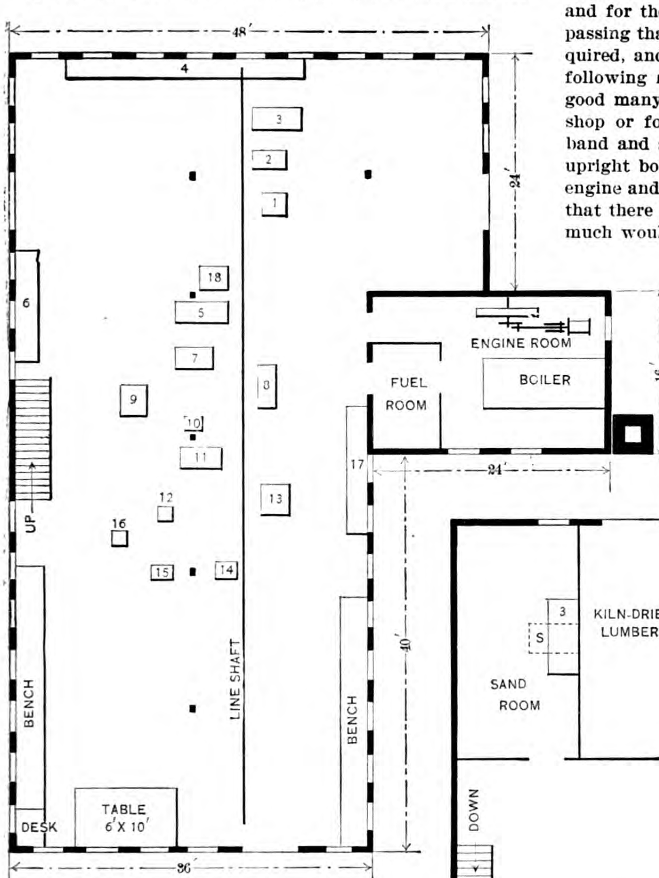
W. E. NICKELS, ARCHITECT. BOFINGER & HOPKINS, BUILDERS.

SUPPLEMENT CARPENTRY AND BUILDING, JANUARY, 190[illegible].

STAIRWAY IN RESIDENCE OF MR. A. G. BOFINGER, IN McGREGOR PARK, MT. AUBURN, CINCINNATI, OHIO.

W. E. NICKELS Architect. BOFINGER & HOPKINS, Builders.

tributed by "F. B. E.," Bennington, Vt., the matter being illustrated by means of plans and elevations. In making the engravings from the sketches furnished by our correspondent the names of the machines with which the shop was equipped and referred to by numbers on the floor plans were inadvertently omitted. In order, therefore, that the description may be complete the floor plans are repeated in this issue and the names of the machines given, so that our readers may fully understand the

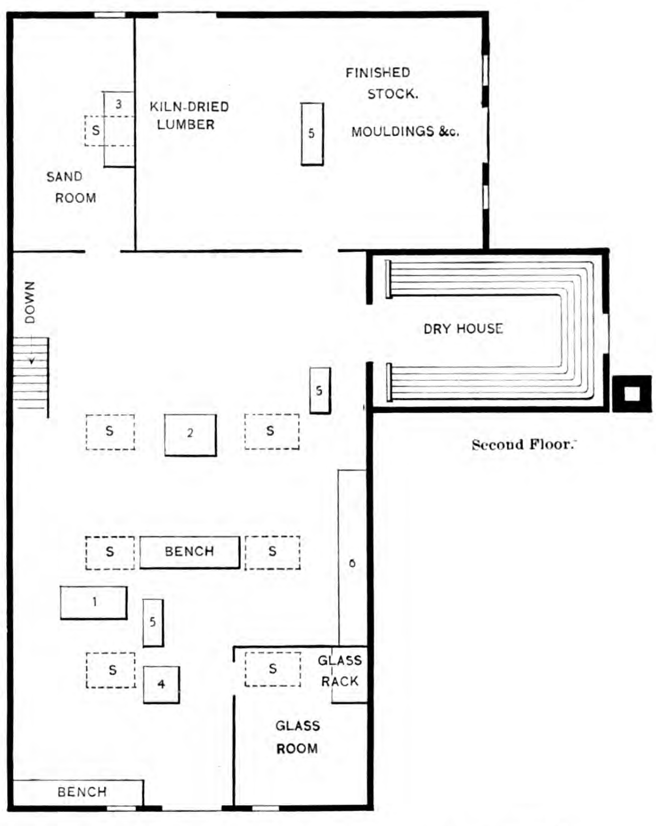


Main Floor.

proper disposition of the machinery as intended by "F. B. E."

Referring to the first-floor plan the diagram marked 1 represents an endless bed surface planer; 2, a large rip saw; 3, an inside molder and matcher; 4, a Daniel's planer; 5, a buzz or Harris planer; 6, a turning lathe; 7, an iron frame saw; 8, a saw and dado; 9, a tenoning machine; 10, a mortising machine; 11, a sticker; 12, a boring machine (upright); 13, an irregular machine or shaper; 14, a band saw; 15, a grindstone; 16, an emery wheel; 17, a swing saw, and 18, a panel planer.

Referring to the plan of the second floor the diagram marked 1 represents a clamp for doors and sash; 2, a jig saw; 3, sandpaper wheel; 4, a miter saw; 5, five trap doors, through which to pass lumber and material, and 6, a press to glue veneers on door stiles and rails, &c.



Second Floor.

Small Wood Working Shop.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

Our correspondent states that the first-floor joist are 3 x 10 inches, and the second-floor joist 3 x 8 inches, dressed, and that the first story has a 1¼-inch lining and a 2-inch planed and matched spruce floor, while the second story has ⅞-inch lining, laid diagonally, and 1¼-inch planed and matched floor on top, laid straight. He suggests for use in the construction of the shop, trusses similar to the one contributed by "R. M. B." of Alliance, Ohio, in the July issue of *Carpentry and Building* for last year.

From C. H., *Bowmanville, Ontario.*—I have to thank "F. B. E.," Bennington, Vt., for the interest he has taken in answering the several correspondents inquiring for small wood working shops, myself among the number, and for the plans in the December issue. I may say in passing that the plan of shop is somewhat larger than required, and if he will give a plan of one containing the following machines, I think it will meet the wants of a good many, either for a small planing mill and jobbing shop or for a builder: Planer, sticker, swing, circular, band and scroll saws, jointer, shaper, mortiser, tenoner, upright borer, lathe and emery wheel, a 10 horse-power engine and boiler; also a small dry kiln. I would suggest that there be not much store room for stock, &c., as not much would be carried.

Process of Silvering Mirrors.

From J. A. L., *Nassau, N. P.*—Please give, through the columns of the paper, a process of silvering mirrors, and oblige an old subscriber.

Answer.—There are various formulas for silvering glass to be found in the "Cyclopedia of Receipts," and as being of interest we give the following: The first thing is to prepare a reducing solution, which may be done by dissolving in 12 ounces of water 12 grains of Rochelle salts, and then bring to the boiling point. While boiling, add 16 grains of nitrate of silver dissolved in 1 ounce of water, and continue boiling for ten minutes more, after which add enough water to make 12 ounces. The next step is to prepare the silvering solution, which may be done by dissolving 1 ounce of nitrate of silver in 10 ounces of water, after which add liquid ammonia until a brown precipitate is nearly, but not quite all, dissolved. Then add 1 ounce of alcohol and sufficient water to make 12 ounces. It may be remarked in passing that distilled water should be used for making the solutions.

In order to silver, take equal parts of the reducing solution and the silvering solution, mix thoroughly and lay the glass face down on the top of the mixture while wet, and after it has been carefully cleaned with soda and well rinsed with clean water.

About 2 drams of each solution will silver a plate 2 inches square. The dish in which the silvering is done should be only a little larger than the plate. The solution should stand and settle for two or three days before being used, and will keep for a long time.

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 cleaned, 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.

The Oil Stone Question.

From M. H. K., *Mena, Ark.*—I have read with interest all the correspondence regarding oil stones since my answer to "Oil Stone" appeared in the June number of *Carpentry and Building*, in which the editor or typesetter made me say "Turkey red" for Turkey stone. As I never saw anything but Turkey white, I surely did not intend to say Turkey red. However that may be, I have gained much information from the correspondence, and now own a full set of seven of the India oil stones, and am going to give them a trial by having my crew of carpenters take a vote on their merits, as compared with the well-known Arkansas and Washita stone found in this State. As the Yankees are a smart lot, however, and have made and sold wooden nutmegs and bass-wood candles, they may be up to their old tricks again in making oil stones to compete with Arkansas rocks, therefore we are a litle slow in accepting them as superior to those picked up on our hills, or even streets, and on which a carpenter may spend $15 to $30 worth of time in polishing and shaping, so he may say that he has a genuine Arkansas stone.

I have seen oil stones 8 inches wide by 15 inches long and 2½ inches thick in carpenters' tool chests here, with one side polished off and faced up for use, which were said to have once been paving stones on the streets of Hot Springs, and better oil stones would be hard to find. Now, if those people of wooden nutmeg fame can give us something better, we will frankly acknowledge it through the columns of *Carpentry and Building*, in due time, and after a fair and honest trial. We are, however, a little "leary" of those Northerners, and have good reason to be, for only last winter a Dutchman from Ohio sold one of our carpenters a receipt for framing roofs and charged him $5. When he got his family connections and kinsfolk together to witness his skill, and see all the secret arts, parts and points of the hidden mysteries of Jackcrafterism exposed, they were greatly disgusted on finding the "thing" wouldn't work even on one of those little houses usually found in the back yards, on which they made their first experiment. This goes to show that box-house carpenters never saw or read *Carpentry and Building*, or they would have made better use of their $5, and had something that would work. I succeeded in getting two new subscribers for *Carpentry and Building* about that time, but not from box-house men. They were mechanics who knew a good thing at first sight.

I think I can explain why *Carpentry and Building* is not better known and patronized. It is this way: A carpenter who has an interest in his trade and self-improvement spends a part of his wages each year for that purpose, staying at home nights to study, and as he has to compete with saloon bummers by day to earn a living, he does not feel like posting these "sports" or showing them his books or papers, or making it known that he has anything to help him out in his work. On the contrary, he usually keeps such valuable information out of sight, and this he must do, or he may have his books stolen. It is my experience as a reader of *Carpentry and Building* since 1881, sometimes by subscription and sometimes by purchase at news stands, that more than half my volumes have been stolen from me after I had them bound. A little of the money and time squandered in cigarettes and sporting purposes would make good mechanics of many of our botch workmen. With over 25 years' experience in this trade, three-quarters of which I have been employed as a foreman, I can testify as to the value and preference of men who keep posted and abreast of the times through the trade journals and books treating on the subjects in which they are interested. Young or old mechanics who spend their time and money sporting and smoking their brains out with cigarettes obtain very poor recommendations for advancement, and are not to be intrusted with important work. I have also discovered that the more a mechanic knows, the more he desires to read, the better he can understand what he does read, and the more interest he takes in his work and trade.

From H. T. F., *Toronto.*—With regard to the oil stone question, it may be well to say just here that no oil stone will do its duty satisfactorily if it is not kept clean and receives its proper portion of care and attention. There is generally too much carelessness among workmen in these days about their tools. Rusty steel squares, briar root handles and oil stones without cases seem to be the rule nowadays. Why, even in the copy of *Carpentry and Building* before me as I write one correspondent hailing from Ohio claims to have found a substitute for the grindstone in the file, an old file, I presume, which he says will sharpen a chisel or a gouge better than a grindstone. After that what is the use of an oil-stone, Washita, Turkey or any other? I should like to know of what kind of steel our Ohio friend's tools are made, if an ordinary file will "cut" them, and whether or not the tools so sharpened are used for cheese paring or for working maple, oak or hickory. Sharpening tools with a file is not new by any means, but the workman who resorts to the practice—well, perhaps he is not a workman, he may be a boss.

COL. JOHN JACOB ASTOR is to erect a ten-story fire proof apartment house in the very center of the millionaire district of New York City. The building, which is to be on a splendid scale and to cost about $1,000,000, will be erected at Fifth avenue and Fifty-fifth street. Architects have been invited to send plans in competition.

MAKING WOOD PATTERNS.—IX.

BY CHARLES J. WOODSEND.

IT should have been previously mentioned that in making the core box, after the dowels were driven in, the two pieces should have been trimmed to the exact length necessary before the circles were struck upon the ends, then taken apart and the operation continued as already described.

The hollows may be worked out with a gouge to the template shown in Fig. 62, the box may also be worked out with a core box plane. This plane is a rabbet plane ⅛ inch, but ⅝ inch is plenty large enough for the face of the plane, while both sides should be perfectly true and the faces square with the sides. On one side of the plane fit and screw on a piece of hard wood, Fig. 63. The face of this and the face of the plane should be exactly true with each other. An end view of the plane and piece, looking from the back and toward the front, is shown in Fig. 64. In using this plane the core box is roughly cut out with a gouge, then from the face of each piece they are worked along the gauge marks and downward about

Fig. 62.—Template for the Hollows.

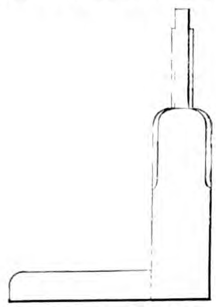


Fig. 63.—Piece of Wood for Use in Connection with Core Box Plane.

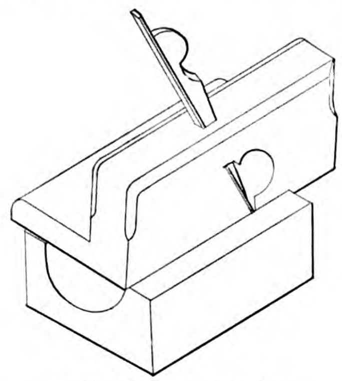


Fig. 64.—General View of Plane.

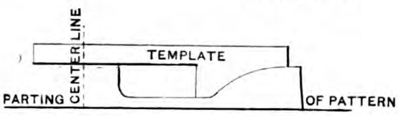


Fig. 65.—Template for Use in Same Manner as the one Shown in Fig. 56.

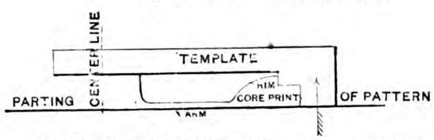


Fig. 66.—Template for Use in Same Manner as that Shown in Fig. 57.

Making Wood Patterns.

1-16 inch—anything sufficient to form a guide for the plane—with the gouge as exactly as possible. Fig. 64 is an isometrical view of the plane as it would appear in use. Work one side for a short distance, then turn the box end for end and then work the other side and so each side alternately, exercising great care, when it will be found that the plane will work an exact semicircle. Care must be taken that the plane bit is just even with the outside of the plane, but on no account project beyond; this applies to the side and not to the face of the plane. For working core boxes up to a certain size this plane is one of the handiest of tools.

The straight part of the core box being worked, the taper part to suit the core print will be the next in order. The joint of the two pieces is shown in Fig. 61. After the pieces are taken to the required size, mark a center line upon each piece. Place the two pieces together, the center lines coinciding, and strike the circles necessary to make the required taper. Work down neatly with a gouge, then nail one of the pieces upon each of the pieces of the straight box. Sandpaper down neatly, shellac the ends as well as the bore with black shellac, giving two or three coats, and finally rub down with hair cloth as for the orange shellac.

It is usual after the pattern and core box are finished to place the pattern together and apply the calipers from outside of the core prints, in order to see if the length of the core box is correct. It is well, in fact, to go over the entire pattern, testing every part for which measurements are given and thus avoid any possibility of errors. It may be as well to mention also that the outside of the core boxes other than the two ends may have as little work put upon them as possible, they being mostly left rough from the saw, the corners being worked off with the jack plane.

Upon page 285 of the November number of *Carpentry and Building* for 1899 the remark was made that to the experienced pattern maker there were two methods of making this pattern in order to arrive at the same conclusion. We have gone through one of the methods, and now will take up the other with its combination. Referring to Fig. 50, page 285 of the November issue of the paper, it will be noticed that a dotted line is indicated upon the outer edge of the diagram. This line is further shown in Fig. 53, and is to form a core print, it being intended this time to core the hollow in which the rope is to run instead of making it in the green sand.

At this point it may not be amiss to explain the meaning and proper use of the words "green sand," which is the sand as it is used in ordinary molding. In speaking of a core, using that word alone, it is understood by the trade to mean that it will be a baked or dry sand core, but if the words "green sand" are added to the word "core," then it is understood that the pattern will form the core and be molded with it. Thus in connection with the pattern at present under consideration the core forming the hollow in which the rope is to run is made at the same time and with the same sand as that used for molding the balance of the pattern, and is done by the use of a three-part flask. Now it is proposed to use a two-part flask and core out this hollow, using a dry sand core for the purpose.

The method of making the pattern will be exactly the same as the other one, all the operations up to and inclusive of the use and application of the template for the hub, Fig. 55, page 321 of the December number of the paper. For the template, Fig. 56, use template, Fig. 65, and for the template shown in Fig. 57 use the template shown in Fig. 66, giving draft in the direction of the arrow shown. The balance of the work will be exactly the same as for the other already explained, with this exception. In shellacking the pattern black the core print which projects from the rim of the pattern. If preferred, the outer edge only may be black, leaving the balance the same color as the pattern. For making this core we will depart somewhat from the beaten track and make use of a combination core board and strike, the details of which will form the subject of the next chapter.

Granite and Foundation Stones.

The ancient Egyptians watched the effect of atmospheric and other influences on stones, and wisely profited by the lessons taught them by experience. They learned that earth, abounding with niter, from its attracting moisture, had the effect of decomposing granite, but that in the dry climate of upper Egypt the stone remained for ages uninjured when raised above all contact with the ground. When, therefore, there was a possibility of its being exposed to damp, they based an obelisk or other granite monument on limestone substructions, and these last are found at the present day perfectly preserved, while the granite above them gives signs of decay in proportion to its contact with the earth subsequently accumulated around it, says *The Stonemason*. This refers to Upper Egypt, visited only four or five times in a year by a shower of rain, for in the Delta granite remains have been affected in a far greater degree than in the Thebaid; niter abounds there, and it is remarkable that the obelisks at Alexandria have suffered the least on the sides next the sea. The Egyptians seldom used granite as a building stone, except for a small sanctuary in some sandstone temple; and in the later times of the Ptolemies one or two temples were built entirely of granite. But in the true Egyptian period the use of that stone was chiefly confined to the external and internal casings of walls, to obelisks, doorways, monolithic shrines, sarcophagi, statues, small columns and monuments of limited size, and was sometimes employed for roofing a chamber in a tomb.

The durability of granite varies according to its quality. The felspar is the first of its competent parts which decomposes, and its greater or less aptitude for decay depends on the nature of the base of which the felspar consists. Egypt produces a great variety of granite, and the primitive ranges in the desert to the east of the Nile, about 35 miles from the Red Sea, supplied the Romans with numerous unknown kinds, as well as with porphyry, which they quarried extensively in that district; but the granite of the ancient Egyptians came from the quarries of Syene, in the valley of the Nile, and from these they obtained what was used for their monuments. It is from this locality that the name " Syenite " has been applied to a certain kind of granite; it is, however, far from being all of the same nature, and a small portion only of the stone found there is really what we now call " Syenite."

At the early period of the third and fourth dynasties, between 12 and 13 centuries before the Christian era, the Egyptians extensively employed granite for various purposes. They had learned to cut it with such skill that the joints of the blocks were fitted with the utmost precision; deep grooves were formed in the hard stone with evident facility, and it must have been known to them for a long period before the erection of the oldest monuments that remain, the Pyramids of Memphis, where granite was introduced in a manner which could only result from long experience. In the time of the first Osirtasen, about 2050 years before the Christian era, granite obelisks were erected at Heliopolis and in the Fyoom, and other granite monuments were raised in the same reign at Thebes, from which we find that even then the Egyptians had learned how the damp earth acted on granite, when buried beneath it; and this interesting question suggests itself—How long before that time must the stone have been used to enable them to obtain from experience that important hint which led them to place granite on limestone foundations ?

ONE method of protecting walls against moisture is to make use of the following composition: Heat five parts of turpentine and stir in ten parts of pulverized common glue and one part of finely sifted sawdust. Cleanse the wall and heat it by means of a soldering lamp or other flame, and apply the rosin composition, which can be run into every crack and joint by keeping the wall warm. Smooth by use of a hot iron. An addition of boneblack to the composition will give a dark color, or if the wall is to be painted, a light color can be had by using light colored rosin and woody fiber. This composition is also good for wood buried in the ground or exposed to moisture.

Discoloration of Brick Work.

A frequent source of trouble in connection with brick walls is the appearance upon the surface of whitish discolorations which seriously detract from the value of the effects sought. It is argued by some writers that the exudations are owing to unfused sulphates of magnesia contained in the clay of which the bricks have been made. From a series of experiments made by a German investigator, Hans Gunther, he concludes that efflorescence on brick may come from three causes, the first being matter contained in the clay; second, matter introduced by means of water used in the process of manufacture, and third, that it is formed during burning by the residue, or ashes, of the coal, from the pyrites (iron sulphide) in the coal, or pyrites in the clay.

Outside any of these causes, efflorescence may result from the mortar, by infiltration of soluble matter in the brick, or by chemical reaction of the alkalies of the mortar with the gypsum of the brick. The soluble salts introduced in the clay by water for tempering, or by the water with which mortar is mixed, are not taken into consideration.

As most brick clays themselves contain more or less soluble salts, particularly sulphates, these often show themselves on the surface of the bricks in drying, especially if the drying takes place very slowly, still more so in the kiln during the process of water smoking, if this is not performed properly and the moisture that is driven out of the bricks in one part of the kiln is allowed to come into contact with the cold green bricks in another part of the kiln. This moisture settles upon the bricks and soaks into them, to be driven out again as these bricks, in their turn, become heated. In this way there is a leaching out of the soluble salts, and the bricks become discolored. They are also, sometimes, checked on the surface.

For the prevention of efflorescence Gunther is not able to recommend any better remedy than that which is already in practical use: The addition to the clay of a small and suitable quantity of carbonate, or chloride of baryta, or both, for the purpose of converting the soluble salts, such as sulphate of lime, into the insoluble sulphate of baryta.

Belgian Artificial Stone.

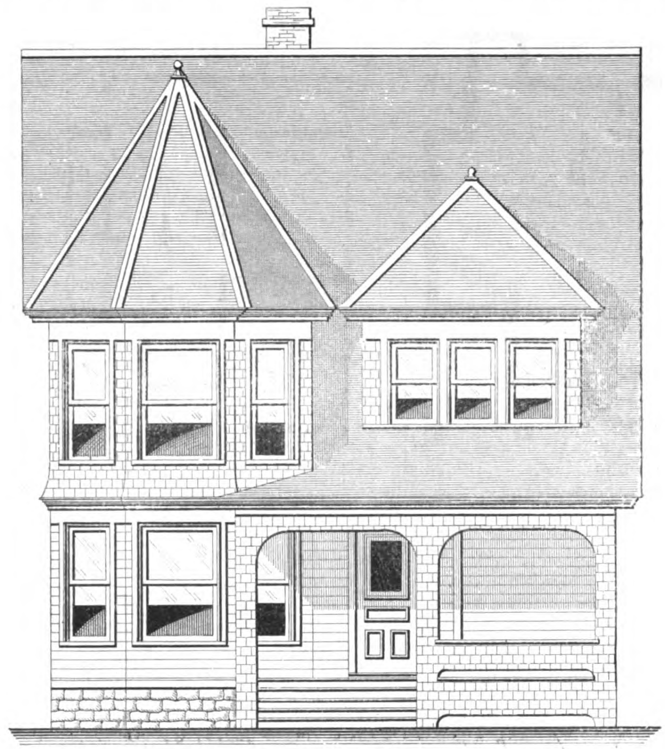
An artificial stone from Belgium has recently been introduced into the French market, which is said to have four times the force of resistance of French free stone and which has nearly all of the properties of Cobestang granite. It has been tried in the Malines arsenal, and is found to be insensible to the action of cold, absorbs only 6 to 7 per cent. of water, even after a long dry spell, and cannot be crushed under a pressure of 40 kilograms (88.184 pounds) to the square centimeter. This artificial stone is manufactured at Uccles, near Brussels, writes Consul Atwell, in the following manner: Eighty parts of extremely clean and dry coarse sand are mixed with 20 parts of hydraulic lime reduced to a fine, dry dust; this mixture is put into an iron box, which is plunged into a boiler of water, and this is hermetically closed. During 72 hours the cooking goes on under a pressure of six atmospheres, the temperature being maintained at 165 degrees. At the end of this time the iron box contains a perfect homogenous mass of stone, which rapidly hardens upon exposure to the air. The most varied colors are given to this stone, and its manufacture costs only 2 cents per cubic foot.

DESIGN FOR HOUSE OF MODERATE COST.

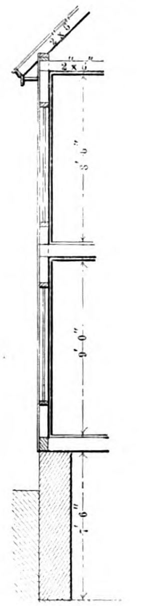
HOUSES of moderate cost are always interesting to a large class embracing not only those who make it a business to erect dwellings, but also to those who are seeking a home for themselves. The design which we present herewith possesses many features liketly to attract attention, and is of a character which will meet the requirements of many. It is neat in its architectural treatment, and affords accommodations for a family in moderate circumstances. On the first floor, as will be seen from an inspection of the plans, there are parlor, dining room and kitchen with a commodious hall communicating directly with the kitchen and avoiding the necessity of passing through other rooms in order to reach the front door. On the second floor there are four sleeping rooms and bathroom, with a minimum of hall space, the stairs being located near the center of the building and lighted from a window in the side.

The main foundation walls, including chimney, porch and veranda foundations, are laid up with large broken stone with close joints and thoroughly bonded. The timber, as well as the roof and wall sheathing, is of spruce or hemlock, with bearing posts in the cellar 8 inches in diameter. All girders and cross sills are 6 x 8 inches, and main sills are 4 x 8 inches, set edgewise and spiked together at all angles. They are gained for the reception of the first floor joist, the gains extending entirely across the sill and being 4 inches deep. The veranda sills are 4 x 6 inches, supported on wrought iron gas pipe footing on a stone pier, as indicated on the foundation plan. All angle posts are 4 x 6 inches; outside wall studding 2 x 4 inches, placed 16 inches on centers, and side studs of all door and window openings in both outside walls and interior partitions doubled the full hight, all door openings being trussed over the top. The hip and valley rafters in the main roof are 2 x 8 inches, and all other rafters 2 x 6 inches, placed 20 inches on centers.

The exterior surface of the outside walls is sheathed with ⅞-inch planed and matched boards, while the roofs are sheathed with 1 x 3 inch hemlock strips, placed 3 inches apart on rafters. The first story is covered with spruce clapboard siding, while the gables, porch and roofs are covered with 18-inch white pine shingles laid 5½ inches to the weather. The first and second floor joist are 2 x 8 inches; the second floor ceiling joist 2 x 6 inches, all placed 16 inches on centers. The porch and veranda joist are 2 x 6 inches, placed 20 inches on centers. The porch and veranda floors are of ⅞-inch spruce strips not exceeding 4 inches in width, all driven up tight and double nailed. The porches and veranda are ceiled with ⅞ x 3 inch mill planed matched and beaded ceiling, worked from bass wood. The first and second floors are of second quality spruce, mill planed and matched, driven up tight and blind nailed. The strips are ⅞ inch thick, and not exceeding 4 inches in width.



Front Elevation.—Scale ⅛ Inch to the Foot.



Section.

Design for House of Moderate Cost.—F. E. Doty, Architect, Herkimer, N. Y.

The inside trim is of white wood, with 8-inch base finished with 2-inch molding, while the casings are worked in accordance with the details shown herewith. The side walls in the kitchen are wainscoted 3 feet 6 inches high, with ½ x 3 inch double beaded white wood fitted with cap. All parts of the china closet exposed to view are of white wood, as are also all interior doors. The bathroom is wainscoted 4 feet high. The room is fitted with a plain siphon jet closet supplied with water from an 8-gallon copper lined, square cornered oak cistern, the bowl of the closet being fitted with 1¼-inch oak wooden lid and seat. The 14-inch wash basin has 1¼-inch Italian marble slab and back, the slab being 24 x 24 inches and countersunk with 8-inch back. The bathtub is a Booth Duplex copper lined one with the usual fittings.

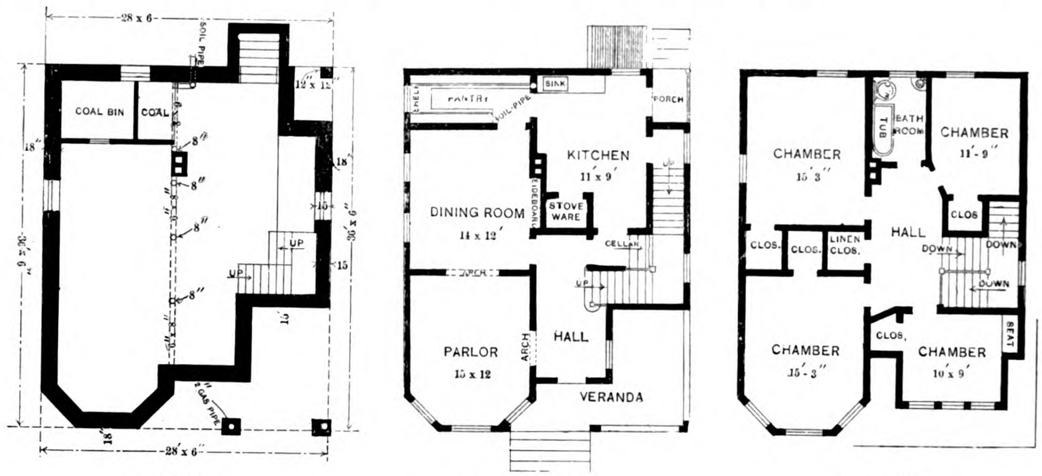
The outer surface of the outside doors is treated with one coat of best liquid wood filler and two coats of Spar varnish. All interior finished wood work has one coat of best liquid wood filler, then sandpapered and finished with two coats of varnish.

The house here shown was designed by F. E. Doty of Herkimer, N. Y.

Protecting Iron Construction from Corrosion.

At a discussion of the Franklin Institute not long since, W. C. Furber, in speaking on the structural design of buildings, said:

On the question of rust protection, I may be taking advanced ground when I say I believe that entirely too little attention has been paid to this matter by designers, yet the liability of corrosion is so great, through exposure and improper covering and the lack of preparation of the metal to receive and hold the covering, that I think the use of the sand blast or some equally efficient means to remove the mill scale and permit the direct application of the protective covering to the actual surface of the metal is not only justifiable but imperative. When the skeleton is once inclosed, examination is difficult and repair practically impossible, and as the life of the building is coincident with the life of the frame work, and the value of the investment is determined primarily by the integrity of the finished structure, a short-sighted and temporarily apparent economy should not be allowed to curtail a proper expenditure on the skeleton, which, if intelligently made, will assure the building a practically indefinite existence.

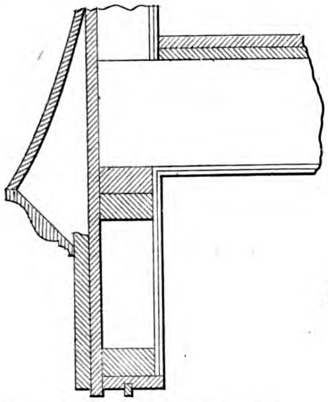


Foundation. First Floor. Second Floor.

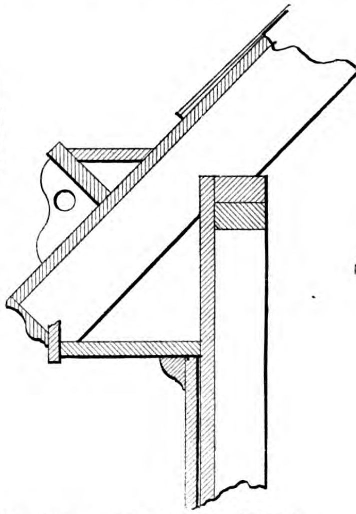
Scale, 1 16 Inch to the Foot.

Side (Right) Elevation.—Scale, 1/8 Inch to the Foot.

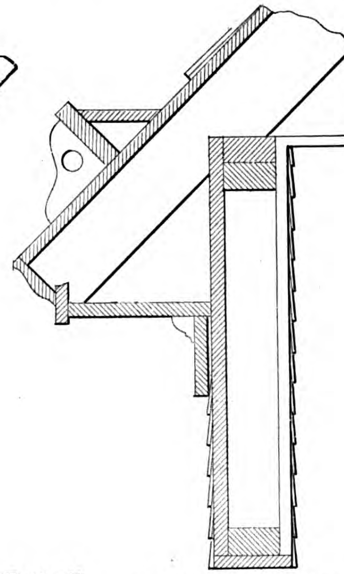
Design for House of Moderate Cost.



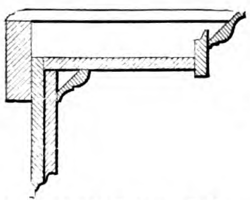
Detail of Belt Course.—Scale, 1 Inch to the Foot.



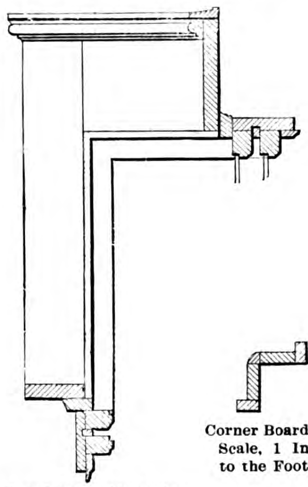
Main Cornice – Scale, 1 Inch to the Foot.



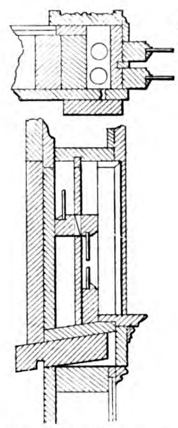
Detail of Veranda Cornice — Scale, 1 Inch to the Foot.



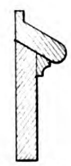
Detail of Rake Cornice.—Scale, 1 Inch to the Foot.



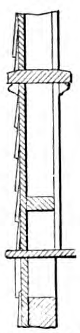
Detail of Outside Casing First Story Windows. —Scale, 1 Inch to the Foot.



Details of Window Frame.—Scale, 1 Inch to the Foot.

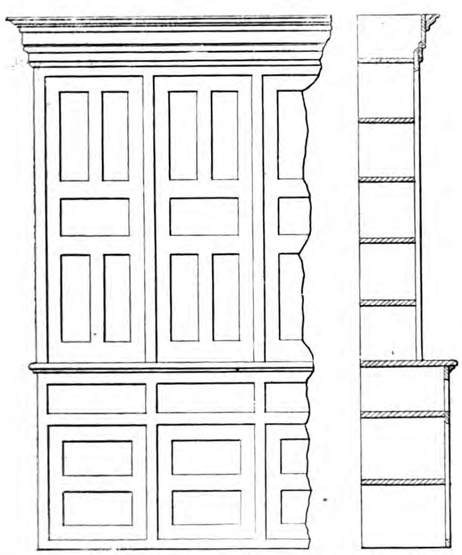


Detail of Water Table.—Scale, 1½ Inches to the Foot.

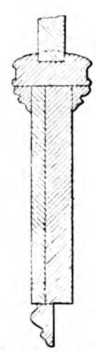


Section through Shingle Wall of Veranda.—Scale 1 Inch to the Foot.

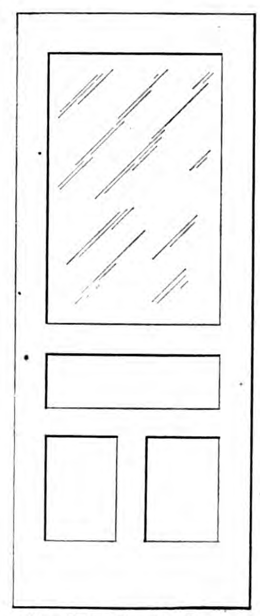
Corner Board.—Scale, 1 Inch to the Foot.



Elevation and Section of China Closets.—Scale, ⅜ Inch to the Foot.



Detail of Stringer.—Scale, 1½ Inches to the Foot.



Elevation of Outside Door.—Scale, ½ Inch to the Foot.

Miscellaneous Constructive Details of House of Moderate Cost.

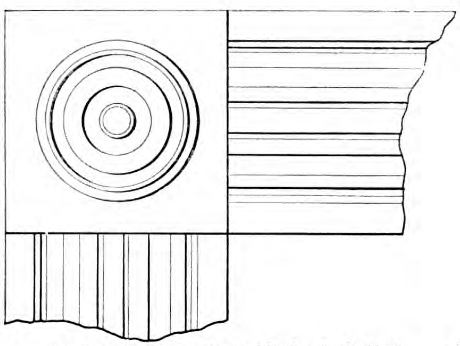
As to the best means of providing against rust, the information already at our disposal seems to me sufficient to indicate a safe course to pursue. Ledebur, in an "Essay on Oxidation of Iron and its Admixtures, Rusting, and the Influence of Liquids upon Iron," points out that three factors are required to produce rust—that is, the hydrated oxide—viz., water, pure oxygen and an acid. Portland cement, by furnishing a base for the absorption of any acid likely to be found, will eliminate one of these factors, and will thereby prevent rust. So that, with the other valuable qualities it possesses, it forms a protective covering of great value. But while this is true if the cement is in direct contact with the metal, we know that as the shapes come from the shops they are covered with mill scale, and that any covering applied to them adheres to the scale, and that a mechanical separation of the scale is easily possible.

Should water penetrate the cement or other covering, through cracks, and find its way between the scale and the actual surface of the metal, the scale being electronegative to the body of the metal, the elements of a battery exist, and the degree of corrosion is a matter of time. We also know that as concrete is frequently put in place the voids are not filled up, and spaces are left for the accumulation of water, which may be present, forming, with the scale already there, rust producing factors.

On the structural work above ground the danger of corrosion is not so great, but is sufficient, I think, to warrant the use of a concrete envelope around the columns and external girders, for the masonry covering is not always thick enough or tight enough to exclude moisture. If concrete is used the metal work should be temporarily protected by a coat of oil, which will be worn away by the time the building is ready for closing in.

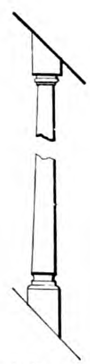
Fire Proof Shutters.

The fire proof shutters which are used on one of the new office buildings on lower Broadway, this city, possess some rather interesting features of construction.

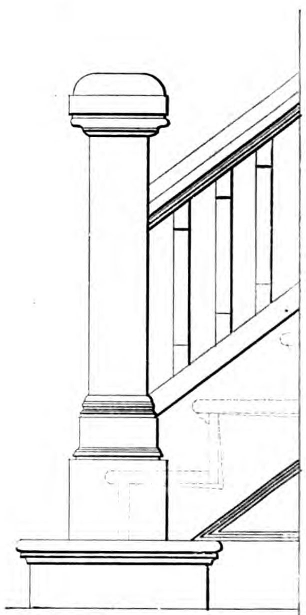


Detail of Interior Trim.—Scale, 3 Inches to the Foot.

Base.—Scale, 3 Inches to the Foot.



Spindle.—Scale, 1½ Inches to the Foot.



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

Miscellaneous Constructive Details of House of Moderate Cost.

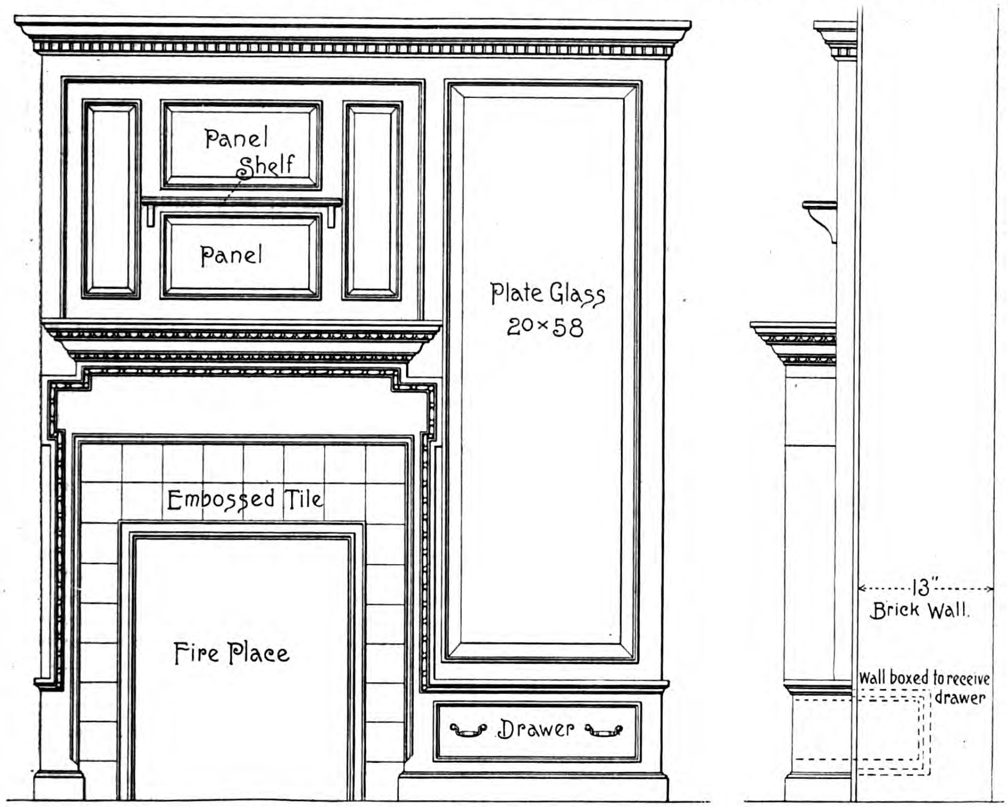
It is not an uncommon thing, where iron footings are placed below the water level, to find that the water has dissolved and washed out all the cement which the concrete originally contained. I have seen more than one building standing with its feet wet, the cement having been washed out before the concrete set, leaving but the stone and sand remaining.

I believe, and have followed it out in my own practice, in placing all iron above the line of saturation if at all possible, and in the Harrison Building, which has been referred to here to-night, and for which I was the designing engineer, the grillage of I-beams in the footings is above the water level, the foundations below this being entirely of concrete; but when for any reason the grillage or underground metal work has to be placed below the water level most extraordinary care should be used to see that the metal work is free from scale and unpainted; that the trenches or pits are so lined that no part of the excavation comes in contact with the beams; that the concrete contains a large proportion of cement, with the aggregate or filler in small particles, so as to allow being rammed easily into a dense mass without voids. In the placing of long girders underground it is not an uncommon thing to see the earth fall in around the girders, and to see the concrete filled in without the earth being removed. It is needless, perhaps, to say that whenever this occurs a fault is formed in the concrete, and rust must inevitably follow.

The two interior walls of the building face a corner, each having three bay windows. The shutters, which roll on a 3-inch barrel, are made of steel of the rolling type, consisting of slats or steel laths, 2 inches wide, fitted together by bending the edges of the slats so that they interlap. The slats are put together by sliding one into the other, end on. The barrel is mounted on a shaft, which turns in two brackets secured to the building, and contains strong steel springs to counterbalance the weight of shutter. The shutters run in steel girders, and have a polishing board over them. They are grouped in threes by joining the winding shafts of the barrels, universal joints being employed at the angles of the bay windows. This continuous line of shafting is driven by vertical shafts between each window, fixed to the piers. All the shutters from the first to the sixth floor are opened or closed at the same time in four sections, and from the seventh to the thirteenth floor in four sections on both sides of the building. The slatted shutter not only permits of using heavy metal, but is said to roll up in about one-third less space than the old corrugated shutter. It is said one man can raise or lower 18 or 21 shutters, the weight being balanced by a spring. By a simple arrangement, by throwing out of connection one of the tiers, one out of every three tiers of shutters may be raised from the outside by firemen in case of fire, thus complying with the Fire Department rules.

Design of Mantel for Bedroom.

In the more pretentious dwellings it is usual to finish all the important rooms in a style appropriate to their requirements and thoroughly in keeping with the general appointments of the house. In the sleeping rooms a bright, cosy, comfortable effect is desirable, this being especially true of what is usually designated as the family sleeping room and the guest chamber. Open grates and fire places with attractive mantels are features of the equipment and finish, these adding materially to the general effect. In the design of bedroom mantel which we present herewith our readers may find suggestions of interest and value. The wood used may be of any one of a number, as for example, bird's eye maple, which gives most beautiful effects. Features of the design include the paneling, moldings and heavy plate glass mirror at the right. The mantel was designed by Grodavent Bros., architects, of Denver, Col.



Front Elevation. Side Elevation.

Design of Mantel for Bedroom.—Scale, ¾ Inch to the Foot.

Heating and Ventilation of Tall Buildings.

At one of the meetings of the American Society of Heating and Ventilating Engineers a paper on the above subject was presented by Henry C. Meyer, Jr., some portions of which are of such interest to readers of this journal that we give them below:

The demand for proper ventilation in the modern office building is of recent origin and it is very seldom, even now, that means are provided for furnishing a supply of pure air. This demand is not so great as it ought to be, nor is it so great as it would be if architects and engineers were to urge upon building owners that the same means be provided for encouraging a healthier condition of mind and body in our business men and women, who spend almost the entire daytime in their offices, that these business men demand in the way of proper ventilation for the schoolrooms in which their children spend a portion of their time. Some men object very strongly to their children being exposed to anything but the best sanitary conditions, yet themselves spend their daytime in an atmosphere which is anything but healthful. The author has visited many offices in our most recent buildings which, when entered from the outer air, appeared to possess at least some of the properties found in the air of menageries, and when one of these properties, that affecting the sense of smell, is apparent, it is a pretty sure sign that ventilation is needed. Perhaps some day business men will wake up to the fact that their work can be done more easily if their offices are furnished with a pure air supply, and will demand it.

The increased cost of a ventilating system over the ordinary heating job would make such a slight addition to the cost of a large building that it would seem good engineering on the part of the architect to provide for it, and a good business investment on the part of the owners to pay for it. Of course the cost of operating the ventilating system is greater than the cost of heating alone, but the increased cost would have such a slight effect upon rental values that the installation of a ventilating plant certainly ought to attract rather than keep away tenants. In considering the cost of a ventilating system it should not be forgotten that the number of really cold days in a year in the latitude of New York and Chicago is not very great, and also that in almost all the tall buildings there is considerably more exhaust steam than is needed to do the simple heating of the building.

Earliest Example.

One of the earliest really tall buildings in which provision was made for an air supply was the Manhattan Life Building in New York City. In this the building is warmed by direct radiators placed inside of the windows. Long, narrow slots were cut in the window sills admitting fresh air over the radiators, so that it would meet and mingle with the column of heated air rising from the radiators. To make the air supply independent of the force and direction of the wind each room is connected to one of four systems of foul air ducts carried above a suspended ceiling in the corridors, each of the ducts connecting with a flue or shaft leading to a fan chamber on the roof, where a powerful exhaust fan tends to create a vacuum throughout the building, which insures a flow of fresh air through the window openings. Kimball & Thompson were the architects of this building, and Gillis & Geoghegan the heating contractors.

Novel Ventilating Plant.

A novel ventilating plant for a tall building is to be found in the 11-story Real Estate Exchange, in Buffalo, where a blower system is relied upon entirely for heat and ventilation, there being no direct radiation in the building. Two independent hot blast coils and fans are employed. The building is E-shaped in plan. Near each angle in the building is a shaft running from the cellar to the upper floors and containing a number of galvanized iron flues, one independent flue being carried up from the coils to each of the upper floors. Each flue supplies one-half of a floor, and does this by means of a duct located above a suspended ceiling, the duct supplying registers opening into the top of each room. The air passes out of the rooms through registers into the corridor and leaves the building through openings over the elevator shaft. The architects of the building, Green & Wicks of Buffalo, informed the author but a few weeks ago that the plant cost but little more than the ordinary heating system and had given excellent satisfaction, so much so that they would install the same system again if opportunity offered. The Buffalo Forge Company were the contractors for the heating system. In this building the temperature of the rooms is regulated by controlling the amount of heated air admitted, as all of the air must be raised to a temperature necessary to warm the most exposed rooms. The ideal arrangement would be to have a double duct system, that is, a hot and cold air duct, with a mixing damper for each room, but the cost of such a plant would make it almost out of the question. It might be well, therefore, in such a system of air supply, to depend partly on direct radiators, say to put in enough to supply the heat transmitted by the walls and windows, and depend upon the blower system for air for ventilation only.

Another Type of Apparatus.

Still another type of ventilating apparatus is found in the American Surety Building, in New York City, of which Bruce Price was the architect. Alfred R. Wolff, who designed the ventilating system, provided an extensive Sturtevant hot blast plant in the basement, supplying about four changes of air per hour to the seven lower stories. From each of these foul air was drawn by flues to fan chambers on the roof. The plant of the Singer Building, in New York, and that of the Carnegie Building, in Pittsburgh, both designed by Mr. Wolff, are arranged with the direct-indirect system of supply with an exhaust ventilating system, and both are said to have been very satisfactory. In all probability this last mentioned type of plant or that used in the Buffalo Building mentioned will be most used in the future, as the flues required in the system where the air is both supplied and removed by a blower system take up so much room as to render them objectionable, particularly if the building is a tall one.

Room for Improvement.

The author believes that there is room for improvement in some of the details of the steam and exhaust piping in our modern buildings. Too frequently has it been the custom in connecting engines and boilers to run a main from the boilers to the engines, with branches leading from the side, and occasionally from the end of these mains to the engines. The danger from water finding its way into the engine cylinders and wrecking them has been shown sufficiently often to demonstrate the danger in a plant so designed. The author believes that in office buildings where the head room is restricted, a good arrangement is to provide an elbow on the nozzle of each boiler and run a horizontal pipe from the elbow to an angle stop valve bolted to a flanged nozzle on top of the steam main. The stop valve should have its stem in a vertical position, so that, on shutting down the boiler, there is no pressure on the packing when it is required to repack the valve. The branches to the engines should in every instance be taken from the top of the main. Not long ago the author was shown a plant where this was not done, and the statement was made that the designer wished to connect the branches to the top of the main, but did not do so on account of the lack of head room. This difficulty might have been overcome, however, by lowering the steam pipe. The connections to steam pumps which have a variable stroke will not, of course, be damaged by water, hence it does no harm to connect the steam supply pipes for pumps to the side of the mains. The author was shown one plant where the connections to the pump were made at the bottom of a steam main, the object being to drain the main in this way. This, however, does not seem to be good practice, as it tends to turn a steam cylinder into a pump; moreover, the condensation in the steam main contains no oil and is at high temperature, and, therefore, could well be returned directly to the boilers.

A Topsy-Turvy Building.

Some newspapers have lately printed a description of a building which is said to be in course of erection on the exposition grounds in Paris. This description, which, we imagine, may be taken with some reserve, is thus commented upon by the *American Architect and Building News:* The building is said to represent a country house, or rather, a mediæval chateau, inverted, so that it stands on the tops of its towers, its roof hanging between, just off the ground, while its front door is in the air. Entrance is obtained through a hole in one of the towers, and the visitor ascends thence through the bedrooms to the drawing rooms, ending his journey at the front door at the summit, from which he can look out, as we are informed, on "a terraced garden hanging in the air." Except for the inverted garden there is nothing very impracticable about the building as so far described, but the papers add some details which seem to have been supplied by the distinguished Baron Munchausen. For example, we are told that the visitor after ascending a "chimney" to the bathroom, will find a marble tub "suspended over his head," and supplied by a "steaming jet of hot water spouting upward" into it. What is done with the overflow is not mentioned, but such trifles would hardly present any difficulty to the talented designer of an inverted bathtub holding water suspended in it. Leaving this uncomfortable place, and climbing to the drawing room, the stranger may, as we are informed, "listen to the strains of 'La Tzigane,' or the latest tune from the Folies Bergères, played on the piano by some gay Parisienne, head downward." This illusion could, of course, be managed by means of mirrors, but a moral, rather than a physical, explanation seems to be requisite for the assertion that "on looking through the windows into the grounds of the exhibition the latter will appear to the observer in an inverted position, at the same time conveying to himself the strange idea, shared, moreover, by the people outside, that he is, in truth, standing head downward." The inventor of this structure, which is known as the Manior à l'Envers, is said to be M. Kotin, a Russian engineer, who is probably not responsible for the newspaper descriptions of it.

THERE is some talk of preserving the buildings of the National Export Exposition, at Philadelphia, Pa., the preliminary step having been taken at a recent meeting of the Committee on Administration, when a resolution was adopted recommending to the directors of the Exposition Association that the main group of buildings be allowed to remain undisturbed, at least for the present. The idea is to make use of the buildings in the future for exhibition purposes.

MODERN STABLE PLUMBING.

THE improvements in the drainage systems of buildings have been such as to leave no class of structure out of consideration. The stable that was offensive in former times when the liquids were allowed to soak away may under modern methods be found unobjectionable under the same roof that covers a manufacturing plant. In building a new factory for his sheet metal lath business at Third avenue and Seventh street, Brooklyn, N. Y., Mr. C. Schratwieser has arranged a stable of 18 stalls with two box stalls in the basement, a plan of which is presented in Fig. 1. Two features of the stable are of special interest, as they work together in making it possible to place the stable in the cellar. One is the cement work done by Castle Brothers, of the city named, and the other is the plumbing done by Thomas E. O'Brien, of the same place, after plans prepared by Alfred L. Perpignan of Brooklyn, N. Y., who was the architect. The entire floor of the cellar, including the stable, is made of concrete with a cement surface finish. A space of several feet is to prevent air from the drain escaping except through the stacks leading to fixtures on upper floors, as shown in Fig. 2. The main drain is provided with an intercepting trap at the front wall and just inside of it is the fresh air inlet and the front area drain connection, serving to flush the main trap whenever it rains.

On both the first and second floors, as shown in Fig. 2, there is a water closet of approved type for factory use and a large cast iron sink. These fixtures are provided with traps which are vented as shown, the main vent passing up through the roof and increasing in size where it passes through. The water service system provides a 2-inch connection with a full way gate valve on each floor, with a coil of hose attached with branch pipe ready for immediate use for fire protection. At the end of the horse stairs is a large manure pit, and the rules of the stable require that the stalls shall be frequently cleaned and the gutters flushed so that there shall be no collection that will generate offensive or injurious odors. Ample

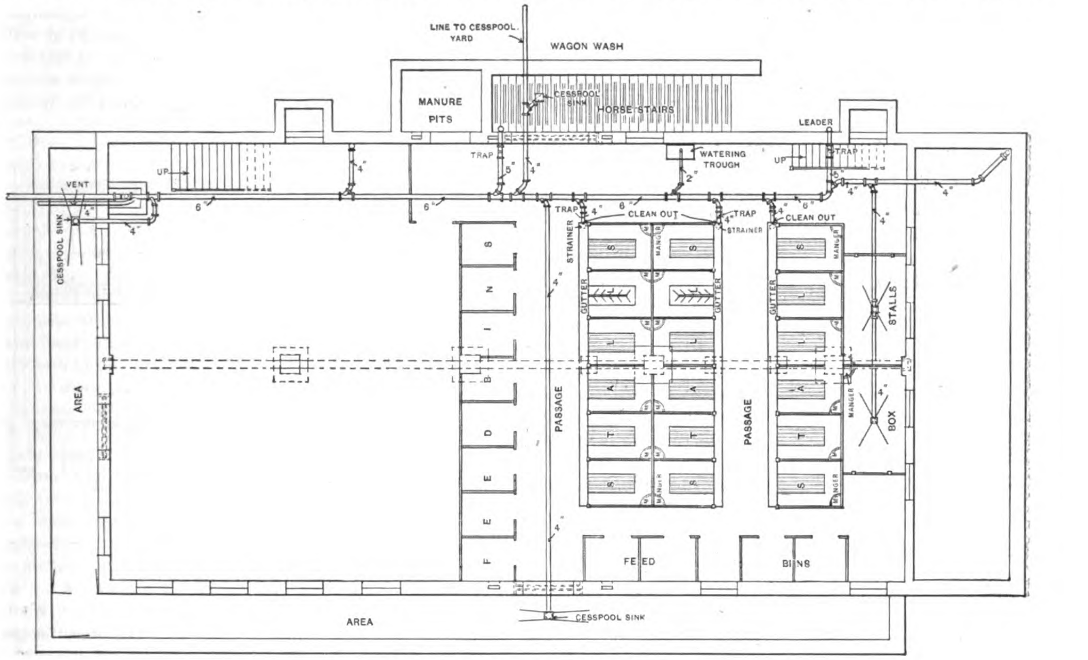


Fig. 1.—Plan of Stable, Showing Drainage System.

Modern Stable Plumbing.—Alfred L. Perpigan, Architect, Brooklyn, N. Y.

provided between the cellar and stable windows and the wall of the sidewalk the whole length of the building and across one end to make an air and light area. On the other side of the building there is an ample yard with sheds for the storage of wagons. From this yard there is an inclined walk leading to the stable for the horses

The bottom of each stall is provided with a wooden rack for the horses to stand on. The cement floor below this rack has a number of small gutters leading from the outer edge to a larger gutter, as shown, which discharges into the main gutter that runs across the rear end of each row of stalls to a strainer. The strainer is to keep hay or other solid matter from reaching the trap just beyond it. A cleanout is located near the trap and the strainer for use in case of stoppage. In the box stalls a strainer, trap and cleanout combined is used. The main gutters have a movable cover and provision is made so that they can be easily flushed and kept clean. A watering trough for the horses is so arranged that the overflow serves to flush the main.

The leaders from the roof and the rain water from the side area and horse stairs and the water from the wagon wash also connect with the main drain to discharge and have a cleansing effect. All these connections are trapped conveniences are provided for the storage of harness and bins for keeping a supply of feed. The walls of the stable and cellar are kept whitewashed and care is taken to keep the stable in perfect sanitary condition.

Acetylene Lighting.

One of the papers read at a recent meeting of the Chicago Architectural Club was prepared by F. Cortez Wilson on the subject of acetylene lighting, from which we make the following extracts :

In what I shall endeavor to present to you to-night it has been my object to give a brief outline of facts connected with the subject of acetylene lighting. This paper was written by the light of an acetylene flame from which I sought illumination, so any apparent dullness is not chargeable to the lamp. I will, however, omit reference to the efforts of man to produce artificial light from the days of the pine torch and the tallow dip down to electric lighting, which are matters of history familiar to you all.

I will assume that every person present knows what calcium carbide is, how it is made, when and by whom its process of manufacture was discovered and that from it acetylene is made by wetting. Even if you are not familiar with the technology of carbide it is sufficient for the every day requirements of a busy man to know that acetylene lighting for over two years has been reduced to successful practice. It has been my privilege to enjoy life in this world more than 60 years and witness the general utilization of many inventions and discoveries, and I believe that nothing of equal importance came into extensive use in anything like so short a period of time as acetylene.

Burners and Generators.

That difficulties in the practical use of the gas would be met with was to be expected. At first it was learned that owing to the richness of acetylene in carbon it was difficult to supply sufficient air to the burners to insure perfect combustion, and in consequence they would become clogged and in a comparatively short time fill the air with lamp black of purest quality. This difficulty has been overcome by the invention of burners especially designed to insure a sufficient supply of air. These burners act upon the steam injector principle, the stream of gas drawing in air before reaching the point of combustion, and there is now upon the market a variety of such burners which are satisfactory; but it is still inadvisable to turn the light down, as is done with ordinary gas, for the reason that the gas flow is not sufficiently rapid under such circumstances to draw in the necessary amount of air. The burners begin to carbonize, and if the practice is persisted in will in time become clogged and not do good service when the full flow is turned on.

It was also found that the main difficulty was in the generators more than the burners; that when carbide is slacked much heat is evolved by the chemical reaction, and acetylene being a very delicate gas the heat would polymerize or break up the gas, forming benzine, &c., which in burning fouled and clogged the burners and did not provide the light for which the consumer had paid. By the addition of water to carbide temperatures as high as 1353 degrees F. have been reached in experiments conducted for the purpose, the lumps of carbide becoming incandescent, and as the gas begins to break up at 140 degrees F., according to Professor Lewes, and certainly is destroyed for lighting purposes at about 400 degrees, it is easy to understand why so many generators have been unsatisfactory in use. It has been demonstrated that "1 pound of carbide evolves about 900 British thermal units while generating about 5½ cubic feet of acetylene, so that it would raise the temperature of 6 pounds of water from 62 degrees F. to the boiling point." (Henry Harrison Suplee in *Engineering Magazine*, August, 1897.)

It has been settled that no generator operating upon the spray or sprinkling system can give satisfactory results, as the gradual addition of small quantities of water to masses of carbide is sure to result in overheating.

There are generators that operate upon the overflow plan, *i.e.*, carbide is put into a number of pans separated by partitions, the water is made to flow into one until the carbide is exhausted, and from this division overflows into the next and so on until all are hydrated. This is somewhat better than sprinkling, but as the flow of water is not continuous and the hydrated carbide cannot fall away from the lumps it retains the heat until it is raised to a point sufficiently high to damage the gas.

Generators made to dump the carbide in small quantities into large quantities of water are now upon the market and are theoretically correct. Their drawback is in the fact that much machinery for operating the various devices is necessary and in the hands of the unskilled is liable to become damaged and refuse to perform its proper function, necessitating attention at a time when a light is necessary, and many accidents have resulted in consequence.

Dangers from Illuminants.

Do not understand me as saying that such accidents have been more frequent with such dumping generators, but rather that many accidents have resulted from the failure of different generators to work. Speaking of accidents, I would say that most of them are due to ignorance or carelessness. Any illuminating gas or vapor mixed with air in proper proportions forms an explosive. Acetylene does not differ from other gases (which have been almost universally used for the past 80 years in large cities) in this regard, excepting that on account of its richness the percentage of air required to form explosive mixtures covers a wider range than with leaner gases, some experimenters claiming that mixtures of from 5 to 76 per cent. of acetylene are explosive, while others equally reliable state that mixtures of over 56 degrees are not explosive. Such mixtures do not explode spontaneously. Gas explosions are by no means confined to acetylene. Last year an explosion occurred in the Capitol Building at Washington, damaging it to the extent of about $25,000 and causing a fire which destroyed priceless public records which cannot be replaced. A few years since an explosion was caused by city gas in the Boston subway, with resultant losses said to amount to millions. The gas works at Poughkeepsie exploded about a year or two since and two attendants lost their lives. The gas works at Jackson, Miss., were practically destroyed by an explosion within the last two years.

Electricity has been the cause of some disastrous fires, notwithstanding the very rigid inspection of underwriters' bureaus everywhere. Acetylene inspection is only an incident in the excellent electric inspection bureau of which Mr. Merrill is the chief engineer.

Last year 156 fires were caused by lamps in London. Statistics were compiled from the records kept by the fire patrol in Chicago a few years since which showed over 900 lamp explosions in this city from which fires resulted. How many exploded that were not reported it is impossi-

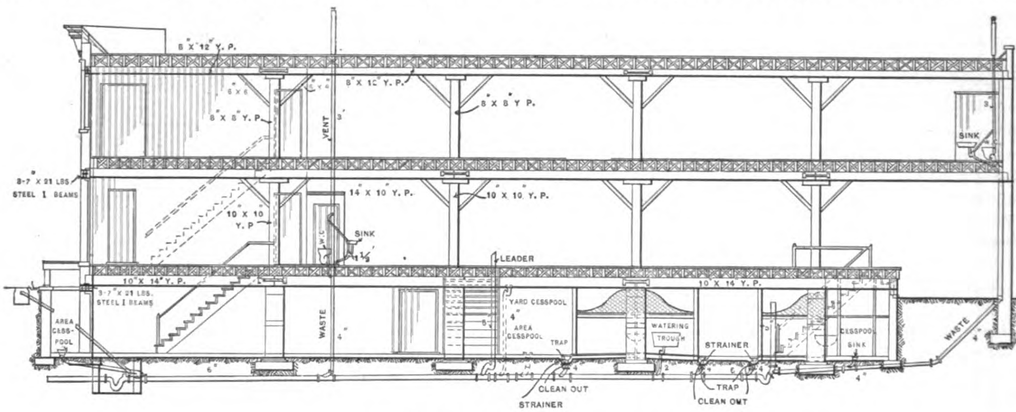


Fig. 2.—Elevation, Showing Piping.

Modern Stable Plumbing

ble to say. In discussing the dangerous nature of acetylene people seem to forget that even a stone wall becomes dangerous to the person who stumbles at just the right time. I have been using acetylene for lighting at my factory for the past three years and in my residence for the past two and one-half years, in both risks with the permission of the insurance companies interested.

Qualities of the Light.

The spectrum from the acetylene light is practically the same as the solar and the gas is being used by manufacturing photographers with much success. The quality of acetylene light being almost equal to sunlight, practically a pure white, in this respect it is superior to all other artificial illuminants, as owing to this fact all colors appear under its rays, the same as by daylight. Under proper conditions as to density and pressure the flame is perfectly steady and free from the flickering peculiar to common gas.

Acetylene possesses a peculiar and unmistakable odor of such a pungent and penetrating character as to render its presence apparent at once, and as its specific gravity is so near that of air it is diffused throughout the room instead of rising to the ceiling, hence leaks in pipes and fixtures are at once detected. Acetylene is much less poisonous than coal gas, being practically free from sulphuretted hydrogen and carbonic oxide, with which coal gas is always more or less contaminated, which constitute the really poisonous element. And right here is a matter well worth your consideration. It is well known that a conservatory cannot be lighted with coal gas, as the plants are destroyed by the poisons evolved from the lights. We conducted a few experiments which demonstated that plants would thrive under acetylene light and assume their natural color. Tender shoots would become perfectly white in 36 hours when left in a dark place, but would assume their green dress with astonishing rapidity when the acetylene light was turned on, a green hue being observable within five hours afterward.

In comparison with other hydro-carbon flames of equal lighting power that of acetylene is comparatively cool, a 24 candle power acetylene flame producing but little more heat than is developed by an incandescent light of equal power. Discomfort arising from vitiated or overheated air in coal gas lighted rooms is too common an experience to more than mention. The so-called "dangers" of acetylene and other objections raised by prejudiced persons ignorant of its properties or having interests that it is believed will be injuriously affected by the general introduction of the new illuminant, are purely imaginary and unworthy of serious consideration by intelligent people.

We do not contend that acetylene under present conditions is the cheapest light obtainable, but the cost is certainly reasonable and need not prevent any fairly well to do individual from enjoying its many advantages. Half a cent per hour for a 24 candle power light cannot be considered an extravagance. Some of our patrons have sent us certificates to the effect that acetylene does not cost them any more than coal oil did for lighting their stores and we are not prepared to dispute them. Candles are believed to furnish a cheap light. Let us see: At present good paraffine candles cost by the box about 10 cents per pound, and a candle weighing 1 ounce will burn from three to three and one-half hours, costing 5-24 cent per hour; 24 candles, equaling a ½-foot acetylene burner, would cost per hour 5 cents, or ten times as much as an equal amount of light from acetylene gas.

Gas Room.

Acetylene will stay with us and as its many merits become known home builders will demand it, and therefore the progressive architect will provide in his plans for a gasroom. It should be in the basement and have water and sewer connections, independent ventilation and daylight. For the ordinary residence it should be about 8 x 8, with a door 36 inches wide, a passageway to it of the same width to admit the introduction of the apparatus. For a large residence it should be 8 x 10, with a door and passage 42 inches wide.

As a small amount of gas escapes into the room when the apparatus is recharged there should be a tightly closing door and a ventilator to carry outside the gas that escapes from the generator at such times and also that given by small lumps of carbide that are liable to be scattered upon the floor by careless persons. . . . . There should also be an opening through the wall about 12 inches square upon a level with the ground through which to pass the pans of residuum. Of course the gas room should be in such location as will be secure from hard freezing. The sewer should lead direct to a catch basin outside the house, conveniently arranged to permit the removal of lime deposits, and no other drains should empty into this catch basin. The lime water from this basin, if conducted through the rest of the system, would have a deodorizing effect. In closing we desire tc acknowledge our obligation to G. F. Thompson. Prof. Vivian B. Lewes, Henry Harrison Suplee, C. de Perrodil, Pictet and others.

New Publication.

FIRE PROOFING OF STEEL BUILDINGS. By J. K. Freitag. 8vo, 319 pp., illustrated. Published by John Wiley & Sons. Price, $2.50.

The author first considers the development of fire proofing methods and steel building construction, the earliest application of the present general system of fire resisting design being the use of the brick arch sprung between iron beams. The employment of wrought iron beams permitted a reduction of the distance between the walls to any desirable span, so that the deep and heavy brick arches could be made thinner and therefore lighter. The depth was finally reduced to one course of brick, which brought the weight down to about 33 to 35 pounds per square foot when set, to which was added a concrete filling of varying depth but averaging 8 to 10 pounds to each inch in thickness. In the earlier buildings the interiors were formed of cast iron columns, iron girders and iron floor beams carrying the brick arches. This left the lower flanges of the beams entirely exposed to the possible action of fire. An attempt to reduce the cost and dead weight of the brick arch method led to the introduction of the arch in which sheets of corrugated iron, curved, were sprung between the lower flanges of the I-beams.

The present systems of fire proofing resulted practically from the great Chicago fire in 1871. Flat hollow tile arches were introduced in Chicago in 1872, and shortly after in New York. These arches proved substantial, and served well the purpose of a light fire resisting floor. Previous to the year 1883 all of the tile arches used in Chicago had been made of tiles without interior webs except in the skewbacks. It was found that these tiles were not strong enough to sustain heavy loads, and the interior webs were introduced first in the building of the Mutual Life Insurance Company in New York. This type of arch was also used in the Home Insurance Company's building, Chicago, in 1883-1884, which was the first skeleton construction building erected.

At first iron was considered to be a fire proof material, and in the earlier constructions was not protected. The first attempt to protect the columns against fire was through the use of a double shell, one within the other, the intervening space being filled with plaster. The plaster was afterward abandoned and dependence placed upon the air space between the two casings. After 1886 architects generally began to specify iron columns to be incased in terra cotta blocks, and many of the present forms came into immediate use.

The author states that while mill construction undoubtedly possesses some decided advantages the accepted methods of "slow burning" construction have not been sufficiently "slow burning" in practice to warrant the extended use of the system. The objections to the use of this construction lie in the general employment of pitch pine for the longer and heavier timbers required in the system. This timber, when once ignited, makes a hotter and fiercer fire than even the light joists and lathing of non-fire proofing construction.

The results of tests of the well-known forms of fire proof floors are presented in such form as to be of the greatest value from the standpoints of the owner, architect, builder and underwriter.

The materials usually employed in fire proof building construction are cast iron, wrought iron, steel, stone, brick, terra cotta, mortars, plasters and concrete. It is stated that unprotected cast iron can stand practically unharmed in temperatures from 1300 to 1500 degrees F. while carrying heavy loads, while wrought iron or steel will commence to yield at temperatures from 1000 to 1200 degrees. The results of tests showing what we may term the yielding point due to heating are presented. Stone under the action of severe heat will crack or calcine, according to its nature, and should therefore be most cautiously used in fire proof construction. The fire resisting qualities of brick and terra cotta are well known. Experiments made in Hamburg, Germany, on different mixtures of concrete showed that 1 part cement to 7 parts coarse cinders gave the best results. Fire was applied to this cement for three and three-quarter hours, when one sample was cooled suddenly and one slowly, but neither suffered under the test.

Chapter six considers the permanency of modern design, the effect of corrosion and the methods of guarding against corrosion. The next division deals with the design of successful fire proof buildings, the essential points of which are enumerated as follows: The fire resisting detail of all structural portions of the building, adequate equipment to cope with either exterior or interior fires, and the proper planning of the general features.

This is followed by descriptions of floors of different types, methods of protecting floor beams and columns of different section and material. The author states that the present methods of so-called fire proof partition construction undoubtedly constitute the weakest feature in modern fire resisting design. An inspection of these partitions will reveal the fact that one of the most important functions has been overlooked—namely, the fire retarding quality. To fully meet the requirements these partitions should be fire resisting to such an extent as to limit the spread of fire, should possess heat retarding qualities, should have stability against shock, water streams, &c., and should have deadening qualities to prevent the transmission of sound. These are of the utmost importance, since the confining of a fire depends upon the integrity of the partitions. The usual methods of partition construction are described and a comparison presented of their various good and bad features.

The final chapters of the book treat of the exterior of the buildings, wall and roof, and the equipment to be provided for dealing with a fire.

The book is well arranged, the descriptive matter clear and concise, and there is a copious index. The entire subject has been admirably handled, and the data set forth should be of the greatest value to both the architect and owner.

The Mechanics' Institute of New York.

The Mechanics' Institute, which was located for many years on East Sixteenth street, New York City, has been removed to new and more commodious quarters on West Forty-fourth street, where the institution will be enabled to greatly extend its educational work. A number of new classes have been started, the library has been greatly enlarged and 275 boys have enrolled in the various classes of the Institute school, a number considerably in excess of that in any former season. The Mechanics' Institute, which is probably the oldest organization of its kind in the country, was established in 1785 by the General Society of Mechanics and Tradesmen of the City of New York. In 1820 the Mechanics' School and the Apprentices' Library were founded and in 1833 courses of lectures were added. The Institute inaugurated reading rooms in 1856 and in 1889 instituted 12 free scholarships in the New York Trade School. The evening classes of the Institute school furnish free instruction to young men in freehand, mechanical and architectural drawing, cabinet work and clay modeling. There are two new evening classes, a mathematical and an architectural class. The modeling class is for young tradesmen such as plasterers, stone cutters and wood carvers. The aim of the General Society of Mechanics and Tradesmen, which consists of about 500 members, is to make the Institute a place where young men, by applying themselves for three or four years, may upon passing a prescribed examination receive a certificate, which will be of service to them when starting business life. The courses of study were formerly limited to one year, but the regular courses are now three or four years, in order that the pupils may be turned out with a thorough knowledge of the subjects they have studied.

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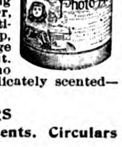

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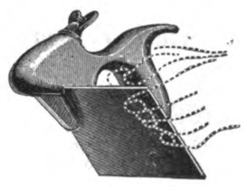
NOVELTIES.

Saw Steel Cabinet Scrapers.

In the illustration presented in Fig. 1 we show several forms of cabinet scrapers put on the market by George H. Bishop & Co., Lawrenceburg, Ind., New York office 100-102 Reade street. The scraper handle is made of beechwood with varnished edges. The blade, which is shown in different positions in the illustrations, is held by a japanned clamp secured by a thumb nut on the top of the handle. The blade can be slid from side to side in the handle to suit the work being done. When very particular work is required one end of the blade can be guided by taking hold of it by the hand as shown in cuts Nos. 1 and 2. It is explained that the blade is held firmly in the holder and at the correct slant to permit of steady, even strokes. The point is made that blades held in the operator's hand without the holder become hot and burn the hand, which is not the case when the holder is used.



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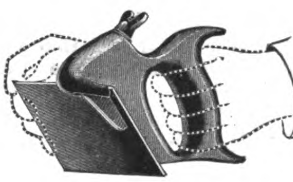

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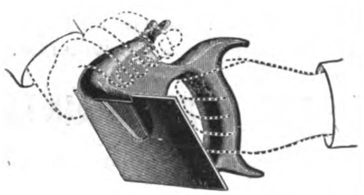


No 3.

Novelties.—Fig. 1.—Saw Steel Cabinet Scrapers.

Pullman Spring Door Holder.

Pullman Sash Balance Company of Rochester, N. Y., with A. G. Sherman, agent, in charge of the New York office at 14 Warren street, are offering a spring door holder having two bearings. It is referred to as small, neat, useful, practical, ornamental and is operated by the foot without stooping. Among the points of excellence claimed for it are the following: That it is adjustable to any door; that there is nothing about it to wear out; that it will hold a door open in any desired position; that the holder works equally well on carpet, wood or marble; that it does not injure the floor or carpet; that there are no catches to become dull and slip and that a child can operate it.

Foster-Munger Hard Wood Mantels.

An illustration is given in Fig. 2 of the cuts of one of the many modern designs of hard wood mantels manufactured for the trade by the Foster-Munger Company, West Twentieth and Sangamon streets, Chicago, Ill. These mantels are furnished principally in plain sawed and quarter sawed oak, red birch or birch stained to imitate cherry or mahogany. An oak mantel can be treated either medium, antique or old English or finished in oil natural. The mantels can also be furnished in curly birch, bird's-eye maple, genuine solid cherry or in white and gold at some advance above the prices charged for the standard finish. All are made with adjustable wall plates to fit chimney breasts from 4 feet 10 inches wide up to 5 feet 4 inches wide. The manufacturers furnish everything complete for the erection of the mantels, including grates, except the fire brick, which can usually be bought at home for less than the freight would cost from Chicago. A mantel boxed for shipment weighs about 300 pounds. The hight of the mantel here illustrated is 7 feet 1 inch, the size of the French bevel mirror plate is 18 x 40 inches and the opening is 41½ x 41¾ inches. Any ordinary workman can fit the grates in the mantel The company have issued a magnificent catalogue, which shows a great variety of hard wood mantels as well as a very complete line of all kinds of doors, sash, blinds, moldings, grilles, &c.

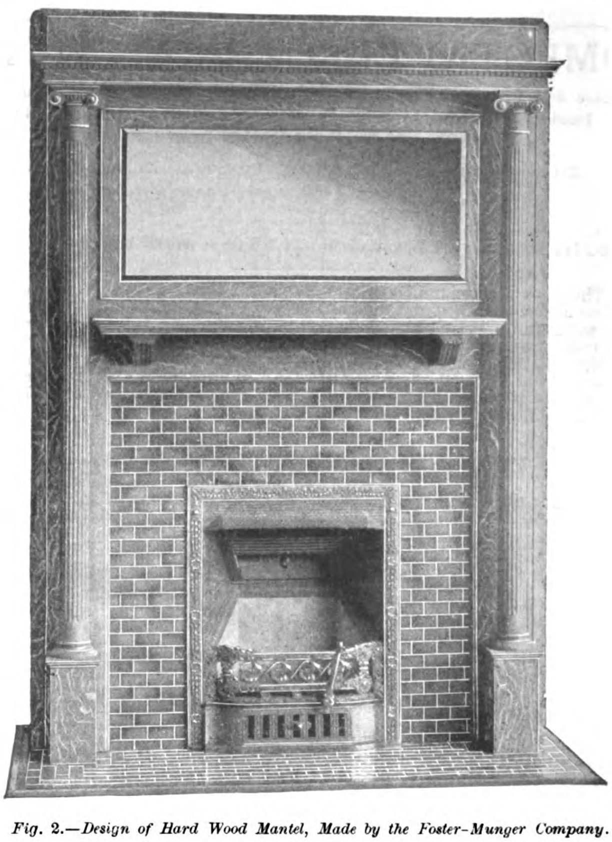


Fig. 2.—Design of Hard Wood Mantel, Made by the Foster-Munger Company.

Improved Grand Rapids Sash Pulley.

An illustration is given in Fig. 3 of the improved all steel sash pulley wheel now used by the Grand Rapids Sash Pulley Company, Grand Rapids, Mich The two disks composing the wheel are fastened together at four points where they interlace, which also provides a thick steel bushing for the bearing. The particular advantage of this wheel is the strength that the interlaced eyelets give it. The wheels have been tested to the extent of nearly 600 pounds and are guaranteed by the manufacturers to hold up any weight that a sash cord will support The construction adopted is a distinct improvement in this line of goods on account of the old wheel splitting apart and allowing the cord to rest on the axle, defeating the object for which the pulley was originally devised.

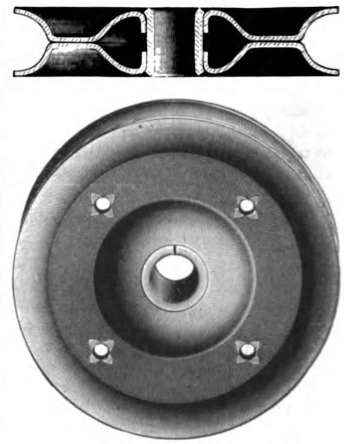
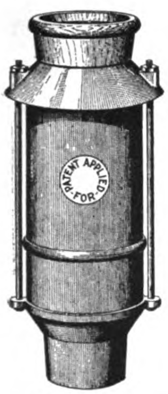


Fig. 3.—Improved Grand Rapids Sash Pulley.

Cooper's Leader Ventilator.

A novel attachment for leader pipe, known as Cooper's leader ventilator, has been patented and is manufac tured by the National Sheet Metal Roofing Company of Jersey City, N. J., general and sectional views of it being shown in Figs. 4 and 5. It is pointed out by the manufacturers that the corrosive action of sewer gas and dampness on the inner surface of the rain water conductors results in the leader giving out in one-half of the time of the roof it drains, and in many cases its life is not one-fourth that of the roof. To overcome this difficulty they have devised a leader ventilator, the construction and use of which will be readily understood by reference to the engravings. It is in reality a section of pipe substantially constructed of wrought and cast iron, galvanized, to be inserted in the leader near where it enters the drain.



Novelties.—The Leader Ventilator.—Fig. 4.—General View of the Device.

Within this section is a valve supported by a light spring against the circular seat, as shown in the lower part of Fig. 5. When the water falls through the leader it compresses the spring and the water finds free exit through the lower mouth. When the rain ceases the spring raises the valve to its seat, preventing the ingress of air from the drain or sewer. At the

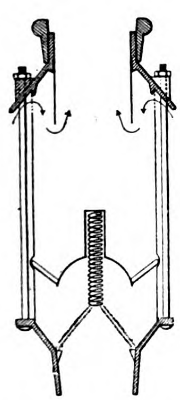


Fig. 5.—Sectional View.

same time ventilation is secured, as shown by the arrows, the air entering under the upper hood and keeping the leader dry. The upward closing valve is of copper, while the spring and attachments that hold it in place are of brass.

Union Brand Leather Handle Screw Driver.

A screw driver put on the market by the Union Mfg. Company, Buffalo, N. Y., and possessing features of interest to the trade is shown in Fig. 6. The handle can be used in the regular way or as a T-lever, as shown in the illustration. This feature is claimed by the manufacturers as indispensable for heavy work. It is also claimed that the driver is the only one made with a handle that can be used as a T lever. The handles are made of only the best quality of sole leather with powerful automatic machinery, it is explained; also that the steel used in the bits is of the highest grade, made to order for the purpose, hand forged and well tempered. Every tool is guaranteed.

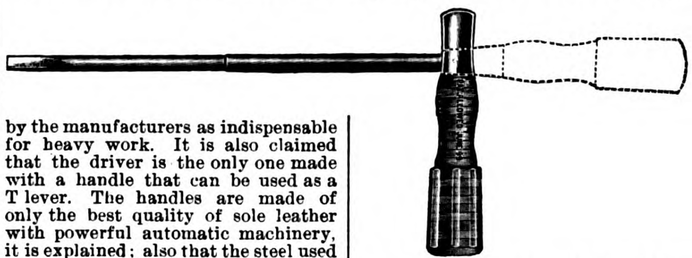


Fig. 6.—Union Brand Leather Handle Screw Driver.

The Montross Metal Shingle Company,

Camden, N. J., have just issued a handsome 36-page illustrated catalogue covering their architectural sheet metal building materials. The book is compiled especially for circulation among architects and property owners, but is also interesting to the roofing trade as embodying a lot of information not generally at hand concerning the values of different metals for roofing purposes. The Victor tile, prominent among the productions shown in the book, is a handsome affair, deeply embossed and made with the company's well known telescope side locks. Gothic and Diamond tiles for mansards, towers, windows, bulkheads, porches and for siding are shown, as are also Eastlake and Octagon shingles. These tiles and shingles are all made of tin. Metal siding, Japanese hip capping, ridge capping, roof gutters, conductor heads, finials and other architectural materials are shown in variety. A pleasing feature of the book is the number of half tone engravings it contains, covering a number of residences and buildings on which the products of the company have been used.

The Bliss-Heath Low Pressure Pumping Engine.

A pump designed for use in raising water to tanks for furnishing a supply to the upper stories of buildings is the Bliss-Heath vacuum or atmospheric pumping engine shown in Fig. 7, and built by the E. W. Bliss Company of 16 Adams street, Brooklyn, N. Y. The device consists of a double acting engine operating a double acting pump, a tubular steel boiler for a pressure of only 1½ pounds, a surface condenser and a single acting air pump. The motive power of the engine is the normal atmospheric pressure (14.7 pounds to the square inch) brought to bear upon the power piston by means of a vacuum formed in the power cylinder, alternately above and below the power piston. The air is expelled from the power cylinder by admitting steam without appreciable pressure, after which the steam itself exhausts into the surface condenser, in which a constant vacuum is maintained. Steam is then automatically admitted into the power cylinder, alternately above and below the power piston, for either the up or down stroke, breaking the vacuum and giving the piston the required impetus. The principle is the same as that of an ordinary condensing steam engine except that to operate this engine only enough steam is required to be generated to balance the normal atmospheric pressure. The surface condenser and the air pump perform their usual functions.

The generator or boiler is exceedingly simple, having at the top a large opening into which fits a light cover or safety valve, like that of a tea kettle. A very light pressure of steam suffices to lift the cover, affording a vent and making the generator absolutely safe from danger of explosion. The generator is fed automatically by means of the water tank pressure. On account of the freedom from explosion of this engine no licensed engineer or skilled mechanic is required to operate it. Coal or wood may be used as fuel. The engine can be operated in connection with an

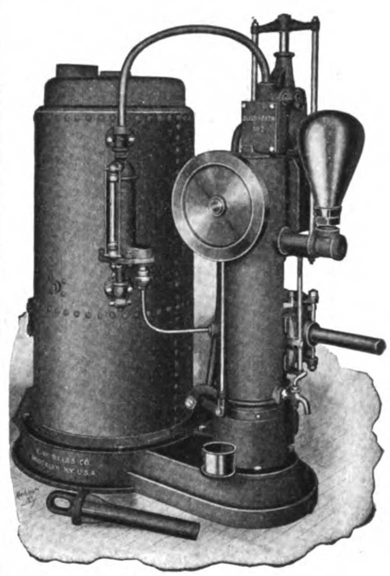


Fig. 7.—The Bliss-Heath Low Pressure Pumping Engine.

ordinary low pressure house heating steam boiler, thus making the cost of operation very low during the steam heating period. During the warm weather, and all the year where buildings are not heated by steam, the small steel boiler furnished with the engine provides ample power at low cost. The engine is self oiling, and steam and water being themselves good lubricants, there is no "gumming up" to clog the machinery and impair its efficiency. Its wearing parts are heavy, durable, simple, reliable and interchangeable. An important feature of the pump is that it never "pounds," and is practically noiseless. The pump is made at present in a number of sizes, from 300 up to 3000 gallons per hour 50 feet high, or corresponding quantities a greater or less hight than 50 feet.

Simonds Saw Tools.

The cuts herewith shown relate to saw tools put on the market by Simonds Mfg. Company, Fitchburg, Mass. The saw tool illustrated in Fig. 8 is referred to as insuring a quick, accurate and rigid adjustment of the raker gauge. With this the depth of a raker tooth can be varied from 1-16 to 1-1000 inch, the slide, it is explained, being held firmly in all positions. The manufacturers claim that there is no chance to dislocate the slide when once set in position, a feature peculiar to this tool; also that it permits holding the jointing file square with the body of the saw. Fig. 9 shows a hammer and a setting slot combined in one tool. It is pointed out that the manner in which the hammer is poised—the way the weight is distributed—is best adapted to the work in question. The advantages claimed for the hammer are that the wide jaws of the setting slot prevent injury to the tooth, that the hammer is perfectly balanced as regards the body and that it is easy to handle.

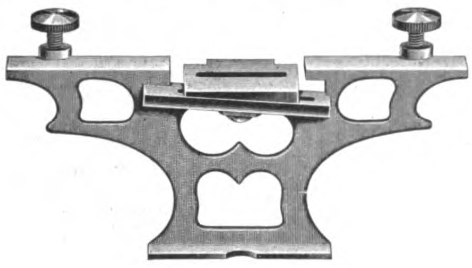


Fig. 8.—Crescent Saw Tool.

Fig. 9.—Swaging Hammer.

NOVELTIES.- SIMONDS SAW TOOLS.

The Kilmer Lawn Fence and Steel Posts.

The Kilmer Wire Mfg. Company, Chicago, Ill., are manufacturing the lawn fence and steel posts of which an illustration is given in Fig. 10 of the cuts. The posts are intended to be set in concrete, so that the fence requires no top rail or bracing. A hole for these posts is dug about 6 inches larger than the spread of the post at the bottom, the hole being a little larger at the bottom than at the top. The concrete is easily made. The company's directions are to take four shovelfuls of crushed stone or coarse, clean gravel, two shovelfuls of clean sand and one shovelful of good cement, to be mixed with water and put around the post immediately after mixing it, and tamping down thoroughly. The fence is of an ornamental character, is 36 inches in hight and is constructed with the Kilmer spring twist in all the cables, which overcomes any tendency to expand or contract.

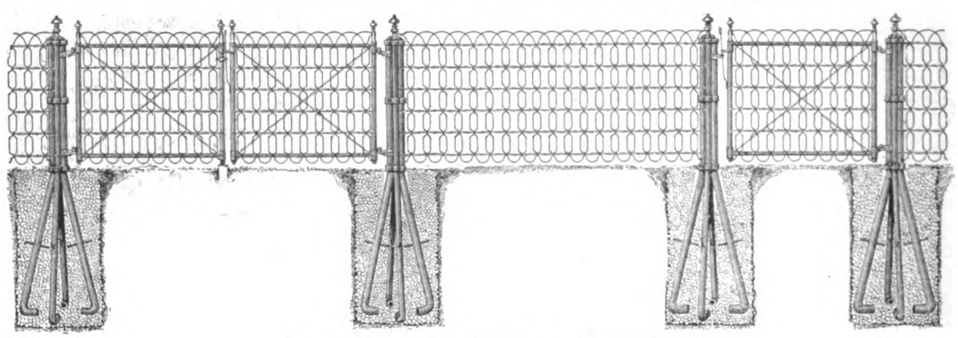


Fig. 10.—The Kilmer Lawn Fence and Steel Posts.

Starrett's Catalogue of Mechanics' Tools.

We have just received from the L. S. Starrett Company of Athol, Mass., a copy of what is known as Catalogue No. 16, this superseding all previous catalogues sent out by the manufacturers. It is a publication of 112 pages, profusely illustrated, neatly printed on good paper and is bound in attractive paper covers of a design suggestive of some of the lines of goods manufactured by the company. An important announcement to the trade is found among the early pages of the volume, together with a view of the company's works. The manufacturers state that every tool listed in the catalogue is warranted accurate and satisfactory and that the prices of the tools as given are net.

In offering this catalogue to the trade the company direct special attention to the following new tools: Combination squares with hardened blades, new style combination square, No. 17; carpenter's square, center square, pocket slide caliper, micrometer gauge No. 24, 12 to 36 inches; micrometers with finger ring, micrometers with ratchet stop, attachment for converting a 2-inch into a 1-inch micrometer, micrometer No. 127, 0 to 12 inches; inside micrometer, 32 to 107 inches; thickness gauge No. 172, inspectors' gauges, Little Giant jack screws, complete line of hack saws, Universal surface gauge No. 57, screw adjusting calipers, double calipers, carpenters' dividers No. 92, stair gauge fixtures No. 111, trammels No. 59, drill and tap gauges. The makers have changed and improved the designs of No. 11 squares, No. 9 sets, No. 1 cut nippers, No. 47 bevels, Nos. 120, 125 and 126 inside caliper gauges, Nos. 26, 36 and 38 calipers; have added valuable attachments to No 360 protractor and No. 66 guide liner, and have increased the number of sizes of several tools.

The company state that they have stopped making the ordinary soft steel rules and that their former surface gauge No. 55 is replaced by a better one known as No. 57. It is also announced that milling cutters are no longer manufactured. While the company have added a line of combination squares with hardened blades for those who may prefer them their regular No. 11 blades will still be made as before, with sufficient hardness for all ordinary purposes. In connection with the goods illustrated will be found ample descriptive text calling attention to the important features of construction and operation, list prices and dimensions. One page at the close of the catalogue is devoted to a list of the company's foreign agents, with reference to their New York store at 126 Liberty street, where a full stock of tools is carried. The catalogue concludes with an alphabetical index and some remarks on postal insurance.

The W. I. C. Wire Stair Tread.

Shenango Specialty Works, Sharpsville, Pa., are offering wire stair treads, constructed upon the plan of the concern's wire floor matting, but to fit the steps of stairs, and can be made of iron, steel, brass or aluminum wire. The manufacturers explain that if placed on outside steps the treads clean the feet much better than a mat, that they do not become displaced, that they can be taken up instantly and as easily replaced, that they will not kick or kink up, and that they permit ice, mud, snow and dirt to pass through and dry out underneath. The treads are furnished to fold, or in sections, or in one piece, according to the size of step and requirements of the purchaser. It is pointed out that in public buildings, flats and business establishments the treads are superior to a solid sheet tread of brass or cast iron, as they are more cleanly and almost noiseless, and do not retain mud, dust or disease germs.

Tool and Cutlery Grinders.

The Acme knife and tool grinder and Schofield's Scientific knife and scissors grinder are among the specialties now being turned out by Schofield & Co. of Freeport, Ill. In Fig. 11 is shown the Acme knife and tool grinder. The frame is strong, the driving wheel 12 inches in diameter and the emery grinding wheel is 4 inches in diameter with a face ¾ inch wide. This machine is intended for sharpening chisels, planes and any carpenters' tools, particularly such as require a true bevel. A feature of the grinder is that it is portable and if necessary after use can be hung up out of the way. The Acme grinder is especially recommended to carpenters, hotel and restaurant keepers and any who use cutlery or edge tools, particular attention being called to the moderate cost.

In Fig. 12 is shown the knife and scissors grinder, which is designed for use in the family for use in sharpening knives, scissors and similar small articles in daily use. It has a 2-inch corundum wheel and a capacity for fine work. The frame is japanned. On either side of the wheel are rests, which can be set at any angle to grind the blade thin or otherwise. By holding the flat side of scissors blade against the rest at the top of the wheel and passing the blade back and forth from heel to point it grinds it to the correct bevel the whole length of the blade.

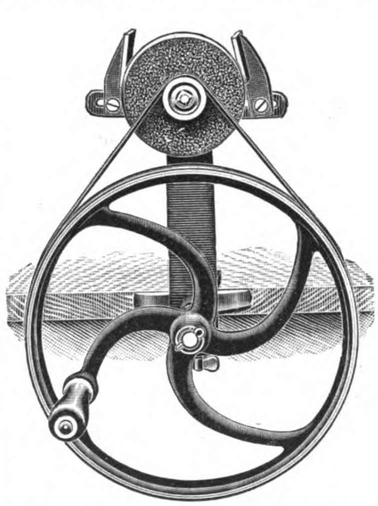


Fig. 11.—Acme Knife and Tool Grinder.

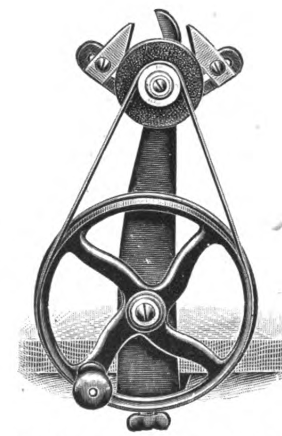


Fig. 12.—Knife and Scissors Grinder.

Novelties.—Tool and Cutlery Grinders.

TRADE NOTES.

THE International Correspondence Schools at Scranton, Pa., have recently issued a very interesting pamphlet, bearing the suggestive title of "The Official Messenger." The issue at hand contains a very full account of the school, the buildings occupied and the facilities afforded for study. It is beautifully illustrated by half-tone engravings and is intended to serve "as a medium of communication from the home office to the constantly increasing force of solicitor collectors and assistant superintendents." The management have also recently issued circulars calling attention to the special privileges to all who enroll before January 1, 1900.

FREDERICK REISSMANN of West Point, N. Y., is distributing very neat circulars illustrating his Rafter and Polygon gauge, reference to which has previously been made in these columns. A view of the tool is given, together with an enumeration of some of the uses for which it may be advantageously employed. It is described as being unlike any other tool on the market, "saves time for the skilled mechanic and enables the ordinary workman to frame roofs with absolute certainty."

THE GRAND RAPIDS WOOD CARVING COMPANY, Grand Rapids, Mich., have issued a very beautifully illustrated catalogue, comprising 48 pages, of wood carvings, moldings, rosettes, newel posts, balusters, twist work, capitals, columns, &c. The illustrations are in half-tones and are printed on heavy paper of highly calendered finish, enabling the fine points of the company's magnificent work to be brought out in very perfect detail. The specimens presented in this catalogue comprise a very great variety of designs, showing the admirable facilities possessed by the company for this class of work. All their work is carved and not pressed. They are prepared to furnish designs for any kind of ornaments in wood that may be required by architects, contractors and builders.

WE are indebted to John J. Brown, general contractor, carpenter and builder, with office at 308 Post Office Building, Germantown, Philadelphia, Pa., for a neat blotting pad, with copies of which he is favoring friends in the trade. The body consists of several sheets of blotting paper varied in color, while the face calls attention to the fact that Mr. Brown furnishes estimates and gives prompt attention to work in the line indicated. He guarantees all work as strictly first class and claims, as every one knows to be a fact, that "real pleasure consists in having your work done in a satisfactory manner."

THE CINCINNATI BALL BEARING MACHINERY COMPANY, Cincinnati, Ohio, send us a 16-page pamphlet bound in colored paper covers calling attention to Parks' patent foot and hand power wood working machinery. In offering this to the trade the manufacturers call attention to the fact that after years of experience with foot and hand power machinery, and with the additional experience and suggestions of skillful mechanics, they are now able to produce "the most practical combination of machines on the market, also cutter heads and saws with special shaped teeth that will do the work with as little power as possible and have properly geared the machines to get the best results." Reference is made to the fact that the machines are being extensively used in the United States, Canada and foreign countries. The machines illustrated and described include combined saw machine with ball bearings, combined rip cross cut and jointer, rip saw, band saw and boring attachments, scroll saw, shaper and lathe attachment, jointer heads, &c.

THE UNITED STATES MINERAL WOOL COMPANY of 2 Cortlandt street, New York City, present in their announcement in another part of this issue some interesting comments regarding the use of mineral wool in connection with house construction. Sections of roof, floors and walls are presented, showing how mineral wool may be employed to keep a house warm in winter, cool in summer and at the same time make it sound proof. Reference is made to the fact that the lining is vermin proof and that neither rats, mice nor insects can make their way through or live in it. Another point which is emphasized by the company is that mineral wool checks the spread of fire and keeps out dampness. Samples and circulars will be sent by the company to those who may be sufficiently interested to apply for them.

THE BERLIN IRON BRIDGE COMPANY recently shipped from their works in East Berlin, Conn., 27 cars of structural material, consigned to the United States Commission at Paris, France. This trainload of material is for the steel framework of a typical American machine shop, to be used exclusively by the American exhibitors of iron and wood working machinery at the fair of 1900. The material comprises a building 343 feet long and 74 feet wide and will be equipped with motive power in order that American exhibitors may show their machinery in practical operation and at the same time make an exhibit of a typical American machine shop, with all modern appliances.

HAND AND FOOT POWER wood working machinery for carpenters and general wood workers forms the subject of an announcement in another part of this issue by Niles, Luhn & Co., 526-528 Livingstone street, Cincinnati, Ohio. The company call special attention to their combination rip and cross cut saw with scroll saw, plowing and rabbet attachment, also to their new and improved foot power mortiser, edge molders, mitering and trimming machines, &c. The claim is put forth that the machines are made for good work and are of a character to give entire satisfaction. The company will furnish catalogue and prices on application.

THE GARRY IRON & STEEL ROOFING COMPANY are preparing to move into their new factory buildings in the eastern part of the city, which, when in full operation, will comprise one of the largest plants in Cleveland. The building to be used in the manufacture of structural iron work is 240 x 70 feet, while the main factory, in which will be manufactured heavy machinery, is 130 x 295 feet. The demand in all departments is greater than ever before and they are at work on some very large contracts. A revolving derrick, one of the most powerful ever built, has recently been completed for Hunkins Brothers, contractors, and it is now at work on the Cleveland breakwater. It was designed by Kaltenbach & Griess of Cleveland and has a number of new features. A coal handling rig of unusual size was recently shipped to Peekskill, N. Y. The Garry Company have furnished a greater portion of the cement plants recently put up in this country, and are now at work for a large plant for the Oniga Portland Cement Company of Jonesville, Mich. A heavy shipment of structural iron work is soon to be made to Pine Bluff, Ark.

THE ACME KNIFE AND TOOL GRINDER is a device which is being introduced to the trade by Schofield & Co., Freeport, Ill., and is illustrated and briefly described in their advertising space this month. The claim is made for it that it will grind carpenters' tools of all kinds, requiring a true bevel "more perfectly in half the time and with less than one-half the labor required with a grindstone." The tool is such that it can be clamped to the bench, carried in the tool chest or hung up on a nail.

THE B. F. STURTEVANT COMPANY of Boston, Mass., report an increase of nearly 40 per cent. in the volume of their business for 1899 as compared with the previous year. The shipments, both foreign and domestic, included fan blowers for all purposes, heating, ventilating, drying and mechanical draft apparatus, engines, electrical apparatus, &c. During the past year an addition covering 20,000 square feet has been made for the use of the electrical department, which has shown the most rapid growth, the output having more than doubled during the year, and covering principally electric fans and special generating sets. The sale of mechanical draft apparatus has been practically quadrupled, while the output of engines has increased one-third over that of the preceding year and has included many special designs.

THE ILLINOIS ROOFING & SUPPLY COMPANY, Chicago, are distributing a remarkably fine catalogue of copyrighted designs of continuous steel ceiling, side wall plates, borders, corner plates, moldings, cornices, centers, friezes and wainscoting; in short, of everything necessary for the steel ceiling trade. A great variety of designs is shown, from simple to highly ornate. The catalogue comprises 24 broad pages, heavy paper being used to bring out the handsome cuts to best advantage.

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— SIMILARITY IN EPITAPHS.—"Mama," thoughtfully said the child, who had been playing among the tombstones all day, "where are the wicked people buried?"—*Judy*

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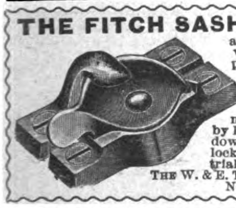

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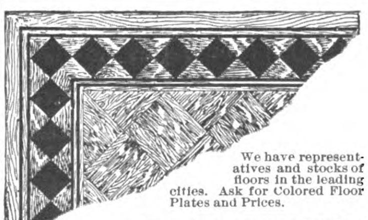

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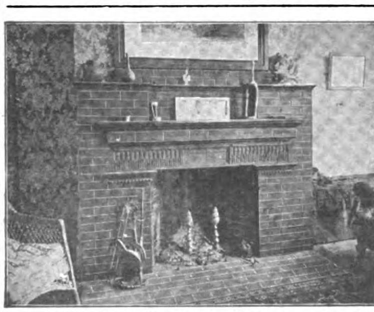

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Elting, Irving & Co.
Fitch, W. & E. T. Co.
Ives, H. B. & Co.
New Century Mfg. Co.

Sash Pulleys
Empire Forge Co.
Fox Machine Co.
Grand Rapids Hardware Co.
Palmer Hardware Mfg. Co.

Sash Weights
Barney & Reed Mfg. Co.
Raymond Lead Co.

Sashes, Doors and Blinds
Foster-Munger Co.

Saws
Jennings, C. E. Co.
National Saw Co.

Saw Guide
Thomson Bros. & Co.

Saw Jointer
Pike Mfg. Co.

Saw Sets
Taintor Mfg. Co.

Schools
Academy of Architecture and Building.

Screw Drivers
North Bros. Mfg. Co.
Russell & Erwin Mfg. Co.
Sawyer Tool Co.

Sheet Metal Fronts
Mesker & Bro.

Shingles and Tiles, Metallic
Berger Mfg. Co.
Burton, W. J. & Co.
Cortright Metal Roofing Co.
Garry Iron & Steel Roofing Co.
Montross Metal Shingle Co.
Thorn Shingle & Ornament Co.
Van Noorden, E. Co.

Shingle Stains
Cabot, Samuel.

Shutters (See Blinds.)

Skylights
Canton Steel Roofing Co.
Kanneberg Roofing Co.
Van Noorden, E. & Co.

Speaking Tubes
W. R. Ostrander & Co.

Spring Hinges
Bommer Bros.

Squares
Mayhew, H. H. Co.

Stable Fittings
J. L. Mott Iron Works.
Ludlow-Saylor Wire Co.

Stained Glass Windows
Keystone Stained Glass Works.
Wallis, A. H.

Steel Figures and Letters
Sackman, F. A.

Tiling
Star Encaustic Tile Co.

Tool Cabinets
Hammacher, Schlemmer & Co.

Tool Chests
Jennings, C. E. & Co.

Tool Grinders
Schofield & Co.

Tools
Gage Tool Co.
Hammacher, Schlemmer & Co.
Jennings, C. E. Co.
Leavitt Mch. Co.
Mayhew, H. H. Co.
Millers Falls Co.
North Bros. Mfg. Co.
Sawyer Tool Co.
Smith, Otis A.
Stanley Rule & Level Co.
Starrett, L. S. Co.
Strelinger, C. A. Co.
Walter's Sons, Wm. P.

Turn'd, Mold'd, Carv'd Wk.
Grand Rapids Carved Moulding Co.
Mertz's, Geo. Sons.
Standard Wood Turning Co.
Waddell Mfg. Co.

Ventilating Attachment
Ormsby, E. A.

Ventilators
Doerge, H.
Globe Ventilator Co.
National Sheet Metal Roofing Co.

Wax, Floor
Butcher Polish Co.

Weather Strips
Church, E. I. & Co.
Hammacher, Schlemmer & Co.

Weather Vanes
Jones, Thos. W.
Mott, J. L. Iron Works.

Window Fasteners
Stanley Works.

Wood Ornaments
Waddell Mfg. Co.

Wood Working Machinery
American Wood Working Machine Co.
Ball Bearing Machinery Co.
Barnes Tool Co.
Barnes, W. F. & John.
Cordesman, Meyer & Co.
Crescent Machine Co.
Fay, J. A & Co.
Fox Machine Co.
Marston, J. M. & Co.
Miles, Luhn & Co.
Seneca Falls Mfg. Co.
Seymour & Whitlock.
Towsley, J. T. Mfg. Co.
Yerkes & Finan Wood Working Mch. Co.

Woods, Ornamental
Albro, E. D. & Co.

Work Holder
Johnson Bench Tool Co.

Alphabetical Index to Advertisers.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS

232-238 WILLIAM STREET, NEW YORK.

FEBRUARY, 1900.

The Building Situation.

The reports which have been received covering building operations during the year just brought to a close show that with few exceptions every part of the country has witnessed a most gratifying degree of activity. This tendency toward improvement was more noticeable perhaps in the latter part of the year than it was in the spring, as at that time building enterprises had not yet begun to feel the stimulus of the rapidly growing prosperity which was manifest all over the land. As in times of depression the building business is the last among the various lines of industry to be adversely affected, so in times of prosperity it is the last to reflect the prevalence of good times. This raises the hope that the year upon which we are now entering will witness a large volume of business in the building line, and if the opinions of architects, builders and contractors scattered over a wide area are any criterion, these expectations are likely to see substantial realization. In some instances where labor troubles have been deterrent factors in the situation, causing a heavy falling off in the amount of work done as compared with the previous year, the existing difficulties have been so far adjusted as to give promise of a revival of activity as soon as the building season opens. In striking contrast to such instances, however, are the records of cities where building operations were conducted upon a scale of unprecedented magnitude. In New York, for example, in the boroughs of Manhattan and the Bronx, the extent of the operations during 1899 was far ahead of anything heretofore known, the number of buildings projected reaching an aggregate of 4933, not including 3350 alterations, and involving an estimated expenditure of $135,982,960, as against $78,484,627 in the previous year. A part of this greatly increased total was obviously due to the fact that the new building code went into effect December 23, and many plans were filed just before that date in order to take advantage of the easier provisions of the law of 1892. In fact, during the week ending with the date named permits were issued by the Department for more than 300 buildings, estimated to cost in the neighborhood of $15,000,000. While it is probable that many of the buildings for which provision has been made in the plans filed will not be erected for a long time to come, the showing is certainly a remarkable one for such a period, and at the same time the record of the year is striking evidence of the general prosperity which prevails. All things considered, therefore, the present situation has in it much of substantial promise for the members of the building profession.

A Large Riding Academy.

A movement is at present on foot to give this city what will probably be the largest riding academy in the country, if not in the world. It will occupy something like a dozen city lots, and the estimated cost is placed in the neighborhood of $500,000. The plans for the structure have recently been filed with the Building Department, and according to them the academy will have a frontage of 200 feet on West Sixty-sixth street, between Central Park West and Columbus avenue, and of 100 feet on Sixty-seventh street. It will be of steel construction, with walls of red brick and trimmings of terra cotta. According to the design of the architect, Henry F. Kilburn, the central portion of the building will be the riding ring, which will have a promenade its entire length. In the eastern wing will be located the apartments for the clubs, the basement being fitted with public bathing rooms, lockers, shower baths, steam drying room, &c. On the first floor there will be reception and reading rooms, smoking room and administrative offices, while on the second there will be a large club room and a ladies' parlor and dressing room. The other three floors of the eastern wing will be devoted to riding and driving clubs. In the western wing will be located the stables with stalls for 400 horses, rooms for carriages and automobiles, harness storage rooms, supply rooms, &c. The gallery overlooking the riding ring will have a seating capacity for 1500 people, and additional chairs can be added to accommodate 1000 more. The band stand will be of sufficient size to accommodate 40 musicians.

Failures in 1899.

Among the tests of business prosperity none is found more reliable than the record of commercial failures. In this respect the year 1899 stands in remarkably favorable comparison with the years that have gone before. Notwithstanding that several important failures fell into the last few days of the year, adding several millions to the total of liabilities, the commercial mortality was smaller than in any other year of the past twenty-five, excepting 1880 and 1881, while the average of liabilities per failure was less than in any previous year, and, most important test of all, the rate of defaults to solven payments through clearing houses was the smallest ever known. Moreover, the falling off in failures last year was not only in the aggregate, but was also shown in every section of the country and in all classes of business. Such uniformity of improvement throughout the country is extremely rare, and would be impossible if business conditions were not generally sound and prosperous. The total number of business failures last year, according to the returns of *Dun's Review*, was 9337, as compared with 12,186 in 1898, 13,351 in 1897 and 15,088 in 1896. The liabilities of 1899 aggregated $90,880,000, as against $130,663,000 in 1898, $154,332,000 in 1897 and $226,097,000 in 1896. In the panic year, 1893, they amounted to $346,780,000. Had it not been for the nest of failures resulting from the speculative collapse in Boston at the close of the year, the aggregate of liabilities for 1899 would have been about $21,000,000 less than it was, or under $70,000,000. Of the $90,880,000 commercial defaults last year, $30,792,000 were in manufacturing, against $57,544,000 in 1898, and $48,925,000 in trading, as compared with $61,918,000 in the preceding year. The decline in manufacturing and trading failures was larger than ever before in every section, except New England, where a number of concerns became involved in the troubles before referred to. In New York the manufacturing failures were only about one-quarter of those in two years of the previous five and but half those of the other three preceding years. All other sections of the country display strikingly favorable comparisons, showing the lowest average of commercial liabilities ever reported.

Heavy Fire Losses.

Unlike the great majority of business interests the fire insurance companies found the year just closed a very disastrous season. Many of these concerns, it is feared, will show a heavy loss on their year's operations. The fire loss statistics of the New York *Journal of Commerce* for 1899 show, for the United States and Canada, a total of $136,773,200, an increase over 1898 of $17,000,000, $26,000,000 over 1897 and $30,000,000 over 1896. During the past year there were eighteen fires each of which involved a loss of over half a million dollars, the largest individual loss being in Philadelphia, where $1,725,000 worth of property was wiped out in the large department store and publishing house conflagration in November. The Windsor Hotel fire in New York City and the big fire which devastated Victor, Col., each inflicted over $1,100,000 of damage. Other big fires of the year occurred with losses between $500,000 and $1,000,000 in Chicago (three), Columbus, Ohio; Dawson City, Alaska; Philadelphia, St. John, N. B.; Toledo, Ohio; Cincinnati, New York City, Brooklyn (two), Augusta, Ga., and Montreal, Canada. The fires exceeding $10,000 in destructiveness numbered 2345. That an average of $11,400,000 worth of property should have gone up in smoke each month in spite of all our improved fire fighting facilities seems a deplorable waste. The fire underwriters are naturally much discouraged over the outlook and are planning for united action in the direction of higher rates for insurance in the current year.

George Tapper.

Members of the building profession will learn with deep regret of the death at his home in Riverside, near Chicago, on January 9 of George Tapper, first vice-president of the National Association of Builders and one of the oldest and best known building contractors in that city. Mr. Tapper was born in Devonshire, England, May 29, 1835, and while yet a boy learned the trade of mason from his father. He went to Chicago in 1852, entering the employ of William E. Mortimer & Co. In 1864 he became a member of the firm under the title of Mortimer, Loberg & Co., which continued until 1866, when Mr. Loberg withdrew, the firm then being known as Mortimer & Tapper. The concern built some of the first of the large buildings in the city, as well as the Michigan Southern Depot, First National Bank Building, Montauk Block, numerous churches and the Grand Pacific Hotel. The last public service Mr. Tapper rendered was when he was appointed a member of the Swift Tax Commission. That body placed a valuation upon all the realty holdings in the First Ward. At the time his judgment as to the value of the largest buildings in the heart of the city was not disputed, and he was considered an extremely capable member of the commission. He was appointed by former Mayor Swift at the suggestion of former Commissioner of Public Works Joseph Downey, who was one of Mr. Tapper's earliest and best friends.

Previous to his election as first vice-president last year Mr. Tapper had filled the office of treasurer of the National Association of Builders ever since its organization. He was an ex-president of the Chicago Builders and Traders' Exchange and a member of the Builders' Club of that city, both of which passed resolutions of regret at a recent meeting.

New Horace Mann School.

The plans were recently filed with the Building Department for the new Horace Mann School, which will occupy the easterly block fronting on Broadway between 120th and 121st streets, New York City, the estimated cost of the structure being placed at $350,000. The designs furnished by Josselyn, Howells & Stokes provide for a structure five stories in hight, built of brownstone and Holland brick, surmounted by a steel and slate roof, which will be ornamented with a cupola over the Broadway entrance. Across the front elevation will be carved panels bearing the names of philosophers and men noted for educational work. Two floors of the building will be devoted to an auditorium, with a balcony, having seats arranged on the horseshoe plan. The rest of the structure will be used for the various classes.

The Decision in the Thirtieth Competition.

We take pleasure in laying before our readers the decision of the committee having in charge the award of prizes in the Thirtieth Competition, being that covering the construction of Inside Folding Window Blinds or Shutters. The responses to the invitation extended in the issue for December last were such as to indicate widespread interest, coming as they did from many sections of the country. Under the conditions of the contest, the committee have awarded the first prize to Frank J. Grodavent, Fort D. A. Russell, Wyo., and the second prize to Howard B. Gallaway, 315 North Greene street, Baltimore, Md.

The committee also announce that the article submitted under the *nom de plume* of "Nail" is worthy of special mention, both by reason of the author's description of the method of doing the work and the excellence of his drawings. Other contributions entitled to notice are those submitted under the *nom de plumes* of "Kent" and "Utopia." It may not be without interest, perhaps, to state in this connection that the criticism by the committee of the article submitted by "Kent" is based on the fact that while the several drawings clearly showed the construction of the blinds, he failed to give in his description any idea of the way in which the work was done. The same criticism applies to some extent to the article awarded the second prize, the author failing to make the description as complete, in all respects, as could have been wished. His effort, however, was in the opinion of the committee second in order of merit and a decision was rendered accordingly. In several of the articles submitted important points regarding construction were not properly covered in the description, and in some instances no mention whatever was made of features of the work of making and fitting which would be regarded as essential in a set of properly constructed inside blinds or shutters. We hope in the near future to lay some of these contributions before our readers, and at the same time shall be glad to have them criticise and comment upon them in the light of their own experience.

The Price of Lumber.

The question of the future price of lumber is one which is occupying the minds of those engaged in the industry at the present time, and it is freely asserted that it will never again be as cheap as in recent years. On this head the Cleveland *Leader* observes that it is already a fair question whether or not lumber will ever be cheap, as values were rated less than one year ago. No sound judge of economic and industrial conditions can doubt that many staples will lose much of the advance made in the past ten months. It is inevitable, in the nature of things. With timber and all its products the case is different. The darkening shadow of inadequate or very expensive supplies lies over the trade in merchandise which comes from the forests. It will not be permanently lifted by any known agency. With population and production of all kinds fast increasing, and the country gradually filling up, the demand for timber and wood of all kinds will naturally increase. That means heavier drafts upon the forests, and the best possible care of our remaining sources of supply can hardly make lumber cheap and plentiful, in the old sense. There may be temporary depression in the market, but reactions from too sudden and violent advances in the price level will scarcely last long.

COLONIAL RESIDENCE IN MERIDEN, CONN.

THE growing popularity of the "colonial" in the architectural treatment of dwellings at the present time renders interesting and suggestive the design which we illustrate this month by means of the colored supplemental plate in combination with the elevations, floor plans and constructive details presented upon this and the pages which follow. The character of the design, the treatment of the exterior, combined with the arrangement of the rooms are such as cannot fail to attract attention. A feature which will strongly appeal to many is the arrangement of the rooms on both sides of the main hall and the "den," brilliantly lighted by art glass windows at the right of the main stairs. The disposition of the rooms is such that the front door can be reached from the kitchen without the necessity of passing through any other rooms, while the location of the butler's pantry insures ready communication between the dining room and kitchen. In the second story are four sleeping rooms, one of which has an alcove of good size, ample closets, and a bathroom, all of which are readily accessible from the main stairs, which land in the center of the house. In the attic are two rooms finished for servants' use.

The house, as will be observed, is of frame construction, all timber being of spruce. The first and second floor joists are 2 x 10 inches, the attic floor joists, 2 x 8 inches; the studding, 2 x 4 and the window studs 3 x 4 inches, all studding and joist being placed 16 inches on centers. The sills, girts and posts are 4 x 6 inches; the plates 2 x 4 inches, doubled, and rafters 2 x 6 inches, the latter being placed 20 inches on centers. The frame is sheathed with No. 2 matched spruce, covered with water proof paper, this in turn being covered with clear white pine clapboards. The roof is slated with No. 1 old quarry Bangor, Pa., slate, with boxed hips. All the ornamental work is of London putty. The underpining, front and sides, is rock faced ashlar. The outside chimney and chimney tops are laid up with Trenton red pressed brick.

The first and second floors are double, the finished floors in the dining room and bathroom being of rock maple treated in wax. The kitchen and pantries are North Carolina pine, straight grained and oiled. The hall, vestibule and den floors are quartered white oak 2½ inches wide, treated in wax. The balance of the floors of the house are ⅞-inch matched pine. The dining room and den are treated in brown ash antique finish; the kitchen in North Carolina pine, and the pantries in white pine natural finish. The bathroom is entirely in white enamel and the balance of the house in four coat work, white.

The fire place shown in the sitting room is laid up with red pressed brick, with hearth of the same material. The wood mantel is treated in a way to correspond with the finish of the room. All of the ornamental windows are metallic setting. The laundry is located in the basement and the cellar is cemented. The house is heated by a hot air furnace made by the Dighton Furnace Company, Dighton, Mass. The plumbing is of the most approved type, all being exposed work and nickel plated.

The house here shown is pleasantly located on Broad street, Meriden, Conn., and was erected for I. Burton

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

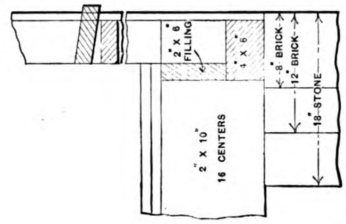
Colonial Residence in Meriden, Conn.—David Bloomfield, Architect.

Miller in accordance with plans prepared by David Bloomfield, architect, 129 State street, Meriden, Conn. The builder was C. Wagemann of the same place.

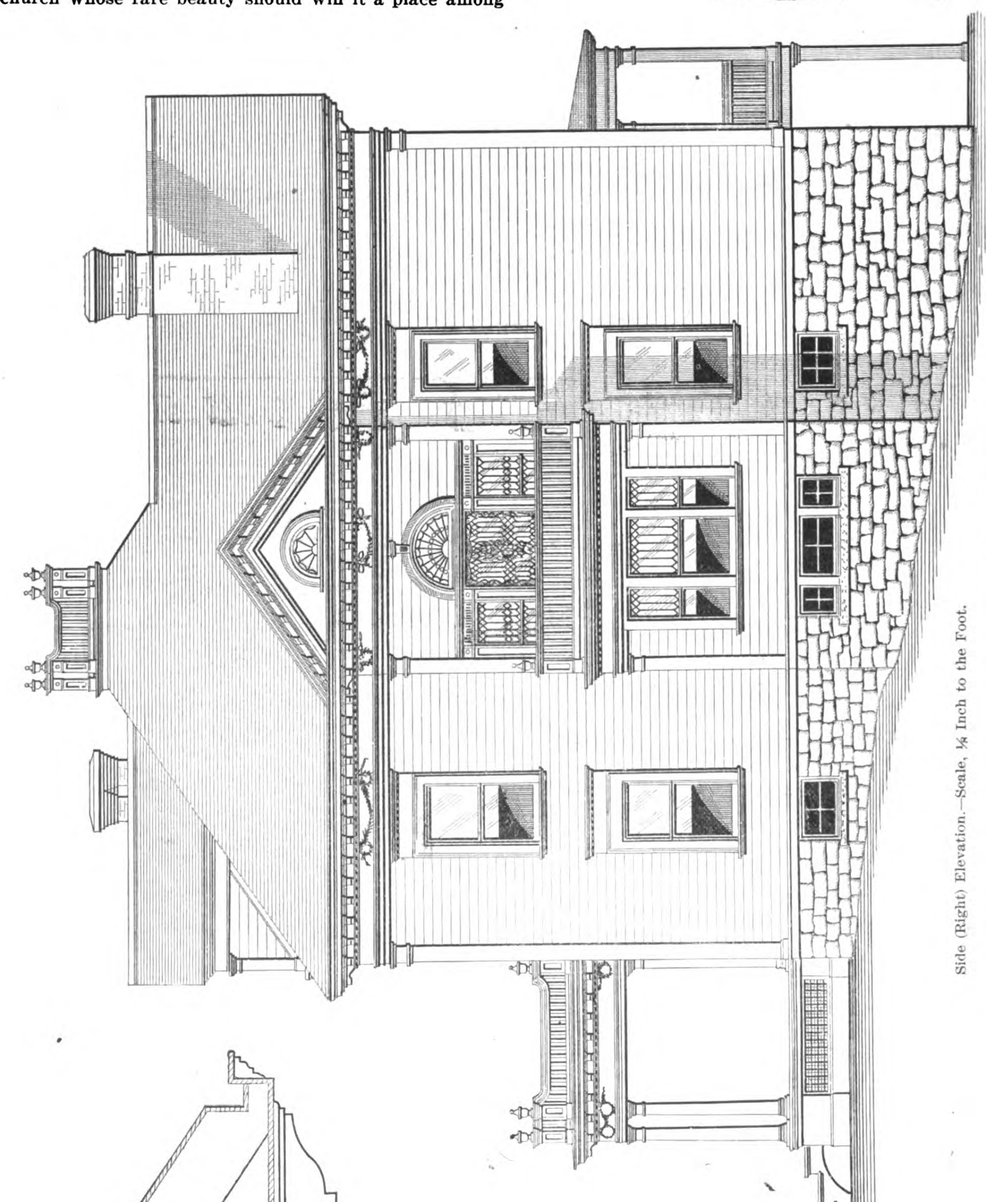
Filipino Wood Carvers.

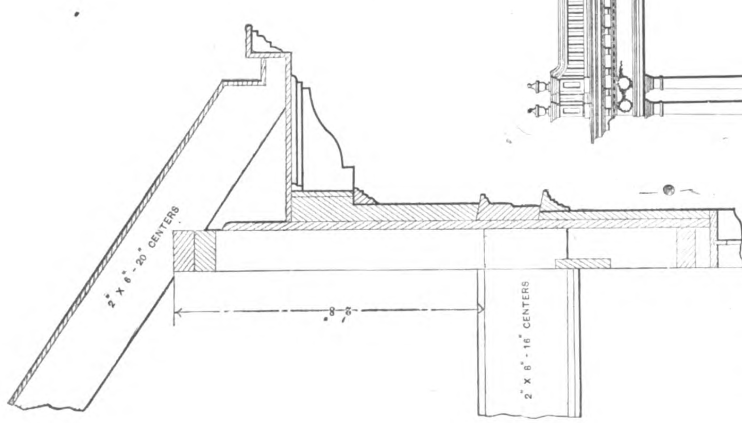
Some interesting facts relative to the skill of the Filipino wood carvers are set forth in a recent issue of the San Francisco *Chronicle*, from which we quote the following:

There stands in the old walled city of Manila a church whose rare beauty should win it a place among the famed temples of the world. It is the Church of St. Ignatius of Loyola, and, as the name would indicate, was



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


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

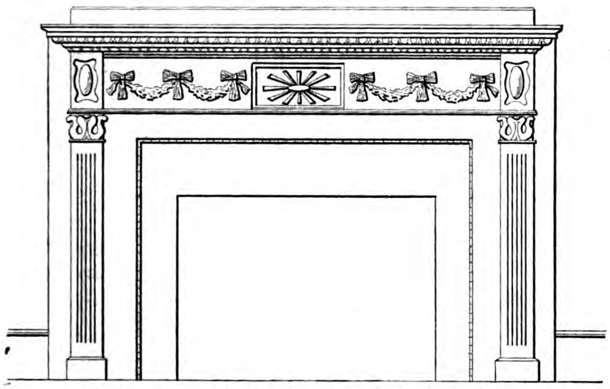


Main Cornice.—Scale, ¾ Inch to the Foot.

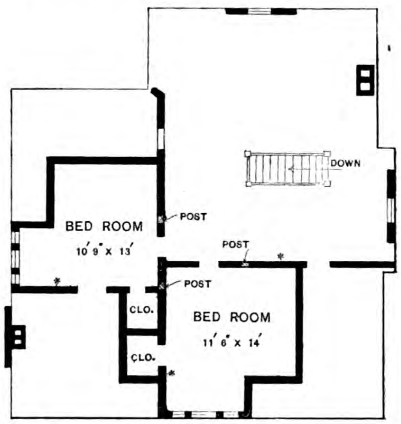
Colonial Residence in Meriden, Conn.—Side Elevation and Miscellaneous Constructive Details.

erected by the Jesuit fathers. The ten years that elapsed between 1879 and 1889 were consumed in its construction, and a success that was truly artistic crowned the effort of a decade. The exterior is neither imposing nor artistic, but it was upon the interior that effort was centered, and few structures in the world can boast of the perfect harmony of effect there attained. Practically the entire interior is done in the native hard woods of the Philippine Islands that have been carved by master hands. A remarkable fact in connection with the work is that it was all done by natives. The designs were all made in Europe, but every credit is due the workmen who so closely followed their models. This incident illustrates a peculiar trait in the Filipinos. They and the effect is at once harmonious and artistic. One of the rectors of the church, under whose direction much of the work has been done, relates that the carving of the base of the pulpit consumed two years, and that the balustrade occupied nearly as much time. Next to the pulpit the ceiling, which is entirely of carved wood, attracts the most attention.

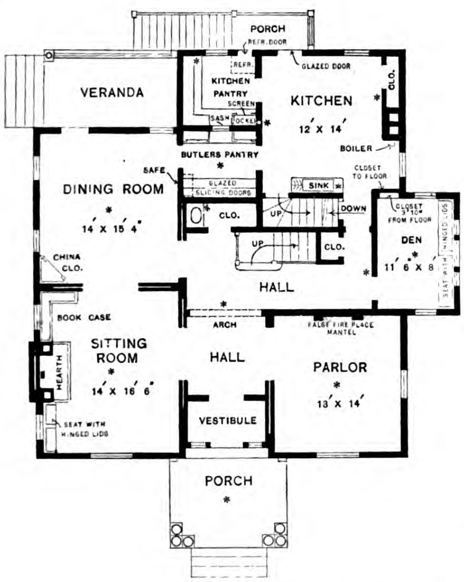
There are a series of intricate designs that show the genius of art and the skill of the carver, and the effect is admirable. The columns, capitals and arches have also been done in wood, and they, too, enhance the beauty of the church. The altars—one main and two



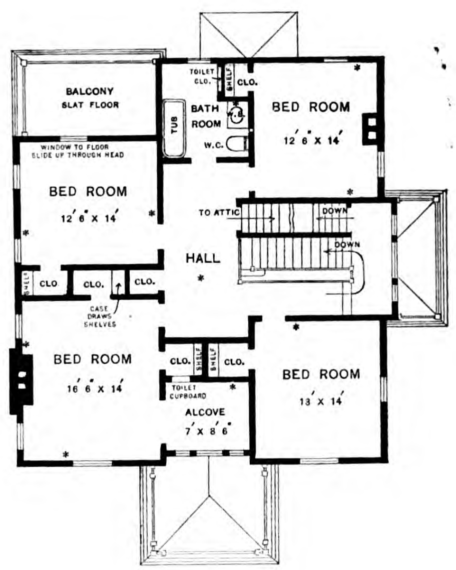
Elevation of Parlor Mantel.—Scale, ⅛ Inch to the Foot.



Attic.



First Floor.



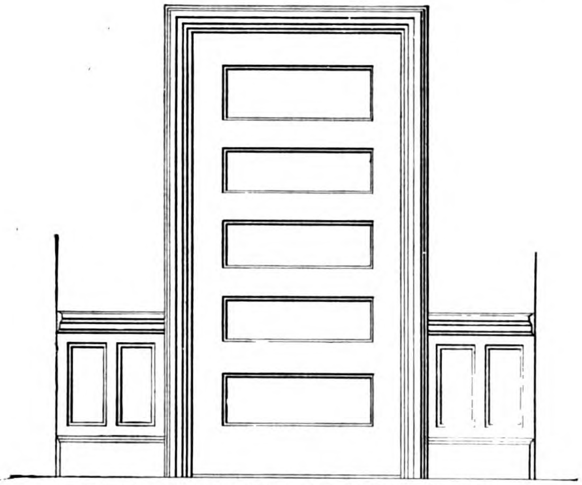
Second Floor.

Colonial Residence in Meriden, Conn.—Floor Plans.—Scale, 1-16 Inch to the Foot.

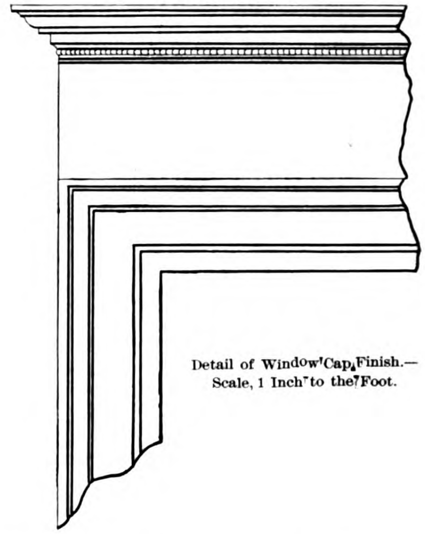
lack originality, but they are wonderful imitators. Give their carvers a model and they will duplicate to perfection. Let their painters see a picture and they will reproduce it on their own instruments.

Probably the most artistic piece of carving in the church is the pulpit. It is a massive affair, affixed to one of the giant columns close to the altar rail. On its sides are a series of panels upon which have been carved scenes depicting important Scriptural events. The pulpit has a beautifully carved base, and upon the outer side of the balustrade are the figures of saints. The figures have all been perfectly carved, and there has been a wonderful regard for detail. Proportions are perfect side—are also of wood, and show splendid specimens of the skill of the carvers. The floor is also of wood, and the sheen of its polish serves to highten the general effect.

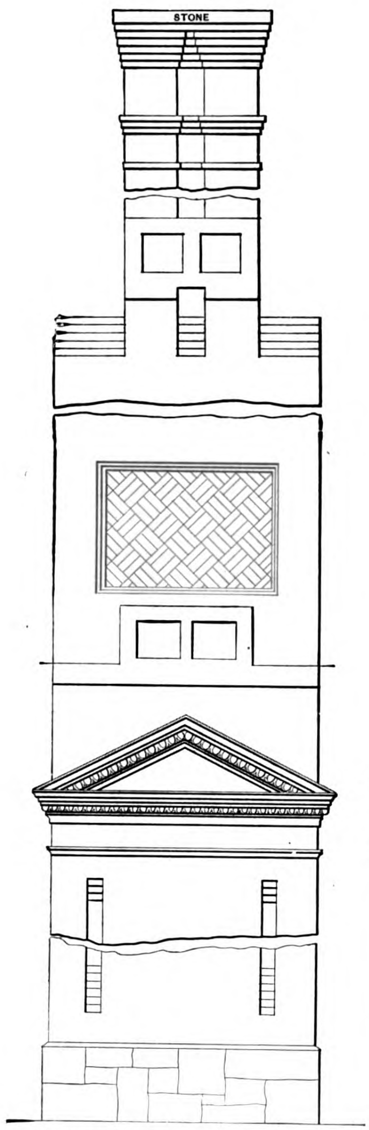
Most of the wood used is malove, best of all the 50 varieties of hard wood that grow in the Philippines. It is capable of resisting any of the insects that attack wood, and neither heat nor water affects it. Steel is the only thing that will outlast it. It is so hard that the fashioning of it is very difficult, but the excellent results obtained make it worthy of the effort. The art of wood carving has long been taught to the Filipinos and the traveler in their islands sees many samples of their work.

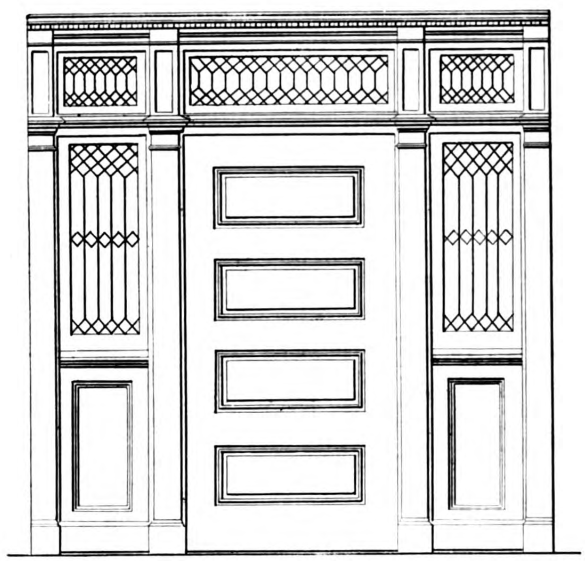


Elevation of Vestibule Door.—Scale, ⅜ Inch to the Foot.

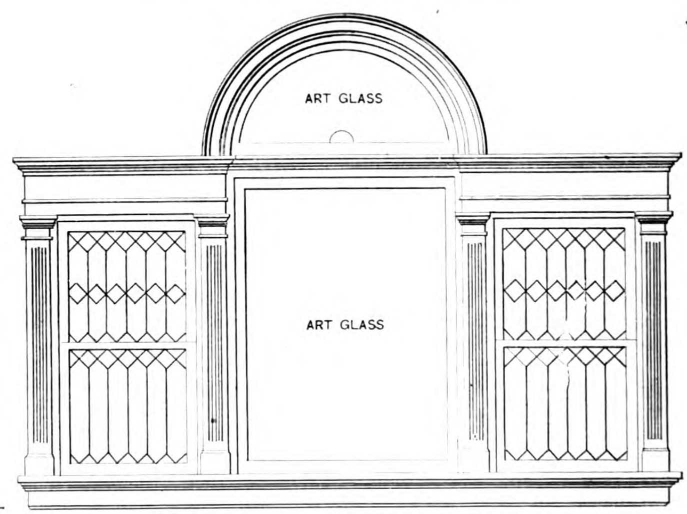


Detail of Window Cap Finish.—
Scale, 1 Inch to the Foot.





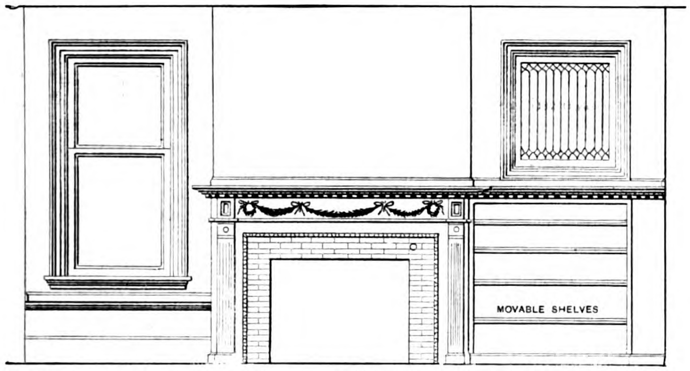
Elevation of Front Door.—Scale, ⅜ Inch to the Foot.



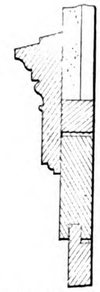
Elevation of Ornamental Chimney on Left Side of House.—Scale, ¼ Inch to the Foot.

Inside View of Stair Window in Right Side Elevation.—Scale, ⅜ Inch to the Foot.

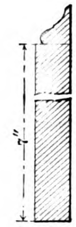
Miscellaneous Constructive Details of Colonial Residence in Meriden, Conn.



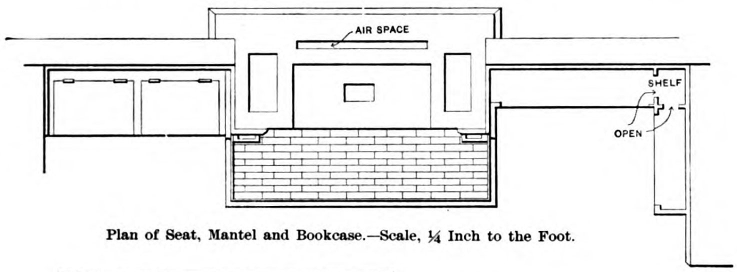
Elevation of Seat, Mantel and Bookcase in Sitting Room.—Scale, ¼ Inch to the Foot.



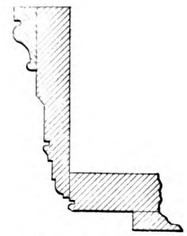
Vertical Section through Panel Work.



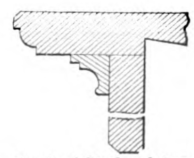
Base



Plan of Seat, Mantel and Bookcase.—Scale, ¼ Inch to the Foot.

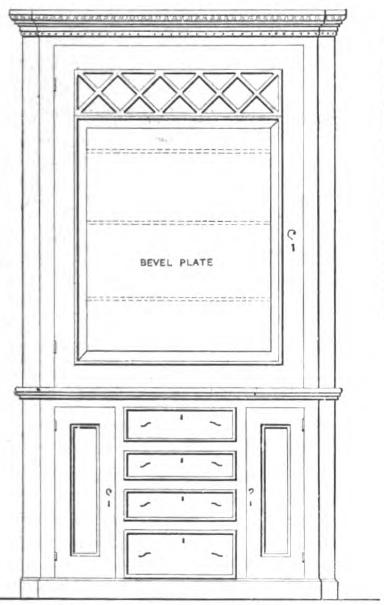


Section through Inside Trim.

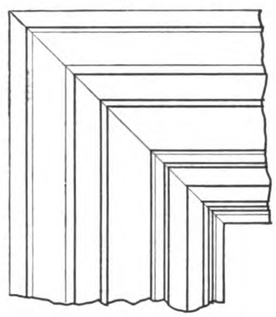


Detail of Stool and Apron.

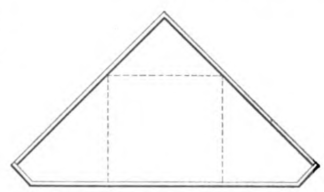
Scale, 3 Inches to the Foot.



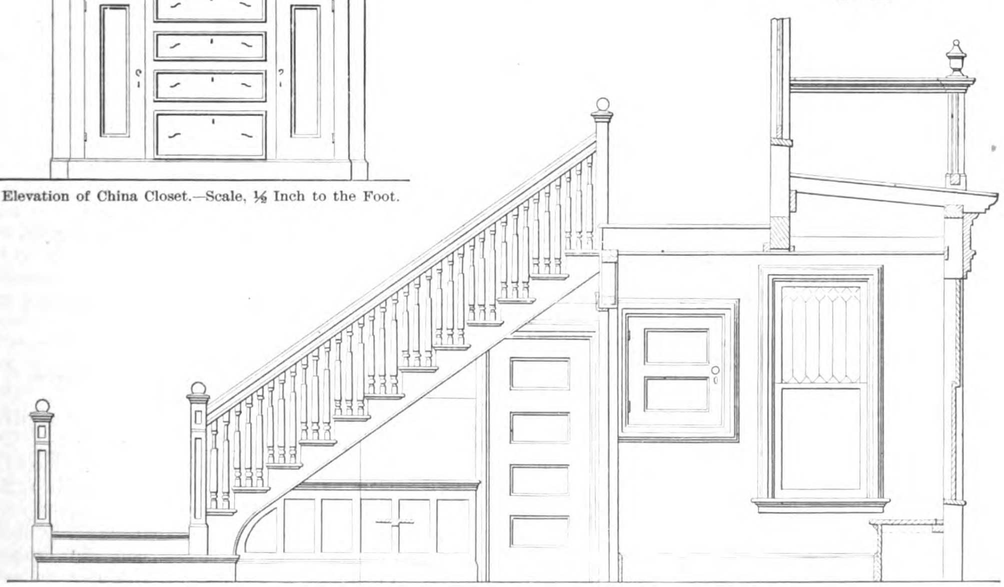
Elevation of China Closet.—Scale, ½ Inch to the Foot.



Inside Trim.—Scale, 3 Inches to the Foot.



Plan of China Closet.—Scale, ½ Inch to the Foot.



Elevation of Main Stairs and Section through Den.—Scale, ¼ Inch to the Foot.

Miscellaneous Constructive Details of Colonial Residence in Meriden, Conn.

Sizes of Pipes for Heating Houses by Hot Air.

Supplementing what we published in the December issue in answer to a correspondent making inquiry with regard to the sizes of pipes necessary for heating houses by hot air we present herewith an extract from an interesting article contributed to a recent issue of *The Metal Worker* by William G. Snow, who has had a long experience in hot air furnace work:

Much larger furnace pipes are now used than formerly. This involves a greater original outlay and an increased running expense for fuel, but the householder is repaid by the more healthful conditions secured through the supply of an ample volume of warm air in place of a small volume of intensely heated air. The pipes should be so proportioned that the several floors will be heated equally.

Table IV, calculated as explained below, will be found useful in determining their size. It must be borne in mind, however, that in heating and ventilating work no rule or table can be successfully used without a certain co-efficient of common sense to allow for varying conditions.

The main steps involved in the calculation of the above table are:

1. The determination of the loss of heat through the walls, windows and floor or ceiling of the room.
2. The volume of warm air required to offset this loss.
3. The velocity of air in the pipes.

The loss of heat is calculated by first reducing the total exposure to equivalent glass surface. This is done by adding to the actual glass surface one-quarter the area of exposed wood and plaster or brick walls and one-twentieth the area of floor or ceiling to cover the loss of heat to non-heated basement or attic. Ten per cent. is added where the exposure is severe to cover the increased loss of heat by transmission and by the leakage of air. The window* area assumed in calculating the table is one-fifth, or 20 per cent., of the entire exposure of the room. From the inspection of a number of plans this ratio was found to represent a liberal allowance for glass surface.

Having obtained the equivalent of glass surface (E. G. S.), multiply by 85 (the loss of heat per square foot of glass per hour with 70 degrees difference in temperature). The product will be the total loss of heat by transmission per hour.

* Double windows, when tightly put in, transmit about three-fifths as much heat as a single window.

The volume of warm air required to offset this loss depends on its temperature, which generally ranges from 120 to 140 degrees in zero weather. Assuming the temperature of the entering air to be 140 degrees and that of the room to be 70 degrees, the air escaping at approximately the latter temperature will carry away one-half the heat brought in. The other half, corresponding to the drop in temperature from 140 to 70 degrees, is lost by transmission. With outside temperature zero each cubic foot of air at 140 degrees brings into the room 2.2 heat units. Since only one-half of this, or 1.1 heat units, can be utilized to offset the loss by transmission, to ascertain the volume of air per hour at 140 degrees required to heat a given room, divide the loss of heat by transmission by 1.1; the quotient is the volume sought. This result divided by 60 gives the number of cubic feet per minute. Having determined the volume of air required per minute, if we know the velocity with which it will travel through the pipes, their area in square feet is readily determined by dividing the volume by the velocity in feet per minute. This area is easily reduced to square inches, from which the diameter of the pipe may be obtained.

In calculating the table maximum velocities of 280 and 400 feet were used for pipes leading to the first and second floors respectively. These velocities are readily attainable in practice. They are lower than those commonly assumed for straight vertical flues, but this is accounted for by the greater resistance to the passage of air through the nearly horizontal basement pipes, and through elbows, nettings and registers. The size of the smaller pipes was based on lower velocities, according to their size, to allow for their greater resistance and loss of temperature.

Table IV, Showing the Proper Size of Furnace Pipes to Heat Rooms of Various Dimensions When Two Sides Are Exposed. Temperature at Register 140°, Room 70°, Outside 0°. Rooms 8 to 17 Feet in Width Assumed to be 9 Feet High. Rooms 18 to 20 Feet in Width Assumed to be 10 Feet High. For Other Hights, Temperatures or Exposures Make a Suitable Allowance. When First Floor Pipes Are Longer Than 15 Feet Use One Size Larger Than That Stated.

Width of room.	Length of room.																						
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
8	7 8	7 8	7 8	7 8	7 8	7 8	8 9	8 9	8 9	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
9	.. ..	7 8	7 8	7 8	7 8	8 9	8 9	8 9	8 9	8 10	8 10	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
10	.. ..	.. ..	7 8	7 8	8 9	8 9	8 9	8 9	8 10	8 10	8 10	9 10	9 10	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
11	.. ..	.. ..	.. ..	8 9	8 9	8 9	8 9	8 10	8 10	8 10	9 10	9 10	9 11	9 11	9 11	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
12	.. ..	.. ..	.. ..	.. ..	8 9	8 9	8 10	8 10	8 10	9 10	9 10	9 11	9 11	9 11	9 11	10 12	10 12	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
13	.. ..	.. ..	.. ..	.. ..	.. ..	8 10	8 10	8 10	9 10	9 10	9 11	9 11	9 11	9 11	10 12	10 12	10 12	10 12	10 13	.. ..	.. ..	.. ..	.. ..
14	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	8 10	9 10	9 10	9 11	9 11	9 11	9 11	10 12	10 12	10 12	10 12	10 13	10 13	10 13	10 13	.. ..	..
15	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	9 10	9 11	9 11	9 11	9 11	10 12	10 12	10 12	10 12	10 13	10 13	10 13	10 13	11 13	11 13	11 13
16	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	9 11	9 11	9 11	10 12	10 12	10 12	10 12	10 13	10 13	10 13	10 13	11 13	11 13	11 13	11 13
17	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	9 11	10 12	10 12	10 12	10 12	10 13	10 13	10 13	10 13	11 13	11 13	11 13	11 13	12 14
18	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	10 12	10 12	10 12	11 13	11 13	11 13	11 13	11 13	11 13	12 14	12 14	12 14	12 14
19	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	10 12	11 13	11 13	11 13	11 13	11 13	11 13	12 14	12 14	12 14	12 14	12 14
20	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	11 13	11 13	11 13	11 13	11 13	12 14	12 14	12 14	12 14	12 14	12 14

One 12-inch pipe .... = two 9-inch pipes.
One 13-inch pipe .... = two 10-inch pipes.
One 14-inch pipe .... = two 11 inch pipes.
One 15-inch pipe .... = two 12-inch pipes.
One 16-inch pipe .... = two 12-inch pipes.
One 17-inch pipe .... = two 13-inch pipes.

In the space opposite the numbers indicating the length and width of room, the lower number shows the size pipe for first floor, the upper number the size pipe for second floor.

For third floor use one size smaller than for second floor.

For rooms with three exposures increase pipe given in table in proportion to the exposure.

For halls use pipe of ample size to allow for loss of heat to second floor.

Location of Floor and Wall Registers.

In discussing the location of floor and wall registers an expert in hot air heating says:

Registers in the lower story are generally placed in the floor for convenience in piping. It is difficult to find space for wall registers on that story without interfering with the proper location of risers to the floor above. The registers in rooms on upper floors can often be placed in the wall to advantage. This location overcomes the necessity of cutting carpets and avoids the accumulation of dust from sweeping.

THE ART OF WOOD TURNING.—II.

(SECOND SERIES.)

BY FRED. T. HODGSON.

THE elliptical chuck is not by any means a new invention, but the one now about to be described is of recent origin, and is an improvement on all previous chucks intended for turning elliptical forms. This chuck consists of three parts—the chuck proper, the slider and the eccentric circle. The chuck is secured to the mandrel by a screwed socket cut in the piece *f*, Fig. 12, which projects from the center of it behind, so that the chuck partakes of the circular motion of the mandrel. In front of the chuck is a dovetailed groove formed by the pieces *i i*, Fig. 11, for the reception of the slider *g*, from the center of which projects a screw, *h*, for the reception of a wooden chuck which holds the work. By this arangement the work in turning round by the motion of the chuck has a sliding movement across the center by which means an ellipse is generated. The sliding motion is given by means of the eccentric circle shown in Fig. 13, or by a ring of brass fastened to the poppet head of the lathe, close to the collar in which the neck of the mandrel runs. The mandrel passes through the aperture *l*. The flat plate which strengthens the ring has at each end a bend, *m*, with a screw, and exactly opposite each other. The screws have sharp points for insertion in small holes in each side of the poppet, as at C, Fig. 14, the from the mandrel by means of its screws *m*, by which means the slider *g* will be moved into the groove of the chuck, but the work will be moved with it to a greater distance from the center, because the two steel pieces *n n* include the whole circle between them.

The quantity of eccentricity given to the ring must be equal to the difference between the two diameters of the required ellipses, so that the work shall move or "throw out" a sufficient distance to bring the point of the tool as much beyond the circle first described, as the length of the ellipse exceeds the breadth. The point of the tool will now be at one end of the largest diameter, and from this point will commence to trace the curve all round. In turning the mandrel round until the slider becomes vertical it must return in its groove to the place it first occupied—viz., the center, because the eccentric circle which guides the slider is not eccentric in a vertical direction, though it is in a horizontal. In this motion the tool point has cut or described one quadrant of an ellipse, because it gradually approached the center of

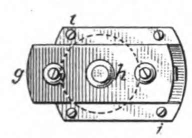


Fig. 11.—Front View of Chuck.

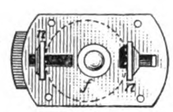


Fig 12.—Back View of Chuck.

Fig. 13.—Concentric Ring.

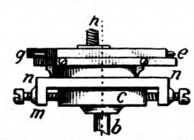


Fig. 14.—Side View of Elliptical Chuck.

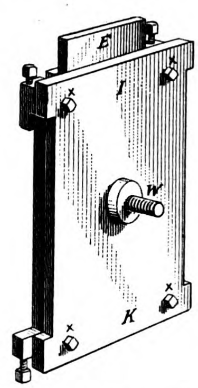


Fig. 15.—Front View of a Home Made Chuck.

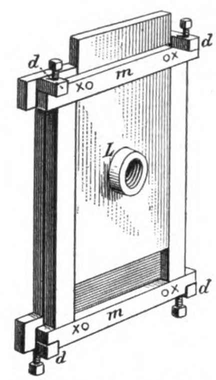


Fig. 16.—Rear View of Chuck Shown in Fig. 15.

The Art of Wood Turning.

back of the plate *m* of the circle lying flat against the flat face of the poppet C; by which means the circle is fixed. The two screws are horizontal, and both point to the center of the mandrel *b*, so that by turning one screw in and the other out, the whole circle may be moved sideways horizontally, so as to give the required degree of eccentricity from the center line of the mandrel, and it will be held stationary wherever it is placed. The back of the chuck, Fig. 12, shows two grooves made through it in the direction of the length of the slides for admitting the shanks of two steel pieces, *n n*, to pass through the chuck. They are attached to the slides *g* by screws in front, as shown in Fig. 11. The two inside edges of *n n* are parallel to each other, and the distance between them is equal to the diameter of the outside ring, Fig. 13, the ring being included between them when the chuck is screwed to the mandrel, and the circle fixed to the poppet C, as in Fig. 14. Now if the circle be set concentric with the mandrel, the chuck, the slider *g*, and the work attached by the screw *h* will all be concentric, and plain circular work will be turned, the slider being guided by its claws, *n n*, which embrace the circle.

In order to set the work for an ellipse, the point of a tool in the slide rest is placed opposite the work, so far from its center that it will describe a circle of a diameter equal to the breadth or smallest diameter of the intended ellipse. The mandrel is now turned until the slider *g* is horizontal. The circle is then set eccentric a quantity equal to the eccentricity of the circle. By continuing to turn the mandrel round further, the circle will cause the slider to move out the other way from the center in its groove until it comes again horizontal, when it will be at the greatest "throw out," as the turners term eccentricity, and the point of the tool will be at the other end of the largest diameter, having described one half of the curve. Continuing to move forward till the slider becomes vertical, it will become concentric again, and the tool will be at the breadth of the ellipse, having finished three-quarters of the ellipse, and in turning the next or fourth quarter the slider "throws out" till it comes horizontal and brings the work to the position where we first set out—namely, to its greatest eccentricity, and with the tool at the longest diameter of the ellipse. The chuck may be provided with a disk, or even with a micrometer plate, for placing the ovals in different directions.

While we have stated that the tool sets at different points of the ellipse as the chuck revolves, it must be understood that the tool does not move at all toward the axis of the work; it is a fixture so far as that direction is concerned, only, of course, when removing overwood, but it may when desired traverse the work parallel to its axis—that is, in the direction of the length of the stuff being worked. Now it must be evident that, to make stuff of any length, where a tail center must be employed, two of these eccentric chucks must be used or the work will be elliptical on the end near the head block and chuck and gradually die out to a cylindrical form at the tail block. Screw driver and other handles are often made in this way by having a sliding chuck at one end, and a set center at the other end when being turned.

Chucks made from this pattern are necessarily expensive, as the work must be of the highest quality, and the materials the best of their kind, or, in operating them the revolutions will be jerky and noisy, and, if every part does not work smoothly, much more power than ought to be employed will be necessary. But chucks of this kind when the workmanship and materials are good, run as smoothly as though no attachment of the kind was on the lathe.

A chuck capable of doing very good elliptical work may be made at a very much less cost than the one just described, as the greater portion of the work may be made by the carpenter, who can also make the patterns for the brass and iron work required. We give a description, with illustrations, of this chuck, which the writer is persuaded may be made by a skillful carpenter at a cost not exceeding $5 over and above his own work.

In making elliptical chucks of any pattern or style, the capacity of the lathe must always be taken into consideration, as the chucks must swing clear of the bed of the lathe when attached to the mandrel, and when the slider is drawn out to give its greatest " throw " to the

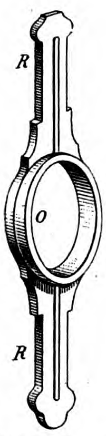


Fig. 18.—Concentric Ring for Home Made Chuck.

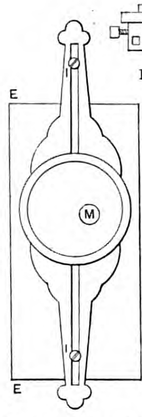


Fig. 17.—Concentric Ring Attached to Lathe Head Stock.

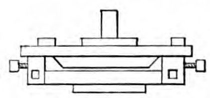


Fig. 20.—End View.

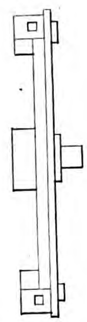


Fig. 19.—Side View Showing Section of Home Made Chuck.

The Art of Wood Turning.

ellipse being formed. We make this remark here in order to prevent disappointment after the work is finished. In making a chuck of this kind it is always best to describe a circle on a drawing board the full diameter of the swing of the lathe, making the center point of the mandrel the center point of the circle described. If the center point of the mandrel is 8 inches from the bed of the lathe, then the swing of the lathe will be 16 inches. In practice, however, this would be working a little too close for a wood turning lathe, though it might do for a metal turning lathe. It is always better to allow ½ inch or more for inequality of stuff and other reasons. Therefore for a 16-inch swing it will be better to have the chuck made so that it will swing within the limits of 15 inches when fully extended. This being understood, we will now proceed to describe what may be called a " home made elliptical chuck."

In Fig. 15 a front view of the machine is exhibited, in which I K is a plain iron plate to which all the parts, excepting the guiding ring, are fastened. A screw similar to that on the end of the mandrel is riveted to this plate, as shown at W, and upon this the work required to be turned is fixed. Fig. 16 shows a rear view of the chuck. At each of the four corners there is a short, square pillar marked *d*. Within these are two narrow ribs of steel, reaching the whole length of the plate, I K, Fig. 15. Each of them being beveled forms an angular groove reaching the whole length of the chuck. By means of these grooves the slider E moves up and down.

When the slider is in its place, two pieces, *m m* of Fig. 16, bear upon the side pieces to which, and to the plate I K, Fig. 15, they are firmly attached by four screws, as shown at *x x x x*. The plate E, being cast in the same piece as the slide, cannot be thrown out of its position, but moves in a longitudinal direction only, the nut L acting as a stop to prevent its going too far. The space between the end pieces *m m* is just equal to the diameter of the ring O of Fig. 17, upon the outside of which they revolve when the nut L is screwed upon the mandrel. Two arms, R R, are connected to the ring, and in each there is a groove extending nearly its entire length. This machine is fastened to the lathe on the mandrel, and its motion is obtained as follows: Referring to Fig. 18, E E represents a headstock through which two holes are drilled, the centers of which are precisely in line with the center of the mandrel M. The ring is fastened to the head stock by two screws, I I, the shanks of which pass through the grooves and through the holes in the headstock. When the ring is in this position it will be perceived that it can only move backward and forward in one direction, and its center must always be in the same horizontal line with the center point of the mandrel.

Having attached the ring, as shown, with the grooves, of course, lying on a horizontal line, screw upon the mandrel the nut L of Fig. 16, then the plate I K, if set exactly opposite the mandrel, will revolve in a circle, but if the center of the ring be in the least degree to one side of the mandrel it will revolve in an elliptical orbit. When, therefore, the work is fastened to the screw W of Fig. 15, it is quite as easy to turn an ellipse as on the ordinary lathe to turn a cylinder. Of course the slider E must move in the grooves with great steadiness and freedom, to effect which very great accuracy in the workmanship must be observed; indeed, in every part connected with a lathe, the workmanship should be of the very highest quality.

In Fig. 19 is shown a side view of the chuck, and Fig. 20 exhibits an end view with the working parts exposed. This chuck may be made largely of wood, but, of course, it will be a little cumbersome and unwieldy. Twenty-three or twenty-four years ago the writer saw a large wooden chuck made after this pattern in a pretty large establishment in Detroit, Mich., where oval picture frames and frames for oval mirrors were manufactured, and was struck with the smoothness and steadiness with which the great clumsy chuck did its work. It was nearly all made of hardwood, maple I think, and was fully 3 feet over its largest dimensions. The man who operated it said that it had been in use nearly every working day for over six years.

Defective Plumbing.

The recent experiences of a number of different cities in reference to the plumbing of school houses is similar to that of Cambridge, Mass., which the *Chronicle* says shows the necessity for the most careful inspection of this line of work. In no other part of the building is it easier to do poor work without detection, and no other line of poor work is so dangerous to the persons occupying the building. It would seem as if any plumber, realizing that a defective pipe or joint might jeopardize a human life, would exercise the greatest care to secure perfection. But it is not done. Imperfect pipes, imperfectly put in, are very common in old buildings and in some new ones, and would be more so but for the careful inspection now prevailing. The people do not appreciate what protection is afforded by this inspection and by the building ordinances.

RESIDENCE OF MR. I. BURTON MILLER ON BROAD STREET, MERIDEN, CONN.

D. BLOOMFIELD, Architect.

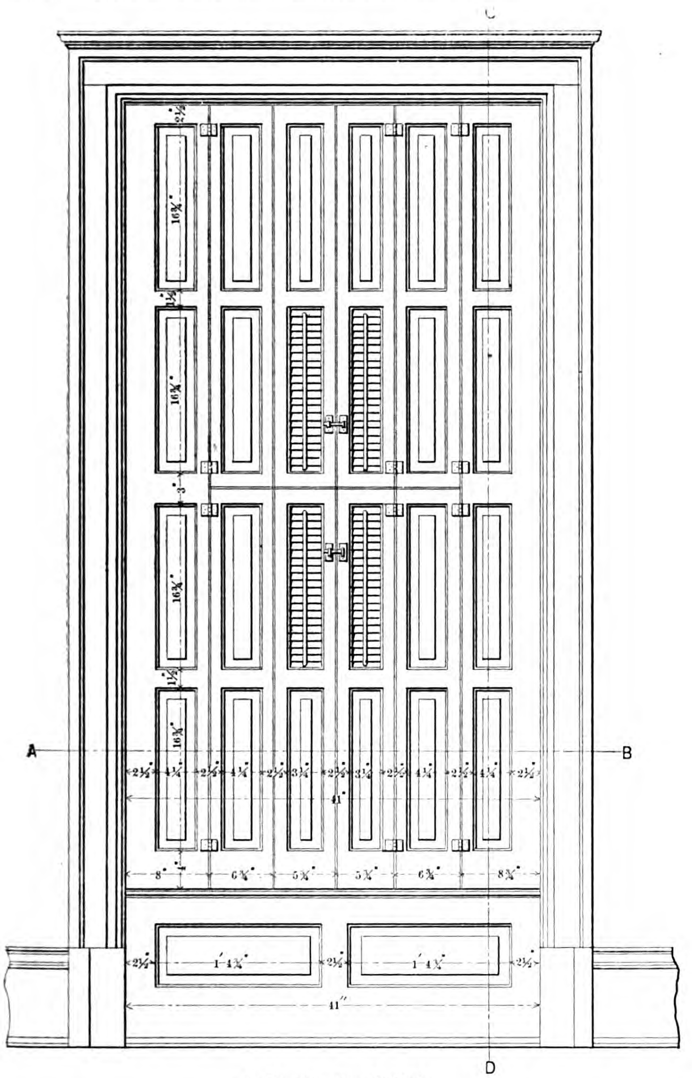
CONSTRUCTION OF INSIDE FOLDING BLINDS.

We have pleasure in laying before our readers herewith the article and accompanying drawings to which was awarded the first prize in the Thirtieth Competition, the author being Frank J. Grodavent of Fort D. A. Russell, Wyoming.

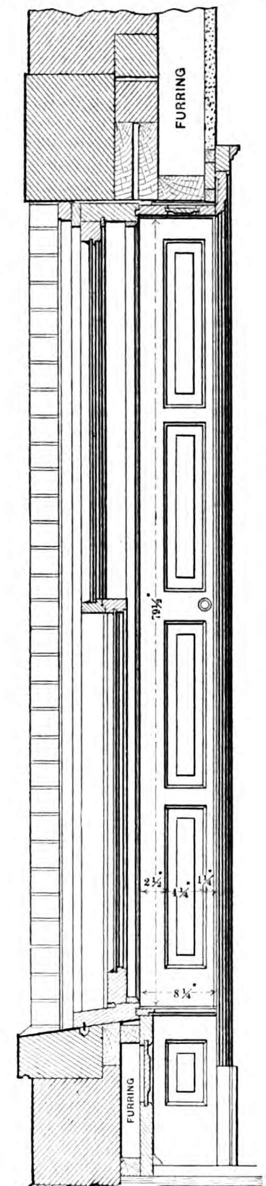
In submitting a design for inside blinds under Competition XXX, I have taken a window of medium width with box frame and double sash, hung with cords and weights on axle pulleys, as found in a residence having 13-inch brick walls with furrings lathed and plastered. I use a 2-light window with glass 36 x 36 inches.

My design represents a six-fold blind (box shutter), designed to fold back into side pockets and to be finished with paneled soffit, elbows and panel back. Blinds to have rolling slats in center panels and inside sections should be regulated by the size of glass, and my design is worked out accordingly.

I have taken the width of each stile on the sash as 2 inches and the glass as 36 inches wide, thus making the opening on the frame 2 inches plus 36 inches plus 2 inches, or a total width on opening of 40 inches. I lap each hanging section of the blinds ½ inch over the frame opening, thus making the full width of the blinds ½ inch plus 40 inches plus ½ inch, or 41 inches. As stiles of sash are 2 inches wide, and I lap each hanging section of blinds ½ inch over frame, the width of hanging stiles will be 2 inches plus ½ inches, or 2½ inches. As the top rail of sash is 2 inches and the top of blinds lap the window frame ½ inch, the top rail of blinds will be 2½ inches wide, same as hanging stiles. The meeting rails of sash are 1½ inches wide, rebated and grooved ¼ inch for the glass top and bottom, leaving 1 inch between



Inside Elevation of Blinds.



Vertical Section of Blinds on Line C D.

Construction of Inside Folding Blinds.—Awarded First Prize.—Scale, ¾ Inch to the Foot.

divided in their length at the meeting rail of the sash to regulate the light.

In construction for inside blinds I prefer not to divide the main hanging section, as the blinds will work better and there will be less trouble of their interfering at the meeting rail, when the blinds are opened and closed.

In laying out inside paneled blinds, the size of panels the glass in the upper and lower sash, so that the length for panels in blinds will be 36 inches plus 1 inch plus 36 inches, or 73 inches, and the width for panels being the same as the glass—viz., 36 inches, we have for the limits of our panels 36 x 73 inches.

Where inside blinds are used, the stool finish for windows should be grooved into the wood sill instead of being placed on top, thus giving something for the bottom of the blinds to strike against and keep them straight. This would give a bottom rail of 4 inches on the blinds if the bottom rail of the sash was 3½ inches wide at the glass, as in my design. The thickness of blinds I make 1⅛ inches.

In my design I have allowed 1¼ inches as the width of intermediate stiles, and provided for a 3-16 inch rebated joint and bead, making the total width of two stiles 2½ inches. The size given for the widths of stiles and rails does not include the molding, which gives an additional width.

Widths of Panels.

Having found the widths of stiles and rails, the widths and lengths of panels will be as follows: As the extreme width for panels and the intermediate stiles has been found to be 36 inches, same as width of glass, and we have a six-fold blind closing into side pockets, there must be a difference in the widths of these blinds in order to get them to fold into the boxes and work well. To find the widths of the panels when the total width is known—viz., 36 inches—I proceed as follows:

To the total width of the panels (36 inches) I add 2 inches as a margin of difference in order to make my calculation. Thirty-six inches plus 2 inches equals 38 inches as the calculated width. The intermediate stiles are only 1¼ inches wide, with an allowance of 3-16 inch for rebate and bead, or an allowance of 2½ inches between panels, and as we have five sets of intermediate stiles, we have five times 2½ inches, or 12½ inches, to be deducted from 38 inches, leaving 25½ inches for the six panels, 4¼ inches as the width for each, but as our two central sections have panels narrower than the two sections at each side we will deduct the 2 inches allowed as a margin of difference in making our calculation and take 1 inch from each of the panels of central sections, or from 4¼ inches, leaving 3¼ inches as the width of our central panels. In practice this allowance has been found to give satisfactory results.

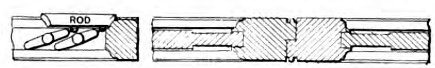
By adding the widths of stiles to our panels we get the widths of the different sections, thus for hanging stiles we have 2½ inches plus 4¼ inches plus 1¼ inches equals 8 inches. For second section, 1¼ inches plus 4¼ inches plus 1¼ inches equals 6¾ inches; and for the third section 1¼ inches plus 3¼ inches plus 1¼ inches equals 5¾ inches. The total width of blinds will be 8 inches plus 6¾ inches plus 5¾ inches equals 20½ inches times 2 equals 41 inches, as before figured from the glass and hanging stiles. An allowance is given to the dimensions for rebate and bead at stiles where they meet. The width of the hanging stiles is figured at 8 inches, but one-half of the rebate and bead equals 3-32 inches, giving a net total length of 8 3-32 inches, but the width of the pocket is made ¼ inch wider than the figured dimensions or 8¼ inches, in order to allow for this 3-32 inch and to give some freedom for swinging and to provide a striker in the pocket to hold the blinds flush with the face of the elbow panel below, and to prevent the blinds from going too far into the pockets.

Hights of Panels.

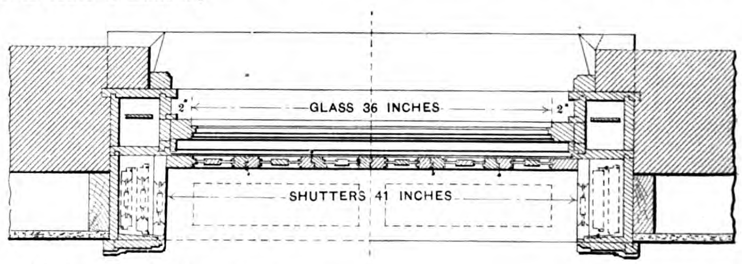
As the extreme hight for panels and the intermediate rails has been found to be 73 inches, same length as the two lights of glass and the space between, and we have three sets of rails, one 3 inches and two 1½ inches each, the total allowance for the rails will be 1½ inches plus 3 inches plus 1½ inches, or 6 inches, which deducted from 73 inches gives 67 inches as the length for panels, and 67 inches divided by 4 gives 16¾ inches as the length of each panel.

Having found the widths and lengths of panels and widths of stiles and rails, we can proceed with our construction. Provide a smooth dressed rod as long as the blinds, and upon this lay off the exact lengths for panels and widths for rails, with a margin of length for fitting when hanging; locate the mortise for each rail in its proper place, allowing the full size of the rails as figured for the mortise. It is presumed that from the design the proper bill of quantities has been made and the material provided; the strips for stiles and rails having been mill run and grooved and molded to form the panels; and the stiles carrying rolling slats grooved only at top and bottom for panels and bored ¾ inch on centers at central openings for slats.

On the same rod can be laid off the exact dimensions for widths and panels and stiles, and in running, an allowance made for rebate and fitting; rails to be cut to lengths, allowing for blind tenons after they have been



Horizontal Section through Shutter.—Scale, 3 Inches to the Foot.



Horizontal Section through Blinds and Window Frame taken on Line A B of the Elevation.

Construction of Inside Folding Blinds.—Awarded First Prize.

mill run, molded and grooved for panels where required, or left without grooves at panels where rolling slats are to be placed. The stiles having been properly blind mortised, the rails are to be properly cut and the tenons formed on a machine coping the moldings of the rails to member with the moldings on the stiles. The panels to be made with a raised panel on each side and cut at least 1-16 inch less in length and width than figures on the drawings, so they will not bind upon the stiles and rails when put together. Rolling slats to be set ¾ inch on centers and connected after the sections are put together, with an operating rod secured to each slat with a staple. Each section of the blinds to be put together separately, well glued and clamped up, and when set, dressed off smooth to a finish and sandpapered with the grain of the wood; the sections rebated 3-16 inch and beaded at the vertical joints.

The sections should now be assembled in their regular order on a bench or other convenient elevation, secured together across the top and bottom with strips of wood put on temporarily and the blind carefully squared and marked for neat width and length, and cut and fitted for hanging. Put on the hinges or "back flaps" securing the inner sections, after which the entire blind should be hung to the frame before the parts are separated, and then the temporary strips taken off, the inner sections divided at the meeting rail as shown, or left in the full length, as desired. Put on the necessary shutter bars and knobs. The hanging stiles should be dressed on a bevel at the edge to allow the blinds to swing back into the pockets without binding. In some cases blinds are secured to the frames with four hinges instead of three, as shown in the drawings, in which case they would be placed to line with the other hinges on the intermediate sections.

The moldings around panels in my design are worked on the solid stiles, as I believe the solid work best for the general run of inside blinds, but if desired separate moldings can be cut around the panels against square stiles and rails.

In connection with these details I invite attention to the water bar between the wood and stone sill. This bar consists of a band of wrought iron 1/8 x 1 inch, let 1/2 inch into a saw kerf on the bottom of the wood sill, and let into a corresponding groove about 1/2 inch wide cut into the stone sill. When setting frames the groove in the stone sill is run full of liquid Portland cement and the iron bar set in the cement, which soon hardens and makes a complete cut off against wind and rain.

Believing my design and construction, with this description, of some merit, and offering some instruction to the many readers of *Carpentry and Building*, I respectfully submit the same in Competition XXX.

NEW BUILDING CODE OF NEW YORK CITY.

THE building code of New York, which went into operation on December 23, is the first codification made of all the ordinances and laws affecting buildings and building operations in the various boroughs of the city. The following statement covering the changes effected by the new code has been given out by the New York Building Department:

The first important change is the extension of what are known as the "fire limits" of the consolidated city, within which limits it is made unlawful to erect any frame buildings whatever, other than open sheds and temporary structures, for the use of citizens engaged in building operations. The old law of 1892 fixed the fire limits to the territory extending from the Battery to 165th street on the west side, and from the Battery to 149th street, and northerly to Westchester avenue, on the east side. The new code extends the limits of the old city, so that they take in practically the whole area of Manhattan Island, being extended on the west side 2¾ miles beyond the old limits, clear to the Harlem River, to what is now known as West 220th street.

The only territory exempted in this area is the high ground of Washington Heights and Inwood, west of that part of Broadway formerly known as the Boulevard. This was exempted because of the fact that it is all restricted property of a fine residential class, where the land is so laid out that the fire risk is reduced to a minimum. The code retains the provisions of the old law prohibiting the rebuilding within the fire limits of any wooden structure that existed before 1892 that may be damaged by fire so that more than half of the building is injured by flames. Fire limits are also prescribed for the Borough of the Bronx and the Borough of Brooklyn.

The code changes the old provision restricting non fire proof apartment houses, tenements or dwellings to a maximum hight of 75 feet above the curb where the first story of the building is occupied as a store. It permits such buildings to be erected to a maximum hight of 85 feet where the first and second floors or stories are built of what is known as thoroughly fire proof construction. This change was urged by builders and architects.

A notable amendment to the old law requires buildings exceeding 85 feet in hight to be equipped with auxiliary fire appliances and apparatus, consisting of stand pipes, with Siamese connections at the sidewalk, and line of fire hose, properly stored on each floor, ready for use, and regularly inspected. Buildings exceeding 150 feet in hight will be required to be provided, in addition to these stand pipes and hose, with wrenches, fire extinguishers, hooks, axes and other fire fighting appliances required by the Fire Department, and a steam pump; and at least one passenger elevator must be kept always in readiness for the instant use of firemen during all hours of the night and day.

Perforated fire extinguishing pipes or sprinklers must also be provided in the basements of buildings used for business or manufacturing purposes. Heretofore these requirements applied exclusively to theaters and buildings used for large public assemblages, built subsequent to 1892. They are now made to apply to all public buildings, such as hotels, churches, theaters, railroad stations, public halls, as well as department stores and other exclusively business buildings.

The new code contains a specific definition of what constitutes a hotel, and provides that where the building is located on any but a corner lot it shall not cover, above the second-story level, more than 90 per cent. of the area of the whole of the lot, and if more than five stories in hight, 2½ per cent. less than 90 per cent. for every additional story above the fifth story. In the case of corner lots the restriction is reduced to 95 per cent. of the lot area, with the same percentage of reduction of area for all stories above the fifth. This requirement is introduced to secure better light and ventilation to tenants.

The commission which drafted the code incorporated in it the law of 1896, which makes it mandatory upon owners, builders or contractors, in cases of buildings over 65 feet in hight, being erected or repaired, to construct over the sidewalk in front a strongly and tightly built wooden shed, extending from the building line to the curb, for the protection of pedestrians.

In other respects the new code continues in full force all the protections for life and limb and safeguards of health of the old law, such as the providing of fire escapes and adequate means of exit from buildings, and fire proof shutters upon window openings to prevent flames from extending to or from adjoining property in case of fire, and it also empowers the Building Commissioners of the various boroughs to take instant action where necessary when buildings become unsafe and dangerous, and authorizes them to recover bodies which may be buried under fallen walls of buildings damaged by fire.

Provision is made also for tests to determine the efficacy of various systems of fire proofing and of fire proof building material wherever owners or architects or builders contracting for the erection of fire proof buildings apply for permission to use any certain kind of material or style of construction and desire that the Department shall pass upon the character of the material or construction submitted.

The sanitary provisions of the code are to be supplemented by a series of rules and regulations adopted by the Board of Buildings to govern the arrangement of the plumbing and drainage and of the light and ventilation of all buildings to be hereafter erected. These rules are revised editions of those established in 1892, the Department complying, in their formulation, with the sanitary requirements of the health laws, in their enforcement, co-operating with the Board of Health to secure the best sanitary conditions in all classes of buildings. To carry out the provisions of the code the Department has also a series of regulations for the inspection and regulation of all elevators in use in the city limits.

IT is estimated that there are now 7,000,000,000 feet of white pine standing within the borders of Minnesota, and that this is being cut at the rate of 1,500,000,000 feet every year, thus promising to exhaust the finest tract of lumber in the United States in about five years.

OVERHEAD SYSTEM OF HOT WATER HEATING.

THE possibility of heating large and high buildings successfully by hot water circulation has been considered by some to be impracticable, but that decision is usually arrived at by men lacking experience with or having no knowledge of the advantages of the system. There are those who have had experience in hot water heating who claim that there is no building constructed requiring a constant application of artificial heat during the winter months but can be more successfully, efficiently and economically heated by hot water than by any other system, and that the larger the building the more apparent are the advantages of the hot water system. There are three different applications of mains for the system in general use to-day, and under different conditions of application each has its advantage. The usual application is one or a number of flow and return mains leading up from the heater to the radiators. Another is the circuit system, one or more mains falling from a point above the heater around the basement to the heater and connected with the return opening, the flow connections for the risers and radiators being taken from the top of the main and the returns into the side of the main.

The method which is the subject of this article is called the overhead system, and is another application of hot water heating, which consists of carrying one or more large flow mains up to a point below the highest radiation, though it is frequently placed above all the radiation, and falling from the highest point, where it is usually relieved of air by being connected to the side opening of the expansion tank. The connections for the radiators on the various floors below are taken from the side or end of the falling mains which drop down to the basement, where a similar arrangement of return mains are suspended from the basement ceiling, falling back to the heaters. The radiators on the falling mains are connected at one end and at the top and bottom to the vertical pipe, the radiators above the horizontal flow mains being connected in the usual way at each end at the bottom, the flow connection being carried up from the top of the falling horizontal flow main and the return connection being carried back into the side of the same main, preferably with an eccentric tee, so as to bring the return as near the bottom of the main as possible. This system is one of the oldest applications of hot water heating, having been used and illustrated over 60 years ago. Owing to the advantages of this system under some conditions it was selected for heating the Masonic Temple Building, at Staunton, Va., where it required fewer mains and gave a more uniform distribution of heat than could be obtained from the rising main or the circuit system.

Overhead System of Hot Water Heating.—Fig. 1.—Front Elevation of Building.

The building is a handsome structure, as may be seen from the front elevation shown in Fig. 1, and was designed by I. E. A. Rose, architect, of Staunton, Va., who also prepared the plans for its erection. The heating system was installed by Howell & Shanklin of Charleston, W. Va., according to plans and specifications made by W. M. Mackay, of 235 Water street, New York, who was employed as consulting engineer.

The building is about 65 x 80 feet in size, six stories high, and contains about 250,000 cubic feet of space. It is heated by direct radiators of the three-column type, 38 inches high, which expose 5590 square feet of surface in addition to the exposed mains. This makes a ratio of radiation to cubic contents of 1 to 45, or if mains are included, a ratio of about 1 to 40.

There are 74 radiators located in the building, as shown by Figs. 2, 3, 4, 5, 6, and 7, which are plans of the first, second, third, fourth, fifth and sixth floors. The first floor is divided up into three stores and entrance hall; the second floor is arranged in offices; the third, fourth and fifth contain lodge and other rooms for the Blue Lodge, Chapter, Council and Commandery, and the sixth floor contains the janitor's apartments.

The following table presents information for comparison of the proportion of various parts of the system:

TABLE OF RADIATION.

	Hight of ceiling.	*Space in cubic feet.*	*Number of radiators.*	*Radiator surface in sq. feet.*	*Ratio of surface to space.*
1st floor	15 feet.	60,000	13	1,320	1 to 46
2d floor	11 feet.	40,000	15	925	1 to 43
3d floor	12 feet.	45,000	14	1,090	1 to 41
4th floor	14 feet.	50,000	15	1,150	1 to 43
5th floor	12 feet.	45,000	13	925	1 to 50
6th floor	9 feet.	10,000	4	180	1 to 57
Totals		250,000	74	5,590	

The heating is done by two boilers connected together, located in the basement, as shown on the plan presented in Fig. 8, which also indicates the run of the flow mains to the risers, which extend to the fifth floor, and return system suspended from the basement ceiling. The boilers are of the horizontal tubular type, each 44 inches in diameter and 14 feet long, containing 38 3½-inch tubes exposing 700 square feet of fire and flue surface over a grate surface of 16 square feet. The boilers are set in brick work, arranged for the smoke draft to pass over the top of the boilers after passing through the tubes. Five-inch flow pipes are taken from each of the boilers and connected. A 5-inch branch runs to the back of the building, where it is reduced to a 4-inch with the expansion tank, as shown in Fig. 7, which is located so that any overflow can find relief without damage in the plumbing system. At the highest point of both the 4-inch and the 5-inch main risers an air pipe is carried to the expansion tank and connected with it so that any air that might otherwise accumulate in the mains can escape. The mains provide an area of about 2-3 square inch for each 100 square feet of radiator surface in the system. The proportion existing between the boiler, the radiation and the work is as follows:

One square foot of grate surface to 43.75 square feet of boiler surface, to 349 square feet of radiation and to 15,625 cubic feet of space.

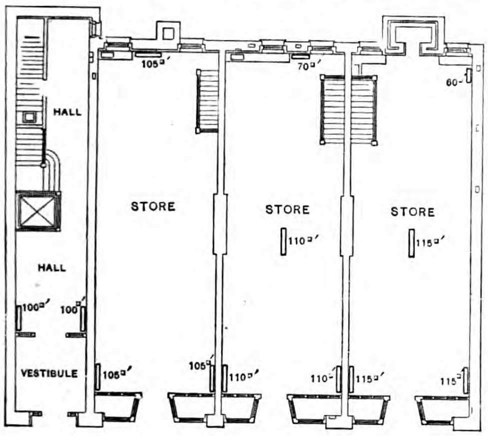


Fig. 2.—First Floor.

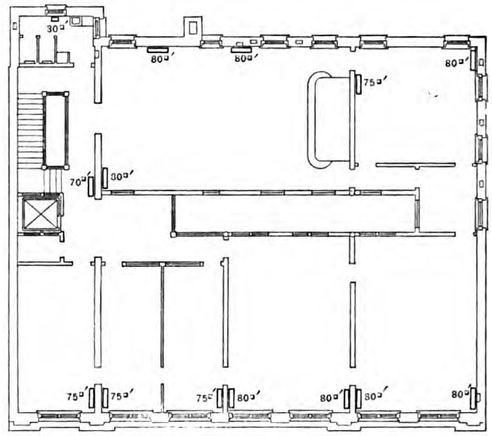


Fig 4.—Third Floor.

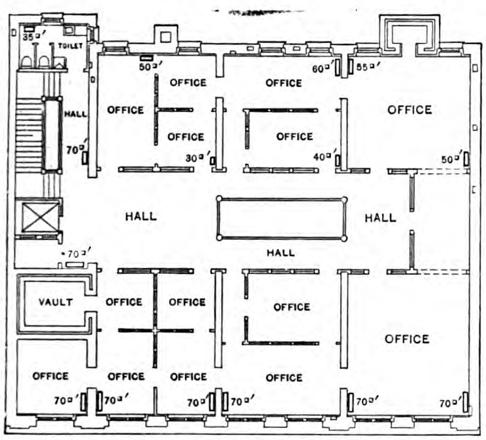


Fig. 3.—Second Floor.

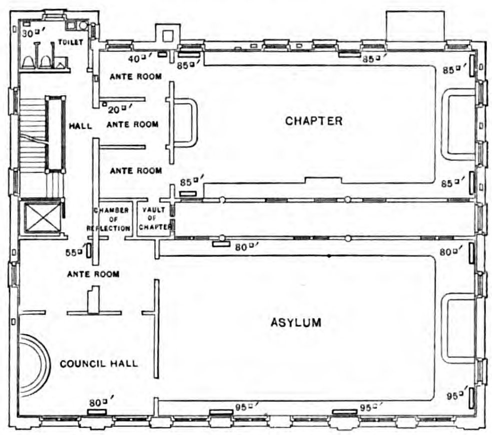


Fig. 5.—Fourth Floor.

Overhead System of Hot Water Heating.

riser, which is carried to the ceiling of the fifth floor, shown in Fig. 6, where branches are taken to the various falling mains which it supplies.

Another 5-inch main runs from the boilers toward the front of the building, a 2-inch branch being carried along the basement ceiling to supply two 1½-inch connections to radiators in two stores on the first floor, these radiators being so located that no falling supply main could reach them without interfering with the upper floors. At the front of the building this 5-inch main rises and is carried full size to the ceiling of the fifth floor. Here it branches, as shown in Fig. 6, connections being taken from the top of this main to supply radiators on the sixth floor, shown in Fig. 7, the return from these radiators connecting with the side of the same main near the bottom.

A 1½-inch pipe connecting with the return mains at the boilers is carried to the sixth floor and connected

One square foot of boiler surface to 7.98 square feet of radiation and to 357 cubic feet of space.

One square foot of radiation to 44 cubic feet of space.

These proportions and the description of the system of heating this building are more interesting from the fact that the system has now been in operation four winters and has given perfect satisfaction.

The contractors, who have had a large experience in steam and hot water, state: "We never erected a more perfect plant. The circulation is even and the temperature maintained throughout the building is uniform. The building is thoroughly heated in zero weather with the boilers running under slow combustion." While this system is primarily an overhead system, it will be noticed that it embodies all the systems of hot water heating mentioned. Two of the stores on the first floor are heated on the flow and return plan, and the radiators on the sixth floor are connected as in the circuit system.

School House Heating.

The following extracts are from a paper read by Dewees L. Farrar, Westminster, Md., before the Maryland Association of School Commissioners, on "Hygiene in the Construction of School Houses."

The building should be more than a shelter. Attention should be given to heating, lighting and ventilating.

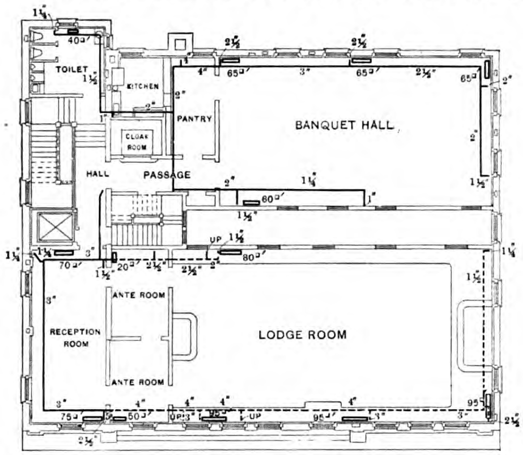


Fig. 6.—Fifth Floor.

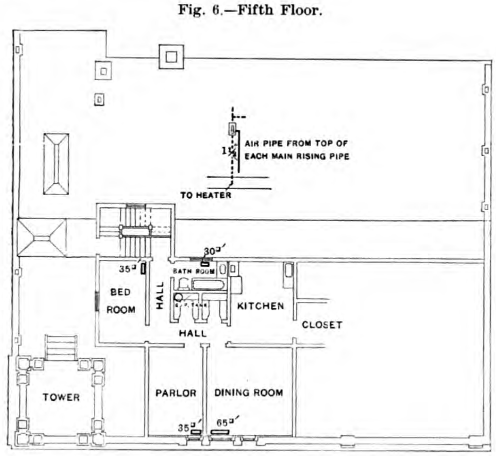


Fig. 7.—Sixth Floor.

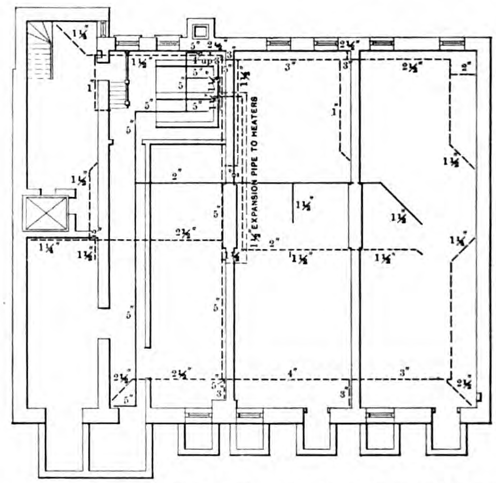


Fig. 8.—Basement, Showing Location of Boilers, Risers and Returns.

Overhead System of Hot Water Heating.

Each child should have from 650 to 700 cubic feet of fresh air an hour and the temperature should be kept at from 65 to 70 degrees. This makes a thermometer an indispensable piece of school furniture. The ordinary stove in the middle of the room, where the pupils near it would be half roasted, while those at a distance would be freezing, was condemned. In order to make room for the stove the outside row of seats is often set next the wall, which is dangerous to the pupils from the cold and dampness.

The plan advocated provides a cellar under the school house, which may serve the double purpose of a place for storing fuel, janitors' tools and a place to set a ventilating heater, the heater to have a cold air flue running to the outside of the building and the heated air to be sent to the school room through vertical registers. Floor registers were condemned as too likely to accumulate dirt. Ventilating registers were to be provided near the floor line, communicating with a flue in the same stack as the smoke flue. A second ventilating register was to be put in near the ceiling of the room.

Where it is impossible to have such an arrangement a board was advocated to fit across the window below the lower sash, which would allow a circulation of fresh air between the sashes and would prevent a draft.

Light should enter the school room from both sides of the room and preferably from the back, but never from the front. By massing the windows in the side walls, room is left for maps and blackboards. The windows should be shielded with shades of a neutral color, arranged to roll at the bottom, so that the light would first be let in from the top of the window and a glare avoided.

Test of Fire Proof Ceiling.

A fire test of a fire proof ceiling was made at the testing plant of the British Fire Prevention Committee in London last summer. The construction of the ceiling was as follows: The main members were 3 x 9-inch wood joists, spaced 19 inches apart c. to c., and resting on brick walls 4½ inches at each end. There were two joists spiked together in the center of the hut. At both sides at the end of each joist, and screwed thereto, was a slag wool slab, 1 inch thick, 5 inches wide, and the full depth of the joist. On the top of the joists, and forming a floor, was ⅞-inch beaded boarding, tongued and grooved, nailed with 2⅛-inch floor brads, two nails to each joist. One board in the middle of the floor was then screwed down so as to be removed for inspection. Slag wool slabs 1¾ inches thick (reduced to 1½ inches thick when pressed into position), were fixed to the under side of the joists, covering the entire area of the hut and projecting down the walls all round about 3 inches, secured to the joists with 3¼-inch screws and washers. The screws were inserted in asbestos tubes 1½ inches long. The slag wool slabs comprised slag wool inclosed on both sides with galvanized wire netting of No. 19 gauge and 1-inch mesh. The slabs were made so as to butt against each other at the double joists in center, and the whole of the slag wool ceiling was then covered with ⅞-inch tongued, grooved and beaded boarding, nailed through the slabs to the joists with 4-inch wire nails. Round the walls of the hut a wood molding was fixed, forming a cornice and covering the slag wool which projected below the boarded ceiling. The space at the end of each joist was grouted in with fire clay, and the space between joists on the set-off was filled in with brickwork. The test was a fire rising to 1800 degrees F. in one hour, followed by the application of a stream of water for two minutes. At the conclusion of the test the flooring over the ceiling was uninjured. With the exception of one small hole the joists were not burned.

FOUNDATIONS FOR BUILDINGS.

IT is evident that no part of a building is secure unless it is on a thoroughly secure foundation, and, therefore, it is of the first importance that this matter receive the most careful attention from the architect or his engineer. For the ordinary residence or small building, the weight to be carried on the foundation is so uniformly distributed and of such small magnitude that the ordinary footings under the thicknesses of walls required are amply sufficient to carry, on any ordinary material, and, therefore, this problem has not been a difficult one till recent years; but the advent of very tall buildings with concentrated loads of varying magnitudes has so complicated the problem and increased the difficulties of making a safe foundation that it has become one of the architect's most difficult undertakings, and generally requires the advice and services of an engineer experienced in such matters.

It is not my purpose, says Henry W. Hodge in a recent issue of the *Brickbuilder*, from which the accompanying illustrations are reproduced, to try to cover in this article the entire subject of foundations, which is a very broad one, but only to give a few ideas of what should generally be done, and of still greater importance, what should not be done, with a few examples of modern foundations; as these points will, I trust, be of assistance in ordinary cases; and in special cases of great magnitude no directions can be given other than to employ the best and most experienced engineer possible, as every foundation must be designed to meet the local requirements and seldom can one be exactly patterned after some previous one, and one cannot be too careful to get a perfectly secure foundation even if it does seem expensive, as almost any other portion of a building can be strengthened if found insufficient; but an insufficient foundation means a permanently insecure building, and seldom can it be remedied at anything like a practical cost.

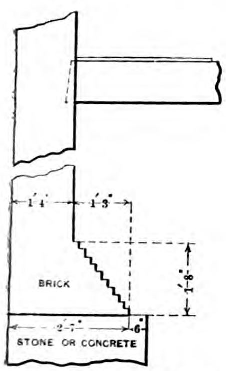


Fig. 1.—A Footed Out Wall.

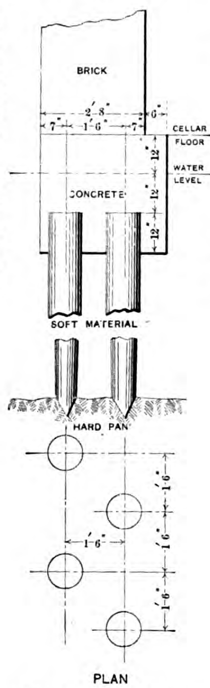


Fig. 2.—Plan and Elevation of Pile Foundation.

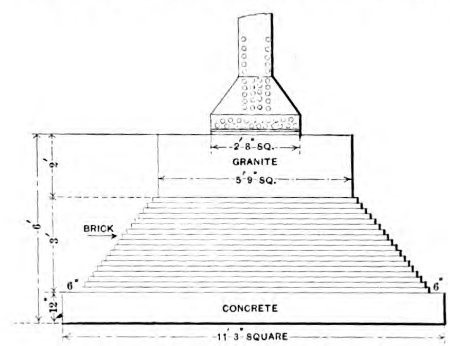


Fig. 3.—Brick Footing for Columns.

Foundations for Buildings.

The simplest foundation is the ordinary footed out wall, as shown in Fig. 1, and it has become so customary to foot out all on one side, as here shown, to prevent encroaching on adjoining property, that some architects think a uniform pressure is thus brought to bear on the material under such footing, and the writer has often been asked to state "what is the average pressure, and where is its center of gravity."

The supposition that this footing gives a uniform pressure is entirely erroneous, as it does not; since the center of pressure is directly under the center of gravity of the wall above and the floor loads resting thereon, or practically under the center of the wall, so to get an absolutely uniform pressure the footing should be either footed out on both sides of the wall equally, or not footed out at all, as it is evident the center of the loads is fixed practically at the center of the wall, and the shape of the footing cannot possibly change this line of loads; so that the unbalanced portion of the footing, if it gets any pressure at all, must have a moment around the center of loads, and thus tends to "bulge" the wall above.

While for these reasons the above footing is not theoretically correct, it can safely and properly be used in some cases, as, within limits, the wall will be strong enough to stand the bending moment and thus to some extent distribute the load on the unbalanced footing; but it is impossible to exactly compute the distribution of pressure on the footing, and this form of footing is not recommended for heavy loads, and never for a projection of more than the thickness of the superimposed wall.

It is, therefore, well wherever possible to foot out walls equally on both sides from the center of the walls, and where the bearing material is earth these footings should be wide enough to keep the pressure on the footings between 2 and 4 tons per square foot, depending on the nature of the material, though 4 tons is as high as should be put on any earth.

Footings are often made of rough rubble masonry, but the author much prefers concrete, as this can be shoveled in and rammed to completely fill the trenches, and if made of good Portland cement it will set as a solid monolith and be much better than stone footings. These concrete footings should not be less than 12 inches thick, and thicker for very heavy loads, and they should project about 6 inches beyond the face of the wall above.

On these footings brick or stone foundation walls may be built, though brick is the better material, and if stone is used the walls should be at least 4 inches thicker than if built of brick. All these foundation walls, and in fact all masonry up to the first tier of beams above the ground level, should be laid in Portland cement mortar, as the dampness of the earth backing keeps Rosendale cement mortar from properly setting.

When the ground is too soft to put a footing directly thereon piles should be driven and capped with concrete, as shown in Fig. 2. These piles should be driven as near as practicable under the wall above and should be staggered in rows, and not be closer than 2 feet center to center.

The load allowed on a pile will vary with the nature of the material it is driven in, but in ordinary materials well driven piles will safely carry from 15 to 20 tons each. If the weight to be carried is so great that enough piles cannot be driven directly below it, and the footings cannot be extended on both sides of the wall, it is best to use some other style of foundation, as it is bad practice to have the center of pressure not practically over the center of the pile supports.

If driving piles through a very soft material underlaid by a hardpan, the piles should be shod with iron and well driven into the hard material, which will hold their points securely while the concrete cap, as shown, will hold the butts, and thus make them act as columns even if the surrounding material is very soft. The writer has put in very satisfactory foundations of this character where the upper material was so soft that the pile would settle in it 10 feet of its own weight, and where hardly any driving was necessary to sink the pile to the hardpan. Piles should be cut off at least a foot below the water level so as to keep them always wet, and timber capping is to be avoided, as it is liable to rot, and does not as securely hold the pile heads as concrete filled in around the piles for a depth of 1 foot at the top, as here shown.

Where the rock is within 20 or 25 feet of the cellar bottom it is far better to excavate the intervening material and found on the solid rock, as this depth of material can readily be held by 3-inch tongued and grooved sheet piling driven down by hand and supported with breast timbers as the excavations go down, and for a building of any importance it will pay better to do this excavating than run the risk of unequal settlement and consequent cracks in the building.

When excavating deep trenches of this kind for walls, a considerable saving may be effected by simply running down piers to the rock and arching over or resting steel beams from pier to pier just below the cellar floor, making the cellar wall continuous. These piers will, of course, have to be of sufficient area to stand the crushing effect of the loads to be carried, and the front and rear piers will also have to be designed to stand the thrust of the end arches, if arches are used.

If the rock is inclined at much of an angle to the horizontal it should be leveled off or stepped off in horizontal steps before putting in the foundations, so as to do away with the tendency to slip.

A cheap and satisfactory foundation for light structures in very wet and soft ground can be made by putting in what is known as a "scow bottom," which is nothing other than building a regular timber scow with sides and ends 12 to 16 inches thick and 3 or 4 feet deep, and bottom of two thicknesses of plank 3 to 6 inches thick, calked all around and sunk in the soft bottom. The brick walls are built directly on the sides and ends, and the whole structure thus literally floats in the mud. If the building is of any width there must be a sill timber with a line of columns thereon supporting the floors parallel to the side walls and holding down the bottom planking against bulging. A large number of old warehouses near the water front in New York are founded in this way, and have stood without serious settlement.

The above mentioned foundations cover about all the cases for direct wall footings, and if sufficient bearing cannot be obtained by any of these means it will be necessary to resort to some means of extending the area of foundations, and yet keeping the lines of pressure directly over the center of such areas; this can be done by using steel beams and girders, so arranged as to deliver the loads exactly where and in such proportion as is desired. In the modern tall building the loads are not delivered to the foundations uniformly, nor are they generally on continuous walls under which footings of any of the above mentioned forms can be placed, but they are generally delivered by isolated columns more or less irregular as to position and varying greatly in amount, and it is necessary to so arrange the foundations that each and all of these loads will be delivered centrally over its foundation, and that the pressure per square foot will be uniform for all footings regardless of the actual loads on the various columns.

This question of equal unit pressures under all footings is of the greatest importance, as the neglect of it causes serious trouble, due to unequal settlement, and the writer lately inspected an ordinary five-story building where the footings had been so designed that the pressure under the exterior walls was 1 6-10 tons per square foot, and under some of the interior piers supporting the floors 4 3-10 tons per square foot; and, naturally, the piers had settled so much more than the walls that the floors were badly out of level, and great damage had been done to the building throughout, which could only be remedied by shoring up the interior of the building, removing the center piers and putting larger footings under them.

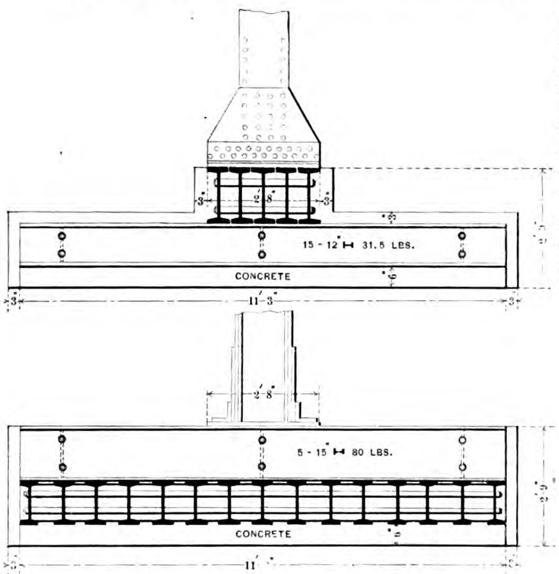


Fig. 4.—End and Side Views of Grillage Footing.

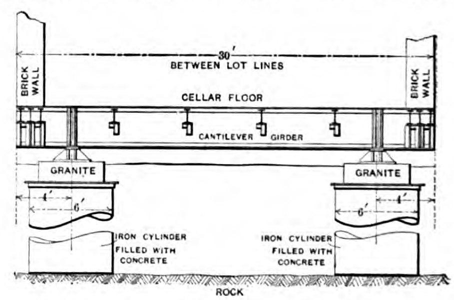


Fig. 5.—Cantilever Girder Supported by Caissons.

Foundations for Buildings.

A still more serious example of the trouble caused by neglect of this important requirement was the United States Government Post Office and Custom House in Chicago, built in 1877, and now being replaced because it absolutely fell to pieces, entirely through the fault of improperly designed foundations.

The architect founded this building on one continuous layer of concrete about 3½ feet thick overlying the clay, and as some portions of the building were much heavier than others, a very unequal settlement due to the unequal unit pressures took place, and parts of the building settled nearly 2 feet, while other portions hardly settled at all, and this made a complete ruin of the building, and it had to be pulled down.

That this trouble was simply due to the inequality of the pressures, regardless of the soft material on which it was built, is shown by the action of buildings properly founded on the softest material, of which a notable example is seen in the United States Government Custom House at New Orleans, which is founded on piles driven in soft mud, and the entire building has settled considerably; but as the number of piles were properly proportioned for the loads to be carried, the settlement has been uniform throughout and the floors are still level, and no serious cracks or other serious defects have developed, and the building is still as good as ever. So that if the footings are so designed as to give uniform pressures, it is not a very serious matter if some settlement does take place, as it will cause no trouble, and where the bearing strata is clay or other compressible material a certain amount should be allowed for and expected, as on the clay bottom of Chicago the settlement is found to be about 1 inch for each ton per square foot of pressure, though this settlement reaches its maximum at the end of about one year.

If footings can be built out on all sides of the applied load, it is a very simple matter to spread the foundation pier, and thus bring the bearing pressure to the value desired. The old method of doing this was by building brick piers, as in Fig. 3, but this method has generally been replaced by getting the necessary spread by steel grillage, consisting of two or more layers of rolled beams or rails imbedded in concrete, as shown in Fig. 4. In Figs. 3 and 4 are represented two different designs for the footing of an interior column carrying 500 tons, resting on a good earth bearing.

The first advantage of the grillage footing is its decreased depth and volume, as the room in the basement

caissons carried to the rock and for a pile foundation, and it was found that this foundation would cost only one-third as much as the caissons supporting cantilevers.

The groups of piles under two adjacent columns were so spaced that their center of gravity was under the center of gravity of the applied loads, and after driving the points of the piles well into the hardpan the heads were cut off even below the water level, and concrete was filled in around same. On this concreate the longitudinal grillage beams were placed, and the two column loads were distributed to these grillage beams by the riveted transverse girder. This arrangement of two columns on one footing is often followed on a smaller scale where the large girder here used is replaced by rolled beams. By this method the weight from the wall columns can be most economically distributed evenly over the footings without encroaching on the adjoining property.

In cases where none of the above mentioned foundations can be used, and where one cannot extend footings beyond the lot lines, it becomes necessary to use cantilevers to support the wall columns; and while this method of founding has been used quite extensively, it is the most expensive foundation in use, and should only be resorted to where absolutely necessary. This principle can be used in a variety of ways, but in general it consists in sinking caissons well within the lot lines to the solid rock, and supporting cantilever girders on the caissons extending out to the walls for the support of the wall columns, as

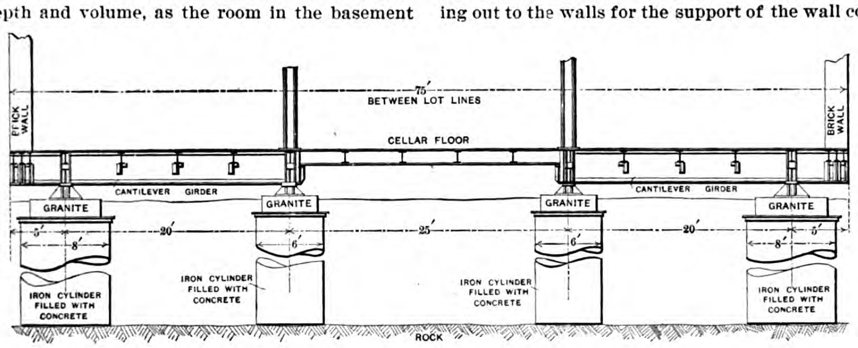


Fig. 6.—Cantilevers Supported by a Series of Cylinders or Caissons Filled with Concrete.

Foundations for Buildings.

of modern buildings is almost as valuable as in any other floor, so that it is of great advantage to take as little room out for foundations as possible, and it is readily seen that the large brick piers shown in Fig. 3 would be much more objectionable in a cellar than the footing shown in Fig. 4, or if it were desired to put the entire footing below the cellar floor, the footing shown in Fig. 4 would take much less excavation than the brick footing.

The second advantage of the grillage footing is its greatly decreased weight, and the weight saved by such footings will sometimes be sufficient to compensate for adding another story to the building.

Still another advantage of grillage foundations is the rapidity with which they can be procured and put in place, as the large granite base stones, shown in Fig. 3, take considerable time to be quarried, cut and delivered, and the handling and setting of such heavy pieces is slow and troublesome, whereas grillage beams can be secured immediately, and the individual pieces are easily handled and set. These grillage foundations are somewhat more expensive than brick piers, but the advantages named above more than compensate for the increased cost.

Grillage foundations need not be made square, as the tiers of beams can be arranged in any shape desired, and this style of footing is readily adapted to whatever requirements are met. A good example of the use of grillage beams resting on piles is that of the foundations for the Hudson Building at 32-34 Broadway, New York City.

Here we had a very soft bottom overlying the hardpan and rock, and designs were made both for pneumatic

in Fig. 5. If, however, the building is wide it may be necessary to sink more caissons, as in Fig. 6. These caissons may be round or square, and built of wood or steel, and their size must be proportioned for the loads they are to carry, and they may be sunk either by the pneumatic process or open excavation. Sometimes it is convenient to place the cantilever girder at the first floor above the cellar, in which case it is only necessary to put columns on the caissons extending through the cellar, and place the cantilever girders on the tops of these columns.

The above mentioned forms of foundations cover the most general cases, though they can be varied greatly in the details of application, as every case must be studied as to its local requirements, always bearing in mind the two fundamental principles, that the center of loads should be over the center of foundations, and that the area of each foundation should be in exact proportion to the load to be carried.

A SHORT time ago we referred in these columns to the Grand Palace which is to be erected at Tokio for the Crown Prince of Japan, and to the fact that the chief architect had recently been in this country placing contracts for some of the material which is to be used in its construction. The latest phase of the matter is the shipment to Japan of the derricks which will be used in putting up the palace. The work is to be done by the Carlin Foundry & Supply Company of Allegheny, Pa., while the steel will be supplied by the Carnegie Company.

Free Hand Architecture.

Some interesting comments on the lost beauty in building are found in an article by Julian Moore, contributed to a late issue of the *Fortnightly Review*. We present the following extracts:

From investigations made amid many more architectural styles than my great predecessors found time to examine, I believe all old buildings to have been erected, either in exact *fac-simile* of beautiful free hand drawings or in accordance with a principle of irregularities that it was noticed good artists most often imparted to roofs, pediments, &c., when drawing them in free hand, and it was found by experience that these could be satisfactorily added—as conventions—to stone reproductions of ruler-made designs. In fine art such a custom is most religiously sought after and obeyed. No artist, for example, would draw a doorway or a building within his picture with mechanical aids. By doing so this part of his work would lose what is called by artists "quality" or "beauty" in the drawing. To make their buildings look when built as beautiful as they might appear in beautiful free hand drawings—as beautiful as ours sometimes look in the free hand drawings of our best artists, but, alas, only in such drawings—was, I think, the high ambition of our ancestors, and the one that they can be shown to have always kept in view, even from examples of their slighter architectural efforts.

In recommending generally the reintroduction of more spontaneous methods in the minor arts and their architectural equivalent, carefully prepared divergencies from the mathematically precise in what I may perhaps be allowed to call the greatest of the decorative arts, I do so on the expedient ground of much extra beauty without extra cost; I would also like to recommend them, however, on the ground of absolute artistic necessity, since, after 60 years' experimenting with ruled lines, good results seem not to be even in prospect of coming. The new West End and Arundel street buildings, though erected by good artists and good tradesmen at vast cost, are not as beautiful as the humble inns that Morland loved to paint, or a country gentleman's mansion erected any time before 1820. More than this, no one can point to a building produced since 1830 that compares for a moment with 500 that could be named produced in the same number of years preceding that date, or during any other 60 years to the beginning of the world.

One of the clearest manifestations of modern incapacity to see a point for ourselves is that an architect who might be artist enough to make a most charming drawing of an old inn would, if asked by a patron to build him a *fac-simile* of it elsewhere, go to his draft board, T-square, compasses, &c., and commence to "lay in" a host of precise vertical and horizontal lines, honestly fancying he was copying the old building. When the result of this abortive labor was actually before him, in solid stone or brick, and found unsatisfactory by every one, himself not excluded, he would console the company and himself by saying that it wanted, of course, "the tone of age." How strange it is that buildings, erected in 1810, have had the tone of age as long as people now old can remember, whereas those erected in 1830 and 1840 show no sign as yet of its coming, though they by no means lack the decrepit features of time, even to the point of requiring to be thoroughly overhauled and repaired.

Value of Old and New Work.

A building which had been standing for about 60 years, and was consequently built in the period of our architectural development when it was assumed that good honest masonry was the rule, recently underwent some alterations, says a writer in the *Brickbuilder*, in the course of which it became advisable to remove the outer casing of brick wall and substitute therefor some light colored face brick. It was found that the outer 4 inches of the old work was laid up not only without the slightest kind of backing, but was in many cases entirely free from the rest of the wall, so that a crowbar put in behind the lining would pry off huge slabs of the face brick in one piece. In opposition to this, a wall which had been built only a few months, in connection with the same building, was found to overlap the lot line to a certain extent, and it became necessary to remove the outer 8 inches of it. Although the wall was not supposed to be a specially good wall, but simply built up as one would ordinarily construct such work nowadays, it was found that nearly every brick had to be broken away or forcibly detached from the backing. The mortar had set up so hard it was almost impossible to drive a nail into a joint without bending and the face of the wall was, as it ought to be in all work, an integral part of the whole. We certainly do some things better than our forefathers.

The Oldest Buildings in America.

The first buildings by the white races in America, says a writer in an exchange, were mere makeshifts—architectural accidents—due to unusual circumstances or exigencies, like those found at Newport, R. I., and Woods Holl, believed to have been erected by Norsemen, about 1507. That one at Newport, known as the "Old Mill," is a round structure of stone, supported upon short pillars and arches, in the early Roman or Etruscan style. The other, at Woods Holl, is also round, and of stone, but is built up from the ground, and has a battlemented top. It is without openings in the wall, except the entrance, and narrow windows immediately under the cornice, suggesting the idea of a fortification.

The second oldest building by white people in what is now United States territory, and the oldest known residence, is in St. Augustine, Fla., which was settled in 1564, when the monks of St. Francis erected this house for their occupation. It is constructed of coquina, a mixture of sea shells and mortar, which forms a cement as solid as natural rock.

Sir Francis Drake, while roving the seas in quest of riches, in 1585, destroyed the town of St. Augustine, but was unable to demolish this monastery. Its age, quaintness of design and historic interest have of recent years led to repairs and to its preservation as a museum, where have been gathered relics of past centuries. The round tower and the walls of the lower story are intact, the latter being sustained by heavy buttresses. The frame work of the second story gives evidence of being more recent by a century; and some even more modern features appear, in windows and balconies.

A deputy of the Spanish Government in 1590 came into possession of the building, which remained in the family until 1882, when it was sold to Dr. C. P. Carver, who more recently transferred it to J. H. Henderson, the present owner.

Figuring Rent by the Square Foot

A Cleveland architect is quoted by a local paper as authority for the statement that in all of the recent or improved office buildings in the city rent is paid by the square foot.

Here is one way in which he looked at it: "To keep this chair, about 1½ feet square, standing on the floor and occupying that much space, would cost no little sum in some of the better buildings. To have a table in an office is quite an expensive luxury, while a whole set of furniture would be more so. Every little bit of space counts, and even the corners must be utilized. Then think of the acres in all our new blocks and consider the money represented in their floor space. You seldom, if ever, see a cat in a modern office building, and I suppose one reason for this is that the cost would be great, as the cat could not get along with less than 4 feet."

CORRESPONDENCE.

WE are constantly in receipt of interesting letters of inquiry and comment from readers of the paper, many of which have nothing about them to indicate from whence they come or by whom they were written. We have in the past called attention to the omission of this important information, and we take this occasion to again suggest that in writing to the editor, every correspondent sign his letter with full name and address, in order that he may be properly located. In publishing communications, however, we shall use the initials of writers rather than their full names, except in cases where we are otherwise requested.

Design for Bridge of 50 Feet Span.

From E. T. S., *Fitchburg, Mass.*—In answer to F. R., Coalville, Utah, I send by this mail sketches showing plan and elevation of a bridge of 50 feet span for a highway. The drawings show the sizes of timbers and rods, and if carried out faithfully will, I think, prove satisfactory. At least, I hope the design may prove of benefit to the correspondent making the inquiry.

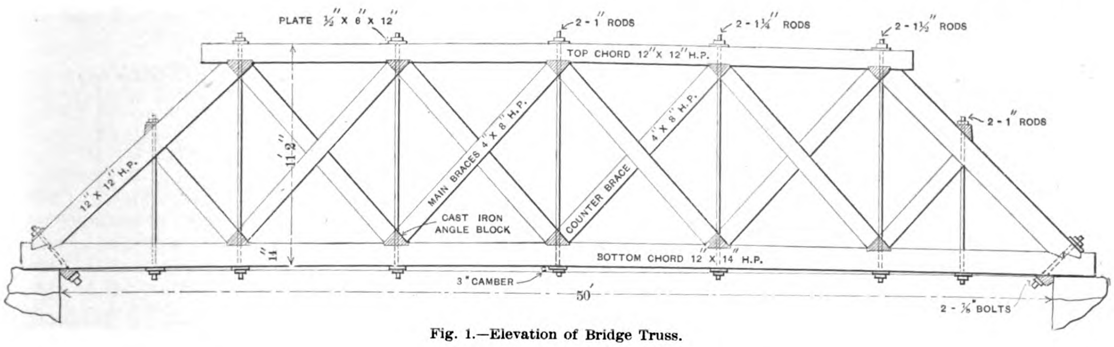


Fig. 1.—Elevation of Bridge Truss.

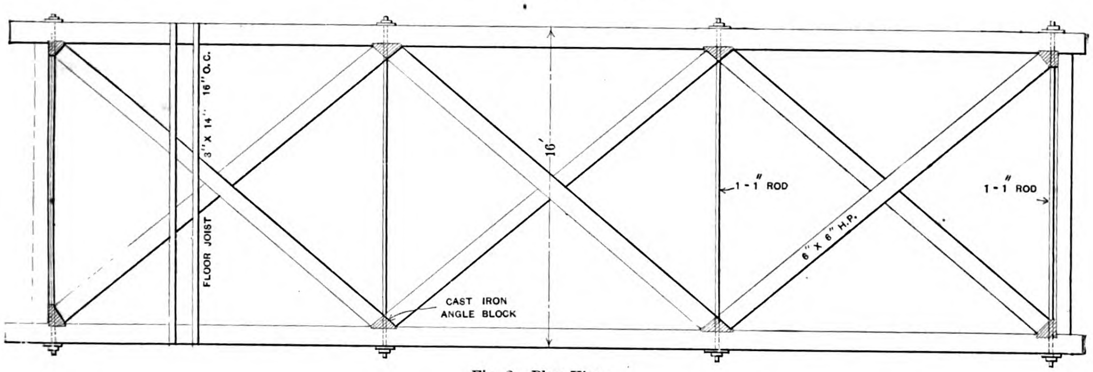


Fig. 2.—Plan View.

Design for Bridge of 50 Feet Span.

Design and Construction of Log Houses.

From W. A., *Chicago, Ill.*—I wonder if some of the country readers could tell me how to build a log house? I am called upon to erect a summer cottage in the Michigan woods of halved logs, that is, logs cut in two and used with flat face inside. I am told that log houses have to be laid up without any doors or windows, and the openings cut after the walls are all up. Is this so? As I never built a log house, I am looking in all the books I can find for instruction, but they do not seem to think that style of construction worth writing about. Cannot some of the readers of the paper give me a few words of advice, or perhaps the editor could refer me to some book on the subject?

Note.—We shall be glad to have those of our readers experienced in work of this kind express their views in answer to the above request, and furnish such sketches as may be necessary to show the methods of construction. As being of interest in this connection, we would state that a little book of designs containing suggestions for construction is "Log Cabins and How Best to Build Them," the price of which is $1.50, obtainable through this office.

Finding the Number of Shingles Required for a Roof of any Size.

From M. D. S., *Pittsburgh, Pa.*—Mr. Reissmann's article on this subject is very good; but it may interest "G. W. N.," Norristown, Pa., and other readers, to hear another method of calculating the number of shingles for a roof. We will take Mr. Reissmann's figures: A building 120 feet long, and the rafter 27 feet. We will allow 1 foot for the projection at the rake—1 foot at each end. That gives us 122 feet for the length of each row of shingles. Now, as Mr. Reissmann has shown, one shingle covers 4 inches, or three shingles to 12 inches or 1 foot; and to lay a row 122 feet long it will require 122 × 3, or 366 shingles. The rafter is 27 × 12, or 324 inches long. To this we must add—if it is a rough building—say, 2 inches for projection beyond sheathing at eave. So we have 324 + 2, or 326 inches, to be divided by five, if shingles are laid 5 inches "to the weather." This gives us 65 full rows, to which we add one for the double row in starting. We have now to multiply 366, the number of shingles in one row, by 66, the number of rows, and have 24,156, the number of shingles for one side of the roof, twice this number, or 48,312, being the count for the whole roof. But from experience, we know that in using the shingles on the market in these times there is always a shortage—bad shingles, splinters and waste in trimming, &c., so that it has been my practice to allow 1000 extra for every ten of the count. "One thousand shingles to the square" was never used in my practice, except for approximate estimates, as it is not correct. I might note here that 4 pounds of fourpenny nails are usually billed for 1000 shingles.

Now I want to take exception to Mr. Reissmann's recommendation to "treat a new roof with a coat of metallic paint." Any one who has observed closely knows that a sawed shingle rots first just at the point of the lap. The reason is, I think, that the rough surfaces of the shingles lying close together hold the moisture—from rain and snow—long after the exposed surface has dried off. Consequently this condition induces decay at this point. Now if you stop up the exposed surface of the shingle with paint or oil, you only add hindrance to the natural drainage at the point above mentioned; decay will go on all the more rapidly. I have a painted roof in mind now that looks fairly well; but, with my pencil as a lever, I can turn off three-fourths of the shingles within reach—all rotted off just under the lap. The paint has been no protection at that point. I have in mind another roof, the shingles of which, before laying, were dipped in hot linseed oil mixed with a little Cessna's Sienna. This roof has been laid 17 years; it is good for ten years more. Paint both sides of the shingle for two-thirds of the length, before laying, and you will at least double its lasting qualities.

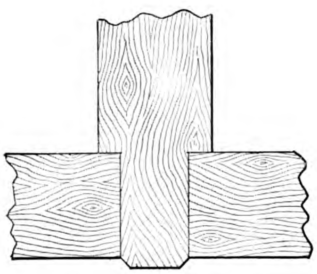


Fig. 1.—A Through Tenon.

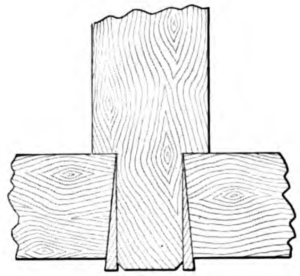


Fig. 2 —Through Tenon with Side Wedging.

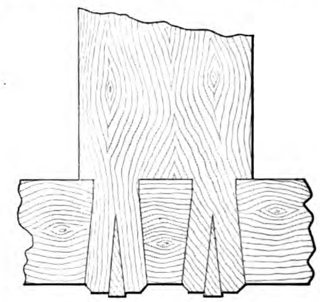


Fig. 3.—Through Tenon with Split Wedging.

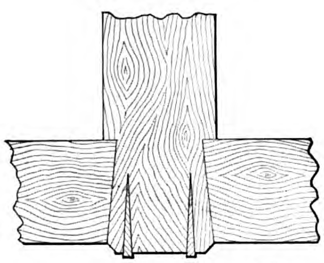


Fig 4.—Another Style of Through Tenon with Split Wedging.

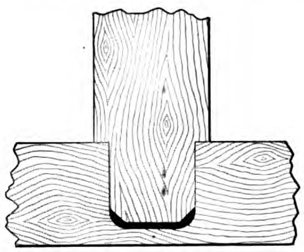


Fig. 5.—A Blind Tenon.

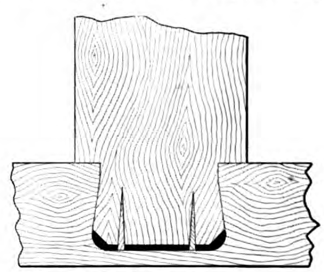


Fig. 6.—Blind Tenon with Split Wedging.

Some Examples of Mortise and Tenon Jointing.

Design Wanted for a Dairy Barn.

From J. L. T., *Bremen, Ind.*—I wish to ask space in your valuable paper for the purpose of consulting some of my brother carpenters about a round barn. I have a dairy barn to build, 60 feet in diameter, 20 feet high, with a silo 20 feet in diameter in the center. The cattle are to stand with their heads toward the center, and there is to be an 8-foot feeder aisle around the silo and in front of the cattle. I would like to hear from those who have had experience in work of this kind. What would be the best roof and the best way to frame it? We have plenty of timber in this country, and could build out of square timbers, if that is practical. There may be either 8 or 16 corners to the building.

Size of Gutters and Spouts.

From HENRY MAACK, PRINCIPAL OF THE ACADEMY OF ARCHITECTURE AND BUILDING, *St. Louis, Mo.*—In the December issue "J. C. B.," from Hickory Corners, Mich., asked about information regarding gutters and spouts. In reply I beg leave to cite the following information regarding this subject, based on experiments. Allow for every 100 square feet, horizontal projection of roof, 1 square inch spout, and every 25 feet arrange a down spout. Less than a 2-inch spout would hardly be assigned for any small roof, therefore we may modify the rule as follows:

	Square inches area.
For 100 square feet horizontal roof surface, 2-inch diameter spout	= 3 1/7
For 500 square feet horizontal roof surface, 3-inch diameter spout	= 7
For 1,000 square feet horizontal roof surface, 4-inch diameter spout	= 12 4/7
For 2,000 square feet horizontal roof surface, 5-inch diameter spout	= 19 9/14
For 3,000 square feet horizontal roof surface, 6-inch diameter spout	= 28 2/7

To find the girt measure of suitable hanging gutters square the diameter of the down spout. For example, a roof whose horizontal projection measures 1000 square feet requires a 4-inch diameter down spout, and a 4 x 4=16-inch girt gutter.

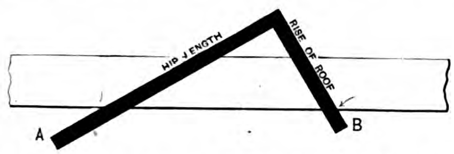
The best material for gutters and spouts is copper, then follows for durability enameled cast iron, next lead, glazed earthen pipe, galvanized iron, zinc, lead, and black plate iron in the order named. In thickness the galvanized iron, which is mostly used for its cheapness, should be No. 24 for good work and No. 26 gauge for ordinary buildings, agreeing to 16 ozs. and 14 ozs. respectively per square foot copper, or 0.0215 inch and 0.0188 inch respectively. The copper used should be cold rolled, except for linings in valleys, when it should be hot rolled. The best way to determine the thickness is by Brown & Sharpe's Pocket Sheet Metal Gauge, allowing an easy detection of one-thousandth of an inch.

Some Examples of Mortise and Tenon Jointing.

From R. B., *New Britain, Conn.*—The tusk tenon shown in one of the issues of the paper for last year was very interesting to us, and as offering suggestions to others we inclose a blue print showing the common forms of mortise and tenon joints used in door work. Fig. 1 represents a through tenon and Fig. 2 one with side wedging, while Fig. 3 represents a through tenon with split wedging. In Fig. 4 is shown another style of the through tenon with split wedging. In Fig. 5 is shown a blind tenon, and in Fig. 6 a blind tenon with split wedging. The latter was formerly used considerably by cabinet makers and is now coming largely into play on nice door work, especially in the New England States.

What Tools are Best for Carpenter's Kit.

From YOUNG WOOD-BUTCHER, *Ashton, R. I.*—Will some of the old hands tell me what are the most serviceable tools for a carpenter's kit, such, for example, as fancy plane, single planes or combination planes, such as a Stanley Universal plane; also, what kind of a saw set is most satisfactory? I am getting together my first



Obtaining Bevel of Backing for Hip Rafter.—Sketch Accompanying Letter of "L. W. G."

kit of tools, and I naturally want those which experience has shown to be the most desirable for the purpose.

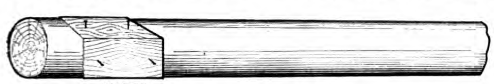
Laying Out Polygons.

From F. L. T., *Eureka, Cal.*—In a recent issue "A. S. W." of Shawnee, W. Va., asks for an easy rule for laying out polygons with five and six sides (pentagons and hexagons). Referring to the accompanying diagram if A P and C D are two diameters in a circle and E the middle point of the radius O C, and if E F is taken equal to E A; then A F is equal to the sides of a regular pentagon (one whose sides and angles are all equal), inscribed in the circle. The radius O C is the side of a hexagon. I might add that O F is the side of a decagon, or a ten-sided figure.

If it is required to construct a pentagon upon a given side this method might be adopted: Lay off D S equal to A F. Produce O D to M and draw O S N. At X draw X Y parallel to D S and equal to the given side. Draw Y P parallel to O X; then O P is the radius of circle in which the pentagon can be inscribed.

Obtaining Lengths and Bevels of Round Timbers With Steel Square.

From HEE H. SEE, *Montreal, Canada.*—Will you kindly allow me, through the columns of *Carpentry and Building*, to thank "Old Builder" for answering my queries in relation to repairing shingle roofs, and obtaining the lengths and bevels of round timbers with the aid of the steel square? I might say in regard to the trestles spoken of that they were to be of four round posts, two plumb and two battered with cap and sill. Two trestles were put side by side and braced with 3-inch plank 11 inches wide and 18 feet long. I forgot to say that the end posts were battered 3 inches to the foot. Perhaps the way I did the work may interest some of the younger readers of the paper. I first made a pattern by which to

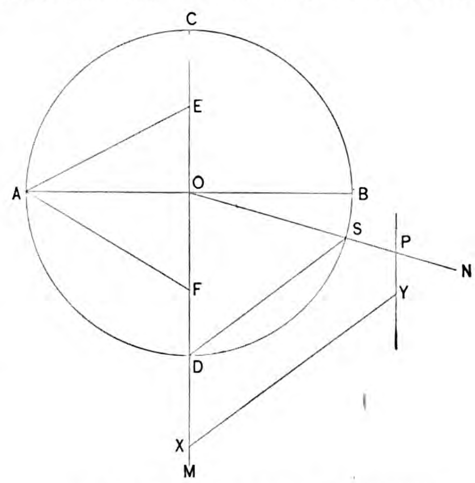


Obtaining Lengths and Bevels of Round Timbers with Steel Square.

cut the top and foot of the post, getting the bevel by means of the square. I then set out a 10-foot rod—that is, I took 3 inches on the tongue of the square and 12 inches on the blade and run it ten times. I divided the last foot into 12 equal parts, calling them inches. My trestles were 27 feet 9 inches high, so that by cutting the foot of the post to the pattern, running the rod twice and then 7 feet 9 inches and cutting to pattern again, I obtained a post that was exactly the same length when set up as those cut square 27 feet 9 inches. I never before saw or heard of this method, but unless I find a better one I shall always use it. I show in the sketch, as well as I am able, the pattern I made and the manner of using it. Two patterns should be employed, and then sight one from the other so as to get the ends square with each other. Please take notice that "Young Chip" has changed his *nom de mick* to "Hee H. See."

Why 17 and Pitch of Roof Gives Cuts for Rafters.

From L. W. G., *Alpena, Mich.*—In reply to "W. S.," Paterson, N. J., who asked why 17 and the pitch of the roof gives the plumb and level cuts for hips and valleys, I offer my rule and the principle on which it is based. In laying out common rafters with the square, we use the figure 12 on the blade to represent a foot of run and the rise per foot on the tongue, applying the square as many times as we have feet to run for our rafter span. Where the hips are equal, the same rafter rule applies to them and valleys as well. For example, if the roof is to be one-third pitch, then as the common rafters rise 8 inches in every foot run, the hip rafter will rise 8 inches in 17 inches, as the hip is the diagonal of a square. Then again, as our common rafter rule used 12 on the blade and 8 on the tongue, the building being, say, 20 feet wide, the square would be applied 10 times to run half way, making 10 feet run and 80 inches, or 6 feet 8 inches rise for the common rafters. As we used 12 inches on the blade of the square for cutting common rafters and run 10 times, we must use 17 on the blade for hip rafters



Laying Out Polygons.—Diagram Accompanying Letter of "F. L. T."

with the same rise, and run 10 times, just the same, making 170 inches, or 14 feet 2 inches, for the run of the hip, its rise being the same as the common rafters.

The reason 17 is used is because it is the diagonal of a square the sides of which are 12, and as the base of the common rafter rule is 12, the base of the hip must be 17, as the diagonal of a square, the sides of which are one-half the width of the building or run of common rafters.

As for the bevel of the back of hip rafters, where the hips are equal, take the length of the hip rafter on the blade of the square and the rise of the roof on the tongue, as shown in the accompanying sketch, the tongue giving the bevel either way from the center of rafter. Of course if the hips are unequal, or the rafters of more or less curvature, then I employ other methods, which I will describe later on, if requested. The sketch which I send shows the square applied in order to obtain the bevel of backing for a hip rafter. The bevel at B is the bevel required.

From G. L. McM., *Tacoma, Wash.*—In the December issue "W. S." asks why 17 and the pitch of the roof will give the plumb and level cuts for hips and valley rafters, where the roofs are all one pitch. It will only do so where the seat of the hip or valley makes an angle of 45 degrees with the plates of the building, or in other words, where the hip or valley starts from a square corner. For any other hip, as, for instance, the hip of an octagon roof, another cut must be used. If "W. S." will draw a plan of a building and lay down the seats of the common rafters, and also of the hips or valleys, say, for instance, of a building 24 feet square, with a hip roof, and measure the lengths of the seats, he will find that the seat of the hip will measure 17 inches for every 12 inches of seat for the common rafter, meeting it at the top, and since both rafters rise the same distance, it follows that the hip must rise just as much in running 17 inches as the common rafter does in 12 inches. The rest of "W. S.'s" question was answered in the December issue.

From E. T. S., *Fitchburg, Mass.*—I notice in the December number of the paper some rafter questions from "W. S.," Paterson, N. J. He asks why 17 inches and the pitch of the roof will give the plumb and level cuts of valley or hip rafters, also the length. His second question asks how to find the backing of hip rafters. In reply I would say that the position of the hip or valley is diagonally across the building, and the diagonal of 12 inches and 12 inches is 16 97-100 + inches, but 17 inches is near enough for all practical purposes. Therefore the rise of the hip in going 17 inches on its run is the same as the rise of the common rafter in going 12 inches on its run, consequently 17 inches and the rise of the common rafter to the foot will give the cuts. The length of the hip to the foot run of the common rafter is the diagonal of 17 inches and the rise of the common rafter to the foot run. Suppose the run of the common rafter is 10 feet and the rise 6 inches to the foot; the length of the common rafter is 13 42-100 inches to the foot run, and for 10 feet, 13 42-100 inches × 10 = 11 feet 2 1-5 inches. The corresponding hip or valley length to the foot run of common rafter is 18 3-100 × 10 = 15 feet and 3-100 of an inch. To find the backing of a hip rafter, lay the square on the straight edge, take the length of the hip on the blade in inches and the rise of the roof on the tongue in inches, and the angle the tongue makes will give the backing of the hip.

Give the Young Men a Chance.

From A. L. W., *New Hampshire.*—In the January number of *Carpentry and Building* I notice a half column of advice to boss carpenters from "C. W. B." of Reading, Pa. In my opinion "C. W. B." would make a good missionary to some of our foreign possessions as a bureau of knowledge and instructor of boss carpenters, but he would be a back number in the New England States. I have 12 volumes of *Carpentry and Building* filed away in my shop, and in the whole number I have never read anything so absurd and out of place. As a contractor and builder, it has been my experience that there is not one case in 50 to which the correspondent's remarks would apply. I have taken boys to learn the trade, and in three months they knew more than the whole gang, and would pick up and go to some other builder and let themselves as carpenters. This is a sample of 49 out of 50. Now show me a boss who has worked all his life to master the trade who would give his life's experience and knowledge away to a puff ball. There is not one man in a hundred who will confine himself to serve a proper time in order to master the trade. For instance, I took a young man from a saw mill to work not long ago. He was a good worker and did his work well, but the next season nothing but $2 a day could hire him. In another case, a young man wanted to learn the trade. He worked one month and then got mad, because he was asked to shingle. He knew how to shingle, but he wanted to do something he did not know. The next season he went out contracting. Again I employed a man lathing one season; the next season he struck out as contractor and builder to work for nothing, taking the bread and butter from a man who did good work at fair prices. I could name dozens like these in my experience. I heard an old contractor say "there will be enough contractors available next season; I have taught a hundred this season." Now, if "C. W. B." could do a contracting business one season and pay his green men $1.50 a day, which we have to, and do as he preaches, and pay 10 cents on the dollar at the end of the season at the same time, and let us old contractors know how he does it, he will accomplish more than Dewey did at Manila, and deserve to be placed on the retired list with a $50,000 mansion. I would like to have "C. W. B." read the last paragraph of the letter in the January number from "M. H. K.," Mena, Ark. Read and reflect, brother.

Quantity of Material Required in Laying 1000 Bricks.

From FRED WHITE, *Denver, Col.*—It has frequently occurred to me that a subject of deep concern to the general readers of *Carpentry and Building* might be profitably discussed by those who are interested in the various branches of building, and at the same time lead to a comparison of methods adopted by such tradesmen to reach the approximate amounts of materials required in their separate branches of building. To meet such comparison, a series of questions should be published under the head of "Correspondence," treating the several subjects, these questions to be answered by readers who are men of building experience, and the best answers be published for general information. The subjects to be treated should include brick work of various kinds, concrete floors, footings, walks, rubble stone walls, ashlar, pointing, &c., plastering, including scratch coat, brown coat and plaster of paris hard finish, also the treatment of patent plastering material. As a leader, I have prepared a few questions on brick work, and respectfully invite readers interested to submit their methods and experience. If the subject is well taken, I will follow with questions on other subjects.

How much material will be required for laying 1000 bricks under the following conditions:

1. Common bricks in ordinary wall, lime mortar, lime and sand only.

2. Common bricks in heavy walls, cement mortar, cement and sand, but no lime.

3. Common bricks in heavy walls, cement, lime and sand.

4. Face bricks in white mortar, lime and sand.

5. Face bricks in cement mortar, cement and sand only.

6. Face bricks in red mortar, lime, sand and mineral.

In giving answers state the proportions of lime, sand, cement, mineral, &c., necessary to make the required amount of mortar to lay 1000 bricks, also state experience and best methods of preparing the mortars.

7. In making white mortar for face work, is it best to use quicklime putty and mix sand when putty is cold, or mix the sand as soon as the lime is run off and while hot? What kind of sand should be used for white mortar for face work?

8. In making red mortar for face work, is it best to add the mineral to brown mortar, or slack the lime and set for putty, and then add the mineral, and when well mixed add the sand?

I trust these questions will draw out answers which will be of benefit to every one interested in building.

Note.—The questions of our correspondent open up an excellent field for valuable discussion, and we invite a full and free expression of opinion.

ONE of the finest power houses for electric lighting purposes is about to be erected in New York City, at a cost of over $800,000. It will be of steel skeleton construction with *façades* of brick with granite and terra cotta trimmings.

MAKING WOOD PATTERNS.—X.

BY CHARLES J. WOODSEND.

THE subject of discussion in the last issue was a combination core board, a plan view of which is presented in Fig. 67 of the illustrations, while Fig. 68 represents a section of the core board showing the battens upon the back. It will be remembered that the hollow for the rope was to be 2⅝ inches when finished, and allowing for the finish would bring it to 2⅜ inches. In making this core board the lumber will require to be at least 2 inches thick where the hollow for the core comes. It is not necessary that the whole board should be of this thickness, as it could be made ⅞ inch thick for the board and then segments 1⅜ inches thick glued under where the hollow will come. If constructed in this way the battens may be dispensed with. If there are many cores to take off a solid board with battens would be preferred, for the reason that after the core maker has constructed the core the board with the core upon it will be placed in the oven and baked for several hours. A heavy board, therefore, will stand better than a thin one.

Joint up and glue the board together, allowing about 1½ inches of wood upon the outside diameter of the core. After the glue is dry saw to a circle, screw on the battens, then fasten it to the chuck used for the pattern; or if preferred, it may be screwed directly upon the face plate. In this the operator's own judgment must prove the guide, as in some cases the chuck is to be preferred while in others the face plate is the better. After the board is in the lathe rough off the outer edge; then true up the face to a straight edge, mark the center and describe the two lines bounding the core, as shown in Fig. 67.

Prepare a template the exact size and shape of one-half of the core required. Then turn out between the lines already marked upon the board to this template, Fig. 68; sandpaper down and shellac, using black shellac. It is only necessary to shellac the depression for the core, not the whole board. Rub down and finish as explained for core boxes.

The next thing will be the pin from which the strike is to radiate. This pin may be of any size desired. A hole should be bored in the center of the board, the pin glued and driven in tight and afterward turned off. It may project from the board 1 inch or 1½ inches.

The strike will next require our attention, and is shown in Figs. 69, 70 and 71. This strike may be made of 2½ x ½ inch stuff. Glue two pieces on the sides at one end, Fig. 70, in order to strengthen the strike to receive the hole. Now bore the hole to receive the pin that was placed upon the board, and, of course, the hole must be perfectly square with the piece. The strike requires to revolve freely about the pin, but on no account must it be loose—that is, so as to rattle or have play. Now place the strike upon the pin on the board, and mark just where the core will come. Work out the strike to the template made for the turned part, Fig. 69, so that when the strike is in its position upon the board the two together will show an exact section of the core required.

The part that is cut out now requires to be beveled, Figs. 70 and 71. The amount of bevel is immaterial so long as it is upon the proper side of the strike, and the edge is not left too thick, nor yet worked down too thin. In this case about ⅛ inch is right. Fig. 70 shows the correct way of making the bevel, the edge shown being the one that rests upon the board. It is not necessary to shellac the strike. In using this core board and strike the core maker (molder) will ram the core in the board first, then will gradually build up on this, using the strike to obtain the correct size and shape.

The plan of a box for making this core in another manner is presented in Fig. 72 of the illustrations, while Fig. 73 is an enlarged section upon the line E F. It will be noticed that this box is made in two parts, and for the core under consideration each of these parts should be 2 inches in thickness, not less.

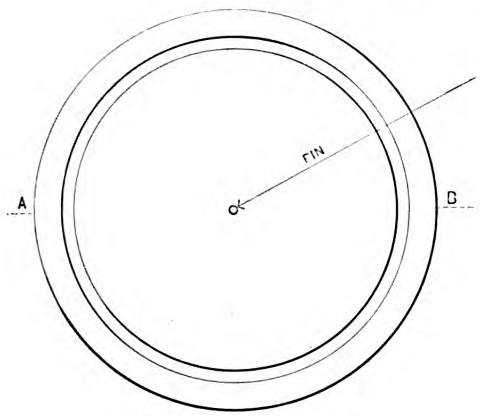


Fig 67.—Plan View of Core Board.

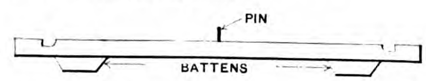


Fig. 68.—Section of Core Board on Line A B of Previous Figure.

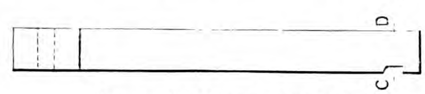


Fig. 69.—Side View of "Strike."

Fig. 70.—Plan View of "Strike."

Making Wood Patterns.

Before proceeding further it is desirable to explain that in using a box of this kind the core print upon the pattern must project sufficiently to balance the core when placed in the sand mold. An explanation of my meaning will be rendered clear from a study of Fig. 74. The projection of the core over the edge of the pattern in this case is 1 5-16 inches. In order to make sure of balancing this, the core should project past the edge of the pattern 1½ inches. The reason for all of this is that by using this kind of a box the core is made in sections, in the present instance 6, so that if there is not sufficient weight to balance the projecting part of the core the molder will have great difficulty in placing them in position. The box may either be turned off upon a chuck by screwing the two pieces upon it and using other pieces to balance, or they may be worked by hand. It is understood that the outer radius of the box is exactly the same as the core print.

The length and bevel for the ends is obtainable in the same manner as was explained for making the mold for segments, Fig. 39, upon page 229, of the September issue of *Carpentry and Building* for last year. The pieces should be worked out neatly, and if done by hand, then screw together and put in two dowels, so that the pieces will always come together in the same position. The part where the core is made should be treated with black shellac in the same manner as previously stated. Upon the ends G and H screw pieces of ½ or ⅝ inch stuff.

These are to be fastened to one piece only, it makes no difference which. Take apart the two pieces composing the box. Trim the dowels, as was explained, for core boxes previously made. Now upon the sides where are located the screw heads make marks around them with the black shellac. The marks should form a ring around the screw heads, and should be placed about ¼ or ⅜ inch away from them. This mark tells the molder that the screws may be, or ought to be, removed to release the core from the box after being made. The upper edge of the box will be left open for the core maker to ram up the core. The top will then be struck off with a straight edge or a trowel, the screws will be removed, the box taken apart, the core removed and placed in the oven for baking and the operation repeated. It is understood that these core boxes and strikes are to be of white pine, and all measurements taken from the shrinkage rules, the same as for patterns.

Fig. 71.—Enlarged Section on line C D of Figs. 69 and 70.

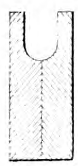


Fig 73.—Enlarged Section on Line E F of Fig. 72

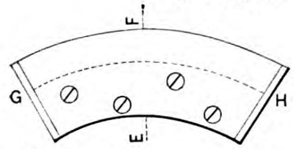


Fig. 72.—Plan of Another Style of Core Box.

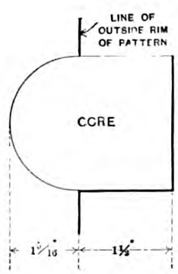


Fig. 74.—Showing Projection of Core Print upon the Pattern.

Making Wood Patterns.

Settling the Chicago Building Trades Dispute.

The joint conference committee of the Chicago Building Contractors' Council and the Chicago Building Trades' Council came to a definite agreement on December 30. The agreement is to be ratified by the bodies respectively represented before going into effect, but little doubt is expressed that the ratification will be speedily accomplished. The text of this agreement is as follows:

SECTION 1. Each council shall elect a board of arbitration of five members, who shall jointly constitute a final board of arbitration, to serve until their successors are elected, and who shall have the power to impose such fines or punishments or both as in their judgment the evidence may warrant, and until such fines shall have been paid or punishment satisfied such member or members shall be barred from all the privileges of the council, association or union to which he or they may belong.

SEC. 2. The right of a steward on the job to protect the journeymen's interest is recognized. All complaints, disputes or violation of joint agreements by employer or employee, parties to this agreement, to be adjusted by the contractor or his agent and the steward or business agent of the Building Trades' Council or affiliated unions, who shall be allowed to visit all jobs during working hours to interview the steward or workmen, but will not in any way interfere with their work. Failure to adjust any complaints, disputes or violations of agreement, the subject matter shall at once be referred to the standing arbitration committee of five from the employers and five from the employees representing the trades interested, who shall immediately decide the matter at issue. Any case at issue that cannot be adjusted by the trade directly interested, appeal shall immediately be taken to the final board of arbitration, as provided in section 1, to adjust all matters referred to it by any of the associations affiliated or may become affiliated with either party to this agreement, and that their decision shall be final. Said final board of arbitration shall be and is hereby given full power by both parties to this agreement to establish and enforce its own rules of procedure. No strike or lockout shall be authorized or called by either party to this agreement or by any member or association affiliated or may become affiliated with either party or their business agents, by reason of any dispute arising between the unions represented in either association. Work shall continue uninterrupted while any case is pending before the final board of arbitration.

SEC. 3. There shall be no limitation as to the amount of work a man shall perform during his working day.

SEC. 4. The question of machinery is hereby referred to the different organizations of employers and employees. In the event of failure to agree, either party shall have the right of appeal to the final board of arbitration.

SEC. 5. That each established employer in each respective trade shall be allowed to have at least one apprentice, whose time of expiration of apprenticeship shall expire before the apprentice shall reach the age of 22 years.

SEC. 6. No restrictions shall be placed on the use of building materials other than cut and sawed stone, granite, exterior marble work, common brick, wood mill work (except mantels and movable furniture), and prison-made material.

SEC. 7. It shall remain optional with the contractor as to the amount of men he shall employ.

SEC. 8. No rules other than those embodied in this agreement shall be promulgated, recognized or enforced by either party to this agreement, their affiliated associations or their members while the same remains in force, unless authorized by the final board of arbitration.

SEC. 9. The respective associations connected with the two councils shall immediately upon the adoption of this agreement by the two councils call together their arbitration committees to formulate such necessary rules and joint agreements as they may deem fit to govern their respective trades in the future, and submit the same without delay to the final board of arbitration for approval or otherwise.

SEC. 10. Members of the employers' associations represented in the Building Contractors' Council shall in all ways receive as favorable treatment by the Building Trades' Council and its affiliated unions as do any contractors in the same trade who are not members of associations affiliated with the Building Contractors' Council.

SEC. 11. It is agreed that as long as this contract is faithfully kept by the Building Trades' Council and its affiliated unions the members of the associations affiliated with the Building Contractors' Council in the erection of buildings will employ at the buildings in Cook County none but the workmen carrying Building Trades' Council working cards in good standing in their respective callings, except where it may be otherwise agreed, now or in the future, by the joint arbitration committee of the trade involved.

With this agreement in force many of the obnoxious regulations of the past will be wiped out. Labor disputes are to be settled immediately by the arbitration board and not to be long drawn out. Limitations on what a man shall do in a working day are abolished. The walking delegate is retained, but his powers are curtailed. The workingmen have gained a strong point in binding the contractors to assist them in completely unionizing the city building trades.

Ventilation.

In discussing the disadvantages of ventilating buildings from the top by means of lowered windows or ventilating registers, a correspondent of the New York *Tribune* throws the blame on architects and builders, who get their faulty ideas adopted, and continues the discussion as follows: They should know better than to make openings at the top of rooms, which simply allow heat and pure air to escape. It is not at all satisfactory to heat all outdoors and still have to breathe carbonic acid gas. Court rooms, school rooms, auditoriums, offices, dwelling rooms, and especially sleeping rooms, are giving slow poison to millions. The trades are to blame. It is their business to know. The remedy is simple and comparatively cheap. The fire place idea and its modifications will solve every problem. The opening near the floor and the heat in it makes perfect ventilation, for it gets rid of the poisonous air, and somehow, without opening any window, fresh air comes in. It will do it every time. An air tight building is an impossibility. Fresh air will come in when impure air is taken out. Build brick stacks and make openings into them at the floor for large buildings.

PROF. WALTER A. WYCKOFF of Princeton, the college graduate who spent two years tramping across the country from New York to San Francisco, that he might study the condition of laborers as one of them, and subsequently embodied his experience in that interesting book, "The Workers," recently lectured in New York. One of his statements is of considerable significance. He said that one of the things that had impressed him most in the course of his peregrinations was that he could get work whenever he wanted it, in the country. In the cities it was different. There he always found the supply of labor to be in excess of the demand. The lesson of this observation is obvious.

WHAT BUILDERS ARE DOING

THE amount of building in Boston, Mass., during the past year shows a slight gain over the preceding twelve months, the total number of buildings completed in 1899 having been 1305, involving a total expenditure of $9,890,577, as against 1284 buildings, costing $9,379,530 in 1898. A noticeable feature of the operations was the material increase in brick construction, several causes contributing to this result. It is pointed out that in the first place the building of single frame houses in the suburban wards had been overdone, so that professional builders turned to other forms of construction, three family brick houses springing up in large numbers. This type came into favor because of the laws relating to fire proof building which operated against the four-story tenement houses having two suites to each floor. Another explanation of the increase in brick construction is found in the advanced cost of lumber.

Chicago, Ill.

Architects, contractors, builders and real estate men generally are encouraged to look for a revival of building operations in Chicago during the ensuing twelve months. This prospect, it is intimated, is made almost certain by the changed conditions in labor circles, a very encouraging fact in support of this being found in the action of the Building Trades Council in deciding that materials may hereafter be purchased anywhere and that union labor may employ itself on any material it wishes, so long as the union rules prevail. This action, it is thought, will restore confidence in Chicago's progress, induce capital to return to building work, and release the flood of held-up contracts that has been awaiting favorable labor conditions before being put into effect. The record for the past year is not a particularly flattering one, showing as it does the smallest amount of capital expended in building operations in many years. During 1899 there were 3792 permits issued for buildings involving an expenditure of $20,856,570, as compared with 4066 permits issued in 1898, calling for an expenditure of $21,281,225.

The question of an amendment to the building ordinance fixing the limit of the hight of buildings to be constructed at 12 instead of 10 stories is being agitated, and is said to be regarded with favor by Building Commissioner McAndrews as well as by the City Council.

A sympathetic strike occurred January 6, when the Building Trades Council voted to aid and assist the strike of the marble workers on the Western Methodist Book Concern Building on Washington street.

The members of the Chicago Architectural Club held a "smoker" on the evening of Monday, January 15, dinner being served at 6. The address of the evening was by Joseph Twyman, who spoke on "Tapestry, or the Psychology of Textile Materials."

Columbus, Ohio.

The Builders' and Traders' Exchange held their fourth annual reception and banquet at their rooms, 71½ East State street, on the evening of Thursday, December 28, and was a grand success in every way. It was the largest and most elaborate in the history of the exchange, there being over 200 present, the guests including Edward A. Roberts, secretary of the Cleveland Exchange. The programme was varied, including vocal and instrumental music, speeches and a most attractive *menu*. Speeches were made by Prof. W. T. Magruder, on "Present and Future Duties of the Exchange;" by Judge T. B. Galloway, on "Who is a Builder?" by A. F. Blesch, president of the National Association of Brass Manufacturers, who spoke on "Fraternal Beneficial Societies;" by W. D. Richardson, president of the National Association of Brick Manufacturers, who discussed "The Relation of Brick Manufacturers to the Builders' Exchange," and by Fred. Weadon, City Building Inspector, who spoke on "The Relation Between the Contractor, Architect and the Inspector."

At the election, which ocurred on the evening of January 1, the following officers were chosen:

President, John G. Drayer. Second Vice-President, Charles J. Palmer.
First Vice-President, J. F. Blayer. Secretary, R. J. Gardiner.
Treasurer, E. L. Harris.

DIRECTORS.

William Brust,	E. A. Hildreth,
F. J. Busch,	J. J. Marvin,
J. B. Coulter,	F. H. Nichol,
E. T. Ewers,	George W. Ochs,
F. C. Ferris,	B. F. Stevenson.

The exchange is in excellent condition as regards finances, membership, exhibits, &c., and there is an excellent opportunity for a further large increase in membership. In fact, Secretary Gardiner reports that the exchange was never in better shape and with brighter prospects than at present. The outlook for the year in the building line is very good.

Cleveland, Ohio.

Architects are reasonably busy preparing for an active spring, and building operations promise to be numerous notwithstanding the increase in the price of materials. The record of the Building Inspector's office shows that during the last year permits were issued for 160 brick and iron structures, 1756 frame buildings and 1004 additions, the total value of all improvements being $5,488,976. This is an increase of nearly $2,000,000 over the preceding year.

Secretary Roberts states that the Builders' Exchange has experienced a surprising growth during the past year, having increased in membership 100 per cent., in assets 300 per cent. and in annual income 500 per cent. This is attributable largely, if not entirely, to the occupancy of new quarters and the successful installation of a permanent exhibition feature. The exchange is conducting a series of monthly dinners, at the last of which there were present among the guests United States Senator M. A. Hanna and Congressman E. T. Burton, chairman of the Committee on Rivers and Harbors. The grouping of the several promised public buildings on a central site fronting Lake Erie was the subject of discussion and met with general favor. The annual banquet will be held on February 21 and will be on a more elaborate scale than heretofore. The officers of the exchange for the ensuing year are:

President.....C. W. McCormick, of the Cleveland Stone Co.
Vice-President........James Young, carpenter contractor.
Treasurer..E. W. Palmer, of the Cleveland Window Glass Co.
Secretary.........William Downie, painter and decorator.
Exchange Secretary..................Edward A. Roberts.
Assistant Exchange Secretary..........Chester M. Harris.

The directors include G. E. Needham, president of the National Iron and Steel Roofing Association; the three ex-presidents of the exchange; W. H. Gick, Arthur Bradley and George Caunter, as well as Jacob Schade, a prominent general contractor.

A new lien law for the State of Ohio is being agitated and steps were taken at a general meeting of the exchange on January 10 to have such a law drafted, and if possible passed at this session of the Legislature. The proposed measure will probably follow the Illinois law in its main requirements.

Fall River, Mass.

The Builders' Association of Fall River, Mass., held their annual meeting in their new quarters in the Hudner Building on January 4, when the following officers were elected for the ensuing year:

President, Joseph Dickinson; vice-president, Robert Nicholson; secretary, John Dinnie; treasurer, A. K. Hunter. The Board of Directors consists of A. Homer Skinner, A. Leeming, J. D. Blossom, Joseph Nannery and J. Dickinson.

The members celebrated the occasion with a turkey supper and a social session, which was heartily enjoyed by the large number present. The association is in a very flourishing condition financially and many new members have been added to the roll during the past year. The outlook for 1900 is encouraging.

Los Angeles, Cal.

The record of building operations in Los Angeles for 1899 shows that 55 brick business structures, costing $339,366, were erected; 333 two-story frame dwellings, costing $962,200, and 382 one-story frame dwellings, costing $346,360. There were also several flat buildings, store buildings, brick residences, hospitals, barns, stables, &c., bringing the total cost up to $2,197,887.

Lowell, Mass.

The past year has not been one of any great activity in the building line in the city and vicinity. Very little work of any size has offered, and what has been done was at little profit, owing to the keen competition among contractors. The major portion of the building has been in the way of low cost houses and cottages. While it is rather early to give much of an idea as to the coming season, building work ought eventually to better itself from the fact that local manufacturing industries have been enjoying a period of great activity. Some of these, it is said, largely increased their capacity, which, added to several new industries lately materialized and work commenced by breaking ground, together with rumors of others, should all tend to give encouragement for a much better season than has been enjoyed for some years back. There is some promise of a revision of the building ordinances in the city in a short time, and there has been more or less activity among the various building labor unions of late. Among those which have taken the preliminary steps are the Bricklayers and Plumbers' unions, who are desirous of securing shorter hours and more pay.

The Builders' Exchange, notwithstanding the unusual lack of activity on the part of its members in their respective lines of work, continues to hold its membership and its prominence as an association. The relations continue harmonious among contractors and workmen.

Memphis, Tenn.

The Builders' Exchange of Memphis, Tenn., was organized on December 11, when C. J. Wagner was elected president; J. W. Higgins, first vice-president; R. H. Miller, second vice-president; Fred. B. Young, secretary, and P. R. Friedel, treasurer. A board of directors representing the different interests was also chosen for the ensuing year, composed of I. N. Chambers, representing the bricklayers; W. H. Fleehearty, the plasterers; A. B. Bartholomew, the roofers; A. W. Broderick, the tinners; R. F. Hodges, the contractors; David Peacock, the mill men; E. B. Causey, the lumber men; G. H. Kemker, the painters; John Kastner, the stone men, and S. M. Wright, the lime and cement dealers. The exchange rooms are located in the Planters' Insurance Building, and an application has been made for a charter.

Milwaukee, Wis.

If present expectations are realized, the coming season will witness the greatest activity in the building lines in the city and vicinity which has been known for a long time. The outlook at present is regarded as very encouraging, and there are a number of large jobs for which contracts are being placed.

On Wednesday, January 10, the members of the Builders' and Traders' Exchange held their annual election, with the following results:

President, P. L. Petersen.	Second Vice-President, John Bennett.
First Vice-President, H. S. Pelton.	Treasurer, John Langenberger.

Secretary, Charles H. John.

DIRECTORS FOR THREE YEARS.

H. Ferge,	E. F. Whitnall,
A. P. Compton,	Louis Hoffman.

The election was a spirited but friendly contest and brought out more votes than at any previous election for some years. After the result of the ballot had been announced at the evening meeting, the retiring president, E. F. Roberts, made an able farewell address before introducing the newly elected president, who responded with a few well chosen remarks. At this time a pleasant surprise was sprung upon the members in the shape of the final report of the Executive Committee, which had charge of the entire arrangements for the entertainment of the delegates attending the annual convention of the National Association of Builders, held in the city in February of last year. The report, contrary to expectations, showed a comfortable balance to be turned into the treasury of the exchange instead of a deficit, which often happens when arrangements on a large scale are attempted. The report was accepted and the committee discharged with the hearty thanks of the members for their untiring efforts. The committee consisted of Henry Ferge, chairman; E. J. Roberts, treasurer; H. S. Pelton, secretary, and B. F. Sanders, assistant secretary.

After the business portion of the meeting was concluded the members, nearly 100 in number, enjoyed the annual stag party and banquet, which was a very enjoyable and successful affair. A luncheon was served in the directors' room by a competent caterer, while mandolin and guitar music and phonograph and several interesting numbers of stage performance helped to fill out a very pleasant evening. The finance report showed the exchange to be in a very prosperous condition.

Minneapolis, Minn.

During the year just brought to a close Minneapolis has made very satisfactory progress in the building line. In that time 3103 permits were issued, representing an estimated expenditure of more than $3,000,000, while in 1898 2388 permits were issued for buildings costing $2,271,755. The advance in the price of all kinds of building materials tended in some measure to cut down building operations for the year, but it is expected that this will serve to increase the amount of work to be done during 1900. Prospective builders were somewhat backward about starting new work while prices were advancing, but now that they are stationary, although high, it is thought that construction work will be resumed. The indications are bright for a continuation of activity as soon as spring opens.

Newark, N. J.

At the annual meeting of the New Jersey Society of Architects, held at 842 Broad street on the evening of January 5, the following officers were elected: President, Paul G. Botticher; first vice-president, Thomas Cressey; second vice-president, Thomas Dickson; secretary and treasurer, George W. Von Arx. The Board of Governors consists of Charles P. Baldwin, John C. Ely, Herman Kreitler, R. W. Saylor, Albert Beyer and Henry C. Klemm.

Omaha, Neb.

The Builders and Traders' Exchange met in their rooms at 207 New York Life Building on the evening of January 2 and elected the following officers for the ensuing year: President, J. Fred. Smith; vice-president, Robert C. Strethlow; treasurer, E. G. Hampton. The Board of Directors consists of Thomas Herd, Albert P. Johnson and John Rowe.

Philadelphia, Pa.

The report of the Building Inspection Bureau shows that during the twelve months of last year there was a marked falling off in the amount of building done as compared with the year before. In fact, the figures are said to be the lowest in ten years and almost $8,000,000 behind 1895, which was the "boom" year in the building line. In the year just brought to a close 8431 permits were issued to cover 11.859 operations, estimated to cost $20,377,990. These figures compare with 8237 permits covering 13,197 operations in 1898 and involving an expenditure of $21,865,555. The extent to which dwelling houses were erected is seen from the statement that in 1899 there were 3622 permits issued for this class of structures, costing $7,616,730, as against 5144, costing $11.757,650 in 1898.

In the opinion of prominent architects, contractors and real estate men this amount of business was far in excess of what was generally anticipated at the beginning of the year. The dwelling operations in West Philadelphia were conducted on a large scale, and while those in South Philadelphia were not quite so extensive they were of a very substantial character. Germantown, in the northwest, contributed its share, and many other of Philadelphia's beautiful suburbs shared in the general improvement. It seems to be the opinion that the approaching spring will witness a marked degree of activity.

The Master Builders' Exchange celebrated the close of the old and the advent of the new year by a jollification at the exchange on South Seventh street, which was enjoyed by many prominent followers of all branches of the building trade. The proceedings opened at 12.30 with a luncheon in the café, followed afterward by a season of music, speeches, songs, &c., a stage having been erected at one end of the large hall. President John Atkinson was the master of ceremonies, while the Entertainment Committee was composed of W. S. P. Shields, chairman; J. A. Lindsay Little, John L. Gill, A. B. Barber, Frank K. Whiteside, Frank McAvoy, J. T. Allen, William J. Gray and Edwin Hall. The exercises closed with the singing of "Auld Lang Syne" and the "Star Spangled Banner."

Pittsburgh, Pa.

Superintendent J. A. A. Brown of the Bureau of Building Inspectors reports for the month of December that there were 112 permits granted for new buildings, 19 for additions and 28 for repairs, which in comparison for the record for the same month in 1898 was an increase of 35 in the number of buildings and $349,164 in their estimated cost. The month of January up to the time of going to press has been very quiet, applications for permits coming in very slowly and architects reporting that not much new business is as yet in sight. It is felt, however, that with the approach of spring there will be greatly increased activity in all lines, and that with the amount of prospective work in sight in and about the many suburbs of the city the aggregate volume of business for the season will be large. In Allegheny the outlook is very encouraging, and for the month of December the record of building operations is said to have been the best since the bureau was established five years ago.

The Builders' Exchange held their annual meeting on January 3, when officers, with the exception of secretary and treasurer, for 1900 were chosen. On the 8th of January the Board of Directors met and elected a secretary and treasurer. The results are as follows:

President, W. B. Lupton.	Secretary, Geo. S. Fulmer.
Vice-Presidents, Adam Wilson, John S. Elliot.	Treasurer, T. J. Hamilton.

DIRECTORS.

T. J. Hamilton,	J. P. Knox,
G. S. Fulmer,	James Hay,
John M. Addy,	A. Rasner,
James M. Jones,	Samuel Francies,
E. R. Cluley,	J. J. Munn,
N. Green,	H. R. Rose.

Spokane, Wash.

It is stated that 26 of the contractors of the city and the Master Plumbers' Association have signed a wage scale to govern building operations for the year 1900. The rules are to go into effect April 1 and to apply only to contracts signed after that date. The rules provide that there shall be a pay day every two weeks, but laborers shall be paid in full when discharged. They also declare against sympathetic strikes, and in favor of arbitrating all differences which may arise. Eight hours is to constitute a day's work, time and a half to be allowed for overtime, night, Sunday and legal holiday work.

The following is the scale of wages: Carpenters, 40 cents per hour; bricklayers, 62½ cents per hour for common brick, 70 cents per hour for pressed brick, nothing but buttered joints to be classed as pressed brick; stone masons, 62½ cents per hour; stone cutters, 62½ cents per hour; plasterers, 62½ cents per hour; building laborers, mortar mixers and hod carriers, 35 cents per hour; wheelbarrow men and all other mason help, 30 cents per hour; plumbers, $4 per day, subject to the existing contract, and lathing, $2 per thousand.

Springfield, Mass.

At the annual election of the Builders' Exchange, held in their rooms the latter part of December, officers for 1900 were chosen as follows: President, L. O. Eaton; vice-presidents, W. A. Newton and C. P. Chase; secretary, S. F. Sibley, and treasurer, S. H. Howland. The trustees include the officers above named, together with E. W. Shattuck, J. S. Anderson, W. D. McKenzie, L. H. Scott, J. F. Walls and E. P. Davis. The Membership Committee consists of T. T. Morrissey, J. W. Hayden, N. E. Russell, C. P. Chase and W. J. Howland.

St. Louis, Mo.

Although it is rather early in the year to form an opinion relating to the spring outlook, architects and builders seem to feel that the prospects are fair. More or less will be done in the way of dwellings in and about the suburbs of the city, and considerable money will be expended in business structures. There is nothing at the moment to record in the building line, as everything at present is rather dull. Commissioner Stemmes' report shows that during the year just brought to a close there were 1539 permits issued for brick structures valued at $7,087,027, and 926 permits for frame structures valued at $447,472. As regards the total amount of building done, the report shows that $30,796 less was expended for building improvements than during the preceding year.

At the meeting of the Builders' Exchange the following officers were elected for the ensuing year: President, Henry Fairbanks; secretary, Richard Walsh, and treasurer, Thomas Mockler.

The Master Builders' Association recently held their annual meeting and elected A. W. Black president, J. B. Marley secretary and Jacob Schenck treasurer, for 1900.

Worcester, Mass.

While it is rather early as yet to get much of an idea as to the spring outlook, architects and builders appear to be of the opinion that if the prices of building materials are kept within reasonable figures there will be quite as much work done in 1900, even if it does not show a marked increase over the previous year. A number of buildings are under way, and at present there is more or less repair work in progress. The amount of building in the city during the past year has shown quite an increase over the previous twelve months, this being true both as to the number of permits granted and the estimated valuation of the work.

The Builders' Exchange held their annual meeting in the Knowles Building, 518 Main street, on January 10, there being a large number of members present. The annual election of officers resulted in the selection of B. C. Fiske for president, James I. Elliott for vice-president, and C. W. Carr for treasurer. The directors elected were Ellwood Adams, George Kingston and C. R. Clemence, who were to meet on the 17th of January for the purpose of electing a secretary.

A very interesting meeting of the exchange was that held on December 28, the affair being social in character. Mr. George Kingston gave a brief review of the movements which led to the organization of the Builders' Exchange, after which W. H. Sayward, secretary of the Boston Master Builders' Association, spoke on "The Benefits Derived from the Builders' Exchange." O. S. Kendall, Sr., C. A. Vaughn and others were called on for brief remarks, after which lunch was served and there was an informal reception.

Notes.

It is stated that never in the history of Greenwich, Conn., have there been so many costly houses in construction as at present, and that the prospects for the continuance of the building activity is most encouraging. The builders have recently received a notice that the members of the Union of Amalgamated Building Trades will on April 1 demand an eight-hour day instead of nine, the present schedule, with the same amount of wages.

The masons of Passaic, N. J., have recently notified builders that beginning with April 2 they will demand 45 cents an hour for nine hours' work a day.

It is expected that Louisville, Ky., will soon be in the midst of an important building boom, as many new buildings are contemplated for dwelling and business purposes.

The report of Building Inspector Kelly of Jersey City, N. J., for the fiscal year shows that permits were issued for 610 new buildings and 482 alterations, estimated to cost $2,141,789.

The bricklayers of Toledo, Ohio, will on May 1 make a move for an eight-hour day and an increase of wages to 50 cents an hour. The lumber men are of the opinion that the opening of the season will witness an advance in building material.

The building operations in Reading, Pa., during 1899 are said to have been the most extensive for a number of years past. It is expected, however, that the demand for houses the coming spring will be as great as last year and that there will be a boom in building during 1900. During the past year 1615 permits were issued, of which 490 were for two-story houses, 61 were three-story buildings and 5 for one-story structures.

The Plasterers' Union has notified the contractors of Detroit, Mich., that after April 1 the wages of plasterers' helpers will be 25 cents an hour. This is the first action of the kind taken by any local union with regard to the season beginning April 1, but it is believed that a similar demand will be made from other quarters, although it is not expected that it will be general.

The journeymen plasterers of Wilmington, Del., have been granted an eight-hour scale and $3 a day, the men heretofore working nine hours a day for the same money.

The members of the Builders' Exchange of Cincinnati, Ohio, are agitating the question of a new lien law, and a special meeting of the exchange is to be called for a general discussion of the subject. It is intended that the new law shall secure the equal protection of the interests of architects, builders, contractors, sub-contractors and material dealers.

The records of Building Inspector Jackson of Scranton, Pa., furnish an interesting study of the amount of building since the beginning of the fiscal year in April last. The records show that the cost of the buildings erected was $885,772. Mr. Jackson is inclined to regard the outlook for the coming season as rather uncertain, on account of the unsettled relations existing between employers and workmen in the building trade.

It is stated that more building was done in Kansas City, Mo., the past year than was ever known before in the history of the city.

A great deal of building was done in Greenville, N. C., during the year just brought to a close, and the city made greater advancement in this respect than during any corresponding twelve months in its history.

The Master Builders' Exchange of Houston, Texas, and many of the leading architects of the city have reached an agreement by which the architects are to furnish all plans required and no contractor shall be allowed to make estimates on any work in the office of any architect unless the contractor be a member in good standing of the exchange.

The contractors of Poughkeepsie, N. Y., and the Bricklayers' and Masons' unions have agreed to a scale of wages to go into effect May 1. The work day will consist of eight hours and the wages will be 40 cents per hour.

Atlantic City, N. J., has been rapidly developing during the past year. There were 572 permits taken out for operations of more or less magnitude, some of them calling for the erection of as many as 20 houses. There were 327 frame cottages erected and 48 brick bwellings, while the capacity of the hotels was increased by over 1800 rooms. This was brought about by the erection of eight frame hotels and nine brick hotels. It is estimated that the total value of the improvements will foot up several millions of dollars.

THE INSPECTION OF LUMBER.

BY F. A. HERSH.

THE inspection and classification of lumber, or its valuation, according to the uses to which it may be put in building or elsewhere, is, at most, a matter of judgment. In each locality there are certain rules used as a guide which the inspector must follow as far as his judgment will allow in classifying the lumber. I will endeavor to give the rules used in the three lumber centers, Maine inspection for the East, Baltimore inspection for the South, and Saginaw inspection for the West.

Maine Inspection.

Pine.—No. 1 pine is entirely done away with, and the first quality recognized is called No. 2. This may be of most any length or width, but short lengths and narrows must be good; the shorter and narrower the piece the better is the quality required. A board 10 to 12 feet long and 4 to 6 inches wide must be entirely free from knots and sap and straight in grain. Stuff of larger dimensions must be nearly free from knots, sap and shake.

No. 3 pine must be free from shakes, but a small number of knots and a little sap will not condemn it. The size of the piece goes far to determine the quality. Very small pieces otherwise up to grade No. 3 would be classed as No. 4.

No. 4 pine can be a small board free from knots, but with some sap. If a large piece be put in this grade it is because one-quarter or one-third of the piece is shaky, although the balance may be of good quality.

The market recognizes two kinds of shipping boards called "Shippers," "Smooth Shippers" and "Common Shippers." "Smooth Shippers" are without shake or case knots or any large knots. "Common Shippers" are coarse and knotty, 8 inches and upward in width and 12 feet and upward in length. Splits, red streaks or very shaky boards are not recognized as belonging to this grade.

"Narrows" is the next grade below Common Shippers. They are too small for Shippers, but must be fairly good and suitable for floor boards. Poor fours are sappy, shaky and knotty, not good enough to be classed in any of the former grades.

"Scoots" are the lowest grade, rotten boards and stuff of a very poor grade.

Spruce.—Spruce is known in two qualities, "Merchantable" and "Scoots." The Scoots are boards which are cross-grained or rotten. In surveying the grades are divided in two qualities, "Floor Boards" and "Coarse." The Floor Boards must be almost free from knots; all others are considered Coarse.

Baltimore Inspection.

Rules.—The following rules for the inspection of lumber were adopted by the Lumber Exchange of Baltimore: In the inspection of hard wood lumber it is necessary that the inspector use his best judgment, using the rules for his guidance. The standard knot must be sound, not to exceed 1¼ inches in diameter. Splits are considered defects, and usually reduce the piece to a lower grade. Mill culls are never considered as marketable, and any piece which will not cut to the use for which the size is applicable without wasting more than half is a mill cull. The standard lengths are 12, 14 and 16 feet, but 15 per cent. of 10-foot lengths are allowed.

In black walnut or cherry 10-foot lengths are considered as standard, and 15 per cent. of 8-foot lengths may be used on the first and second grades. All badly manufactured lumber should be reduced to a lower grade, and that for newels must be inspected with a view to the adaptability of the piece for the intended use, as in many cases it cannot be for any other purpose. They should be cut outside the heart to square the following sizes: 5, 6, 7, 8, 9, 10 and 12 inches, when seasoned. The lengths should be 4 feet or the multiple thereof. All rotten, shivered and shaky ends should be cut off in the measurement, when the piece will make 8, 10 or 14 foot lengths, clear of the bad end, and be classed in the grade the part will make, except culls, which should be counted full in all cases. Face cracks in all cases will reduce the stock one grade; if badly face cracked, so that one-half the board or plank cannot be used without waste, then it shall not be counted. The inspector in all cases is to keep a separate tally of each size and quality. All boards and plank should be graded on the worst side. The recognized standard thickness is 1, 1¼, 1½, 2, 2½, 3, 4 and 5 inches in all classes of hard woods, and in all cases the piece shall be of full thickness, parallel in width and have square edges and square ends. All tapering pieces shall be measured one-third the distance from the narrow end, when 12 inches and over at the center. When less than 12 inches wide at the center it shall be measured at the narrow end. Worm holes are considered one of the most serious defects in hard wood lumber. All inspectors of hard wood under these rules shall mark the quality upon the lumber so inspected when so required.

Black Walnut is inspected in three grades, "Firsts," "Seconds" and "Culls."

Firsts should not be less than 7 inches wide, and must be free from defects, but at 10 inches wide will admit of defects equal to 2 inches of sap on the edges. Defects may increase with the width, but not such as to cause waste when used for first-class work.

Seconds should not be less than 6 inches wide, and at 6 inches would admit of one knot in each piece. Defects may increase with the width. Sap on the face side should be measured out.

Culls should include all lumber not up to the standard of the former grades. Mill culls should not be excepted in this grade.

Poplar or White Wood inspection grades shall be known as "Firsts," Seconds," and "Culls."

Firsts should not be less than 10 inches wide, and at this width should be free from defects; at 12 inches 2 inches of white sap, at 16 inches 4 inches of white sap, should be allowed. More sap may be allowed in proportion to the width. In lieu of the sap one standard knot should be allowed for each 4 inches of sap.

Seconds should not be less than 6 inches wide and clear up to 8 inches. When over 8 inches, may have two sound knots not to exceed 1¼ inches in diameter, and 2 inches of white sap. At 10 inches defects equal to 3 inches of white sap or two sound knots are admissible. Defects may increase with the width. Two-thirds of the entire piece must be suitable for first-class work without waste.

Culls shall comprise all sizes not up to the standard of seconds. Mill culls are not excluded from this grade.

Ash.--The inspection of ash shall be "Firsts," "Seconds," and "Culls."

Firsts shall not be less than 8 inches wide, free from all defects. Sap shall not be considered a defect if bright and sound.

Seconds shall not be less than 6 inches wide, and at 8 inches may have two standard knots; must be free from heart, dry rot, dote and worm holes.

Culls shall include *all* grades not up to the standard of seconds.

Oak inspection is the same as ash, excepting timber in which sound knots and heart not showing on the outside shall not be considered as defects.

Cherry, Ash and Walnut Counter Tops shall be 12 feet long and over 17 inches wide and over 1, 1¼, 1½ and 2 inches in thickness, and must be clear of all defects.

(To be continued.)

New York Trade School at the Paris Exposition.

With a view of giving an idea of the extent and perfection of manual training in this country, the commissioners who have charge of the United States exhibits at the Paris Exposition have induced the New York Trade School to make an exhibit. The exhibit will consist largely of pictures and charts showing the pupils of the different classes at work, and also examples of their work in the various stages of completion, so as to convey a good idea of the course of instruction. In addition to these pictures, the working drawings that are given to the pupils will be arranged on charts so that those who visit the exhibition and are interested in this branch of education may gain a comprehensive idea of the methods followed.

New Home of the General Society of Mechanics and Tradesmen.

On the evening of January 3 the General Society of Mechanics and Tradesmen held its 114th annual meeting, which was made the occasion for a formal opening and dedication of the society's new building, 20 West Forty-fourth street. The new structure is five stories high, with a front of brick and stone. The lower floor is devoted to a library department, the second to a large entrance hall and assembly room and executive officers' and members' room. The three upper stories are devoted to the various school departments of the institute, there being rooms for clay modeling, cabinet decoration, architectural, free hand and mechanical drawing, stenography and typewriting.

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Carpentry and Building

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NOVELTIES.

The Heidt & Hubbard Safety Sash Lock.

A sash lock possessing a number of interesting features of construction is being introduced to the attention of architects, contractors, builders and house owners generally by Heidt,

Novelties.—The Heidt & Hubbard Safety Sash Lock.—Fig. 1.—Single Lever Lock for Bottom Sash without Balance.

Hubbard & Co. of Bay Shore, Long Island, N. Y. This device is referred to as the Safety sash lock and is manufactured under patents granted to A. P. Heidt. The construction of the device is such that in use it is set in the window frame on either side opposite the sash and entirely out of sight. It consists of few parts and is referred to as being automatic in action. These parts will be readily understood from an inspection of the accompanying illustrations, in which Fig. 1 represents a single lever lock for bottom sash without balance, while Fig. 2 shows a double lever lock where both sash are balanced. The manner in which the parts are applied is shown in Fig. 3, where two single lever locks are represented as applied to both sash without balance, one of

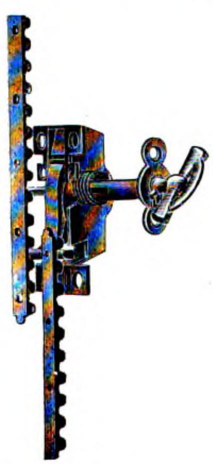


Fig. 2.—Double Lever Lock for Use where Both Sash are Balanced.

the sash being removed for the purpose of more clearly showing the position of the locks. In operating the device the key passes through a cam, which presses the lever against the corrugated steel rack on the window sash. The manufacturers state that any person who can mortise a hole in the window jamb can put the lock in place. For purposes of ventilation one or both sash may be placed in any desired position and securely locked, as they cannot be moved up or down without using the key. The lock also has a cut-off which keeps the lever away from the sash when so desired for painting, repairing, cleaning windows, &c. The key, it is claimed, will operate the lever to any desired pressure against the sash, and as the lever is non-receding it stays wherever it is placed. Another point to which the manufacturers call special attention is that when the lock is at full pressure it is impossible to shake the window or cause it to rattle. On this account the locks are especially adapted for use in hospitals, sickrooms, schoolrooms, libraries and in fact all places where quiet is desired. The device has been fully tested, and architects, builders, contractors and others who have used it refer in very flattering terms to the satisfaction which it has given. The further claim is made that it saves the sash from being split off or from having a hole pounded in the top of the

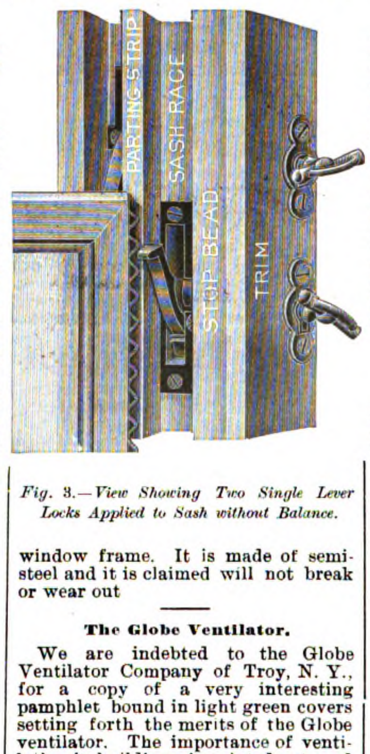


Fig. 3.—View Showing Two Single Lever Locks Applied to Sash without Balance.

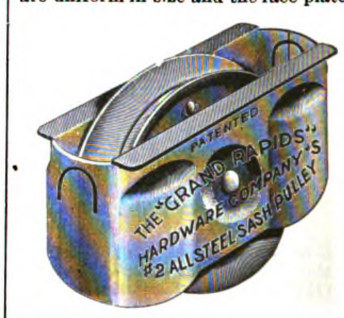
window frame. It is made of semi-steel and it is claimed will not break or wear out

The Globe Ventilator.

We are indebted to the Globe Ventilator Company of Troy, N. Y., for a copy of a very interesting pamphlet bound in light green covers setting forth the merits of the Globe ventilator. The importance of ventilation in buildings is pointed out and it is shown how this may be accomplished by the aid of the device mentioned. The ventilator has been before the public for many years and is favorably known to architects, builders and the trade generally. Numerous testimonials are given showing the satisfaction which the device has given, while many of the illustrations are of buildings in connection with which the Globe ventilator is used. The pamphlet also calls attention to Globe ventilated ridging in brass, copper and galvanized iron, and to the fact that the Globe ventilator is especially adapted for ventilating schools, churches, hospitals, theaters, factories, armories, cars, steamships, stables and in fact buildings of all descriptions. Many of the illustrations are half-tone engravings, which add materially to the artistic effect of the catalogue. The last page is devoted to a price-list of the Globe ventilators.

Steel Sash Pulley and Triple Bit.

The Grand Rapids Hardware Company, Grand Rapids, Mich., are offering the trade the No. 2 all steel sash pulley and Grand Rapids triple bit illustrated herewith. Fig. 4 represents an all steel noiseless sash pulley, which requires in its installation neither screws nor nails. The pulleys are uniform in size and the face plates



Steel Sash Pulley and Triple Bit.—Fig. 4.—All Steel Sash Pulley.

are not let into the wood. The shell is so formed that the sash cord will not get off the wheel. When fitting this pulley to a frame three 1-inch holes are bored in line, with centers ¾ inch apart. The pulley is fastened into the frame by punching the end tongues, seen in the illustration, into the wood with a common nail set, the company supplying a punch free for this purpose, although any common nail set is sufficient. Fig. 5 illustrates the Grand Rapids triple bit, for use in any common power boring machine for simultaneously boring the three holes at one operation instead of three, as with the ordinary bit.

The India Oil Stone.

The Pike Mfg. Company, Pike Station, N. H., and 151 Chambers street, New York, have arranged with the Norton Emery Wheel Company of Worcester, Mass., for the exclusive sale of the India oil stone line. By reason of its remarkable cutting qualities and extreme hardness the India

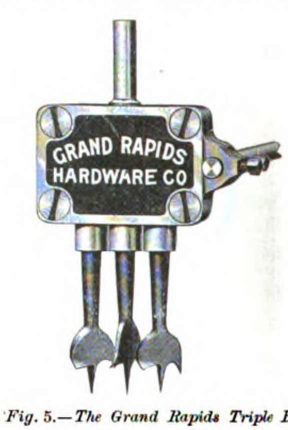
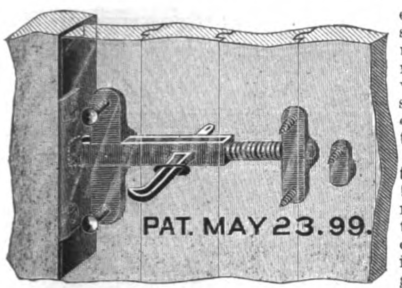


Fig. 5.—The Grand Rapids Triple Bit.

oil stone is referred to as especially adapted for machinists' use for cutting metals that a file would slip on. They are made in several grades of fineness, and particular attention will be given to special shapes for special and experimental work. No change will be made in the prices of these stones, and the advantage to the dealer of being able to cover his requirements for all kinds and grades of sharpening stones in a single order, which this arrangement permits, will be obvious. A complete stock of regular shapes and sizes will be carried at Pike Station as well as at their store, 151 Chambers street, New York.

The Perfection Spring Door Latch.

Clark Mfg. Company, Moline, Ill., are offering the latch shown herewith for use on barn and outbuilding doors or gates. In Fig. 6 the latch is shown in position on the inside of the door, the door being represented transparent in order to show the latch. It is easily locked, if desirable, with the button at the back. In Fig. 7 the door is represented hooked open, using the loop which goes with the latch. This feature is referred to as an im-



Novelties.—The Perfection Spring Door Latch.—Fig. 6.—View Showing Latch on Inside of Door, the Latter Being Represented as Transparent.

provement, there being no possibility of the door or gate closing while driving stock through. All castings are referred to as of the best malleable iron, and especially durable. Among the points of excellence claimed for the latch are the following: That the latch, being on the inside of the door, is protected from the weather and cannot be affected by snow or ice; that it is easy to unfasten; that it is self fastening, catching either open or shut the first time the door is pushed or swung by the wind; that the latch is so constructed that the door may be opened from either side, and that it holds a door close enough to keep out cold in winter.

Church Cushions and Mattresses.

We are indebted to Ostermoor & Co., 115 Elizabeth street, New York City, for a copy of a handsomely

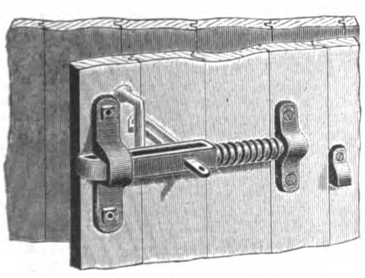


Fig. 7.—Perfection Latch with Door Open.

printed and illustrated catalogue calling attention to their lines of patent elastic felt mattresses adapted to a great variety of uses. One of the important items of church equipment is the cushions for the pews, and in this line the manufacturers state that 25,000 churches in the United States are at present using their goods. In comparing their mattresses with other makes the claim is made that the patent elastic felt goods are as far superior in comfort and luxury as the modern limited express train of the present day is to the post chaise of old. The history of the mattress as used in the household is described in entertaining style, ending with a description of the patent elastic felt mattress, for which strong claims are made. Scattered through the volume, which consists of 64 pages, are handsomely executed illustrations showing different varieties of mattresses and the many places to which they are adapted for use. The text appears in two colors of pleasing contrast and embraces numerous testimonial letters relative to the goods of the manufacturers. In connection with church cushions the makers state that they issue a special catalogue, in which are given interesting facts and information. Those who are interested in goods of the character indicated can secure copies of these catalogues by making application to the above address.

Asbestos Goods.

H. W. Johns Mfg. Company, 100 William street, New York, are sending out their asbestos catalogue for 1900, which is new in both contents and cover. The outside finish to the cover is asbestos, a use to which they believe the material has never before been put. The book contains 62 pages, profusely illustrated with cuts showing the many uses of asbestos, a full description of the mineral and its adaptability for mechanical, structural and household purposes where its fire resisting qualities are of advantage. The last 16 pages are devoted to a list of important buildings, factories, &c., in which the company's asbestos materials are in use, together with views of a number of the most prominent of these structures. Among the goods shown are asbestos pipe and boiler coverings, asbestos fire felt covering and fittings, asbestos sponge fitted covering, natural covering for low pressure or hot water pipes, frost protective pipe covering, Zero and Champion coverings, asbestos sheet fire felt, for flues, ceilings, &c.; asbestos roll fire felt for furnaces and hot air pipes, asbestos lining and deadening felt, asbestos steam packing, asbestos furnace cement, asbestos stove lining, asbestos gloves and mittens, asbestos fiber for gas stoves, grates, &c.; asbestos stove polishers, mats and flat iron rests; asbestos stove pipe shields, &c. Special attention is called to the company's asbestos lead joint runner for running lead or molten metals in soil, water or gas pipes. These joint runners are easy to handle and apply, and are made to fit any size of pipe from 2 inches up to the largest water main.

Hard Wood Miter Boxes.

C. E. Jennings & Co., 101 Reade street, New York, are directing the attention of the trade to the hard wood miter box shown in Fig. 8 of the cuts. It is made of alternate strips of black walnut or beech or cherry glued together. While making an attractive and salable miter box the chief object of this construction is to counteract any tendency to warp, thus keeping the angles true for accurate work. There are three sizes—viz.: 12, 18 and

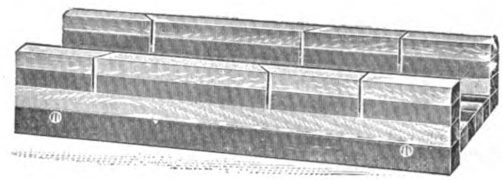


Fig. 8.—Hard Wood Miter Box of Glued Alternate Strips.

24 inches in length, the widths being $2\frac{3}{4}$, $3\frac{1}{2}$ and $4\frac{1}{4}$ inches respectively. The two smaller sizes are packed in dozens. and the largest size six in a box. They also have a line of plain hard wood miter boxes.

Bommer Bros.

of Brooklyn, N. Y., had a very interesting exhibit at the National Export Exposition recently held in Philadelphia, Pa., a view of their display being presented in Fig. 9 of the engravings. The goods were shown in a large three-fold case or cabinet of cherry, and was made up entirely of their Bommer spring hinges in all the different

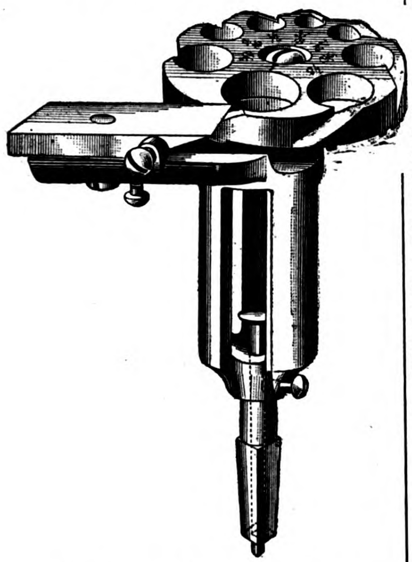
Fig. 9.—View of Exhibit of Bommer Bros. at National Export Exposition.

finishes. Tables in front of the exhibit were used for the display of different patterns of the hinges mounted on door sections. Their planished steel line created much interest, particularly in the bronze plated and antique copper finishes, and also the antique copper sand blast on steel, on account of the reasonable prices in connection with the beauty of finish and workmanship. The japanned on steel line also attracted attention and in fully polished steel goods there were some fine examples of bronze, antique and copper, nickel and silver plated finishes. The manufacturers were awarded silver medal and diploma.

E. A. Ormsby of Melrose, Mass., has just placed his apparatus for operating monitor roof and transom windows into the works of the Norwalk Iron Works Company, South Norwalk, Conn.

Bonney Hollow Auger.

An improved hollow auger which the Bonney Vise & Tool Works, 3015 Chestnut street, Philadelphia, Pa., are placing on the market is shown in Fig. 10. It is said to cut freer, faster



Novelties.—Fig. 10.—Bonney Hollow Auger.

and cleaner than the old style auger, and may be changed from one style to another almost instantly. There is no projection above the knife, therefore the tool may be used to cut any size of work, and offset tenants may be cut with it as readily as those cut in the center. The knife is made extra heavy to prevent any possibility of its springing, and the body is a steel

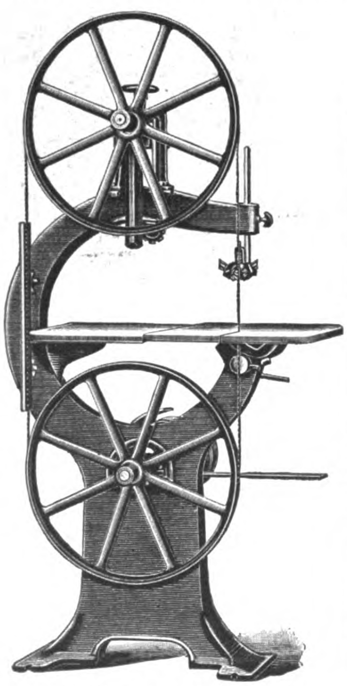


Fig. 11.—New 26-Inch Band Saw.

casting, which precludes liability to breakage. The shanks are made small to fit any size of bit brace. The plate is made thick, forming a better guide for the tenant, and enabling an operator to turn a tenant truer. The stop is of improved design, to allow of more accurate adjustment, and enable the auger to turn a larger tenant. The improvements in the tool have been patented by the makers.

New 26-Inch Band Saw.

One of the latest productions of the Crescent Machine Company of 1 Front street, Leetonia, Ohio, is the 26-inch band saw which we illustrate in Fig. 11 of the engravings. The machine is made entirely from new patterns, is extremely rigid and durable and has the main frame cast entirely in one piece, being cored out hollow and giving great strength for a given weight. The upper wheel is adjustable in all directions while the saw is in motion to suit the tension and to lead the saw in its proper path on the wheels. The manufacturers refer to this machine as especially suited for small shops, and it is said to be complete in all details, having tight and loose pulleys, belt shifter, tilting table, tension spring, &c. Foot power treadles can be furnished when so ordered. The company have a full line of foot and belt power band saw machines and have issued an interesting little pamphlet describing them, copies of which will be mailed to those making application for them.

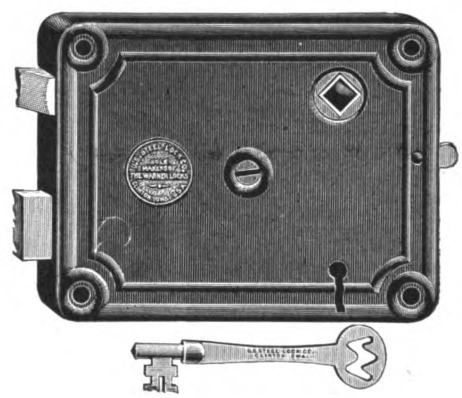


Fig. 12.—Steel Horizontal Rim Lock with Key.

Steel Horizontal Rim Lock.

The United States Steel Lock Company, Clinton, Iowa, have put on the market the horizontal rim lock No. 1155, illustrated in Fig. 12 of the cuts. It is made from drawn steel, with brass bolts and ivory black finish. A marked difference as compared with many horizontal locks is that the key comes directly under the knob, and if the middle rail is wide enough a combined escutcheon may be used. The latch bolt is constructed on their simple reversing plan, as in No. 1105 lock. The hub is of a composite character, consisting of three parts of steel, riveted together with a hollow square brass rivet, holding the three parts together, which they refer to as a new feature. The levers or cams of the hubs are centrally located, so that it may be placed in the lock either side up. The small brass medallion attached to the cover of the lock is an innovation. For exportation this lock is also made with a double throw for the bolt. The company expect that a large foreign trade in this lock will be developed. Indeed, it was largely with this end in view that the lock was originated.

The "Hummer" Warm Air Furnace.

A new warm air furnace, adapted to the use of all kinds of fuel, is being brought to the attention of architects, builders and house owners generally by Schwab & Sercomb of Milwaukee, Wis. It has been named the "Hummer" on account of its quick action and great power and is described by the manufacturers as follows: This furnace is provided with a base plate of solid cast iron and a base ring connected thereto with several arms. On this base plate rests the ash pit, which is of large capacity, affording ample room for ashes and leaving a sufficient air space below the grates to prevent burning out. The grate consists of three or four heavy cast iron bars, arranged parallel to each other, running from the rear to the front of the ash pit, where they are connected with levers, and one of these bars arranged to receive the shaker hand when the bars are closed. These grates are so constructed that the openings are the same between the bars when shaking them to and fro a certain distance as when standing in the proper position. The grate bars are set in sockets at the rear end of the ash pit and are supported at the front end with a bar, which is bolted to the top of the ash pit, making it easy to replace these grates when necessary, as the bolts can be removed through the large ash pit door. The fire pots to this furnace are cast heavy, in two sections, which allow for the expansion and contraction at a point where it is needed, thus preventing the fire pot from cracking. The dome is of large proportions, giving ample space for combustion; as the gases rise from the body of the coal into this dome, and as there is no escape at the top, they are drawn down through the diving flue and into the smoke flue. All of the radiating surface of the furnace, being in direct contact with the products of combustion, is utilized, making it a quick and intense heater. Between the lower edge of the steel plate and the fire pot is a cast ring or spider standing outwardly from the fire pot to insure durability at this point. The steel plates used on these furnaces are extra heavy. The dome top is of cast iron, and at all points where the steel plate and cast iron are connected this heater is furnished with a patent keystone joint, which makes it smoke and gas tight.

This joint is used only on furnaces of Schwab & Sercomb's manufacture, and is said to be a positive smoke and gas tight joint. It consists of a groove cast to the dome top or dome ring, which is cast deep and provided with two lips, making a narrow entrance into this groove, consequently after it is packed with asbestos cement the cement forms two wedges, making it impossible for the cement to fall out, and insures a positive gas tight joint. At close intervals there are lugs cast on the dome top, to which the steel plate is tightly bolted. The ash pit door of this furnace opens up the full hight of the ash pit, making it convenient for the removal of ashes and getting at the grates if necessary. The feed door is also of large dimensions and is cast in two sections, allowing for the opening of both doors when it is desired to burn wood or large coal, the lower door only for smaller fuel. The casing rings used on this furnace are of bar steel, thus securing a uniform size to all rings and a tight fitting jacket, and also there is no danger in breakage in transportation. These furnaces are provided with an evaporating pan, which is attached to the galvanized iron jacket at any point desired around the circumference of the furnace, also with a check draft and chain attachment for operating both drafts from some room above the furnace.

TRADE NOTES.

F. K. THOMSON, whose work in the architectural line is more or less familiar to our readers by reason of the illustrations which have appeared from time to time in the columns of the paper, has recently formed a copartnership with C. W. Barrett under the style and title of Barrett & Thomson, architects, 115½ Fayetteville street, Raleigh, N. C. The new firm have issued a neat four-page folder, giving some of the many points to be observed in selecting an architect. The fact is emphasized that in building, expert advice is needed, and that an architect of broad study and ability should be selected. There are a great many valuable suggestions presented which if more generally heeded would cause less dissatisfaction on the part of those for whom dwellings and other buildings are erected.

FREDERICK REISSMANN of West Point, N. Y., has issued four verses of rhyme calling attention to the merits of Reissmann's rafter and polygon gauge. They tell the various uses of the device, the price at which it can be obtained and point out the sad condition of the mechanic who finds that his tool box is not up to date by failing to have in his kit one of Reissmann's rafter and polygon gauges.

AMONG the attractive calendars which have reached us for the new year one of unusual merit is that of N. W. Ayer & Son of Philadelphia, Pa. It is in the nature of a large poster, with a panel at the top representing modeled work with egg and dart molding. The leaves for the months of the year are of liberal proportions and the printing is in brown effects. The entire make-up is rich and attractive and the calendar is of a character to serve a most useful purpose.

THE BUCHANAN SCREEN WORKS of Hillsdale, Mich., have recently issued a handsome publication of 20 pages, illustrating the various styles of screen doors and window screens offered by them to the trade. The doors are of different kinds, from a plain pattern to an exceedingly ornamental design. The window screens shown comprise the improved Hillsdale Adjustable Spring, the Columbia Improved Center Extension, the Buckeye Center Extension and the Shankey Adjustable sliding window screens.

THOSE of our readers who have occasion to use sheet metal in connection with building construction will be interested in the announcement presented elsewhere in this issue by Friedley & Voshardt, 194-200 Mather street, Chicago, Ill. This concern have a large and well equipped plant and give special attenion to the manufacture of architectural sheet metal work and zinc and copper ornaments, embracing steel ceilings, statuary, rock face work, crestings, Pinnacles, as well as other interior and exterior work. An interesting catalogue has been lately issued by the concern and a copy will be sent to any address on application to the manufacturers.

WE are indebted to North Brothers Mfg. Company, Philadelphia, Pa., for a little folder showing a view of their exhibit at the National Export Exposition, held in Philadelphia last September to November. The display consists of the company's hardware specialties, prominent among which is a central coulmn carrying different sizes of Yankee ratchet screw drivers, spiral screw drivers and automatic drills. Accompanying the folder we have a little pamphlet known as "Yankee Tool Book No. 2." As its title indicates, it illustrates and describes the Yankee screw drivers and drills, illustrations of some of which have previously appeared in these columns.

AMONG the attractive calendars which we have received for the new year is that being sent out by John J. Brown, contractor and builder, Post Office Building, Germantown Philadelphia, Pa. It consists of a card of liberal proportions, the upper half of which is embellished with a panel picture representing a hunting scene when wild ducks are in season. This is printed in colors with good effect. The leaves for the different months of the year are attached to the lower part of the card and give, in addition to the days of the week and month, the various phases of the moon.

THE B. F. STURTEVANT COMPANY of 34 Oliver street, Boston, Mass., have recently issued what is known as "Bulletin Q," illustrating and describing the Sturtevant electric propeller fans and inclosed motors. These devices are intended for ventilating buildings of all classes, smoking and dining rooms, restaurants, kitchens, bakeries, laundries, engine and boiler rooms, &c. They are manufactured in all sizes from 18 to 120 inch, with capacities running from 2000 to 175,000 cubic feet per minute.

THE EMPIRE FORGE COMPANY of Lansingburg, N. Y., in a neat little pamphlet which they have issued call attention to the Twentieth Century sheet steel sash pulley which they manufacture. It is reinforced at all bearings, cuts away less of the frame than other pulleys, does not require any screws, has a ¼-inch steel axle, requires no mortising or countersinking for face plates, can be easily inserted and no chiseling is required.

THE GOHEEN MFG. COMPANY, Canton, Ohio, issue a card in the interest of their carbonizing coating, presenting an illustration of the Fourteenth street viaduct in Denver, Col., which is one of the many structures protected from rust and corrosion by this paint. The carbonizing coating is described as impermeable to acids, alkalies, sulphur fumes, &c.

THE BERGER MFG. COMPANY of Canton, Ohio, are favoring their friends in the trade with a poster calendar for the new year, the upper part of which is embellished with a bird's-eye view of their extensive sheet metal manufactory, while the lower portion of the poster carries the leaves for the 12 months of the year. The latter are of large size, so that the figures, which appear in deep black, may be readily seen at a distance. Each leaf also makes some reference to the company's facilities and the extent and growth of their business. Accompanying the folder is a circular letter, in which the statement is made that 1899 was the most successful year in the history of the company, who call attention to the fact that with their present facilities they are in a better position to care for increasing business than ever before. In conclusion they wish the recipient a happy new year.

THE PENN METAL CEILING & ROOFING COMPANY, Limited, Hamilton and Twenty-third streets, Philadelphia, Pa., present a unique announcement in another part of this issue indicative of the lines of goods of which they make a specialty. The extent to which sheet metal is employed at the present time in building construction and for decorative purposes lends additional interest to goods of the character named, and architects, contractors and builders cannot fail to find valuable information bearing upon the application of sheet metal in building construction in the literature which the company issue. The New England plant of the concern is located at 24 Harcourt street, Boston, Mass.

THE NEWMAN & CAPRON HARDWARE COMPANY, with salesrooms and factory at 157-163 West Twenty-ninth street, New York City, announce that they have purchased the business and plant formerly owned by Newman & Capron and A. G. Newman, that the factories have just been remodeled and extended so as to increase their facilities and that they have resumed the manufacture of all kinds of artistic hardware, builders' hardware and all kinds of metal work.

THE BARNEY & REED MFG. COMPANY, Boston, Mass., have been reorganized with the following officers: George S. Boutwell, formerly of Boutwell & Co., president, and A. W. Reed, who has been connected with the management of the company from the first, treasurer. This company are the well known manufacturers of the Walda sectional window weights, which, we are advised, are having an extensive sale throughout the Eastern States and in foreign countries, notably Germany and Holland. They are making extensive preparations for handling a much larger business and are now turning out the weights both round and square. Many prominent buildings in Boston and vicinity, including the new terminal station, are equipped with these weights, which, it is stated, hang exactly in the center, require only 10-inch pockets and eliminate the use of lead weights. The point is made that the hardware dealer with one-sixth the stock required for one-piece weights can fill any order. The Walda weights are crated 100 pounds in a box.

THE STANLEY WORKS of New Britain, Conn., have been favoring their friends in the trade with a very attractive calendar for the new year. As it is issued primarily for advertising purposes it is not surprising to find upon it some reference to their leading specialties. In the present instance the calendar artistically emphasizes the merits of their ball bearing hinges.

AN INGENIOUS arrangement to prevent overcrowding of stairways and elevators when entering or leaving a building is used in the main office of the International Correspondence Schools, Scranton, Pa. The time of entering and leaving the building is regulated by clocks on each of the five floors. On the lower floors the clocks are set correctly, but on the upper floors they are a few minutes slow, so that the employees on the lower floors are at their desks before those on the upper floors are due at the building. In leaving the building the employees on the upper floors do not leave their desks until several minutes later than those on the lower floors. Over 500 people are employed in the building, which is used exclusively by the International Correspondence Schools. This institution has over 70 courses of instruction by mail and its students may be found in all parts of the world.

THE L. S. STARRETT COMPANY of Athol, Mass., have been incorporated with a capital of $100,000 for the manufacture and sale of tools and machinery. The incorporators are L. S. Starrett, F. E. Wing and F. A. Ball.

FRIEDLY & VOSHARDT of 194 to 200 Mather street, Chicago, Ill., have issued a decidedly neat pocket catalogue mainly devoted to steel ceilings. The ceiling designs are shown in a series of well executed half-tones, giving corner pieces, center panels, combinations of borders and center panels, combinations of panels of different patterns, coving patterns, moldings, &c. The designs for this class of work are largely original and are exceedingly artistic. Illustrations are also presented of the company's sheet metal productions in other lines, as, for instance, letters and figures, statuary, festoons and garlands, gable pieces, gargoyles, column capitals, shingles, tiles, crestings, finials, &c. The book comprises 48 pages.

WE are indebted to the Pope Mfg. Company of Hartford, Conn., for a copy of the Columbia desk calendar for 1900. Like its predecessor it is designed to furnish the user with a convenient memorandum pad arranged according to the days of the year and incidentally to call attention to Columbia bicycles. There is a leaf for each day, the entire pad being supported by a metallic standard which holds it firmly in place. We understand that copies of the calendar can be had by sending five 2-cent stamps to the "Calendar Department" of the company named.

THE INTERNATIONAL SPRINKLER COMPANY of Philadelphia, Pa., are directing the attention of architects and builders to the automatic fire extinguishing apparatus which they manufacture. The company state that they have a complete organization and modern factory for making all their own materials, as well as a complete equipment for installing both the wet and dry systems of automatic fire extinguishers. Reference is made to the International head as being in all respects the best now before the public. It is simple, reliable and effective and the manufacturers claim that from 20 to 70 per cent. of cost of insurance can be saved by placing International sprinklers in a mill, factory or store. The president of the concern is Clarke Merchant, president of Merchant & Co., Incorporated, of the city named.

SAMUEL H. FRENCH & CO., York avenue, Fourth and Callowhill streets, Philadelphia, Pa., recently favored their friends in the trade with a New Year's greeting in the shape of a memorandum calendar of the same general size and make-up as those which have been sent out by this house in previous years. Each leaf is intended for one week, the spaces for memoranda being sufficiently large to serve a most practical purpose. Across the top of each leaf is the name and address of the company, with an indication of the many lines of product which they are prepared to supply. These include among others architectural and ornamental plaster work, mantels, tiles, grates and fire place goods, builders' and painters' supplies, Peerless mortar colors, Buck white lead, enamels, glass, varnishes, &c. The leaves are perforated at the top, so that after a week is completed a sheet can readily be detached from the pad, the latter being arranged with a metal loop for hanging it up. The company state that in 1844, when their business was established, memorandum calendars were unnecessary and unknown, but now every possible facility for the rapid conduct of business is required to keep pace with competitors. Therefore, in order to aid their customers, they are sending out this "memory promoter" as their 1900 New Year's greeting.

— SMITH: "Have you many friends, Barber ?"

Barber: "Oh, I occasionally scrape up a few acquaintances."—*Philadelphia Press.*

— MOTHER: "What! Swinging the cat by its tail again! How often have I told you to be kind to dumb animals ?"

Tommy: "But, ma, she ain't dumb; listen to her holler!"

— Y.: "Do you think Ike ever lies about the fish he catches ?"

C.: "No, I don't; but I think he lies about the fish he doesn't catch."—*Yonkers Statesman.*

— SHE says their summer in Europe was a perfect dream."

"I guess it was. You see, as a matter of fact, they stayed on a New Jersey farm all the time."—*Chicago Journal.*

Carpentry and Building

WITH WHICH IS INCORPORATED

The Builders' Exchange

VOL. XXII. No. 3. NEW YORK, MARCH, 1900. Ten Cents a Copy. One Dollar a Year.

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U. S. Mineral Wool Co.

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Thomson Bros. & Co

Miter Machines
Fox Machine Co.

Mortar Colors
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Stanley Rule & Level Co.
Starrett, L. S. Co.
Strelinger, C. A. Co.
Waltrs's Sons, Wm. P.

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Dickey, A. & Co.
Grand Rapids Carved Moulding Co.
Mertz's, Geo. Sons.
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Ormsby, E. A.

Ventilators
Doerge, H.
Globe Ventilator Co.
National Sheet Metal Roofing Co.

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Weather Vanes
Jones, Thos. W.
Mott, J. L. Iron Works.

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Woods, Ornamental
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CARPENTRY AND BUILDING

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DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK

MARCH, 1900.

Exhibition of the Architectural League.

The fifteenth annual exhibition of the Architectural League of New York, which is now being held in the galleries of the American Fine Arts Society in West Fifty-seventh street, is without doubt the most successful it has ever given. The great number and variety of the exhibits are such as to interest all classes of visitors and at the same time afford the young architectural student, as well as the lover of art, an excellent opportunity for inspecting the efforts of some of the master minds in the profession. The 1310 exhibits, which fill the five galleries and the entrance hall, the League meeting room on the second floor and a room in the basement, are made up of architects' designs, embracing plans and elevations, many of them of large size; examples of beautifully executed wrought iron work, cartoons and decorative drawings, stained glass window and other designs, ornaments, designs for memorial tablets, models for wood carving, mural paintings, mosaics, sketches, bronzes, color studies for interior decoration, as well as many other things calculated to interest and instruct. What may be regarded by some as one of the most important features of the exhibition, architecturally considered, are the competitive designs for the University of California, in which the very elaborate drawings submitted by Emil Benard were awarded the first prize. These are effectively shown directly opposite the entrance in the Vanderbilt Gallery, while the other prize designs are to be found in the League rooms on the second floor. Of special local interest, among others, are the plans for the new custom house, which is intended to be erected at the foot of Broadway, just south of Bowling Green. The various drawings submitted in this contest are effectively arranged in the Vanderbilt Gallery, the winning designs by Cass Gilbert occupying a conspicuous position. The feature of most interest to the general public, perhaps, is the large plaster models of buildings and private residences which are to be found on pedestals here and there about the rooms, accompanied by ground plans and elevations on the walls near by. The most notable of these is the plaster model of the palace of Mr. Carnegie, of iron and steel fame, now in process of erection at Fifth avenue and Ninetieth street, and which, when completed, will be among the most magnificent in the city. The display of sculpture and statuary is found in the center gallery where there are 65 pieces arranged with pleasing effect, the exhibit including a sketch model for several groups and spandrels of the Dewey Arch. The other small galleries contain decorative panels executed in several processes, book covers, stamped leather, pottery, illustrations, posters, photographs, rug designs, &c. The exhibition will continue until March 3, and should record a large attendance.

A Mammoth Office Building.

It seems probable that, as a result of certain real estate negotiations which have been in progress for some little time past and recently brought to a close, there will be erected in the financial section of the city an office building which will rank as the largest ever projected in this country, if not in the world. By largest we do not mean to be understood as intimating that it will be the tallest, but rather as having the greatest available floor area. It will be of the usual steel skeleton construction, with facades of stone, brick and terra cotta, the style of architecture being of the Italian Renaissance. The building will occupy a site on the southeast corner of Broad street and Exchange place, with a frontage on the former of 106 feet and on the latter of 236 feet, with a wing 50 feet wide and 150 feet long extending into the middle of the block at an acute angle with the main structure. In hight it will be 20 stories and in a circular space in the center of the building will be located the elevator shafts, 12 in number. The preliminary plans for the proposed structure were filed with the Bureau of Buildings by Architect Robert Maynicke in December last, in order to take advantage of the provisions of the laws of 1892, which expired on the 23d of that month. It is estimated that the structure will cost to erect $4,000,000, while the site represents an additional investment of probably one-half of this figure. We understand it is the intention of the owners of the property, the Alliance Realty Company, to commence operations on the building some time this summer and to complete the structure within a period of two years.

Other Building Operations.

Some of the other notable building operations lately projected include an 11-story warehouse, 179 x 229 feet in area, to be erected for the Linde Company on West street, at an estimated cost of $1,200,000, in accordance with plans prepared by Architect G. W. Thomson; a 12-story brick and limestone business block 51 x 101 feet in area at the corner of Broadway and Thirteenth street, at a cost of $350,000, and in accordance with plans drawn by Robert Maynicke, architect, while on the opposite corner, now occupied by the Star Theater, William Waldorf Astor intends to erect a somewhat similar structure costing $400,000. The plans, which have been drawn by Clinton & Russell, call for a building eight stories in hight, with fronts of granite and limestone with bluestone copings. The same architects have been commissioned to draw the plans for an 18-story fire proof office building for the Atlantic Mutual Marine Insurance Company, to cost in the neighborhood of $1,000,000. It will occupy the site at the southwest corner of Wall and William streets, fronting 58 feet on the former and 142½ feet on the latter thoroughfare. It is expected that the work of construction will commence May 1 of the present year. An office and loft building 15 stories and basement in hight is to be erected for Frederick Ayer of Boston at 524-526 Broadway, the architect, A. J. Manning, estimating the cost at $350,000. Mr. Manning is also architect for a loft building to be put up at 599-601 Broadway for the same owner, at a cost of $500,000. There are also to be noted many elevator apartment houses in process of construction and projected, which bring the aggregate amount of capital involved up to many millions of dollars.

The Labor Situation.

In these prosperous times, with wages so generally advanced, and workmen earning far more than they were previously able to get for many years, labor troubles should be few and far apart. Golden days are now being enjoyed by employers and employees. Factories and mines are running to their full capacity instead of half time or intermittently, and earnings are piling up monthly as they have not previously done for a long period. These are the days, too, when provision on the part of every workman should be made for the slack times which are sure to come sooner or later. Activity in trade cannot be kept up continuously. It is extremely desirable for many reasons that under existing conditions labor troubles should be avoided. Employers of labor feel the importance of the situation and the responsibility resting upon them of keeping customers supplied probably just as much as they appreciate the desirability of securing a steadily full output on account of the profits involved. They endeavor by all reasonable means to keep their workmen satisfied, and to remove possible causes of friction which might compel the stoppage of operations. Thus we quite frequently see reports of voluntary advances in wages, undoubtedly made for the purpose of promoting contentment and preserving peace and harmony. But despite the efforts made to keep everything moving smoothly, we have at present a condition of perversity and uneasiness in some important lines which may lead to serious consequences if prudent counsel does not speedily prevail. It is, of course, assumed by those who are fomenting troubles of this character that the proper time to act is when business is brisk and a strong pressure is felt for all kinds of material. Employers may then concede a point or two rather than have operations suspended by a strike. But indications are visible of a pugnacious spirit among employers, especially among those managing important interests, and it is to be feared that the demands of labor when pushed too far will meet with such resistance as to considerably derange important branches of industry affecting wide areas. While labor leaders are active, the employers of labor are also on the alert.

Model Tenement Competition.

Some time ago we referred in these columns to the exhibition to be held by the Tenement House Committee of the New York Charity Organization Society, the object being to show improvements in the planning and construction of tenement houses, workmen's cottages, model lodging houses, &c. The exhibition is now in progress in this city and will continue up to and including February 24. In connection with it the committee invited architects to submit plans in competition for "improved city tenements," these plans to form a feature of the exhibition in question.

As a result of this competition the jury of award has rendered its decision as follows:

First prize—R. Thomas Short, 3 West Twenty-ninth street, New York.

Second prize—Israels & Harder, 194 Broadway, New York.

Third prize—Covell & Smith, 152 Broadway; Joseph Wolf, 1125 Broadway; Israels & Harder, 194 Broadway, all of New York.

In awarding the third prize the jury decided that three plans presented such equal merits that it was unable to do otherwise than to recognize all of them.

It is stated that the new Hall of Records, now in process of construction at the corner of Chambers and Centre streets, will, when completed, be a very elaborate affair. The building is to be lighted entirely by electricity generated by a plant in the building. The heating and ventilation will be on the blower system, the fresh air being drawn from the street at the hight of the sidewalks. Heat will also be supplied by direct radiation. There will be six passenger elevators, four private elevators and one sidewalk elevator. The elevators are to be worked on the hydraulic system. Cold drinking water, at a temperature of 40 degrees, will be furnished throughout the building. The steam power is to be furnished by five boilers. There will be no wooden floors in the building. The floors of the vestibules, the rotunda and the corridors are to be of marble; those of the rooms of mosaic. No wood is to be used in the building except for doors and window frames. The wood of window frames is to be covered by copper. The ceilings of the first-story vestibules will be finished in marble mosaics.

The Chicago Architectural Club

The thirteenth annual exhibition of works of architecture and the allied fine arts will be held at the Art Institute, Chicago, Ill., under the auspices of the Chicago Architectural Club from Tuesday, March 20, to Monday, April 2, of the present year. The exhibition of original works not previously shown in Chicago will include architectural drawings and sketches in plan, elevation, section, detail and perspective; projects for public and monumental work, interior decorations and furnishings, architectural and decorative glass and mosaic work, architectural metal work, sculpture, embracing architectural and decorative; models, landscape architecture, &c. Photographs will also be included in the exhibition, these being accompanied wherever possible by plans or other explanatory drawings, separately framed or mounted. In connection with the exhibition will be published a catalogue or annual, profusely illustrated, containing papers relating to Chicago's architectural possibilities. The Exhibition Committee consists of Walter H. Kleinpell, chairman; Clarence Hatzfeld, secretary: August C. Wilmanns, treasurer; Henry W. Tomlinson, Max Mauch, Charles A. Carr, C. M. Winslow and Dwight H. Perkins, the latter being editor of the catalogue above referred to.

Pittsburgh's Architectural Display.

Early in June the Architectural Club of Pittsburgh, Pa., will hold an exhibit of architectural work collected from the large cities of the country. There will be many drawings of handsome exteriors, together with photographs of the finished buildings. Each type of architecture will be grouped in such a manner as to show the development of the various styles. The exhibition is made possible through the novel plan adopted by the Architectural League of America last summer at its convention in Chicago, a circuit of the larger cities being formed for the purpose of exhibiting work in each place. The dates were so arranged that there should be no conflict, in order that each succeeding display should be able to secure all that was best in those which had preceded. Fortunately, perhaps, for Pittsburgh, the date of its exhibition has been set so that it will come after the displays in nearly all the League cities, and thus the range of selection for the architectural display will be of the widest character. The Hanging Committee will be selected by the Executive Committee of the club, which is made up of Henry M. Kropff, president; John T. Comes, vice-president; George M. Rowland, secretary; Harry S. Estep, treasurer, and Benjamin M. Nesbitt, chairman of the Entertainment Committee.

It is said that San Francisco is to have a new 11-story hotel, which will cost at least $1,500,000, and require about two years to complete. It will be erected by the Fred Crocker Estate, and will be of brick, iron, stone and steel and as nearly fire proof as possible.

The plans for a two-story frame residence, to be erected in Joplin, Mo., for B. M. Stevens, are on the boards of Charles Pauly & Son of Edwardsville, Ill. The building is estimated to cost $6000, and will have hot air furnace, electric lights, art glass, &c., wood mantels and veneered doors. The finish will be in hard wood.

REMODELING A FRAME DWELLING.

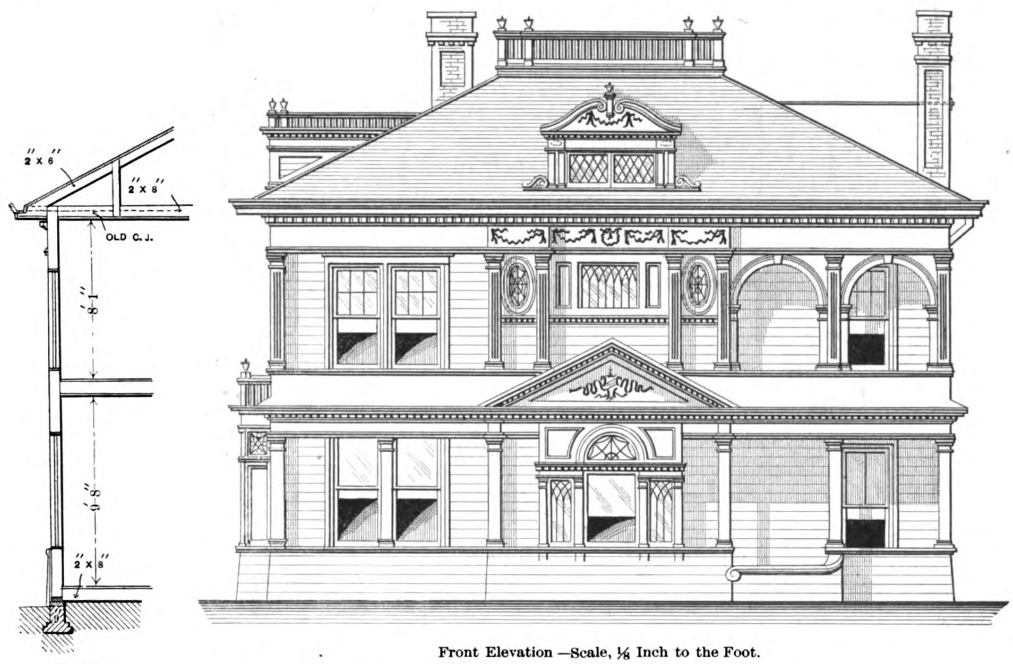
THE problem of remodeling an old building is one with which architects and contractors often have to deal, and it is with pleasure that we lay before our readers this month an interesting example of the manner in which a problem of this character was worked out not long since by Architect E. R. Rice of 320 Kittredge Building, Denver, Col. The half-tone supplemental plate accompanying this issue of the paper shows the appearance of the building, which is located at Boulder, in the State named, before and after it was remodeled, while the floor plans, elevations and details indicate the extent and character of the alterations. In this connection it is interesting to briefly refer to the requirements and conditions which led to the adoption of the various features shown.

The owner desired that the shed kitchen, which was in a very dilapidated condition, should be removed and replaced by a new wing containing pantries, servant's room and rear stairs; that the existing cramped front entry should be expanded into a reception hall communicating with the parlor and dining room; that the second floor should contain at least two large new chambers with bathroom and attic stairs; that a new roof, high enough for a storage attic, should be added, and the exterior of the building should be made as artistic as possible, all to be accomplished within a stipulated amount.

A brief glance at the floor plans will show how these various changes in arrangement were accomplished. As to the elevations, Mr. Rice points out that the projecting reception hall at once suggested a central feature, which was attained by roofing it with a low pediment and putting a Palladian window in the front. This was then followed by verandas on either side in order to relieve the extreme projection, and with the veranda on the right was incorporated the space formerly occupied by the old porch, making a very spacious lounging place.

The central feature was repeated in the second story, the space thus gained being added to the old closet, making a good size dressing room. The entire front was then brought to a line by the addition of a loggia, which occupied the remainder of the space. The old cornice was used, merely removing the large ugly brackets and replacing them with a dentil course under the bed mold. The old roof was torn off and replaced by a new one, while attic floor joists were put in without disturbing the old ceiling joists. The old front porch, minus a few of its jig sawed abominations, was put up on the side of the new wing, and bay windows were added to the front and back parlors.

Mr. Rice also states that it had been intended to raise the entire building about 18 or 20 inches, it being set very close to the ground, but investigation disclosed the fact that all the exterior walls were filled between the studs with brick. Consequently the idea was abandoned, but an attempt was made to disguise the lowness by running a sill course at the level of the windows with battered siding to the ground. The curved buttress to the front porch entrance is partly for this purpose and partly to avoid changing the old entrance gate and walk.



Section.

Front Elevation —Scale, 1/8 Inch to the Foot.

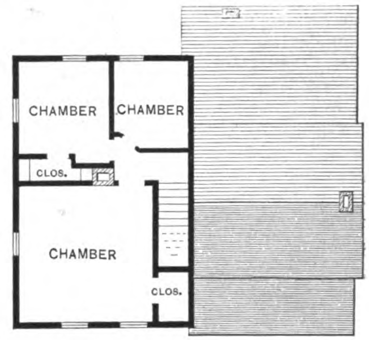
Remodeling a Frame Dwelling.—E. R. Rice, Architect, Denver, Col.

The exterior siding is painted colonial yellow, with white trimmings, and the roof shingles are stained moss green. The cost of the alterations, exclusive of mantels and hot water heating, was about $1500.

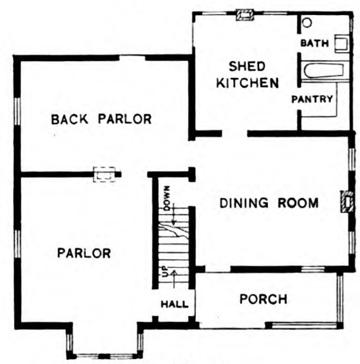
The Trade School as a Substitute for Apprenticeship.

In the course of an interesting address on "Modern Apprenticeship Conditions," recently delivered before the manufacturers and mechanics of Rochester, N. Y., Professor John E. Sweet of Syracuse, N. Y., made some weighty remarks on the need of trade schools, from which the appended extracts are taken. After showing how the old fashioned apprenticeship system for young tradesmen has gradually been dying out by reason of the compete revolution in modern industrial conditions brought about by machinery and scientific advance, Professor Sweet said.

As shown, the apprenticeship system of old is only in rare cases possible now, and the question must force itself upon our people as to what is to take its place. If limited by the circumstances and the unions our ranks must be filled from abroad or trade schools must be established. I do not mean training schools, which are useful enough in their way, but trade schools pure and simple. Owing to the fact that the opinion is universal among mechanics that a boy cannot learn a trade at a school, I wish to define what I mean by a trade school; that is, a school where the object is to give a boy a chance to learn a trade, not a school of school teachers out of college, or school teachers that are graduates of technical schools; not an educational institution with machine shop attachments, but just shops, with machines and foremen and workmen, and work of all kinds going on to be sold for what it will bring. Instead of the chance the old apprentices had, I would have the boy not only have the chance of the old apprentices for doing all kinds of work, but would also give him all kinds of tools to work with, and all kinds of machines to build, which the old apprentices had not; and I would do better by him than that—he need work but eight hours instead of 12 or 14, and the rest of the time, after seeing that he knew how to read and write and spell, he should be taught enough drawing and machine shop mathematics to calculate anything he might need, and enough of the principles of mechanics as would be necessary to keep him from fooling away time on perpetual motion and like impossibilities, and, too, he should be trained to make what he did make a work of art.

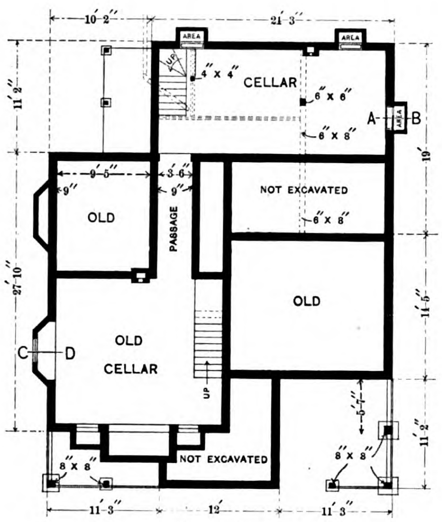


Second Floor

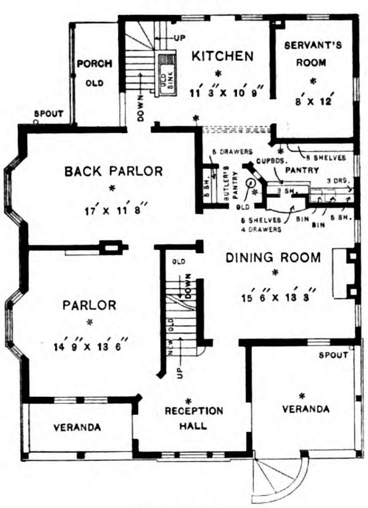


First Floor.

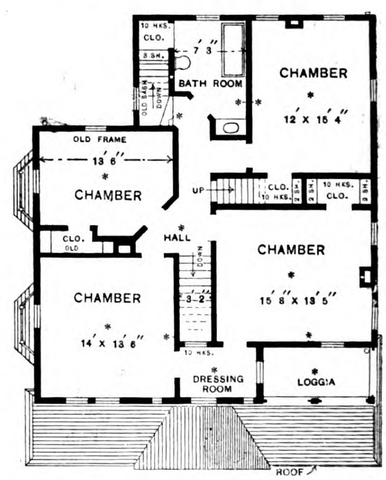
Floor Plans of Old House.



Foundation.



First Floor.



Second Floor.

Remodeling a Frame Dwelling.—Floor Plans.—Scale, 1-16 Inch to the Foot.

State Support for Trade Schools.

The question will at once come up: Can such a school be made self supporting? No, it is not at all likely that it can. Some will think, after the shops are built, machines and power put in, that certainly the work turned out ought to sell for as much as the material cost. Yes, it should do this; but there is coal to buy, foremen and instructors to pay; and such a school, excepting by the greatest economy and genius, cannot be self sustaining. Then the question naturally arises, How is it possible to establish such schools? and the reply is, exactly in the same way that all schools and colleges are established and maintained.

The State (that is, the people) establishes and maintains schools. Not that it (that is, we) has any moral right to take the money of the rich to pay for the training of the poor, but on the basis of the arrangement that we have adopted a form of government wherein we agree to abide by the will of the majority, so, as the majority say the State shall establish and maintain schools, it has the same right to train the poor man's son to be a shoemaker as it has the rich or poor man's son or daughter to be a scholar, a doctor or a teacher, and it has already established special schools for teachers and doctors. It is true that doctors, while people get sick, and teachers to maintain schools, are necessary, so, too, while we live in this climate we must have food and clothing, boots and hats, houses and tools, plows and fuel, and if we die (which we can do even without a doctor), crematories or coffins; and we need to know how to make all of these things before we need to know how to read or write, spell or cipher, and much more so before we need to study any of the higher branches.

The Value of Practical Trade Training.

As all children with present opportunities have the chance to gain the rudiments of an education, the book part of the true trade school need bear but an insignificant position. I know this sentiment will meet with universal disapproval, but let us argue it to the end. Are not the boys and girls (for the girls are as much entitled to the benefits of a trade as the boys)—are not the boys and girls we are talking about to learn trades to follow through life, and trades at which they expect to make a life business? If so, then what is the education or training that will be of most use to them? Certainly it is of far more use to the shoemaker, as a shoemaker, to know the difference between a good piece of leather and a poor one, than to know how to read. It is of far more use to the horseshoer to know how to fit a horseshoe than to know how to spell, and of infinitely more use to the carpenter to know how to file a saw than to know how to write, and yet thousands of our carpenters know how to read, write and spell to every ten who can file a saw decently well, and one defect in their education arises from the fact that they are taught to be proud of the fact that they can read, write and spell, and have passed in arithmetic, grammar and geography, French or Latin, and not to be ashamed of the fact, as they should be, that they cannot file a saw or build a winding stairway.

Book Knowledge and Manual Skill.

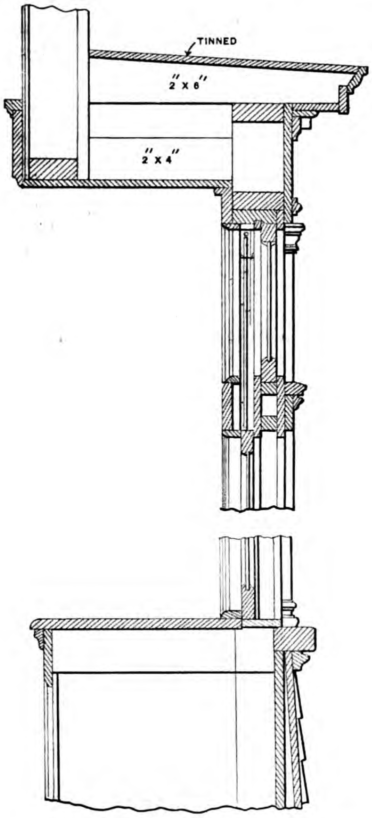
I would have the boys and girls who pass through trade schools know both the trade and all of a general knowledge that would do them any good, and I would not have the school spend one cent on them beyond that. If the boy had the ability to become an engineer, or the girl to become a teacher, or either had a desire for a scientific or liberal education, there are now plenty of schools for that without hampering the trade schools. But, you will say, will not our mechanics and workmen be better mechanics and better workmen, and a great deal better citizens, to have a thorough education? Yes, if educated for his business as I propose, but not if educated through the regular course of our common schools and high schools, technical schools and colleges as now conducted. A thoroughly educated man in the ordinary sense, as a workman, is generally a nuisance to have around, but a man educated to his business, whatever it may be, is an honor to himself and his business, if he sticks to it and behaves himself.

The shoemaker who can take suitable leather and make an $8 pair of shoes out of it, where the cobbler could only make a pair that would be dear at $3, has a right to be proud of it, and when the scholars spend term upon term to learn to read and write, and speak indifferent French or German, worse than the German or French children, there is not a thing about it to be proud of, and, many times, the training in those directions gone through with by children in the high schools gives them little to be thankful for.

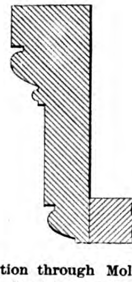
The man who is to spend his life as a workman is a poorer workman, a more unhappy man, and more often than otherwise a less desirable citizen, with a liberal or scientific education. With the liberal or scientific education he may get above the necessity of working for a living; but this all cannot do, and those who cannot should be trained to their calling and live happily.

Side (Left) Elevation.—Scale, 1/8 Inch to the Foot.

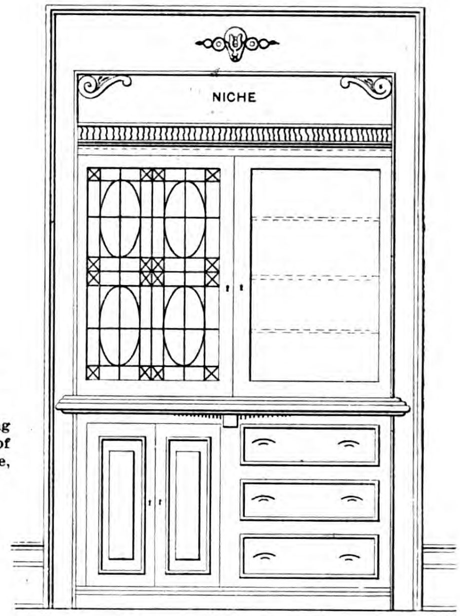
Remodeling a Frame Dwelling.



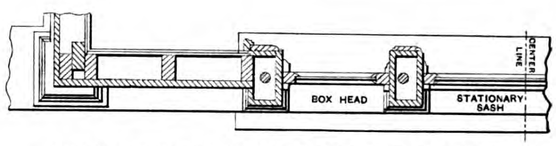
Vertical Section through Bay Window.—Scale, ¾ Inch to the Foot



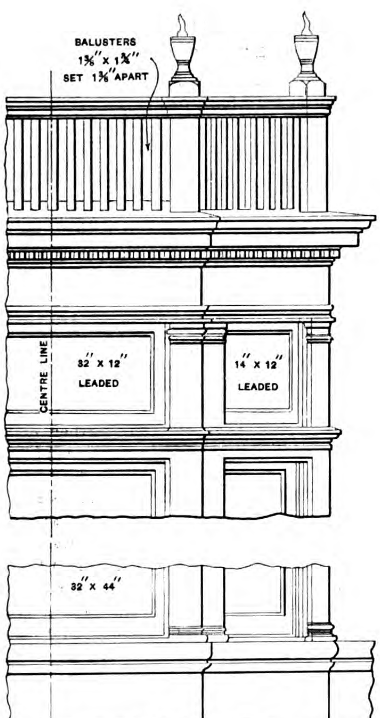
Section through Molding of Semicircular Top of Palladian Window.–Scale, 3 Inches to the Foot.



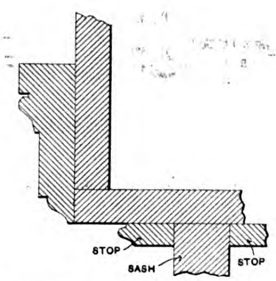
Elevation of Sideboard in Dining Room.—Scale, ½ Inch to the Foot.



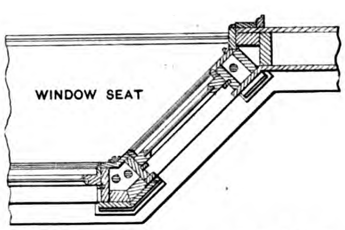
Half Plan of Palladian Window.—Scale, ½ Inch to the Foot.



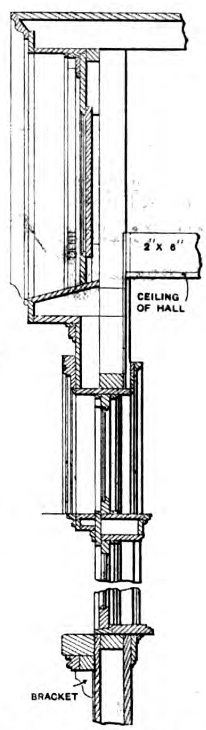
Partial Elevation of Bay Window.—Scale, ½ Inch to Foot.



Section through Casing of Oval Windows in Second Story.—Scale, 3 Inches to the Foot.

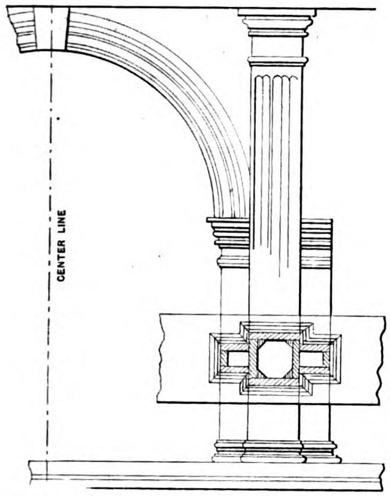


Partial Plan of Bay Window.—Scale, ½ Inch to the Foot.

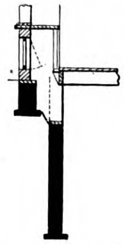


Vertical Section through Palladian Window in Main Story.—Scale, ½ Inch to the Foot.

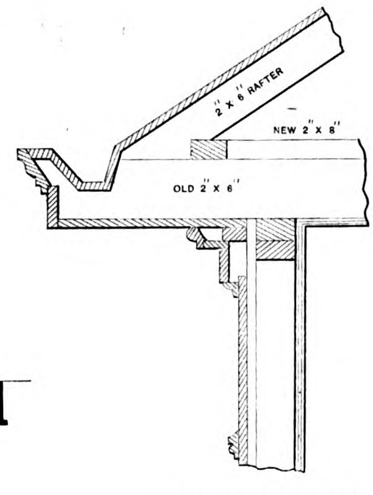
Miscellaneous Constructive Details of Remodeled Frame Dwelling.



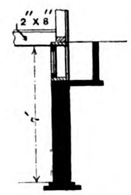
Details of Front Loggia, at Second Story.—Scale, ½ Inch to the Foot



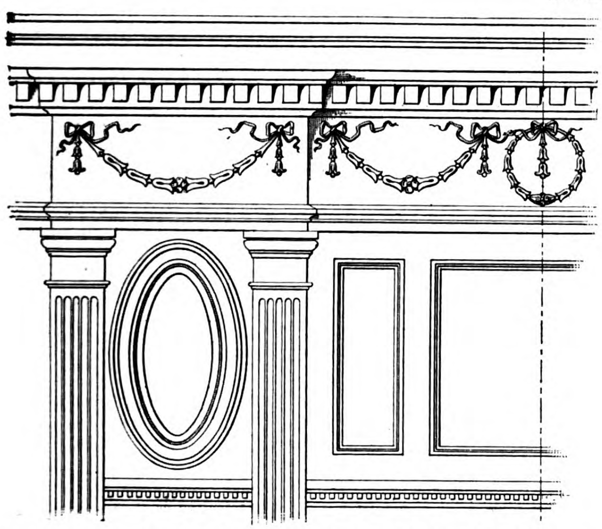
Detail of Foundation Wall on Line C D.—Scale, ¼ Inch to the Foot.



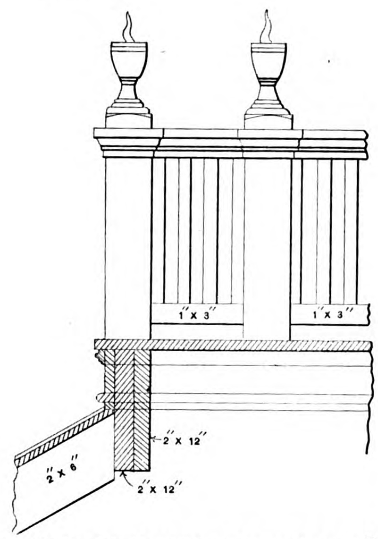
Detail of Main Cornice.—Scale, ¾ Inch to the Foot.



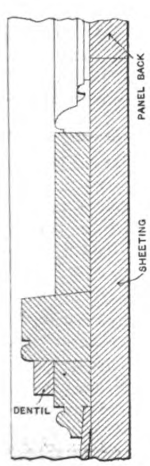
Section of Foundation Wall on Line A B.—Scale, ¼ Inch to the Foot.



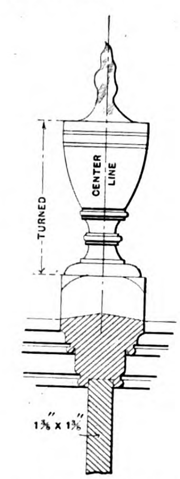
Partial Elevation of Cornice and Ornamental Windows in Center of Second Story. —Scale, ½ Inch to the Foot.



Detail of Deck Mold and Balustrade.—Scale, ¾ Inch to the Foot.



Detail of Dentil Course Below and at the Right of Oval Window in Second Story.—Scale, 3 Inches the Foot



Detail of Posts and Balustrade Over Bay Windows and Side Dormers. —Scale, 1½ Inches to the Foot.

Half Elevation of Front Dormer Window.—Scale, ½ Inch to the Foot.

Miscellaneous Constructive Details of Remodeled Frame Dwelling.

THE INSPECTION OF LUMBER.

BY F. A. HERSH.

Saginaw Inspection.

"FIRST CLEAR" is not less than 8 inches in width and is free from all imperfections, the term "Clear" implying freedom from defects.

"Second Clear" is not less than 8 inches in width, at which it must be so nearly perfect as to fall but a trifle short of first clear. As the width increases a larger range of defects may be allowed, so that at 12 inches wide a piece may have two knots of 1 inch diameter, or two narrow saps on one side; at 16 inches wide, especially if the piece is more than 1 inch thick, two knots may be allowed, or one knot and one sap not to exceed 1½ inches wide. At 20 inches wide the two knots may be larger or saps increase in width.

"Third Clear" is supposed to admit of three defects, but up to 10 inches knots should not exceed ¾ inch in diameter, or the sap should not exceed ¾ inch on one side. With increasing width knots may increase to three in number, not over 1 inch each, or sap equal to 1½ inches in width. As a rule the three first grades demand one perfect face. In the Saginaw and some other markets the term "Good" is used in designating the three upper grades, and purchases are sometimes made in "Good," "Select," "Fine Common," "Common" and "Culls," but unless these terms are specified the quality "Good" in common use will include not only the three upper grades, but also the next grade below, or "Selects."

Selects.

"Selects" is a term which will allow four defects in a piece of lumber: Four knots not over 1 inch in diameter, according to the size of the piece, or two saps on one side, which in pieces 12 inches wide should not exceed 3 inches in the aggregate or include more than one-quarter the sap side, the heart side being the face. With increasing width the proportion of sap may increase, or with narrow saps the face side may have some knots. The general description of this grade, however, is of a class of lumber which has defects of such a character as to condemn it for the three uppers, yet suitable for many uses to which the three uppers may be put.

"Fine Common," sometimes known as "Select Common" or "Select Box," or merely "Box," is a grade of lumber suitable for finishing purposes, yet having too much sap on one side or two many knots on the other to admit of its being classed in the grade of "Selects."

"Fine Common" is usually cut from the outside of the log, sometimes known as sap boards, the general character of which is to give one face side while the other is largely covered with sap, which if properly piled to dry without mold is adapted to a large proportion of the finer work where only one side is exposed to view. With this point in mind the inspector will allow knots in this grade proportioned to the size of the piece. If the sap is narrow the face may have one or two small knots, but, except in wide lumber, the rule is observed "one side a face." Pieces below 8 inches in width are seldom accepted in this grade, and at that width the defect is in sap which may embrace not more than one-third the sap side and must not run out to the face side; or a board of that width may have a good sap side nearly, if not wholly, clear of knots and with two small knots on the heart side.

In larger pieces a board or plank having too many defects for the grade of "Selects" and yet approaching almost to the requirements of the grade is included in the "Fine Common." A board 16 inches wide, 1 inch thick, with five knots not to exceed 5 inches in diameter and having no other defects, would be classed as "Fine Common." The same piece if 1½ or 2 inches thick would likely be classed as "Selects" by most inspectors. Shaky lumber is not admitted in this or the upper grades.

Strips.

"Strips First Clear" are 6 inches wide, 1 inch thick, free from all imperfections, and are known as clapboard or siding strips. The term "siding strips" should not be confounded with "sidings," lumber cut from one side of a log, in distinction from the stock or lumber cut from the square log.

"Strips Second Clear" are 6 inches wide and 1 inch thick, and may have two small sound knots, or if no knots the sap may equal 1 inch on one edge of one side.

"Strips Third Clear" are 6 inches wide and 1 inch thick, and may have three small sound knots, and on one side in addition sap equal to 2 inches in width.

All strips in these three grades must be free from rot split or shake.

Strips, Flooring and Fencing.

These terms include all strips not as good as "Third Clear," yet free from rot or split. Flooring strips must be of full thickness and width, except where narrower width is desired, when they may be of the uniform width of 3, 4 or 5 inches. All knots in flooring strips must be sound. Fencing strips include all coarse grade strips not good enough for flooring and above the grade of culls, or strips not up to the standard thickness, and their inspection is less rigid than the other grades.

"Common."—This term includes all boards, plank scantling, strips joist, timber and lumber not otherwise defined which do not come up to the "Select Box" grade, but are of a generally sound character, well manufactured, of full thickness, and free from large loose knots and bad shakes.

Scantling joists and timber must be free from knots or imperfections which would weaken the piece for substantial building purposes. Pieces containing worm holes and small sap streaks which do not materially damage the piece for the uses in which it is usually employed belong to this grade. One straight split not more than one-quarter the length of the board may be allowed. No lumber under 10 feet in length is considered merchantable in this or the better grades.

Shipping Culls.

Timber containing unsound knots which affect the strength of the piece, black or moldy sap, unsound hearts and badly sawed are included in this class. The pieces are available for coarse use and all other lumber not up to the grade of "Common" is included in this grade. Anything poorer than "Shipping Culls" is not recognized in any market.

Saginaw lumber is always made in 12, 14 and 16 feet lengths (with an exceptional log of other lengths), in all grades, except dimension stuff, where lengths are cut to suit the sizes demanded, but the sidings from such logs are usually cut off to the 12, 14 and 16 foot standard. The thicknesses of Saginaw lumber as usually cut are 1, 1¾ and 2 inches, but with some 3-inch in coarse plank or in extra nice stock for thick upper or deals.

Marble as a Flooring.

In a German technical newspaper it was recently pointed out that large rooms in which there is a good deal of traffic should never have wooden flooring, but rather floors made of slabs of stone or tiles, as otherwise the dust becomes insufferable. It is pointed out that in the old Berlin Exchange the principal room, while floored with wood, was always involved with a cloud of dust, while now stone flags have been laid down nothing of the kind is to be remarked. Of course, much depends upon the kind of stone used. The softer sandstones are useless for the purpose. The plague of dust is then quite as bad as that arising from wooden floors. There is no doubt that for places of public resort, where there is much traffic, a floor of marble or of marble tiles is the best for the purpose. From such a floor no dust is raised. It can be readily and easily cleansed, and will not wear hollow, as clay tile floors do.

SHEET METAL IN INTERIOR DECORATION.

IT seems strange that an industry appealing to a particular class of craftsmen should, in its infancy, have been slighted by those best able to promote its growth, and to an extent which has threatened to drive a profitable business into other and less competent hands. Yet such has been the case with the comparatively recent introduction of sheet metal plates for interior decorations.

The various makers of metal plates for decorative purposes have done a vast amount of work and spent large sums of money in their endeavors to educate the public to the use of their products, and with good results.

They have done everything practicable to gain the support of the metal working trade, the skill of the metal worker being needed in the installation of the plate maker's products, but that artisan possibly has felt that the time for engaging in the business was not yet ripe. That this is a wrong impression is evident when we look around us in city, town, or country. On every hand we see churches, schools, public buildings, theatres, private dwellings, and even vessels, with interior decorations of sheet metal.

The advantages of metal decorations as applied to interiors of buildings or dwellings are numerous. Being applicable to old plaster or wood, they are just as suitable for old buildings as new. When used in new buildings no plaster need be applied to walls or ceilings, a saving of some consequence. The weight of a metal ceiling is trifling, consequently the strain on the trusses is much reduced. In case of fire much protection is afforded by metal coverings, in their ability to check the spread of flames. Many cases are on record where metal decorations have checked fires which otherwise would have assumed serious proportions.

Both ceilings and walls are easily kept clean, and are in no way susceptible to damage through leaks in roofs or water pipes. Nor are they at all affected by jar or vibration. The opportunities presented for the finished decoration of the plates are great, and limited only by the skill of the painter or decorator. The best effects of embossed papers, Lincrusta Walton, and similar types of decorative material are by the use of metal plates readily obtainable, the first cost is much less, and the durability, of course, greater.

Plates for ceilings and side walls are made from soft steel, stamped with artistic designs. When steel plates for decorative purposes were first introduced there might have been objections to them owing to their crudeness, both as to stamping and design. Presses wholly incapable of exerting the power necessary to stamp a sharp, strong design were used, the result being a plate with a partly formed design, which, when painted, lost its identity almost completely.

The plates of to-day, however, are stamped with the heaviest forms of presses and the designs clearly and sharply defined in the metal, so that when decorated every line of the design is displayed to advantage. Every year an improvement in the designs has been noticeable, until now the art work in the preparation of a new plate is a most serious problem for consideration by the plate maker. The artist must be the best obtainable, and the die work is placed only in the hands of experienced die makers. The plates are made to suit almost every condition to be met with in the surfaces of ceilings and walls, and with the small fittings and ornamentations used to break up dull portions of a design the finished effect is at once grand and imposing.

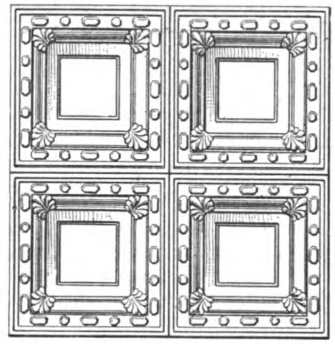


Fig. 1.—Group of Four Deep Ceiling Plates.

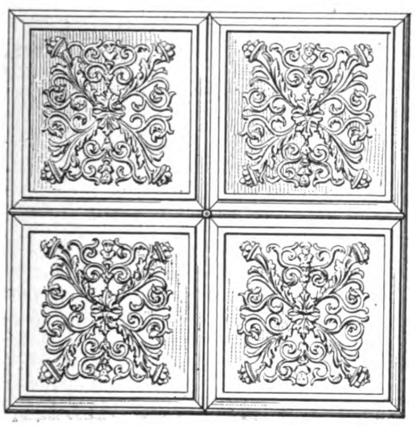


Fig 2.—Four Shallow Ceiling Plates.

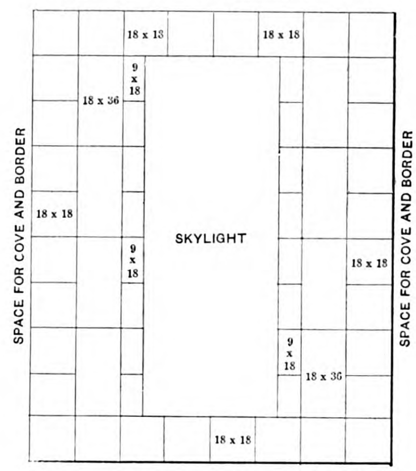


Fig. 3.—Arrangement of Plates to Relieve Skylight.

Sheet Metal in Interior Decoration.

In this series of articles it is proposed to describe minutely the installation of steel plates for decorative purposes, and to illustrate the different phases of an installation by working drawings, in order that a sheet metal worker may see that the business of installing or affixing plates cannot be considered otherwise than as a branch of his business, appealing to his skill in the shaping, forming and fitting of flat and curved plates to follow the contours and curvatures of all descriptions of ceilings and walls.

Laying Out a Steel Ceiling.

In the application of a steel ceiling it is needless to say that an accurate measurement of the old ceiling, or ceiling area, must be taken before the selection of materials can be considered. Ceilings of square rooms are seldom finished so that their outer lines will form an exact square. It is necessary, therefore, in taking a measurement to work from the center of the ceiling. The working center is best found by drawing cross lines from corners, which is done by the use of a chalk line and blue or red chalk, if the ceiling to be covered is white. The center found, we are ready to make plans from which to work, the plans, when complete, serving as our working drawings for the job.

Our first consideration will be the style of plates to be used. If the ceiling, or joists, are high, we may with good effect use deep molding plates, like those shown in Fig. 1. Should the ceiling be low, shallow plates, as in Fig. 2, would, of course, be more suitable. Deep plates lend a paneled effect which is strikingly handsome and massive, but this effect would be out of place on an ordinary low ceiling, so the use of deep plates is not recommended for ceilings less than 10 feet high.

The plates are supplied 9 inches, 12 inches, 18 inches and 24 inches square, and 9 x 18 inches, 12 x 24 inches, 18 x 36 inches, and 24 x 48 inches. It will be noticed that these sizes allow of combinations in squares, the advantage of which we will explain. A ceiling might be required to have a plain center extending the length of a room, or it might be that a large skylight occupied a good deal of the center space, and so would not permit of the use of whole, or square, plates without destroying the lines of ornamentation. The diagram, Fig. 3, will make the use of different sizes of plates plain.

In the diagram the plate grouping only is shown. The dimensions of the cove and inner border to be used would be governed by the amount of area available after the center was completed.

In the case instanced the space at the ends between the skylight and the cove would not permit of two rows of plates 18 inches square being used, therefore a pleasing division of the space would be made, as suggested in the diagram, Fig. 3. A double row of plates 18 inches square could have been used on the sides instead of the 18 x 36 inches, and plates 9 inches square instead of the 9 x 18 inches; but the dimensions of the room largely govern a proper selection.

All these things, however, must be decided at the time of making the plans. Moldings to represent beam or girder casings can be introduced in large rooms or halls very effectively, and serve to relieve a flatness which otherwise might be too pronounced. And when deep plates are used in the center field the border or borders surrounding the same may be relieved with drop molds to correspond with the plates.

The details of design having been arranged (and the task is an easy one, the plate makers' catalogues being very complete in the matter of illustrations and measurements), we are ready to put up the ceiling, the work incident to which we shall describe in our next article.

(To be continued.)

Tearing Down Buildings a Century Old.

The old buildings on the site to be occupied by the new Custom House at the foot of Broadway, New York City, are being torn down, and in doing this the contractors find that tearing down a dwelling erected a century ago is a very different matter from destroying the kind of masonry contractors lay at the present day. The block being torn down is bounded by State, Whitehall and Brid[illegible] streets, and Bowling Green. These are the exact limits of Fort Amsterdam, built by the Dutch in 1626, within which was erected, as a tablet on the door of 4 Bowling Green announces, "the first substantial church edifice on the Island of Manhattan." A representative of the concern doing the work of demolition said, while the walls were being taken down, that every brick would have to be cut out separately. "We can usually fasten ropes to the top of the walls," he continued, "and simply pull them down. But that would make no impression on these walls. Why is it? Well, in the first place, the builders took a great deal more time and pains than any contractor would think of taking nowadays. Then the material seems to be far better than we use to-day for dwelling houses. The bricks are firmer and the mortar is almost as smooth and firm and solid as cement. There is not a crack in the walls of any of these buildings that have stood nearly a century. I'd like to see one of these new uptown blocks after it's stood that long."

Architectural Display at Paris Exposition.

Our architectural exhibit at the Paris Exposition will, on the account of the small space available, consist of a group of photographs of characteristic buildings, together with the chief works, either completed or in process of construction, of leading architects. The photographs will be placed upon a standing screen about 8 feet high and having a total length of 31 feet.

This screen has a middle section 15 feet long, and two end wings each 8 feet long. In the center of the middle screen are three large panoramic views of New York, one looking north from the Battery, one taken from Brooklyn, by the bridge, and one from the North River. The skyscrapers are taken as characteristic buildings, for it was the Americans who invented and perfected iron construction, and these views of New York's sky line are given to show the character of our American city. All around these central pictures are numerous views of individual skyscrapers, and such groups as old Trinity and its giant neighbor, the Arcade Building.

A double line of photographs of summer cottages and houses have been put at the bottom of the screen, extending along the entire length. The body of the wings has been devoted to the principal buildings and our leading architects. The main features of the right wing are the library buildings of McKim, Mead & White, notably the Boston Public Library and the Columbia University Library, while the designs of Carrère & Hastings' New York Public Library occupy the center of the left wing.

A Monster Tree.

What might be called a good sized toothpick was cut on the Lindsay Creek property of the John Vance Mill & Lumber Company, Humboldt County, Cal., a few weeks ago, says the San Francisco *Wood and Iron*. The tree was estimated at something over 300 feet in hight, and one-half of this presented a colossal shaft, bare of limbs. The diameter of this vegetable column was 16½ feet at the butt, tapering to 8 feet at the first limb, 150 feet above the ground. By way of comparison, if the tree stood at the "Newspaper" corner of Market street in San Francisco, a man perched on its top could almost look over the top of the *Call* building, the dome's tip of this building being 310 feet above the ground. From a commercial standpoint the value of the tree was proportioned to its size, as it furnished eight logs of an average diameter of 11.87 feet—6 logs each 20 feet in length and 2 logs 16 and 14 feet, respectively, the contents of which amounted to 166,125 feet, board measure, which, allowing for the kerf and waste in sawing, should make about 133,000 feet in lumber. The total weight of the logs as cut was 747,000 pounds, or 4½ pounds to each foot of board measure. The lumber obtained from three of such trees would be a full cargo for one of the ordinary coasting schooners engaged in the lumber trade.

Preventing Nails from Rusting.

A correspondent of one of the trade papers who asked how he could keep iron nails when used in wooden construction work from rusting after a few months' exposure was told to "heat the nails to a cherry red and throw them quickly into a pot of raw linseed oil, drain off the oil and let the nails become fairly dry before using."

CONSTRUCTION OF INSIDE FOLDING BLINDS.

As announced in our last issue the winner of the second prize in the Thirtieth Competition was Howard B. Galloway, 513 North Green street, Baltimore, Md., and we take pleasure in presenting herewith his method of constructing inside folding blinds or shutters.

Inside window blinds or shutters, as shown in Figs. 1 and 2, are made at the planing mill and delivered at the building ready for the carpenter to erect. In new buildings having inside shutters the latter are made by the rod, showing the stiles, panels, &c., the width is laid off. Then the material is ripped and planed, and after it has all been brought to the required size all the stiles, M and L of Fig. 3, required for one window are clamped together with the above rod and are laid off from it. After this they are mortised, plowed and molded, and then the rails E, F, G, N, as in Fig. 3, are laid off from the same rod.

After they have been clamped together the rails are

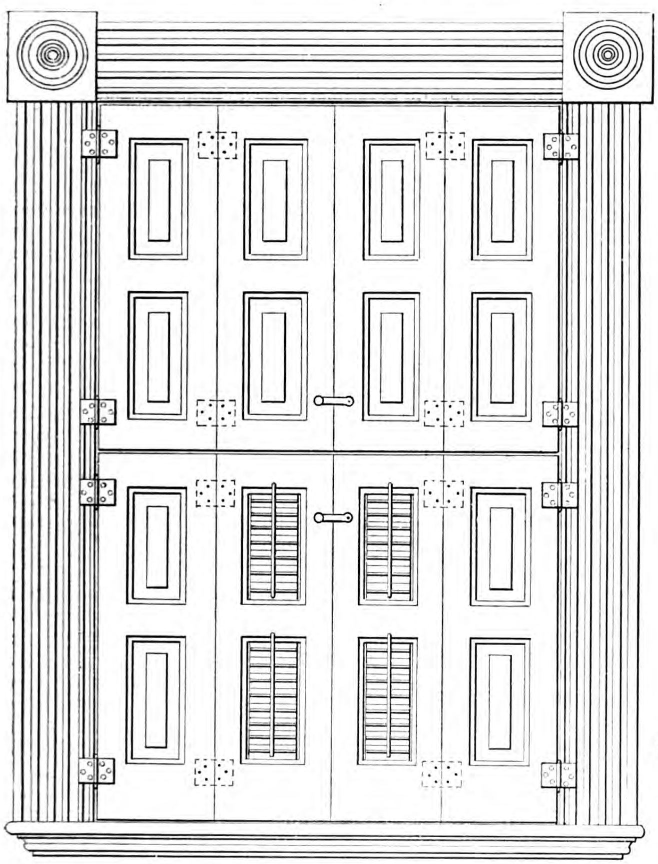


Fig. 1.—Elevation of Shutters.

Fig. 4.—Section on Line A A of Fig. 3

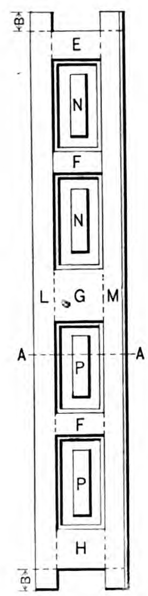


Fig. 3.—Elevation of a Shutter.—Scale, ¾ Inch to the Foot.

Fig. 6.—Section and Elevation of a Slat.—Scale, 3 Inches to the Foot

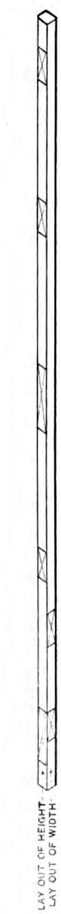


Fig. 5.—Rod Showing Layout of Shutters.—Scale, 1 Inch to the Foot.

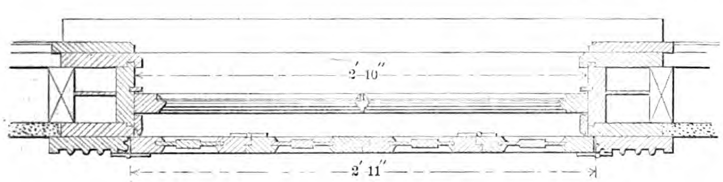


Fig. 2.—Horizontal Section through the Shutters.—Scale, 1 Inch to the Foot.

Construction of Inside Folding Blinds.

firm who contract for the mill work, such as windows, doors and frames, moldings, &c. The architect furnishes the mill with drawings of each window having inside window shutters, these drawings being generally made to a scale of 1½ inches, or 1 inch to the foot. He also furnishes the mill with full size details of the shutters. The mill upon receiving these drawings proceeds to make the shutters, first by taking a rod, Fig. 5, and laying out the hight of the shutters, one side of the rod showing the position of the rails and panels, and on another side of the plowed, tenoned and molded. Afterward the panels N P are laid off, raised, as shown in the section, Fig. 4, or else paneled. Then the slats, Fig. 6, are molded and pivoted, after which the stiles and rails are fitted together. The panels and slats are each fitted into position, then each fold of the shutters is clamped, glued and pinned. After the glue has set the shutters are smoothed with a plane and then sandpapered. With the exception of the laying off with the rod the entire process of making, clamping, gluing and pinning is done by machinery. In Fig. 3 is shown the finished shutter, the ends of the stiles M L projecting beyond the top and bottom rails, protecting the shutters, as indicated at B B. The outside of the stile L and rails E and H are not planed at the mill, nor are the shutters painted there.

Upon the arrival of the shutters at the building the carpenter will select those intended for one window and lay them together upon two trestles, leaving the proper distance between the folds, which is done by inserting wooden wedges about 1-16 inch thick between the folds of the shutters. Next the carpenter will take two rods, each of which must be less than the opening intended for the shutters. Then by sliding one rod upon the other the net width of opening at the top and bottom of the window is obtained. These widths are then laid off on the shutters, after which the hight is obtained in the same manner and applied to the shutters. It is necessary to see if the opening is square. Next take two strips, tack one across the top and the other across the bottom of the shutters, and then the whole set is fitted in the opening, leaving a space about 1/8 inch all around the shutters for clearance. Lay the shutters back on the trestles, put on the hinges on the surface of the blinds, using 2 x 2 or 2 x 2½ brass hinges. Place in the opening, adjust properly and then remove the strips. If the blinds are to be sawed in half, take a straight edge and mark across the shutters. Then saw to the mark. A small bead should be run across the top of the lower half, so that the joint will not be so readily seen.

Stealing a House.

An extraordinary case of larceny is reported from Chicago. Some time ago, says the *American Architect*, a man named De Young bought a double lot, with a house on it, on the corner of two streets in a certain part of the city. The house being vacant, he advertised for a tenant, and in course of time an applicant appeared. Mr. De Young went with his customer to see the house, and was, not unnaturally, surprised to find only the foundation. There were no marks of fire or tempest on the premises, and, in his search for the ruins of his property, he received another surprise at discovering the superstructure of his building in a lot some two blocks away, resting on a new foundation and occupied by a tenant, who professed to know nothing of the migration of his abode and said that he was paying his rent regularly to the owner of the lot on which the house now stood. Mr. De Young, not being able to carry his house back to its place himself, has now brought suit against the owner of the lot on which it stands, Mrs. Jane G. Patterson, to compel her to restore it to him, and to account to him for the rents which she has received for its use. It is not probable that Mrs. Patterson was a party to the stealing of the house, which is more likely to have been an enterprise of one of those "hustling" business men of whom, as we are told, Chicago is so proud. It would not be difficult to move a wooden house, such as this seems to have been, a few hundred feet over level ground, and set it on a new foundation, prepared ready for it on a lot belonging to the speculator, and sell the whole at a bargain to some one with money to invest. And the operation would be comparatively safe, for the moving of a house is an every day occurrence, which would not excite the suspicions of the neighbors, and the new purchaser, finding the title to the land unencumbered, and receiving a satisfactory explanation of the moving of the building, would pay, with full and justifiable confidence, the purchase money, which, it is needless to say, would immediately disappear from the view of attaching officers and sheriff's deputies. Meanwhile, the real owner would be likely to find some difficulty in getting pecuniary satisfaction for his loss. It is very doubtful whether an innocent purchaser of land is obliged to ask whether the buildings that he finds on it came there honestly or can be compelled to give them up to another claimant, for the reason that the laws concerning real estate are framed, in general, with the purpose of preventing disputes, by requiring notices and records, so that a person who has complied with the necessary formalities in buying can rest secure in the possession of his property, without fearing to be deprived of it by ancient or trumped up claims against former owners. This is certainly in the interest of reason and justice, and while the owner of portable goods, which have been stolen from him, can reclaim them wherever he finds them, the case is, and should be, different with a building. No doubt the man who steals a house can be punished as a criminal, if he can be caught, but it will be interesting to see whether the house itself can be recovered from an innocent purchaser.

WHEN the tower on the Montgomery Ward Building at Michigan avenue and Madison street, Chicago, Ill., is finally completed, it will afford, next to the Washington Monument and the Park Row Building in New York City, what is claimed to be the highest point of observation in the country. The structural iron workers have recently completed the frame work, and when it is bricked in elevators will be put in operation, and the lookout point of the tower will be thrown open to the public. The building itself is of marble, steel, brick and terra cotta, and from the street level to the top of the tower is 385 feet. This compares with 302 feet for the Masonic Temple and 280 feet for the Auditorium Tower. The Montgomery Ward Tower overlooks Lake Michigan, and it is said that on a clear day the view from it takes in a section of the four States of Illinois, Indiana, Michigan and Wisconsin.

THE ART OF WOOD TURNING.—III.

(SECOND SERIES.)

BY FRED. T. HODGSON.

THE overhead motion now attached to first-class lathes intended for ornamental turning deserves special notice, as it enables the turner to perform some operations with much greater ease than without its intervention. The arrangement referred to is that by which the slide rest itself, a working apparatus fixed in it, is driven automatically by the crank and treadle, as is also the mandrel. A good form of the overhead motion was shown in Fig. 9, and to which we may refer the reader later on. It will be noticed that on the outside of the frame of the lathe there is a driving wheel with a belt or band, which gives motion to the small shaft and its pulleys K above. Another band connects one of these pulleys with the slide rest or apparatus fixed in it, this arrangement giving a very rapid motion. A small drilling frame which fits in the rest, and has a minute pulley at one end, is a very effective instrument. In drilling, or boring, for instance, instead of having the work up to a drill in a chuck in the mandrel, the work is on the latter, and by means of a brass plate on the face of the pulley, divided and drilled with several circles of small holes, together with a point mounted on a small piece of elastic steel fitted to the mandrel stock, the work may be held in any desired position, and holes drilled in circles, in spirals, or, in short, in any position required. Nor is this confined to drilling holes, as many ormantental tools can be used instead of disks, which will produce rosettes and other small decorative ornaments in endless variety, and with great rapidity.

The ornamental hardwood and ivory turner makes great use of this little frame, and when the eccentric chuck is employed in connection with it, most complicated patterns may be produced. A still further step is made when the mandrel, and consequently the work in hand, is made to move slowly while the drill or other tool is in action, the small pulley at K being provided for this purpose. Epicycloidal curves are produced on the face of the work thus: Suppose the revolving drill tool to be set to cut circles 1 inch in diameter, and the mandrel to move around at the rate of ½ inch during one revolution of the drill tool, the circles will be converted into a curl with ½-inch loops, and when the mandrel has completed a revolution the curl, which is a true epicycloidal curve, will be complete. Now suppose the eccentric chuck placed on the screw of the mandrel with the work on the chuck, and the slide at the chuck drawn out to a given extent, as described in the foregoing, any number of these beautiful epicycloidal curves may be executed on the face of the work, either following or overlapping each other.

There are quite a number of devices for overhead motions, and while the one exhibited in Fig. 9 is, in our spring, either made of rubber or of spring wire wound spirally. On this spring two loose pulleys are nicely adjusted, as shown. These pulleys, with all their attachments, can be moved to suit any position within the range of the device, and the arm may be raised or lowered to suit the length of the driving cord.

In the example before us the cord lapping over the pulley which drives the tool is shown to be out of line with the pair of pulleys on the outer spring E. This is so placed in order to show how the springs E E may be adjusted. If the work to be wrought is heavy and the arm F F is not sufficiently strong to prevent undue vibration, it may be left long enough to pass over the whole length of the lathe and the right hand end of it supported by another standard, like B. It will be seen that if the cord be run over the driving wheel, then over one of the little loose pulleys on the left hand spring E to the corresponding pulley on the right hand spring E, then over the pulley O, and back again over the other pulleys to the driving wheel, where both ends of the cord should connect, the circuit will be complete, and any movement of the

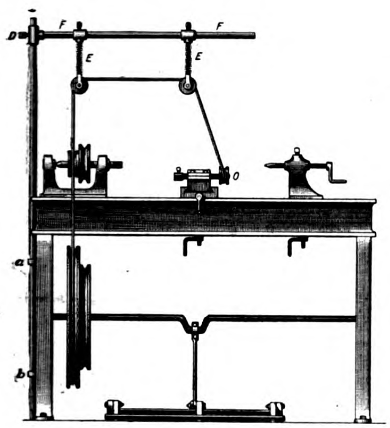


Fig. 21 —Showing Arrangement of Overhead Pulleys.

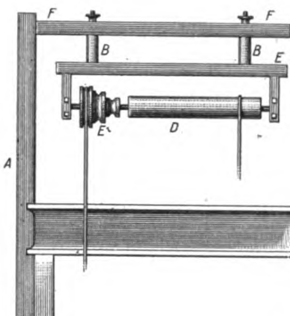


Fig. 22.—Arrangement for Overhead Driver.

Fig. 23.—Pulley Shaft.

Fig. 24.—Index Plate.

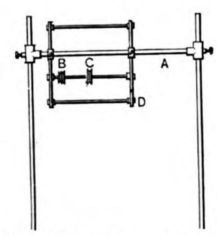


Fig. 26 —Swinging Overhead Gear.

The Art of Wood Turning.

opinion, one of the best, yet, we can understand, there may be occasions for other methods of giving circular motion to various appliances and attachments, which could not be obtained by the method shown. In order to provide for such contingencies it may be well to illustrate other methods, and show their purposes.

The oval chuck, for the present, may be dispensed with, and one of the features of overhead attachments described in connection with the slide rest or other tool holders. The sketch shown in Fig. 21 exhibits the ordinary lathe bed, head and tail blocks, with rest and driving pulley. On the left of the bed is a round iron rod, standing up, say, about 3 feet 6 inches above the bearers and directly in line with the lathe centers. The rod may be an inch or less in diameter and so attached to the standards of the lathe by staples *a b*, or other device, so that it can be removed at will, but it must be so arranged that it can be turned around in its holders whenever required. The arm F F is made with a sleeve on the end, as shown at D, so it can be made to slide up or down just as the workman desires. In this sleeve is a set screw, shown at D, whose duty it is to hold the arm F at any hight wanted. This will admit of the driving cord to be shortened or lengthened at will. On the arm F F are two loose ferrules which slide freely along the arm. In each of these ferrules is a set screw on the top side, and below a loop or hook in which hangs a treadle will cause the pulley at O to revolve. Here, then, we have one of the first uses of an overhead lathe. If the revolving pulley O is attached to a shaft having a socket or other device at the other end, into which a tool may be placed and firmly held, we at once see the value of the machine for boring, ornamenting, dividing and many other things in connection with the work attached to the face-plate of the lathe.

Another overhead attachment is that in Fig. 22, which, though more expensive, is not practically any better than the one shown. It has, however, a neater and more workmanlike appearance, so we will describe it. The standard A in this case may be of flat iron or of wood, with the arm F F welded or mortised into it; the frame E E is suspended from F F by means of two coiled springs in brass boxes B B, which keep up the necessary tension on the cords, for here there are two cords required—one from the driving wheel to the small pulley E and one from the drum D to the tool holder. The drum may be grooved or left plain, and may be replaced by a second small pulley which is capable of being slid along the round shaft which forms the revolving axle and which is hung on centers, as shown on each end of the suspended drum. This is a matter, however, in which the workman will find ample scope to display his own judgment. When a pulley is employed instead of the drum, the shaft has a small groove or channel made along its length, as shown in Fig. 23. A pin projecting from the central hole in the pulley enters the groove and holds the pulley so that it must revolve when the shaft revolves, and at the same time allowing the pulley to be adjustable at pleasure. The tension of the springs B B is lessened or increased by a turn or two of the screws C C.

To fit the work in the lathe in such a manner as to enable any point in the face or side to be operated upon, a division plate and index are required. The first is a thin plate of brass or gun metal cut round to suit the size of the large cone pulley in the head block, and it may be about 1-16 inch thick, with the holes drilled through it in concentric circles. The index is generally a steel spring with a projecting point, which, entering any one of the holes, retains the plate and with it the pulley, on the face of which it is fastened by screws. Generally there are four circles of holes, the number in each chosen with reference to its divisibility by the greatest possible number of spaces. Generally the longest, or outside, circle is divided into 360 parts, as it can be divided without a remainder by 2, 3, 4, 5, 6, 8 or 9, while 144 is a good figure for the second circle, as it can be divided by 2, 3, 4, 6, 8 or 9 without remainder. If more circles are wanted, 112 and 96 may be employed.

The plate in Fig. 24, though only laid out for two divisions, that is, 360 and 144, shows the method of making the plate. The uses of this plate are many and varied, as will be shown later on. Its use has been known to French and German turners for a long time, as Bergeron and other old writers on the lathe mention its use over a century ago. Eccentric cutting and drilling could not well be done without its aid, and wheel cutting for clocks or for making cycloidal and similar chucks are entirely dependent on this old contrivance.

The plate, with the index attached, is shown in Fig. 25, where the cone pulleys are in evidence with the division plate shown on the face of the large pulley. There is a slot in the steel spring that carries the index point in order to allow the point to be moved up or down so as to fit in the holes of the smaller circles. The pin or point is held solid in the slot by aid of a screw and milled-headed nut, which can be loosened or tightened by the fingers. When the index plate is not in use the steel spring may be turned down so that it will be in the position shown by the dotted line.

Before proceeding to describe the method of making ornamental work with the aid of the appliances enumerated, it may be well to offer a few practical suggestions as to how some of these appliances may be made with little cost of labor and material. We have shown in Fig. 21 how a very simple overhead arrangement may be attached to the lathe, but in order to make the whole matter better understood we offer some further details which will aid the operator in making his own attachments. The iron rod and arm may be made of ordinary gas piping, as it will be cheaper in the end, and much lighter. It should not be less than 1¼ inches in diameter. All the tees and other connections can be obtained from any plumber's establishment ready to put together and at very little cost. To insure a strong, rigid overhead appliance we would suggest that there be a tubular standard at each end of the lathe, with a cross arm connecting them together, as shown in Fig. 26. On this arm hangs the overhead pulley frame, with the pulleys B and C slid on the shaft A, the shaft having a long slot or key seat in it, the pulleys so arranged that they can be fastened on the shaft at any point in its length and held in position by a set screw. Fig. 27 shows one of the hangers forming the pulley frame. It will be noticed that there is a set screw running through the bar at E, which is intended to press against the arm which passes through A in order to hold the frame solid on the bar when the machine is in operation. The pulley frame is intended to be slid along the arm to any point to suit the work under operation, and is held in position by the set screws. B shows the point through which the top adjusting rod passes, C the centers on which the pulley shaft is hung, and D the bottom adjusting rod. In Fig. 31 a tee coupling is shown which may be employed to connect the horizontal arm to the upright standards, as shown. These couplings may easily be obtained with the thread cut in ready to receive the horizontal bar, for a few cents each. The set screw D would have to be tapped in, an operation any country blacksmith can readily perform. The ends B and G show the line through which the upright standard would go, A showing the threaded end for the horizontal arm. Figs. 28 and 29 show the blocks by which the standards are held solid to the lathe. Fig. 28 has a hole in the center, of the same diameter as the standard tube; it is secured to the floor at the end of the lathe either by bolts or screws; Fig. 29 is screwed on the lathe, as high up as it can be got, and the standard, of course, passes through the cutting shown and steps into Fig. 28 at its lower end, where it is held solid and rigid.

An overhead arrangement of this kind, while perhaps not quite as cheap as that shown at Fig. 21, is capable of doing the most difficult kind of work, and it has the complete range of the lathe from head to tail block, something the more limited overhead gear does not possess. If it should be desired, one, or even two more pulley shafts could be added to the hanging pulley frame, for in very complicated work more than one tool revolving at the same time are desired, as the operator will soon discover, after he once works and understands the overhead arrangement.

The circles shown in Fig. 30 are intended to represent the face of the cone pulley, as at B, Fig. 26, the various diameters showing the gradual lessening of the pulleys. B shows the hole through which the shaft A, Fig. 26, runs, and A represents a brass plate screwed to the face of the pulley, and which in this case is intended to prevent the pulley from turning round on the shaft, which is supposed to have either a slot or a flat place along the whole of its length.

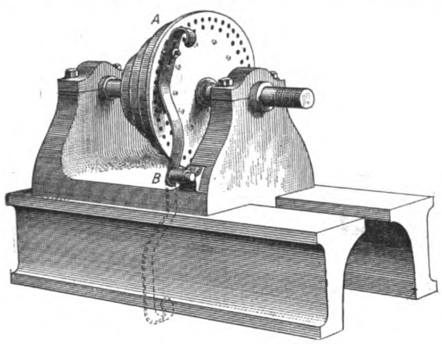


Fig. 25.—View Showing Index Plate in Position.

Fig. 27.—Elevation of a Hanger.

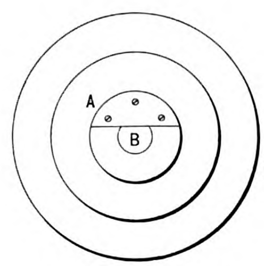


Fig. 30.—Cone Pulley and Plate.


Fig. 28.

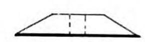


Fig. 29.

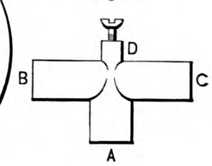


Fig. 31.
Tee Coupling and Fastenings.

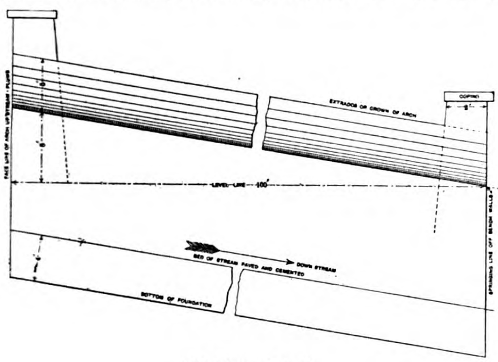
The Art of Wood Turning.

CORRESPONDENCE.

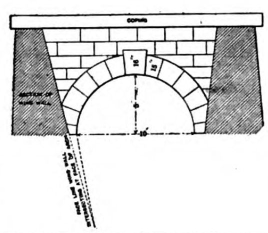
Some Questions Regarding Stone Arches.

From J. F. M., *Pocatello, Idaho.*—I send a rough drawing showing a stone arch built on the grade of 8 per cent., as you will see from the level line. I would like to ask the editor or some of the readers of the paper who are familiar with this class of work two questions in regard to the arch. In the first place, should the cross joints of the interior stone sheeting be squared up from the intrados to extrados off the grade line or off the level line which would make them plumb, or, rather, parallel to the faces of the arch ? In the second place, what effect has this grade, 8 per cent., on the strength of the arch ? Is it not weaker than an arch built on the level ? The grade mentioned was adopted to suit the grade of the stream and reduce the amount of masonry. The arch will have to carry from 50 to 60 feet of dirt on top, so as to bring the gulch up to the level required for the road bed. An early answer to these questions in the Correspondence department of *Carpentry and Building* will be appreciated.

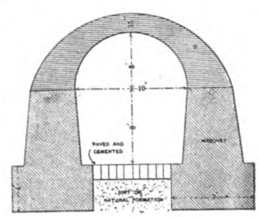
Answer.—The above questions were submited to F. E. Kidder, the well-known consulting engineer, who in reply furnishes the following: In determining the strength of a vault it is considered to be made up of a series of arches 1 foot thick, set side by side, and if each arch has sufficient stability to sustain itself and the load directly above it then the whole series of arches must be sufficiently strong. Now, a single arch 1 foot thick would have practically the same strength if the intrados and extrados were inclined to the face of the arch that it would if these surfaces were at right angles to the face, as the abutting surface of the voussoirs would have practically the same area in both cases. The springing stone of each arch, however, should be cut with a level bed and the two faces of the arch should be parallel. To answer the questions of the correspondent more definitely, I should say that the cross joints of the sheeting for, say 15 or 20 feet from the lower end of the vault should be cut parallel to the face and each springing stone cut with a level bed. Above that distance it would probably be safe to cut the joints at right angles to the soffit on so slight a grade as that mentioned. Constructed as above the arch would probably be fully as strong as if the soffit were level.



Side View of Arch.



End Elevation of Arch from Spring Line.



Section at Center of Arch.

Some Questions Regarding Stone Arches.

What Tools Are Best for Carpenter's Kit.

From H. K. R., *Larned, Kan.*—Replying to "Young Wood Butcher," Ashton, R. I., whose letter appears in a recent issue, I would advise him to get a Stanley combination No. 45 plane; one 1¼-inch rabbet plane, one set of wooden hollow and round planes, and for fancy planes he will have many idle days during the year in which he can make all the different patterns of molding and match planes for which he can ever find use. If he lives near timber and can get all kinds of hardwood this will be an easy matter. I have a number of molding and match planes of my own manufacture, and if we could get in this market good beech and apple wood, as well as cabinet woods, I assure you I would have no idle time, as I have learned more about a plane in my own shop than any man who has not made one could possibly teach me. "Young Wood Butcher" will likely make a failure of his first effort at plane making, but if he will persevere he will learn something new with every trial. I would not give room in my "box" for an iron plane except Stanley's No. 45 combination, and if I could get beech and apple wood, I would have two or three "boxes" full. However, in this day of cheap tools and machine moldings, "Young Wood Butcher" will have little use for hand made moldings except in remodeling old houses where it is desirable to match old casings and moldings. Then if he be as far from market as we in the West are, and he has a knowledge of plane making, it will stand him in good stead. It is not the saving in cost of making or buying that is so important, but rather in the experience which he will gain, as it will more than pay him for his trouble. I have a 10 x 12 shop in the rear of my residence where I have spent many an hour working over a difficult molding, not for profit, but for the pleasure of conquering a difficult task. In conclusion I would say that success comes to him who perseveres, and not always then; but in case of failure try again.

From C. E. W., *New Hampshire.*—In answer to "Young Wood Butcher" of Ashton, R. I., in regard to the most serviceable tools for his "kit," I would advise him to purchase only the very best on the market, because they are the cheapest in the long run. Stanley's Nos. 45 and 55 are very nice planes, as well as all tools marked "Stanley." The "Taintor Saw Set" is a good one, and the "Langdon Miter Box" will give satisfaction. Stratton levels, Buck's chisels and Disston's saws are also good. I have one of "Starrett's Patent Combination Squares" with which I would not part at any price if I could not get another like it. But no two carpenters think alike in buying tools, and "Young Wood Butcher" will find it very convenient to have a good variety in his chest.

Construction of Dormer Door or Window.

From NO NAME, *Gladstone, Mich.*—I am seeking the experience and knowledge of mechanics older and abler than myself in the art of building, and hope you will place my request in the Correspondence department of the paper. I desire to ask with regard to the proper construction of a dormer door or window, and trust some chartiable reader will respond. I have built several in my own way, but believe I am not right in the construction on a balloon frame building. A dormer of proper dimensions, neat and becoming in appearance, is a thing that every carpenter does not build, yet I have seen them. The kind of dormer about which I desire to learn would be part below and part above the wall plate, and be itself in a plane with the main wall, the plate of the dormer to be carried up to support the extension of the collar beams and the eaves not connected with those of the main roof. My difficulty is this: My casing inside and out is out of proportion; the outside casings are too wide, and the inside casings too narrow. My mode of construction is to use 2 x 4, doubling them at the corners, thus making 4 inches; the window jambs ⅞ inch and side corner board ⅞ inch, making a total of 5¾ inches, or 6 inches for the width of outside casing. This is too wide. At the same time the plaster inside is flush with the face of the jamb. How are the collar beams managed, and are the dormer walls built on double rafters, and what projection should the cornice have as compared with the main cornice ? This building of dormers I consider a rather important matter to the average carpenter, particularly to the small jobber and country carpenter who makes his own plans and does his own work. I therefore ask some kind reader to do me a kindness by giving it in detail.

Universal Rule for Obtaining Lengths and Bevels of Hip Rafters.

From L. W. G., *Alpena, Mich.*—Having given a reply to "W. S.," of Paterson, N. J., in regard to a method of obtaining lengths and bevels of hip rafters where the hips were equal and the plan square, I will now give a rule which is universal, and can be applied to any plan, whether square or not, and is adapted for any shape of

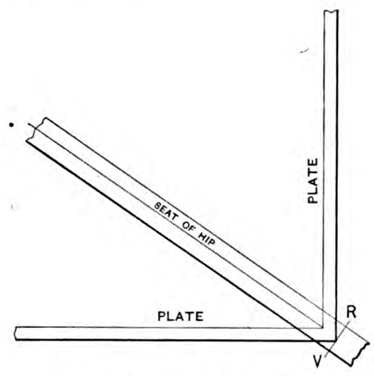


Fig. 1.—Plan of Corner Building, Showing Seat of Hip Rafter.

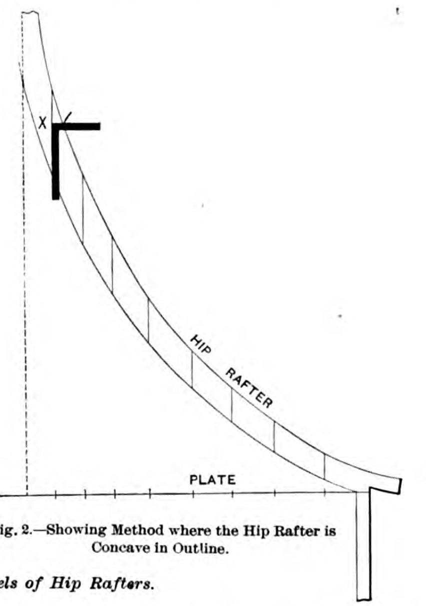


Fig. 2.—Showing Method where the Hip Rafter is Concave in Outline.

Universal Rule for Obtaining Lengths and Bevels of Hip Rafters.

rafter, be it straight, concave, convex or any other form. First make a plan of the corner on which the rafter is intended to rest, as in Fig. 1, and draw a line to represent the seat or run of the hip rafter. Be sure that the line of the seat thus made angles on the corner to correspond with the real work. Next lay off one-half the thickness of the hip rafter each side of this line and square over from the seat line each way, as shown from R to V of Fig. 1. Now lay out the hip rafter pattern by the common rafter rule, which I gave in connection with my reply to "W. S. W." in a previous issue, and which is no doubt understood by many, if not all, the readers.

Having the pattern completed with its plumb and level cuts, make plumb marks on the side of the pattern about a foot apart. Now, with the square to those marks, slide it up or down until the edge of the rafter coincides with the figure on the tongue of the square, which is the distance from V to the plate in Fig. 1. Prick off this distance as shown at X in Fig. 2. Do this at all the plumb marks, and then, setting a nail in the points thus made, a thin batten bent around them will give the line of bevel for that side, to be worked from the center of the rafter. If the hips do not angle equally it will, of course, be necessary to use the distance from R to the plate for that side. It will be noticed that the angle which the seat of the rafter makes with the corner of the plan gives the distance more or less at V and R of Fig. 1, which governs the bevel of the backing for that particular side. The hip rafter in Fig. 2 is shown concave in outline in order to demonstrate that the method gives the proper results whether the work be concave, convex, ogee or straight.

Does Owner or Contractor Assume the Loss?

From W. S. W., *Washington, Iowa.*—I have been a reader of your paper for 16 years without interruption, and have obtained many valuable hints in the way of planning and executing work. It is a good while since I gave anything for the Correspondence Department, but there is a question I would like to have discussed by some of the contractors who read its columns. The question is this: Suppose I was building a house where I was to furnish the material and do all the work, but had no written contract, as is often the case here; or, if I had a contract it would state the kind of material to be used in addition to other things. Now, while the house was in course of erection, suppose there occurred a loss by fire or wind storm. Who would be the loser; or, in other words, whose house is it? I know that by the "Uniform Contract" the owner is required to keep the building fully insured, but in 20 years' building I have only once built under that contract, and I know that there are few who ever use it here. We make our own contracts and the owner seems to think that the building belongs to the contractor until finished, whether there is a contract or not. It seems to me that when the material is put up and not objected to by the owner, it then becomes his property. What is the practice among builders in the rural districts?

Some Questions on Rough Casting.

From E. S. M., *Saxon, Ill.*—I would like to ask the readers of *Carpentry and Building* a few questions on rough casting. Will it do as well to use sheathing lath as two layers of common lath laid on diagonally over the sheathing ? What is the cost of such work, and is it as warm and durable as beveled siding ? Would there be danger of its being damaged by a hard rain before it was dry, and would it crack much if put on in very hot weather ? Would cement be better than lime plaster ?

Discussion of Stair Work Desired.

From O. S., *Denver, Col.*—The best answer that I have seen to an inquiry—that is, the one most easily understood by young carpenters with little education—is the answer given by "C. H. C.," Jackson, Miss., in regard to laying out circular headed doors and windows in a swell or circular wall. Now I, like a good many more young carpenters working for a living, run across a great deal of stair work, and I would be very grateful, while I am sure it would interest other readers of the paper, if "C. H. C." or some one else competent to handle the subject would discuss stair work in as simple a manner as "C. H. C." has illustrated the circle upon circle head, keeping in mind that the practical way is the quickest and best.

Rule for Chamfering.

From CHAMFER, *Michigan*.—Will some of the readers kindly give me a rule for chamfering the corners of verandas and porch columns, and in fact for any situation where a chamfer is required?

Construction of Inside Folding Blinds.

From FRANK J. GRODAVENT, *Fort D. A. Russell, Wyoming*.—In looking over my notes from which the description accompanying the drawings of inside folding blinds published in the February issue was written, I find that something was omitted which I had intended to incorporate, and which should have been included, as the blinds on the "A" side are hung differently from the sections on the "B" side. On the section taken on the line A B of the elevation, two methods for hanging the blinds are shown. On the "A" side they are hung to fold in a zig-zag way so that the second section folds upon the first, and the third upon the second. This arrangement is not the best or most convenient, as the central or narrow sections will at times cause trouble by catching in the pocket and offer an obstruction against opening. The method of hanging as shown at "B" has some decided advantages and merit, but requires a special hinge with the knuckle set out from the face of the blinds about 1¼ inches with connecting wings at a slope. These special hinges are used to connect the first and second sections, while the third or central sections are hung to the second section with the regular flat surface hinges. This allows the central or third section to open singly and fold back upon the second section, which, in turn, will fold back upon the first with the third section between the first and second, the three sections together folding back into the pocket or box. By this arrangement of hanging the shutters will never bind in the pockets, but will open freely. This method of hanging also allows the central or narrow sections to be opened back upon the other sections when the blinds are closed, thus giving light at top or bottom.

Quantity of Material Required in Laying 1000 Bricks.

From W. W. S., *Brockton, Mass*.—In reply to the questions raised by "Fred. White," Denver, Col., in the February issue of *Carpentry and Building*, permit me to offer the following:

Question 1.—One barrel of lime and three barrels of sand will lay 1000 bricks.

Question 2.—One and three-quarter barrels of cement and five barrels of sand will lay 1000 bricks.

Question 3.—Two barrels of cement and six barrels of sand will lay 1000 bricks. A barrel is two and one-half bushels. The joints are to be ¼ inch.

Question 4.—One-half barrel of lime, two barrels clean white sand, quite fine, and one-half barrel of marble dust.

Question 5.—Three-quarter barrel of cement and two barrels of sand, the brick to be laid with ¼-inch joints.

Question 6.—Two barrels of lime and two and one-half barrels of quite fine sand. "Mineral," I assume, means "coloring," in which case put in from ½ to 1 peck, according to the shade required.

According to my experience Peerless colors are the best. Slack the lime as you would in making common mortar. If the color is dry mix it in water and then turn on the lime when slacking. I think the above covers the sixth and eighth questions.

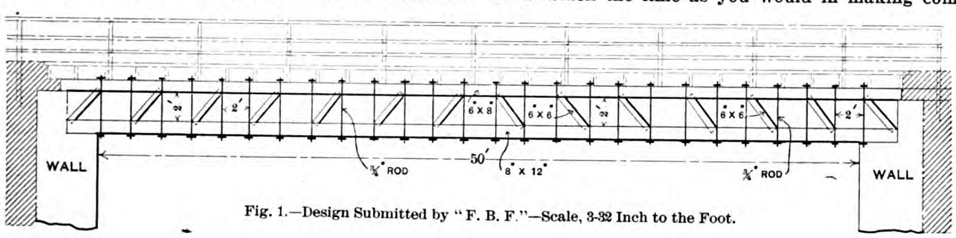


Fig. 1.—Design Submitted by "F. B. F."—Scale, 3-32 Inch to the Foot.

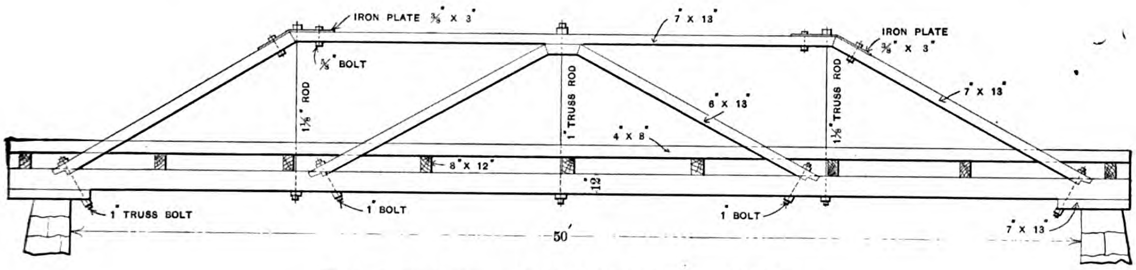


Fig. 2.—Design Contributed by "S. N. H"—Scale, ⅛ Inch to the Foot.

Design of Bridge of 50 Feet Span.

Design for Bridge of 50 feet Span.

From F. B. F.—In answer to "F. R.," Coalville, Utah, I send sketch, Fig. 1, of a truss for a suspension bridge having a span of 50 feet, and so built as to sustain a weight of 75 pounds per square foot.

From S. N. H., *Cambridge, Mass*.—I send inclosed a drawing, Fig. 2, of a truss bridge in reply to the inquiry of "F. R.," Coalville, Utah, whose letter appeared in a recent issue of the paper. I think the drawing is sufficiently plain to be readily understood by the sorrespondent in question.

How to Light Gas By Electricity.

From J. E. D., *Chicago, Ill*.—As a reader of *Carpentry and Building* I have obtained valuable hints on a great many things, but I regard the most interesting portion to be the Correspondence columns. I wish to ask for a little information on the subject of electric gas lighting, and would request the readers to tell me how to light gas by electricity? How many batteries are needed and where should the spark coil be placed? Is it a good idea to use the gas pipes as a ground connection or a return connection to the batteries? How should the wires be placed and how are they properly insulated.

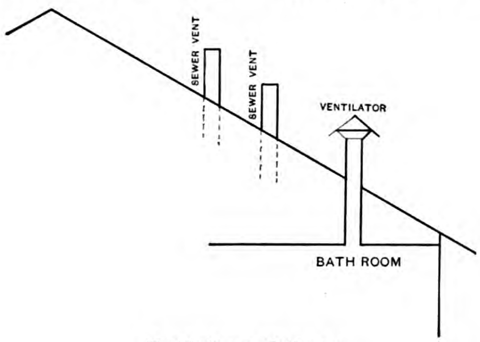
Give the Young Men a Chance.

From M. L., *Newark, N. J.*—I wish to commend "A. L. W." of New Hampshire for his letter in the February number of *Carpentry and Building*, and will add a few words for the benefit of the young men in the trade. In the first place permit me to say that they should be able to make good drawings, both of floor plans and elevations, for in order to know how to read plans they must know how to make them. This is a vital point, and answers in some degree the inquiries of correspondents as to how to read architectural drawings. We must not forget that the contractor takes a big risk on his lumber pile when he gives a man his first job of framing. My advice to the new framer is to make himself a set of framing plans with all openings figured out, as well as length of trimmers and headers. This has been my plan of procedure for the past five years, and I find it a great help. Young men should not be afraid to ask questions, for I have yet to see the case where a foreman has refused to show a young man when he asked him for information. For instance, there is on the job I am framing a young man who is learning the trade. He was with me while I was laying out the floor timbers and roof, yet he did not ask a single question. Now, my young brothers, if you get a chance, ask your foreman how he gets the lengths of those rafters and the cuts. Go right at it and keep it up, and he will find that you want to learn and mean to work for something else besides 5 o'clock. He will show you all you want to know, I will wager.

From H. M. B., *Roxbury, Conn.*—In the February number of *Carpentry and Building* I saw a letter by "A. L. W." of New Hampshire which, I think, is a good one for all the young chips to read, and some of the older ones, too. I have had a little experience in carpenter work, and I ask space for a few lines for the benefit of the subscribers of the paper. Last year I contracted for and built a factory for grinding silica. I used heavy timbers of oak and chestnut, the main timbers being 10 x 12, and all well boxed, the amount of timber used being over 60,000 feet. Now what I was going to say was in regrad to the men employed to do the work. Of course I laid it out and looked after it, but I had only two men who could do good work and make a good tenant and mortise. The rest of the men thought they were carpenters, owing, I presume, to the fact that they had at some time or another made a chicken coop or executed an odd job for their neighbors. I hired these men, as I could not get first-class carpenters, they being very scarce. I didn't hire the men because they were cheap, nor as a majority of the farmers do, who say that they cannot afford to pay us boss carpenters $2.50 a day when they can hire a man for $1.50. Now these men we call "Jack Knife Carpenters" in Connecticut. In the summer of 1898 I was repairing a house, making it two-story and remodeling it inside and out. The next neighbor had a roof put on by our "Jack Knife Carpenters," and, as will be remembered, it was a very dry summer, which was possibly fortunate for the occupants of the house. When it did rain the roof leaked so that the wall fell off in the pantry, and, of course the roof had to be looked to, so I was asked to go and see what could be done. I found that the leak was in the gutter, so it had to be ripped up and laid over again, as it should be. Now this is what the farmer calls cheap work, but it is dear in the end. Of course we all have to live and learn, but it takes a long siege of practice and patience to become good carpenters. It requires an extra fine lot of tools and various grades of oil stones in the tool chest, but all of these are of not much value if you do not know how to use them. Give me the man who can take an old tool, place it in working order, and then is willing to be told how to use it. When I commenced to work at carpentery these were the kind of tools I had to contend with. I don't suppose I had any of those fine grades of oil stones that we read so much about in *Carpentry and Building*, but the old plane cut and did its work well as long as the elbow grease lasted. Wooden oil stones were not in style then. Some of the young carpenters may think I am rather harsh in my remarks, but that is not my intention. If they will have patience they will soon see how the boss carpenter will help them, and when he finds they can do better work he will advance them step by step, and so on until they are able to read the plans. When they have reached this point, if they have had a good boss, they have learned the different grades thoroughly and are ready for contracting and to be master of their work.

Carpentry is not my only work, as I am a pattern maker and molder as well. I am much pleased with the articles describing the method of making wood patterns, flasks, core boxes, &c., by Charles J. Woodsend. I do not suppose carpenters generally are interested in molding work, but if so I can tell them how to build a plow out of an old stove or any old cast iron, and would advise them not to trade their clean work for that of a foundryman. I work in the foundry in the winter and do carpentry work in the summer. There may be some of the readers of the paper who will say "he is an old chip; a jack of all trades and master of none." If some of you young chips who pound your fingers in cold weather will come to Roxbury, where our foundry is located, we will warm you up so you can strike for higher wages.

From N. H. D., *Newburgh, N. Y.*—In this month's (January) issue there is a letter by "C. W. B." of Reading, Pa., entitled "Give the Young Men a Chance." This is a timely topic, and if the bosses and contractors would take the suggestion offered by "C. W. B.," there would be better mechanics all around. How many bosses are there who will give their carpenters a chance, even old mechanics, to work from plans, or even look at the plans and specifications ? It appears to me as if the majority of contractors and their foremen are afraid to let the men working under them see the plans of a job, for fear the men might learn something; or perhaps they fear that something might be stolen or the foreman might lose his job. I have worked at the trade over ten years, and in different sections of the Eastern States, but I found very few bosses who will give the working mechanics the plans, &c., to work from, no matter how good the mechanic may be. I have worked on jobs where the working mechanics knew more about the drawings and the way to work from them than did the foreman in charge. It is not always the foreman in charge of the job who understands his business, nor is he always a mechanic. I know that from my own experience, neither are all the contractors competent as to mechanical ability or in reading plans, but there are men who have plenty of nerve and they get to be foremen. Some of them soar to the position of contractors and they trust to luck and go ahead. I have seen men who were foremen on jobs who had to depend on one of their men to work the plans, and then the foreman claimed the credit for the satisfactory completion of the job. I know of numerous cases where contractors and foremen have measured up plans for material for the carpenter work and then came out behind and considerably short of material. I have in mind one builder for whom I worked a few years ago who figured on the carpenter work of a double two-story brick building, and who left out a tier of floor beams and rough timbers of one house, as well as the rough sheathing and the floor for one story of the same house. He had his bid made out according to his bill of material. This is only one instance. I might quote others under the same heading. I agree with "C. W. B." that if the bosses would give their men a chance at the plans and instruct them in reading and measuring them, we would have better work done, and much better mechanics. I have found that it takes considerable tact to explain to a man how to do so and so when perhaps he has never seen anything like the idea that the boss is trying to explain. By giving the same man a scale drawing and the specifications to study he would catch the idea at once and execute the work as intended by the architect, whereas, if the boss tried to get him to catch the idea from verbal instruction he might miss some idea that would spoil the work. As "C. W. B." says, some bosses say they have no one whom they can give in charge of work. I say the chances are ten to one that they have men who could take charge of a job anywhere if they would give them a chance. If not, they must have a queer lot of mechanics. But let them teach the men who do not understand plans how to read and work from them, and then they need not cry that they have not a man they can send out on a job. I hope to hear from others on this subject.



Ventilating a Bathroom.

From E. L., *Globe, Ariz.*—Having read the issue of *Carpentry and Building* for January, 1900, which is just at hand, I take the opportunity of answering "C. W. B.," of Reading, Pa., whose communication appears under the title "Give the Young Men a Chance." The cause for inferior mechanics lies not with the boss, but with the men. My experience with every man I have thus far handled is that if I instruct him, and spend my time with him for any length of time, he invariably thinks I cannot run my business without him. He strikes for higher wages or quits and goes into competition for less than that for which I could get anything done. Although such men are forced to leave after a short while, it hurts the trade for the time being. The cause for the poor class of mechanics nowadays is simply that the young men have perfected themselves in one certain piece of work and do not travel. They want as high wages as a good all-around mechanic who has knowledge of all the branches of the business and who learned and perfected himself at his proper cost and not at the cost of his boss. Nowadays the trade is conducted upon a very small margin and no one can experiment with men.

If the young men want a chance let them study after work hours, go traveling and try to get into every kind of work, from digging fence post holes to very fine cabinet work. For a period of about ten years let the question of wages alone, and after this time I could guarantee such a man a job anywhere, even where there is the greatest supply of labor, for he would be able to command the highest wages and steady work at that. The fault lies only with the young men, who are really nothing more than apprentices, who want as high wages as an old experienced hand. No one can blame the boss for putting these young men on such work only as they are able to do, and a good deal of their work has to be done twice on account of lack of proper judgment. I hope I have given a few pointers to the young men, for I have practical experience to show for my assertions, and would be only too pleased if some of them would take it to heart.

Power for Small Carpenter Shop.

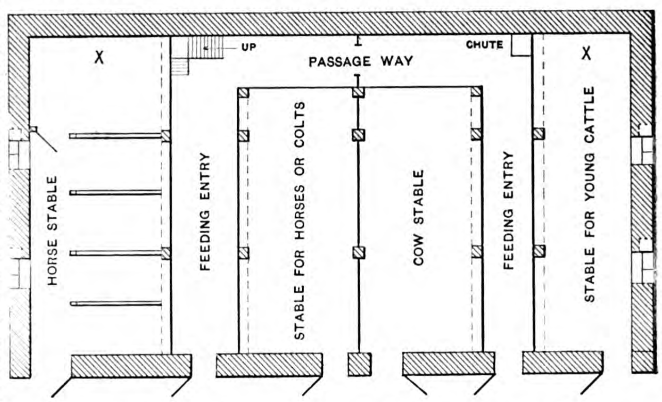
From J. E. D., *Chicago, Ill.*—What is the best motive power for use in a small carpenter shop? I want to run a lathe and circular saw and desire to know whether to use 1½ to 2 horse-power. Will some of the readers who have had experience in this line do me the favor to reply?

Ventilating a Bathroom.

From J. E. D., *Chicago, Ill.*—Will some reader tell me how to ventilate a bathroom, located as indicated in the sketch which I inclose? I have a 5-inch ventilator through the roof, which I find is all right some days, and at other times there is a down draft with a strong smell of sewer gas from the vent pipes extending through the roof, as indicated in the sketch.

Plan for Stone and Frame Barn.

From J. C. W., *Pine Hill, Pa.*—I notice in a recent issue of your valuable paper the inquiry of a correspondent, "D. S.," Belmont, Manitoba, for a barn plan, so I take the liberty of sending herewith a rough sketch, which represents my understanding of his requirements. The plan is for a bank barn, 36 x 64 feet, with an 8-foot "foreshoot," as we call it. He can at once see that there is little space which is not utilized. The plan will give him eight doors and four windows at the sides, and if the barn is not too much in the bank or hill he can put one at each end of the stables, as indicated at X X on the plan. The advantage of having the doors all leading out is that the cattle are not likely to get mixed, and in having a foreshoot or overshoot one is not exposed to the weather in opening the doors. I would suggest to the correspondent that he make double doors in two halves, one above the other, and then have a transom above the doors. This will give sufficient light when all the doors are closed. This kind of a barn should face east, if possible, and in summer or on a warm day in winter the upper doors can be opened. Referring again to the plan, it is intended to have the cattle stand facing the entries, so that feeding can be done from both sides. The dotted lines indicate the manger or racks and troughs, while the little squares show stones for posts under girders. If preferred to shut out chickens, &c., from the horse stable, put in a door in the rear passageway. It will be noticed that one stall is left large enough for a sick horse, or one that is cross to others. Make the door about 4½ feet high, and lath up the stalls above the troughs, as this will make the stall light. I have not given any particulars about the frame superstructure, as I understand the correspondent wanted only the floor plan. Should he desire more in this direction I shall be glad to comply with his wishes, so far as I am able.



Plan for Stone and Frame Barn.—Scale, 1-16 *Inch to the Foot.*

BRICK VERSUS WOODEN HOUSES.

By T. B. Ghequier.

MUCH has been said in the trade journals during the past year about the superiority of brick over wood for country houses. The writers have in many cases been men of talent, who handled the pen with the skill and grace an Italian does the stiletto, and many of the points have proved well nigh convincing. The articles have furnished most interesting reading, and the mound of favorable evidence has so grown by accretion that it bids fair to claim brotherhood with its great predecessor, the mighty tower, at the building of which backward reading languages, separable verbs and other lexicographical delights came into being.

If the tower of Belus, the Babylonian walls and the massive structures of Rome were of burnt clay, they are all now either unpicturesque ruins, heaps of debris or memories. Some day, perhaps, our 30-story buildings will likewise fall of a heap and the coming man will sit on a hill of clay fragments, mixed with iron and muse on the air of ugliness and desolation it imparts to the surrounding landscape.

Carpentry and Building should put lance in rest, buckle on an armor of proof and sally forth to do battle for wood, while it still exists. Some day this commodity bids fair, as things go now, to become as extinct as the dodo, or as the white rhinoceros will be in a few years. Wood in all its forms may become an item of record only, with a few samples to be found, perhaps, in museums and curio cabinets. Then the building world will be compelled to fall back on burnt clay, and the evidential mound will reach the sky.

It should not be, although it is, necessary, as a preface, to distinguish between wood as wood and the proper treatment of it in building. Many a shed or barn is more picturesque than its accompanying, yet pretentious neighbor, the family house. Why? Because wood is used in them in a manner that is in strict conformity with its characteristics, while on the adjacent house all sorts of vagaries, incongruities and curiosities are attempted. Quoins are nailed at the courses to give an air of stone, bands and molds are introduced that do not belong to the material, buttresses are built up of inch boards and pinnacles cap the climax by being stuck on windy points, over saw cut arches, perhaps, where they by degrees, as they decay and become loose in the joints, tumble about at various angles, and give the building a rakish look of dissipation far from pleasant.

The defense of wood houses must be confined strictly to such as are, or are to be, built on the immutable principle of construction and decoration in accord with the material to which they are applied. It would be mere Quixotism to fight for others. As we are likely to have wood with us for some generations yet to come, it is possible that some wise legislative act may bear fruit in providing a means whereby trees may be something more than a name to our descendants, and as people of means will continue to live in cities and towns for the winter season, using more or less temporary habitations among the fields for the warm months, it will not be amiss to state a few reasons why, in our opinion, wood is far better suited to such buildings than brick or stone.

To begin with, there is but one reason why wood is objectionable, and that is on account of its being burnable, and even this is more in the imagination than the reality. Everything in a brick house, as at present constructed, is liable to conflagration, except the walls, and even they have frequently, after a fire, to be taken down and rebuilt. They get smoked and have to be cleaned; if they are painted they cost as much or more to keep in order than frame, and the mortar joints are constantly disintegrating. They are apt to be damp, they are gloomy, and it is very difficult to make them thoroughly harmonize with the surrounding life of nature. The sharp angles and rises admit of no relief, and baked clay outlines do not soften with time. These faults wood constructions have not, and indeed there are processes whereby inflammability can be much diminished, if not overcome. There are several reasons that operate very strongly in favor of wood houses:

1. Their comparative cheapness. In some localities brick and stone are difficult to procure, as for instance the seaside and out of the way country places. Even with these materials close at hand, under no circumstances will the cubic foot cost be less than 12 cents, while frame houses can be built from 8 to 9. The average house has, say, 50,000 cubic feet. What would then cost $6000 in brick can be built for $4000 or $4500 in frame, with the same interior finish and conveniences. This saving is a considerable item to the person who has only so much to spend.

2. The wood house is likely to be dryer and in consequence more healthy. Bricks absorb moisture, and after a long spell of wet or damp weather this fact is painfully apparent to the indwellers, fire being required; whereas a frame house, if properly painted, is dry almost immediately, and the moisture does not permeate the material at all.

3. Picturesqueness. In this particular much more can be done with wood than brick, and the outlines, as we have said, are always softer. Sticks and boards can be chopped up and made to take almost any variety of shape, sometimes, we are sorry to say, of the most incongruous and grotesque kind, and in skillful hands the result of such freedom must tell for beauty.

4. The wooden houses can be built in much less time, and in weather that is prohibitory to the erection of anything in which mortar plays a part. This is a valuable consideration when work must be done, as it frequently must, in winter. No doubt close and attentive consideration would discover many other reasons in favor of wood. But we did not start out with any purpose of exhaustive discussion. We merely desired to point out a few things that seem to have escaped observation, and that might at the parting of the ways prove food for thought. We trust that the frame house, which has proved recently so valuable an educator in artistic designing, so picturesque a habitation for our forefathers, and so lasting, if properly cared for, will still remain a factor in the days to come, and will not be scoffed at and relegated to second place, because it is not of brick or stone. It has charms and benefits such as we fail to find in anything but itself.

It is said that the addition of even so small a proportion as one-tenth of as much brick dust as of sand to ordinary mortars is preventive of the disintegration so often characterizing mortars used in the masonry of public works. The use of such dust mixed with lime and sand is said to be generally and successfully practiced in the Spanish dominions, and is stated to be, in all essential points, superior to some of the best imported hydraulic cements for the construction of culverts, drains, tanks or cisterns, and even for roofs, whether for setting flat tiles or for making the usual flat tropical roof.

A good lime should possess the following qualities: When delivered, it should be in hard lumps, free from slaked particles of dust. There should be no cinders nor clinkers in it, nor should there be more than 10 per cent. of other impurities in it. It should slake readily in water, forming a very fine smooth paste, without any residue. It should dissolve freely in soft water. Lime that leaves kernels of stones and traces of silica and alumina when "run off" should not be employed for plastering, but may be used in common masonry and brick work with fairly good results.

REMODELED FRAME RESIDENCE OF J. H. NICHOLSON, ESQ., AT BOULDER, COLORADO.

E. R. RICE, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, MARCH, 1900.

MAKING WOOD PATTERNS.—XI.

BY CHARLES J. WOODSEND.

THE next article for our consideration will be a beveled wheel, suitable for a turn table, the plan and elevation being shown in Figs. 75 and 76 of the engravings. The sizes, &c., are immaterial, the idea being to give the principle upon which a pattern for this and similar work is made. In examining the elevation of this wheel it will be evident that the pattern must be made in such a manner as to use a three-part flask, and by so doing it will not render the pattern any more expensive than is absolutely necessary for the proper performance of the work. It has been mentioned before, but will bear repeating here, that one great principle in pattern making is to employ as few parts (separate) in a pattern as possible, and to so make the parts that the greatest amount of metal shall be in the drag, or, at any rate, that it shall be below the cope. Now by examining Fig. 77 it will at once be seen how this is effected in the present instance. The rim of the pattern at the smaller end is left loose. The wheel is intended to be of iron. First lay down a move chuck and pattern from the lathe and then the pattern from the chuck. Place the chuck back into the lathe and face it off again. Now turn a depression into it a little deeper than the amount of the projection of the hub and of exactly the same diameter. There must not be any play whatever, but an exact fit. Keep trying the pattern onto the chuck and turning the hole larger until the hub slides in snugly without forcing. Now put three or four fine screws through from the back of the chuck into the rim of the wheel, placing them so they will not be struck when turning the other parts of the wheel. Take the chuck off the face plate if necessary, having care to mark exactly where and how it goes on the face plate, as the slightest movement or displacement is liable to cripple the pattern—that is, make it irregular. Put the whole back into the lathe and face off the web to true it up, then proceed to build up the pattern a little higher than the dotted lines, Fig. 77. Build it up while the pattern is upon the face plate. Remove the chuck and the

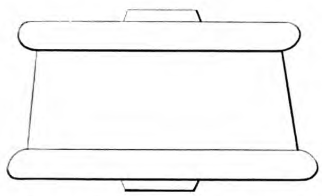


Fig. 75.—Elevation of a Beveled Wheel.

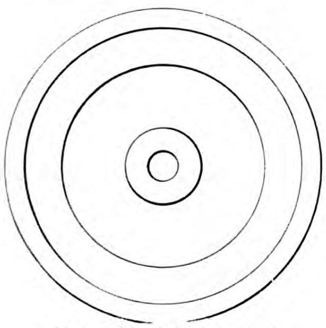


Fig. 76.—Plan of Beveled Wheel.

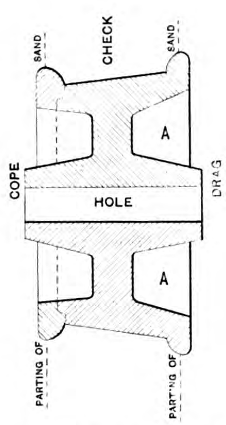


Fig. 77.—Section through Wheel.

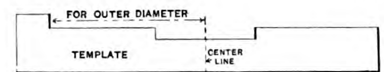


Fig. 78.—Template for Truing off Faces and Turning Down the Rim

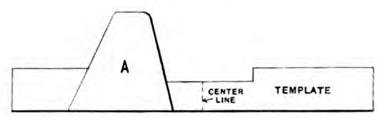


Fig. 79.—Template for Hollow Parts of Wheel Marked A A.

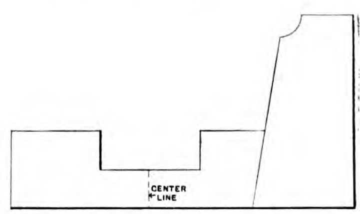


Fig. 80.—Template for Turning Thread of Wheel.

Making Wood Patterns

section upon the board full size and to the shrinkage rule. In making the pattern we start at the web and build up that portion which will be in and toward the drag; in other words, the largest side of the wheel. If the pattern is a small one, circles sufficiently large for the work may be sawn out of boards and glued one on top of another until the desired thickness is obtained, always, of course, putting the grain of one piece at right angles to the preceding one. If, however, the pattern should be large, the better way is to glue the rim up in sections, that is, segments, making the hub only of the solid pieces, the hole, of course, to be cored out. After this is all built up and the glue sufficiently dry, fasten it onto a chuck in the same manner as previously explained. Make two templates, as shown in Figs. 78 and 79. The former will be used first to true off the faces and turn down the rim to the proper diameter. The piece upon the template marked A in Fig. 79 should be very thin, ⅛ inch being plenty, and may be nailed or screwed on to the other piece. This piece is the same shape as those marked A A in Fig. 77.

This part will be next to be turned. Afterward round the edge of the rim—that part only which goes into the drag, Fig. 77. Sandpaper these parts and shellac. After the shellac is dry sandpaper again until smooth; then re-

pattern from the face plate and lay aside to dry. If there are two face plates this will not be necessary. Just remove the whole from the lathe and lay aside, using the second face plate for the next work, which is the loose rim. Prepare and face off another chuck; then prepare segments for the loose rim. This must be made of at least two thicknesses of stuff, no matter how reduced in thickness the whole rim may be. These segments may be nailed directly upon the chuck, using small wire brads. It takes very little to hold a thing like this fast upon the face plate, at least if care is taken not to catch the turning tool in it. Face it up, then true up the inner and also the outer edges; then turn out the rebate, being very particular to get it in the proper place and to give the sides plenty of bevel. It is to act in the same manner and is for the same purpose as dowels. After this is all done remove the rim from the chuck and draw the brads out of the pattern with a pair of pincers, putting the wheel back into the lathe. It is supposed that we have the templates prepared for this side, the same as for the previous one, and also one for the bevel of the tread of the wheel, Fig. 80. Face up the pattern down to the dotted line, Fig. 77, then turn the tread of the wheel, using template, Fig. 80. All these templates are used with the measures taken from the center of pattern, as working from one point reduces the liability of mistakes. After the tread is turned up turn the rebate to fit the loose rim. It must work freely, having a very small amount of play so as not to be liable to stick fast. After this is correct, tack the loose rim upon the pattern with three or four small wire nails. Then finish the turning, using templates similar to Figs. 78 and 79. Afterward round up the edge of the loose rim, sandpaper and shellac as explained, give the final coat of shellac and rub down with hair cloth after the pattern is out of the lathe. Now turn up the core prints for the hole through the hub, putting the cone print upon the side of the pattern which goes into the cope, Fig. 77. Proceed with these and the making of the core box exactly as has already been explained.

WHAT BUILDERS ARE DOING.

THE building prospects for the ensuing year in Binghamton, N. Y., are regarded as exceedingly bright, and it is expected that the amount of work done will exceed by a large percentage that of 1899. One of the leading real estate dealers and contractors expresses the opinion that while it is somewhat early to make predictions of an exact nature, he has no doubt whatever as to the prosperous outlook for the year. Many new dwellings are to be put up, new sections are to be developed, and some of the industrial establishments are to enlarge their facilities, all of which tend to stimulate building activity.

Birmingham, Ala.

The annual election of officers and directors of the Builders and Traders' Exchange was held on January 10 at their quarters, 306½ Nineteenth street, corner of Third avenue. The result of the election was the choice of Norman Kerr for the office of president, S. Spiro for first vice-president, C. T. Hardman for second vice-president, A. Stockmar for treasurer, and Charles W. Frickhoeffer for secretary. The directors selected were A. N. Nelson, Henry Uhl, C. C. Scull, and Martin Kerr.

After the election a banquet was held in the rooms adjoining the Assembly Room and a general social good time was enjoyed by all. The exchange is in a healthy condition, having 65 members, while several applications are pending. Much new work is in contemplation for the ensuing year, some members having reported business 50 per cent. greater than for the corresponding month the year before.

Buffalo, N. Y.

The annual meeting of the Buffalo Builders' Association Exchange was held in the rooms in the Exchange Building, and called out one of the largest gatherings ever recorded at an annual election. The officers chosen for the ensuing year were Frank T. Coppins, president; Charles Geiger, vice-president; C. B. Jameson, treasurer, and James M. Carter, secretary. The trustees selected were Christian Flierl, James S. Stygall, Jr., and Henry Rumrill, Jr. The Arbitration Committee is made up of B. I. Crooker, John Feist and H. C. Harrower.

Before the business meeting adjourned the retiring president, J. W. Herrick, was presented with an alligator dress-suit case, a pair of cuff buttons set with diamonds and a diamond pin. The presentation was made by E. M. Hager, who thanked Mr. Herrick in behalf of the exchange for his excellent management of affairs. The report of the treasurer showed the organization to be in excellent financial condition and the exchange is at present especially strong in numbers and in the interest manifested among the members. A very prosperous year is expected. The meeting concluded with an informal banquet, in which all participated.

Chicago, Ill.

The bright prospects reported in our last issue for an amicable adjustment of the labor trouble in the Chicago building trades seem to have pretty nearly vanished. It had been expected that the workmen's unions would accept the arbitration agreement made by the joint conference committee of contractors and workmen's organizations. The agreement was ratified by the contractors, but the several labor organizations ignored the question at their meetings and finally the contractors became exasperated at the indifference shown and attempted to force the situation. About February 1 they sent an ultimatum to the labor leaders, insisting upon immediate action upon the agreement, but the labor organizations practically ignored it.

The contractors have laid down rules which they say will govern all their dealings with the unions, but they have also adopted wage scales. In two instances the wages that the contractors agree to pay are less than those demanded for the year 1900 by laboring men, and the officers of the unions affected declare that they will order strikes unless the contractors pay the wages that they demand. Such strikes would cause sympathetic strikes by the Building Trades Council and the consequent cessation of building operations throughout Chicago.

The rules recently adopted by all the contractors' associations are as follows:

"The unions affiliated with the Building Trades Council having absolutely ignored the joint arbitration agreement and failed to ratify the same, we hereby make the following rules, to be enforced by the ——— contractors of Chicago on and after February 5, 1900:

"Eight hours shall constitute a day's work.

"Time and one-half will be allowed for all overtime.

"Double time for Sundays and holidays.

"No limitation as to the amount of work a man can perform in a day.

"No restriction as to the use of union or non-union material.

"No restriction as to the use of machinery.

"The foreman shall be the agent of the contractor.

"The right to employ and discharge whomsoever he may choose is reserved to the contractor."

The contractors' rules clash with the rules of the unions in regard to the restrictions of material, the privilege of discharging men without cause, and the employment of non-union foremen. The rules of the Stonecutters' Union will conflict in other particulars. This union forbids the use of machinery in cutting stone and makes six hours a working day from October to April. The restrictions as to the amount of work a man shall perform are made by five unions—namely, the plumbers', gas fitters', steam fitters', plasterers' and lathers'.

The men declare that they will refuse to abandon any of their rules without submitting them to an arbitration board for consideration. It is believed that the contractors' rule as to wages is the most likely to start trouble. The contractors have declared that they will pay but 42½ cents to carpenters, while the carpenters demand 50 cents an hour, and but 25 cents to hod carriers and building laborers, when the union demands 30 to 35 cents an hour. These two organizations are among the most powerful in the council. In all cases but these two the scale of wages granted by the contractors is identical with that now demanded by the men. Some of the unions may yet demand better wages, however.

On February 10 several thousand men took their half holiday in accordance with the union rules, which precipitated a crisis in the trade on the following Monday when the men reported for work. Operations on most of the large buildings came to a standstill, although the cessation of work was not universal throughout the city. As we go to press it is stated that the unions may attempt to carry the fight to other large cities, and develoments are awaited with interest.

At the annual meeting of the Builders' Club of Chicago, held in January, William D. Gates was elected president; Spencer S. Kimbell, first vice-president; E. W. Sproul, second vice-president; Charles W. Gindele, treasurer, and Edward Kirk, secretary. The Board of Managers consists of Edward Kirk, A. W. Beidler, James A. Hogan, T. D. Whitney, Frank J. Johnson, Julian J. Pleas and John C. O'Connell.

The Carpenters and Builders' Association at their annual meting in January elected the following officers for 1900: President, Murdock Campbell; vice-president, William A. Harris; secretary, John F. Neagle; treasurer, Robert Munro; directors, for two years, W. F. Behel, C. W. Mills, Alex. Gordon; for one year, W. Irving Clark, John Ramcke, John Dick; Arbitration Committee, Frank Doherty, T. A. Dungan, Murdock Campbell, C. W. Mills, T. J. Hodgson.

The Builders and Traders' Exchange, at its annual election on January 15, selected the following officers for the ensuing year: President, John Rawle; first vice-president, Victor Falkenau; second vice-president, Samuel I. Pope; treasurer, I. D. Richards. The directors include Alexander Gordon, J. H. Coffey, Martin Delaney, S. M. Randolph and H. W. Barber.

Cleveland, Ohio.

The regular monthly dinner of the Builders' Exchange was held Thursday, January 25, at the Weddell House, there being present as guests of the exchange Director of Law Hogsett, Building Inspector Harks and City Engineer Ritchie. A number of architects were guests of different members. The subject for discussion after the dinner was "The Building Laws and Regulations of the City of Cleveland." Several good suggestions were offered by the city officials, and the necessary steps were taken to co-operate with the city to secure the proposed reforms.

The regular quarterly meeting of the exchange was held Monday evening, February 5, when very satisfactory reports were received from the secretary, treasurer, and Committees on Finance, Membership, Entertainment, Legislation and Revision of the Constitution.

The Legislative Committee has taken steps to secure a law whereby electrical construction may be placed under closer supervision and faulty work endangering life and property be rendered impossible. Other reforms which are receiving attention are in the direction of a proper and constitutional fire escape law, and a law in the interests of proper safeguards in reference to the construction and location of heating apparatus.

The annual banquet will be held Monday evening, February 26, in the auditorium of the Chamber of Commerce Building. This will be the most elaborate and important banquet ever given by the exchange. Governor Nash has accepted an invitation to be present, and it is hoped that Secretary Sayward of the National Association of Builders will also attend. The Pittsburgh, Columbus and London (Ont.) exchanges will be represented.

The exchange has published a vest pocket hand book. containing the names of the officers and committees of the exchange; an alphabetical and classified list of members, with addresses and telephone numbers; a list of exhibitors and desk holders; employers' associations; national, state and city supervising architects and building inspectors; members of the local chapter of American Institute of Architects; Cleveland Architectural Club, and list of architects, with addresses and 'phone numbers. This book has been widely distributed among the building fraternity and has been received with many compliments.

The Entertainment Committee has proposed organizing a Builders' Congress, to be held some time in the early spring before the opening of new summer work. It is the purpose of the committee to have different subjects of interest to builders discussed by experts in specific departments of work, and also to open the way for general discussion by those interested.

Colorado Springs, Colo.

The Master Builders' Association of Colorado Springs was incorporated in January, the object of the association being the maintenance of reading and exchange rooms, to establish a certain standard of worth, excellence and skill, and to work for the best interests of members by seeking and demanding fair and honorable dealing among themselves in relation to each other and third parties. The Master Builders' Association has existed in the city for the past two years, but it is only recently that it was incorporated. The directors include A. J. Gillis, G. M. Young, R. J. Verner, Peter Schmidt and James Kern. The membership is limited to 30.

Detroit, Mich.

The figures covering building operations in Detroit during the year just brought to a close show a slight increase as compared with 1898. In 1899 the number of buildings projected was 2054, estimated to cost a trifle over $4,000,000, while in the previous year 2020 buildings were projected, estimated to cost $3,915,565. As might naturally be expected, the greatest activity occurred in March, April, May and June, when over 900 buildings were planned. The outlook for the ensuing year is that considerable work will be done, including the execution of some rather large undertakings.

Grand Rapids, Mich.

One of the most interesting phases of the building situation in Grand Rapids, Mich., is the apparent tendency to build better houses than heretofore. It is said that the average house which will be built next summer will cost more, irrespective of the rise in the price of materials, than has been the case for four or five years. Real estate is becoming active, and not only in Grand Rapids, but all through Western Michigan the feeling is gaining ground that the next six months will see a large increase in the amount of building.

Hartford, Conn.

The annual meeting of the Master Builders' Association was held on Monday evening, February 5, President H. B. Philbrick being in the chair. The report of the secretary showed a membership of 75 and that there had been an average attendance of 40 at the meetings during the year. The subjects discussed at the meetings and appropriate action taken included "Hours of Labor," "Rates of Wages," "Co-operation with the Labor Unions Regarding Outside Labor," "Rules Governing Competition," and "Co-operation with Dealers in Building Materials." The report of the treasurer showed the finances to be in flourishing condition.

After the association adopted a set of rules governing the preparation of estimates, the y proceeded to the election of officers, which resulted as follows: President Halsey B. Philbrick; vice-president, Charles B. Andrus; secretary, Burton L. Newton, and treasurer, Thomas Barrett.

The directors elected were W. H. Scoville, Fred. J. Bliss, W. E. Caulkins, George J. Gerety, Edmund Brown, and A. W. Budde.

Kansas City, Mo.

The Master Builders' Exchange has elected the following officers for the ensuing year: President, W. H. Wood; vice-president, John Lonsdale; secretary and treasurer, W. A. Wilson.

Trustees: A. Sutermeister, A. F. Roddy, D. B. Rudy, W. A. Bovard, J. A. Oates, George Goodlander.

Lowell, Mass.

The building prospects for the spring season remain about the same as last reported. Labor organizations, however, are active and prolific and now cover about every trade in the building line. The Builders' Exchange has suffered the loss of two prominent members in the death of W. H. Staples of Staples Brothers, mason builders, and Charles H. Costello of T. Costello & Co., plumbers. The latter concern has executed some of the largest plumbing contracts in the country, including the State House and Union Station at Boston.

New Haven, Conn.

The annual meeting of the Builders' Exchange was held in the parlors of the Tontine Hotel on the evening of January 29, a goodly number being present. The meeting was called to order by President J. A. Fogarty, after which reports were read showing the exchange to be in a prosperous condition. The election of officers for the ensuing year resulted in the selection of A. H. Buckingham for the office of president, F. R. Thompson for vice-president, J. Gibb Smith for treasurer, and Elmer Dibble for secretary. The Board of Directors elected to serve for three years consists of C. A. Knoll and G. P. Merwin. At the conclusion of the meeting light refreshments were served.

New Bedford, Mass.

The annual meeting of the Builders' Exchange, which was held in January, was one of the most largely attended in the history of the organization. The officers elected were: President, S. C. Hunt; vice-president, Arthur E. Buffington; treasurer, Charles S. Paisler, and secretary, E. F. Penney. The Board of Directors include the above, with Charles E. Pierce, H. W. Tripp, C. G. Randall, George R. Wood and William B. Janney.

At the conclusion of the meeting the members enjoyed a collation at Winship's Café. After refreshments, remarks were made by the newly elected officers and others, the master of ceremonies being President Hunt.

Omaha, Neb.

The Builders and Traders' Exchange held their annual meeting in January and elected the following officers for 1900: President, J. Fred. Smith; vice-president, R. C. Strehlow; treasurer, E. G. Hampton; secretary, W. S. Wedge. Directors: John H. Harte, John Rasmussen, J. M. Dow, Thos. Herd, A. P. Johnson, John Rowe.

Philadelphia, Pa.

At its annual meeting in the lattter part of January, the Master Builders' Exchange elected seven directors to fill vacancies in the board caused by the expiration of terms of office, the new members being elected for three years. The annual report showed a large credit balance. An endowment of $6000 for the Master Builders' Mechanical Trade School was reported.

At a meeting of the newly elected Board of Directors of the exchange, held on February 13, they organized by electing John S. Stevens president for the ensuing year; William Conway, first vice-president; William S. P. Shields, second vice-president; James J. Ryan, third vice-president; William Harkness, secretary, and Charles H. Reeves, treasurer. Stacey Reeves was chosen trustee of the Endowment Fund, and W. H. Matthews superintendent of the building.

At the annual election of the Building Trades Club Thomas F. Armstrong was chosen president; Albert A. Reeves, vice-president; Henry Longcope, recording secretary; John D. Carlile, financial secretary, and F. M. Harris, Jr., treasurer. The club is composed of the younger members of the Builders' Exchange and has quarters on the third floor of the building on Seventh street.

The annual meeting of the Master Carpenters and Builders' Association was held at the Hotel Lorain the latter part of January, resulting in the election of Stacey Reeves as President, R. J. Whiteside as first vice-president, George Watson as second vice-president, Thomas J. Marshall as treasurer, and Charles G. Wetter as secretary.

The celebration of the 110th anniversary of the founding of the Master Bricklayers' Company occurred in January at the rooms of the Builders' Exchange. The company is the second oldest mechanical organization in the country and has a membership of over 3000. The officers elected for the ensuing year were: President, Franklin M. Harris; vice-presidents, Michael McGee and Charles P. Hart; treasurer, John W. Miller, and secretary, William J. Gillingham. The meeting was of special interest in view of the formulated demand of the bricklayers for higher pay. Since the meeting it is stated that the master bricklayers acceded to the demands of the men for 50 cents an hour for an eight-hour day, to go into effect May 1. The meeting was followed by a banquet and afterward there was a vaudeville entertainment.

The feeling is that there will be a gratifying amount of building during the ensuing year, and this opinion is confirmed in some degree by the large number of permits filed during the month of January.

Pittsburgh, Pa.

The amount of building in the city of Pittsburgh during the fiscal year ending January 31, 1900, was greater than during any similar period in its history. Superintendent J. A. A. Brown of the Bureau of Building Inspection issued his report on February 10, showing that for the period named the operations numbered 3547, aggregating a cost of $8,291,204. A classification of the operations shows that of new buildings there were 2090; additions to buildings, 691; alterations, repairs and moving of buildings, 766. Of the new buildings erected 909 were of brick, 940 frame, 145 brick veneered, 23 brick and stone, 28 brick and frame, 22 iron clad, 9 of iron, 4 of steel, 3 of stone, and 2 of steel construction. There were 1602 dwellings and 57 stores and dwellings. The increase in the number of new dwellings erected, as compared with 1898, was 516, and the increase in the estimated cost of same was $2,164,464. As in the previous year, the majority of the improvements were made in the outer wards or residential portion of the city. Superintendent Brown recommends in his report the passing of an ordinance by the city controlling and regulating elevators and inclined planes.

Among the large building projects which are expected to be launched in a few weeks is the erection of 100 houses, each standing on a plot having a frontage of 30 feet and a universal depth of 100 feet, and which will cost in the neighborhood of $400,000. Most of the houses will have stone and pressed brick fronts, and they will be erected after the Colonial and cottage style of architecture. The contract for a large extension to the Westinghouse Electric & Mfg. Company's plant at East Pittsburgh has recently been awarded, the total cost of the work running up in the neighborhood of $400,000. There is also a great deal of work in prospect in the suburban districts, so that the outlook for Pittsburgh and vicinity is very gratifying.

Racine, Wis.

The Builders and Traders' Exchange has just moved into new quarters in the Young Men's Christian Association Block, where they now occupy rooms of their own. Secretary John M. Driver writes that they are desirous of receiving catalogues, samples and price-lists of all kinds of building materials, to be the property of the exchange. For the purpose of identifying the various contributors a card will be placed with the materials and publications, so that the senders will receive due credit.

Reading, Pa.

The annual meeting of the Builders' Exchange was held at the Board of Trade Rooms February 1 for the election of officers, which resulted as follows: Thomas P. Merritt, president; Fred. Shunk, vice-president and treasurer, and E. F. Keever, secretary. The secretary read communications from the Builders' Exchanges in Philadelphia, Pittsburgh and Scranton.

Savannah, Ga.

Something over fifty of the contractors and master builders of Savannah held a meeting the latter part of January and organized a Builders' Exchange. It is stated that the movement was brought about by a notification on the part of the carpenters' unions that on May 1 an increase in wages of about 33 per cent. would be demanded. The chairman of the meeting in question was L. A. McCarthy and the secretary H. M. Ward. A committee was appointed to draw up by-laws for the new organization.

Scranton, Pa.

The annual meeting of the Builders' Exchange, held in the Board of Trade Assembly Room, was largely attended, and the result of the election showed the choice of the following officers: President, Conrad Schroeder; vice-president, J. Colligan; treasurer, J. W. Finn.

The directors to serve for two years are:

H. J. Gunster,	J. Colligan,
E. W. Smith,	H. E. Sykes,
E. J. Williams,	W. R. Williams.

The directors to serve for one year are:

John Benne,	H. A. Hamfhold,
Luther Keller,	H. C. Hennman,
C. N. Lord,	F. Carlucci.

The report of Secretary Laudig was presented showing a largely increased membership as compared with previous years, and with a comfortable sum in the general treasury.

The building situation is rather quiet, but the feeling is hopeful as to the immediate future.

St. Louis, Mo.

A new organization of the building contractors of the city has recently been formed in South St. Louis with a membership of 63. The claim is made that this is the first organization of its kind to be found in St. Louis, as its purpose is to include not only the master builders but the subcontractors in all lines of the building trades, in which point it differs from the old organization of builders composed of building contractors only. The objects of the association are said to be "to arrange for harmonious and universal action among all classes of builders, to correct abuses that exist in the business, such as the peddling of sub-bids to smaller contractors, to stop the payment of percentage on figuring on contracts, to elevate the condition of the members of each branch of the business and to prevent the builders from making plans for buildings," a work which they claim belongs to the architect. It is said that no attempt will be made to raise the prices of building or to advance the cost of materials, and all collusion with associations having such obejct in view will be prohibited. It is also claimed that the organization will guarantee to owners of buildings that all transactions will be on a fair and honorable basis. Three meetings of all the members are to be held each month and the fourth meeting will be for the master builders only.

The officers chosen at the meeting early in February were George L. Gerber, president; Paul Wolz, vice-president; A. Fredericci, corresponding secretary; E. J. Remmers, financial secretary; Henry Albers, treasurer, and S. Scherrer, sergeant-at-arms.

Toronto, Ont.

At the annual meeting of the Builders' Exchange a large number of members were in attendance and the report of the treasurer showed the finances to be in a satisfactory condition. The election of officers resulted in the selection of H. Martin as president; Thomas Christie, first vice-president; James B. Thompson, second vice-president, and David Williams, treasurer. The auditors chosen were George Clay and Frederick Holmes. The directors elected were James Crang, R. G. Kirby, James Russell, T. Cannon, Jr., and John M. Gander.

Watertown, N. Y.

The Builders' Exchange held their annual election the latter part of January and selected the following officers for the ensuing year: President, George F. Townsend; vice-president, Thomas Ward; secretary and treasurer, P. H. Brennan. The trustees are C. C. Burns, S. D. Peters, Thomas Bigham, John Hardiman, D. Cavanaugh and John Solar.

Wilkes-Barre, Pa.

The first annual banquet of the Builders' Exchange was held at the Sterling about the middle of January. Many architects and builders were present, and hearty good feeling prevailed throughout the evening. Several addresses were made during the evening, the speakers including Philip Raife, a well-known builder, who defined the objects of the association, spoke of the necessity of the co-operation of both builders and architects, and who also gave a short history of the organization. He was followed by Architect H. L. French, E. T. Long, J. B. Hauser, A. H. Kipp, and, in conclusion, W. J. Smith, who delivered an excellent good night address.

Worcester, Mass.

The architects and builders of Worcester are looking forward to a very busy season this spring. While building operations were in fair volume a year ago, the present outlook is said to promise a considerable increase over that period. While the greater amount of building in sight for the spring and summer seems to be in the shape of dwellings, it seems probable that several new business blocks will be put up in the not very distant future.

One evening in January was observed as ladies' night at the rooms of the Builders' Exchange, the social gathering being one of the most successful in the history of the association. Every one joined forces in the endeavor to make the evening a success and their efforts were rewarded. The entertainment consisted of humorous selections, a graphophone concert and instrumental music by the Venus Mandolin and Guitar Club. Refreshments were served and the closing hours were devoted to whist and dancing. The committee in charge was made up of James I. Elliott, M. L. Foster and A. W. Kimball.

LAW IN THE BUILDING TRADES.

ACCEPTANCES WILL NOT PREVENT LIEN.

A contractor, in the course of the construction of a building, drew several drafts upon the owners of the premises in favor of, and delivered them to, a company furnishing material, which were acceptel by such owners, but nothing was paid upon them. The court held that, in the absence of an agreement to receive the acceptances as payments, they would not defeat the right of the contractor to a mechanic's lien.—Bradford *vs.* McNeill, 76 Ill. App. Ct. Rep., 488.

RIGHT OF CONTRACTOR WHERE OWNER COMPLETES BUILDING.

Where a building contract reserved to the owner the right to finish the work and deduct the expense from the contract price if the contractor should fail on three days' notice to supply a sufficiency of workmen and material, and the contractor abandoned the work on receiving such notice, and the owner completed the building, the contractor could recover the difference between such expense and the contract price.—Robinson *vs.* Chinese C. & B. Assn., 54 N. Y. Supp. Rep., 858.

WHEN ARCHITECT'S CERTIFICATE MUST BE IN WRITING.

Under a building contract providing that, if the contractor fails to prosecute the work, the owner may take possession and complete it, and the expense incurred by the owner for materials and work "shall be audited and certified by the architect and his certificate of same shall be conclusive on the parties," the architect's certificate must be in writing, and it is too late to give same after commencement of the suit upon the bond of the contractor.—De Mattos *vs.* Jordan, Wash., 55 Pac. Rep., 118.

WHEN BOARD OF HEALTH MAY REMOVE BUILDING.

A city board of health may remove a nuisance, consisting of a building, or part of same, which is dangerous to the lives of pedestrians passing along the adjacent street; but they must be prepared to show that it was in fact a nuisance when their action is called in question.—Smith *vs.* Irish, 55 N. Y. Supp. Rep., 837.

RIGHTS OF WIFE AGAINST CONTRACTOR.

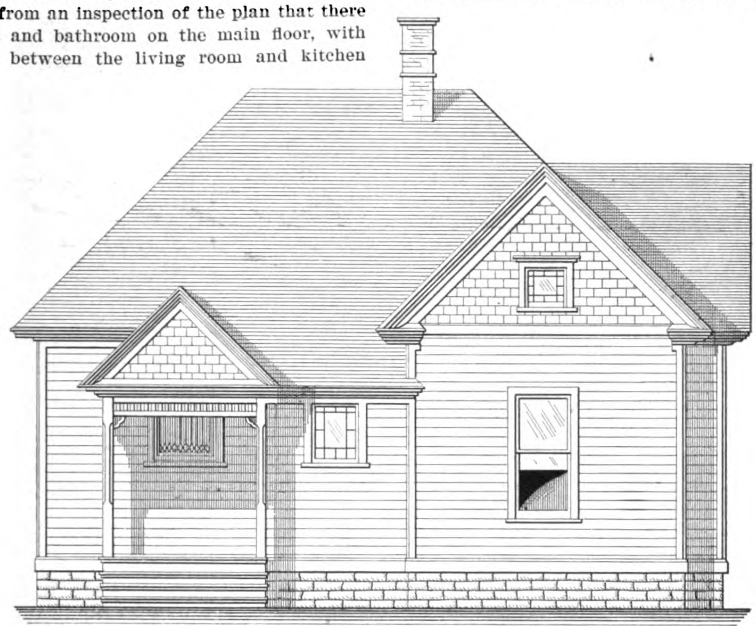
Where one contracted with a husband and wife to erect a house upon their homestead for a stated sum, and the contractor afterward agreed with the husband that some of the money should be diverted to the husband's pockets, the wife, by acquiescing in such diversion, was not thus prevented from requiring the contractor to build the house according to the contract.—Paschall *vs.* Pioneer Sav. & L. Assn., Texas, 47 S. W. Rep., 98.

WHAT IS NOT SUBSTANTIAL COMPLIANCE ?

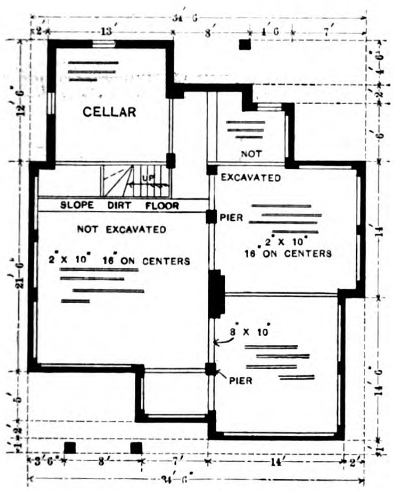
There is not a substantial compliance with the contract, such as would entitle the builder to recover the final payment, where there was a failure to plaster a portion of the house and build a flue provided for by the contract.—Franklin *vs.* Schultz (Mont.), 57 Pac. Rep., 1037.

DESIGN FOR A ONE-STORY COTTAGE.

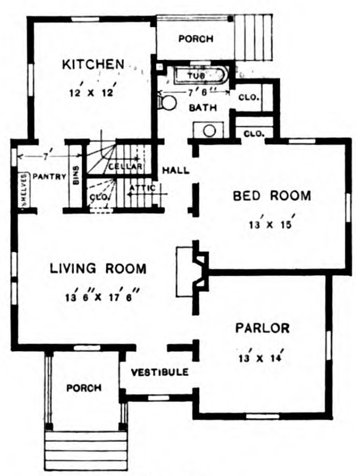
MANY of our readers will doubtless be interested in the design of the one-story cottage which we illustrate herewith, more especially those who prefer a bedroom and bathroom on the main floor. The cottage is of a design which readily adapts itself for erection in the suburban and southern districts, and meets the requirements of a family in moderate circumstances. It will be seen from an inspection of the plan that there are four rooms and bathroom on the main floor, with communication between the living room and kitchen plastered on the inside and topped out above the roof with colored bricks. The frame of the house is to be of North Carolina pine, with girder 8 x 10 inches, sills 4 x 10 inches, joist 2 x 8 inches, ceiling joist 2 x 8 and 2 x 6 inches, studding 2 x 4 inches, all placed 16 inches on centers, and rafters 2 x 4 inches, placed 2 feet on centers. The outside walls are to foot on the sills and have a



Front Elevation.—Scale, 1/8 Inch to the Foot.



Foundation.



First Floor.

Scale, 1-16 Inch to the Foot.

Design for a One-Story Cottage.—Frank K. Thomson, Architect, Raleigh, N. C.

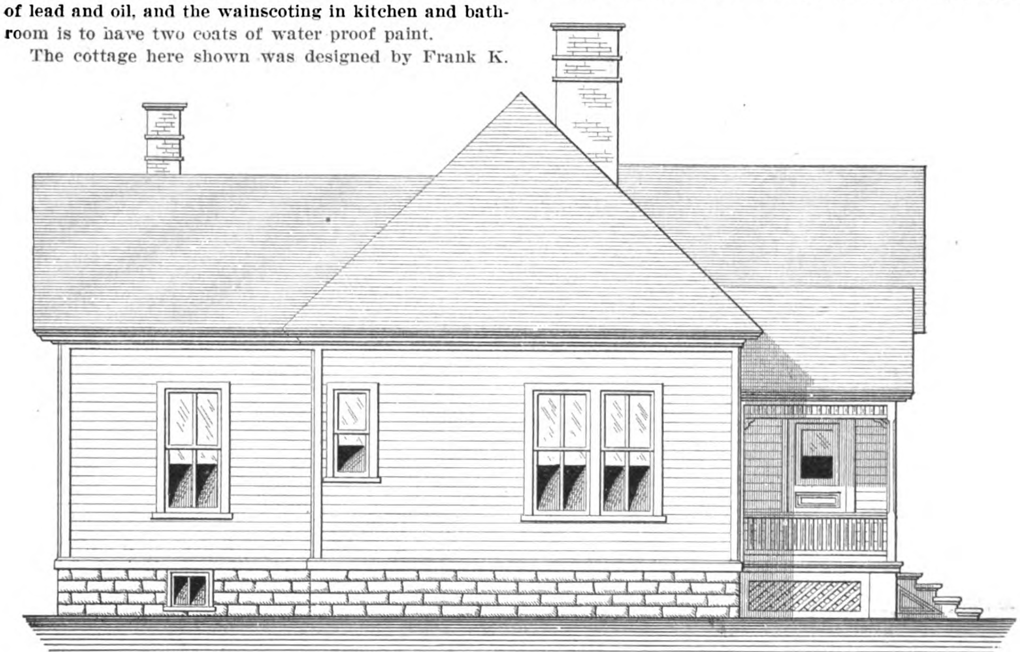
established by means of a well equipped pantry. The stairs to the cellar lead directly from the kitchen, while those to the attic rise from the hall in the center of the house. The cellar is located directly under the kitchen, the other portions of the area not being excavated.

From the architect's specifications we learn that the foundation walls, piers and chimneys are to be laid up with kiln dried brick in lime mortar, the walls to have footings four brick courses in depth with a 4-inch projection each side. The chimney flues are to be smoothly double 2 x 4 plate at the top. The inside partitions are to have 2 x 4 inch bearing plate top and bottom. All floor joists are to have one row of 1 x 4 inch cross bridging, well nailed at each end.

The outside walls are to be covered with one thickness of Cabot's Sheathing Quilt, securely fastened to the studding, and on this is to be placed North Carolina pine weather boarding with 1¼-inch lap. The roof is to be covered with 1 x 4 inch surfaced strips, well nailed, and on these 4 x 18 inch pine shingles, laid 5½ inches to the weather. The rear porch, bathroom and closets are to be roofed with tin, laid flat lock. All outside casings, corner boards, cornices, &c., are to be of North Carolina pine.

The flooring is to be narrow No. 1 North Carolina pine, blind nailed. All interior finish is to be of kiln dried stock, to be put up after the plastering is thoroughly dry. Door openings are to be cased with ¾ x 5 inch plain casing cap and cap mold, as shown in the details. Rooms not wainscoted are to have a 9-inch base and the kitchen, bathroom and closets are to have 1-inch quarter round at the floor. The kitchen and bathroom are to have a wainscot of adamant or other quick setting cement finish extending to a hight of 3 feet in the kitchen and 5 feet in the bathroom. All walls and ceilings are to be plastered one coat, the mortar to be stacked for at least four days before applying to the walls, the latter then being finished for papering. All outside and inside wood work is to be painted two coats of lead and oil, and the wainscoting in kitchen and bathroom is to have two coats of water proof paint.

The cottage here shown was designed by Frank K. Thomson, architect, of Raleigh, N. C., and now of the firm of Barrett & Thomson of the city named.



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

Design for a One-Story Cottage.

Fire Hazards in Tall Buildings

At a recent meeting of the Franklin Institute in Philadelphia, Pa., a paper on the above subject was read by H. de B. Parsons of New York City and from the *Public Ledger* we take the following reference to it:

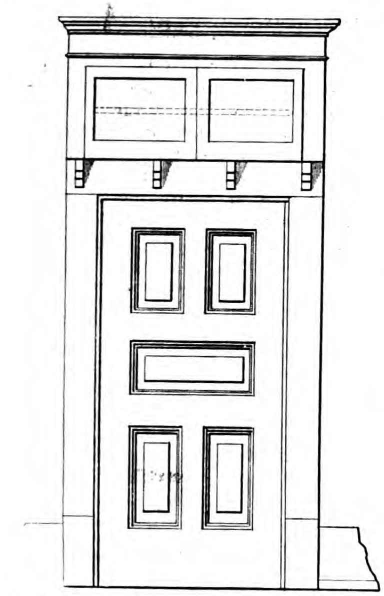
The speaker prefaced his remarks with the statement that the term "fire proof," as applied to many large buildings, is always a misnomer, as it is impossible to conceive of a building which could not be damaged by fire. Many large buildings, suposed to be fire proof, are of such faulty construction that the application to them of the term fire proof is particularly erroneous. While it is practically impossible, therefore, to construct an absolutely fire proof building, much can be done to reduce the hazard of destruction by fire, either from within or without.

Among the safeguards recommended by the speaker were the protection of steel columns and girders with fire proof material, the construction of fire walls, the reduction to a minimum of the use of wood in the construction of the building, the use of fire shutters or of wired glass, the lining of elevator shafts with fire proof brick, which affords much resistance to the progress of the flames, and the avoidance of air spaces underneath the floors. Elevator shafts and light shafts in tall buildings, said Mr. Parsons, are excellent conductors of fire. In view of the fact, however, that they cannot well be dispensed with, great care should be taken in rendering them as nearly fire proof as possible. The presence of many windows in a building adds very greatly to the danger of fire from the outside.

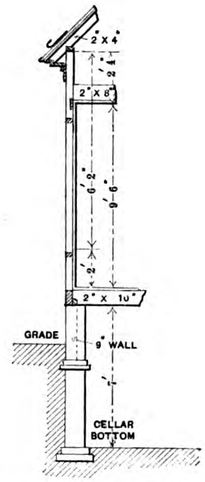
Mr. Parsons condemned the use of water tanks on the roofs of tall buildings, unless the supports on which they rest are properly protected. He illustrated the uselessness and even danger of an improperly constructed water tank with a view of the Windsor Hotel fire, where the water tank fell 25 minutes after the fire was discovered, carrying with it a large part of the front wall of the building. The speaker also used the Windsor Hotel fire, several views of which were presented, to illustrate the rapid spread of fire through a large building in the composition of which wood entered extensively and in which the protection offered by fire walls was completely neglected.

Other views illustrated the result of tests made by applying great heat to unprotected steel posts and girders. Five views of this character were shown. In each case the girder or post was either broken or twisted after being subjected to great heat for a period ranging from 23 minutes to two hours. One view showed the effects of fire on a factory building, the floors of which were supported by steel posts and which was supposed to be fire proof. The destruction was almost as complete as if it had been constructed of wood throughout. Well made and well laid brick and mortar, said Mr. Parsons, are as good protection for posts and girders as can be devised. Almost all kinds of stone show serious evidence of disintegration after the application of great heat, and for this reason are not as suitable for the protection of posts and girders as brick.

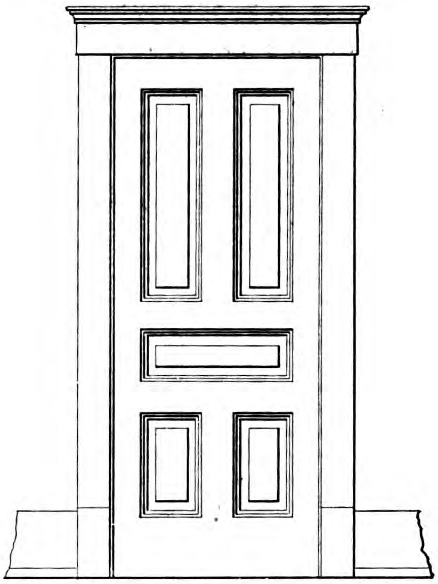
THE fire loss of the United States and Canada for January, 1900, amounted, according to the New York *Journal of Commerce*, to $11,755,300, as compared with $10,718,000 in January, 1899, and $9,472,500 in January, 1898.



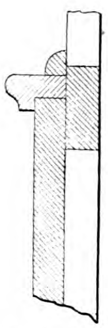
Elevation of Closet Door and Cupboard in Living Room. —Scale, ¼ Inch to the Foot.



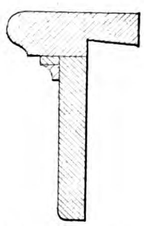
Section of Building —Scale, ⅛ Inch to the Foot.



Elevation of Inside Door, Showing Trim —Scale, ¼ Inch to the Foot.

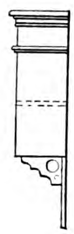


Detail of Wainscoting and Cap.

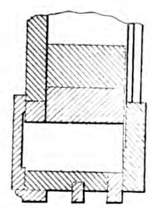


Detail of Window Stool and Apron.

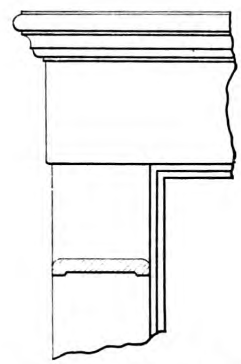
Scale, 3 Inches to the Foot.



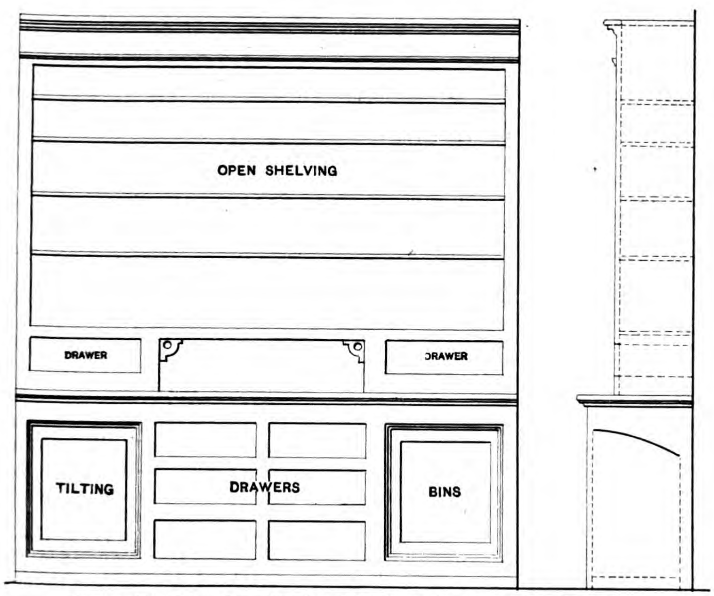
End View of Cupboard in Living Room. —Scale, ½ Inch to the Foot.



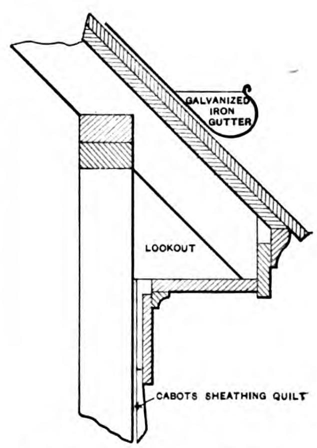
Detail of Window Frame —Scale, 1½ Inches to the Foot.



Detail of Inside Finish.—Scale, 1½ Inches to the Foot.



Front and End Elevations of Cupboard in Pantry.—Scale, ¼ Inch to the Foot.



Detail of Main Cornice.—Scale, 1 Inch to the Foot.

Miscellaneous Constructive Details of a One-Story Cottage.

Some Mistakes of Contractors

Contractors often make mistakes in assuming responsibilities without proper compensation and in taking unnecessary risks, says F. E. Kidder, the well-known consulting architect in a late issue of the *Brickbuilder*. Not a few contractors will estimate on a hazardous piece of work on the basis that everything will proceed favorably, and if any mishap occurs they have no provision for meeting the expense invariably occasioned. The contracting business necessarily involves the taking of some chances, as in the rise of the price of materials or labor, but when unusual chances are to be taken, as in remodeling, underpinning, or supporting old buildings, or in the case of uncertain foundations, the contractor should protect himself by estimating so that in case unexpected, although possible, difficulties are encountered he will not lose more than his profit. It is much better to let some one else have the job than to take it at a figure which will allow a profit only under the most favorable conditions.

Careless About Work.

Then many contractors are careless about allowing their work to be damaged by other workmen or through orders of the owner or architect. For instance, a mason contractor has built a cellar or basement wall, and the excavator wishes to fill against it on the outside before there is sufficient weight on the wall to insure its stability, or perhaps he may be directed so to do by the architect or owner. If the excavating is under the control of the mason, he can forbid the filling until such time as it may be done with safety, but if he has no control over it, he should protect himself by notifying the owner in writing that if the filling is done it must be at his, the owner's, risk, otherwise if the wall springs or falls the mason contractor will be expected to make it good.

Similar risks or chances of injury frequently arise in connection with other portions of the building, especially when the work is done under several contracts, and the wise contractor will protect himself as far as possible from damages that may happen to his work through the ignorance or carelessness of others. If a contractor executes a given piece of work in conformity with the plans and specifications, and it is injured through the fault of persons working under another contract with the owner, it is evident that the first contractor should not be made to suffer from the damage; but it is the experience of all who have had charge of building operations that, unless some unusual precautions are taken, it is difficult for the contractor to collect damages for repairing his work, and he must leave it in good condition before it will be accepted.

Work Improperly Designed.

Contractors also occasionally run a risk in attempting to execute work that is not properly designed or has not sufficient strength. For example, a stone lintel may be shown on the drawings with a span so great that it is doubtful if the stone will support its own weight and that of the load upon it. Now, if the contractor goes ahead and puts in the lintel without comment, and it breaks, the chances are ten to one that the architect or owner will insist on his putting in another stone or remedying the defect in some way, at his, the contractor's, expense. The same thing might happen in the case of an arch without sufficient abutment, or of a flat arch with no support under it. It is therefore the business of the contractor to carefully consider all of the constructive features of the building before he commences work on them, and if he believes that any part of the work cannot be safely executed, as shown by the plans, he should call the attention of the architect to it and try and have it changed, or extra provision made to give the necessary strength, so that there will be no risk of failure. In case the architect declines to make any change, the contractor should serve a written notice on the owner that he will not be responsible if the work fails, and at the same time he should take care to see that the work is executed in the best manner, and in strict conformity with the plans and specifications, so that in case it does fail there will be no opportunity to show defective work as a cause. Generally it will pay the contractor to go to some extra expense himself to insure the safety of the work rather than to run any risk of a dispute or possible lawsuit. The writer has known of a number of instances where contractors have suffered considerable loss from carelessness or negligence in this respect.

Contractor and Architect.

Occasionally a contractor permits himself to be imposed upon by the architect in the way of details. Not a few architects have the fault of showing much more work on their details than is implied by the scale drawings, and of expecting the contractor to carry out whatever they may choose to draw. Of course, if the details are made before the contract is awarded, and the contractors have an opportunity to examine them, it makes no especial difference if the drawings do not exactly correspond, as the details would determine the character of the work to be done, and the tender would, or should, be based on them. When the details are made after the contract is signed, however, the contractor is not obliged to adhere to them if they show more expensive work than is reasonably implied by the scale drawings and specifications. Thus, for illustration, where carving or dentils are put on the detail drawings, but are neither shown in the original scale drawings nor mentioned in the specifications, the contractor may claim an extra price for the extra work, or refuse to execute it. A claim for extra remuneration, however, would probably not be allowed unless made in writing before commencing the work, and acknowledged by the architect. It is, therefore, best, in such cases, for the contractor to politely call the attention of the architect to the discrepancy, and show him that the work cannot be done for the price at which the original work was figured. If he is then unwilling to either allow an extra price for the work, or to change the details, the contractor must choose between omitting the extra work or putting it in at his own expense. If to carry out the details means a loss on the contract, it will probably be best to refuse to do more than the contract drawings call for, but if only a small amount is involved, it may pay the contractor to retain the good will of the architect by doing the work. Very often such extra work is put on the detail drawings by draftsmen without the knowledge of the architect, and when his attention is respectfully called to it he will have the details revised.

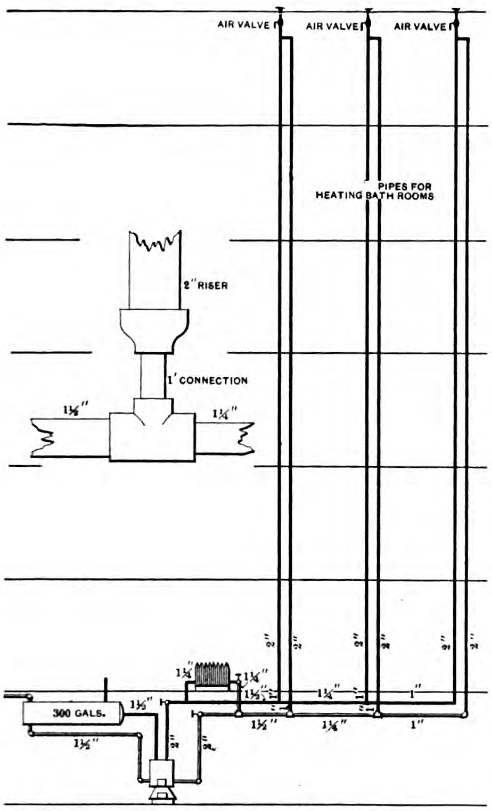
In conclusion, the writer suggests that while the main object of a contractor is to make a profit from his business, or, in other words, to make a success of it, such success depends upon the exercise of a considerable degree of intelligence and tact, and that a successful contractor must have in mind the interest of the owner and architect as well as of his own; also that a successful business does not necessarily imply that a profit must be made from every piece of work. Not a few successful contractors owe their success in a considerable degree to the fact that they have carried out their unprofitable contracts with the same thoroughness with which they have executed their profitable ones.

ONE of the largest midwinter shipments of brick on record was made from Haverstraw to New York City the latter part of January. The shipment aggregated nearly 6,000,000 bricks, which required 23 barges. It is said to be the intention of the Haverstraw brick makers to continue shipping their stock to the city, and it is expected by the time the work of manufacturing begins in the spring their present surplus of over 90,000,000 brick will be gone, and that this will cause an active spring and summer among the brick makers.

Heating Bathrooms ɾnd Water Supply in Tenement Houses.

The custom of furnishing the occupants of apartment houses of the luxurious type with heat, hot water, electric light, elevator and much other service that is desirable has led to a demand that some of these conveniences be supplied in tenement houses. In some tenements the apartments are let very low and the tenants are provided with only a kitchen range, and they must supply the stove to heat the sitting room and chambers. In summer gas or oil is quite freely used for cooking, and from this has arisen the demand that hot water be furnished, and many owners to keep their buildings rented are contracting to have a small heater placed in the basement to furnish tne hot water and also a tank to store the water in. In some instances far sighted owners are also seeking to reduce the expense of plumbing repairs by heating the bathrooms and water closets to avoid freezing.

A system that was installed last winter by L. R. Wil-



Heating Bathrooms and Water Supply in Tenement Houses

liams, 115 Beekman street, New York, is shown herewith, which is designed to furnish the tenants with hot water, to heat the main hall from one radiator on the first floor and also to prevent freezing in the 15 bathrooms and water closets in the building, by running 2-inch flow and return pipes through them. A No. 324 Patriot water heater, made by Boynton Furnace Company, 207 Water street, New York, is used for the work. It has a 19-inch grate and is rated to carry 450 square feet of direct hot water radiation, or to heat 275 gallons of water per hour to the boiling point. The heater, however, in this case satisfactorily accomplishes a considerably larger task.

It is connected by 1½-inch pipes with a 300-gallon hot water tank, and has furnished the necessary supply to the tenants without complaint. In the winter it carries in addition 225 square feet of radiating surface, not including the flow and return pipes in the cellar, which are covered. A 2-inch pipe runs from the heater, and after a 1¼-inch branch is taken off for a radiator having 75 square feet of surface in the main hall, it is reduced to 1½ inches and a 1-inch connection is made, as shown, to a 2-inch pipe that runs to the top of the fifth floor. The main continues as shown, 1-inch connections being made with two other rising lines. Just under the ceiling on the fifth floor the 2-inch pipe returns from the side of a tee in the riser to the basement, and with a 1-inch connection joins the return main, as shown. At the head of the 2-inch riser a cap is placed after the pipe is run through a hole in a board that rests on the timbers to support the weight. An air valve is placed in this pipe just above the return tee so as to prevent the pipes from becoming airbound. No expansion tank is used, as the heater is connected at all times with the 300-gallon tank, and any pressure from expansion can work against the pressure in the street main. The water in the large tank being continually in circulation and never being entirely drawn off, does not require as much heat as if 300 gallons had to be boiled every hour. In consequence the work to be done by the heater is very much reduced.

When the valves on the heating system are opened the work for a time is a burden on the boiler, but the bathrooms, being small, when once heated are easily kept at a temperature well above freezing, so that the tax on the heater is again reduced when in full operation normally. The satisfaction to landlords from such systems, which do not increase the cost for heating greatly over the cost for heating the water, has led to quite a business for heating contractors in this line, and it is estimated that several hundred small boilers were used as tank heaters in New York last winter, many of which are also connected with an auxiliary heating system.

Precautions Against Fire at Paris Exposition.

Intending exhibitors and visitors from the United States to the Paris Exposition in 1900 will be interested in knowing what arrangements and regulations will be made by the French authorities against fire. The Paris Exposition administration has taken all the measures possible to afford security to exhibitors and visitors. Their regulations are rather voluminous, containing 36 articles distributed in six chapters.

These regulations take up the openings and exists and the stairways and doors of all palaces and buildings. They regulate the width of doors and steps. All exterior doors will open in and out. Doors opening only inward must remain open constantly. Emergency doors will bear an inscription stating their purposes, and in all hallways and corridors painted arrows will indicate the direction of the exit. An emergency lighting system for night use will consist of lamps of 100 candle power, bearing the distinctive red color. All wood of the frame work in the buildings will be covered with an insulating coat of non-inflammable material. All stairways will be of fire proof material.

The floors of all buildings, palaces, theater halls, cafés, concert rooms, exhibition places and all railing and balustrades will also be of fire proof material, and before accepted will be thoroughly tested at the expense of the contractors. All decorative canvas, awnings and canvas coverings must be fire proof. All electric installation of cables, lamps, wires and conductors in the interior of the buildings must be put in under the supervision of the director of exploitation. All motive power will be admitted only under rigid conditions. The use of celluloid in lamps, globes, balloons and other fancy apparatus for lighting decorations will be forbidden. The regulations for heating and lighting provide that it can only be done by gas or electricity. The use of hydrocarbons, oils and petroleum, acetylene gas and other gases than coal gas is positively forbidden, either for heating, lighting or motive power.

The construction of meeting halls, cafés, concert halls and theaters must be of fire proof material, and the theater curtains must be of iron or asbestos cloth. The lighting of such places will be exclusively by electricity. A fire service as nearly perfect as possible will be established, with a water piping and pressure sufficient for firemen's service. The administration assumes the right to enforce any measure that may be deemed necessary to assure safety.

The Spanish "Escurial."

It is said that Spain possesses one of the largest buildings in the world. It is at once a palace, a museum, a library, a picture gallery, a monastery, a church and a burial place. This wonderful edifice is called the Escurial, and is located about 25 miles northwest of Madrid. It was commenced in 1653 by order of Philip II of Spain, and was intended partly as a royal burial place for the kings of Spain and partly as a commemoration of Philip's victory over the French at St. Quentin in 1557. It is built entirely of granite and measures 744 feet in length by 580 feet in breadth. At each corner is a tower 200 feet in hight. The building is supposed to represent an enormous gridiron lying upside down, and this shape is believed to have reference to St. Lawrence, who was martyred on a gridiron. Twenty-one years were spent in building it, and it cost $12,000,000—an enormous sum at that time even for a palace. It has been twice partly destroyed by lightning and was sacked by the French soldiers in 1808. It is said to contain 14,000 doors and 11,000 windows.

New Publications.

ARCHITECTURAL DRAWING. By C. Franklin Edminster, Instructor in Department of Fine Arts, Pratt Institute. Size 9½ x 7¼ inches; 210 pages. Illustrated with 96 full page plates. Substantially bound in cloth, with attractive side title. Published by the author. Price $2, post-paid.

This is a work which strongly appeals to the young student seeking a knowledge of the principles of drawing, and should prove especially valuable to those desirous of learning how to read architects' drawings, for it is obvious that in order to readily understand all that a drawing is intended to convey it is essential that the student should, in some measure at least, know how to make one. In the preparation of the above work the author has brought to his aid many years of practical experience in teaching young men how to make drawings, and it has been his aim in the compilation of the volume to meet a well defined demand for a treatise on elementary architectural drawing. An idea of the scope of the work may be gained from the headings under which the subject is considered. There are nine chapters, the first of which deals with Drawing Materials and Their Use, embracing Drawing Boards, Drawing Paper, Triangles, Compasses, Ruling Pen, Tee Square and Pencils, together with the matter of Inking, Visible and Invisible Lines, Working Lines, Dimensioning, &c. In the second chapter simple geometrical problems are considered, after which come, in the order named, Simple Projection, introducing the principle of working drawings; Intersection of Solids and Development of Surfaces; Projection of Shadows; Instrumental Perspective, Orders of Architecture, Study of a Frame House and Studies in Masonry Construction The illustrations are carefully executed, with lines clearly drawn, so that the student may readily follow the various steps.

The two chapters last named will be found of special interest and value to those who are interested in acquiring the ability to read drawings, as the various parts of the drawings carry the names by which they are known. This is more particularly true of the sectional drawings, such as those showing details of windows and frames, door frames, sections through floors, partitions, &c. Several of the general methods of splicing timbers are illustrated, together with the manner of framing sills and corner posts, water tables, cornices, &c.

The plates in connection with the various subjects are arranged in consecutive order, so that each sheet presents a problem a trifle more difficult than the one before. For example, in the Study of a Frame House the plan is first drawn, this forming a basis for a complete study of all its details and framing, while in many instances more than one form of detail which might be used in the same position is presented. The work, considered as a whole, is such as to prove of more than ordinary interest and value to those desirous of acquiring a knowledge of architectural drawing.

FORMULAS AND TABLES FOR HEATING. By J. H. Kinealy. Size, 4½ x 6¾ inches; 53 pages; 17 illustrations; bound in leather. Published by the David Williams Company, New York. Price, $1.

This work consists of a series of formulas and tables for heating engineers that have been translated from the German for the convenience of those who plan and erect heating apparatus, by Prof. J. H. Kinealy of Washington University, St. Louis, Mo. The contents of the book had previously appeared in serial form in *The Metal Worker* and were of great interest to those who wish to compare their heating calculation with those of the best German engineers. The formulas are simple, easy to understand and apply, and in all of the formulas and tables the English units are used. Great care has been taken to make the translation and calculation absolutely correct. The work is divided under 16 different heads, which are mentioned in a table of contents, and it also contains 15 tables indexed, so that any one can be conveniently referred to. The size is convenient for pocket use, and the binding is leather.

CONTENTS.

— WHERE SARCASM PAID.—Philanthropist: "What would you do with a nickel, if I gave you one?"

Treadway Tatters (sarcastically): "Git a new coat, Mister, an' some supper an' a night's lodgin' an' breakfast an' dinner termorrer."

Philanthropist: "Here, take this quarter and support yourself the rest of your life!"—*Truth.*

— "I'M sorry, madame, but we can't exchange those goods."

"But my husband doesn't like them."

"Why don't you exchange your husband?"—*Exchange.*

— THERE is no easier way in the world for one to lose a good name than to have it engraved on the handle of an umbrella.—*Baltimore Life.*

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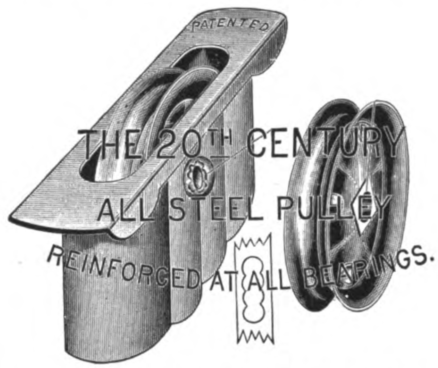
NOVELTIES.

The Twentieth Century Sheet Steel Sash Pulley.

The Empire Forge Company, Lansingburg. N. Y., are offering the sheet steel sash pulley shown herewith. In



Novelties.—The Twentieth Century Sheet Steel Sash Pulley.—Fig. 1.—General View of the Device.

Fig. 1 are shown the pulley complete, the wheel with reinforced bearings and the mortise in window frame. In Fig. 2 the construction of the wheel is illustrated. The wheel disks are riveted together to prevent them splitting open, and the rims of the wheels are reverted to prevent them cutting the sash cord. All axle bearings in the cases and wheels have patented reinforcements It is pointed out that the cases have solid ends. making them as strong and durable as cast iron pulleys, also that the ends of the face plates enter the wood, holding them as securely as screws would. The case has a deep housing, which,

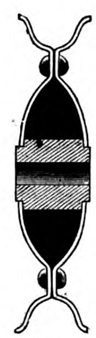


Fig. 2.—Sectional View of Twentieth Century Sash Pulley.

it is explained, keeps the rope from jumping off the wheel. The manufacturers state that the pulleys fit the mortises, taking off all the strain, and that the cases cannot buckle or bend back. The pulleys are packed in paper boxes and 100 dozen in a wooden case. They are furnished in 2 inch sizes, with plain face plates, also with brass or nickel face plates.

Angell Acetylene Generator.

The extent to which acetylene is being used for lighting purposes and its especial adaptability for illuminating dwellings or other buildings so situated as not to be readily accessible for gas connections renders interesting a description of the Angell acetylene generator, for which E. S. Boutwell of 12 Nutting street, Fitchburg, Mass., is agent The generator, which has only recently been placed upon the market, is shown in Fig. 3 of the accompanying illustrations, some of the parts being lettered for convenient reference. In the engraving T represents the water tank, R the gasometer, G the carbide chambers and M the pneumatic water chamber.

In operation the gas passes from the gasometer to the scrubber S and thence through the pipe 4 to the burners. A three-way valve is located in the pipe marked 11, directly over the generator, and operated by the lever H. This lever also operates at the same time a cam connection with the closure of the generator, so that its movement in half a circle in one direction both releases the generator from its closure and shuts off communication with the gas holder, while in the opposite direction it both fastens the generator to its cover and connects it with the gas holder. The U-shaped tube Z connects the generator with the box P, within which is a pivoted basin, and into this basin from the pneumatic chamber M extend two tubes, one provided with a stop cock and terminating in the bottom of the chamber, while the other is an air vent pipe extending nearly to the top. The scrubber is filled with powdered pumice stone or a mixture of pumice stone and soapstone, which, it is claimed, condenses moisture and purifies the gas, thus improving the light and protecting the burners. The box P has an apartment to receive any excess of water from the pivoted basin and conduct it through a pipe to the drip. Reference is made to the fact that the chamber containing water for the carbide is refilled simply by pouring water into it after closing a stop cock under it and reopening it when filled. There are no valves to be operated by the working of the machine, consequently there is no chance of any part binding or sticking or otherwise interfering with its operation, which is said to be perfectly automatic. All parts, excepting the upright pipes under the gas holder, are in sight and all working parts readily accessible. The generator is the invention of Edmund R. Angell of Derry, N. H., and a little pamphlet which has been issued illustrates and describes the device in addition to telling how it is operated.

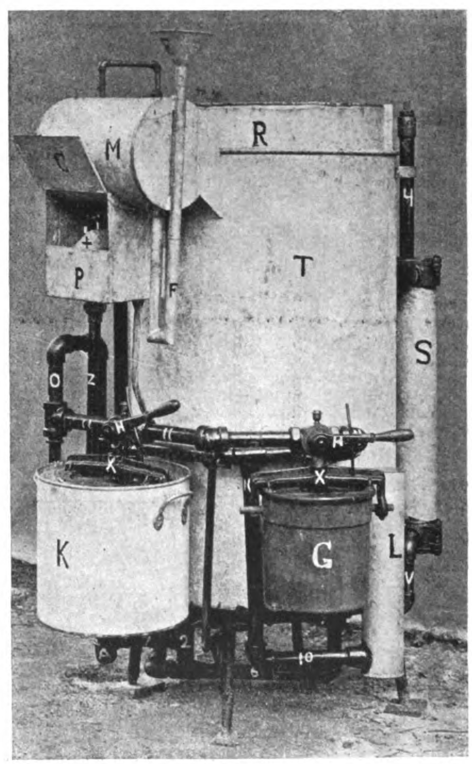
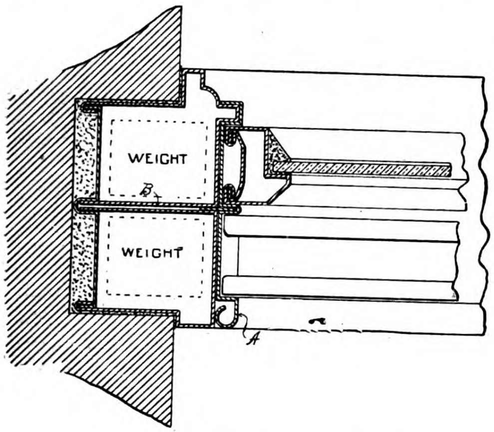


Fig. 3.—The Angell Acetylene Generator.

AN interesting pamphlet entitled "The Preservation of Wood, Steel and Galvanized Surfaces" is published by the Goheen Mfg. Company. Canton, Ohio. A great deal of information is given on the phenomenon of iron rust and illustrations of various structures preserved or needing preservation are presented. The argument of the pamphlet is directed toward the advantages possessed by the carbonizing coating made by the Goheen Mfg. Company. At the end of the treatise are a number of testimonials from prominent sources.

Smith's Metal Window Frames and Sash.

The attention of architects, builders, contractors and in fact all interested in fire proof building construction is being directed to the hollow metal window frames and sash which E. Van Noorden & Co. of 944 Massachusetts avenue, Boston, Mass., are manufacturing for the New England States under patents granted to H. Collier Smith. The frame and sash are made of galvanized iron or sheet copper and are glazed with wire glass, which, it is claimed, affords better protection against fire than ordinary windows with tinned shutters now in common use. Fig. 4 represents a horizontal section through the frame and sash, the latter being balanced by weights and sliding vertically in the frames as in ordinary windows. The bars and mullions of the sash are made with interlocking seams and are joined together with rivets at the corners of the sash, thus obviating any danger of melting apart in case of fire. The construction of the frame is clearly indicated in the engraving. The guiding strip, A is made in two parts, the upper part being secured permanently to the frame and the lower part being removable to allow the sash to be placed in the frame. For the purpose of giving access to the weights the frame is provided with slots opening into the weight pockets, the slots being covered by the guiding strip. Reference to Fig. 5 will show that the side frames are very strong, the face being reinforced by the guiding strip A and further strengthened by the double thick web B, thus making a stronger box, it is claimed, than one of wood



Novelties.—Smith's Metal Window Frames and Sash.—Fig. 4.—Horizontal Section through Sash and Frame.

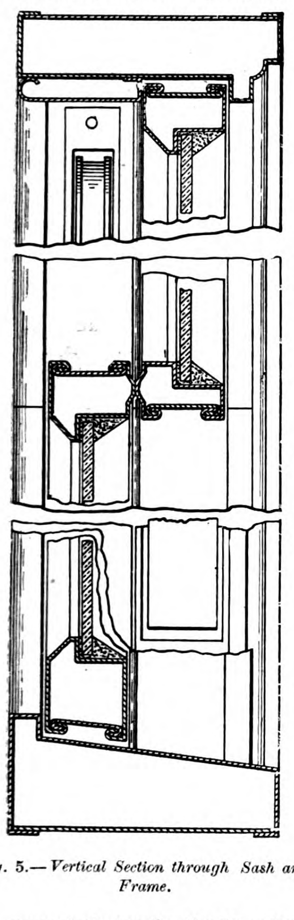


Fig. 5.—Vertical Section through Sash and Frame.

Fig 5 represents a vertical section through the frame and sash, showing the head and sill filled with cement or fire brick, thus forming a non-combustible fire and weather proof window, which, it is claimed, will neither warp nor buckle when heated. While the construction here shown is intended for the use of sash balanced by weights, it is also adapted for sash without weights, one sash being made to balance the other, the frame being filled in solid with brick and cement. Still another construction is where the frame is filled in solid with brick and cement and the sash are self balancing.

In connection with these metal window frames and sash the manufacturers direct attention to an automatic self closing method, acting by gravitation. In this method when sash are balanced by weights the lower sash weights are made lighter than the sash, while the upper sash weights are made heavier than the sash, so that if the sash are left free to move the lower one will descend and the upper one ascend, thus closing the windows. A friction spring is provided for the purpose of holding the window open in any desired position by pressing against the side of the frames and thus compensating for the difference in weight between the sash and weight. As the spring is attached to the sash by means of fusible solder, which melts at a low temperature, it drops off and becomes inoperative in case of fire near the window, and the latter will then close. In the constructions where the sash balance each other the lower sash is made heavier than the upper and the spring used in the same manner as described. The manufacturers have issued an illustrated catalogue presenting a very interesting description of these goods, and we understand that a copy will be forwarded to any interested person upon application to the address given.

Plaster Corner Protection.

The use of metallic corners for the protection of plastering in buildings is rapidly growing in favor and several forms of the device are at present on the market. Among these may be mentioned Wood's steel corner bead, possessing many interesting features, not to mention the low price at which it is offered. The device is manufactured by Gara, McGinley & Co., 23 South Seventeenth street, Philadelphia, Pa., who state that during the past 12 months it has been very extensively employed in all classes of structures, especially in public buildings, churches, schools, hotels, &c., where the wear is severe and the use of a device of this kind almost imperative. In Fig. 6 of the accompanying illustrations we show the practical application of the corner and its appearance after the lath and a portion of the plastering have been put on. The point is made that the device is not only serviceable after the corner is made but it also serves to make the grounds and enables the plasterer to work more rapidly than when the corner was made in the old way with a straight edge. We understand that the manufacturers will forward printed matter, together with a sample of the device, to any one who may be sufficiently interested to make application.

Fig. 6.—Showing Application of Wood's Steel Corner Bead.

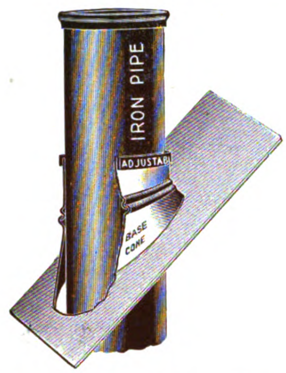
The Berger Mfg. Company.

The salesmen of the Berger Mfg. Company of Canton, Ohio, recently tendered the officers and office employees a banquet at the Barnett House, Canton, which was a most enjoyable affair. A large party sat down at the tables in the spacious dining room, which was handsomely decorated for the occasion, while popular music was rendered by F. Derlich's orchestra. The toastmaster was S. Y. Buckman, well known to the sheet metal and roofing trade, and the toasts and the responses were as follows: "Growth and Success of the Berger Mfg. Company," Hon. John E. Monnot; "Our Salesmen," Ed. Langenbach; "Salesmen's Expense Account," Hon. Jos. Biechele; "Punctuality and System," R. H. Yancey; "Our Troubles on the

Road," Walter Voight; "Greeting to the Ladies of Our Office," Geo. Barnes, and "Commercial Courtesy," F. Schwertner.

Star Adjustable Roof Flange.

The custom of extending the soil and waste pipes of a plumbing system to the roof has made a demand for



Novelties.—Star Adjustable Roof Flange.—Fig. 7.—For Roofs of Sharp Pitch.

some convenient form of roof connection that will be water tight. In the accompanying illustrations we show the Star adjustable roof flange that is being put on the market by the Kendrick Valve & Washer Company of Syracuse, N. Y. The device is made both of galvanized iron and copper and so constructed that by carrying two styles in stock a tight connection can be made on a roof of any pitch. Fig. 7 shows the flange with a section of iron pipe passing through it, adapted for roofs from one half to one-quarter pitch. It is pointed out that when the nipple is adjusted at the desired angle the joint can be soldered so as to be water tight, when it can be placed in a roof to receive the pipe. The upper portion is provided with a lead calking ring so as to make a tight connection around the pipe at the top. The flanges are made for both extra heavy and standard pipe, and are of the best quality of galvanized sheet iron and copper. Fig 8 shows the nipple which is adjustable from a pitch of one third to a flat roof. It is pointed out that by the use of this roof flange a plumber has less stock to carry, as two sizes fit all pitches of roof and there is no liability of making a mistake in the angle, for it is not necessary to adjust it until the job is reached, when a neat, clean and quick job can be completed.

Fig. 8.—For Flat or One-Third Pitch Roofs.

Solid Frame Variety Wood Worker.

A new machine adapted for a heavy range of work and likely to prove of special interest as a labor saving tool to carpenters, builders, sash, door and blind shops, pattern makers, &c., is the No. 2 solid frame variety wood worker, illustrated in general view in Fig 9 of the engravings. This machine is being manufactured by J. A. Fay & Co. of 513-533 West Front street, Cincinnati, Ohio, and will form a part of their extensive exhibit at the Paris Exposition this year. The tables of the machine are made of iron, each 36 x 19½ inches and having independent vertical and lateral adjustments by means of the hand wheel at the working end of the machine when facing for planing out of wind. The adjustments can also be made simultaneously, thus constantly retaining the proper distance between the periphery of cut and the edge of the table. The tables are made with grooves to receive the gaining frame and are made continuous by filling pieces connected with them when so used. For sawing a short supplemental table is inserted between the other two, thus making a continuous saw table. For these purposes and for paneling the tables are arranged so that both can at the same time be adjusted in a vertical line for varying the depth of cut. The arbor is of steel 1 7 16 inches in diameter and revolves in three bearings supported on the column. Another important advantage which the manufacturers point out is the fence, which is said to require no separate adjustment. The machine here shown is claimed to have a capacity for planing out of wind, surface straight or tapering, rabbet door frames, &c., rabbet and face inside blinds, joint, bevel, gain, chamfer, plow, make glue joints, square up table legs, newels, &c.; raise panels, either square, bevel or ogee; stick beads, work circular molding, rip, cross cut, tenon, bore, rout, &c. In introducing this machine to the trade the manufacturers point out its advantages in the range and variety of

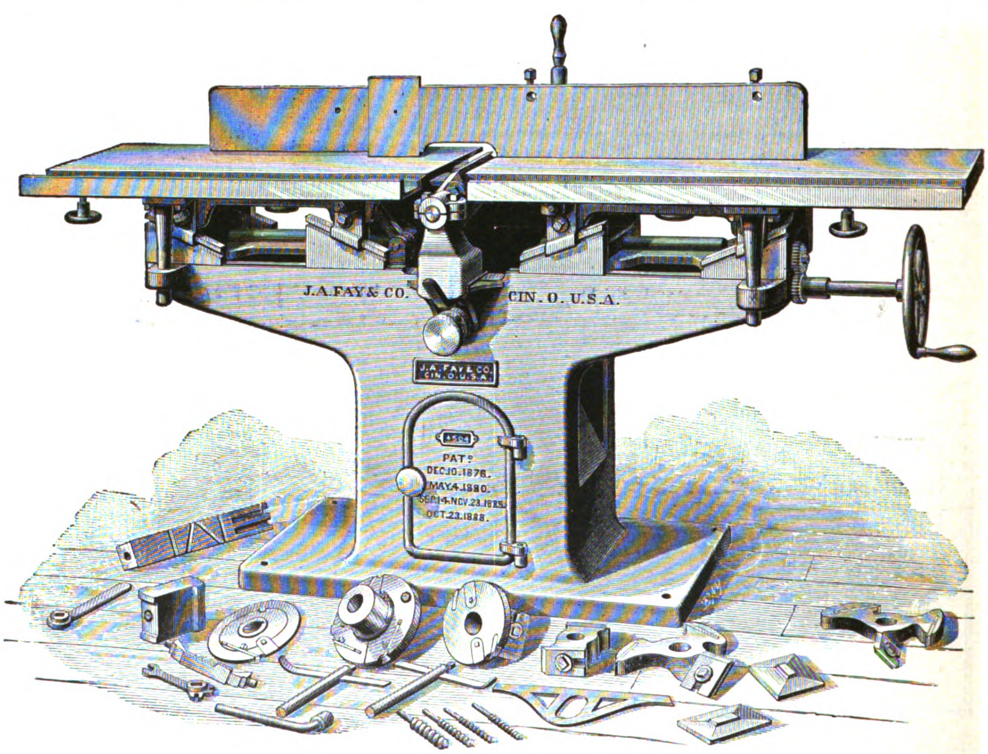


Fig. 9.—Solid Frame Variety Wood Worker.

work for which it is adapted, its readiness of adjustment, the ease with which it is operated and kept in order and the accuracy and rapidity with which the work is performed.

Leather Handles for Chisels.

The Union Mfg. Company of 247 Grant street, Buffalo, N. Y., are

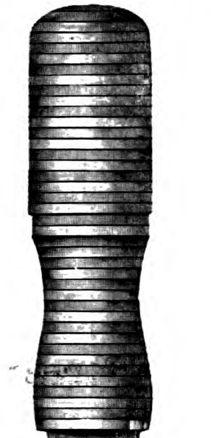


Fig. 11.—Leather Handles for Chisels.

directing the attention of building mechanics to the line of leather tool handles which they are offering the trade. The handles are made of sole leather with square core bar, and the company point out that the handles will not twist, break or split. While their first cost is slightly higher than wood, the company state that the leather handles are cheaper in the end. They are highly finished and will not blister or chap the hands. The socket firmer, which we show in Fig. 11 of the illustrations, is made in six sizes to fit chisels from 1/8 to 2 inches. The company state that these handles have been in use for several years and that they are rapidly increasing in popularity.

TRADE NOTES.

FROM the National Sheet Metal Roofing Company, 339 and 341 Grand street, Jersey City, N. J., we have received a red pocket wallet, containing a batch of circulars relating to Walter's Patent Standard metallic tiles and siding, Cooper's Patent Queen Anne and Clover Leaf metallic tiles and siding and other specialties of their manufacture. The company's sheet metal shingles are made in copper, galvanized steel or painted tin. The galvanied steel and oxidized shingles are manufactured from soft Bessemer steel sheets, coated with zinc after all corrugations and embossing are completed. The painted tin shingles are made from the best full weight IC roofing plates, painted on both sides with pure linseed oil and oxide of iron. Cooper's leader ventilator, a patented device to be placed at the intersection of the leader and sewer pipes, forms the subject of one of the circulars, and attention is also called to the concern's improved ventilated skylights, steel and galvanized water tanks, sheet metal finials and spires and the improved Emerson ventilator.

THE EMPIRE FORGE COMPANY of Lansingburgh, N. Y., call attention in their advertising space this month to some of the merits claimed for their Twentieth Century sheet steel sash pulleys, on which three patents have already been allowed and others are pending. The construction is such that the ends of the face plates enter the wood, holding them securely in place; the rims of the wheels are riveted and cannot cut the rope; the cases have deep housing, which keeps the rope from jumping off the wheel, while the wheel disks are riveted together and therefore cannot split. The company also show the power drill and boring machine by which the mortises for the pulleys are made, the power drill being referred to as "five machines in one." A full description of the pulley will be found in the department of Novelties.

WE have received from A. Dickey & Co., 37-41 Bristol street, Boston, Mass., a four-page folder illustrating what is known as the Dickey spiral molder. This is a machine which, as its name indicates, is intended to turn out spiral work of a great variety of patterns, and the manufacturers state that it represents years of experience in the business of spiral molding. It has a capacity for turning out all kinds of spiral moldings, straight, tapering, curved or oval shapes. It will cut rights and lefts and from 1 to 20 threads. Its construction is such that it can be set at any angle or degree of twist from one turn in 3/4 inch to one turn in any pitch required. It can be operated by hand or power feed and one set of cutters is sufficient to make a variety of patterns. The traveling bed which holds the work swings on a pivot so that the work is always square to the cutters, and the bed which operates back and forth cuts both ways, so that there is no loss of time. This, the manufacturers state, is an exceptionally strong point.

THE NATIONAL PANCOAST VENTILATOR COMPANY, Philadelphia, received the only award, a diploma, for ventilators at the National Export Exposition just closed in Philadelphia. The exhibit of the company was a very creditable one, and covered a line of ventilators ranging in size from 48 inches to the smallest made. The 48-inch ventilator formed the rear of the exhibit. Ventilators of a variety of sizes were arranged in columns, and made quite an imposing appearance. Besides the commercial sizes and styles of ventilators made by the concern a number of models of ventilators of special styles made for especial purposes were shown.

THE WILCOX MFG. COMPANY of Aurora, Ill., in their advertisement, which appears in this issue, call attention to the Le Roy noiseless hanger, which they manufacture and which they have only recently placed on the market. This hanger is referred to as being cheap in price but of good quality. The track and hanger are both adjustable, the steel track being covered by a wood cover or shoe, and is absolutely noiseless. It has ball bearing journals, case hardened, and is meeting with an unusually favorable reception at the hands of the trade. This company make a full line of door hangers and will be glad to mail catalogue on application. Their trade has increased so rapidly that they have opened an office and warehouse in New York City at 168 Church street, which office is in charge of Edgar Zabriskie as manager. A sufficient stock is carried to meet the requirements of the trade, and the customers of this company will doubtless appreciate the enterprise shown by this company to take care of their wants.

THE VAN WAGONER & WILLIAMS HARDWARE COMPANY of Cleveland, Ohio, have recently been distributing a very neat pamphlet bound in colored paper covers, illustrating and describing the Cleveland joist and wall hanger which they manufacture. The merits of this hanger are set forth in a rather interesting style, while the illustrations show some of the ways in which it is used. Price-lists are given covering a great variety of sizes adapted to meet many requirements.

THE PAYSON MFG. COMPANY of Chicago, Ill., are directing the notice of architects and builders to the transom lifters which they manufacture and the application of which is shown in their advertising space this month. These lifters are referred to as the "Solid Grip" and as the "only reliable lifter made." The company state that they will send prices to interested parties on application.

J. A. FAY & EGAN COMPANY of 513-533 West Front street, Cincinnati, Ohio, will have at the Paris Exposition this year a very elaborate exhibit of wood working machinery, embracing many of their leading productions. American made wood working machinery has been growing rapidly in favor with manufacturers all over the world, and the exhibit of the company should prove of unusual interest.

E. C. ATKINS & Co of Indianapolis, Ind., have recently issued a new illustrated catalogue of 156 pages relating to their complete line of saws, saw tools, mill specialties, &c. Some of the lists have been revised and particular attention is called to additions and changes in the line of cross cut saws and small goods, such as hand saws, &c.

AUSTIN & EDDY of 121 Broad street, Boston, Mass., favor us with a copy of a four-page folder which they are distributing, calling attention to their Pioneer molding sander. This machine is said to have a capacity for moldings, casings, base, &c., up to 12 inches in width, and finishing up to 8 inches without turning the stock. There are three different speeds at which the work can travel under the brushes, and the manufacturers point out that it will finish any even or uneven surface of molding, casing or base equal to the best hand smoothed work at the rate of 25 to 50 feet per minute. The machine is so constructed as to adapt itself to the form or shape of any molding, and is claimed to work equally well in hard or soft wood. It occupies a floor space 7 feet by 10 inches and stands 4 feet 10 inches in hight. The four-page folder gives explicit instructions for operating the Pioneer molding sander, and also carries numerous testimonial letters from some of those who have practically demonstrated its merits.

RAY S. BLINN has opened an architect's office in the Hunt Building, Coshocton, Ohio, and would be glad to receive from the manufacturers and others in the trade catalogues and circulars of building materials.

THE NICHOLSON FILE COMPANY of Providence, R. I., have purchased the plant of the Eagle File Company, formerly the Madden & Cockayne File Company, Middletown, N. Y., and will continue the business of the latter, assuming all unfilled orders, and to them all accounts due the Eagle Company will be payable. In a circular relating to the matter the Nicholson File Company state that they will continue the manufacture of the old and well known Eagle brand of files, and assure the trade who are now selling these goods, and the consumers who are using them, that their qualities shall not diminish under their care. They solicit the continued patronage of all those who have handled Eagle files, and promise that their business will receive prompt, careful and courteous attention. All invoices will hereafter be made out by this company, and all unsettled accounts due the Eagle File Company should be remitted to the Nicholson File Company, Providence, R. I.

FREDERICK REISSMAN of West Point, N. Y., is distributing among the trade circulars descriptive of his Rafter and Polygon gauge and of the Perfection rule gauge, each of which he is offering at a price which cannot fail to command the attention of the practical building mechanic. The Perfection rule gauge covers a wide scope and is of great practical utility, it being of special value to carpenters, builders, cabinet makers, draftsmen, architects, machinists and metal workers. The Rafter and Polygon gauge, by which any angle or cut required in the construction of buildings can be instantly obtained, and with minute accuracy, is proving very popular, and those who have demonstrated the practical merits of the tools speak in very flattering terms concerning them.

THE third number of the second volume of "Graphite," published by the Joseph Dixon Crucible Company of Jersey City, N. J., in the interests of Dixon's graphite productions, contains some very interesting matter. Among the articles which are to be found is one on "Bridge Painting," another on "A Durable Paint for Tin Roofs," some "Comments on the Twentieth Century," together with short paragraphs of general interest to commercial readers.

THE Kinnear & Gager Company of Columbus, Ohio, announce that they have sold to the Kinnear Mfg. Company the steel rolling shutter department, including patents, patterns, plans, machinery and material pertaining to the steel rolling shutter, door and partition department; also the good will of the business. All unfilled orders and contracts for rolling shutters, steel curtains and partitions, it is stated, have been transferred to the Kinnear Mfg. Company, who will execute them in accordance with conditions named in each of the various contracts and orders yet unfilled. All payments in accordance with conditions stipulated in each contract or order will therefore be made to the Kinnear Mfg. Company on all shipments made on and since January 1 of the present year. The Kinnear & Gager Company will continue the manufacture of Kinnear's patent ceilings, siding, wainscoting, &c., including paneled fire shutters and doors.

THE I. X. L. PUMP COMPANY of 1015 Christian street, Philadelphia, Pa., have distributed among their friends a unique and attractive calendar representing a slanting roof house of the usual Japanese architecture, with two rows of lanterns hanging from the cornice, while a view of a Japanese flower garden shows through from the background.

THE BANGOR EXCELSIOR SLATE COMPANY of Easton, Pa., have been granted a charter of incorporation, of which R. S. Brown, H. J. Steele, B. Pearson and E. R. Armstrong of Easton, and C. Miller of Nazareth, Pa., are the directors. The company have a capital stock of $250,000, and will manufacture and sell roofing slates and other slate goods.

THE GURNEY REFRIGERATOR COMPANY of Fond du Lac, Wis., are sending out an attractive catalogue presenting a full line of domestic refrigerators, grocers' boxes, refrigerator sideboards, ice chests, cooling rooms, water coolers, &c. The Gurney refrigerator is made with a removable patent galvanized ice compartment, which is so placed in the refrigerator that the side walls and both end walls make an additional condensing surface to that of the ice itself.

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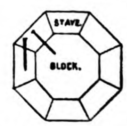

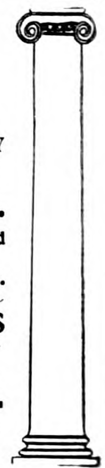

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Miter Machines
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Burton, W. J. & Co.
Cincinnati Stamping Co.
Cortright Metal Roofing Co.
Garry Iron & Steel Roofing Co.
Montross Metal Shingle Co.
Van Noorden, E. Co.

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Cabot, Samuel.

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Tools
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Hammacher, Schlemmer & Co.
Jennings, C. E. Co.
Leavitt Mch. Co.
Mayhew, H. H. Co.
Millers Falls Co.
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Sawyer Tool Co.
Smith, Otis A.
Stanley Rule & Level Co.
Starrett, L. S. Co.
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Waltr's Sons, Wm. P.

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Wood Working Machinery
American Wood Working Machine Co.
Austin & Eddy.
Ball Bearing Machinery Co.
Barnes Tool Co.
Barnes, W. F. & John.
Cordesman, Meyer & Co.
Crescent Machine Co.
Fay, J. A. & Co.
Fox Machine Co.
Marston, J. M. & Co.
Seneca Falls Mfg. Co.
Seymour & Whitlock.
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Woods, Ornamental
Albro, E. D. & Co.

Work Holder
Johnson Bench Tool Co.

Alphabetical Index to Advertisers.

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J. A. OAKLEY & SONS, Architects.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK

APRIL, 1900.

Stable and Carriage House Competition.

We take this occasion to remind our interested friends of the Competition in Stables or Barns and Carriage Houses, which expires with the close of business on May 7, for it is probable that there are many among the present readers of the paper who did not see the announcement of this contest in the issue for December last but who would like to compete for the cash prizes offered now that the matter has been brought to their notice. The nature of the scheme differs somewhat radically from anything we have heretofore undertaken, in that the basis of the prizes will be photographic views of the buildings rather than drawings of them. The stable and carriage house covered by the competition may be described as such as can be found scattered all over the country, on suburban sites and in the smaller cities and towns, but in order to keep the contest within reasonable limitations, and at the same time place all contestants on the same plane of equality, the size of the building is restricted as to the number of animals for which accommodations are provided. This we think will add materially to the interest, as it will exclude the more elaborate and costly structures, and confine it to that class of building which appeals most strongly to the man in moderate, yet comfortable circumstances. Photographs of the most attractive buildings, architecturally considered, will be made the basis of the four cash prizes to be awarded in the order of their respective merits. After a decision has been reached by the committee having the matter in charge, each winner of a prize will be required to furnish, within a specified time after notification of the fact, detailed drawings of the building shown in his photograph, to the end that the complete study may be published in our columns in the usual manner. There is, of course, no objection to a competitor forwarding his drawings at the time he submits his photographs; although this is not vital to his chances for a prize, but he must be prepared, should he secure a prize, to furnish the drawings in due course. In this connection it may not be without interest to inform prospective competitors that it is not essential that they personally " take " the photographs which may be sent in, or be the architect of the particular building represented. Those who are interested in this contest will find a full statement of the conditions, together with all necessary particulars, in the prospectus of *Carpentry and Building* for 1900, which immediately follows the front cover of the issue for December last. We trust that there will be a liberal response to the invitation there presented, so that we may have the opportunity of publishing a great variety of buildings of the character indicated.

Building Situation in Chicago.

The building trades strike in Chicago continues and threatens, according to the statements of the labor leaders, to extend its unhappy influence into other parts of the country. It has resulted already in a practically complete suspension of building operations in Chicago and the throwing out of employment of thousands of men. The union leaders are still as determined and aggressive as ever, and the contractors are equally determined to hold out against what they consider the arbitrary and unjustifiable demands of the unions. The dispute which caused the strike is not over any question of wages or hours of labor, but is based on the refusal of the contractors to submit the conduct of their business to the direction of the labor unions. They claim the right to employ or discharge whoever they choose and decline to permit the unions to limit the amount of work their employees shall do in a day. They also refuse to promise not to use non-union made material, or to use only such machinery as the unions permit. To the dictation of the labor unions in the past the contractors attribute the fact that while the building operations in all other important cities of the Union have shown large gains in recent years, Chicago's total amount of building has steadily declined until, last year, it was less than half of what it was in 1890, and less than one-third of what it was in 1892. So far, no dispositon toward compromise or conciliation has shown itself on either side, Meanwhile a new element has injected itself into the local situation. The manufacturers of building material in Chicago have come together and decided to suspend business entirely until such time as the building trades dispute is settled. By this action some 15,000 men are thrown out of employment, and plants valued at $20,000,000 are made idle. No stone, brick, cement or lumber can be obtained, nor can a building of any kind begin until the differences between the contractors and the unions are adjusted. The action of the material men has been taken avowedly with the view to force the contending parties to seek a settlement and put an end to a state of things that is affecting not only the contractors and workmen, but the welfare of the city at large. The effect of this new factor in the situation will be watched with interest by the building interests in all parts of the country.

A Trade School for Boston.

The gratifying announcement is made that the city of Boston is at last to have a trade school, modeled after the pattern of the pioneer institution that has proved so shining a success in New York City. For a number of years the friends and advocates of trade schools in that city worked hard to have the Franklin Fund devoted to the establishment of an institution for definite instruction in the trades, and at one time it was believed that their efforts would be successful. It was urged that this disposition of Benjamin Franklin's bequest would carry out in the most fitting way the aim of the testator—to benefit the young tradesmen of Boston. But, after years of delay, the trustees finally decided upon appropriating the fund to more general objects of a public character. The idea, however, has now been taken up by the Massachusetts Charitable Mechanic Association, an old and influential organization, composed of tradesmen who are the sons of tradesmen, and which was founded in the interests of tradesmen. This body has undertaken to establish at once a trade school in Boston on the lines of the New York Trade School. It is planned to start it on a modest scale, with only three classes at first, but with the view of ultimate expansion to large proportions. The movement is commendable from every point of view, and, rightly conducted, will command success. That specific instruction in the trades is appreciated by the young men of Boston is proved by the success of the plumbing classes carried on for some years past at the North End Union in that city. These classes are always full to their capacity, and young men have been turned away each season for lack of accommodations. The projected school in its wider sphere will doubtless meet with similar appreciation.

Fourteenth Annual Convention of Brick Manufacturers.

In accordance with previous announcement the National Brick Manufacturers' Association of the United States held their fourteenth annual convention in the city of Detroit, Mich. February 7, 8 and 9, the headquarters being at the Cadillac. The gathering was a large one, there being representatives from nearly every State in the Union, a fact which President Richardson in his annual address pointed out as being indicative not only of increased prosperity in the past year, but also of good fortune in having been invited to hold the convention in the "beautiful and hospitable city of Detroit." After the president's address the treasurer's report was presented, showing a comfortable balance on hand.

The election of officers was then taken up, resulting in the choice of William D. Gates of Chicago for president; George H. Clippert of Detroit for first vice-president; C. A. Schultz of Rondout, N. Y., for second vice-president; Xavier Wittmer of Pittsburgh, Pa., for third vice-president; Theodore A. Randall of Indianapolis, Ind., for secretary, and John W. Sibley of Birmingham, Ala., for treasurer. The Committee on Technical Investigation, consisting of D. V. Purrington, Anthony Ittner, Charles A. Bloomfield and W. D. Richardson, was re-elected.

A feature of the convention was the large number of papers presented and the valuable discussion of them by many of those prominently identified with the brick industry. Among these papers may be mentioned "Progress and Prosperity," by Grant Dibert of Pittsburgh, Pa.; "Business Methods in Clay Working," by O. T. Denison of Mason City, Iowa; "The Clay Age," by Fritz Wagner of Chicago; "The Man Behind the Pug Mill," by J. R. Copeland of Birmingham, Ala.; "Discipline and Courtesy in a Brick Yard," by M. E. Gregory of Corning, N. Y.; "Construction of Brick Pavement," by G. R. Grimes of Terra Haute, Ind.; "The Market Side of the Paving Brick Industry," by F. B. Stevens of Detroit, Mich.; "Brick Yard Pilgrimages," by Charles H. Bray of Helena, Mont.; "Kiln Experiences," by T. C. Lundy of Farmingdale, L. I.; "Down Draft *vs.* Up Draft Kilns for Burning Common Brick," by L. C. Moore of Memphis, Mo., and "The Continuous System of Burning," by F. S. Naugle of Warner, N. Y. There were also a number of questions on the programme for general discussion, each member being allowed five minutes for an expression of his views. These questions were of a thoroughly practical nature and brought out some valuable points touching the manufacture of brick.

A very interesting report presented was that of the Committee on Technical Investigation, by Prof. Edward Orton, Jr., in which he gave in detail the result of the experimental work, illustrating the same by a series of charts. The report of the Committee on Resolutions was also presented and Secretary Randall read letters from absent members. The convention was regarded as one of the most important and successful which the association has held, and in the opinion of President Gates the association is stronger to-day in every essential element than ever before.

The usual "pow wow" was held, this being a happy combination of banquet, smoker and vaudeville.

Cincinnati Builders' Exchange.

On the evening of February 28 the old Builders' Exchange, which for a number of years had occupied rooms in the Grand Opera House Building on Vine street, was formally declared out of existence. The Builders' Exchange went into liquidation on January 3 last, and its affairs were placed in the hands of a Board of Trustees. Secretary George L. Utter of the old Exchange states that all indebtedness has been paid up without assessing the members, and the new organization, the Builders' and Traders' Exchange, which will succeed the old one, will start in with a clear field. The Builders' and Traders' Exchange have taken the rooms of the old exchange in the Grand Opera House Building. Fifty members are on the list, each having paid dues to the treasurer of $25 for the ensuing year, a slight advance over the dues exacted by the Builders' Exchange. Enough money has been collected and is now in the hands of the treasurer to pay all expenses for the new exchange for the coming year. A committee was appointed to formulate a constitution and by-laws for the Exchange.

Mechanics and Traders' Exchange.

The Mechanics and Traders' Exchange of New York City have elected the following officers for the ensuing year: President, Francis N. Howland; vice-president, Frank E. Conover; secretary-treasurer, Edmond A. Vaughan.

Trustees. Charles A. Cowen, Stephen M. Wright, Augustus Meyers, John L. Hamilton, Thomas M. Mulry, Francis M. Weeks, Ronald Taylor.

Representatives on Board of Examiners, Building Department, Warren A. Conover, Edwin Dobbs.

Inspectors of Election, Alphonso E. Pelham, Michael Larkin, Richard R. Latourette.

National Association of Master House Painters.

At the sixteenth annual convention of the National Association of House Painters and Decorators of the United States, held in Washington, D. C., in February, a number of very interesting papers were presented, drawing out in the discussion many valuable suggestions. In connection with the convention were a number of exhibits of goods of interest to the delegates, many of these being arranged with a good deal of artistic taste. The officers elected for the ensuing year were:

President, Francis F. Black of Philadelphia, Pa.

Vice-president, Eugene McCarthy of Chicago, Ill.

Secretary and treasurer, Joel Kennedy of Cincinnati, Ohio.

Building Trades Club.

The Building Trades Club of New York City held their annual election on February 19, resulting in the choice of John L. Hamilton for president, Warren A. Conover for first vice-president, Francis M. Weeks for second vice-president, and William K. Fertig for secretary and treasurer.

Managers for three years, James Curran, Vincent C. King, Jr., John H. Shipway, Allen S. Duncan and John Little; manager for one year, George S. Holmes.

National Wholesale Lumber Dealers' Association.

At their recent meeting in Baltimore, Md., the National Wholesale Lumber Dealers' Association elected the following officers:

President, N. C. Lippincott of Philadelphia, Pa.

First Vice-President, Pendennis White of North Tonawanda, N. Y.

Second Vice-President, C. H. Bond of Oswego, N. Y.

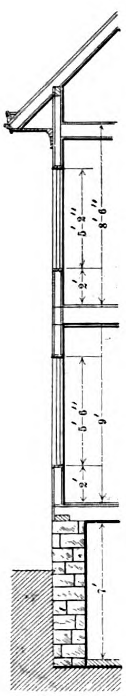
Treasurer, Frederick W. Cole of New York City.

Secretary, E. T. Perry of New York City.

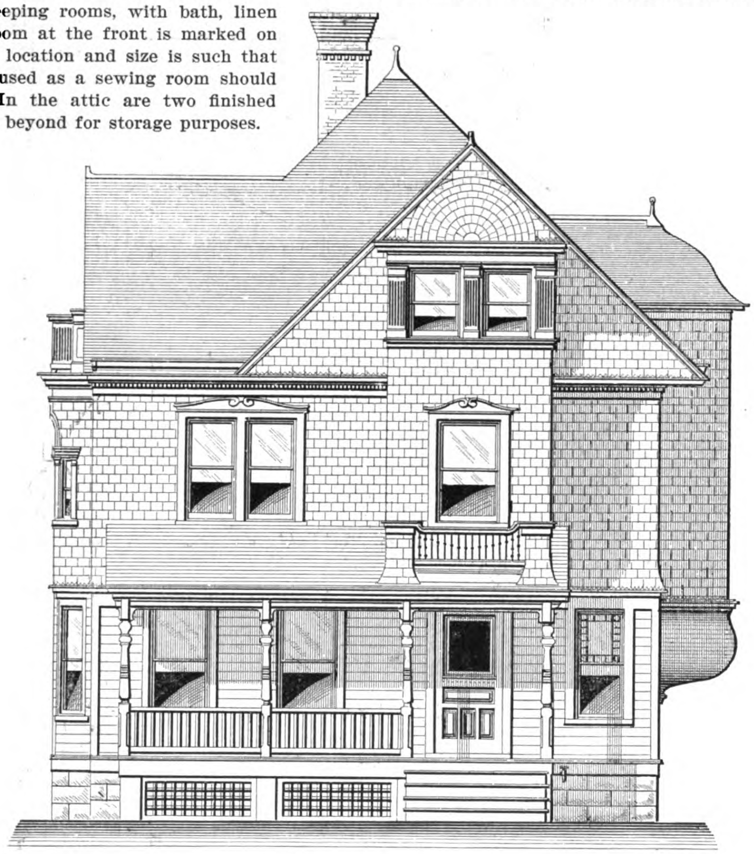
The Board of Trustees selected Pittsburgh as the place for holding the next convention.

FRAME RESIDENCE AT CRANFORD, N. J.

THE basis of the colored supplemental plate which accompanies this issue of the paper is a frame residence, embodying in its external architectural treatment many points of interest. Especially noticeable is the projection at the side of the house carrying the windows which light the several flights of stairs, the window treatment in the front gable directly over the front door, the bays at the left terminating with an ornamental railing, and the general effect produced by the use of shingles above the first story. The interior is divided into four principal rooms on the main floor, a hall with an alcove serving as a reception room, a conservatory opening from the dining room at the rear, and a commodious butler's pantry in addition to one for kitchen utensils. On the second floor are five sleeping rooms, with bath, linen closet, &c. While the room at the front is marked on the plan "bedroom," its location and size is such that it may conveniently be used as a sewing room should circumstances require. In the attic are two finished rooms, with ample space beyond for storage purposes.



Section.—Scale, ¼ Inch to the Foot.

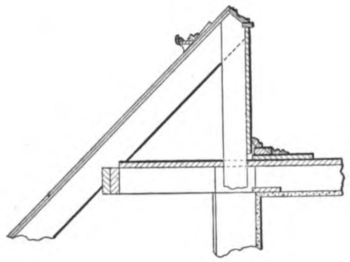


Front Elevation.—Scale, ¼ Inch to the Foot.

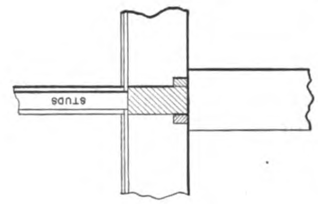
Frame Residence at Cranford, N. J.—J. A. Oakley & Son, Architects, Elizabeth, N. J.

The house is pleasantly situated on Pittsfield street, Cranford, N. J., and was erected for John H. Thompson, in accordance with plans prepared by Architects J. A. Oakley & Son of Elizabeth, N. J. The foundation walls of the house are 18 inches thick, built of good field stone, with joints pointed in cement mortar, the cellar windows being blue stone rock faced. The cellar bottom is of concrete. There is a blind drain around the entire foundation of the house. All the timber used in the frame is of spruce, the girders being 6 x 10 inches, the posts and ties 4 x 6 inches, first and second floor joists 2 x 10 inches, the third floor joist 2 x 8 inches, the rafters and collar beams 2 x 4 inches, and the outside studs, braces and partitions 2 x 4 inches. The veranda sills are 4 x 10 inches and the beams 2 x 10 inches. All floor joist and studs are placed 16 inches on centers and the rafters 20 inches on centers. The frame is covered with ⅞ x 10 inch hemlock sheathing of the best quality, with sheathing paper over the entire outside. The first story is covered with clapboards, and the gables, bays, &c., with shingles, as shown on the elevations presented herewith. The roof is covered with red cedar shingles, all of which used on the house are treated with creosote stain. The belt courses, cornices and all outside frames are of clear white pine. The floor of the piazza is 1¼ x 2¼ inch white pine, jointed in white lead. The conservatory has a tile floor and ¼-inch ribbed glass in the skylights. All floors and partitions are bridged with two rows of 2 x 3 inch hemlock. The inside walls are of adamant plaster. The first story floor is double, the lower section being rough boards on which paper is placed and over this a finished oak floor. All the trim is of selected cypress, and in the parlor, dining room and library the windows have panel backs below them. The bathroom has oak trim and floor. The stair newels and balusters, also the rails and treads, are of oak, with selected cypress for strings and risers. The entire house and front porch is furnished with mosquito nets, also the cellar windows. Each room, except the kitchen and bath, is fitted with picture molding. The walls are decorated with tinting and stencils. The kitchen walls are finished in imitation tile by jointing off the plaster while green, and then treating with three coats of paint and a coat of white enamel.

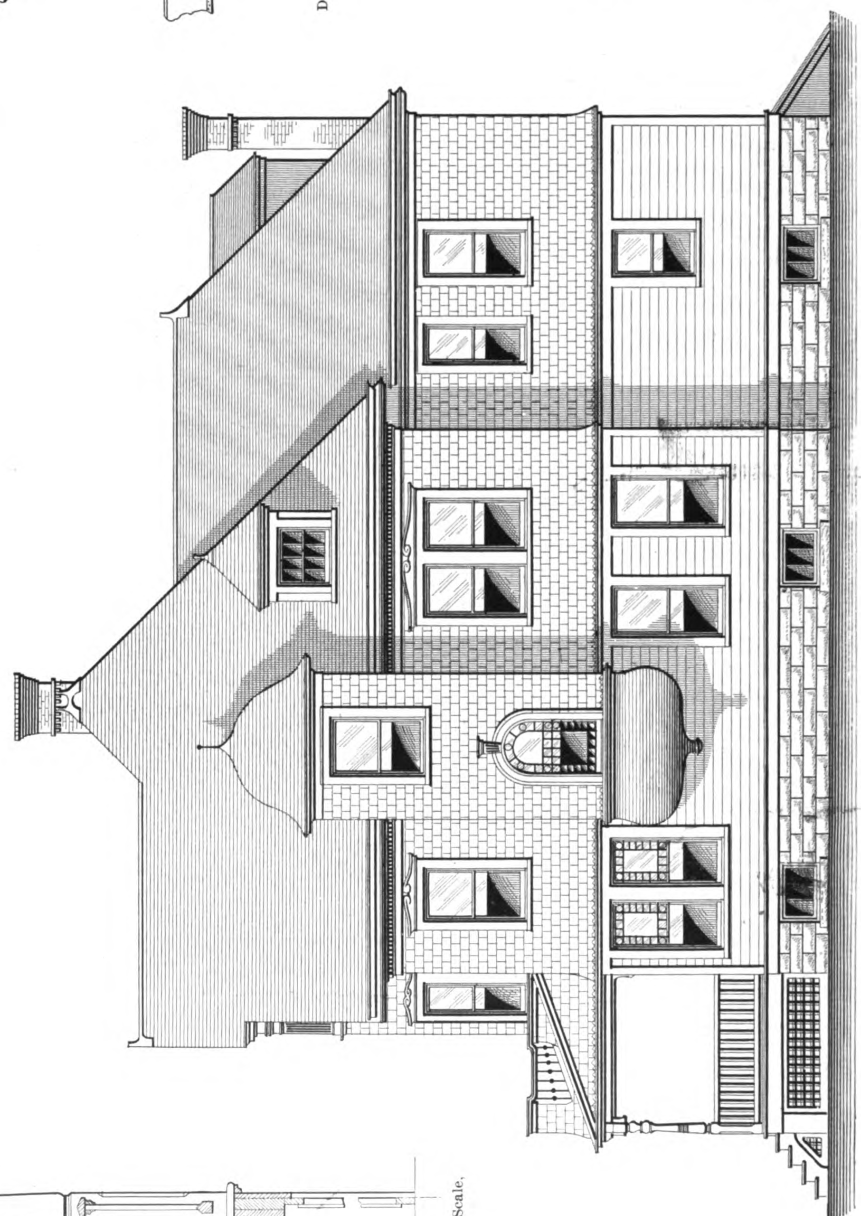
All the plumbing work is of the exposed type, the pipes being nickel plated. The bathroom is fitted with embossed porcelain water closet, porcelain lined tub and



Detail of Main Cornice.—Scale, 3/8 Inch to the Foot.

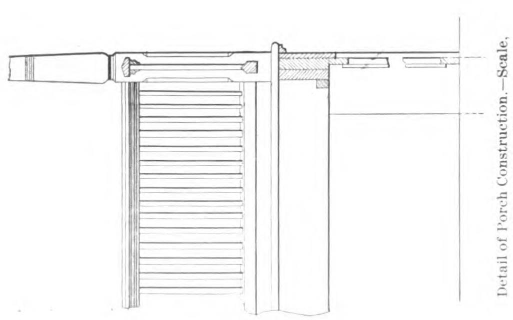


Detail of Girder and First-Floor Beams.—Scale, 3/8 Inch to the Foot.



Side (Right) Elevation.—Scale, 1/8 Inch to the Foot.

Frame Residence at Cranford, N. J.—Elevation and Miscellaneous Details.



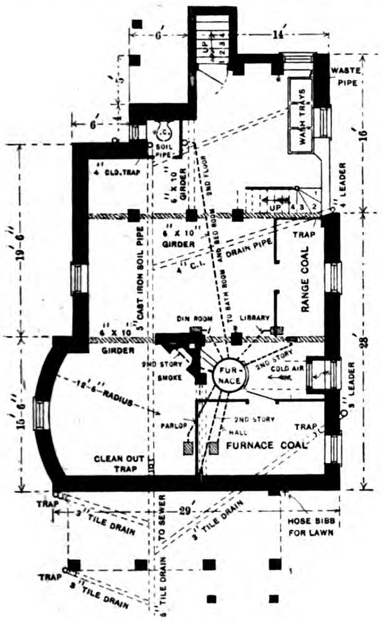
Detail of Porch Construction.—Scale, 3/8 Inch to the Foot.

Tennessee marble washstand, with oak tank for water closet. All plumbing is vented. The house is heated by hot air from a Richardson & Boynton furnace. All pipes in the partitions are wrapped with asbestos felt and covered with metal lath.

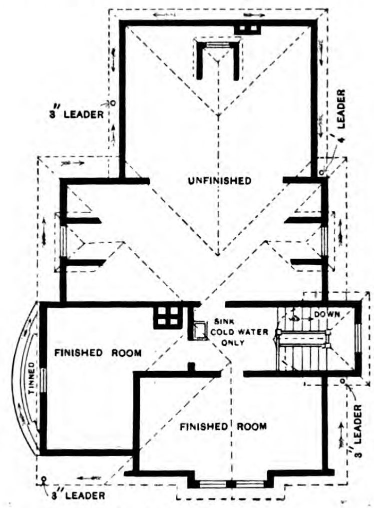
House Construction in France.

The methods of house construction pursued in France and the United States present some marked differences. In the former the heavy work—that is to say, the main walls—are all of dressed stone or rough blocks faced with mortar, the girders and cross beams are of iron, the ceilings are arched and of brick, the stairs of stone or marble, the floors of terra cotta tiling of diamond or hexagonal shape, the interior walls of hollow bricks placed edgewise, the roof of blocks of terra cotta covered with tiles or slate, the chimneys of marble, and, finally, the doors and windows, the friezes, cornices, casings, base boards and other wood work are all of oak or walnut. It is due to this selection and arrangement of materials, the proportion of anything of an inflammable character being relatively so small, that a fire can very generally be confined to the place where it started—to this, indeed, says a writer, being attributed the fact that a fire often breaks out in the cellar of a building full of various combustibles, such as petroleum, oils or varnish, without doing damage to the rest of the building. Another safeguard against fire may be added to the foregoing—viz., the almost universal use of Swedish safety matches, which can only be lighted by scratching on the side of the box.

THE annual report of the New York State Board of Mediation and Arbitration shows that there were 455 strikes last year compared with 271 the year before. The demands generally were for higher wages and for shorter hours, and were in the main successful, the Board stating that the wages at the present time are higher than they have been in some time past.

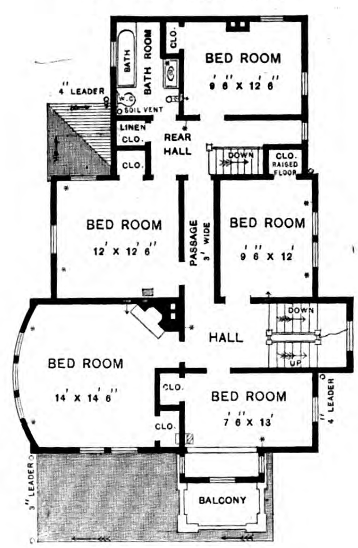


Foundation.



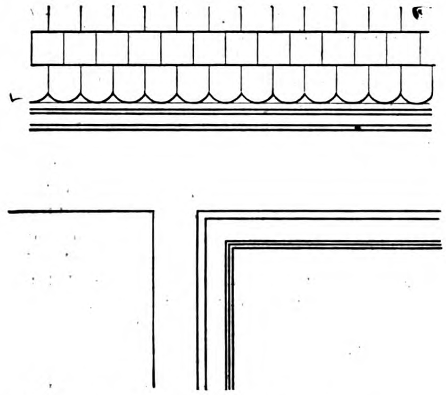
Attic with Outline of Roof.

First Floor.

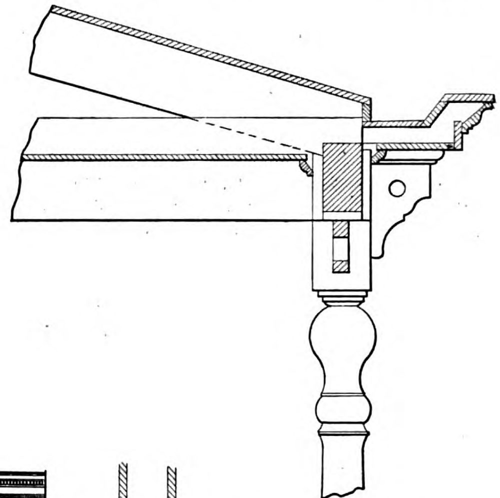


Second Floor.

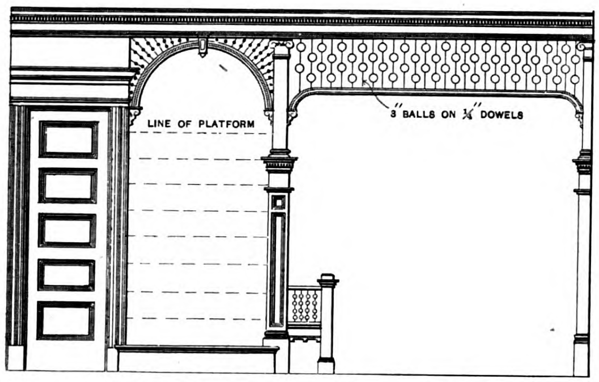
Frame Residence at Cranford, N. J.—Floor Plans.—Scale, 1-16 Inch to the Foot.



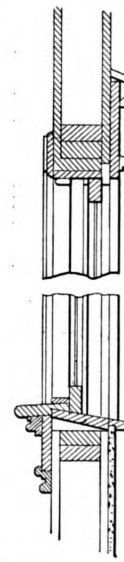
Partial Elevation of Belt Course and Outside Window Finish.—Scale, ¾ Inch to the Foot.



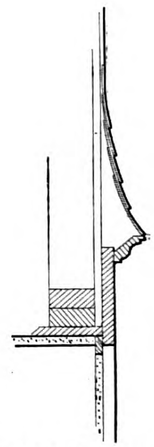
Detail of Porch Cornice—Scale, ¾ Inch to the Foot.



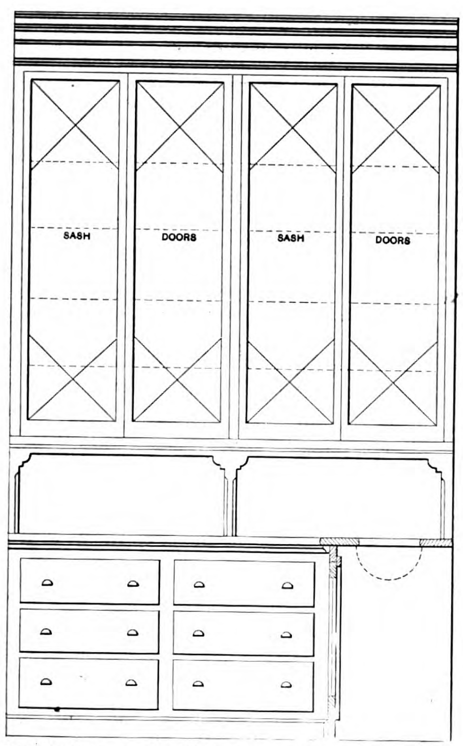
View of Grille and Trim in First-Story Hall Looking Up Main Stairs.—Scale, ¼ Inch to the Foot.



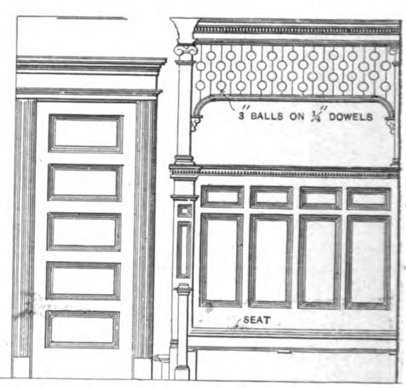
Vertical Section through Window Frame.—Scale, ¾ Inch to the Foot.



Detail of Belt Course.—Scale, ¾ Inch to the Foot.



Detail of Dresser in Butler's Pantry.—Scale, ½ Inch to the Foot.



View in Alcove Looking Toward Library Door, Showing Panels and Grille at Side of Main Stairs.—Scale, ¼ Inch to the Foot.

Miscellaneous Constructive Details of Frame Residence at Cranford, N. J.

THE ARCHITECTURAL SUPERINTENDENT.

THE art of superintending is not only the art of fault finding, but the art of fault remedying and fault preventing. If building operations were not attended by mistakes, misinterpretations and disagreements, it is evident there would be no need for the genus superintendent; hence, it is with the difficulties that beset him, and their remedies, that this article will chiefly concern itself, says Edwin B. Clarke in the *Techograph*, an annual published at the University of Illinois.

The faulty plan is the first source of annoyance. Frequently a set of drawings is so hastily finished that omissions and inaccuracies are almost unavoidable. Contradictions and discrepancies occur between the general drawing, scale, and full size details, and the specifications, resulting not only in annoyance and controversy, but also in no little expense and delay if not discovered before the ordering of material, or the performance of that part of the work affected by them. It should be the superintendent's first care to make a thorough examination of all plans and details, comparing them with the specifications and with each other, in order that all errors may be discovered and eliminated before the work is begun. This examination will also aid in fixing in the mind the peculiarities which differentiate the new work from others with which he has previously been connected.

The plans furnished the contractors should be complete. The drawings should be provided in sufficient number to thoroughly cover the work, and show plainly how it is to be done, so nothing will be left to the imagination of the builder. Numerous sectional drawings should be provided, which shall clearly show any unusual or special features or finish, and a sufficiency of dimensions to permit the execution of the work with the fewest possible arithmetical calculations by the workmen at the building.

Reducing Liability of Errors.

Draftsmen are usually reluctant to bind themselves by figures on a drawing, but unless the workmen are mind readers—and few of them are—it is hardly to be expected they will properly carry out the artist's idea when he himself declines to define it. In figuring dimensions, it is of advantage to give, where possible, a string of distances between centers of main features, with subordinate lines of dimension for the separate parts of those features, and also to note on each plan the bays of dormers which are to center with some other feature of the building, above or below them. This method will materially decrease the liability of the builder to make mistakes in laying out his work, and an error when made may be quickly found and easily rectified without affecting more than a single feature. It will also be found useful to adopt a "building" line (usually the line of the first story above the water table) as a base line from which to figure dimensions, as well on the basement and foundation plans as on the first floor plan. This building line may be shown by a red or black dotted line on the drawings.

Explanatory Notes.

The value of explanatory notes on drawings should not be underestimated, and the more of them there are, even though they are repetitions of items covered by the specifications, the better. The plans may be called common property, since they are used by all the craftsmen alike, while the specifications, if accessible, are usually so divided that each foreman refers only to the particular section covering his special work, and is ignorant of its relation to that of the other trades. In such cases it is evident that proper co-operation is improbable, if not impossible.

The repetition of the common lines of hight on all elevations and vertical sections is to be recommended. It is quite a convenience to the superintendent, and saves mistakes arising from the builder's inclination to trust to memory rather than to turn to the plan on which the hights occur. It may be said that the contractor should be made to suffer for his own negligence, but it must be remembered that the drawings are really implements or tools, as necessary for the prosecution of the work as the trowel, saw or hammer, and it is the duty of the architect to furnish them to the builder in as perfect a state as possible, if the final results are to be satisfactory.

Any improvements tending to convenience in handling will amply repay any extra time consumed in preparing them in the drafting room, and a day or two, or in unusual cases even a week, devoted to figuring and checking up dimensions on the working plans will avoid expensive mistakes and time wasting delays, with the resulting disputes and controversies, and at the same time will give the plans a definiteness that will enable the estimator to make a closer proposal for the work before the contract is awarded. For the same reason it is desirable to fully indicate, by framing plans or diagrams, the kind and size of materials to be used and the methods to be employed.

It is a decided advantage to the superintendent if he has been employed in the production of the plans the execution of which he is to supervise. His familiarity with the drawings will enable him to see more readily the effect that a change at one point will have on others of the work, and will be especially valuable to him when it is necessary to give an order without a chance for study or leisurely consideration.

The Superintendent's Drawings.

The superintendent should secure a complete set of all drawings to be used in the work, including general plan, scale and full size details and diagrams, outside of the sets furnished the contractors. He should also have his own copy of the specifications, and all agreements and contracts to which to refer in case of dispute between contractors concerning the scope of their respective contracts. The above applies only to the superintendent in charge of large work not in the same city with the architect, who cannot, therefore, have access to the office sets.

The First Duty.

The first duty of the superintendent on the ground is to check up the dimensions and laying out of the building. For this a steel tape should preferably be used, and, for a long series of measurements, the ring end held at a single point while the different required dimensions are marked off in order along the length of the tape from a memorandum slip previously prepared. This prevents accumulative errors, which, with the average mason, reaches 4 or 5 inches in 100 feet before it is considered worth noticing. In order to keep the work in hand, the superintendent should require that he shall have approved all work laid out before building is proceeded with. To measure the width of footing trenches a stick cut to the width of the footing, with a notch for the building line, will be found convenient. A plumb line dropped from the building line stretched above will pass the notch and show at once if the trench is properly located and of the required size. With several different widths of footings, and for places where no line can be stretched in the excavation itself, this method should save much time and many mistakes.

If the plans show no chases or slots for soil and waste pipes, or gas, water and electric mains, the superintendent should arrange with the mason to build them in the proper places as the walls go up. Neglect to consider this frequently leads to unsightly results, such as a group of pipes cutting through a handsome cornice, or spoiling the appearance of an otherwise attractive room. The location of the horizontal pipes should also be considered; whether in the floor—that is, between the joists, or cut in over them; under the floor; hung to the ceiling below and exposed to sight; or under a raised floor; also, whether the marble or other wainscoting back of toilet room fixtures can set flat against the wall, or must be moved far enough forward to allow the waste, supply and vent pipes to run behind it.

The Note Book.

The note book should be the superintendent's constant companion, not only for jotting down ordinary items to jog the memory for the daily details of the work, but to be used as well to preserve a record of orders to and agreements with contractors, instructions to foremen, and alterations or changes sanctioned in plans or specifications. In fact, the entries should include everything relating to the building which may possibly be needed for future reference. Especially should dates of orders, and delivery of plans and details (if no record is kept in the office) be noted down, in case it becomes necessary to refer to them in settlement of claims for enforced delay in completing a time contract.

The superintendent should notice, from time to time, if all the workmen who can be advantageously employed are on the different branches of the work. He should inquire concerning the ordering of material, and the progress of the work of the sub-contrctors, in order that no delay be caused by their failure to come to time. More time is thus lost than from all other causes together.

The superintendent should see that application is made for detail drawings in such season that they will be on hand before needed for use.

It is a good plan to occasionally visit the mills, foundry, pattern and modeling shops, to inspect the work in progress, and explain to the workmen points that are vague or misunderstood, before it is too late.

One should not be above accepting advice from contractor or workman, for fear of loss of prestige, since frequently their experience suggests methods or facts, either of merit in themselves or expedient under existing circumstances. Neither should one be so complaisant as to adopt these suggestions without careful consideration. If they are rejected, it should be done so as to leave no doubt about it in the mind of the workman, nor as to the method actually to be employed. Frequently it is necessary to say to the builder: "Your way must be just as good, but the specifications prescribe a method which I know will give results satisfactory to the architect, and, as I am answerable to him after your responsibility in connection with the work ceases, I must require you to follow the specified directions." Material or work condemned should be ordered removed at once. It is a common trick among foremen to agree to see to that later, with the expectation that the matter will slip the superintendent's mind until the defective material or work can be hidden or covered up.

Structural iron is usually required to have several coats of paint after delivery. In order to insure its receiving the required number of coats, and proper care in their application, and also to prevent a delay for painting and drying when the material is wanted for use, it is well to insist that this work be done as soon as the metal is on the gound.

Desirable Characteristics.

The superintendent himself should cultivate the following characteristics: Tact, force, decision and gentlemanliness. He will be called upon to listen to endless complaints of interference by one contractor's men with the work of the others, and is expected to arbitrate them. He will be referred to as a walking specification by foremen who find it more convenient to question him than to take the trouble to look up requirements themselves. This they should be encouraged to do. Some foremen ignore the specifications entirely, depending on the superintendent to assume responsibility for anything opposed to them, which he has failed to discover, but "which it is his duty to find out," as I was once informed by a foreman. The same brilliant fellow was one day very much put out with me because his attention had not been called to a note on one of the plans. He had shored up a 17-inch brick wall and cut an opening in it in the first story before he discovered that it should have been torn out above also, to make way for a stud partition to take its place. Of course the single I-beam, which the note called for, while ample to support a stud partition, would hardly do the same service for a 17-inch brick wall. Another nuisance is the man who always knows a better way to do everything than the way he is called on to do it (simply for the sake of change), and who is positively unhappy if his suggestions are unheeded. Of course the superintendent ought never to lose his temper. He may lose his patience and express his opinions, but he should let the other fellow put himself at a disadvantage by getting mad. As a general rule, however, flattery builds quicker than friction, and the greater the superintendent's skill in overcoming difficulties, expediting work, and settling differences, the better superintendent he is.

House Lining Materials in Norway.

In a recent letter to the State Department, Consul Victor E. Nelson, at Bergen, Norway, calls attention to two recent inventions in Scandinavia of material adapted for various purposes, but more particularly lining houses. The names of these materials, he says, are "Savareid Bygningspap" (Savareid building pasteboard) and "campo board." The first, a Norwegian invention, is made from a specially prepared paper, which, together with several layers of asphaltum, is compressed into a solid plate, thus forming a very serviceable and fine material suitable for covering walls, ceilings, &c. The material thus obtained is absolutely damp proof and does not conduct heat; therefore it will keep any room lined with it warm and comfortable. It serves to deaden noise and will keep away all kinds of vermin. Although a thick and solid substance, it is very pliable, and at the corners of a room can be either turned down or else bent to fit into the required angle without in any way destroying or injuring it. If used for paneling, it makes a smooth, even surface, free from cracks or folds of any kind. It is odorless and will not rot, and, although just as strong as a wooden panel, it will be found to be cheaper even than thin boards.

The other invention—"campo board"—Swedish patent, is a board composed of five layers. The central one is composed of pieces of wood fitting close together and lying in different directions. The adjoining layers are composed of a very strong cement, which is used to fasten the pieces of wood forming the central layer into a solid and inseparable board. The two outer layers are composed of strata of very heavily compressed paper, which has been made waterproof. Campo board, as made in Sweden, in pieces 4 feet wide by 8 to 18 feet long, will be found as serviceable for the interior of houses as the building pasteboard, since it has the same qualities, and, in addition, can be used for lining ships, making boxes, trunks, all kinds of fillings, tables, writing desks, bottoms of drawers, signs, backs of looking glasses, &c., and is capable of being either polished or painted. It would be found very useful by our trunk makers, as it is much lighter than ordinary wooden panels and is also cheaper. It should prove an excellent method of disposing of a large part of the odds and ends of wood which are to be found at wood working factories.

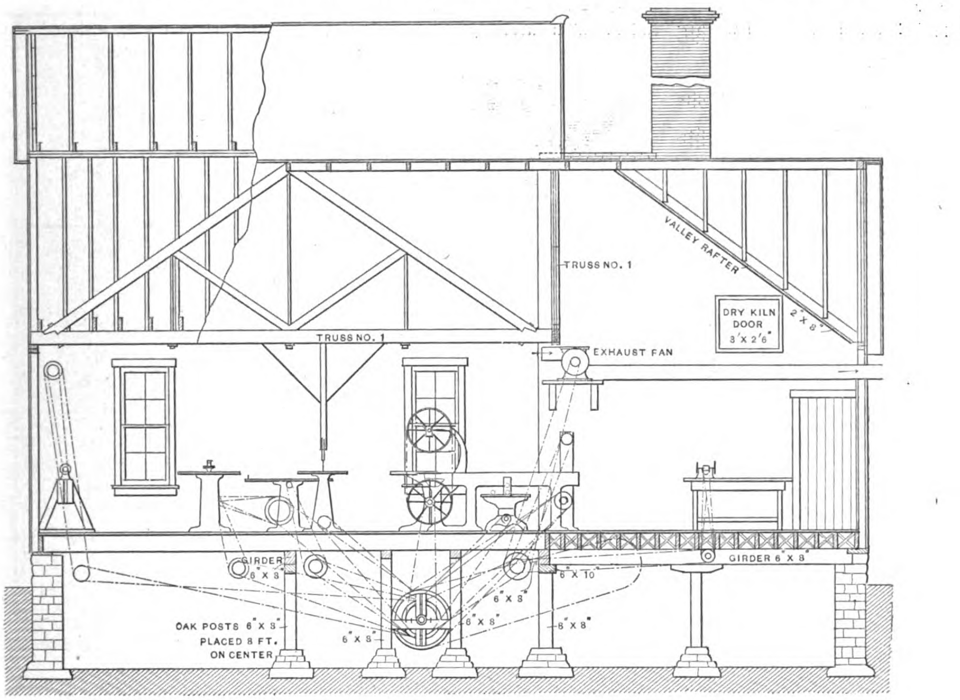
THE Yale Club of this city contemplates erecting a new club house ten stories high, of brick and gray stone, on a site 50 x 100 feet on West Forty-fourth street near the Bar Association Building. The new club house will have a roof garden, and there will be numerous bachelor apartments, in addition to the requisites of the ordinary club. The new structure will cost in the neighborhood of $175,000.

COMPETITION IN SMALL WOOD WORKING SHOPS.

WITH a view to obtaining the ideas of practical readers regarding the arrangement and equipment of a small wood working shop, we announced in the issue for December last a competition covering this style of building and offered in connection therewith, for the best designs submitted, three cash prizes to be awarded in the order of their respective merits. The object was to secure drawings of such shops as would be adapted to the requirements of a large class of contractors and builders, who, in connection with their business, have frequent occasion to turn out various kinds of light wood work, such as the making of cornices and brackets, doing light cutting and ripping, sticking and shaping moldings, scroll sawing, and doing a general line of job work. The number and character of the studies received in response to our invitation show a widespread interest in the subject, the territory represented extending from Canada on the north to Louisiana on the south and as far west as the Mississippi River. While some designs are rather elaborate for what would be termed a " small " shop, calling as they do for a large equipment and motive power, the majority are wrought on lines in consonance with the conditions of the contest.

According to the stated conditions the building could be either of brick or frame construction, preferably not more than two stories in hight, and equipped with such machines as would be appropriate for a shop of this kind. Each set of drawings was to be accompanied by a description of such a nature that the construction of the building, the arrangement of the machinery and the disposition of the main shafting, with its various connections, could be readily understood. A call was also made for brief reference to the method of heating, if any, and to the kind of motive power employed for operating the machines. Another requirement was that each set of drawings, as well as the accompanying description or specifications, should bear a *nom de plume*, motto or device by which they could be identified, and the same designating character be placed on a sealed envelope containing the real name and address of the competitor. The obvious purpose of this requirement was to place all designs while in the hands of the Committee of Award upon the same plane of equality so far as their authorship was concerned.

The first work of the committee having the matter in charge was to ascertain if vital conditions had been violated in the case of any of the designs submitted and to regard all such as failed to comply with the stated requirements as at once out of the contest. The individual merits of the others were carefully considered in the light of the expressed conditions of the competition and a decision rendered in accordance therewith. It is peculiarly gratifying to note from the report of the committee the varied character of the efforts submitted and the many features of practical interest and value which the contest developed. In one case a competitor shows a shop with the main line of shafting placed in the basement so that the belting is out of the way, thus leaving the first floor free for the convenient operation of the machinery; another makes use of electricity as the motive power; others gas or gasoline engines, and still others steam, while several employ electricity for lighting purposes. There are also interesting points in connection with methods of heating the shop and the dry kiln, as well as in removing the dust and shavings made by the machines.



Sectional Elevation, Showing Position of Main Shaft in Basement.—Scale, 1/8 Inch to the Foot.

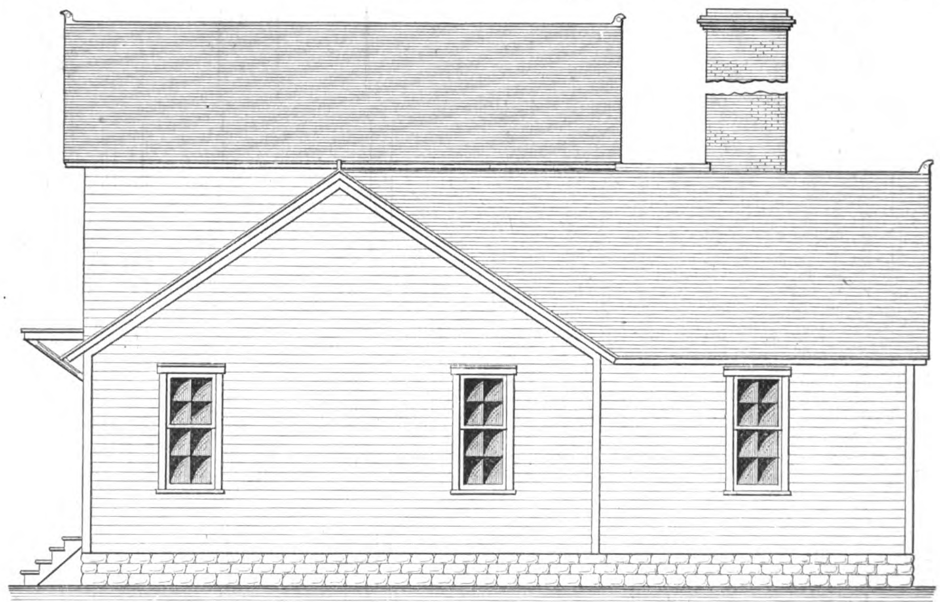
Competition in Small Wood Working Shops.—Awarded First Prize.—Designed by Frank Terry, Findlay, Ohio.

Under the terms of the contest the Committee of Award decide that the design submitted by Frank Terry of 701 Center Street, Findlay, Ohio, is entitled to the first prize of $75; that contributed by Frank B. Edgerton, 118 Dewey Street, Bennington, Vt., to the second prize of $50, and that furnished by Karl G. Johanson of 197 Middle Street, New Bedford, Mass., to the third prize of $30.

There are several designs deserving of mention, both by reason of the general equipment arranged with a view to the economic handling of material, and also by reason of the practical nature of many points involved. The contribution of "Beaver" represents a small wood working shop and planing mill erected seven years ago for a contractor and builder, and is well calculated to meet the wants of many. Its location is such that it is cheaper to operate it by means of electricity than by other power, and this is also used for lighting purposes. The heating is by means of box stoves. Another design possessing features of practical merit is that of "E. S.," who makes use of a gasoline engine for power and hot air for his dry kiln, with stoves for heating the first floor. "Balsom" contributes drawings of a one-story planing mill, which, he states, experience teaches to be the most economical form of structure, especially where ground is cheap. He utilizes the space over the office for a drafting room, and requires a 75 horse-power boiler and a 60 horse-power engine to operate the plant. Some of the more elaborate studies include that of "Pen," who furnishes an excellent design of a steam heated brick mill equipped with 22 machines operated by a 40 horse-power engine and 50 horse-power boiler, with the water supplied from an artesian well; "Student J.," a carefully considered design of a two and a half story building, heated by exhaust steam, lighted by 75 sixteen candle-power incandescent lights and equipped with 33 machines operated by a 50 horse-power engine and a 75 horse-power boiler, with exhaust fan in the basement, while "Hall" contributes a design of a shop well equipped to do large work, covering as it does over 6000 square feet of area. "Lace" shows a shop built in accordance with what is known as "Mill" construction, and is equipped with 26 machines of various kinds. The heating is to be done by exhaust steam from the engine and the lighting by electricity, generated by a dynamo in the building. While these designs possess many excellent features of practical interest and value to the wood worker conducting operations upon an extensive scale, the committee report that in their opinion they hardly come under the designation of a "small" shop. It is also to be regretted that there were some competitors, who, while submitting carefully considered designs embodying modern features of equipment, so far failed to observe the conditions of the contest as to place their names on the drawings or specifications, thus showing the committee at a glance by whom they were contributed. This being a violation of the conditions, the committee had no alternative but to throw them out. Considered as a whole, however, the competition was eminently successful, and we hope to lay a number of the designs before our readers as rapidly as space can be found for them.

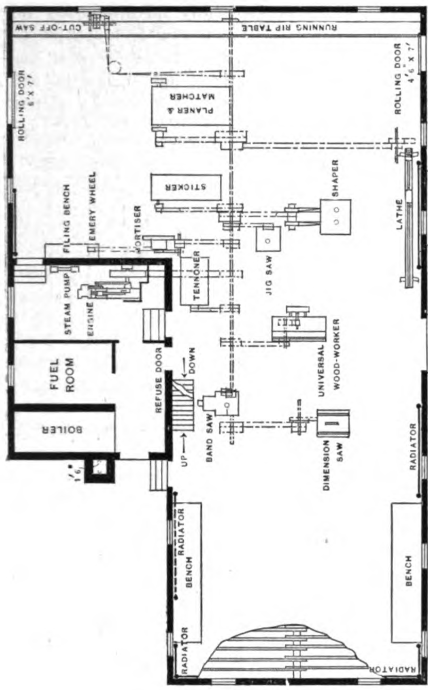
We present herewith the contribution of Mr. Terry, awarded the first prize: In submitting a plan for the twenty-eighth competition—a small wood working shop—I have taken as a base of my design a frame building resting on a stone foundation, with basement for the line shafting, belts and countershafts, thereby avoiding the inconvenience of overhead and vertical belts. For this reason also no heavy timber is required in the construction except for the main floor. The dotted lines on the floor plan indicate the position of the main shaft, belts and countershafts in the basement. The boiler, engine room and dry kiln will have brick walls to extend above the roof where joining the main building, which will add greatly to protection from fire and thereby lessen the rate of insurance, as a steam boiler and engine will be used for power.

The hight of the floor above the grade line, about 2 feet 8 inches, as shown by the details, will be found very convenient for loading and unloading lumber, &c., from the dray wagon. The depth of excavation is about 4 feet 4 inches, thus giving 6 feet in the clear for the basement. The posts and girders are to be of white oak; the sills and joist of hard wood, preferably beech; the studding, rafters and other frame stuff of pine or good hemlock; the roof sheathing of pine or hemlock laid close, and the frame covered with ⅞-inch patent or cove siding, either poplar or pine. The studding is to be 2 x 4 inches, placed 16 inches on centers; the sills and first floor joist 2 x 10 inches, the tie beam of truss No. 1 to be 4 x 8 inches, and of truss No. 2, 2 x 6 inches; the rafters, 2 x 6 inches, and the roof to be of one-third pitch. The cornice is to be plain. The roof of the main building is to be covered with a good quality of green slate, while the deck and dry kiln are to be covered with No. 20 galvanized iron. All windows are to be eight lights, 12 x 16 inches, divided into two sash and provided with lock, except those marked otherwise on the plan. The windows in the main building are to be set 2 feet 8 inches above the floor. The outside rolling doors are to be made of 3½-inch beaded ceiling, with three cross battens, and hung on ball bearing rollers. No detail of

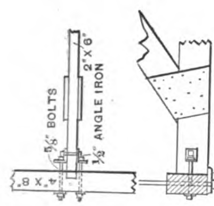


Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

Competition in Small Wood Working Shops.

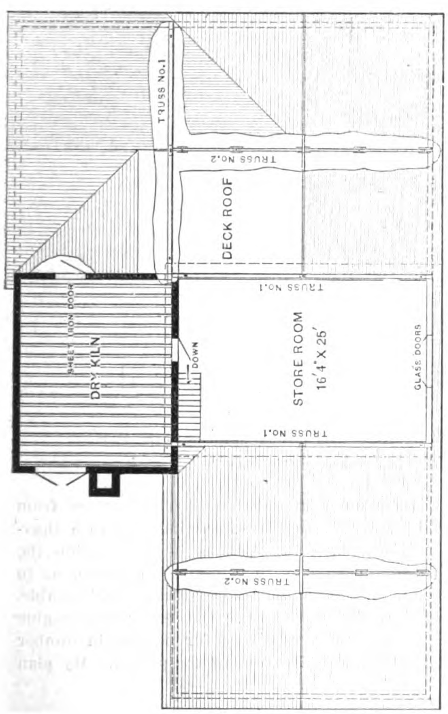


Main Floor.—Scale, 1-16 Inch to the Foot.



Details Showing Method of Joining Trusses 1 and 2.—Scale, 3/8 Inch to the Foot.

R.L.



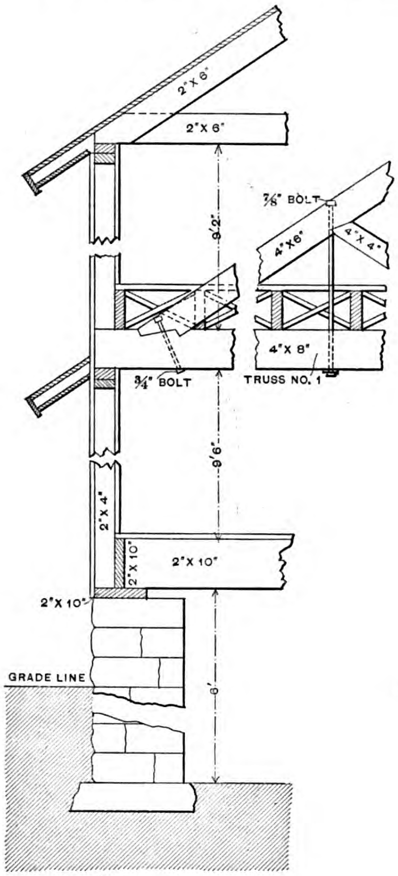
Store Room, Dry Kiln and Roof Plan.—Scale, 1-16 Inch to the Foot

door or window frames is shown, as they will be on plain frames, with 7/8-inch outside casing on outside of siding.

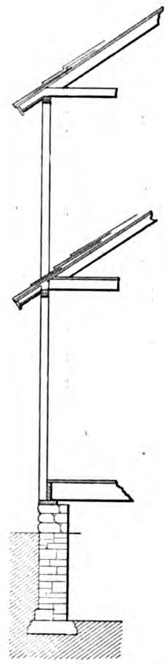
Front Elevation.—Scale, 1/8 Inch to the Foot.
Competition in Small Wood Working Shops.

Plain frames will be used in the brick wall, with 1¾-inch jambs rebated for 1¾-inch thick doors, all outside doors of this thickness being hung on hinges and rollers. The front doors are each 2 feet, 8 x 7 feet, with glass in the upper half, the doors opening inward. The main floor is to be of 1½-inch red elm, which, being of a fibrous nature, will not wear slippery, thereby lessening the danger to machine operators. The store room floor is to be of 7/8-inch pine. The boiler and engine room floor will be cement on a concrete foundation 4 inches thick. There will be no floor in the basement.

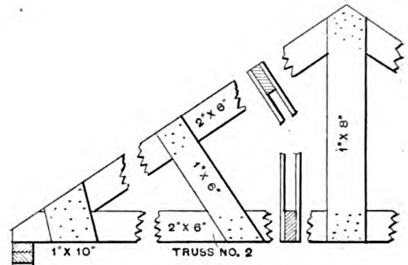
The position of the machinery, shafting, belting, &c., is all clearly shown on the floor plan and sectional elevation, ample room being given for handling lumber in lengths up to 16 feet and longer, if necessary. The position of the shaper, jig saw and band saw are such that the largest kind of work likely to come to a shop of this kind can easily be worked. The band saw and dimension saw being near the benches are very convenient for the use of the bench hands, while the space between all the machines is sufficient for shop trucks to pass, and also easy to clean the floor at the end of a day's work. There being no posts or belts to interfere, the machinery can be operated and the work carried on to the very best advantage. It is intended to use a running rip table, which is especially advantageous for edging a board straight. The rip saw is to be placed directly over the line shaft and operated by a sliding tightener, so that when the saw is not in use the belt will hang loose. The cut-off saw is to have a sliding arbor frame.



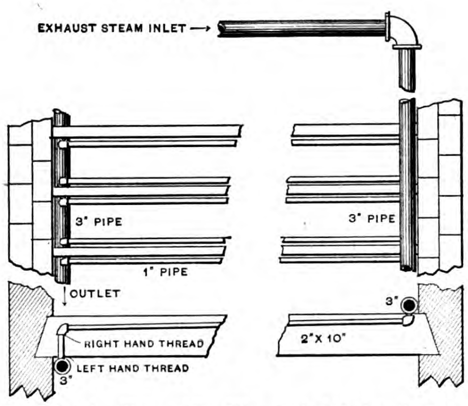
Detail of Frame Construction.—Scale, 3/8 Inch to Foot.



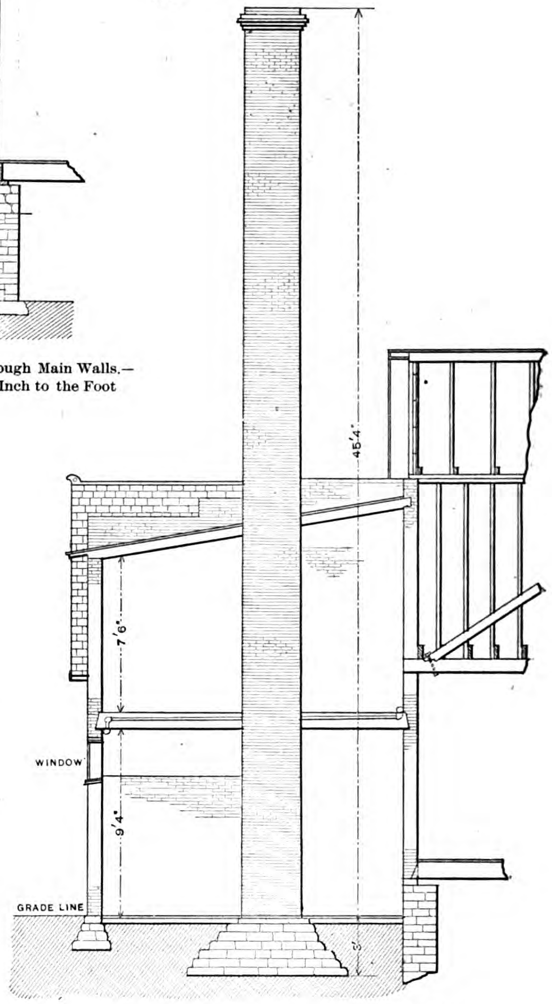
Section through Main Walls.—Scale, 1/8 Inch to the Foot



Detail of Truss No. 2.—Scale, 3/8 Inch to the Foot.



Detail Showing Piping of Dry Kiln.—Scale, 3/8 Inch to the Foot.



Cross Section of Dry Kiln.—Scale, 1/8 Inch to the Foot.

Competition in Small Wood Working Shops.—Miscellaneous Constructive Details.

The exhaust fan is intended to carry shavings from the planer and sticker outside of the building to a shavings bin and not used for fuel, as in this section the proceeds from the sale of the shavings are such as to render the use of some other kind of fuel more desirable.

The dry kiln is located over the boiler and engine room and is easy of access, both for putting in lumber and taking out directly in front of the planer. My plan of piping the kiln is easily and cheaply constructed; requiring a small number of fittings and being elevated at the inlet, it will always be drained and not liable to freeze. It is intended to use exhaust steam from the engine, so that the expense of heating the dry kiln will be reduced to a minimum.

The method of heating the shop will be through radiators made of steam pipe placed at the outside walls, as shown on the floor plan, making use of exhaust or steam direct from the boiler, according as the intensity of the cold may demand.

In adopting a steam engine for power I can offer several reasons. First, it has long life; second, it is easily kept in repair; third, the exhaust steam can be used for drying and heating purposes, thereby saving the expense of an extra apparatus; fourth, the cost of installing the plant is no more than other kinds, while the expense of operating will compare favorably with others in the long run, except water, which is not available in this locality.

In designing this shop my principal object has been to produce one most convenient for the purpose—a substantial building with plenty of light and machinery located for long life to belts, as countershafts can be placed to the best advantage for any length of belt, according to whether heavy or light work is to be done, and yet keep the cost as low as possible.

BONDING OF BRICK WORK.

As bearing upon a subject which is always interesting to members of the building fraternity, we present some extracts from an article on the above mentioned topic contributed by the well-known architect, Ernest Flagg, to a late issue of the *Brickbuilder*. After referring to the change in the methods of bricklaying in this country which the next few years are likely to witness by reason of the introduction of the principles of good design, he among other things says:

The practice of running up certain walls or parts of walls of a building in advance of others is a practice which should never be tolerated by the architect. It is nevertheless a practice which is so common here that one may say it is the general custom to carry up the walls which are composed entirely of common brick in advance of the ornamental façades,, and then to connect the two by means of an abomination in bricklaying called toothings. The workman accustomed to laying up his work without proper bond sees nothing inconsistent or slovenly in such a proceeding. But how can an architect who takes pride in his work permit such practices? They are proceedings which could only be tolerated where pride in good bricklaying is unknown, and that they are common now serves as clearly as anything could to show the present degradation of bricklaying in this country. They are makeshifts, which result from a mistaken notion on the part of the builder that by resorting to them he can hasten the work, but it is evident that the building cannot be inclosed or finished until all the walls are up, and if one part is carried up before the rest nothing is gained.

It needs no argument to demonstrate that the way to build well is to carry up all the walls simultaneously, interlocking all the materials as the work proceeds. To do otherwise involves an unequal distribution of weight on the foundation during the process of building, which should not be tolerated even if it could be done consistently with good bricklaying, but when this is done in connection with the so-called toothings it cannot be too strongly condemned.

In the manufacture of fine grades of brick, our progress during the last twenty-five years has been very rapid, and we now produce them in extraordinary variety and of most excellent quality. Strange to say, this progress in brickmaking has not conduced to progress in bricklaying, but rather the contrary. The fine grades are used only for face work, and our designers, losing sight of the fine effects which might be produced by laying them up in regular bond with the backing, have used them solely as a veneer, independent of the main body of the wall, and adding practically nothing to its strength. They are laid in a sort of running bond, and are tied to the backing at every fifth or sixth course by what is called diagonal bond. That is, their inner corners are clipped off and the corners of common brick laid diagonally on the wall are lapped over the face work, a process as insecure and slovenly as it is ugly, for by this method the outer veneer has little or no connection with the body of the wall, and looks as if it had absolutely none, appearing to be what it is, weak. The writer has often noticed workmen in taking down old buildings—buildings which would be called new anywhere else—remove great slabs of this outer veneer with a crowbar, showing that there was practically no bond between it and the backing. It seems incredible that such unscientific and inartistic methods could take root anywhere to an extent that architects will deliberately specify this sort of thing; but one who observes our progress in other directions must have far too much faith in the future of good art and its handmaiden, good workmanship, among us to believe for a moment that these methods will endure. At present, this way of laying brick, considered very ugly everywhere else, seems to be admired here. It was first adopted through false notions of economy, but we now find it used almost everywhere in buildings where such considerations evidently did not govern, as well as in buildings of the cheaper kind.

With the introduction of the fine grade of bricks we have developed a love for fine joints, and this class of work is laid up with joints so thin as to be of no use constructively, and which rob the work of all character, and give to it a hard, dry, sleek appearance, which can appeal to no artistic instinct. Now and then we find an attempt at Flemish or English bond, doubtless made by some one who has seen and admired the genuine article abroad or in old buildings in this country, but almost all such attempts are sham, for the face is not really bonded to the backing. The headers are not headers, but bats, because the designer cannot bring himself to give up the small fine joints, and to use joints of a size which is necessary to insure good workmanship; with the thin joint retained it is impossible to interlock the face work with the backing. In other words, our brick work is laid upon the theory that honesty is inconsistent with art. To vary the general monotony sometimes recourse is had to bricks of peculiar shapes, such as the long, narrow, thin bricks called Roman, which do not and could not bond with the backing. Many people think this variety truly artistic. Few seem to realize that the finest and most artistic effects can be produced by simple means, or to understand what needs only to be tried to be proven, that brick of the commonest kind laid up in interesting and logical bonds will produce far finer effects than the most expensive bricks or the craziest shapes that ever were made, if laid up without regard to the rules of common sense.

One has but to try to find how easy it is to devise all sorts of interesting patterns and endless varieties of beautiful wall surfaces by the use of brick of the standard size regularly bonded to and forming an integral part of the body of the wall. The supposed economy of the present methods, like many other thriftless attempts in the same direction not founded on reason, which spring up in new countries, will be found upon examination not to be economical, but the reverse. With a very slight increase in the number of face brick the outer 4 inches of the wall, now practically useless, can be made to contribute its proportionate share to its strength. Let us make some calculations to show how slight is this increase, and how out of all proportion to it is the saving effected. In New York face brick is generally laid up ten courses to 25 inches, and common bricks nine courses to 2 feet. If the face brick is made to bond with the backing, it, too, will lay up nine courses to 2 feet, or better still, for face brick and backing, nine courses to 25 inches; then 8.64 face bricks and 10.8 common bricks will be required to each square foot of a wall 1 foot thick. By the common method there would be required to accomplish the same result 7.2 face bricks and 13.5 common bricks, so that by the use of 1.44 more face bricks, against which there is a saving of 2.7 common bricks, we obtain a wall which is practically one-third stronger, for the outer 4 inches is an integral part, whereas in the other case it is a veneer of little or no value as regards strength.

The taste for good workmanship is fortunately a taste very easily acquired; familiarity with it breeds a desire for more, and when the difference between the appearance of good bricklaying and bad bricklaying is once understood, the demand for the former will spread rapidly. There is now urgent need for good manual training schools where young mechanics can be taught good workmanship in bricklaying; or rather, perhaps one should say, there is urgent need that good bricklaying should be taught in the manual training schools which are already established. It ought to be no more expensive to lay up brick in regular bond than by the "every fifth course a header course" system. That it is more expensive to do so is entirely owing to the fact that the bricklayers are unskilled in the art of good bricklaying. They do not know how to lay the regular bonds because they have never been taught, and if they attempt to do it, of course the progress is slow, and time means money. But if the architects would specify work of this character there would soon spring up a demand for skilled workmen, and the mechanics would soon adapt themselves to the new conditions; it would soon be demonstrated that good bricklaying costs no more than bad bricklaying, and the benefit both from the artistic and constructive standpoints would be worth a thousand times the cost of introducing this reform.

In the large Eastern cities there is fast being created a great body of skilled mechanics in almost every line, except bricklaying, that has to do with building. This has come to pass because there has been a demand for fine workmanship, which has been specified regardless of expense. The building up of these industries and the creation of this body of skilled labor has been of incalculable benefit to the country, and is worth a great deal more that it has cost. Bricklaying is the only building industry which seems to have made rather the reverse of progress during this century.

ARCHITECTURE IN AMERICA.

IN speaking recently of the general condition of American architecture Cass Gilbert, the architect of the new United States Custom House, which is to be erected at the foot of Broadway, New York City, is reported as expressing the following views:

Architecture in this country, in common with the art of all the more progressive nations of the earth, has been immensely influenced by the progressive spirit of the last decade. This influence is felt not only in America, but is noticeable in France, Germany and Austria, and, to some extent, in England. Speaking of the work in America only, I believe it has developed along utilitarian lines with greater rapidity than elsewhere, and, in comparison with our own work of 20 years ago, it has developed in artistic expression, although to compare our architecture with that of Europe is to find that we still have a great deal to learn on the artistic side. I refer to the modern as well as to the old architecture of Europe. In the growth of high buildings—what are popularly called sky scrapers—our country stands quite alone. The problem was, to start with, essentially an economical problem, and began to take form scarcely a dozen years ago, but within that brief time American architects are already finding an approximately satisfactory solution of the artistic difficulties. The high building, from an atristic standpoint, is an exceedingly difficult problem, and one in which economic and practical considerations are controlling factors. People do not build skyscrapers because they want to, but because they have to. Land values fix the hight. Taxation, interest, insurance are important elements. The owner of property in the congested district must build a high building, for a low building would not bring rent enough to enable him to carry the cost of his land.

Once there is a law established limiting the hight of buildings and it is known to be permanent land values and rents would adjust themselves accordingly. Yet even if such a law should never be made, I am confident that the high building problem can be satisfactorily solved. I find the lower end of New York exceedingly picturesque with its high buildings, whether viewed from the rivers, the harbor or from the streets themselves, although, of course, individual buildings may be justly criticized. In designing high buildings one difficulty an architect meets is that a great number of openings must be put in the wall without having the relief of a broad, uninterrupted wall surface. In fact, the whole wall must be filled with openings, which must be practically of a uniform size. Their function is the same, and as "form should follow function," in the words of Louis Sullivan, their form should be similar. This gives a certain monotony, perhaps barrenness, to the wall, and our architects have used every device thinkable to overcome the difficulty. Some have overlaid the wall with an applied architecture of columns and entablatures extending through the several stories. Some have grouped a number of openings within great arches which rise through several stories. Others have arranged these stories in alternating groups of two, three, &c., and in some of the buildings all these features have been combined in one facade. It seems to me, however, that the rational thing to do is to express the function of the building in the simplest possible way, giving the wall as much texture and color as found agreeable, and recognizing wherever possible the third dimension—thickness; then with several main divisions, namely, a basement, a shaft and a crowning feature, not to fear monotony. The common sense of such a solution commends itself to me, and I believe that it is upon the basis of common sense that the architecture of the past has been founded, and that the architecture of the future will develop. Of course, common sense does not mean stupidity. There must be with it that sentiment and quality which we call art, but art is possible within the realm of common sense. Art does not mean affectation.

Of course if it were possible for our streets to have great series of buildings of uniform hight, as in Paris, I think the effect would be unquestionably finer than our present street architecture, where every owner builds to any hight he wants, regardless of unity. I have been much interested in the development of the streets in Europe, especially in Paris, Berlin and Vienna. In all these cities, I believe, a careful censorship as to the artistic qualities of the buildings is exercised, and in Berlin, I understand, bonuses are granted by a board of commissioners to those owners who erect buildings of a high esthetic quality.

I look hopefully, however, for the future of architecture in this country. But architecture, more than any of the other arts, is sensitive to the general development of the people. It expresses the times and the conditions whether you will or not. Its development is not measured from year to year, but from decade to decade, from century to century, and it is too soon to say what this development will be.

HOW TO LIGHT A HOUSE.

HALF the trouble with modern eyesight, writes Frances Hyde in the Washington *Star*, is due to the fact that people now do so much of their work indoors where the houses are imperfectly lighted. If this is so, and there is probably more than a grain of truth in it, it behooves us to look well after our artificial lighting.

Nearly all houses now are lighted either with gas or electric light, and the proper placing of the fixtures determines whether the place is well or illy illuminated. In the house where lamps are used they cannot be conveniently carried about and placed in the positions where they will be most useful. Even in that case it is useful to have a bracket for the accommodation of the lamp in the neighborhood to be lighted, for the mantel or table is not always sufficiently convenient.

It is always much better to have the location of the lights arranged for when the pipes or wires are put in. If the owner of the house means to occupy it, his wife should go over the building and indicate where she will need special lights. She will probably begin with the cellar, her first request for a fixture being for one near the furnace, which is generally in an unlighted portion of the cellar and always require some attention at night. Another light will be asked for to show up the interior of the preserve room in the cellar, and another one near the stairs. In the kitchen there may be a drop light in the center of the room, with a fixture at the sink where dishes are to be washed and such serious work to be done. If there is a large pantry near the kitchen it should be provided with a light too, for it is unreasonable to expect the servants to spare the dishes and be economical with sugar and spices when they are compelled to calculate locations and quantities in the dark. If there is a butler's pantry, it too should be provided with lights. In the dining room a large light over the center of the dining room table is not only an economy but a necessity.

In sitting room or parlor the tendency is to light the rooms from the sides rather than from the central chandelier that used to be so popular. In the bedrooms brackets at each side of the dressing table mirror are required. The others may be arranged according to taste and convenience. The lower hall is generally supplied with a lantern light and with brackets at each landing on the stairway, the upper halls being similarily equipped. Many of those who have used electricity claim that nothing would induce them to do without it, while others are very unfavorably disposed toward it, saying that the strong light is very bad for the eyes. Electric light may be obtained in almost any town of considerable size by consultation with the local company. Even when electricity is used for lighting it is just as well to be supplied with gas or lamps for emergency, as it is very likely to fail at some time when it can least be spared.

When the electric light wires are put into the house it is always wise to have them indorsed by the insurance underwriters before they are pronounced satisfactory. The uncertainty of the electricity makes it absolutely necessary that the wires should be well guarded, so that in case of an accident there can be no danger of their setting fire to the walls. The company always examine and test the wires before they are pronounced complete, but it is just as well to have them indorsed by the company by whom the house is insured, and thus avoid the danger of any later and serious objections on their part when there is an insurance to be collected.

There is nothing so noticeable as the artistic construction of the modern house lighting fixtures. This is due in a measure to the impulse given to household decoration by local and national societies. The beauty of the hall lanterns challenges admiration. Some of the handsomest of these are of iron, wrought into intricate patterns with a skill that would reflect credit on one of the great smiths of the middle ages whom Sir Walter Scott paints picturesquely in his novel, "A Fair Maid of Perth." These lanterns are lined with colored glass and fitted with chains, so that the light falls with a soft and mellow beauty on the rather severe aspect of the entrance room.

The side brackets are equally handsome, the shades that accompany them being of the finest and most artistic patterns in glass, frosted, cut or colored and sometimes blown into the shape of garden flowers.

THE ART OF WOOD TURNING.—IV.

(SECOND SERIES.)

By Fred. T. Hodgson.

IN the first paper of this series we described and illustrated an eccentric chuck, as shown in Fig. 10. We will now endeavor to show its use in connection with the overhead attachment just described. Having the chuck properly fastened on the mandril of the lathe, and the index plate in place, we attach the work to be operated upon on the eccentric chuck by any of the usual methods. The stuff is supposed to be as true on the face as it is possible to make it, and this may be done while on a concentric chuck, or while on the eccentric chuck, if the eccentricity is reduced to a minimum. When the surface of the work is made true and fairly smooth, and the design to be wrought on the work determined, the completion will not be found difficult. We know, by what has been explained in the first paper, that by the use of the eccentric chuck a series of circles, or parts of circles, may be obtained on the face of the stuff revolving in the lathe, any reasonable distance from the actual center of the lathe mandrel, and these circles, or parts of circles, so far as their dimensions are concerned, are entirely under the control of the operator, so that the number of different designs, based on the principle shown in Fig. 32, is illimitable, as will be demonstrated later on. It is to be borne in mind that in the production of figures of this kind the belt or cord from the driving wheel to the pulleys or the head stock is taken off, and the cord running from the driving wheel to the overhead attachment and onto the revolving tool driver is substituted for it. What revolutions are made of the head stock pulleys are by the hand.

The last illustration represents, of course, only surface or ornamental work wrought on the face of a flat article, such as a small box for jewels, gloves or knick-knacks, or it may be cut on anything that has a flat face and is not greater at any point than the swing or diameter of the lathe. Whatever be the material, ivory, ebony or any hard wood, it must be securely fastened to the face plate of the lathe by some device that will readily present itself to the operator. This being done the designs, such as shown in Fig. 32, can be traced on the work by the aid of some kind of a rotary cutter used in the rest O of Fig. 21.

The cutter revolves rapidly while the work in the lathe is moved by the left hand to conform with the pattern, which in this case is done without the aid of the index plate, though this may be employed in connection with the eccentric chuck. The border is seen to consist of a series of four circles, while the pattern of the center is such as to require no explanation, the manner of working it being readily understood at a glance by the workman. There is another method of doing this kind of work on a concentric chuck, or where the material to be worked is simply attached to the face plate of the lathe. The index plate may or may not be used, just as the workman wishes, though it is always safer to make use of the plate if accuracy is necessary in the divisions of the ornament.

Let us suppose Fig. 33 to represent an additional tail block to the lathe as it stands on the bearer, and made so that it can be readily moved to or from the face plate. The various parts of the tool are separately shown at A, B and C. The first A is a small frame 2 or 3 inches long and 1 inch or less in width, made of cast iron, with a circular piece on the back, from 1½ to 2 inches in diameter. This circular piece is to be accurately divided on the edge with any even number which is divisible, as explained in connection with the index plate. This is turned and drilled through the center. The next piece B is flange shaped and intended to screw to the tail block. This is also accurately drilled, and the two are attached by a central steel pin, so that the two flanges may turn face to face, the outer one with frame revolving against the other. The pin must be put in its place in B and turned at the same time as the face of B, in order that it may be truly central. The divisions on the edge of the outer flange are to be drilled like the index plate of the lathe, or cut into cogs, which in either case can be held with a dog at any point desirable. The third piece, C, represents the front of the frame with a screw down its center, together with a travelling slide, F. The head of the screw is divided and a small brass index marks its position. One side of the frame may

revolution of the material on the face plate has been made.

Let it be distinctly understood that the lathe proper is at rest, or nearly so, during the operation of the forming circles, the face plate being moved only by the left hand of the operator to adjust the distances of the circles, while the right hand is employed bringing to and fro the cutting or marking tool by the aid of the handle and wheel X, shown at the right hand end of the tail block. It will at once be seen that a tool of this kind must have a wonderful range in the making of surface ornaments where the circle is the main figure, but to what greater extent must its capacity reach if the cutter be made not only to revolve on its own axis, but also to swing in an orbit of its own on any plane the operator desires. This can be accomplished in two ways: First, by having the tail block so made that it may be brought toward the front of the lathe or moved past the central axis of the mandrel, making it eccentric to the mandrel, and then arranging the divided slide C of Fig. 33 so that it can be revolved by the hand while the rotary cutter is rapidly revolving. This method of controlling the cut-

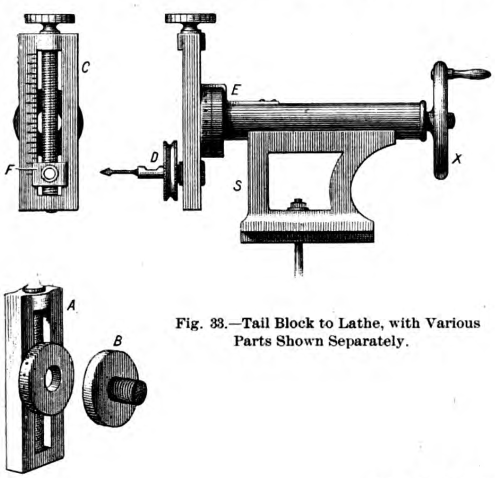


Fig. 33.—Tail Block to Lathe, with Various Parts Shown Separately.

Fig. 36.—A Crank Tool.

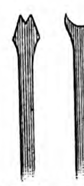


Fig. 34.—Forked Cutters.

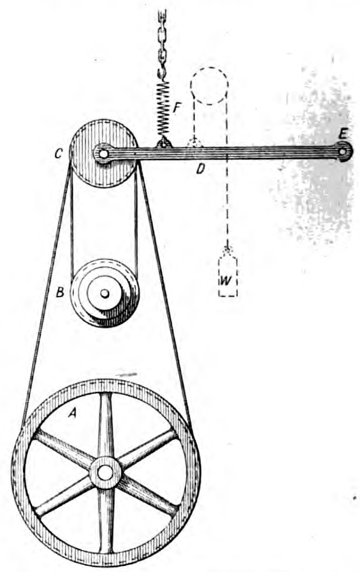


Fig. 35.—Device for Keeping Driving Cord Taut.

The Art of Wood Turning.

likewise be divided into inches or fractions of an inch, according to preference. The small pulley, which is of brass, and the tool socket, are arranged to revolve in the traversing slide F, as indicated in the side view at D. Drills and rotary cutters of any shape may be fixed in the socket at pleasure.

It is quite evident that this cutter frame, being supplied with a division plate of its own and other necessary attachments, disposes of the necessity of one on the pulley mandrel, as shown in Fig. 25, for concentric turning, though the index plate may be employed in conjunction with the attachment in some cases of compound ornamentation. It will be seen that with this little tool or machine the rotary cutter can be made to do its work on the outer edge of the diameter, or it can be brought to perform its work in the center of the field, or even across it. This being the case, it is not difficult to understand how the circular lines shown in Fig. 32 can be described in the lathe.

If the cutter or drill having two prongs on it, as shown in Fig. 34, be fixed in the socket of the tool holder, Fig. 33, and is revolved by aid of the pulley, it will form a circle, and if the material to be operated on is revolved slightly in the lathe and the tool again applied another circle will be formed. This may be continued until one

ting tool will necessitate some additional attachments to the driving cord or catgut, as it is quite evident that the brass pulley to which the tool holder is attached will be continually changing its position, and under the present arrangement of the overhead attachment the cord would often be too tight or too slack to admit of the pulley doing its work properly. In order to overcome this difficulty some one of the many devices employed by machinists for keeping the cord or belt tight must be adopted.

This will not be a serious matter as a tightening pulley, so called, can readily be fixed so that the cord will pass over the groove and the pulley weighted, balanced or adjusted with a spring or springs in such a manner that the cord will always remain at the proper tension to cause the cutter tool pulley to revolve.

The device shown in Fig. 35 will give the reader some idea of how the thing may be managed, and though this example is intended to exhibit the method of keeping the driving belt or cord at the proper tension, it is equally applicable in cases where the catgut from the overhead is required to be held taut. The plan is not more ingenious than practical, and the device can be easily made and set up by any one who has had experience in the use of tools. In this case there is a pulley directly over the mandrel pulley of large diameter in which there are two grooves of equal depth and equal diameter in order not to disturb the set speed of the mandrel pulleys. The upper pulley is suspended on a movable arm, D, which is pivoted at E, and kept up by a chain and spiral spring F, or by a cord passing over a pulley and having a heavy weight attached, as at W, all as indicated by the dotted lines. In Fig. 35 A represents the driving wheel, B the mandrel pulleys and C the upper pulley. The lathe cord is very long and passes upward from A over the upper pulley in groove 1, down again and around the mandrel, a second time over groove 2 of the upper pulley and down to the driving wheel. The tension cord is thus always the same and is regulated by the spring or weight. If the cord is slipped to the smaller pulley the slack is instantly taken up by the descent on the weight and the rising of the arm D which, in like manner, yields to allow the cord to be slipped to the larger groove of the mandrel pulley.

The workman who is master of his own lathe will not be confined to any particular method of keeping the cord tight while the rotary cutter is in motion, and he will not necessarily adopt the plan here shown, but will change it to suit his overhead gear, as it is likely he may be able to devise a readier way than any design possible to describe here owing to the surroundings of his lathe. The illustration, therefore, is presented only with the object of hinting how the tension of the cord may be kept regular by the aid of an automatic tightening device of some kind.

The lathe as now equipped is capable of executing a great many ornamental designs on flat surfaces, dependent to a great degree on the skill and ingenuity of the operator. While the machine or machines, as presented in these papers, is or are designed for working flat surfaces it does not follow that cylindrical, or even spherical surfaces may not be ornamented in like manner.

The tail block or rest S of Fig. 33 can be so manipulated, if in the hands of a careful operator, that any design within the range of the appliances may be engraved on a curved surface. This, of course, would take a great deal of time and involve much care and skill, as the depth of the cut would have to be regulated by the turning of the hand wheel X of the same figure, and the slightest mistake made by getting the cut too deep might spoil the whole work.

The cutting tools adapted to the machine under consideration are many and varied, and may be obtained from any of the firms manufacturing shaper and molding machines advertised in *Carpentry and Building*, notably the Seneca Falls Mfg. Company, the W. F. & John Barnes Company, or they may be made specially for particular purposes. It never pays, however, to make one's own tools if the ones wanted can be obtained from the manufacturers. One cutting tool which will be found very useful for the kind of work under consideration and which is designed to take the place of the forked tool shown in Fig. 34, is known as the crank tool, shown in Fig. 36. It is made in the form of a small crank with the cutting or marking spur fitted in at the distance required to get the size of the circle wanted to be marked off. In this case the spur shows a kind of diamond point, which, of course, would form a series of circles, each one having a diameter of double the distance marked off from the point of the spur to the center of the tool. The cutter or marker, however, need not necessarily be confined to this shape. It may be pointed like a gouge, or it may have two spurs, thus making two concentric circles instead of one, or it may have any shape to suit the taste of the operator or the character of the general design. The machine or tool might be built on the style of Clark's or Jennings' expansion bit, by which the cutter or marker can be at once moved to any diameter within the range of the tool. This arrangement of cutters will depend very much on the work to be done and the length of the purse of the worker.

While it is not intended to illustrate a large number of designs obtainable by aid of the tools and appliances now described, for these designs would cover acres of paper, it may not be out of place to show a few in order to give the reader an idea of the capabilities of the lathe as now equipped. In Fig. 32 is shown one pattern, brief reference to which has already been made, while Figs. 37, 38, 39 and 40 exhibit several others which may be easily wrought with the tools in hand. In these examples it will be noticed that all the ornaments are circles, or parts of circles, and only designs of this kind are obtainable with these attachments. These, however, can be so varied and commingled that the number of designs is legion. Later on, when the rose engine, the geometric chuck and chasing devices are discussed, a few designs formed by such devices will be presented. For the present the ones offered will suffice for our purpose.

Fig. 32.—An Example of Surface or Ornamental Work.

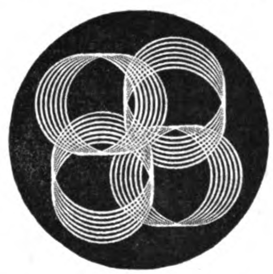


Fig. 37.—Circles in Right Angles.

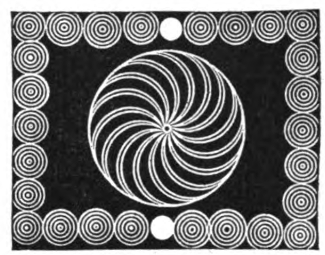


Fig. 38.—Composite Pattern.

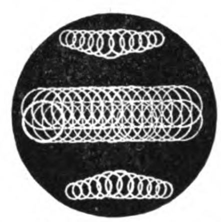


Fig. 39.—Pattern Composed Entirely of Circles.

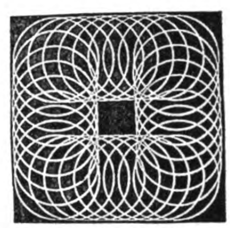


Fig. 40.—Interlacing Pattern.

The Art of Wood Turning

Few places of worship in the country have more interest than the miners' sanctuary in the Myndd Newydd colliery, near Swansea, says a foreign exchange. Situated 750 feet below the surface of the earth, with four long rows of pib wood to sustain the roof, a rude desk on a large lump of coal for a pulpit, and a series of rough hewn planks as "pews," it is indeed the strangest of the many strange bethels in wild Wales. It is stated that every Monday morning without a break for 54 years the colliers have crowded into the novel apartment to ask the blessing of Providence upon the week's work.

CUT AND WIRE NAILS.

CONSIDERABLE correspondence has appeared in the press during the past year regarding the merits of iron and steel cut nails as compared with wire nails, says John Coyne of Pittsburgh, Pa. An important feature which must not be overlooked in this discussion is that, denomination and weight being equal, the first named will resist corrosion twice as long as steel cut and three times as long as wire nails. This fact has been fully proved and published many times in the last 25 years.

Steel cut nails can be prepared to equal the iron cut in corrosion resisting quality at an additional cost of 5 cents (or less) per 100 pounds. A similar treatment of wire nails would not have an equally beneficial effect, owing to the trace of acid remaining after deoxidization. This, together with the carbon condition in the wire, promotes the tendency to corrosion.

Government and private tests have proved that the adhesion (or holding power) of iron and steel cut nails is about 50 per cent. greater than that of wire nails. They have also another decided advantage in that, owing to their shape, they are less liable to bend under the impact of the hammer.

The foregoing facts are well known to those having a comprehensive knowledge of the subject and will not be disputed, except by manufacturers or others having commercial interests at stake.

The reason that wire nails have to such an extent superseded the cut variety is largely due to the opposition of the manufacturers to any improvement in their cut nail machines or the quality of goods placed on the market, which contained a considerable quantity of waste material, amounting in the United States alone a few years ago to more than 20,000 tons per annum, all of which could have been eliminated without cost, but the manufacturers were unwilling to do this, it being much more profitable to sell the whole product as good nails.

There is little or no waste with the wire nail, and there are a greater number of them per pound than of cut nails of the same denomination.

The construction of cut nail machines is more complex, and about three years time is necessary to attain the skill and manual dexterity to successfully operate them, while the ability to operate the wire nail machine can be acquired in about three weeks.

The latter style machines were introduced into the States by Michel Myers of Germany and were, I believe, first put in operation about 1876 at the wire works in Covington, Ky., and no improvement in arrangement or efficiency has since been made in them; in fact, the French pattern in common use for the past 50 years is simpler in construction and just as efficient as any of the so-called "improved" machines later produced. All the requisite movements are secured without rotating cams by a single throw on the power shaft.

The iron cut nail originated in Birmingham, England, in 1726. The steel cut also originated in the same town in 1862, samples of which were exhibited at the Universal Exposition in London in that year. These are now at the Peel Park Museum, in Salford, near Manchester.

TRUSSES FOR WOODEN ROOFS.

By F. E. Kidder, Consulting Architect.

TRUSSES have been used for the support of roofs for many centuries, but it is only within the last 50 years that the principles upon which they act have been reduced to a science and made so plain that any one can master them. Undoubtedly many of the trusses built to-day are copied from existing trusses, and the sizes of the pieces of which the truss is composed are determined by guessing pure and simple, although the person designing the truss would probably claim that he was guided by "experience." If it were always possible to find a truss that had the same span, was built of the same materials and loaded in exactly the same way as the truss we wished to construct, we might safely copy such a truss, provided it had stood long enough to demonstrate its safety. But it is seldom possible to find such an example to follow, and even then we might be using more material than the loads required.

It is therefore necessary to be able to design a truss for any conditions of span, loading or materials, so that we shall know with absolute certainty that it will safely carry the portion of the building supported by it and any pressure of snow or wind that may come upon the roof (with the possible exception of a cyclone), and that without using an unnecessary amount of material. To do this is not a very difficult matter, at least for the ordinary forms of wooden trusses, but it requires some study and practice, and cannot be learned from a thumb rule. At the suggestion of the editor of this journal the writer proposes to discuss the subject of wooden roof trusses in as simple a manner as possible, explaining the way in which they should be built, the action of the various parts in transmitting the strains, and, if there seems to be sufficient interest in the subject, the way in which the size of the pieces should be determined.

Definitions.

In any discussion of trusses it is necessary to use certain terms, the meaning of which, as used by the writer, must be clearly understood by the reader. In these articles the term "truss" will be used to designate any frame work supported only at the ends (except in the case of a cantilever truss, which is supported near the center), and so designed that it cannot suffer distortion—that is, break away—without either crushing or pulling apart one of the members of which it is composed and will exert only a *vertical* pressure on the walls or supports.

A *roof truss* is a form of truss designed for the especial purpose of supporting a roof, although it may also support the ceiling below, and perhaps a gallery or one or more floors.

By *wooden trusses* is meant trusses built principally of wood, but having iron or steel rods for some of the tension members, the term being used in distinction from trusses built entirely of iron or steel.

A *member* of a truss is any straight or curved piece of wood or iron which connects two adjacent joints of a truss, and which is essential to the stability of the truss. The term "piece" will also frequently be used to designate a particular member.

Every member of a true truss acts either as a strut or a tie.

A *tie* is a piece of material that is subject to tension—that is, a pulling strain.

A *strut* is a piece of material that is subject to a compressive force. In wooden trusses the struts are always made of wood, but the ties may be of either wood, iron or steel, the main horizontal tie being generally of wood and the vertical ties of iron. Struts must have sufficient stiffness to prevent their bending under the compression, but ties may be flexible, as a rod or cable.

The points where two or more members of the truss come together will be designated as joints, whether the members end at that point or not.

Purlins are horizontal beams, sometimes trussed, extended from truss to truss to support the rafters or ceiling joists.

Simple Forms of Trusses.

The simplest truss is that shown in Fig. 1. Such a truss, however, is only suitable for supporting a load either at the apex or on the tie beam. For a roof economy requires that the rafters shall not have a greater unsupported length than 12 feet, and in order to secure this it is usually necessary to introduce braces on each side of the truss, as shown in Fig. 2. These braces support the purlins, which in turn support the rafters, as shown in Fig. 3.

When the span becomes greater than 36 to 40 feet two braces are inserted on each side of the truss, as shown in Fig. 4, or the top of the truss may be cut off and a strut beam inserted between the upper ends of the principals, as shown in Fig. 5. When the span is still greater, and it is desired to utilize the attic space, a form of truss such as that shown in Fig. 6 may be used.

The form of construction shown in Fig. 2 is commonly known as a "king rod truss," being the modern form of the old king post truss. The form of the truss represented in Fig. 4 has no generally recognized name, but may be designated as a "triangular truss." It may have two, three or even four braces on each side. The truss shown in Fig. 5 is commonly known as a "queen rod truss." Special names are given to certain members of these trusses, as indicated in the illustrations. With all of these forms of trusses it is desirable that the rafters be supported on purlins in the manner shown in Fig. 3. These purlins should extend from truss to truss, and should come directly over the ends of the braces, or as nearly so as the construction will admit.

The principles of action of any of these trusses are not varied either by the span or by the inclination of the principals, but to keep the size of the pieces within reasonable limits the inclination of the principals should

We will first consider the action of the stresses in the truss shown in Fig. 1, taking first the stresses produced by the loads W_2 and W_3. These loads bear directly on the head or nut of the rod D, the tie beam merely acting as a bearing block at that point. The weight transmitted to the bolt head produces a pull in the rod, which carries it to the apex, where the stress is taken up and divided by the pieces A and B, half passing down A and half down B. The weight of W_1 also produces a compressive stress in A and B, the total stress in A or B being the sum of the stresses produced by W_1, W_2 and W_3. The direction of the stress in A and B is the same as the axis of the piece, and as the supports are constructed to resist a vertical force only the horizontal component or push of the stress must be taken care of by some other piece, and it is the duty of the tie beam to take this horizontal component of the stresses in A and B.

This leads us to a few remarks on the *components* of a force. It is a principle of mechanics that for any given force acting on a point, as, for instance, a small round ball or marble, two other forces may be substituted which, acting together on the marble, will have

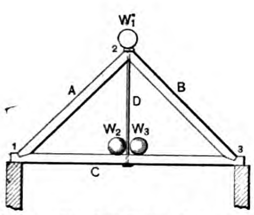


Fig. 1.—Simplest Form of Truss.

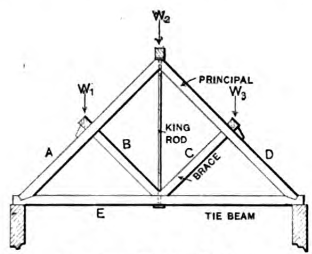


Fig. 2.—A King Rod Truss

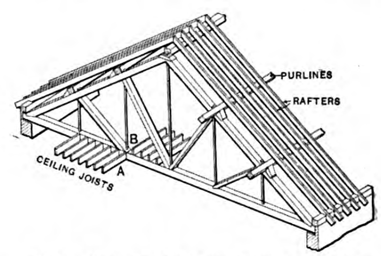


Fig. 3.—Showing how Truss Supports Purlins and Rafters.

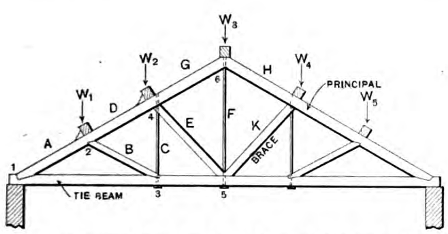


Fig. 4.—A Triangular Truss for Spans Greater than 36 to 40 Feet.

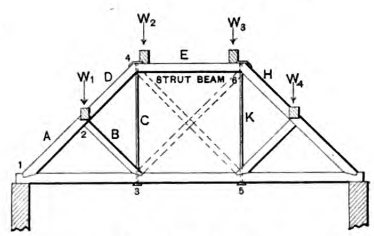


Fig. 5.—A Queen Rod Truss.

Trusses for Wooden Roofs.

not be less than 5 inches in 12, and a rise of 8 inches in 12 will generally be the most economical. The span should not be so great that the horizontal distance between the joints will exceed 12 feet, and it is generally most economical to arrange the trusses so that the distance between purlins measured on the slant of the roof will not exceed 12 feet. Ordinarily the members shown as rods should be of iron or steel, and the other pieces wooden timbers.

Action of Stresses in Trusses Illustrated.

In order to know how a truss should be built one must understand the manner in which the different pieces act in supporting the loads and transmitting the stresses from one joint to another, and, finally, to the supports. It is not strictly correct to say that stresses are transmitted, as a stress is really a force acting against the end of a piece of material, and in a truss these stresses either cause a pulling or pushing at each end of the piece, according as the piece is under compression or tension. In showing how the stresses in the different members of a truss are brought into action by the loads, however, it seems clearer to speak of the stresses as passing from one member to another, and for this reason we shall so refer to them in this article.

the same effect as the original single force. Thus, if we push against the ball represented in Fig. 7 with a force of 10 pounds acting in the direction of the line F (45 degrees) it will cause the ball to move forward in the direction of X. If instead of the force F we push on the ball, horizontally and vertically, with a force of 7 pounds, acting in each direction at the same time, the ball will move forward in the same direction and with the same velocity as when acted on by the single force F; or, in other words, the forces F_1 and F_2, acting together, have the same effect as the single force F. From this fact we may assume that any oblique force may be divided into two other forces, one of which will act vertically and one horizontally, and these forces are spoken of as the *vertical* and horizontal *components* of the given force.

It is evident that for the forces F_1 and F_2, Fig. 7, to have the same effect on the ball as the force F they must bear a partial relation, in magnitude, to it. The value of the components of any given force can easily be determined graphically by drawing the given force in its true direction to a scale of pounds to the inch, and then drawing from one end a horizontal line and from the other end a vertical line until the two lines intersect, as in Fig. 8. The length of the horizontal and vertical lines, measured by the scale used in drawing the original force F, will give the magnitude of the components F_1 and F_2.

Admitting that two forces may be substituted for a single force, it follows that a single force may be balanced by two forces acting in a direction diametrically opposite to the components of the force and equal in magnitude to them—that is, the ball shown in Fig. 7 may be balanced by the two forces P_1 and P_2 acting as shown in Fig. 9 and each equal to 7 pounds. It should also be noticed that the sum of the components of a force is greater than the force itself, and consequently it requires more resistance to balance a single force with two forces than to balance it with one direct force. Thus, in the truss shown in Fig. 1 the combined stress in the struts A and B is greater than the sum of W_1, W_2 and W_3. The sum of the vertical components of these stresses, however, will be just equal to the total load on the truss. With the above explanation it should be easier to follow the action of the stresses in any truss.

We will next consider the action of the stresses in the truss shown in Fig. 2, first following the stresses produced by W_1. This load produces a pushing or compressive stress in A and B. The vertical component of the stress in B is taken up by the king rod, while the

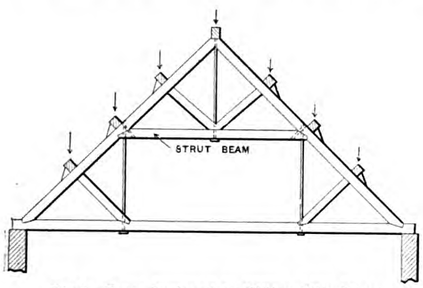


Fig 6.—Truss Designed to Utilize Attic Space.

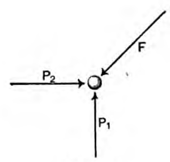


Fig. 9.

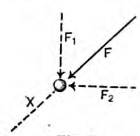


Fig. 7.

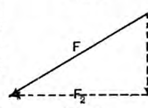


Fig. 8.

Diagrams for Determining the "Components" of a Force and their Value.

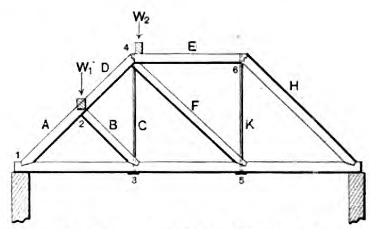


Fig. 11. Truss Loaded on One Side Only.

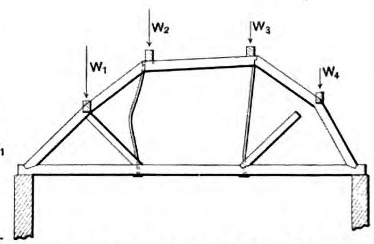


Fig. 10.—Showing Effects of a Truss Unequally Loaded.

Trusses for Wooden Roofs.

horizontal component is resisted by the horizontal component of the stress in C. The stress in C produces a compressive stress in the principals, which passes to the supports. The load W_2 is resisted directly by the two principals. If now we consider the pieces A and D, we find that they receive a stress from W_1 and W_3 direct, a stress from the pull in the king rod and also a stress from W_2. The vertical component of these three stresses is resisted by the walls and the horizontal component by the tie beam.

The stresses in the truss Fig. 4 act in the same way as in truss 2, except that there are more loads. Thus the load W_1 produces a compressive stress in both A and B. The vertical component of the stress in B is taken up by C, which carries it to joint 4, where it is resisted by D and E. The vertical component of the stress in E is taken up by the tie F, carried to joint 6, whence it passes down the principals to the supports. The horizontal component of the stress in B is resisted by the tie beam, while the horizontal components of E and F balance each other, provided the truss is symmetrically loaded. The stresses produced by W_2 and W_3 act exactly as in the truss Fig. 2.

In considering the action of the stresses in the truss shown in Fig. 5 it may be stated that the load W_1 produces a compressive stress in A and B. The vertical component of the stress in B is taken up by C and carried to joint 4, where it produces a compressive stress in D and E. The stress in D is resisted by the wall and by the tie beam, and the stress in E must be resisted by an equal stress coming from the other side of the truss. The load W_2 is resisted directly by D and E, the horizontal push in E being resisted by the corresponding push in the opposite direction produced by W_3.

That the stresses acting against the ends of E shall balance each other, it is evident that W_2 must be exactly equal to W_3 and W_1 equal to W_4. As a matter of practice, a slight inequality in the loads on opposite sides of the truss will be resisted by the stiffness of the joints, but if W_1 and W_2 are considerably greater than W_4 and W_3 then the truss will collapse, as shown in Fig. 10. To prevent this the truss should be counterbraced, as shown by the dotted lines in Fig. 5.

In order to consider the action of these counterbraces we will trace the stresses in the truss Fig. 11, which is loaded on one side only. The load W_1 produces a compressive stress in A and B. The vertical component of the stress in B is taken up by C and carried to joint 4, where it produces a compressive stress in D and F. The vertical component of the stress in F is taken up by K and carried to joint 6, where it produces a compressive stress in E and H. The stress in E is balanced by a portion of the horizontal component of the stress in D and the horizontal component of the stress in H by the tie beam. In a similar manner W_2 produces a compressive stress in D and F, a pull in K and compression in E and H.

Now in actual construction the dead loads on a truss of this kind, consisting of the weight of the roof and of the truss itself, will be practically equal on each side of the truss, but one side of the roof may be covered with snow when there is none on the other side, and the wind can only blow on one side of the truss at a time, consequently one side of the truss is liable frequently to be more severely loaded than the other, and this may happen to either side of the truss. It is also evident that an inequality in the loads will produce the same effect as if the truss were loaded on one side only, and as we have seen that this condition is liable to occur at any time, it is necessary to provide for it by introducing both of the braces shown by the dotted lines in Fig. 5.

It is, in fact, a general principle that whenever a truss is liable to be more heavily loaded on one side than on another all rectangular spaces should be braced by diagonal braces in the manner above described. About the only exception to this rule is the truss shown in Fig. 6, in which the rectangular space may be left open, when there is an attic floor resting on the tie beam.

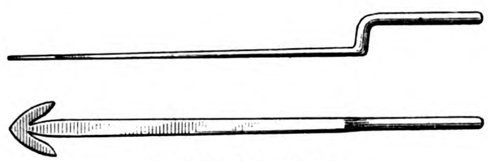
We have now seen how the stresses act in a simple triangular or queen rod truss; the next step will be to determine the magnitude of the stresses, after which we can determine the size of the pieces and the strength required in the joints.

(To be continued.)

CORRESPONDENCE.

Repairing Leaky Roofs.

From L. S. H., *Fredonia, N. Y.*—Having seen considerable in *Carpentry and Building* recently about leaky roofs and the best way to repair them, I send as of possible interest an illustration and description of a tool which I had made some ten years ago, having at the time to repair the roof of a large church building. The bottom of the tool shown in the sketch is perfectly flat, the edges at all points of the head being drawn down sharp from the top, so it will easily catch and hold to the head of a large or small nail if it projects the least bit. The shoulder is nearly or quite at right angles, so it may be driven against with a hammer if necessary, thus enabling the workman to remove a shingle which may be rotten without injuring the one next to it, which may be perfectly sound. I would say in this connection that



Repairing Leaky Roofs.

a leak in a roof is hardly ever found directly over the place where it shows in the rooms below, as the water usually runs down the roof boards or the rafter quite a distance from the point of entrance. A classroom in the building in question was situated at one corner and the plaster was nearly all off. The roof had the appearance of being all right, but nevertheless I patched it in all places where it looked as if water might be driven through with a club. The next time it rained the water came in as bad as ever. I then crawled up the valley, the water from which emptied onto the roof of the classroom, and more than 20 feet from the bottom I found quite a large hole in the tin, the water having followed the valley rafter all that distance without doing the least injury to the plaster or frescoing in the main room.

Formula for Cement Walks.

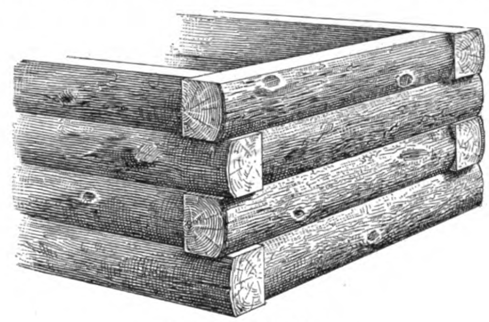
From W. A. T., *Weedsport, N. Y.*—I have read with interest the formula for cement walks by F. Reissmann of West Point, N. Y., which appeared in the December issue of the paper. It is excellent, and I do not see how it can be improved upon. The only objection I have is the cost, which is stated to be about 40 cents per square foot, this being such that most people would hesitate about using it. As being of interest in this connection, I will give our method of making cement walks. We merely level off the ground about 6 inches below the grade line of the walk, filling in any low places that may exist and cutting down high places. We next scatter coarse gravel over the ground and ram it well into the dirt, especially if the ground is soft. We then run a row of 2 x 4 hemlock strips along each side of the walk with the top edges straight and set to the grade line. These pieces we hold in place by means of small sticks driven into the ground on the outside of them. We take feather edge boards 4 inches wide and place between the side strips, dividing the walk into square blocks about 4 or 5 feet each way, making sure that the thin edges of the boards are level with the top of the side strips.

We now are ready for the concrete, which we make as follows: We have a box 4 feet wide by 6 feet long and 1 foot deep, into which we put seven parts of fine gravel, adding one part of Portland cement and sufficient water to thoroughly wet it. Thoroughly mix the cement and gravel while dry. Place the concrete in the square places and thoroughly ram with a pounder made of a block of wood attached to a long handle. The concrete should be, when well worked down, about 1½ inches below the level of the side pieces. When the concrete has set somewhat, but before it has dried out, prepare the top finish by mixing two parts of clear, sharp sand with one part of good Portland cement, adding water enough to make this into a thin grout. Pour this over the concrete and fill the squares full enough so that a straight edge placed across the top of the side strips and drawn across them will level the top of the walk. Let this stand until the water which rises to the top disappears. Then level down smooth with a hand trowel. The side pieces should remain in place for at least one week, when they may be removed.

While this kind of walk may not be as good as some others, it has the advantage of being very cheap, and at the same time very durable. It can be put down at a profit for 9 cents per square foot and guaranteed not to crack or scale off, and as for durability there are walks in this place put down 14 years ago that are apparently in as good condition to-day as when placed there. The Portland cement referred to is the American product, made at Warners, N. Y.

Design for Log Cabin.

From W. F. W., *Warrensburg, N. Y.*—In a recent issue of the paper "W. A." of Chicago, Ill., asks how to build a log house. In reply I would say that old fashioned log houses were laid up of round logs with dovetailed corners, and then the ends of the logs were sawed off, making them all of one length. The doors and windows were sawed out and a piece of plank pinned to the ends of the logs for a jamb, and the inside of the house hewn down as smooth as possible with a broadaxe. "W. A.," however, can cut out his own windows as he lays up the house and save lumber. If he has or can get the use of a saw mill he can split his logs in the center on the saw, then edge two sides, bringing them all to one size, thus giving him three straight sides and two square



Design for Log Cabin.

corners. He can miter the corners or butt the square end up against the inside of the half logs, as shown in the sketch which I inclose, breaking joints every time, so that there will be just one-eighth of the ends to show on the two sides of the four corners. He can then fasten them together with small spikes, or if he prefers he can dovetail the ends together the same as wooden bridge abutments are joined together.

From OLD TIMER, *Michigan.*—Referring to the inquiry of "W. A," Chicago, Ill., on page 51 of the current volume, I would suggest that he use the available lumber in his logs to frame and cover the log house, utilizing the slabs with the bark left on for covering. By having a space of say 2 inches between the slabs, which may be filled with a mixture of cement and sand colored, for instance, a dark red, with the shingles stained to harmonize with the color of the bark and casings, I think the correspondent will have a very pretty cottage with the effect of a log house. The door and window frames I would set back from the extreme edge of the slabs, as in brick and stone houses, the edges of the slabs being chamfered and colored to match the filling between the slabs. If there is an abundance of good building stone, a chimney wall and chimney stack of ample proportions with open fireplace will add to its attractiveness. Perhaps "W. A.'s" patron will insist upon the old idea of solid logs lapped at the corners, but from my experience with them, the structure will in time become objectionable from the fact that the rotting logs are liable to breed all sorts of vermin and insects.

Power for Small Carpenter Shop.

From TRY SQUARE, *Whitewater, Wis.*—I have just received the March issue of *Carpentry and Building* through our news agent, and take this opportunity of stating that I like it better with each number, especially the valuable articles for young carpenters and other wood workers, to which class I belong. Another thing I like about the paper is that it is not full of long winded articles for architects, contractors, &c. I notice an inquiry from "J. E. D.," Chicago, Ill., with regard to the best power for a small carpenter shop. I would advise him to obtain a small gasoline engine. I have run a Webster vertical 2½ horse-power gasoline engine for about a year, and for purposes of light power I think it cannot be beat. I have no doubt, however, that there are other makes just as good as the Webster. For economy, ease of operation and cleanliness by all means get a gasoline engine. I have run this engine ten hours straight with the machinery attached, which was supposed to take 8 horse-power, and I did it with 45 cents' worth of gasoline. I doubt if one could fire up a steam engine for that amount.

Square Cupola for Barn.

From W. A. E., *East Waterford, Maine.*—Will some of the readers of the Correspondence department furnish for publication plan and elevation of a square cupola with a curved hip roof, adapted for a barn 40 x 60 feet in size, with 15-foot posts ?

Laying Out a Polygon.

From J. B. W., *Shelton, Wash.*—Will you please give me room in your valuable paper for just a few words ? On page 13 of the issue for January I find "R. J. H." of Chicago illustrating a simple and easy method of laying out a polygon. Now, his method is good, so far as it goes; but he stops so short that his explanation is of but little value, owing to the fact that he does not tell us how to proceed when the dimensions are given as well as the number of sides. For instance, suppose I was going to lay out a polygon with five sides, and each side was to be 6 feet, what would be the size of my circle, or what would be the first thing to consider, and how should I proceed ? Now if Mr. "R. J. H." will explain this part of the method I shall be ever grateful.

Gas Engines for Small Power.

From W. S. W., *Washington, Iowa.*—I notice a correspondent recently asked about gas engines for small power, and as I have lately put in a 1½ horse-power gasoline engine, it may be interesting to the correspondent to know what I think of it. The engine is used to run a rip saw with the attachments, which were illustrated in the issue of *Carpentry and Building* for March, 1898. I also run a small lathe and a scroll saw. It does the work nicely and effects a great saving of labor, while occupying very little room.

The Size of Cold Air Ducts.

From A. B., *Bayonne, N. J.*—I would like to know why so many houses which are supposed to be thoroughly informed as to the best method of heating by hot air furnace use such large cold air ducts in connection with furnaces. In my experience a great many complaints brought to my shop of unsatisfactory heating are due to the fact that the cold air ducts are about twice as large as they should be, and invariably the remedy applied in cases of complaint is the closing of the damper so that the tube is not more than one-third open. In my work I never make the cold air duct with an area of more than one-half of the area of the hot air outlets.

Note.—We commend this topic to our readers for discussion. The practice of making the cold air duct with an area very nearly that of the combined hot air outlets is due to the fact that in the early fall and late spring, while it is necessary to have some fire, the larger the quantity of air which can be passed through the furnace the less annoyance is experienced in the building from overheating, and it is a simple matter in colder weather, or when the wind blows, to use the damper to reduce the supply. An apparatus for automatically controlling the air supply would undoubtedly answer the purpose, providing it worked satisfactorily. The reason that our correspondent's practice has been satisfactory is partially due to another existing evil—that is, the small flue used in the partitions, which, in view of the small volume of air that it carries, requires the air to be heated to a much higher temperature than can be recommended by good practice. Consequently the smaller the quantity of air brought to the furnace the more readily it is heated to a high temperature. Large cold air ducts and large flues for carrying the warm air from the cellar pipes to the rooms to be heated are far more desirable and should be generally recommended.

Filing Cross Cut Saws.

From R. S., *Kalamazoo, Mich.*—As I am one of the new readers of *Carpentry and Building*, I would ask some kind contributor to your most excellent paper to show, with illustrations, the best way to file a cross cut saw. By so doing he will confer a favor upon me, and no doubt upon many others who are interested. If in return I can favor any one in the future I will gladly do so.

Note.—In presenting the above inquiry to the attention of the practical saw filers among our readers it may be interesting to the correspondent to peruse the letter of "W. F. W., on page 72, and of "S. A. M.," on page 97 of the volume *Carpentry and Building* for last year. These deal with the subject of saw filing and contain much that is of interest and value.

Laying Out Dovetail Work.

From C. E. W., *Canaan Street, N. H.*—Will some of the readers of the paper please tell me the correct way to lay out dovetailing? I am much interested in the subject and shall be glad to see something in the columns regarding it.

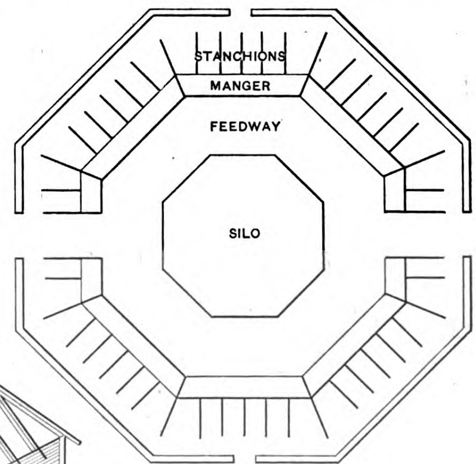
Raising and Moving Brick Buildings.

From A. H. H. M., *London, Canada.*—Will you kindly allow me space to ask a few questions about raising and moving a brick house ? There has never been any of this work done here in the city except last summer, when I raised a brick office which was 20 x 20 feet in size and one and one-half stories high. I have been asked to tender on moving a brick house 10 feet and raising it 3 feet. I have not taken the dimensions of it yet, but would judge it to be about 40 x 56 feet and two stories high. There is a jog of about 2 feet on one side and two bay windows in front. I would very much like to have the readers of the paper describe the best method of proceeding with the work. How should the timbers be put under and is it necesary to have them run the entire width of the building in order to tie it together ? What kind of a runway should be constructed and what kind of rollers should be used ? What is the best method of moving it after it is loaded, there being a cellar under half the building ? I have been told by people who have seen it done that it is customary to use iron bands placed around the walls of the building. I fail to see the use of them, especially in the present case, where there is a jog in the building.

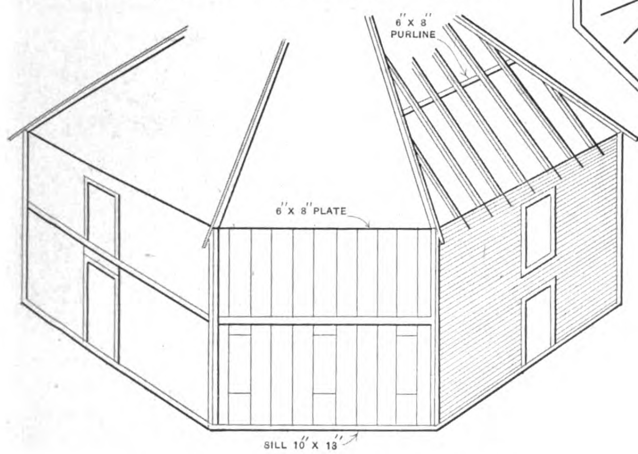
Note.—The subject raised by our correspondent is an interesting one, and while the successful movement of the structure will be governed to a large extent by local conditions, it is probable that he will obtain valuable suggestions from some of the articles which appeared in back volumes of *Carpentry and Building*. In our issue for November, 1893, will be found an illustrated description of the method of moving a brick railroad station, while in the issue for January, 1896, we presented a detailed account of the moving of the Immanuel Baptist Church in Chicago, this being one of the most notable operations of its kind ever successfully executed. In the issue for October, 1898, there is an account of the moving of four double five-story brick flats. The methods of house movers differ, however, in various sections of the country, and we shall be glad to hear from our readers as to the manner in which they would carry out the work described by the correspondent.

Design for a Dairy Barn.

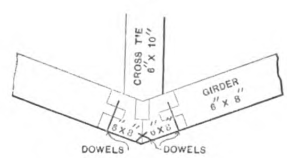
From H. R. R., *Larned, Kan.*—Replying to "J. L. T.," Bremen, Ind., I send herewith sketches, not drawn to scale, of an octagon barn which may prove of interest. The main sills are 10 x 12 inches; the cross sills 8 x 12 inches; the girder in wall 6 x 8 inches; the girder over manger 6 x 10 inches; the cross tie 6 x 10 inches; studding 2 x 6 inches, spaced 2 feet on centers; hip rafters 2 x 12 inches; main rafters 2 x 8 inches, with purlin in center; floor joist 2 x 12 inches, placed 16 inches on centers, and loft joist 2 x 10 inches, placed 2 feet on



Plan of Barn.



Isometrical View, Indicating Method of Framing.



Detail of Framing a Corner.

Design for a Dairy Barn.

centers. The outside walls are to be sheathed with 8-inch matched sheathing and redwood siding over it. The roof is to be sheathed with matched boards and then covered with redwood shingles laid 4½ inches to the weather. As it has not fallen to my lot to build a silo and knowing nothing about its construction, I cannot advise the correspondent how to construct one.

Note.—It may be interesting to the correspondent making the inquiry for a design of a dairy barn to know that he will find valuable information as to the construction of a silo in a little pamphlet entitled "Silos and Silage," issued by the Secretary of Agriculture, Washington, D. C. The matter is contained in what is known as "Farmers' Bulletin No. 32," copies of which he can obtain free on application to the Department.

Backing Hip Rafters.

From W. S., *Paterson, N. J.*—I would like to thank the editor for the space and attention given my questions, and at the same time thank those who have sent answers to them. I would be pleased to have "L. W. G." of Alpena, Mich., submit diagrams of hips and jacks with any curvature he may have used, and perhaps it would interest others as well as myself. I shall try his plan of backing as soon as I can. All the answers in the February number are practically the same. The one in the December issue I do not quite understand, especially that part from G to F on the plan. It seems to me that would cut off on quite a bevel.

Designs of Summer Cottages.

From FRAMER, *Michigan.*—I wish some of our architectural friends would contribute designs of summer cottages, such as would be suitable for summer outing parties, &c. This part of Michigan contains a number of picturesque lakes, which in summer are visited by people from as far West as Chicago. Something modest in cost, style and size is desired.

Note.—We shall be very glad to receive contributions of designs of the character indicated, with a view to their presentation in these columns. The field is a most interesting one, and we trust that architects and builders who have been connected with the execution of designs of summer and seaside cottages will respond to the request of our correspondent.

Boxing for Concrete Houses.

From L. C. F., *Birmingham, Ala.*—I would like to beg space in the Correspondence columns of the paper for the purpose of asking the readers the best method of boxing for building concrete houses and how best to carry on the work. What are the best materials to use and in what proportions should they be mixed ?

Adding a Second Story to a Box House.

From J. M., *Oglesby, Texas.*—Will some of my brother chips kindly answer the following question through the Correspondence columns: I have a box house 28 x 36 feet in size, which has a common gable roof. The walls are 10 feet high and the house contains six rooms and a hall. The outside frame is covered with drop siding and is ceiled throughout. What I want to know is, are the walls sufficiently stout to support a balloon roof with about a square pitch, with three or four additional rooms on the second floor? Any information which the many readers of the paper may see fit to give will be duly appreciated.

Plan for Portable Bins.

From D. F. C., *Virden, Manitoba.*—Will some reader give through the columns of your valuable paper a good plan for building 500-bushel portable bins?

Truing a Level.

From Nailset, *Oswego, N. Y.*—Will some good workman please explain through the columns of the Correspondence Department how to " true " a good level ?

Remodeling a Veranda.

From L. S. H., *Fredonia, N. Y.*—I inclose sketches and description of a piece of work I did last summer which, though comparatively small and unimportant, may not be without interest to some of the younger readers of the paper. Fig. 1 represents a section of a veranda built probably 60 years ago. It was 4 feet 6 inches wide and it was to be made 18 inches wider. In doing the work the first step was to shore up the roof and tear away the old floor, which was not attached to the house in any way, but simply built against the underpinning. This old floor was to be replaced with a new one the desired width, which was to be fastened to the house close up under the door sill. The old roof was hipped, but as it extended clear across the front of the house it could not be hipped when made wider than it was originally, so I brought the ends out square, showing a half pediment at each end, although the ceiling on the inside represents it as though the roof was hipped. The new columns were turned and brackets were placed in the angles, although the drawings sent do not show them. Fig. 1 shows a section of the old column, together with the construction of the old roof, the end plate being left out in order to better show the cornice boxed around the front plate, the latter being halved together. Fig. 2 shows the construction of the extension, the combined lookout and rafter A and the strip B being nailed and spiked in the best possible manner to the old plate in order to insure rigidity.

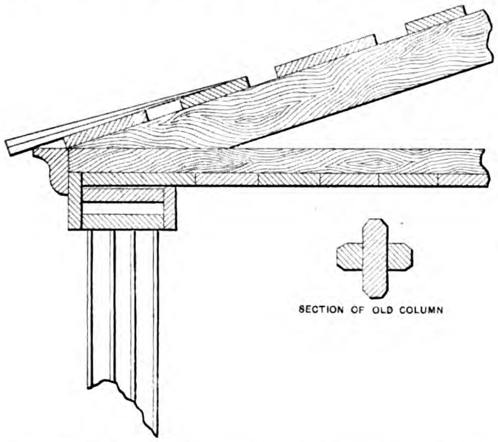


Fig. 1.—Section of Old Column, Showing Construction of Roof.

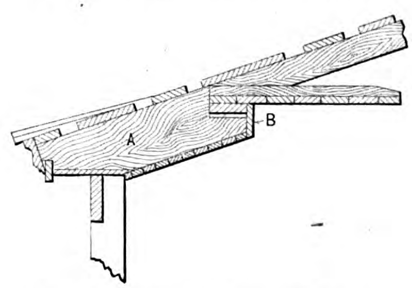


Fig. 2.—Section Showing the Remodeled Roof.

Remodeling a Veranda.

What Is the Best Method of Nailing Shingles?

From G. L. McM., *Tacoma, Wash.*—In the November number a correspondent asked some questions in regard to nailing shingles, &c. If I wanted to make the best possible roof, I would not lay any shingle over 3 or 4 inches wide, but in general practice here we do not split a shingle no matter what its width. As to nailing, my own practice is to nail in each edge of each shingle over 2 inches wide, and nail about ½ inch from the edge. Then by breaking joints about 1 inch or more you are sure not to get any nails in or under a joint.

Plan of a Stationary Bathtub.

From J. A. R. W., *Angel's Camp, Cal.*—Will some reader please give me a plan of a stationary bathtub, stating the required amount of zinc ? I would like to have the tub about 6 feet inside on top and 18 inches deep by 18 inches wide. Such a plan was published some time ago, but I have lost the copy of the paper containing it. As near as I can remember the tub had a panel end with two panels in the side, and it was raised from the floor. This is a rural district, and it is next to impossible to get any work of the kind done.

How Should Corner Blocks Be Placed ?

From H. A. McK., *Neepawa, Manitoba.*—I would like to ask through the columns of the paper a question in regard to a feature of inside finish. In putting on casings with corner blocks, should the blocks be placed with the grain running horizontally or vertically? I have never seen the matter discussed in the columns of the paper, but the carpenters here seem to be about equally divided on the question.

Note.—With no intention of anticipating the replies which we feel our readers will furnish to the inquiry of the correspondent above, we would say that the position of the corner block is usually regarded as one largely of taste and depending somewhat upon circumstances. If the block is carved it makes little or no difference which way the grain may run. If, however, the block is plain, its position would depend somewhat upon the proportions of the opening in connection with which it was used. If it is desired to have the opening appear high, the block should be used with the grain running vertically; if, on the other hand, it is desired to have the opening appear low, then we should turn the block the other way. We submit the question, however, to our readers and hope they will discuss it freely in the light of their own experience.

Opportunities for Concrete Construction.

From Old Hickory, *Michigan.*—Our hard wood timber in this section of the country is fast being bought up and cut into proper size for manufacturing purposes by men who foresee in a short time a scarcity of good timber. Meanwhile they are developing vast beds of clay which is being converted into hydraulic cement. As the timber is fast disappearing, it seems to me some sort of concrete construction must come into play, but whether it will be timber and concrete or metal and concrete remains to be seen. There must, however, be improved methods for mixing and placing the material when needed. Personally I would prefer a concrete house to a frame one. This, of course, is intended as my reflections in regard to the probable result of the scarcity of building lumber in so far as concerns domestic architecture. The architects will take care of the public, mercantile and other buildings in the larger cities.

CONSTRUCTING A WINDOW FRAME FOR CIRCULAR TOWER.

THE subject of our Thirty-first Competition was a "Window Frame for a Circular Tower," the frame being intended for upper and lower sash, hung with weights and constructed with sill and sub-sill. Cash prizes were offered for articles illustrating and describing the best methods of doing the work. The efforts submitted by the various contestants were referred to a committee, who carefully considered the work of each, and have awarded prizes in the order of their merit.

The committee point out that some of the competitors evidently failed to appreciate the full importance of the requirements of the contest, for while carefully executed drawings were submitted clearly showing the construction employed, the descriptive text was in several instances altogether too general in its application and lacking in its mention of the various steps to be followed in the practical execution of the work. A striking example of this was found in the matter submitted by "Jack Plane." Here the drawings were of a high order of merit so far as clearly indicating the construction was concerned, yet the description of the manner in which the actual work should be done was confined to a comparatively few lines of text. This failure to properly cover the ground, as called for by the conditions of the contest, destroyed what would otherwise have been a most excellent chance for a prize. His effort, however, is worthy of special mention, and we trust he will supplement his description with additional particulars, so that we may have the opportunity of publishing it in the columns of the paper.

The same criticism applies, but in a lesser degree, perhaps, to the matter submitted by "Farmer," while "E. M. B." and "H. M. H." departed somewhat from the stated requirements of the contest and presented an elucidation of the problem of laying out veneers for the circular head of a frame standing in a circular wall when the pulley stiles are square with the chord line in plan and also when the stiles radiate to a common center.

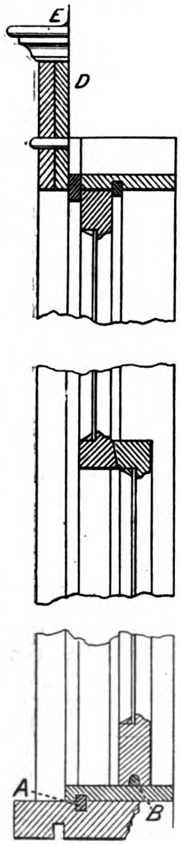


Fig. 1.—Vertical Section through Frame and Sash.—Scale, 1½ Inches to the Foot.

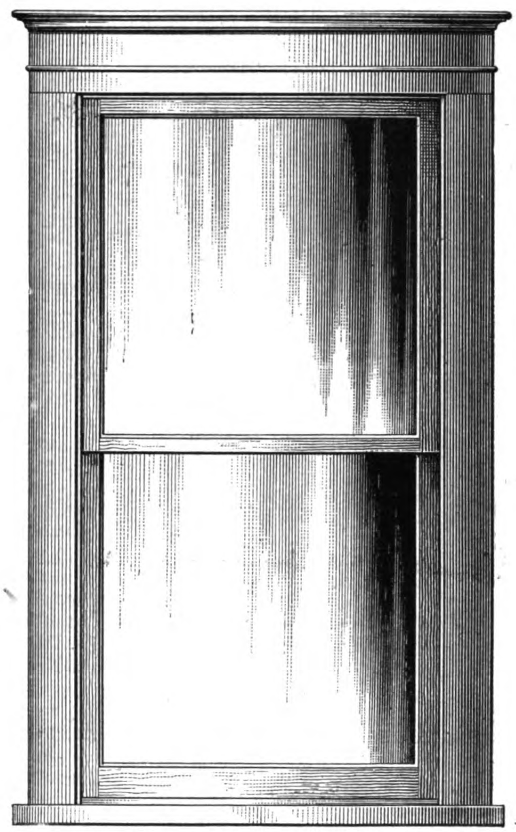


Fig 2.—Elevation of Frame and Sash.—Scale, ¾ inch to the Foot.

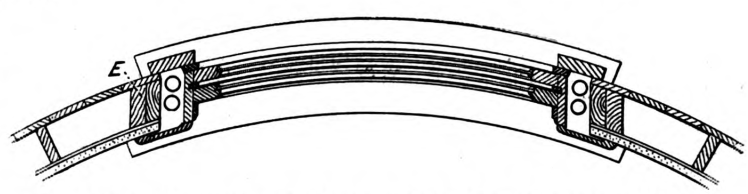


Fig. 3.—Horizontal Section through Window Frame, Sash and Tower Wall, Showing Method of Setting Jamb Studding.—Scale, ¾ Inch to the Foot.

Window Frame for a Circular Tower. - Awarded First Prize.

These, however, are matters in which many readers are interested, and we hope to publish them in due course.

Under the terms of the competition as announced in the issue for December, the committee decide that the matter contributed by George A. Davis of Sidell, Ill., is entitled to the first prize, and that furnished by Frank J. Grodavent of Fort D. A. Russell, Wyo., is entitled to the second prize.

We present herewith the contribution of Mr. Davis, who secured the first prize: The conditions do not state whether the frame shall be for a brick or frame building, but as a choice I give my method of constructing a bow face frame for a frame structure. The same principle, of course, would be used for a brick structure, except that the radius would be changed, a box for weights would be added to the pulley stile or jamb, a 2-inch brick mold would be substituted for the 1¼ x 4½ inch outside casing, and the inside edge of the pocket would be plowed to receive the hanging stile. The drawing which I send is for a 32 x 32 inch, two-light window in a 12-foot tower, radius 6 feet, using 2 x 4 studs, sized to 1¾ x 3¾ inches. The sill and sub-sill will have to be cut square from flat plank, also the head jamb. The sill and sub-sill will be made without any pitch to start with, providing the sill is cut from 1¾-inch stuff, this being the common thickness for sills in frame buildings. If, however, the sill stuff be full 2 inches thick, after cutting out the sill to the proper outside radius, a gauge line can be set in 2 inches from the outer edge or to a point where the sub-sill strikes the sill. From this line plane outward, leaving the sill 1¾ inches thick at the outer edge, thus obtaining ¼ inch fall in 2 inches. The pitch or fall is the first thing to overcome in a circular or bow face frame, as many leaky jobs are caused on just this account. In order to prevent wind or rain from beating in between the sill and sub-sill, the best method is to tongue and groove one to the other, as indicated at A in Fig. 1, applying to the surface between the two a good coat of white lead or thick paint. This will prevent decay, and at the same time will cement the two together, as the sub-sill will naturally have a tendency to warp or cup away from the sill.

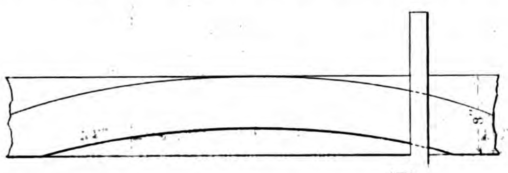


Fig. 4.—Showing Method of Obtaining Cuts for Sill, Sub-sill and Header.

Window Frame for a Circular Tower.

The next thing we have to consider is the joint between the lower sash and the sub-sill. The weather will enter here as readily as at any other place, so a bead or raised round should be inserted in, or planted on, the sub-sill at the proper place on which to center the bottom sash, a hollow being made in the sash to receive it, as shown at B of the figure referred to. This will be found very necessary, especially if the window is situated on the south, southeast or southwest side, from whence most of our driving rains come.

Another thing in circular frames with which the novice is liable to have trouble is the location of his jamb studding. By placing them with the radius they will appear as indicated at E of Fig. 3, where they are shown parallel with the jamb or pulley stile.

If the frame is 2 x 4 the jamb studs will have to be made from 5-inch stuff. In Fig. 4 is shown the method of obtaining the cuts for the sub-sill, head, &c. First joint the inside edge of the stuff straight; strike the proper circle thereon, and from the center of the stick shown halve the width of the window each way. For instance, if the window is to be 36 inches in the clear, measure each way from the center 18 inches, and cut off at the tongue of the square. Allow enough, of course, to enter the gain in the pulley stile, which is generally ⅜ inch on each end, or ¾ inch added to the full width of the window.

In making a water table for a bow face frame I always use wide stuff ⅞ inch thick. Bevel to the outer edge and use tin flashing on top, well up under the siding, as shown at E of Fig. 1. In making the outside head casing I use from two to three thicknesses, according to the size of the circle. In a circle of 6 feet radius, a cap can be made of two ⅝-inch boards, bent one on top of the other, as shown at D of Fig. 1. In my opinion this makes a much better cap than to kerf a board of the right thickness. Set the frame and apply the cap to the frame after it is located in its proper place. Insert the pulleys in this frame the same as any straight box frame. The plowing for the parting stop can be done with any ordinary panel plow, or with a grooving machine. If the mold used under the water table be crown or cove, it will be necessary to have it made at some factory, unless the mechanic possesses a former of his own.

Banquet of Cleveland Builders' Exchange.

The Builders' Exchange of Cleveland held its annual banquet Monday evening, February 2, in the Auditorium of the Chamber of Commerce Building, this being the most successful and enjoyable affair the exchange ever held. There were 255 members with their friends and invited guests present, included among the guests of honor being Governor George K. Nash; Wm. Jeffrey and Wm. Tytler, representing the London, Ont., Builders' Exchange; R. J. Gardiner, secretary of the Builders' Exchange of Columbus; Hon. H. E. Ellison of Governor Nash's staff; H. J. Harks, City Building Inspector; Architect F. S. Barnum, president Cleveland Chapter of American Institute of Architects, and M. S. Greenough, president Chamber of Commerce.

President C. W. McCormick acted as toastmaster, and welcomed the visitors and friends "on behalf of the exchange." Arthur Bradley, former president of the exchange, spoke upon the "Future of Cleveland." The Governor responded to a toast, "The State and Its Builders." Architect F. S. Barnum to "The City's Architecteure." President Greenough of the Chamber of Commerce to "The Value of Association," and William Downie to "Our Silent Partners—The Ladies." William Jeffery of the London Exchange spoke for the Canadian friends in an extempore address.

After the banquet a very pleasant reception was given Governor Nash in the Builders' Exchange rooms on the third floor of the building. The rooms were decorated with palms and flags, and made a very fine appearance. Following this feature of the evening, those who desired to dance returned to the Auditorium, where a fine programme of dancing was arranged.

The Builders' Exchange Bowling League was organized the past winter, and has been a source of much pleasure to a large number of the members during the dull winter months. Five teams were formed, and played a series of games each Friday evening. The team winning the most games will receive a trophy, which will be displayed in the exchange rooms. Picked teams from the league have played with the "All Star Hotel Team." Much interest has been taken in these games, large crowds watching the sport and cheering on their friends.

A GENERAL union of employers, to embrace all branches of industry, is being organized in Germany with the view of counterbalancing the influence of the general union of workmen already existing in that country. Its programme is interesting and seems somewhat drastic. It is intended that when labor troubles break out in any one branch, delegates from all the branches of the union shall meet to consider the question of joint action. A fund for the assistance of weak employers in cases of strikes or lockouts is to be created, and a register of workmen is to be drawn up with a view of preventing strikers from obtaining employment elsewhere, while men who have made themselves particularly obnoxious are not to be employed in any case. The union also intends to put up several candidates for the Reichstag at the next elections.

SHEET METAL IN INTERIOR DECORATION.

HAVING explained the principles involved in the installation of a metal ceiling we will now follow the work from start to finish. As an excellent example of an ordinary ceiling of fair size, and one embodying much in the way of selection of plates and trimming that would furnish hints as to the arrangement of ceilings simpler in character and smaller in size, we have selected one recently installed in a residence at Rutherford, N. J., and present the working drawing in Fig. 4. As will be seen, the ceiling is 36 feet by 26 feet 7 inches. Having taken the measurements of the ceiling, which is of plaster, the next step is the selection of the plates. The ceiling not being particularly high, we select a shallow body plate, the same furnishing the key to the completed ceiling design. To get a massive effect we decide to break up the general field somewhat by the introduction of moldings and borders. The body plate we decide upon is the one shown in Fig. 5, 24 x 24 inches. The field center, 48 inches square, is next provided for, as shown in Fig. 6. A neat border, shown in Figs. 7 and 8, contributes to the effect of the center field piece, and the effect of the whole is hightened by the egg mold shown in Fig. 9, doubled around and ornamented at the corners with the drop block seen in Fig. 10. The drop block also hides the joints in the moldings. Field plates, Figs 11 and 12, complete the center field of the design.

This portion of the ceiling arranged for, we now, for reasons which will be explained later, continue our arrangements from a point nearest the cove or wall finish.

Fig. 13 shows the corner plate of the outer border, and Fig. 14 shows the plate used in the run of the border. The corner plate may be used for upper or lower, left or right corners. The corner plate of the inner border next the center field is shown in Fig. 15, while Fig. 16 is the running plate in the same border. Edging the inner border is a 1¼-inch molding, shown in Fig. 17, which also makes a finish for a false beam, Fig. 18, on both sides. The outer border and field plates are edged with a molding similar to that shown in Fig. 9, the drop block being the one shown in Fig. 10. Fig. 19 shows the drop block used for the corners of the beam molding.

The large plate in the outer field is the 24 x 48 inch plate shown in Fig. 20. The stiling, Fig. 21, is used to fill out all space near the edge not lending its measurements to standard sizes of plates. A cove mold, Fig. 22, is next used, and finally the cove shown in Fig. 23. The lengths given with the figures of straight pieces indicate the lengths in which they are supplied.

The first step in the practical installation is the preparation of the nailing foundation, for which we require several strips of wood known as "furring" strips and measuring 1¼ inches square and upward according to the depth of the plate to be used. Having laid off our center lines, as shown in Fig. 24, we proceed to make provision for the field center piece, Fig. 3, which will be found to require a space equal to the area of four 24 x 24 plates, or plates corresponding in their square aggregation to that measurement. We now square off the center line, so that if it is found that the sides of the ceiling are unequal we may make provision for the irregularity. Finding our ceiling pretty square we proceed with such measuring tools as are at our disposal to mark out with chalk the lines on which our furring strips should rest, and for the marking of which our plan is the guide. This work completed we commence to apply the furring strips, nailing them well to the ceiling and taking advantage of the joists as much as possible. We are also careful to see that the chalk lines on the ceiling come under the longitudinal centers of the strips. We continue in this way until the stripping for the whole of the center field is applied. Our next step is to apply the plates required for this portion of the work, but we must be careful to commence with the first or center row, and square it to prove the work. We now locate the strips for the cove, leaving

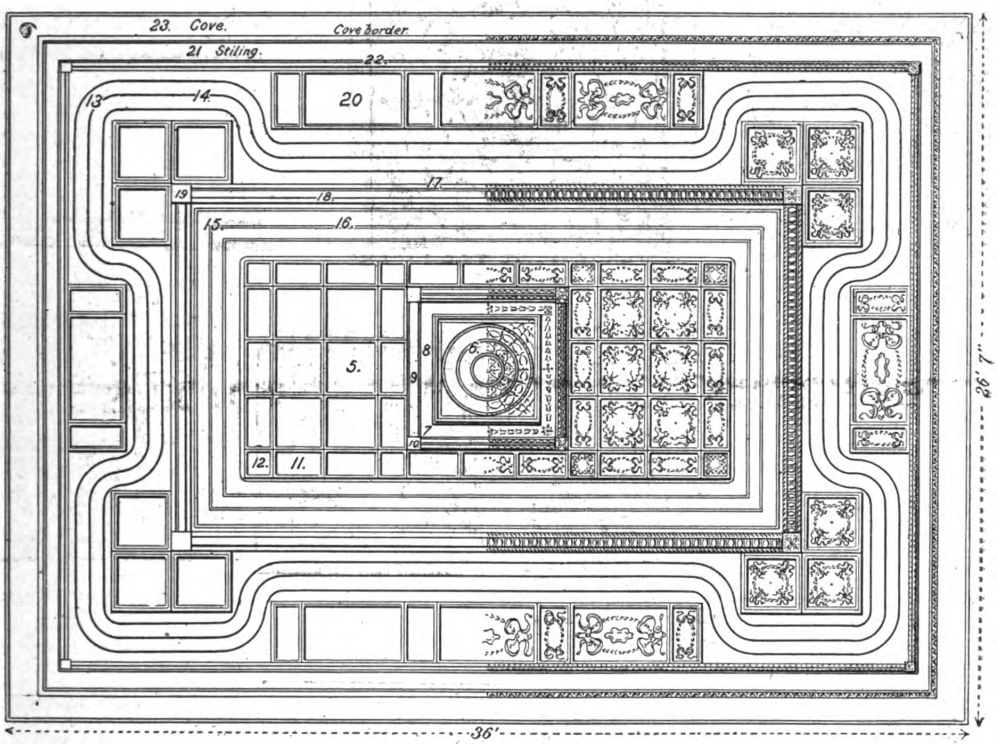


Fig. 4.—Plan of Ceiling, Showing Position of the Various Plates and Trimmings.

Sheet Metal in Interior Decoration.

the intervening space vacant for a while. We do this in order that any cutting or fitting up material may come in on the stiling or filling border, which, being flat and having little or no design, may be cut without any danger of marring the general effect of the ceiling. Wooden cove brackets furnished by the plate makers are used to carry the cove plates, and we toe nail them to the wall at intervals, according to the length of the plates, the upper end being nailed to a furring strip, which we apply to the ceiling to receive the mold forming the stiling enrichment. The cove frame completed we go back to the center field and nail up the strips for the borders, molds and stiling as shown in the cross section, Fig. 25. The stripping for the center field is made clear in Fig. 26. In the cross furring for the border fields provision is of course made for the 12 x 24, 24 x 48 and 24 x 24 plates which compose the corner and side fields. The frame work completed we are ready to nail up the cove plates and outer field plates, which operation we will describe in our next article.

(To be continued.)

Fig. 5.—A Field Plate.

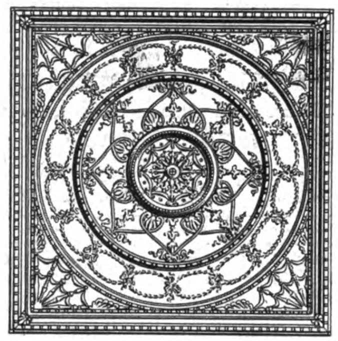


Fig 6.—A Field Center.

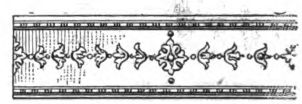


Fig. 8.—Colonial Border, 6 x 24 Inches.

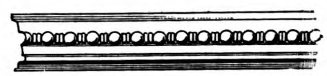


Fig. 9.—Egg Mold, 2¼ Inches Wide by ⅞ Inch Deep.

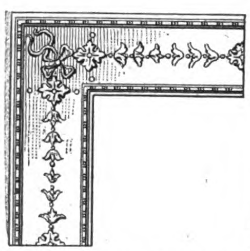


Fig. 7.—Corner Border, 6 x 18 Inches.

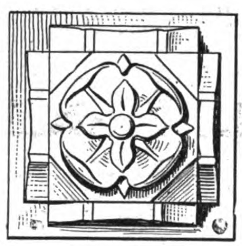


Fig. 10.—Zinc Drop Block, 6 Inches Square by 4½ Inches Deep.

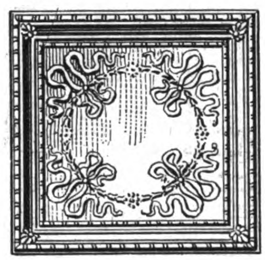


Fig 12.—A Field Plate, 12 Inches Square.

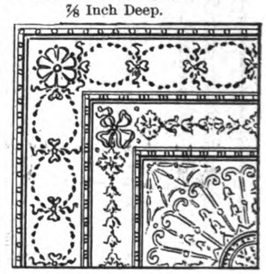


Fig. 15—A Corner Plate, 24 Inches Square.

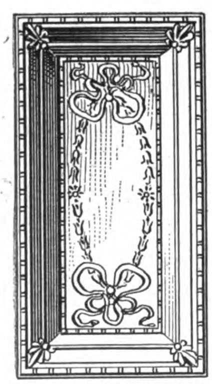


Fig. 11—Field Plate, 12 x 24 Inches.

Fig. 13.—Border Section, 24 Inches Square.

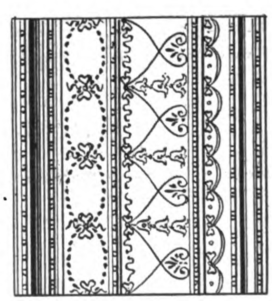


Fig. 14.—Running Border Plate, 24 x 24 Inches

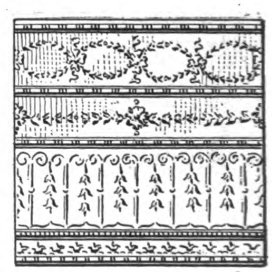


Fig. 16.—Another Style of Border Plate.

Sheet Metal in Interior Decoration.

A CONSIDERABLE amount of building is in prospect in the suburbs of Philadelphia, one of the operations contemplated involving the construction of 40 houses, each 18 x 60 feet in size and three stories in hight. They will be of Pompeiian brick, with Indiana limestone trimmings, and will have large colonial porches, bay windows, plate glass, and galvanized iron cornices. The plans have been drawn by T. Frank Brown, architect, of Germantown, Philadelphia, and the whole operation is estimated to cost in the neighborhood of $160,000. We understand that the contract for the work is in the hands of John J. Brown of the place named.

Permanence in Color of Brick and Terra Cotta.

It has been frequently observed that red brick or terra cotta, after prolonged exposure to the air, undergoes many changes, particularly as regards color. Speaking generally, five or six years' exposure will be found to have considerably modified the color and appearance of most buildings where terra cotta has been largely used in construction. And, commonly, the deeper the original tint the more pronounced the change, and this apart from any considerations in the way of dirty surroundings: smoke, fume or dust-laden atmosphere. The change is, perhaps, not so noticeable where the terra cotta has been made to contribute to, but not to give, the complete outline or elevation of a building. However, the color is never permanent, says a writer in the *Clay Record*. Though the conditions as to composition, making and burning be practically equal, taking the terra cotta as a whole, after exposure hardly two blocks of terra cotta will be found alike.

The properties of iron are well known; it is by far the cheapest and most effective coloring agent known in the clay working industry. Under proper conditions its well-known oxide: $Fe_2 O_3$, gives in effect a deep and permanent red. However, the color may be modified to no inconsiderable extent by the presence of lime, chalk, magnesia and certain soluble salts—chiefly sulphates—to say nothing of organic matter. The operation of burning, also, has its own color effect on the wares: the red oxide of iron: $Fe_2 O_3$, being particularly sensitive to reducing influences at relatively high temperatures.

Clays are frequently used in the fabrication of red brick and terra cotta, often in connection with large and important jobs, which do not contain the essential ferric oxide in due proportion for the work. Or, on the other hand, the presence of one or more of the before mentioned oxides, carbonates, sulphates or carbonaceous matter will seriously affect the color. The problem is to get such clays in the way of finished wares in line with the best known work. This may be in part accomplished by the addition of certain patented mediums, by the limited admission of air or oxygen in the burning or by means of a wash. By such and similar means low grade clays are made to compare favorably with those of the highest quality; in so far as the color is concerned. But there the matter ends; the effect will be but short lived.

Two qualities are absolutely essential to permanence of durability and color, saturation and insolubility. Unsaturated compounds, those capable of further oxidation, existing in brick or terra cotta, must ever be a source of weakness, and prevent the ultimate permanence of one's wares. A piece of red ware under proper conditions may be burned in many shades or tints and it will be more or less permanent in character. Such a clay or body can have but one permanent tint under normal conditions. Any irregularity or limitation of oxygen in the burning—through accident or design—will be surely set right by the atmosphere. A close, tight, vitreous body, as instanced by the best blue wares, would appear at first sight to come under the same category, seing the evident reduction. But here complex alkaline silicates are probably formed with partial fusion; such a body can hardly be compared to such as used in connection with high class rubbers, facings and terra cotta. These wares, in their highest state of perfection, are justly prized for their rich, warm and delicate tint, and, given a good and suitable clay, and burning under proper conditions of oxidation, they give the nearest known approach to regularity and permanence in color that may be attained.

Fig. 17.—Molding, 1¼ Inches Wide.

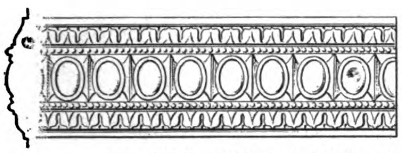


Fig. 18.—Enriched Dividing Mold, 9 Inches Wide and 1⅝ Inches Deep, for False Beam.

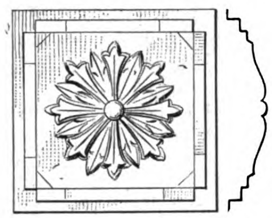


Fig. 19.—Drop Block for Beam Mold.

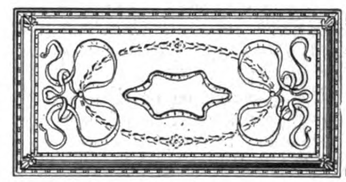


Fig. 20.—Field Plate, 24 x 48 Inches

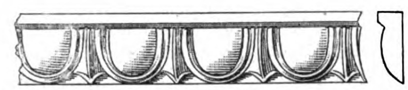


Fig 22.—Egg and Dart Cove Molding with 3-Inch Projection and 3-Inch Drop.

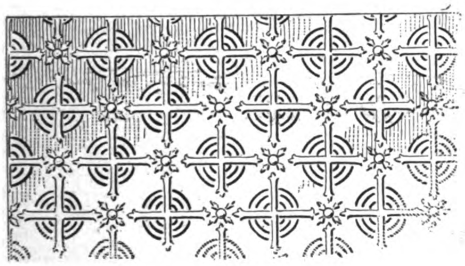


Fig. 21.—Design of Stiling.

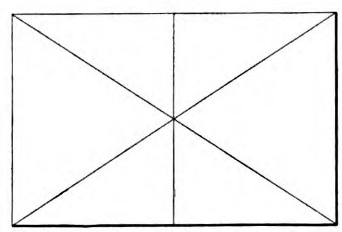
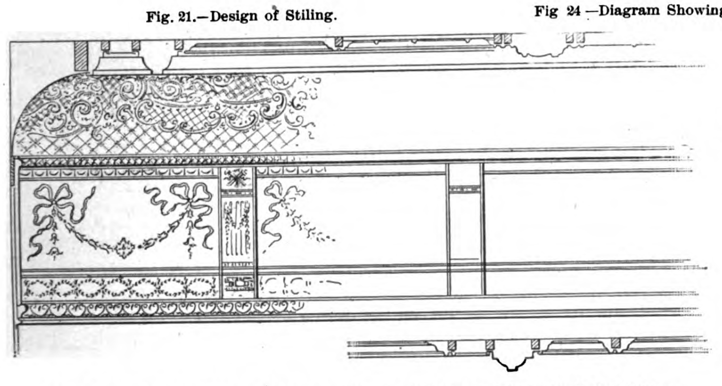


Fig 24.—Diagram Showing Method of Laying Off Center Lines



Figs. 25 and 26.—Elevation and Sections, Showing Method of "Stripping" for Ceiling.

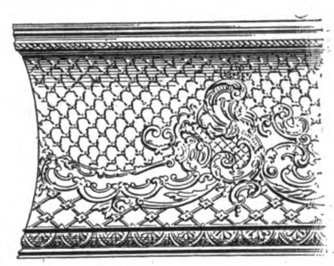


Fig. 23.—Cove Treatment.

Sheet Metal in Interior Decoration.

Fire Resisting Construction.

A noticeable feature of the construction employed in connection with the new Admiralty Buildings in London is the fire resisting floors, ceilings and roofs, which are built on the lines of what is known as the Fawcett system. A writer in one of the London architectural papers thus describes the manner in which the work was done, the floors at the time of his visit to the buildings showing the naked construction, the "girders being filled in with the tubular lintels ready for plastering below, and the breeze concrete filled in above the lintels with the wooden joists or fillets upon which the flooring is fixed. These lintels, which constitute the main feature of the system, are of a semi fire clay, or red chimney pot earth, made in the form of semi-circular tubes, with ribs and corrugations below, and each is supported on the lower flanges of the joists. Above, these lintels form a succession of ridges and furrows, while their lower flat flange-like plates have dovetail grooves to give a key to the plaster, and at the ends are made to project and cover the bottom iron flanges of girder about 2 inches below, so as to protect the same from fire. They are placed diagonally between the joists or girders, giving increased strength, and their soffits form a continuous ceiling. The tubular section of lintel enables the air to circulate freely throughout the whole area, and also beneath the lower flanges of joists, where air passages are formed. These floors are remarkably strong and compact. The 6-inch cross partitions are in many cases constructed of sifted breeze concrete—two central sacks of cement to ½ yard cube of sifted breeze—and are so compact and strong as to resist the heaviest blow that may be given them. In some of these stanchions are placed, carrying the upper girders.

Very important parts of the construction are the roofs. Steel trusses, formed of I-sections about 12 feet apart, are placed over the walls externally, forming the sloping sides, and these carry steel purlins which support the fire clay lintels and concrete for slating or lead work. Various slopes have been formed, some nearly vertical, others of slight fall to the gutters. The purlins are placed 2 feet apart, and the concrete of breeze and cement forms a capital surface for the slates, as no battens are necessary, the nails being driven through the concrete, which gives a secure and firm hold. The numerous dormer windows which light the outside corridors are entirely of breeze and cement concrete, the cheeks and walls being about 6 inches thick.

Law in the Building Trades.

ORDER BINDING WHEN ACCEPTED.

If a contractor to whom a balance is due on a building draws an order upon the owner for a portion of such balance in favor of a subcontractor and delivers it to the latter, who procures its acceptance by the owner, this amounts to an assignment of so much of the fund due under the building contract as will give it precedence over an assignment from the contractor to a third person of his interest in such contract.—Hafner *vs.* Kirby, 53 N. Y. Supp. Rep., 552.

WHEN SUBCONTRACTOR MUST DO HIS WORK.

Where a contractor notified his subcontractor that walls were ready for iron work he had agreed to put on, and that it was necessary for their protection against the elements that the work should be done at once, and that the subcontractor assured him that he was ready to do the work as soon as the walls were completed, the subcontractor is bound to use all the force necessary to finish the work as soon as practicable according to the notice.—Meyer *vs.* Haven, 55 N. Y. Supp. Rep., 864.

RIGHT TO WITHHOLD PAYMENT UNTIL OTHER CLAIMS HAVE BEEN PAID.

A contract for the erection of a building provided for the withholding of a certain per cent. of the contract price until completion, and in case of notice of any claims for mechanics' liens the right was reserved to withhold payment until such liens or claims were paid. It was held that the owner was entitled to withhold such amount until such claims were paid, although mechanics' liens had not been filed, as provided by law.—Ind. School Dist. *vs.* Mardis, Sup. Ct. Ia., 76 N. W. Rep., 795.

RIGHT TO SURPLUS AFTER COMPLETION BY OWNER.

Under the clause of a building contract giving the owner the right on default of the contractor to finish the work covered by the contract and deduct its cost from the contract price, an election by the owner to exercise such right is a waiver of any right he might have to insist that the contractor had forfeited his claim to final payment, and the owner is liable for the excess, if any, remaining after deducting the cost of completion, which excess is chargeable with mechanics' liens of sub-contractors furnishing materials to the contractor.—Dyer *vs.* Osborne, 58 N. Y. Supp. Rep., 1123.

RIGHTS OF OWNER WHEN INFERIOR MATERIAL HAS BEEN USED.

Where one who had contracted to furnish material of a certain quality to be used in the construction of a house, furnished an inferior quality, which became known to the owner after the house was finished, the owner had the right to keep the house in its inferior condition, and recover from the contractor the difference between the actual value and the value had it been constructed of the specified material, since the parties must be deemed to have contracted with reference to the value of the house with the proper materials furnished.—Elwood Planing Mill Company *vs.* Harting (Ind.). 52 N. E. Rep., 621.

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Carpentry and Building

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ENTERED AT THE POST OFFICE NEW YORK, AS SECOND-CLASS MATTER.

—GETTING BACK AT HIM.—"He boasted to me that he was a self-made man."

"What did you say?"

"I told him that he seemed unjustifiably proud of his job."—*Detroit Free Press.*

—WARM.—"About the hottest thing I have seen lately," Asbury Peppers remarked as he speared the best slice of melon, "was an old salt with a peppery temper who had just been mustered out."—*Cincinnati Enquirer.*

—LUCY: "Which side shall I sit on?" Harry: "It doesn't make any difference. I can drive with either hand." —*Chicago Tribune.*

NOVELTIES.

Rapid Mortise Lock.

A feature of lock construction which cannot fail to command the interest of architects and builders has just been introduced to the trade by the Russell & Erwin Mfg. Company of New Britain, Conn., and 43 and 47 Chambers street, New York City, in

Novelties.—Rapid Mortise Lock.—Fig. 1.—Notched Strike.

their Rapid Mortise round end wrought steel lock, which is illustrated herewith half full size The main feature in connection with this lock is the ease and rapidity with which the mortise can be made, the work being done principally with a 7/8 inch auger bit, requiring but little chiseling on the sides and none at all on the ends. For the purpose of quickly and accurately determining the boring points after finding the center of the edge of the door, the notched strike shown in Fig. 1 is

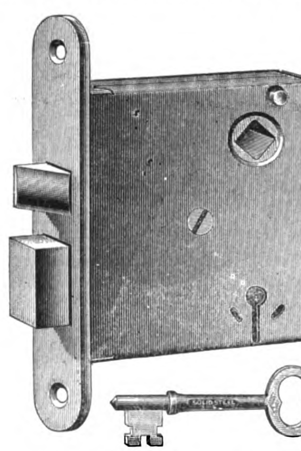


Fig. 2.—General View of Lock.

lightly tapped with a hammer. The manufacturers point out that the holes at the ends should be bored only 1/16 inch in depth, the remaining borings being 3¼ inches to admit of lock casing. Then with slight trimming of the V's formed by the bit the mortise is ready for the lock, a general view of which is shown in Fig. 2. It is claimed that these locks may be mortised in one-third the time required to mortise the square end patterns, while there are several other advantages connected with the lock which render it of special interest to builders. The strike is so proportioned that without the use of a rule the keyhole and knob centers are quickly ascertained, a 7/8-inch bit being used. The notches of the strike are scarcely perceptible when the strike is in place. Accompanying each lock are full directions, together with a diagram showing how the work should be done. The locks are made in all finishes, with both bronze metal and steel front, according to the quality.

Bench Hook and Vise.

Thomson Bros. & Co., Lowell, Mass., have brought out a convenient portable combined wood workers' bench

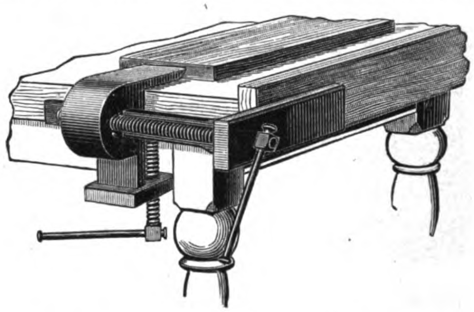


Fig. 3.—Wood Workers' Combined Bench Hook and Vise.

hook and vise, which we show in Fig. 3. It can be expeditiously attached and adjusted to bench, table or horse anywhere, and being light in weight can be taken to work away from the shop and used for holding boards flat or on edge as seen in the engraving. Aside from professional use by the mechanic it is particularly suited for gentlemen amateurs for odd jobs at home, where a work bench is not available.

Nail Set and Punch.

In Fig. 4 of the engravings we show a new line of nail sets, center and prick punches put on the market by Braunsdorf-Mueller Company, Elizabeth, N. J. The articles are knurled extra deep to prevent them slipping from the fingers. The carbon finish re-

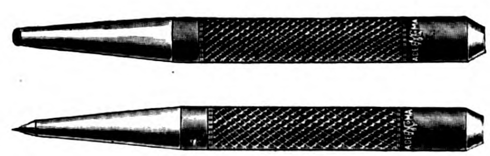


Fig. 4.—Nail Set and Punch.

lieved by the polished ends is referred to as imparting a handsome and attractive appearance.

Lessons by Mail.

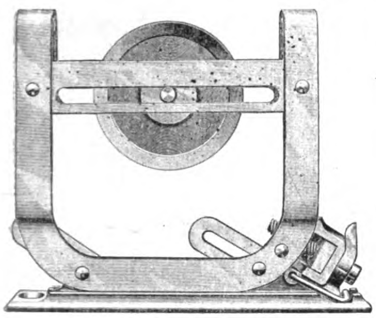
The International Correspondence Schools of Scranton, Pa., are distributing a circular letter calling attention to the growth of that institution and to the system of instruction which is there employed. The plan has proven very popular owing to its enabling the industrial class to obtain by study at home an education in practical subjects without devoting their whole time for several years and a large sum of money to courses in regular engineering schools. Students are thus enabled to acquire an education which will fit them for better positions in life without interfering with their regular work. The subjects taught by mail include all branches of mechanical, electrical, steam and civil engineering, mining, agriculture, plumbing, chemistry, bookkeeping, stenography, lettering and English branches. It is pointed out that from a small beginning in 1891 the schools have grown until now there are some 70 separate courses with 150,000 students enrolled.

McCray Refrigerators.

We have received from the McCray Refrigerator & Cold Storage Company of Kendallville, Ind., and with Chicago office at 182 West Van Buren street, a copy of their new catalogue No. 35, covering the line of wood and tile lined domestic refrigerators of their manufacture. These articles are constructed on the McCray patent system of refrigeration, in which a perfect system of air circulation is secured by having a space between the walls and the ice on the four sides, as well as at the top and bottom of the ice chamber. The walls of the refrigerators are insulated with mineral wool and special refrigerator paper, and the stock sizes are lined with yellow poplar, which is claimed to be always sweet and perfectly dry. The water cooler is made by placing a coil of block tin pipe in the bottom of the ice chamber, having one end attached to the outer source of supply and the other end being supplied with a faucet for drawing off the drinking water. The wood lined refrigerators are made in several styles and sizes, of solid oak and antique finish, with nickel trimmings and ball bearing casters and with one, two or three doors. Numerous styles of tile lined domestic refrigerators are also shown, all having solid water proof cement bottoms and filled corners and finished exterior as above described. A feature of some of these goods is a back door for the ice chamber, whereby the supply of ice may be replenished from the outside. The company have also issued a new catalogue, No. 50, showing a handsome series of refrigerators and cooling rooms for grocers and meat markets.

The Freeport Parlor Door Hanger.

A parlor door hanger of special interest to architects and builders is that which is being placed on the market by the Arcade Mfg Company of Freeport, Ill. The hanger, Fig. 5, is made of steel and malleable iron to prevent breakage. The wheels run on a single steel track and are made of solid vulcanized fiber, so that no metal comes in contact with the track, and makes, it is remarked, the hanger as nearly noiseless as it is possible to do. The sliding base with the automatic lock is referred to as making the hanger more convenient. In hanging the doors it



Novelties.—The Freeport Parlor Door Hanger. —Fig. 5.—Side View of Hanger.

is not necessary to remove the adjusting screws, as when the base plate is screwed to the door the door is coupled to the hangers by sliding the parts together, when the gravity lock falls and locks them together. It is explained that the door may be as readily detached at any time without removing the screws by raising the gravity lock and slipping the hanger from the base plate. Among other points of excellence the manufacturers state that the hangers are independently adjustable, that they are attached without cutting the door, that the center stop is secured directly to the track and is readily released by the

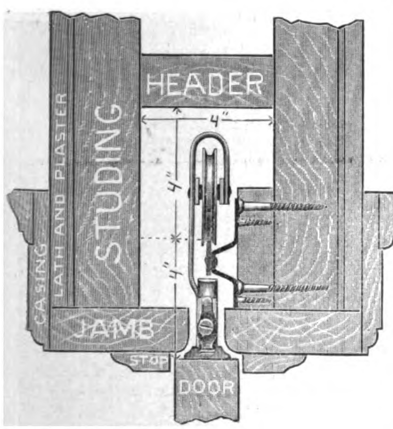


Fig. 6.—Sectional View, Showing Hanger in Position.

aid of a screw driver and moved along the track, so that the door may be run out to get at the rear adjusting screw, and that the stop is provided with a sound deadening bumper. A sectional view is given in Fig. 6 showing the position of the hanger when attached to the door and on the track.

Souvenir Hardware Album.

"Familiar Faces in the Hardware Trade" is the title of a unique album which has recently been distributed among their friends by the Wilcox Mfg. Company of Aurora, Ill. The album measures 11 x 8 inches in size, contains 90 leaves and is bound in heavy cloth covers. It is arranged in an exceedingly neat and attractive style and is suitable for desk or library use, as it has nothing of a commercial nature in it. The contents are made up of the portraits of many prominent wholesale hardware merchants, which are reproduced in halftone from photographs which the president of the company has been collecting for many years past. Following the title page is a comprehensive index, followed by the portraits handsomely printed in groups of two or three on one side of each leaf. Underneath the pictures are the names of the individuals, together with the name of the house with which each is identified. The collection of portraits as covered in this souvenir album is a pleasant recognition not only of men prominent in business but also of the importance of the personal element in trade notwithstanding certain tendencies in prevailing methods to eliminate it.

Cabot's Quilt.

We are indebted to Samuel Cabot, 70 Kilby street, Boston, Mass., for a copy of an interesting little book which he has just issued entitled "Schoolhouses." It is made up of 16 pages, handsomely illustrated and bound in paper covers of a light shade of green, carrying a side title in black. The opening page presents some interesting comments upon the question of schoolhouse acoustics, this, in the opinion of the writer, being next in importance to light and ventilation in the problem of schoolhouse construction. The necessity of preventing sounds of one room from penetrating into another being recognized, has led to exhaustive inquiry into the various methods and materials to be employed for the accomplishment of this result. Reference is made to the value of ordinary plaster and timber construction for this purpose, also to the use of common felts and papers and finally to the merits of Cabot's quilt as a deafening material. Where absolute fire proof construction is wanted the adaptability of asbestos quilt is emphasized, and there is to be found a great deal of interesting information as to the value of the materials named for the purpose intended. The illustrations are half tone engravings of schoolhouses scattered over this country and Canada, in connection with the construction of which Cabot's quilt has been employed. There are also a number of testimonial letters from architects speaking of the satisfaction which the deadening material has given in the buildings illustrated.

The Rosedale Screw Driver.

The Bridgeport Mfg. Company, Bridgeport, Conn., are putting on the market the Rosedale screw driver, which we illustrate in Fig. 7 of the cuts. The special feature in construction is the arrangement of wings on the shank which enters the handle, and which is shown in Fig. 8. The wings being thrown out on the opposite side of the shank are forced into the wood of the handle and ferrule in such a way, it is explained, that turning of the blade in the handle is an impossibility. The point is made that the blades being manufactured from finest grade of screw driver steel, carefully tempered, will not twist or break when put to the severest test. The Bedford screw drivers, also made by this concern, have beech handles flattened on two sides near the top. Both lines are made in 4, 5 and 6 inch sizes, with polished blades.

The Rosedale Screw Driver.—Fig. 7.—General View of Tool.

Rosedale goods are furnished with cherry finished handles.

Sheet Metal for Building Construction.

A handsome catalogue has been issued by the St. Paul Roofing, Cornice & Ornament Company of South Wabasha and Water streets, St. Paul, Minn., showing numerous designs of sheet metal fronts, ceilings, sidings, &c., together with illustrations of

Fig. 8.—The Winged Shank.

other sheet metal specialties which the company turn out in great profusion. Many large sized half-tone engravings are employed, showing examples of rock faced copper and galvanized steel fronts as used in the larger cities, patent rock faced building fronts on brick walls, examples of remodeling with slip joint rock faced siding plates, steel store fronts and Pruden's patent rock faced steel siding. These siding plates it is pointed out, are particularly adapted for use on school houses, churches, amusement halls and public buildings, and many illustrations are presented showing the general effects produced. In connection with the directions which are presented for inquirers the catalogue gives drawings which show how easily and perfectly all fittings are made under the company's method, and that they have reduced metallic covering and fitting to a science. Examples are also given of steel faced fire proof frame buildings and of the company's fire proof method in public building construction. One section of the catalogue is given up to miscellaneous specialties, such as siding and shingles, eave trough and pipe, cornices, skylights and sheet metal building supplies. Another section is devoted to steel ceilings, wainscoting and interior finish, in connection with which half-tone engravings are presented, showing various interiors where the company's goods have been employed. The catalogue has been compiled with a great deal of care and attention to details, and an examination of it cannot fail to prove of interest and value to architects, builders, contractors and in fact all having to do with sheet metal construction.

Shingletint.

We are indebted to Berry Brothers, Limited, varnish manufacturers, of Detroit, Mich., for a copy of a neat little folder calling attention to their permanent shingle stains, for which strong claims are made. The most popular colors now in use are referred to as buff, dark red, light green, brown, red, dark green, light gray and black, these all being beautiful soft tints which cannot fail to give satisfaction, and, what is still more important, they are claimed to retain their color. On the front page of the folder is an illustration of a house on which three varieties of the company's stains have been used, and while the effect is harmonious it is pointed out that dozens of other combinations equally pleasing to the eye can be made from the colors furnished by the company. The covering capacity of the shingle stain is said to depend upon the manner in which it is used. If brushed on the company state that a gallon will cover 160 square feet one coat, while 1½ gallons will cover the same surface two coats. From 2¼ to 2½ gallons of stain is said to be sufficient to dip 1000 shingles, and less than a gallon more is enough for a brush coat in addition after the shingles are laid. Berry Brothers announce that they have ready for mailing samples of wood showing their shingle stains, which embrace the principal colors now in vogue, and they will gladly mail a set free to any one sufficiently interested to make application. The makers also call attention to their Shingletint, an improved shingle stain and preservative, which is said to impart an artistic finish to shingles and prolong their life by penetrating the pores of the wood and retarding decay. The manufacturers point out that Shingletint is made in all desirable shades, is easily applied and the colors are permanent. Berry Brothers have branches in New York, Boston, Philadelphia, Baltimore, Chicago, Cincinnati, St. Louis and San Francisco, from which adjacent territory can be supplied.

GEORGE QUAILE, with office on the tenth floor, Wool Exchange, New York City, is the agent in the United States and Canada for what is known as "glacier," a substitute for stained glass, and has issued an attractive circular showing numerous designs in colors. Glacier is made in innumerable patterns, combining borders, grounds, centers, &c., and it is claimed that a person of average taste and skill can with a very short apprenticeship produce delightful effects in the way of window decoration. Special reference is made to the durability of glacier and to the fact that years of exposure do not diminish the richness of its colors, while excessive heat does not affect it nor does washing do it injury.

TRADE NOTES.

IN VIEW of the discussion relative to small power for shops our readers cannot fail to be interested in the announcement by James Leffel & Co., Box 76, Springfield, Ohio, which appears this month in our advertising columns. The manufacturers are in a position to furnish engines and boilers from 3 horse-power up which are referred to as reliable, durable and satisfactory in every way for wood working shops. Those who are interested can obtain prices and full particulars by stating their wants and addressing the company.

ARCHITECTS, builders and contractors will be interested in the announcement presented elsewhere in this issue by the Columbus Slate Company, 345 South High Street, Columbus, Ohio, and 950 and 952 West Front street, Cincinnati, Ohio. The company are manufacturers of roofing slate, and as the spring building season opens many of our readers will doubtless be interested in learning of the grades and varieties which this concern are prepared to supply.

THE CHICAGO SPRING BUTT COMPANY of Chicago, Ill., issue a catalogue for 1900 containing much that is of interest to the trade. Illustrations and prices are given of spring butts, floor hinges, lavatory catches, fire engine house door latch and catch, door springs, door pulls, door hangers, track, &c.

THE NEW IDEA DOUBLE ACTING SPRING HINGES are being introduced to the trade by the Stover Mfg. Company, 138 River street, Freeport, Ill., and form the basis of some interesting comments presented this month in their advertising space. The point is made that the door cannot sag, that the corners are left square and that the hinges separate at the pintle, allowing the use of two finishes to match the trim of adjoining rooms. Five sizes are turned out, which the manufacturers claim are sufficient to meet average requirements.

A. DICKEY & CO., 39 43 Bristol street, Boston, Mass., are turning out a great variety of spiral moldings adapted to meet many requirements. These moldings are made on Dickey's patented spiral molder, which is referred to in their advertising space this month as the "latest and best machine for the purpose." A circular of the machine has been issued by the company, and they state that a copy will be sent free on application. They have also brought out a catalogue of the latest designs of spiral moldings, and they will forward a copy of this catalogue on receipt of 25 cents.

THE AMERICAN STEEL ROOFING Company of Cincinnati, Ohio, call attention in their advertising space this month to the new patent polygon conductor pipe, which they are offering the trade. It is made of copper or galvanized iron and may be had corrugated and twisted. In referring to this pipe the makers state that a handsome artistic effect is secured by its use; that its construction is such as to prevent denting or disfiguring; that architects indorse it, and that it costs no more than square corrugated pipe.

THE GRAND RAPIDS HARDWARE COMPANY of 3 Pearl street, Grand Rapids, Mich., call the attention of architects and builders to the Grand Rapids all steel sash pulley, which they illustrate this month in their advertising space. They also show the quadruple mortising bit which they furnish for making mortises for the pulleys. The manufacturers state that the end tongues fasten the pulley more firmly than could any number of screws, while the wheels have steel or bronze bushings which they claim to be the smoothest running on the market.

THE BERGER MFG. COMPANY of Canton, Ohio, manufacturers of metal ceilings, roofing and siding, cornices and sheet metal work generally, have opened a branch house at 1428 North Broadway, St. Louis, Mo., under the management of S. Y. Buckman, from which they purpose supplying all the territory west of the Mississippi River, north to the Dakotas and south to the Gulf. The company's St. Louis store is a four-story building containing 25,000 square feet of floor space, with a railroad siding at the rear doors, electric elevators and all modern appliances for the handling of goods quickly.

THE GRAND RAPIDS WOOD CARVING COMPANY, Grand Rapids, Mich., have just issued a 48-page illustrated catalogue of wood carving, molding, rosettes, newel posts, balusters, twist work, capitals, columns, &c. The illustrations in this catalogue comprise quite a number of half-tones, which are exact reproductions of the artistic work produced by the company. Much of it is of such a delicate character that it would seem to be almost impossible to produce in wood except at extremely high cost. The company, however, have facilities which enable them to turn it out at reasonable prices. The illustrations show a great variety of designs.

THE CANTON STEEL ROOFING COMPANY, whose works are located at Canton, Ohio, have recently opened quarters in New York City at 157 West Twenty third street. A large stock of metal ceilings, siding and wainscoting of attractive designs is carried in stock, thus insuring prompt service to the trade in this locality.

THE CINCINNATI STAMPING COMPANY of Cincinnati, Ohio, point out in their advertising space this month the merits of Regan's patent metallic shingles, which are said to be made of tin, painted or galvanized. The character of these shingles is said to be such that any one of average skill can lay them, and that to those who are interested in this form of covering they will send full particulars, with prices, &c., on application.

A GREAT DEAL of attention has recently been given to the subject of rendering wood fire proof, and, as showing the results which have been achieved by means of treating wood electrically, the Electric Fire Proofing Company of 119 121 West Twenty-third street, New York City, have just issued a little volume of 96 pages which is of special interest in this connection. It is, in effect, a record of fire proofed wood, covering various tests which have been made in New York City and elsewhere and also dealing with some of the buildings in connection with which fire proofed wood is largely employed. An important feature in connection with the process is that wood for interior finish may be fire proofed without in any way injuring the grain effects. The little volume, taken as a whole, is a valuable contribution to the literature dealing with the fire proofing of wood.

THE KELSEY FURNACE COMPANY of Syracuse, N. Y., have brought out an illustrated catalogue of the Kelsey warm air generators, reference to which is made in their advertisement presented in another part of this issue. These generators have large heating surfaces, and are referred to as being economical in the use of fuel. The claim is also made that the generators do not superheat the air delivered to the rooms above, and that the construction is such as to be exceedingly durable.

THE McCRAY REFRIGERATOR & COLD STORAGE COMPANY of 120 Mill street, Kendallville, Ind., manufacture a line of refrigerators which possess many valuable features and which are of especial interest to all having occasion to use articles of this kind. The company turn out a complete line of stock sizes and at the same time make special designs to order for clubs, residences, restaurants, public institutions, grocers, &c. In their advertising space this month the company show a stock size tile lined family refrigerator, neatly finished in oak with nickel trimmings. They make a specialty of refrigerators for family use which can be iced from the outside of the house, these being of any size and arrangement to fit local requirements. They are lined with wood or tile, no zinc being employed, as the manufacturers consider a zinc lining dangerous to health. The corroding zinc, they point out, generates poisons, which are absorbed by the foods and cause disease. The manufacturers request those who are interested to write for catalogue and estimates, calling attention to the fact that No. 35 catalogue relates to refrigerators for residences, their No. 5 catalogue to refrigerators for hotels, clubs, public institutions and cold storage houses, while their No. 50 shows refrigerators for grocers and meat markets.

AUSTIN & EDDY, 129 Broad street, Boston, Mass., show in their advertising space this month an illustration of their Pioneer molding sander, a machine which will take in moldings, casing, base, &c., up to 12 inches in width, and finish up to 8 inches in width without turning the stock. The claim is made that it will work equally well in hard or soft wood, and that it adapts itself to the form or shape of any molding. A circular illustrating and describing the machine has been issued by the manufacturers, and a copy will be sent to any one who may be sufficiently interested to make application.

THE MIETZ & WEISS KEROSENE ENGINE, which is referred to by the manufacturers as excellent power for wood working shops, forms the basis of an announcement elsewhere in this issue by A. Mietz of 128 Mott street, New York City. The engine in question is designed to burn kerosene and is referred to as being automatic, simple and reliable. A catalogue of the engine has been issued by Mr. Mietz and a copy will be forwarded to any one sufficiently interested to make application.

"FRESH AIR INDOORS" is the title of a little pamphlet which reaches us from R. M. Pancoast, pneumatic engineer, Camden, N. J. As the title indicates, the matter relates to the ventilation of apartments, this being accomplished by means of what is known as the Pancoast window aerator. This is a device consisting of two or more slats of appropriate width, flexibly united and adjustable in parallel planes to various hights and angles so as to deliver in currents of air in thin sheets upward at the desired angle when in use and to close flat on the sill when not in use. The statement is made that the aerators are such that they can be suited to any hoisting window without in any way interfering with the use of the window in the apartment in which it is employed.

Carpentry and Building

WITH WHICH IS INCORPORATED

The Builders' Exchange

VOL. XXII. No. 5. NEW YORK, MAY, 1900. Ten Cents a Copy. One Dollar a Year.

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CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK

MAY, 1900.

A Model Tenement House.

The exhibition by the Chicago Architectural Club, which was brought to a most successful termination early in April, and which followed closely upon the one held in New York City by the Tenement House Committee of the Charity Organization Society, furnishes cumulative evidence of the deep interest which is being taken in the problem of properly housing the poor in the larger cities of the country. The committee named have not been content with laying bare the evils of ancient and modern tenement house construction, with a view to changing the laws in relation thereto, but they have made progress in the direction of improving existing conditions. In connection with the recent exhibition in this city prizes were offered for the best plans for model tenements, and the author of the design securing the first prize was awarded the contract to carry his work into practical effect. As a result a building is to be erected which will be six stories in hight and arranged so as to secure a maximum of economy, sanitation, comfort and privacy, while providing 14 roomy apartments that will be rented for less money than the apartments in the typical rookery to be found on the "East side." Every room will have abundance of air and light, and each set of apartments will be entirely separate from the others. Each will have its own closets, gas range, sink and washtubs, with steam heat and hot water supplied. Baths will be provided on the first floor, and there will be dumb waiters, dust chutes and other conveniences. That such model tenements are good paying investments has been proved by the experience of those already existing in New York and other cities. In London, it is stated, 150,000 persons live in the model tenements that have been erected in that city within recent years, and the demand for such improved dwellings is so urgent that they can hardly be put up fast enough. Consequently the "slum" over there is fast becoming a vanishing factor, and this is what the Tenement House Committee hope to accomplish for New York.

Handsome Apartment Houses.

For some time past a feature of the extensive building operations which have been in progress on the upper west side in this city has been the large number of fine apartment houses, the major portion of them running above five stories in hight, which is the limit prescribed for such structures as are not equipped with passenger elevators. One of the finest improvements in passenger elevators. One of the finest improvements in prospect is the seven-story apartment house to be vard, and Eighty-fifth and Eighty-sixth streets, representing an estimated outlay of nearly $1,000,000. The structure will cover an area 210 x 112 feet, and occupy what is virtually ten city lots. The plans prepared by Hill & Turner show the first two stories in limestone and the other five in face brick and limestone with terra cotta trimmings. There will be four courts, with a large yard in the rear. Each floor of the building will contain six apartments, each apartment being in what is virtually a separate structure, detached from the others except at the point of common entrance. In the basement space will be provided for a restaurant, and also for automobiles and other vehicles. The main entrance is in the central pavilion, large plate glass and iron doors opening into a spacious vestibule, finished in marbles, and which in turn gives access to two large hallways with reception rooms, office, parlor, &c. It is now thought probable that a station of the underground road will be located at this point, and the architects of the apartment house have made use of this fact to establish an entrance at the basement level leading through corridors to the passenger elevators for the use of the tenants traveling on the tunnel road. It is now expected to have the building completed in a little more than a year. Another handsome building, for which plans have been filed with the department, is the nine-story apartment house to be erected at the corner of Seventy-ninth street and West End avenue. It will be known as the "Century," and will occupy a site 102 x 100 feet in area. There will be two apartments on each floor, the interior rooms being grouped around an open court, 26 x 46 feet in size. One of the features of the house, which strikingly shows the tendency of the times, is an arrangement for the storage of automobiles, which will occupy a three-story extension at the rear; while in the basement there will be, in addition to trunk and bicycle rooms, a complete Turkish-Russian bath, for the exclusive use of the occupants of the house. We understand it is also the intention of the owner to have several electric carriages of different styles for the use of his tenants, for which reasonable charges will be made. Another feature, and one which is becoming more and more common in the elaborately appointed apartment houses, is a cold storage compartment for each tenant.

The Labor Problem in England.

The figures contained in the eleventh annual report by the Chief Labor Correspondent of the British Board of Trade present an interesting study as regards the loss in time and wages caused by strikes during the year 1898, the period covered by the report. According to these statistics the number of strikes and lockouts recorded in England for the year named, which, by the way, was the year of the great Welsh colliery strike, was 711. While this was a less number than recorded in any of the four preceding years, the number of working days lost was greater than for some time past, owing to the length of the Welsh dispute. The number of people in England directly and indirectly affected in 1898 was 253,907, as compared with 230,267 involved in the 864 disputes recorded in 1897, and 198,190 in the 926 instances recorded for 1896. From the report it appears that, of the men thrown out of work in 1898, 16,684 were connected with the building trade, 21,432 with the metal, engineering and shipbuilding industries, while 177,029 were engaged in mining and quarrying. The report shows that the chief cause of the troubles during the year named was the question of wages. In 1898 something like 152,000 working people went out on strike for an increase and 10,654 against a decrease in wages, while other questions connected with wages accounted for about 14,000. Out of 200,769 workmen directly concerned 60 per cent. were entirely unsuccessful in their strikes. Taking the percentages of working people directly affected, the figures show that 22.6 per cent. were successful, 60 per cent. were unsuccessful and 17 per cent. compromised. The balance of results was most favorable to the workmen in the building trades, as only 9.6 per cent. of those involved failed to wholly attain the objects sought. The most generally adopted method or arranging difficulties was that of direct negotiation between the parties concerned or their agents. Nineteen cases were settled by arbitration, 26 by conciliation and mediation, 637 by direct arrangement or negotiation, 114 by returning to work on employers' terms, 107 by replacement of workmen and 19 by closing of works, while at the close of the year four remained indefinite or unsettled. The report states with regard to the first 11 months of 1899 that the number of new disputes reported had only been 680 and the aggregate duration of disputes only 2,375,000 days, which were the lowest totals recorded for a similar period.

The Chicago Building Situation.

The strike in the various lines of the building trades, begun over two months ago, is still on, and a settlement of the controversy is apparently as far off as ever. The building industry in that city is practically stagnant, while many thousands of workmen remain idle at a time when they should be at their busiest. Happily, the example of the Chicago unions has not been followed to any extent elsewhere. In the East the workers in the building trades have decided to postpone making any radical demands on their employers until a more favorable season. They recognize that the present high prices of all building materials are already making capitalists doubtful about investing their money in building and that any threatening labor trouble is likely to turn the scale in the direction of abandonment or postponement of proposed work. Certainly the attitude of the Eastern workmen is a judicious one. The present seems a poor time for strikes in the building industry, and it is to be hoped that the Chicago labor leaders who have come East with the avowed purpose of extending the strike movement in this part of the country will find their mission a fruitless one.

In commenting upon the labor situation as it exists to-day in the building trades in Chicago the *Construction News* in its issue for April 11 says:

There was never a time when the issues were more plainly drawn, and when the employers were so entirely in the right. The best friends of the strikers—nay, many of the strikers themselves—are unanimously of opinion that the success of the vicious element now controlling the destinies of the Chicago Building Trades' Council and its board of business agents would be of vastly greater injury to the men themselves than to their employers, outrageous as the demands are which this vicious element has made at this time.

To hold that the employer must put a certain number of men to work whether their services are required or not, to contend that work which can be done in half a day shall constitute a day's labor, to fight for a Saturday half holiday at full pay, with an absolute refusal to permit even emergency work to be done in that time; to stand out against the use of labor saving machinery, to make constant demands for money under threat of heavy damages, all these things are involved in the present struggle, which assumes the very right of the employers to hire men to be unfounded. And when to all these contentions of ignorance, greed and absurdity are added the repeated acts of vandalism in destroying property and the repeated acts of violence in assaulting non-union workmen, nothing less than the future of the country is endangered and its free and liberal institutions put in jeopardy.

Novel Method of Shoring a Building.

An interesting method of supporting a building while the foundations of an adjoining structure were being laid was recently illustrated in Chicago. An eight-story building was about to be erected for light manufacturing purposes, the structure being L shaped, and designed to occupy, with the exception of a plot 50 x 80 feet, upon which stood an old three-story building, the entire area of a lot 150 x 100 feet. The owner of the old building refused to make any agreement for a party wall, and the only alternative left by custom was to support it either by cantilevers or caissons, while the piles were driven for the foundation of the new structure. For various reasons the architect decided to support the adjoining walls of the building on beams resting on bearings which would be 10 feet from the trench where the piles were to be driven. The foundation of the new building contained some 400 piles, 100 of which were driven in a double row around the two adjoining walls of the old building. The walls were cut off below the first floor and supported at intervals of 6 feet on three 20-inch steel beams, resting on bearings 10 feet from the trench. The work was commenced by digging a trench about 6 feet below the basement of the old building, in order to eliminate vibration, then the piles were driven, the first row being within 4 inches of the wall, and so close that the hammer of the driver at times scraped the bricks of the old wall. Readings were frequently taken, but at no point was the displacement of the building greater than 1/4 inch. It is stated that this is the first time this method has ever been used in Chicago under such circumstances.

Possible Solution of Labor Troubles.

With the view of avoiding labor troubles and stimulating the zeal and interest of their employees, several of the large industrial combinations are said to be arranging to dispose of part of their stock to their employees instead of putting it on the public market. This tendency is said to be quite marked among corporations recently formed, and it is likely to be widely followed by other industrial concerns, having worked successfully wherever tried. It is recognized that employees who are part owners would be liable to show more interest and diligence in their work than those who have no stake in the enterprise further than that of a hireling. Moreover, in the case of strikes or labor disputes, workmen who are also stockholders would not be apt to go out and thereby deliberately injure their own business. In the judgment of some this plan will eventually become the rule among all large industrial concerns as supplying the best solution of the labor problem.

THE proceedings of the thirty-third annual convention of the American Institute of Architects, which was held in Pittsburgh in November last have been published by the Board of Directors in the shape of a volume of 250 pages neatly bound in paper covers. The matter has been carefully edited by Glenn Brown, the secretary of the institute, and the volume, as a whole, forms a valuable contribution to current architectural literature. The frontispiece is an excellent likeness of ex-President Henry Van Brunt of Kansas City, Mo. In addition to the proceedings the volume includes lists of officers, committees, names of the founders of the American Institute of Architects, a list of the members of the institute, a list of the chapters chronologically arranged, together with obituaries of members who died during the year.

THE official report of the operations of the New York Department of Buildings in 1899 shows that last year was a record breaker for new buildings. During the year the department passed upon plans for 10,979 new buildings, of a total estimated cost of $156,843,321. On December 31, 6535 new buildings were in course of construction. The plans approved last year included 40 dwelling houses to cost more than $50,000 each, and 47 office buildings to cost $10,789,865.

RESIDENCE AND STABLE OF MR. EDWARD MOULTEN, ON JUNE STREET, WORCESTER, MASS.

JOHN P. KINGSTON ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, MAY, 1900.

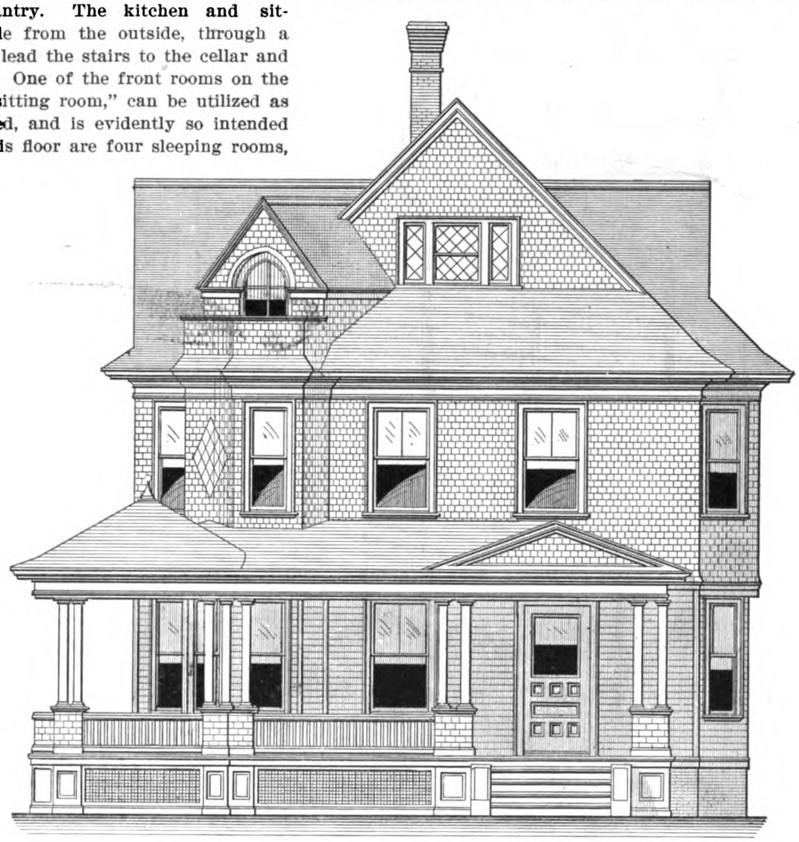
A MODERN RESIDENCE AT WORCESTER, MASS.

THE subject of our half-tone supplemental plate this month is a modern dwelling, possessing in its architectural treatment features which will doubtless interest many of our readers. The broad piazza extending entirely across the front, and along a portion of one side of the house, the quaint treatment of the corner, with its little balcony at the attic dormer, together with the shingle effects, are points to which attention may well be directed.

The interior shows on the first floor a large hall, with lavatory under the stairs, a parlor, sitting room, dining room, kitchen and pantry. The kitchen and sitting room are accessible from the outside, through a rear hall, while from it lead the stairs to the cellar and also to the second floor. One of the front rooms on the second floor, marked "sitting room," can be utilized as a sewing room if desired, and is evidently so intended by the architect. On this floor are four sleeping rooms, bathroom and numerous closets, including one for linen.

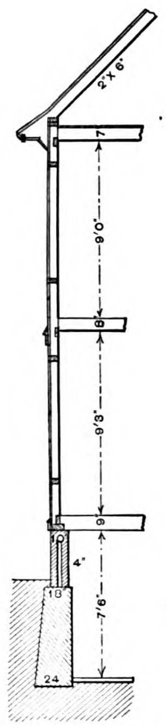
The foundation walls of stone are 24 inches at the bottom and 18 inches at the top. All walls are back filled with cinders or coarse gravel at least 8 inches thick from the bottom of the walls to within 6 inches of the finished grade. The underpinning is of brick, built hollow, and at least 10 inches thick from the bottom to the extreme top. The front steps and buttresses are of granite with all exposed parts 6 cut work, the buttresses being 10 inches thick. The cellar floor has a foundation of cobble stone and tar 3 inches deep, covered with tar concrete 2 inches deep.

The framing and dimension timber is of spruce with the first floor girder 8 x 9 inches; the sills, 4 x 7 inches; first floor joist, 2 x 9 inches; the partition joist, 3 x 9 inches; the second floor joist, 2 x 8 inches; the third floor joist, 2 x 7 inches; the posts, 4 x 7 inches; the braces, 3 x 4 inches; the wall studs and main partition studs, 2 x 4 inches; the front and rear piazza sills, 6 x 6 inches; the piazza joist, 2 x 6 inches; the piazza rafters, 2 x 5 inches; collar beams, 1 x 7 inches; common rafters, 2 x 6 inches; large hips and valleys, 3 x 9 inches, and small hips and valleys, 2 x 9 inches. The wall plates are double, 2 x 4 inches. The joist, studding and furring are placed 16 inches on centers, and rafters and collar beams 24 inches on centers. Outside studs at right angles to joist are set square on top of sills with 2 x 5 resting on top of sills to receive the floor. The flooring extends out to the top of the 2 x 5, thus making a fire and vermin proof stop. The girders in the cellar are supported by 3½-inch iron posts. All joist are bridged with ⅞ x 2½ inch spruce strips fastened with two nails at each end. All main partitions on the first floor are bridged with 2-inch stock.



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

A Modern Residence at Worcester, Mass.—John P. Kingston, Architect.



Section.—Scale, ⅛ Inch to the Foot.

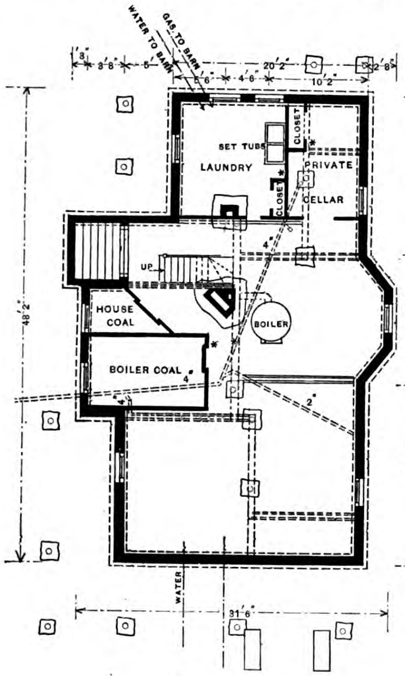
The frame, including the roof, is covered with ⅞-inch boards, on which is placed Neponset water proof paper. The first story is covered with 6-inch pine clapboards, laid 4¼ inches to the weather, while the second story, as well as the sides of dormer windows, gables, &c., as shown on the elevations, are covered with 16-inch shingles, laid 5 inches to the weather. The main roof is covered with shingles, laid 4¾ inches to the weather, and those of the piazza roof, 4¼ inches to the weather. The front, side and rear piazzas have floors of 1⅛ x 5 inch rift grain Southern yellow pine, ceiled with Southern hard pine sheathing. The lining floors of the house are of ⅞-inch hemlock, the top floor in vestibule, front hall and dining room being of selected red birch ⅞ inch thick and 2½ inches wide, blind nailed. The top floors in the kitchen, pantry, bathroom, lavatories, sitting room and hall on second floor are of birch, or maple, also blind nailed. The dining room, vestibule and both front hall floors, as well as the treads of the stairs are treated with a coat of shellac and two coats of Berry Brothers' liquid granite floor finish, rubbed to an egg shell gloss. The other hard floors and treads of rear stairs have a coat of shellac and one coat of Berry Brothers' liquid granite. The finish in the vestibule, front hall, parlor, sitting room and all parts of the stairs is in even colored red birch, and the dining room, including all exposed parts of the china closet, is finished in quartered oak. The kitchen, pantry, lavatory, hall and entry are finished in North Carolina pine. The finish of the second floor is of white wood, as is also that of the closets. The plumbing is of the open type, and the trimmings nickel plated. In the attic is a 20 x 24 x 20 inch tank, lined with 20-ounce copper.

The house is piped for gas and wired for electric lighting by what is known as the two wire system. It is also arranged for electric gas lighting.

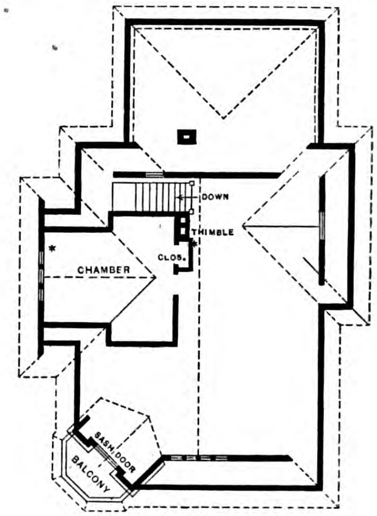
The dwelling here shown is pleasantly located on June street, Worcester, Mass., and was erected for Edward Moulten, in accordance with plans and specifications drawn by Architect John P. Kingston of 518 Main street, Worcester, Mass. The builder was Fred J. Y. Goff of that city.

Builders Must Pay for Plumbing.

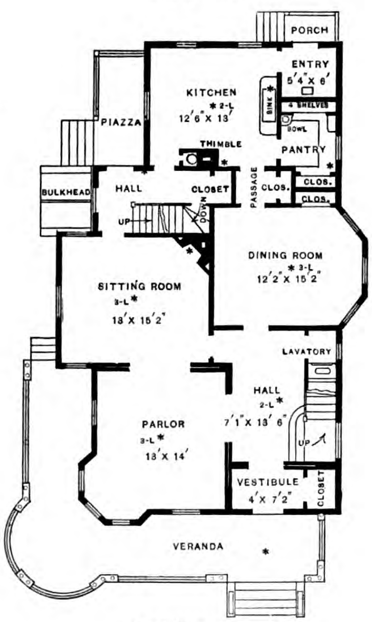
One of the evils the plumbing trade has had to contend with is the practice of one class of builders refusing payments for plumbing work when they become due, claiming contracts have not been fulfilled. In order to avoid law trouble and to secure their money plumbers have in many instances done a great deal of extra work not specified free of cost. In this way these builders have materially reduced the cost of their buildings by following the same methods with the plumbers and such other contractors as they could force. The plumbers



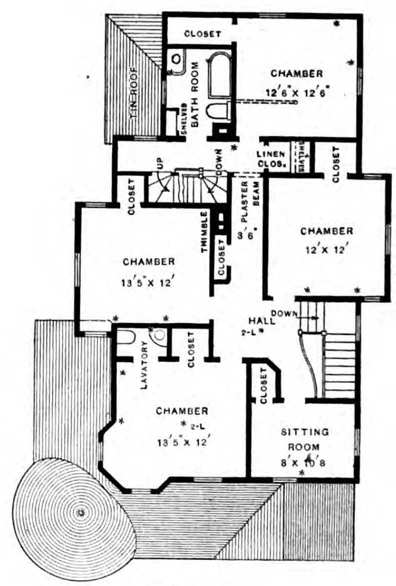
Foundation.



Attic.

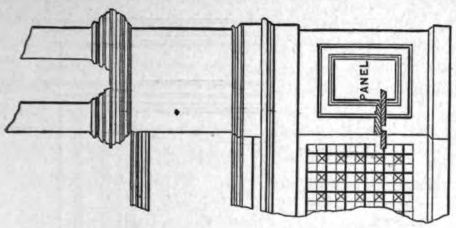


First Floor.

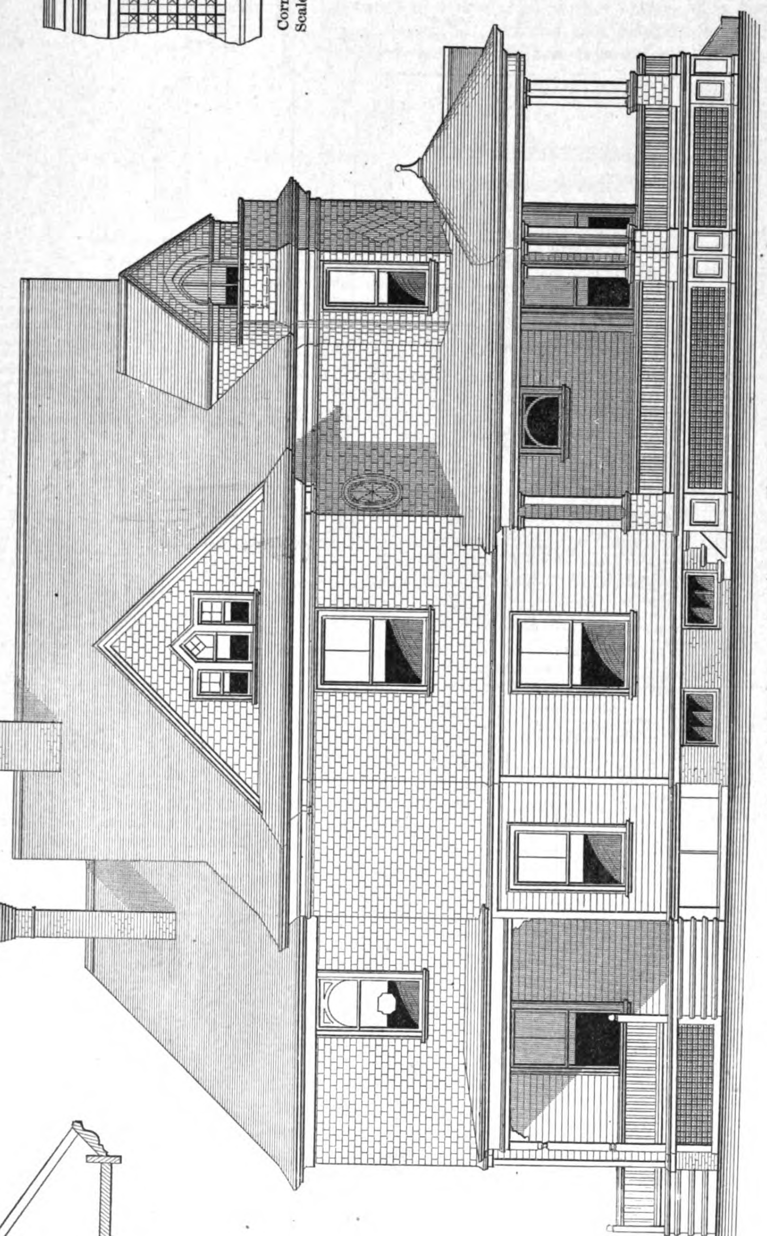


Second Floor.

A Modern Residence at Worcester, Mass.—Floor Plans.—Scale, 1-16 Inch to the Foot.

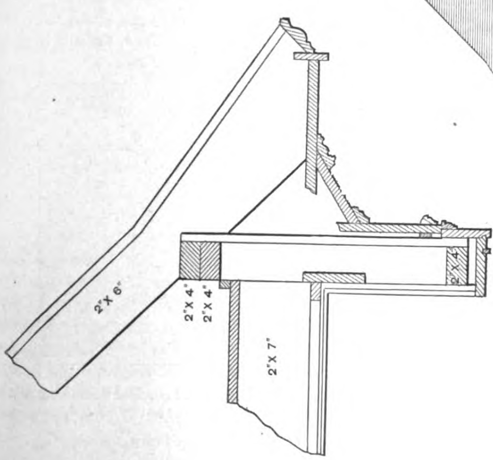


Corner of Front Piazza.—Scale, ⅜ Inch to the Foot.

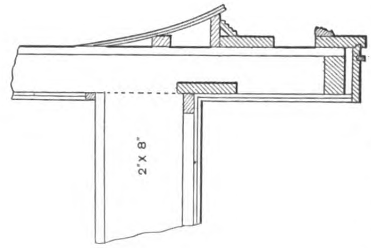


Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

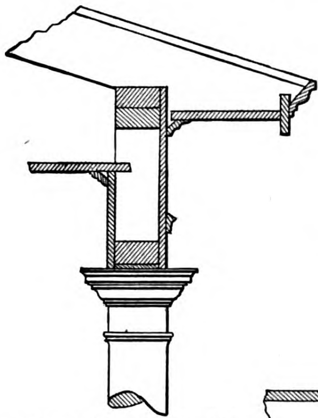
Miscellaneous Constructive Details and Side Elevation of Modern Residence at Worcester, Mass.



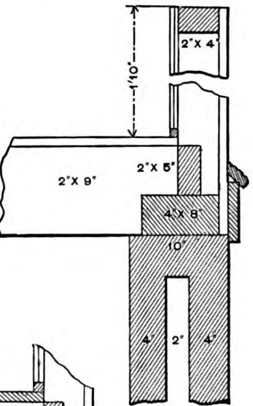
Main Cornice.—Scale, ¾ Inch to the Foot.



Detail of Belt Course.—Scale, ¾ Inch to the Foot.

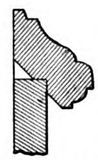


Detail of Piazza Cornice.—Scale, ¾ Inch to the Foot.

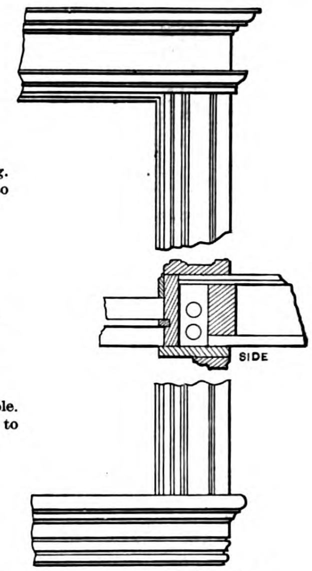


Detail of Framing at Water Table.—Scale, ¾ Inch to the Foot.

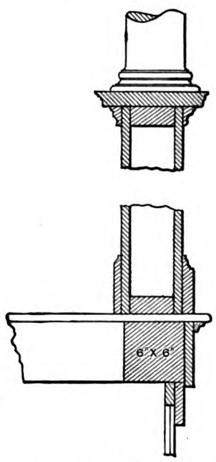
Detail of Base Molding. —Scale, 3 Inches to the Foot.



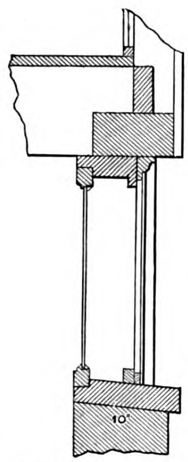
Section of Water Table. —Scale, 3 Inches to the Foot.



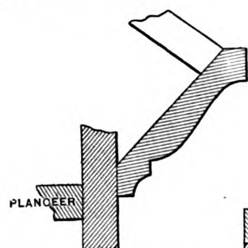
Elevation and Section of Window Finish. —Scale, 1 Inch to the Foot.



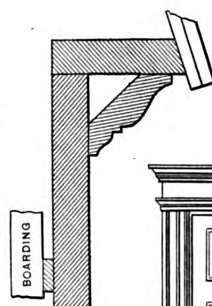
Section through Supports for Piazza Columns. — Scale, ¾ Inch to the Foot.



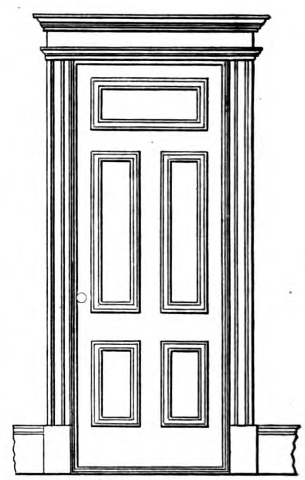
Section through Cellar Window Frame.—Scale, ¾ Inch to the Foot.



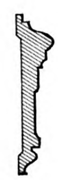
Profile of Crown Molding in Main Cornice.—Scale, 3 Inches to the Foot.



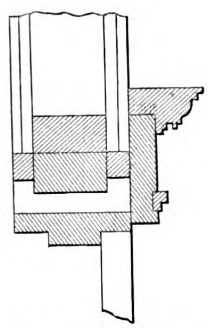
Section of Belt Course. —Scale, 3 Inches to the Foot.



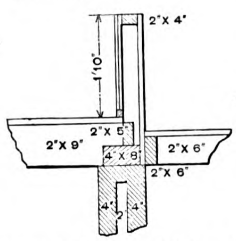
Elevation of Door and Finish in Principal Rooms.—Scale, ⅜ Inch to the Foot.



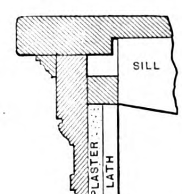
Chair Rail. —Scale, 3 Inches to the Foot.



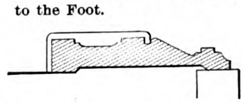
Top Finish in Main Rooms on First Floor.—Scale, 1½ Inches to the Foot.



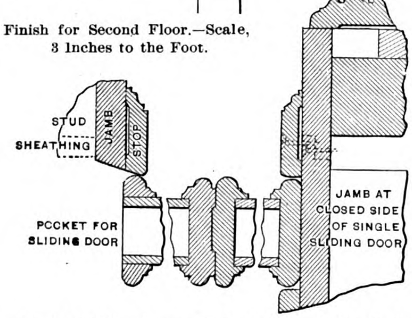
Detail of Framing of Main and Piazza Floors.—Scale, ⅜ Inch to the Foot.



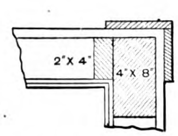
Detail of Window Stool and Apron.—Scale, 3 Inches to the Foot.



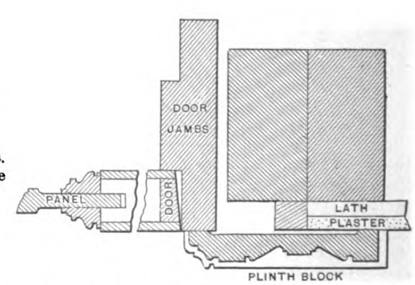
Finish for Second Floor.—Scale, 3 Inches to the Foot.



Detail of Sliding Doors.—Scale, 3 Inches to the Foot.



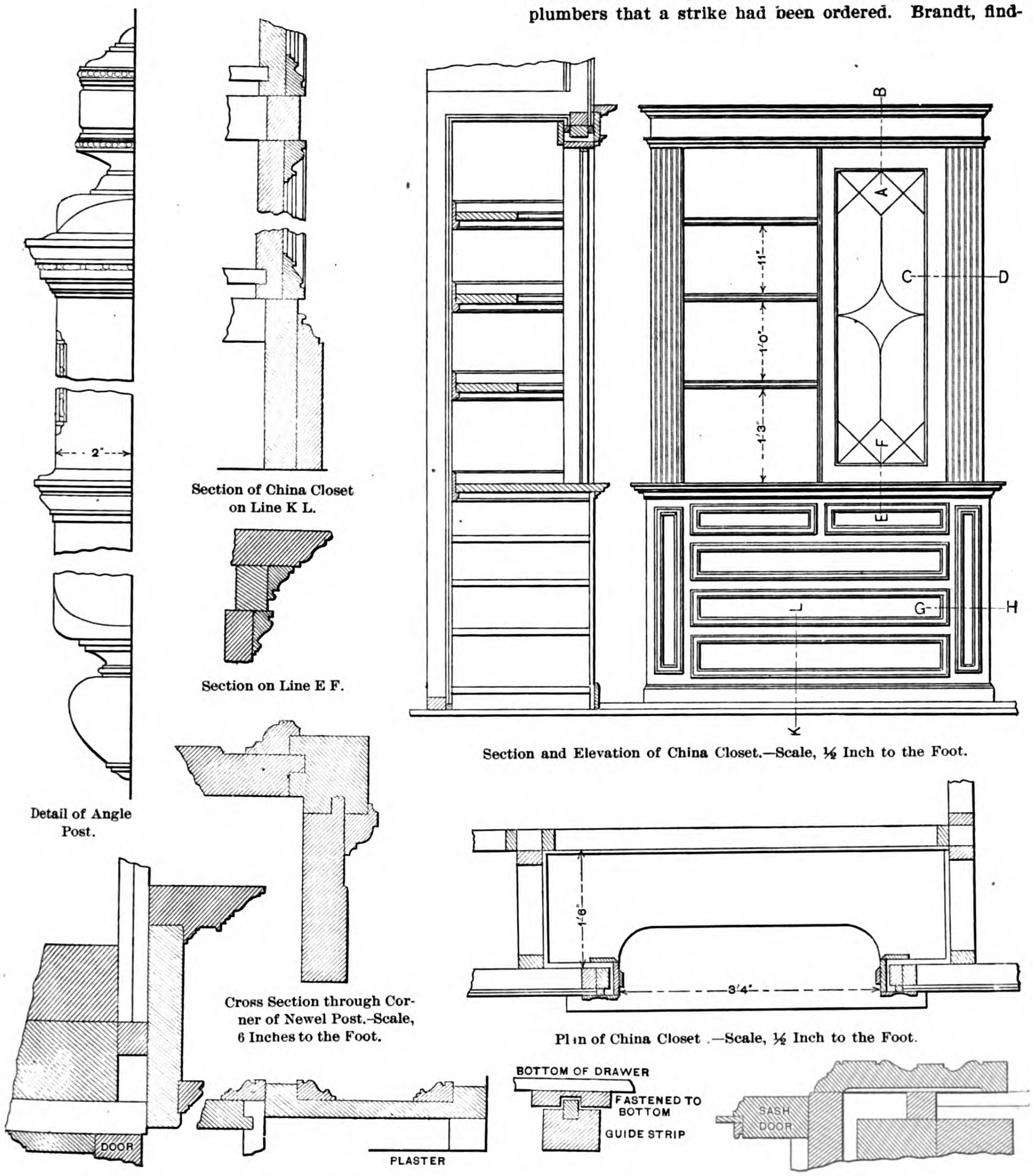
Detail of Corner Boards. —Scale, ¾ Inch to the Foot.



Section through Door Frame in Principal Rooms on First Floor.—Scale, 3 Inches to the Foot.

Miscellaneous Constructive Details of Modern Residence at Worcester, Mass.

have for some time been studying the question and in several instances have induced the builder to settle honestly outside of the courts by refusing to finish the work until the original contractor was paid. The following account is given in the *Telegraph* of a case where their methods have been brought before the court and sustained. An important decision was rendered by Justice Dickey in the Brooklyn Supreme Court in favor of the he was entitled to receive payment. Brandt disputed O'Connell's right, insisting O'Connell had not performed his contract. He then engaged other plumbers to do the work. O'Connell reported his grievance to the Plumbers' Associations, who immediately notified all plumbers not to work on the premises, and also warned the supply houses not to furnish any material. Brandt engaged other plumbers, but as soon as they started work the union ordered them to quit, and sent delegates to notify the plumbers that a strike had been ordered. Brandt, find-



Detail of Angle Post.

Section of China Closet on Line K L.

Section on Line E F.

Section and Elevation of China Closet.—Scale, ⅛ Inch to the Foot.

Cross Section through Corner of Newel Post.-Scale, 6 Inches to the Foot.

Plan of China Closet.—Scale, ⅛ Inch to the Foot.

Section of China Closet on Line A B

Section of China Closet on Line G H.

Scale, 3 Inches to the Foot.

Detail of Draw Slide.

Section of China Closet on Line C D.—Scale, 3 Inches to the Foot.

Miscellaneous Constructive Details of Modern Residence at Worcester, Mass.

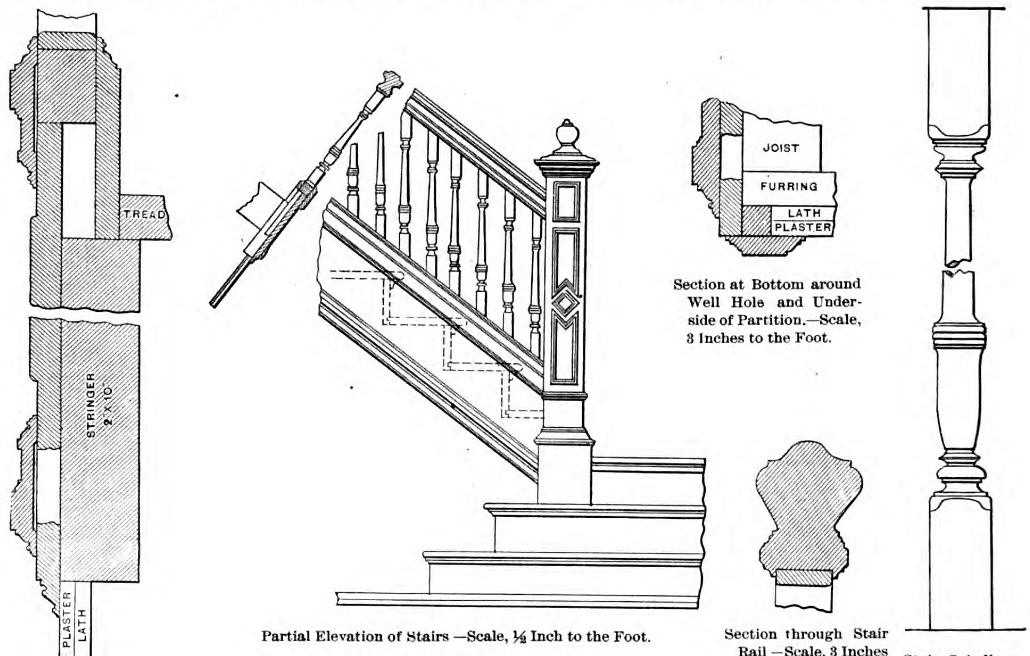
Master Plumbers' Association of the City of New York, and the Amalgamated Society of Plumbers and Gas Fitters of New York, in an action brought against them by Henry L. Brandt, for an injunction forbidding these unions ordering a strike on the premises 19 West 128th street, in this city.

Last December Brandt contracted with William O'Connell for plumbing work. O'Connell worked there from December until January, at which time, he asserts, ing that he could not engage other plumbers, brought an action to restrain the unions from interfering with him.

The Plumbers' Associations, through their counsel, contended they had a right to notify plumbers and supply houses that a strike had been ordered, and to warn them against furnishing goods to Brandt, and, as they had used no force in preventing the men working, an injunction could not issue. Justice Dickey adopted this view, and rendered his decision refusing the injunction.

Laying Brick in Dead Walls.

The present manner of laying brick in dead walls gives one the impression that the quality of brick laid is of far more importance than the quality of the work done. The only way to obtain good solid brick walling is to either flush the joints solid with mortar every course or make a shove joint. The former method takes too much time and material, and the latter is rarely done, except in very heavy buildings. The custom generally adopted, says a writer in the *Clay Record*, is to spread the mortar on the brick (a portion only of which gets in the joints) and lay the brick on top, each succeeding course being bedded in mortar; but the longitudinal and cross joints are only partially filled, the butting joint of the brick receiving a little dab of mortar gathered on the point of the trowel by cleaning the surplus mortar from the outside joint. Grouting with cement mortar every two courses in hight might be adopted for basements and first stories of buildings when great strength is required. Full headers for face brick are better than clippings, and should be specified for all heavy buildings. The face brick are often built up 15 or 20 courses high before the backing up is done, a custom that should not be permitted, as it leaves the wall subject to many defects, as it cannot be well bonded or tied together sufficiently strong to be able to resist unequal strains successfully. For good strong work the mortar joints should never exceed 5-16 inch in thickness.



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

Partial Elevation of Stairs —Scale, ½ Inch to the Foot.

Section at Bottom around Well Hole and Underside of Partition.—Scale, 3 Inches to the Foot.

Section through Stair Rail —Scale, 3 Inches to the Foot.

Stair Spindle.—Scale, 3 Inches to the Foot.

Miscellaneous Constructive Details of Modern Residence at Worcester, Mass.

Gothic Capitals.

The use of capitals in pure Gothic architecture, to speak constructively, is to receive the clusters of arch molds which are stopped by it at the summit of the column, and not continued to the ground, says a writer in a London contemporary. For when the arch molds are not wholly identical with those of the jamb or column, they must either die away at the spring (in which case they are called discontinuous) or be abruptly stopped by a projecting impost. In many cases the moldings are partly continuous and partly stopped by the capitals, certain groups being borne by shafts, while the intervening hollows are continued to the ground, forming at the same time deep lines of division between the groups of arch molds above and the separate jamb shafts below. This is particularly the case in perpendicular piers and arches. Here the soffit or innermost moldings are borne by a shaft, the outer being continuous, while in Early English doorways the soffit is generally continuous, the others carried by shafts. Again, in Norman and Early English the shafts stand isolated; in the latter so far that the hand, or even the arm, may be passed round them. In Decorated they are engaged, fewer in number, less prominent, less important in the apparent work of support. And in Perpendicular they become entirely subordinate and merely decorative, as may be observed in the porches and doorways of King's College Chapel. Hence by an ulterior debasement mere bowtells are furnished with quasi capitals and bases. In some cases a member of the same projection and diameter as the bowtell is continued above this quasi-capital (if the term be allowable), but slightly varied in form and profile.

Roofing the Crystal Palace.

For some time past the Crystal Palace of London has been in process of restoration and repair, and a few months ago the first portion of a noteworthy piece of the work was completed—being that of the reroofing of the entire building. The area covered by the work was about 2 acres, and an enormous amount of glass was used. The entire space covered by glass at the palace is said to be between 13 and 14 acres, and the whole will have to be replaced at an estimated cost of over £20,000. An idea of the extent of the labor and difficulty involved in the accomplishment of the task can be gained from the fact that the transept is 384 feet long, has a semicircular span of 120 feet, and the hight from the floor to the central point is 170 feet. The original form of the roof, that of ridges and furrows, designed to resist the attacks of hail storms, has been preserved, but the panes of glass have been increased from 10 inches to 18 inches in width, and from 49 inches to 54 inches in length.

CIRCULAR STAIRS AND SPIRAL VAULTS.

AT one of the meeting of the London Architectural Association a paper on the above subject was presented by Lawrence Harvey, an instructor in the Guild's Institute, extracts from which may not be without interest to some of our readers.

The invention of circular stairs winding round a solid newel is, I believe, mediæval. I cannot say to a certainty when the first winding staircase was built; but, as far as I know, there are no precedents in either Greek or Roman architecture for that constructional feature. To my mind, the invention of the winding stair arose out of the requirements of military architecture. What was aimed at in the design of castles and fortified places was, among other things, compactness; for, given a certain number of men as garrison, the defense will be strong in inverse ratio to the extent of the wall to be defended. Hence followeth that all spaces that are not required as dwellings or stores should be reduced to a minimum. Among these spaces are the staircases.

It is always a matter of surprise for me to find with what directness mediæval architects found readily the best solution for the constructional problems of their time, a directness and a happiness which we only find to-day in the work of our mechanical engineers. I do not think that mediæval architects were men better gifted than ourselves, but I consider they were particularly happy in not being encumbered by architectural traditions, and in having begun their architectural career as simple workmen, either as carpenters or as stone masons. Free from our preoccupations of re-editing certain past styles of architecture, mediæval architects saw only the constructional problems they had to deal with, and the constructional means they possessed for solving these problems. Moreover, as carpentry and masonry require certain geometrical operations, they developed in time a great power of design, combined with an equally great power of working materials into all kinds of ingenious combinations.

Circular Staircases.

Geneva is particularly rich in circular staircases. Up to the end of the last century none but such staircases were used even in the noblest mansions, for Geneva was a fortified town surrounded by powerful enemies, and hence space was most valuable. These stairs are called *des Virets*, a local denomination which comes from an old French verb *virer*, to turn round. Among the oldest are, no doubt, those which lead up to the towers of the cathedral. They were built probably in the beginning of the twelfth century. Their radius is about 3 feet 8 inches, the newel has a diameter of about 8 inches, so they leave a clear space of about 3 feet 4 inches, which allows a person going down and one going up crossing one another on the stairs. The steps are not all of equal hight. In the lower part, measured in the middle, the steps have a rise of 8 inches and a tread of about 11 inches. There are 16 steps to one wind, which gives an ascent of about 10 feet 8 inches for one convolution. I have noticed that the back of the step as well as the riser go to the center of the newel, an arrangement which leaves very little stone where the step abuts against the newel, and should be discarded. In later work the back of the step is made tangent to the newel, whereas the front part still runs to the center of the newel. In an old castle I noticed that the back of the steps had been finished off with a chamfer, thus making an approach to a continuous ceiling as soffit of the staircase. To make a continuous soffit to a circular staircase requires a rather developed knowledge of geometrical construction, so as to provide a joint which in all its parts shall form a square angle with the soffit of the step.

It is to be observed that as each step is housed in the wall, and at the other end forms part of the newel, it is desirable that the wall and the newel should bear the same weight, otherwise the steps submitted to unequal pressures would break. The newel, if not the steps, should rise therefore to the same hight as the wall. A very good arrangement is to finish the upper part of the staircase with a fan vault resting on the newel.

The Spiral Vault.

In course of time steps are worn out, and in circular stairs new steps are very difficult to fix. To meet this difficulty it is far better to lay the steps on the extrados of vaulted ceilings, which follow the rake of the stairs. This led to the invention of the spiral vault, called Vis St. Gilles, the voussoirs of which are worked on the same principle as winding handrails. As all the voussoirs of one course are identical, it is a very easy vault to construct with concrete blocks. It requires only the working of as many blocks as there are courses, and casting all the others from these models.

In a spiral vault the newel is useless, and the vault would hold quite as well round an open well hole. In that case the vault would look better by having as section either a quarter of a circle or a quarter of an ellipse. In the Town Hall of Geneva there is an inclined road that rises to the top of the building round a square well hole, and which rests on Gothic groins. The spiral vault may be intersected with raking arches to correspond with arches in the outer wall.

Manual Training in Germany.

It is 24 years since the movement having for its object the manual training of boys was inaugurated in Germany. In this space of time the idea has been disseminated largely in the Empire and now over 2000 teachers are engaged in the work. Nevertheless, according to a report recently made to the State Department at Washington by George Sawter, United States Consul at Glauchau, the conditions connected with this branch of tuition leave much to be desired. The original training in home industries has almost disappeared. It is only carried on at present in a few places in Holstein and in a number of institutions for the blind. Most of the other educational establishments in Germany have already introduced manual training into their curriculum. But the endeavor to prepare the pupils directly for engaging in a handicraft has obtained importance in only two of Germany's institutions of learning. The majority of the German industrial schools only deal pedagogically with the subject. There exist at present in Germany, distributed in 605 places, 861 schools and institutes wherein manual training is carried on in 1514 workshops. Of this number 836 schools and institutes conduct the training on a pedagogical basis. The principal centers in which these classes are established are Prussia, Upper Silesia, the Rhenish Province and Saxony. The 1514 workshops are situated in 286 independent manual training schools and 238 public schools, the rest being connected with various kinds of private educational establishments. The organization of the handicraft tuition in the individual schools and institutes is varied in character. Sixty-nine institutes have adopted the whole curriculum as recommended by the German Association for the Dissemination of Manual Skill, while 16 dispense with the preparatory work. Of the rest 177 schools and institutes confine themselves to three branches, 261 limit themselves to two and the remainder to one branch only. Five hundred and thirty-five workshops are devoted to wood carving, 527 to working in cardboard and 336 to the carpenter's bench. Of these 68 are closely connected with wood carving, 77 with preparatory roughing out work, 35 with metal work, 28 with country timbering, 11 with turnery and 11 with modeling in clay. The participation of German teachers in the work of manual training under the association is steadily increasing. Twenty-two hundred teachers have up to now been taught to become instructors in this branch, the majority of whom have been trained in Leipsic.

WINDOW FRAME FOR A CIRCULAR TOWER.

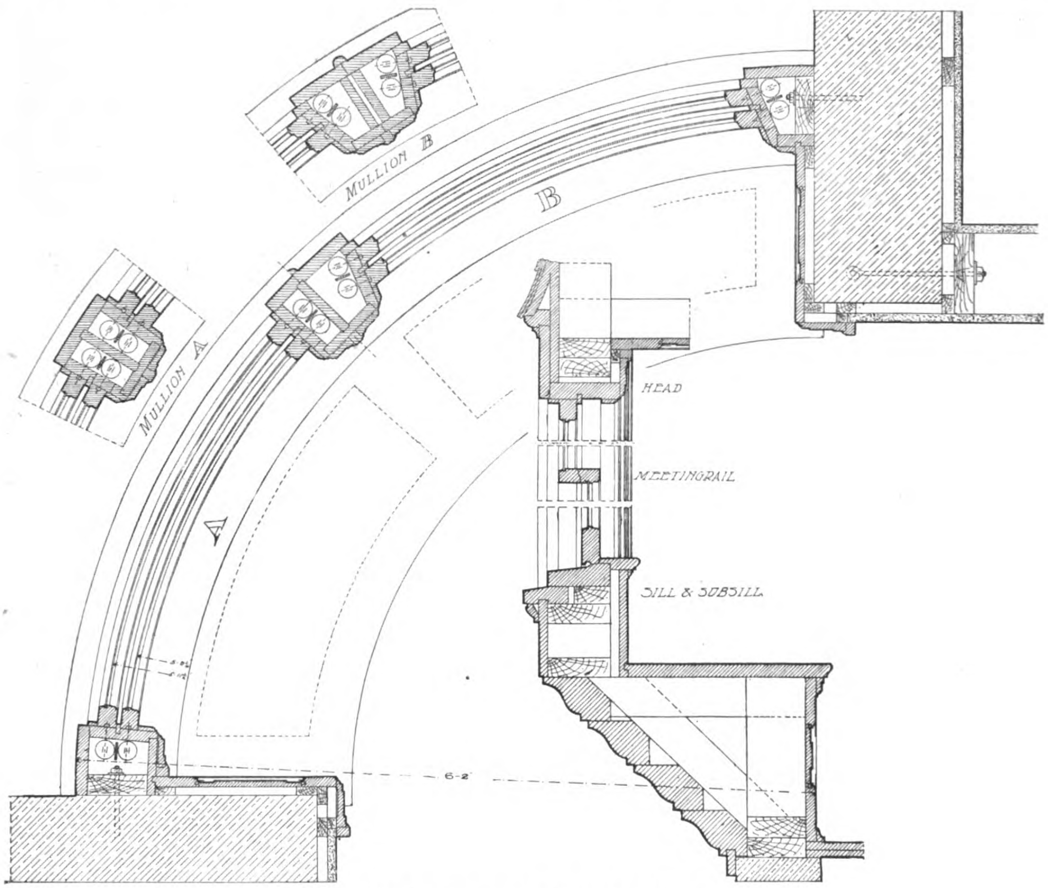
WE present herewith the illustrated description of a window frame in a circular tower contributed by Frank J. Grodavent of Fort D. A. Russell, Wyo., and awarded the second prize in the thirty-first competition. In this connection we desire to refer to the neatness of the drawings and the care with which they were prepared. In order that our readers may judge of this, we have reproduced by photography the sheet of details furnished by the author and give the result on this page for their inspection.

In his description the author says:

I have taken as my subject a circular tower starting at the inner angle of a brick building with quarter circle mullion windows located on a main stair platform, about midway between the first and second floors, with the windows set out 18 inches from the true circle of the stairway. These windows afford light to the stairway and to the hall below, as well as give a place for a rest at the platform. The windows are designed to be made on the circle, with sash glazed with cylindrical glass, and hung with cords and weights on axle pulleys. The side jambs and head which form the recess are designed to be paneled, and the opening cased down to the stair platform and a panel placed below the seat casings. The lines for the circular panels in the soffit are shown by the dotted curve lines on the large detailed section.

In selecting the windows in a circular tower on a stair platform, I not only meet the requirements of the competition, but offer a design to the readers of *Carpentry and Building*, with an idea for the treatment of a well arranged stairway which has an abundance of light, a seat in main hall and a closet below the stairs. The closet can be used as a coat room or may be utilized as a toilet room by continuing a short flight of stairs down to about the ground level (to give hight to the room) and providing a window, as shown on the scale elevation.

In my details I have shown two methods of construction, as both are used in circular towers. In design A the object first sought is to have the arrangement of sash square with the jambs which radiate to the center of the circle. The only objection against this arrangement is the fact that the sash must be placed in position from the outside of the building, and require stops with screws to hold the sash in place.



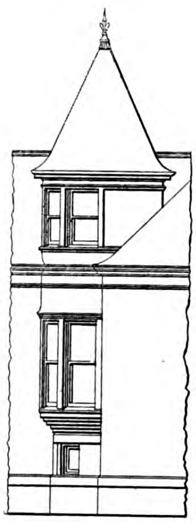
Details of Window Construction.—Scale, ¾ Inch to the Foot.

Window Frame for a Circular Tower.—Awarded Second Prize.

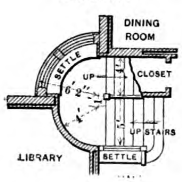
In design B the object first sought is to have the jambs parallel, so the sash can be placed in position and removed from their runs from the inside of the building. This requires sash with the stiles joining the rails at an angle; the runways for the sash are angling, whereas the pulleys must be set square with the jambs, thus requiring the grooves in the sash for cords to be made square with the pulleys and at an angle with the stiles. This design also requires a much larger frame at the mullion than design A. In the latter design the stiles of sash are joined square with the rails, pulleys which are set square with the jambs line with the sash, and grooves in stiles which receive the cords are also square with the pulleys and jambs.

In design A it will also be noticed that the construction of boxes and sash is practically the same as in a common square box frame, and this alone would recommend its use, whereas in design B everything comes on angles for construction. The difference can better be seen by comparison of the two mullion details, mullion A and mullion B, each of which belongs to its respective design of frame. The circular head and sills are to be made of solid material of full required thickness, as the sills cannot be canted to give the slope as in a common flat box frame.

In some circular windows for towers a regular square frame and sash are used, with only the back part of the brick mold cut away to allow the brick jambs to radiate to the center of the circle. This method of construction does very well for narrow windows, but for wide glass a circular frame and sash are best, as a straight frame



Elevation.



Plan.

Scale, 1-16 Inch to the Foot.

Window Frame for a Circular Tower.

and sash on wide circular openings require frames too wide at the jambs. If a straight or flat frame is used in a circular tower, I would make the frame the same as for regular windows in a flat wall, except that I would have the head and sill circular unless I desired to use screens and storm sash, in which case I would have a straight head and sill as in the regular frame. To meet the inside circle I would have the frame grooved for false jambs, head and stool, and inside finish made on the proper circle to the radius of the inside finished wall. In the scheme as shown under design A the projecting windows, as per detail, should all be on a circle.

Cleaning Tracing Cloth.

Very few engineers or draftsmen, says a contemporary, seem to know that tracing cloth can be very quickly and easily cleaned, and pencil marks removed, by the use of benzine, which is applied with a cotton swab. It may be rubbed freely over the tracing without injury to lines drawn in ink, or even in water color, but the pencil marks and dirt will immediately disappear. The benzine evaporates almost immediately, leaving the tracing unharmed. It must, however, be borne in mind that the surface has been softened, and must be rubbed down with talc or some similar substance before drawing any more ink lines.

Advantages of Hollow Brick.

In a paper presented before a recent meeting of the Iowa Brick and Tile Association, by L. W. Denison, some very interesting points were made relative to the advantages of hollow brick. Among other things the author said:

The air space makes a dry frost proof wall. The plaster is applied direct to the brick, thus cutting off all expense of lathing. They take one-third less mortar than common brick. In a 12-inch wall we have three separate air spaces as a non-conductor of heat and cold. The hollow brick at common brick measure are much lighter, weighing only 2.63 pounds, while our common brick weigh 4½ pounds; thus they have advantages over common brick in freight, hauling, handling and hoisting to place in the building. Fifty per cent. more wall can be laid per day of hollow brick than of common brick. At the first use of them here, in Mason City, the bricklayers objected to them on the ground that they made less days work on the building for the bricklayer. They have since found that there are more brick buildings built on account of the lessening cost to the owner, and consequently more days work for the bricklayer, and bricklayers are now advising the use of hollow blocks. By means of the hollow block we are able to compete with stone, which is so abundant in this locality.

Construction of Grain Elevators.

The new building code of the city of Montreal contains some interesting provisions regarding the construction of grain elevators in that place. These may be put up with bin walls made entirely of wood, provided the walls are made solid and without cellular open spaces within them. The external bin walls shall have a covering of brick, slate, metal or other incombustible materials. If the weight of the bins is independently carried on a skeleton construction of wood, steel or iron, and does not rest upon the inclosing walls, the inclosing walls as high as the bottom of the bins shall be made of brick not less than 20 inches thick, or stone not less than 30 inches thick. The walls and roof of the cupola and the roof shall be covered with incombustible materials, also the roadways and the ground floor, together with the supporting timbers when detached. All the external openings in the cupola shall be covered with wire netting of No. 14 wire, with mesh not over ½ x ½ inch. The engine and boiler used in connection with any such elevator shall be inclosed with solid brick walls, and the roof over the same shall be fire proof. Any opening between the engine room or boiler house and the elevator shall be fitted with fire proof doors.

It is interesting to note also that the new laws specify that in all first-class buildings constructed on the skeleton principle "all supports, beams, girders, &c., shall be joined by riveted connections."

Compensation for Architect.

The right of an architect to recover for the making of plans in the absence of an expressed contract entered largely into a suit recently decided in Philadelphia. The suit was brought to recover $25,250 for making interior plans for a 20-story office building, estimated to cost a trifle over $1,000,000, the commission being 2½ per cent. The architect claimed that he was authorized to prepare the plans; that he engaged skilled assistants and traveled in various cities, noting the latest improvements in office buildings for the purposes of his work. When the plans were completed he alleged that he was informed by the owner of the contemplated structure that the project had been abandoned. For the work already done the architect was paid $1000. On the other hand, the owner claimed that the architect was not employed by him to prepare the plans for the building, but rather that the architect asked his permission to submit sketches, which was granted. The architect was only authorized to prepare a rough sketch of the projected building, so that some idea of the cost could be had, and was not authorized to travel to obtain information regarding office structures. The owner also contended that it was not the custom of the members of the American Institute of Architects to charge a commission of 2½ per cent. on the cost of the building when the erection of a structure had been abandoned. The result of the trial of the case by jury was a verdict for $5000 in favor of the architect.

THE ART OF STONE CUTTING.

WE present herewith some extracts from a paper on "Building Stones and Stone Cutting," prepared by Alex. Marshall and read at a recent meeting of the Toronto Chapter of the Ontario Association of Architects:

To the mason and stone cutter a full and accurate knowledge of the materials he uses is most essential to enable him to estimate the advantages to be gained from their proper application for building purposes, so as to fill the conditions of economy, combined with utility and skilful workmanship. He should make himself acquainted with their positive and relative strength, the changes that take place from exposure to the atmosphere, moisture, heat and cold. Regard must also be had to the time and labor required in cutting them for building purposes. On the nature of the materials used in construction, the strength and durability of buildings wholly depend, and all the science we have ought to be applied to make the best selection from the materials within our reach. The most important properties of stone, as applied to building, is strength to resist compression, tension or other strains, its ability to withstand shocks and oppose friction, its unchangeable character when exposed to heat or cold—to the atmosphere or to the application of acids.

In making choice of building stone, when its qualities are unknown, it would be well to make a few simple tests to ascertain its qualities and defects. Sandstones that contain the greater proportion of silex in their composition, with a binding or cementing matter of a silicious nature, when compact and of fine grain, are the most durable, are very hard and most difficult to work, consequently very expensive where fine work is wanted, and not often used for moldings or ornamental work. Alumina or pure clay is very adhesive, is incombustible, insoluble in water, but soluble in acids. It has a great attraction for metallic oxides, and thereby gives the shades of grays, reds and browns common to clays and sandstones.

Presence of Iron.

When iron is to a great extent present in the cementing matter, and the stone coarse grained, disintegration soon takes place. The cementing matter being clay, with more or less iron incorporated, when exposed to the atmosphere the iron becomes oxidized, and is washed out by rain, leaving the surface of the stone porous and liable to absorb moisture in large quantities. There are some sandstones so formed that it is very very difficult to know the natural bed, even with the use of a lens; still, the mason or stone cutter of experience can tell the difference when cutting the stone—it is harder and more difficult to break off across the grain than with it.

Granite must take the first place in building materials, owing to its great strength, hardness and durability. Its ability to resist atmospheric influence puts it in the first rank. Its durability is proved by the remains of buildings erected thousands of years ago. Granite is to be had in abundance in nearly every country, and in blocks of any dimension that means can be provided to move. It is capable of taking on a high and permanent polish. A great amount of labor is required to cut and bring it to a high finish, and it is only used in building for special purposes. In comparing the qualities of granites, the best is that in which the grains or particles are fine, uniform in size and equally distributed throughout the whole mass. When feldspar or mica predominate the stone is softer and easier to dress, but more liable to decay, especially if iron, its ores and sulphur, be present in great quantities.

The art of masonry may be divided into two parts—the rough dresssing and setting of shoddy and rubble stone is what is known as stone masonry. Bricks being of a definite size and regular in form, the manner of setting and arrangement may be formed, and any workman, by practice and experience, may become able to build a good wall. It is quite different with the rubble stone used in common masonry. The workman has generally to deal with stones of various forms and sizes, and a constant exercise of judgment is required of him beyond the tact or skill gained by practice. The bonding of the work is the most essential part, and a skillful workman can make good strong work from rubble stones, though very irregular in shape. Coursed rubble and shoddy work is much easier to set; the stones being gauged to certain sizes and squared, the bonding does not require the exercise of judgment, as with common rubble.

Stone Cutting.

The art of stone cutting is of very ancient origin. The tools used by the ancients must have been of the most primitive kind, consequently the labor must have been greater and much longer time taken to execute the vast works of the early ages. With the improvement in the tools used the quality of stone cutting has improved. Much larger stones are now placed in buildings, and the work is finished with more accuracy.

A stone cutter must have some knowledge of architecture, geometry and projection. His work is constantly changing from one style or order of architecture to another, corresponding with the difference in character of the buildings he may be employed on. He should be a man of taste and judgment, to give to his work the best finish in the shortest time. The moldings and ornament in stone work are all cut out of solid materials, unlike carpenter, joiner or plaster work, that is worked in sections and built together. Commencing with a rough block, he must define the exact size of the finished stone, make the templates and patterns required, and consider the manner of cutting the work to the best advantage and with the smallest amount of labor. There must be constant care exercised, as one careless blow may spoil the work when nearly finished, and so lose all his labor. A long and studious training is necessary to gain a sufficient knowledge to lay out and make templates and patterns for such work as arches, circular work, ramp and twist arches on a circular plan, niches, tracery, skew arches, domes, groined vaulting, &c., in an accurate and scientific manner.

The causes of decay in stone are partly chemical and partly mechanical, and may generally be traced to absorption of water; so that any contrivance that will check the admission of water will be most likely to succeed in arresting decay. There have been many nostrums tried with more or less success to remedy decay in stone. Oil has been used with considerable success when applied thin, when the stone is perfectly dry, or a solution of common soap dissolved in boiling water, allowed to dry and then apply a solution of alum dissolved in water.

COMPETITION IN SMALL WOOD WORKING SHOPS.

THE second prize in the Competition for Small Wood Working Shops was awarded to the design contributed by Frank B. Edgerton of Bennington, Vt., the drawings being presented herewith. In submitting the matter the author says: I have marked on the plans the sizes of the timbers, and would state that the siding and all exposed timber should be dressed. The first floor should have a ⅞-inch lining laid diagonal, and 1¾-inch P. & M. laid straight. The second floor should have a ⅞-inch lining laid diagonal, and 1⅛-inch boards laid straight. I would ceil up the rafters and under the collar beams, as it will make less room to heat and be cooler in summer. I have made the building one and a half stories in hight, as shown in the elevations, with skylights in the roof. The building being low, is more compact and less liable to be shaky. I think there is no light so nice for bench work as that which comes through a skylight.

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

Competition in Small Wood Working Shops.—Awarded Second Prize.—Designed by Frank B. Edgerton, Bennington, Vt.

For heating the building I have planned to use either direct or exhaust steam, as preferred, but if exhaust steam is used it will take a little power from the engine. If a kerosene engine should be used it would need a 5 horse-power boiler for heating purposes; 5 pounds pressure being sufficient, except when using the dry room, then 10 or 15 pounds would do the work quicker. Care should be taken in piping for the heating of the shop, and all return drips from the heating coils should enter the main drip from the dry room, below the water line of the boiler, otherwise it will be liable to form a trap and the circulation will be affected while the pipes would fill with water.

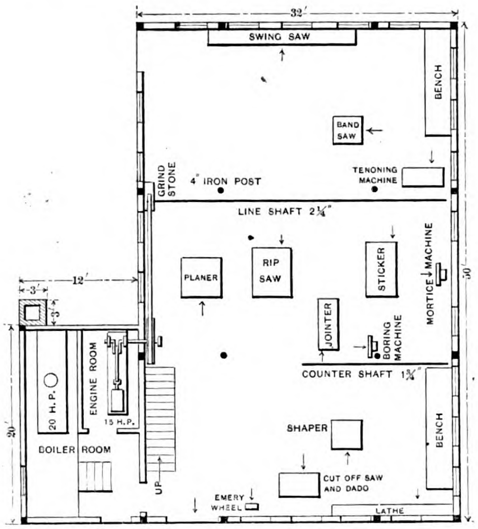
I have substituted iron posts on the first floor, as they take up less room, but if preferred 8 x 8 inch wooden posts can be used, the same as on the second floor.

I have made provision for steam power, as I have had no experience with the other kinds mentioned in the conditions governing the contest, but if I were to open a shop I should investigate the matter, and if kerosene and gasoline engines will do what the makers claim I think they would be the more economical power. They require no fireman, and if there is nothing to do they can be stopped at once and the expense ceases until a job comes in, then all that is necessary is to start them and the power is ready. With steam power it is necessary to keep up the steam all the time, whether there is any work or not, or else when the power is wanted it will be necessary to wait for steam to be generated. I am speaking of cases where a job shop is run, for in most sections of the country there are certain parts of the year when work is slack, yet the shop cannot be closed, and then two or three men could keep at work while the cost of the power would be restricted to the work actually to be done. Of course, where there is plenty of work the year round this part of the equipment would not make as much difference, but circumstances vary in different localities, and one must of course be governed by them.

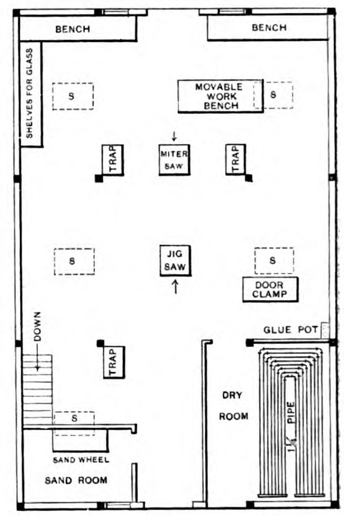
In case a kerosene or gasoline engine is used the boiler house could be reduced in size or dispensed with altogether, as the engine could be placed under the stairs. What would be better for either steam or kerosene power would be to place the boiler and engine in the basement, provided the location was on ground which was a little sloping, then the boiler house could be dispensed with altogether. Most of the time there would be fuel enough made to run the boiler, with the help of a little coal in severe weather. There might be cases where work was mostly light, but a 10 horse-power engine would answer by using judgment and not putting on all heavy machinery at the same time. A reference to the main floor plan will show that a 15 horse-power engine is called for and a 20 horse-power boiler.

I have placed in the building machinery which is sufficient for an ordinary job shop, or for a contractor. There is no planer and matcher, because these machines take a great deal more power and can be dispensed with, but if anybody wishes, one could be substituted for the planer and used for both. The sticker should have a 6-inch bed and three sides, as matching narrow ceiling 1-inch and under could be done on it, as well as casings, small moldings, sash, doors, &c. The shaper should be one spindle with reversible knives to cut both ways. The mortising machine should be of large size for doors, then any work can be done on it, whereas a small machine that would do for sash, &c., would not answer for heavy work. The tenoning machine should have heads outside of the bearings. The jointer should have a slotted head, or be otherwise arranged so that cutters could be put on for various purposes. A very handy thing is a small head to put on the saw arbor, or have a V cut like as the belt that runs the countershafting, should be double.

I would say in conclusion that I have arranged the machinery so that lumber can be taken in at the end doors, planed and taken out the side door, or can be cross cut, rip sawed and jointed without extra handling. Lumber can be placed in the dry room from the outside,



Main Floor.



Second Floor.

Scale, 1-16 Inch to the Foot.

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

Competition in Small Wood Working Shops.—Plans and Elevation.

a shaper collar, so that cutters can be put in. By having an extra throat for the saw table, many small jobs can be done quicker than when one has to set up other machines. The other equipment indicated on the plans is all regular machines and does not call for any particular explanation.

I have indicated by means of an arrow the way material passes through the machine, and the side on which the operator stands. The pulleys should be of the split wood or split steel type. The main and planer belts, as well and when dry taken out, passed down through a trap in the floor, cut up, rip sawed, jointed and planed. Door stock can be mortised, tenoned and stuck downstairs, or passed up through the trap and put together upstairs, as well as glued, smoothed and sanded with the least possible handling.

On the vertical cross section showing the manner of piping for heating the dry room, the dotted lines indicate an iron smoke stack, if one should be preferred to a brick stack.

Some Points on Steel Skeleton Frame Construction.

In discussing the best modern practice in the leading lines of steel frame construction for buildings W. L. B. Jenney, a well-known architect of Chicago, Ill., presents some views in one of our contemporaries which cannot fail to be interesting to many of our readers. Regarding wind bracing, he says that 30 pounds per square foot of exposed surface is usually employed in calculating the wind pressure.

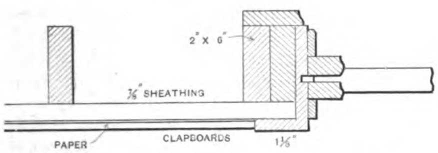
The wind pressure on the exposed parts of the building, as per recent experiments in England, is less per square foot on large surfaces than on small. It was found by actual test that the pressure on 1 square foot was more than 1-100 of the pressure on 100 square feet. It is argued that on a single foot square the air is quickly blown off, while on a large area the air is held against the surface, forming an elastic cushion that to some extent resists and diminishes the wind pressure. The interior columns, together with the rigid floor construction, will take care of about one-fourth to one-third of the total wind pressure, depending on depth of beams, system of construction and the general floor construction. The balance must be cared for by the exterior columns and by wind bracing in permanent unchangeable partitions of the interior. The columns in the direction of the wind in exposed walls may be enlarged, and the junctions of columns with the exterior beams of floors may be connected by gusset plates, and such exterior beams made sufficiently large to resist the stresses occasioned by the wind.

Fire Proofing.

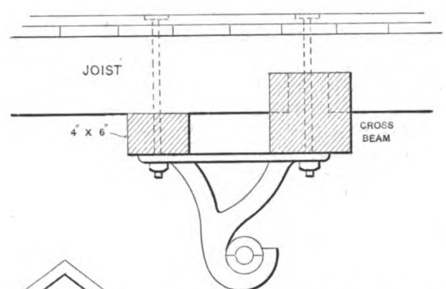
Touching upon the question of fire proofing he writes: The most usual fire proofing for stores, warehouses, bank and office buildings and for tall buildings in general is the hollow tile arches, end construction—that is, the resistance is in the direction of the webs, or subdivisions. The tile should be laid in strong Portland cement mortar; one to three is recommended. Every joint must be filled or there will be cracks in the plastering along the lines of the partially filled joints, as has occurred in so many buildings.

For hotels, apartment houses and dwellings, where wind bracing is not essential, the Roebling, the expanded metal and concrete and other similar fire proofing systems may be used, particularly if the horizontal area of the building is large in proportion to the hight, for these systems do not give the same rigidity to the floors as obtains with the tile arches. They are, however, of light weight, and allow of a corresponding reduction in weight of steel construction.

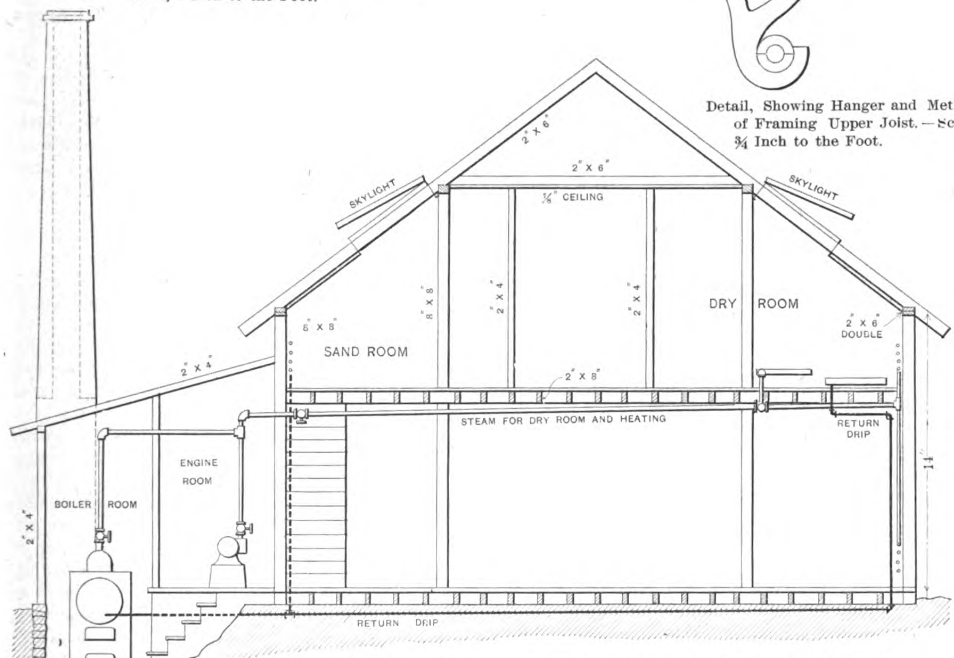
Where concrete floors are admissible the concrete on top of the floor construction is finished off smooth with strong concrete, one of Portland to one of clean, sharp sand, or better, crushed granite or crushed quartz. Where wooden floors are used wooden floor strips are laid, say, 1¾ inches thick, about 12 inches from centers. Formerly these strips were cut, dovetailed and filled in between with concrete, both to hold the strips and to fill the space between the strips. A difficulty was experienced in the floor strips shrinking and the strips loosening, while the concrete filling would not become sufficiently dry before the floor was laid, causing the swelling



Horizontal Section through Window Casing and Siding.—Scale, 1 Inch to the Foot.



Detail, Showing Hanger and Method of Framing Upper Joist.—Scale, ¾ Inch to the Foot.



Vertical Cross Section, Showing Manner of Piping for Heating and Dry Room, Sizes of Timbers and General Method of Framing the Building.—Scale, ⅛ Inch to the Foot.

Competition in Small Wood Working Shops.—Sectional Elevation and Details of Construction.

of the floor, which in office buildings and stores was usually maple. This maple floor was often seriously injured by the dampness in the concrete filling.

The writer has induced an insulating company of Chicago to prepare a pad composed of their insulating material—special mineral wood and asbestos, compressed to the proper width and thickness—to just fill the space between the floor strips, which are clamped to the floor beams. This is found to serve an admirable purpose, and the small additional cost is not to be considered, as compared to the advantages of a fine floor and thorough insulating and deadening; in fact, it is a saving whenever it would otherwise have been necessary to repair and in part relay the maple floor, as has been the case where haste in laying the hard wood floors was essential.

Partitions.

The usual partition has heretofore been hollow tile 3 or 4 inches thick, according to the hight. At the present time many partitions are made by setting up light steel channels ¼ to 1½ inches or more, in proportion to the hight and use. On one side of these channels expanded metal or wire lathing is attached and plastered, and the other side is filled in with concrete and plastered, making a solid partition of about 1½ to 2 inches in thickness. These partitions are sometimes set double. Then the concrete filling is omitted and the exposed surfaces plastered on metal lathing.

Columns.

Fire proofing of columns may be either by tile or by expanded or other metal lathing. If of tile, the tile is molded to fit the column, for which a full sized section is made. These tile may be single or double, according to the fire resistance required. It is very essential that the tile be so substantially secured that it will not be knocked off by the shock of the water during a fire.

Columns are also fire proofed by wrapping expanded metal or other metal lathing around the column and plastering . Then a furring system is put on and another layer of metal lathing and plastering. This, if well done, is probably safer than a single layer of hollow tile as usually put on. It is good practice to fill the columns and the stools with concrete, well rammed in place as the columns are set. This prevents interior rusting and strengthens the columns.

The supply and waste pipes of the principal toilet rooms can usually be run in a channel in the wall of the building. Arrangements must be provided for reaching these pipes whenever required. Steam pipes are often run in the same pockets with the plumbing pipes, for they are unsightly and objectionable when exposed in the rooms. All plumbing fixtures should be the best the market affords, and all work, both for plumbing and steam, should be the best and most substantial. It is a serious mistake to attempt to economize at the expense of quality or durability. Great reliance must be placed upon the contractors for this work. It should be stipulated that a reliable foreman should be constantly on the work, or, better still, the owner should employ an expert plumber, steam fitter and electrician to keep the closest watch on the work in his interest, for the opportunity for covering up bad work is abundant. Often this bad work is only found out when too late to obtain any redress from the contractor. The guarantee may have expired or the contractor may have gone out of business, or left the city. The only safety is to have the work done right in the first instance.

For the electric work the owner would certainly do well to employ an expert to assist his architect, for the whole subject is so new, and often so obscure, that the architect cannot be expected to be up to date in all particulars. Neither he nor his superintendent can be expected to know if the details of workmanship are in accord with the specifications, nor can they be expected to make the tests from time to time as work progresses. If the building has its own electric plant an expert should assist the architect in locating the plant, and in the specifications for the dynamos, engines, &c. It is not well to rely upon one dynamo for the entire work when running at its maximum capacity; it is best to have two or three of different power, so arranged as to be switched into and out of use without disturbing the lights.

The Use of "Pickets" by Labor Unions.

An important point has recently been decided in England with regard to the right of trades unions to put pickets around the works of employers in the case of a strike. Heretofore it was generally understood that what was called peaceful picketing was legal; that is to say, when a dispute was in progress between employers and the workmen it was permissible for the latter to beset in groups the entrances to the works of the employers and to endeavor to induce by argument and persuasion any newcomers to refrain from entering. This course was pursued in the case of "Lyons *vs.* Wilkins," when plaintiffs applied for an interlocutory injunction, which was granted by Justice North and confirmed by the Court of Appeal. They then applied for a perpetual injunction, which was granted by Justice Byrne and confirmed by the Court of Appeal. The defendants then took the preliminary steps for an appeal to the House of Lords; but that appeal has now been withdrawn. The English law, therefore, now is that strikers may not watch or beset the establishment of an employer with the object of dissuading other workingmen from entering his works, but may do so only for the purpose of communicating or obtaining information. The ruling of the Court of Appeal was a great disappointment to the leaders of the unions, and their final decision not to appeal against it is regarded as an acknowledgment of the hopelessness of their case and as a most significant victory for the employers.

A valued correspondent writing from Larned, Kan., states that contracts have been closed for a department store in that place, 50 x 150 feet in size and four stories in hight. It will be constructed of stone and brick. The prospects for a good season in the building trades are reported as very bright.

THE ART OF WOOD TURNING.—V.

(SECOND SERIES.)

By Fred. T. Hodgson.

It may now be in order to explain how the devices in hand can be employed on work intended for every day use. If a newel post, a balustrade, a table leg or any similar work requires to be ornamented at the squares, it will be quite an easy matter to adjust some sort of a rest or table running across the bed of the lathe on which the newel or other work may be laid while operated upon, and it can be moved to such a position that the rotary cutter can act upon it. In this way raised circular ornaments may be formed out of the fillets left on the work, and if the rosettes or other work are to be in relief the waste wood around them can afterward be removed by hand. On the contrary, the ornaments may be sunk in the wood, as in the case of ebony work where the surface is highly polished and the ornamentation sunk and left unpolished, producing a most charming effect. Again, the leg of a table or other similar work while in the lathe between centers may be fluted by keeping the mandrel fixed and moving a revolving semicircular cutter in the cutter frame gradually along the bearers the distance required to be fluted, and if a slow motion be given to the mandrel these flutes may be twisted around the work spirally and to whatever pitch the operator desires. Some small device, however, will be required to regulate the pitch of the spiral. When a full geared lathe is employed the work may be done easily if the gears are so arranged that the cutting tool shall travel the length of the work during one revolution of the mandrel; the flute thus making one revolution around the work. This, it will be seen, is an easy matter, as by attaching gearing with the proper number of teeth any degree of pitch may be obtained. If the table leg or other work is tapering in the shaft, the traveling cutter holder must be so arranged that it will slide in a line parallel with the line of taper. This can easily be done if the work does not diminish too greatly, by angling the sliding carriage on the bearers to coincide with the line of taper.

It is said that all spirals are screws, consequently all screws must be "spirals," but the latter term, so far as wood workers are concerned, is the one more applicable, and it is this term, or the term "helix" used for the twists on cones, which will be employed throughout these papers when talking on this subject. The same conditions, however, that apply to the cutting of screws apply to the spiral fluting of a table leg or other similar work, about the same. The exact dimensions, however, to which the slot is made must be governed by the shape and size of the mandrel frame to which it is fitted. The slot must be exactly concentric with the mandrel, in order that it may partially rotate to suit the requirements of the various trains of wheels which will be required from time to time. At the lower extremity of the arm employed is a curved slot, B, through which a screw passes into the hole C, which is tapped into the mandrel frame. It is this screw which holds the arm securely when the necessary position to sink the train of wheels in use is obtained.

An elongated slot or mortise 7½ inches long, shown at A in Fig. 42, is made in a line with the axis of the circular fitting A in Fig. 41. It will be at once seen that although the curved or segmental slot B is of no great length the amount of elevation and depression that can be given to the arm by moving it along the slot B will be considerable and sufficient for all purposes desired.

In order to facilitate the manipulations of the fixing screw C a curved spanner, similar to the one shown in Fig. 43, will be found the most suitable. The screw head should be made about 1 inch across the flats, and for further convenience a hole is drilled through each side or flat, so that when required a "tommy" or pointed

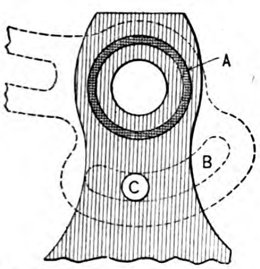


Fig. 41.—Mandrel Frame with Groove to Receive Radial Arm.

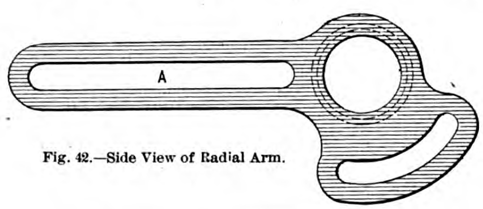
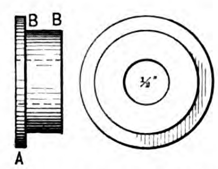


Fig. 42.—Side View of Radial Arm.



Figs. 49 and 50.—End and Face Views of "Bush."

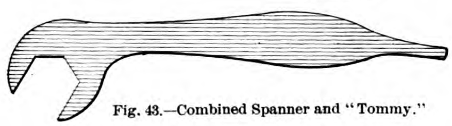
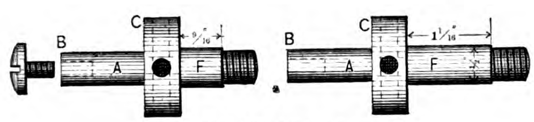


Fig. 43.—Combined Spanner and "Tommy."



Figs. 47 and 48.—Steel Arbors.

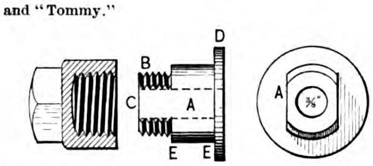


Fig. 46. Fig. 44. Fig. 45.

Body to Receive the Single, Double and Intermediate Arbors.

The Art of Wood Turning.

if the lathe on which the work is done is a geared or screw cutting one. In the first case the revolutions of the mandrel are connected with and derived from a train of wheels which gear to a similar wheel attached to the main screw of the lathe, which engages with the sliding carriage, and so carries it along the bed of the lathe; thus the revolution of the mandrel being conducted by means of a set of cog wheels, which connect to a wheel on the main screw of the ornamental cutter rest or frame, which makes it a very easy matter to produce ornamental spirals and many other adaptations, as will be discovered as we proceed.

There are two ways of attaching a spiral apparatus to the lathe—either at the front or back of the mandrel frame. This being the case, it is now our duty to go fully into each, so that the one most suitable to the work in hand may be adopted. Again, it may happen that the lathe on which the apparatus we are about to describe is to be fitted will not have a traversing mandrel. If this is the case, then the apparatus must be fitted in front.

Having decided this point, the first thing to do is to cut out a circular groove in the front of the head stock, as shown at A in Fig. 41. This slot should be about 2 inches in diameter and 3-16 inch wide, the depth being punch on the end of the spanner, Fig. 43, may be employed for tightening the screw.

The mortise A in Fig. 42 must be carefully set out and accurately filed to fit a gauge which must be made; the usual width being ⅝ inch. It must be perfectly parallel from end to end, also square to the face. The object of this slot is to receive the fitting attached to the bodies of the arbors, which when fitted will move throughout its length and can be fixed in the position found to be that which will accommodate the various trains of wheels.

In Fig. 42 the radial arm is exhibited clear of the head stock with the revolving lines and slot apparent. Reference to this figure will give the reader a good idea of the attachment. Its length over all may be about 12 inches, and it may mave a thickness of from ⅝ to ¾ inch, according to the space available.

Now, about the arbors which are to be used in conjunction with the arm. Of these there will be three—namely, the single, the double and intermediate arbor, the latter being essential to the reversing of twists or spirals from left to right. First, let us take the metal body, which is shown in Figs. 44 and 45. It is in the first place cast in circular form. It is then held in a jaw chuck in the lathe and bored out at the center A, Fig. 44. This hole should be slightly tapering, as it is for the purpose of receiving the steel spindle A, Fig. 47. The external diameter is then turned up true, it being placed on a steel mandrel for the purpose. The next thing is to cut the screw B, Fig. 44. This should be a rather fine thread, which, though preferable, is not absolutely necessary. We must then make the tubular nut, Fig. 46. This must be turned and threaded to fit B, Fig. 44, as it is to be employed to hold it securely to the radial arm, Fig. 42. The body is prevented from turning by the flattened side seen at A of Fig. 45, which must be accurately fitted to slide throughout the length of the slot. The nut, Fig. 46, is turned to a cylinder externally, the extremity being filed to a hexagon 1 inch across the flats. It is, of course, necessary to make two of each of these—one for the single and one for the double arbor. Further illustrations, however, will be unnecessary, as the arbors are identical.

It is now necessary to make the steel spindles which revolve in the parts we have just finished. Figs. 47 and 48 give a clear idea of these in all their parts. They are accurately fitted at A, to revolve in the aperture A of Fig. 44, and retained in position by a screw fitted on the end at B, Figs. 47 and 48. This screw has the head extending beyond the diameter of the fitting, as shown in Fig. 47, in order that it may have a bearing opposite to the face of the collars C on the spindles in Figs. 47 and 48. The end of the spindle must be in exact accord with that

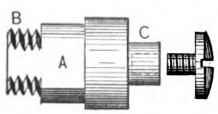
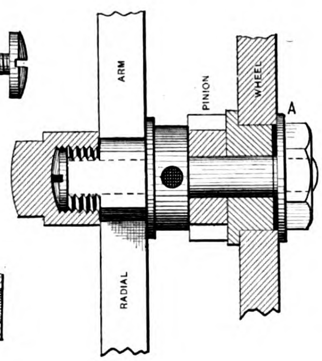


Fig. 51.—Reversing Arbor.



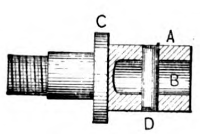


Fig. 53.—Connection to Slide Rest.

Fig. 52.—Double Arbor Attached to Radial Arm.

The Art of Wood Turning.

of the face C, Fig. 44, and when the screw is in its place and the fitting finished, there should be no lost motion whatever in the various parts, but a smooth and even revolution must be the result.

The width of the collars C, in Figs. 47 and 48, is about 7-16 inch. We use the word "about," because the width of the collar will depend somewhat on the dimensions of other parts of the apparatus. The collar at D of Fig. 44 is ⅛ inch wide, and from E to E the width must be a trifle less than the thickness of the radial arm, in order to allow of its being hugged tight to the arm when screwed up. The collars in Figs. 47 and 48 should have four holes drilled through each, for the purpose of holding them firmly with a "tommy" while the wheels are being tightened on to the fittings. This, it will be recognized, is necessary, as there are no other means of resisting the force required to be exerted by the spanner on the hexagonal nut at the end, shown in Fig. 52.

Both spindles are shown in Figs. 47 and 48, as they differ in actual length at that part marked F on each of them. Fig. 47 being the single arbor, and Fig. 48 the double one. The meaning of the term, "single and double arbor," as applied, is that in the one case a single wheel only is employed, and in the other two are placed; that is, a wheel and a pinion, the latter being one of those of smaller diameter and having a hole ½ inch in diameter, the width of the pinion being the same.

The centers of the larger wheels are bored out to 1¼ inches in diameter and their thickness when finished is ⅜ inch. This increase of the size of the hole necessitates the employment of an auxiliary boss or filling piece, which is made as shown in Figs. 49 and 50. A gun metal casting had better be used for this purpose, and when bored at the center to ½ inch to fit F, Figs. 47 and 48, it is placed on a mandrel and the exterior turned to fit the apertures in the wheels, the total width of fitting and collar A, Fig. 49, being ⅝ inch. These dimensions must necessarily be studied, as any error will affect the trains of wheels running in the same plane, and if this should occur it will cause much trouble and inconvenience. The fitting BB of Fig. 49 must be a trifle less than the thickness of the wheel, so that the washer A, Fig. 52, that covers the space of the aperture may take full effect when all is tightened for use.

The intermediate or reversing arbor is made entirely of steel and is shaped as shown in Fig. 51. It is first made in circular form and is then filed at A on opposite sides to fit the slot A in the radial arm, in the same manner as the body shown in Fig 45. The screw B, extending at the back, is provided with a hexagonal nut, which is made as in Fig. 46, so that the spanner, Fig. 43, may be used on it. and a steel washer is placed between the nut and the radial arm. On the front extension C a wheel of 30 teeth is fitted to revolve, the front being countersunk to receive a screw, the head of which must be sufficiently large to form a bearing by which the wheel is kept in contact with the face of the collar.

This wheel is simply an "idler," used for the purpose of reversing the direction of the spiral which has been previously cut without its intervention. An important point to study when fitting up the arbors is to take care that the various diameters of the parts do not prevent the 30-toothed wheel on the intermediate one being placed in gear with the small pinion. Should it be found that a reduction in any part is required, it may be done by filing a flat on the intermediate arbor to allow it to pass further along the arm free of the projection on the double arbor which carries the wheel and pinion.

The reason why the larger wheels are bored out to an increased size is because many of them have to be employed upon the dividing chuck, which, having to be attached to the mandrel nose, must of necessity be left of sufficient strength; hence the increase in the apertures of the wheels which fit over the chuck and are there fixed, thus forming the connection between the screw of the slide rest and the mandrel. Being possessed of the bush or filling piece, Fig. 49, we are enabled to employ all the wheels upon either of the arbors or slide rest screw.

In Fig. 52 is shown the double arbor as fixed to the radial arm, having both wheel and pinion attached. This being in section fully explains the other detailed parts, and will, it is hoped, be of considerable service in the construction of the parts.

The method of attaching the wheels to the main screw of the slide rest is performed in the following manner: In Fig. 53 we show a steel socket which is fitted at A into a hole bored to receive it in the left hand of the slide rest—that is, of course, opposite the crank handle. The best way to insure perfect truth is to make a pin bit, the pin of which must accurately fit the hole already there, which receives the end of the main screw. The socket must then be bored at B to fit over the end of the screw, when the face of the collar C bears against the end of the slide rest. When these fittings are made a hole must be bored through the slide from top to bottom in order that the pin D, by which the socket is held to the screw, may be inserted and withdrawn.

It will be seen by reference to the diagram that the pin D is made of less length than the diameter of the fitting, so that it will not be in the way. The opposite end of the socket is made to fit the wheels of smaller size—namely, ½ inch, a second filling piece being employed when it is required to use wheels with large holes. The end is provided with a hexagonal nut, as in Fig. 46, of such a size that the spanner (Fig. 43) will grasp it.

CORRESPONDENCE.

How Should Corner Blocks Be Placed ?

From D. C. P., *Norwich, N. Y.*—In reply to H. A. McK. of Manitoba, who asks in regard to the placing of corner blocks, I would say cut the casings as you would to put them upon a miter with good joints, then take them down and set the blocks into the casing, with the grain running horizontally. Glue and screw before putting up. The object of running blocks horizontally is to have the shinkage at the top of the side, instead of the head, as it shows less in that place. Blocks should never be nailed up and casings cut between, for it is not workmanlike.

Floor and Roof Truss Construction.

From J. E. S., *Grand Junction, Col.*—Would some one be kind enough to give me a little information in regard to a floor truss ? We contemplate building a lodge room, the space to be covered being 75 x 75 feet. On the first floor we want to leave about 60 x 75 feet outside for a general amusement and dancing room, while the second floor will be devoted to a lodge room about 50 x 75 feet; the other 25 feet will be utilized for stairway, ante rooms and preparation rooms. We want to leave out the columns on the first floor so as not to obstruct dancing. Now, what I want to know is what kind of a truss will be necessary to use for the second floor, or is it practical at all ? The building will be brick. What should be the thickness of the walls and abutments ?

Answer.—The above inquiry was submitted to F. E. Kidder, the well-known consulting architect, who furnishes the following in reply: The floor in question can be supported in three ways without the use of posts. One posts to the opposite wall. The posts should be carried up to support the roof trusses also.

The plan, Fig. 1, shows the general arrangement of first floor and the position of the four large posts and trussed girders. The dotted lines A A show the position of the partition above. Fig. 2 shows a longitudinal section through the building, to a larger scale, and details of trussed girder and roof trusses. The roof trusses come directly above the trussed girders, there being four of each.

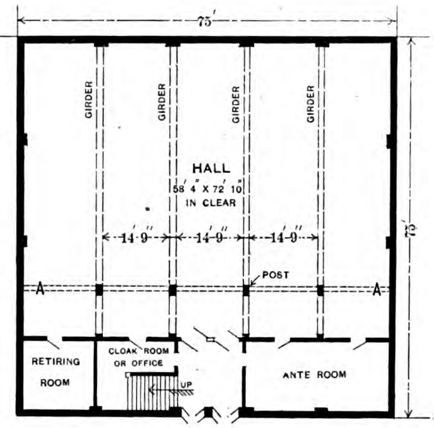


Fig. 1.—Plan of First Floor.

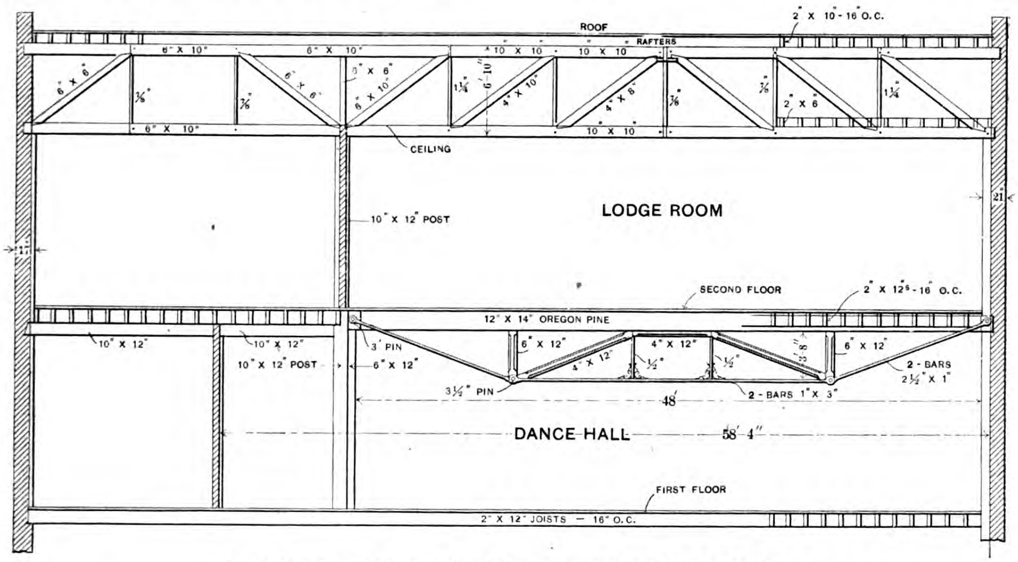


Fig. 2.—Longitudinal Section, Showing Trusses.—Scale, 1-12 Inch to the Foot.

Floor and Roof Truss Construction.

method would be to hang the floor by means of rods from trusses placed above the lodge room. A second method would be to support the floor by open timber trusses and the third method by means of riveted plate girders. The last, however, would be very expensive for such a building, so that they are probably out of the question. The first method would require suspension rods running down through the lodge room, which are nearly as bad as posts and would also tend to make the building "top-heavy." Open timber trusses could be used, but they would have to be at least 6 feet deep.

In view of the fact that the lodge room on the second floor is only to be about 50 feet wide, we would advise a row of posts in the side partition extending from the foundation and spanning trussed girders from these

The fall of the roof had better be at right angles to the trusses and the latter graduated in hight to fit the inclination of the roof. The lowest trusses, however, should not be less than 6 feet 6 inches in hight over all. The 10 x 12 inch posts supporting the trusses should be of Oregon pine and should extend in one length from basement to roof truss. The ends of the trussed girders should rest in a cast iron box, with sides ⅞ inch thick, and the steel pins should pass through the box. The dimensions given for the trussed girder are the smallest that can be used consistent with safety.

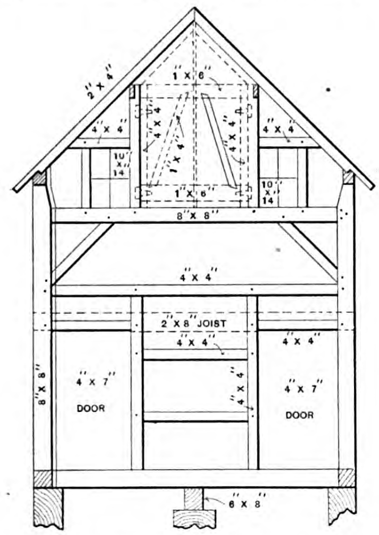
In regard to the thickness of walls, if the stories are not over 14 feet the walls might be 13 inches thick, strengthened by pilasters, as shown in plan, the pilasters under girders and trusses being 9 inches by 2 feet 6 inches and elsewhere 4 x 22 inches. It would be better, however, to make the first-story walls 17 inches thick and second-story walls 13 inches, keeping the pilasters under the girders and trusses and omitting the others.

Removing Oil Stains from Ivory Rule.

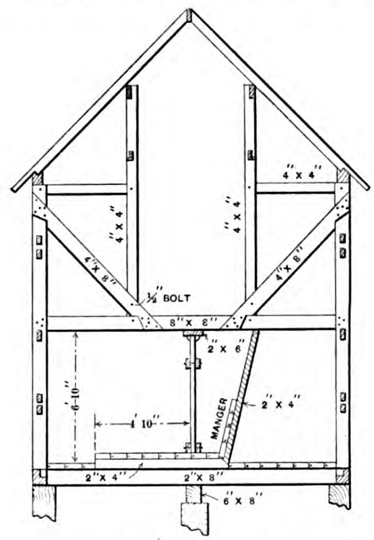
From J. C. B., *Medford, Ore.*—I have an ivory four fold architect's rule which has been stained with machine oil until it has become yellow. I would like to know what I can use to restore its proper white color, and if there is a solution would it take off the lines? What do they use for making the lines of the rules black?

Design for a Cow Barn.

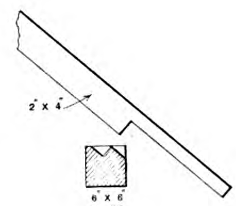
From W. M. B., *Valparaiso, Ind.*—A few months ago I noticed in the columns of the paper an inquiry for a plan of a cow barn, and as being of interest to the correspondent making the request I send herewith drawings which are sufficiently clear to be self explanatory. They include vertical cross sections of the barn, together with plan and details of framing.



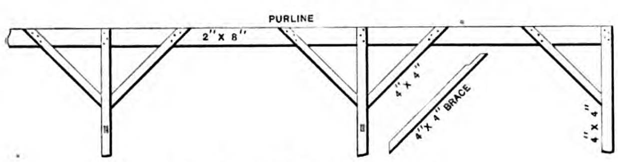
Vertical Section, Showing Framing at Front of Barn.



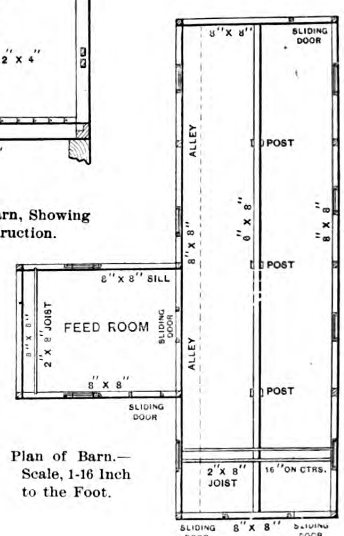
Section through Center of Barn, Showing Manger and Floor Construction.



Detail of Rafter and Plate.—Scale, ⅛ Inch to the Foot.



Detail, Showing Framing of Purlins. Scale, ⅛ Inch to the Foot.



Plan of Barn.—Scale, 1-16 Inch to the Foot.

Design for a Cow Barn.

An Aid to the Reading of Drawings.

From J. S. K., *Poughkeepsie, N. Y.*—In renewing my subscription to *Carpentry and Building* for another year, I would say that there is nothing to which I look forward with greater expectancy than your monthly paper, as I know each month will bring many things of interest. As I am somewhat interested in drawing, I am especially pleased to see the plans and sections of buildings which you show every month in the paper

Laying Out Handrail Around a Landing.

From R. N., *Stockton, Cal.*—I would like to know through the columns of the paper the best and easiest way to lay out a continuous handrail around a landing. The radii of the soffit is 6 inches, the rise 7 inches and the tread 10 inches. There are many methods, but the lines are so numerous as to make it difficult to understand them. It seems to me there are ways much more practical, and so if some of my brother carpenters will solve the problem for me I shall be greatly obliged.

Ventilating a Bathroom.

From F. L. T., *Eureka, Cal.*—I think if "J. E. D." of Chicago will extend his ventilator above the level of the ridge of the roof, the same as if it were a chimney, he will have little further trouble.

Novel Method of Cutting a Miter.

From W. J. S., *Parker, S. D.*—I have a way of cutting a miter by the shadow of the work in the saw, a description of which may not be without interest to some of the readers of the paper. Take a bright saw and place it on the stick or molding as one would if he were going to saw it. The shadow of the stick or molding will at once be seen in the saw. Now, if one wants to cut off the piece square, swing the saw until the piece lines up or is straight with the shadow on the saw. Cut it off and it will be found square. Now, if one should wish to cut a miter, swing the saw around until the piece is at right angles with the shadow, then saw it off and the result will be a miter. With but little practice a person can obtain good joints. It has helped me out in many cases where I did not have my miter box with me. I would suggest to the readers that they try it.

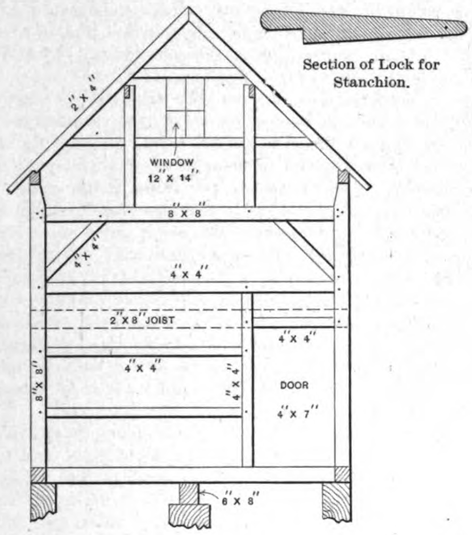
Recipe for Cleaning Tile Flooring.

From L. W. B., *Central Islip, N. Y.*—Can any of the readers give a young chip a recipe for cleaning tile flooring of grease and coffee stains? I want something that is cheap and easily applied.

Note.—With no desire to anticipate the replies which our readers may give, we suggest to the correspondent the following, which is taken from one of the books of receipts. It refers more especially to the removal of grease from marble, but may prove of assistance in the connection named. Apply a mixture of 2 parts of washing soda, 1 part ground pumice stone and 1 part chalk, all finely powdered and made into a paste with water. Rub well over the marble and finally wash off with soap and water.

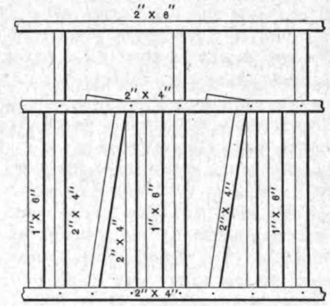
Value of Bound Volumes of Carpentry and Building.

From H. K. R., *Larned, Kan.*—Some time ago I gathered up all my back numbers of *Carpentry and Building*—two volumes in all—intending to weed out those worth saving and making a fire of the remainder. After going through the pile I concluded I would have volumes XX and XXI bound and see what kind of a book they would make. The result was that I took them to the bindery and now have them back again. In their present shape I think they are worth many times their former value; in fact, it has raised *Carpentry and Building* in my estimation to the extent that I shall not miss a number, at least for some time to come.

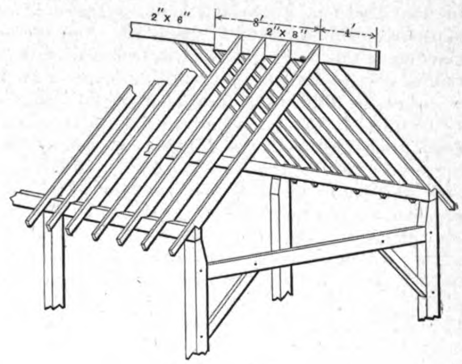


Framing of Rear End of Barn.—Scale, 1/8 Inch to the Foot.

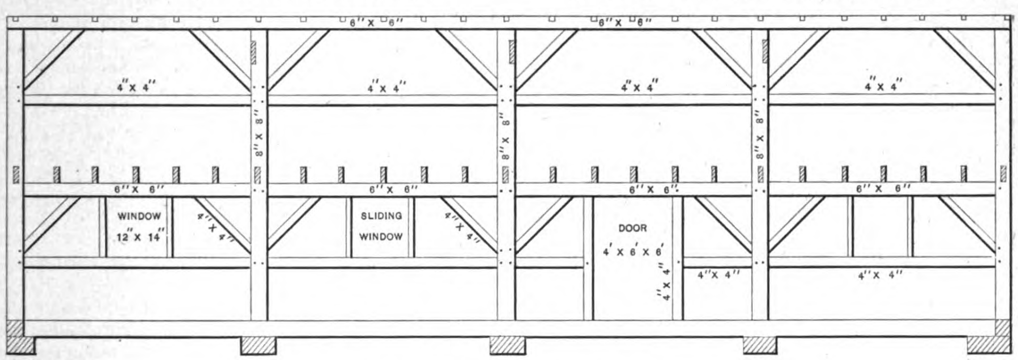
Section of Lock for Stanchion.



A Section of the Stanchions.—Scale, 1/4 Inch to the Foot.



Detail of Roof Framing, Showing Support for Hay Fork.



Elevation of Main Outside Wall Framing.—Scale, 1/8 Inch to the Foot.

Design for a Cow Barn.

Truss for Gravel Roof.

From J. L., *Gilbertville, Mass.*—Will some of the readers of the Correspondence department furnish a design for a truss for a gravel roof 45 feet wide and oblige an old chip ?

Note.—It is possible that our correspondent may derive some suggestions regarding such a truss as he requires from the drawings furnished by Mr. Kidder in reply to J. F. S. of Grand Junction, Col., on page 139.

Lighting Gas by Electricity.

From W. A. Wittbecker, *Lansing, Iowa.*—In answer to "J. E. D." of Chicago, Ill., who asks in the March issue of the paper how to light gas by electricity, I would say that a good battery for this purpose should consist of six cells connected in series. The location of the spark coil is immaterial, but the usual practice is to place it between the battery and gas pipe return connection. The gas pipe is the proper return to use, as all fittings are made to be employed in this way, and it saves the running of an additional wire. If possible, the wires should be so run and fastened that they cannot come in contact with the gas pipes where they run between floors or partitions, because rats and mice are liable to gnaw off the insulation, and it may be a very expensive undertaking to locate the trouble in such a case. It is also a good rule never to permit the wire to come in contact with a pipe at any point where it cannot be readily examined, except in the wiring of fixtures, and for that purpose a double covered fixture wire should be used. All splices in gas lighting work should be soldered, using rosin as a flux—never acid—and then carefully covered with rubber tape. I would advise "J. E. D." to procure a copy of "Domestic Electrical Work," published by David Williams Company, which is sold at 25 and 50 cents a copy. This will give him very simple and minute instructions, not only for gas lighting, but for all kinds of electrical work of this nature.

Some Questions about Making Blue Prints.

From J. C. W., *Pine Hill, Pa.*—In looking over the July number of *Carpentry and Building* for last year I noticed a letter from Frederick Reissmann, West Point, N. Y., which I must say is the best and plainest of any in that line I have seen in any number of the paper. I have 17 volumes preserved, and in looking over them I find no description so plain in regard to making frames and prints. This, I think, is just what we all should strive to do. Some say make the frame so and so; others say do this or that; but what are all these directions to one who never saw a frame or even prepared paper for a print. This is my own case. It is true I have worked over blue prints, but it was not in my line of business to learn how they were made. The prints generally came from the cities where the machinery was made, or from city architects who prepared plans, &c. Since reading Mr. Reissmann's letter in the July number I have become interested in the subject and have read up all I could find in that direction. I intend making a frame after his plans and trying my hand at the prints. Now my understanding is that the paper is to be traced with the solution mentioned on one side only, the paper then being placed on the back of the drawing or tracing. Right here I would like to know in plain words if it is a transparent paper or cloth on which the drawings are made. Will the prepared paper be blue on both sides? All that I have seen was, but as the solution is only applied on one side it raises a doubt in my mind. Is the material on which the tracing is made cloth or paper? If I get my frame made I will have to send away for my paper, as it cannot be had around here. I ask these simple questions in order not to make a mistake when I send for the goods. Can the drawing or tracing be used for more than one copy? All these may be simple questions to those who are fully informed on the subject, but they are not so to one who knows nothing about it. Will drawings in lead pencil make good prints? I shall be very thankful for full information on the above point.

Note.—It is essential that the lines of the drawing be very sharp and clear, and for blue printing purposes drawings in ink are to be preferred. The material on which the drawings are made may be of cloth or paper, but it must be transparent, so that the rays of light can readily pass through and affect the surface of the blue print paper. The same drawing or tracing may be used for an indefinite number of copies or prints, its value for the purpose ceasing only when the lines become indistinct or the drawing so soiled from hard usage as to become practically opaque. In making a print the tracing or drawing is placed upon the glass in the frame, the inked side down, and upon it the blue print paper with the prepared side in contact with the drawing. The frame is then closed and the glass side exposed to the sunlight in the manner indicated in the letter referred to by our correspondent.

The Use of Red Cedar Shingles.

From C. K. S., *Wayland, Iowa.*—I desire to again refer to the cedar shingle question: In the June issue, 1899, I asked a question which will be found by turning to page 156 of that volume, and as there has been quite a good deal said about cedar shingles by "B. F. C.," Chicago, Ill.; "S. F. B.," Wellington, Ohio, and others, I wish to thank them for the information. "B. F. C." seems to think I have evidently gotten hold of the wrong end of the stick. Now let us see how he stands as to being posted himself. Have you ever been out on the coast? Have you ever taken your saw, after sawing off the shingles at the corner, and stuck it under them when they were the least damp? If not try it, allowing the saw to remain under the red cedar shingles, say 20 minutes, and then place one under the white pine shingles, and see which one is rusted the most. You say you are interested in red cedar shingles. I would have decided so even had you not mentioned it. So you have noticed that most all of the shingles are now bound in galvanized binders. Why is this done? Why are the cut nails so very rusty that are driven in those cleats and not so in the white pine? Why do the red cedar shingles color the water if there is no acid in the wood?

Now a few words for Brother "S. F. B.," Wellington, Ohio. If he has any red cedar shingles laid 20 years, I would ask from what part of Oregon or Washington did they come? Why do you use white cedar almost exclusively? Now the first red cedar shingles that were used in this community was nine years ago, and they were nailed on with wire nails; and if I had time just at present, I would take my camera and secure a photograph of the building to convince you that it is as nice a looking roof as any in the community. What kind of wire nails do you use, Brother "S. F. B.?"

Now, brothers, I have only followed the trade since 1893, and have been a reader of this valuable paper for five and a half years, but $20 would not buy the volumes that I have bound in book form, if I could not replace them. If we appreciate the value of this paper, as all of us should, we ought to exercise great care not to misinform the young carpenter along any line of work, or in the use of any kind of material that may be discussed in the Correspondence Department of the paper. I have a right to believe by experience that the wire nail is all right for such work as shiplapping, sheathing and all kinds of inside finish, except flooring. Wherever the wire nail can be driven and kept dry it is all right, but wherever it is exposed to dampness it is all wrong, and should not be used.

Now for the benefit of the readers of this paper, I would say that I spent five months in and around Tacoma, Wash., and a person could at that time, in the winter of 1893 and 1894, go to, I think, about 12 to 14 shingle mills within a radius of 7 miles, and see them take the blocks or logs out of the salty water of the sound, and in less than ½ hour the same wood would be in the dry kilns, drying for the Eastern market. Now if we can get shingles made from wood that never was floated in salt water, we don't need to be so much afraid to use wire nails, and I think our shingle manufacturers should avoid as much as possible floating the wood in water. I have seen roofs where it was claimed the shingles were on for 40 years, and which were entirely covered with moss. I will stop now in the hope that this will not offend any one, nor will any one offend me by criticism.

Raising Iron and Steel Girders in Building Construction.

From L. W. B., *Wilberforce, Ohio.*—I would like to know the cheapest and best method for raising girders of steel or heavy I-beams to their position on the second or third story of a building. If some of the readers of the paper will kindly suggest some economical method, also give sketches showing construction, I shall be very grateful to them.

Strength of Skylight Bars.

From F. L. T., *Springfield, Mass.*—Please publish a rule for computing the strength of skylight bars.

Answer.—The strength of the skylight bar is governed by the size of core placed inside. In other words, if a core of ¼ x 1¾ inch band iron is placed on the inside of the bar the skylight bar will have as much strength as this core bar will sustain. For obtaining the safe load for various sizes of cores consult any engineers' pocket book. Of course, where the bars are of very long lengths additional supports are made of angle iron work on the inside of the building.

MAKING WOOD PATTERNS.—XII.

BY CHARLES J. WOODSEND.

IT is the purpose to make the subject of this article a quarter bend iron pipe having a flange at one end and a socket at the other. A side view of the pipe is shown in Fig. 81, while Fig. 82 represents a cross section of the flange end B, and Fig. 83 a cross section of the socket end A. By taking a pipe of this shape we obtain a combination, all parts of which can be utilized at once, or they can be used separately as required, thus rendering it unnecessary to make or write a separate article for each part. The size of the pipe is of no moment, as the principles are the same in all cases. The first thing to be done is to make a good solid drawing board sufficiently large to take in the whole of the pipe and core prints. This board must be perfectly straight and out of wind. It should also be fastened down to a couple of trestles, and after all is ready, lay down the pattern upon the board full size and to shrinkage—that is, 12⅛ inches to the foot. Show the thickness of the metal, as illustrated in the vertical section, Fig. 84. If the flange is to be finished—that is, turned or planed by a machinist after the casting is completed—allow ⅛ inch more of metal in addition to the finished size that has been marked upon the board.

The pattern is made in two parts, the parting in this case being straight. After the drawing is completed mark the joints from the center O of Fig. 85, which gives the lengths for the quadrants or quarter turns. These lines should extend outside of those bounding the pattern, the reason for which will be explained later on. Now prepare two pieces of stuff for these quarter turns, having them thicker than the finished size of the pipe—that is, when the two are placed together—or in other words, each piece must be a little more than half the thickness of the finished pipe. Have the stuff long enough to cut a little past the lines marked "Joints," Fig. 85. If the pipe is not too large it is well to make each of these pieces equal to a one-half turn, if it is possible to get them of one plank, or make three pieces equal to a whole circle. It is frequently good policy in pattern making to waste lumber, especially if by so doing there is a gain in time. A little explanation in regard to this point may not be out of place.

Taking the case in hand we require two quarter turns, each one-half the thickness of the intended pattern. These pieces could be worked out by hand, but by so doing the time consumed would be three or four times that required in turning them out by means of the lathe. If we turn them in the lathe, however, it necessitates the wasting of nearly half the lumber. However, in nearly all cases, this loss is the least. The pieces must balance while turning, and turning being the quickest, we will do it that way. Screw the pieces upon a chuck. Make a template like that shown in Fig. 86. Turn the inside portion to this template, the center line of the template and the center of the chuck coming together. Rough off the other side and use the template shown in Fig. 87. Sandpaper and give two coats of shellac. Sandpaper the shellac when dry and remove from the lathe.

We must now prepare the other pieces of the pattern ready to turn. In Fig. 88 is represented a longitudinal section of the pieces as they would appear when partially turned up. Pieces of sufficient size to make each half of the two pieces are screwed together, having the screw holes counterbored deep enough to keep the screws out of the way of the turning tools. Dowels may then be put in and the centers marked on each end with the point of the compasses or a scratch awl. Before we can put this in the lathe, however, we shall need two center plates. If the lathe has centers for iron, as is usual in pattern makers' lathes, one of these irons will be similar to the shape shown in Figs. 89 and 90, the former representing a side view and the latter an end view. The other iron will be a plain plate with four screw holes, and one small hole drilled through for the center. Fig. 89 will go toward the head stock and the plain plate toward the tail stock. In placing these irons onto the piece to be turned thrust a brad awl or wire brad through the center hole of the plate and then into the center marked on the ends of the piece to be turned, screwing fast. Two of the screws should be on each side of the

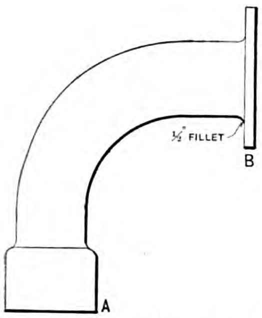


Fig 81.—Elevation of Quarter Bend Iron Pipe.

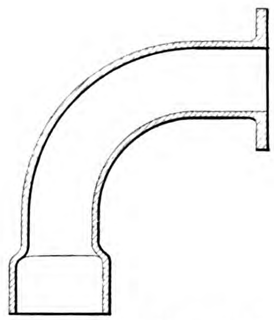


Fig 84.—Vertical Section, Showing Thickness of Metal.

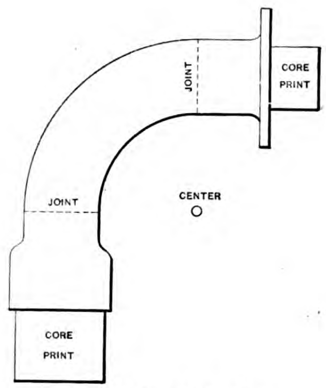


Fig. 85.—Marking the Joints.

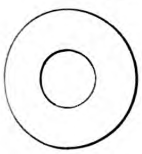


Fig. 82—Cross Section of Flange End B.

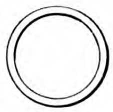


Fig. 83.—Cross Section of End at A.

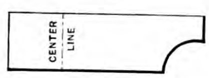


Fig. 86.—Template for Turning Inside Portion

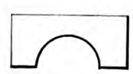
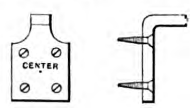


Fig 87.—Template for Outside Portion



Figs. 89 and 90.—Side and End Views of Center Plate

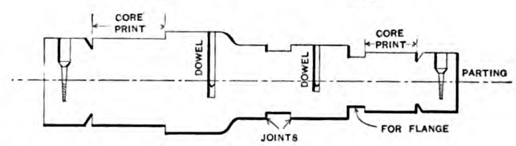


Fig. 88.—Longitudinal Section of Pieces as They Appear When Partially Turned Up.

Making Wood Patterns.

parting. In case, however, the lathe has only the usual centers for wood turning, instead of these plates being made of iron they should be of some hard, close grained wood. They should be about ⅜ inch thick, just square blocks with the four holes for screws and one small hole for the center answering the purpose. Do not try to turn up the pieces without using one kind or the other of these center plates.

New Publications.

HANDRAILING SIMPLIFIED: THE SECTORIAN SYSTEM. By an experienced architect. Edited and revised by Fred T. Hodgson. 52 pages. Size, 5 x 7½ inches. Illustrated by numerous diagrams. Bound in cloth. Published by William T. Comstock. Price, $1.

This, so far as we know, is the only book now before the trade which treats of the art of handrailing throughout on the Sectorian System, which is, in effect, a novel method of finding the curves, twists, wreaths, ramps and cuts for handrailing, for circular and elliptical stairs. This method of finding the lines and angles for stair railing does away to a great extent with the many mystifying lines and references so necessary in constructing a handrailing by many of the older systems now in vogue. The system is founded upon what is called a sector, made of two boards joined together with hinges, so that the joint on the face will be close in any position, and the edges beveled so as to allow it to be adjusted to whatever curves may be under consideration. The section in part is so arranged that its sides may be made tangents to the curve of rail and the risers, and cylinder ends of the winders may be laid out on the inside of the section, which, when folded to the right angle, shows the elevation of the stairs around the cylinder. When in this position, the cuts, curves and levels for building the rail may be obtained. The terms employed are in plain English and the explanations are presented in simple language.

WOOD WORKING FOR BEGINNERS. By C. G. Wheeler. 551 pages. Size, 5½ x 8 inches. Illustrated with over 700 engravings. Bound in board covers. Published by G. P. Putnam's Sons. Price, $3.50.

The object of this book is to suggest to amateurs many things which they can profitably make of wood and to start them in the way to work successfully. The author states that it is not an attempt to teach the arts of architecture, carpentry, cabinet making and boat building, but rather represents an effort to keep in line with the advanced educational ideas of the time, and to look at the subject from the standpoints of the teacher, the mechanic and the amateur workman. The treatment is therefore elementary, with no claim that it will carry any one very far in the various subjects, but aims to be thorough and specific as far as it goes. It is more, perhaps, intended for boys, because the majority of beginners are of this class, although there are many things contained within the covers which older readers may find of material help. The volume is divided into five parts, the first of which deals with a workshop for amateurs. The second part describes articles to be made in the workshop, while the third takes up house building for beginners. A chapter which will be of special interest to many is that entitled "Boat Building for Beginners." This describes how to make a few simple boats, with illustrations of many of the details. The last chapter of the book relates to tools and some of the every day operations that can be carried on by means of them. The appendix is devoted to matters relating to wood, suggestions about working drawings, &c.

PRACTICAL STAIRCASE JOINERY. By Paul N. Hasluck. 160 pages. Size, 5 x 7½ inches. Illustrated by 215 engravings. Bound in stiff covers. Published by Cassell & Co. Price, $1.

This little work contains in convenient form for every day use concise information on the general principles and practice of the art of which it treats. Stair construction is a phase of building which has always proven more or less of a stumbling block to the young carpenter and joiner, and in the volume under review there will be found many things in which he will be particularly interested and with which he will doubtless be glad to become familiar. The matter is comprised in 13 chapters, the first of which deals with an explanation of the terms used in stair construction. Some simple forms of stairs are then given, after which are considered stairs with winders at the bottom, stairs with winders at the top and bottom, stairs with half space of winders, stairs over an oblique plan, stairs with open or cut strings, open string stairs with bull nose step, geometrical stairs, winding stairs and ship's stairs. In the make-up of the book the examples illustrated and described are arranged progressively, beginning wtih the simplest and leading gradually to the more elaborate kinds of work.

AN OUTLINE OF VENTILATION AND WARMING. By William J. Baldwin. Price, $1; size, 4¾ x 6¾ inches; 70 pages; two illustrations.

This is another book by the pioneer American writer on the subject of steam heating, and should be as popular as his other works have been, one of which has reached the fourteenth edition. It begins with an explanation of why it is necessary to introduce fresh air into a building to make it pleasant to the occupants as well as healthy, and also presents a method of arriving at the amount of air required in a manner which can be readily understood. In the same way it treats of the temperature at which air should be introduced to the building and the method of arriving at the amount that will be required when the winter temperatures are prevailing, and goes on dealing with the amount of heating surface that will be required in the radiators, the amount of steam they will condense, the amount of water that must be evaporated, the amount of surface that must be exposed in the boilers, the grate surface that will be required to burn the necessary quantity of coal and the size of chimney that will be needed to carry off the products of combustion. After treating each one of these different details in a simple manner a recapitulation of the whole is made in a simple example.

Another interesting feature is a series of approximate rules for determining the number of heat units required, the weight of steam, the amount of coal, the size of the grate, the size of the chimney, the required horse-power and the boiler surface. The illustrations show the beneficial use of mixing dampers, and the author points out that when it is necessary to close a register on account of the air being admitted at too high a temperature ventilation stops, and also that when the air admitted maintains a proper temperature the ventilation that will naturally ensue is very nearly that which would be called satisfactory in good practice. In the same brief but comprehensive manner forced ventilation and exhaust ventilation is treated. The book contains a great deal of valuable information so presented that there is no difficulty in its being thoroughly assimilated by any one engaged in the heating trade.

ACCORDING to the *American Lumberman's* annual review the stock of white pine lumber in the country continues to decrease rapidly. Going back through the previous years it appears that the present stock of white pine is the smallest since 1890, while at the same time the white pine resources of the country are over 25 per cent. less than they were at that time. This shrinkage in the forest area already means a shortage of 2,000,000,000 feet which must be annually filled by the substitution of Georgia yellow pine and Oregon and Washington fir. It has been estimated that the whole remaining area of white pine forests will be practically denuded in five years.

THE fire loss for the month of February, as compiled by the New York *Journal of Commerce*, shows a total of $15,427,000, as compared with $11,755,300 in January. The record for last month includes 12 fires of over $200,000 destructiveness and 228 fires where the loss exceeded $10,000.

WHAT BUILDERS ARE DOING.

A SPIRIT of unrest seems to prevail among the workmen in many branches of the building trades, the reports which have reached us since the last issue of the paper went to press showing more or less friction between employers and employed in various sections of the country. The basis of the existing differences seems to be, for the most part, one of wages and shorter hours of labor. Outside of Chicago the troubles have not assumed very serious proportions, although in many localities they have interfered to a greater or less extent with building operations. The prospects of a good season's business are considered encouraging in a number of localities, and if the existing differences are amicably adjusted before the spring season is fully opened, there would seem to be no reason why a large business should not result during 1900.

Baltimore, Md.

John M. Herring has been selected to act as secretary of the Builders' Exchange, to fill the vacancy caused by the death of Edward D. Miller, who died suddenly in February of paralysis. Mr. Miller had been secretary of the exchange for 14 years, and at a special meeting of the Board of Directors, resolutions of sympathy were unanimously adopted.

The annual election of the exchange will be held in June, when a secretary will be elected by the members of the association.

Boston, Mass.

For some years past it has been the custom for members of the union bricklayers of Boston, and of the Mason Builders' Association, to meet as a Committee on Arbitration and arrange the schedule of wages and hours for journeymen bricklayers. By mutual consent, if the joint committee could not agree, no strike or lockout was to be established, but the question was referred to an arbiter, whose decision was to be regarded as final and decisive. This year the committees representing the Mason Builders' Association and Unions Nos. 3 and 27 of the Bricklayers' and Masons' International Union held several meetings and agreed to a set of rules as to hours and wages for the season of 1900. The agreement provides for an eight-hour day, except overtime, and a minimum rate of wages of 45 cents an hour, the preference of employment to be given to union bricklayers by members of the Mason Builders' Association.

Buffalo, N. Y.

A local paper is authority for the statement that the union carpenters of Buffalo have accepted the prices made by the Carpenter Contractors' Association, which for the present, at least, would seem to end the controversy between them. Under the agreement the men who do rough work get 25 cents an hour, and the men who do the finishing, as high as 30 cents an hour. Eight hours constitute a day's work, and for overtime the pay will be time and a half. Sundays will count as double time.

Cincinnati, Ohio.

The Builders' and Traders' Exchange recently organized by the election of seven directors, who immediately selected officers for the ensuing year, as follows: President, Frank Hoke; vice-president, Herman Busse; treasurer, W. J. Tanner; secretary, George Heitbrink, and assistant secretary and doorkeeper, Charles B. Stevenson. The constitution and by-laws adopted contain but few changes from the documents under which the old exchange operated. A lease of the rooms now occupied in the Grand Opera House has been effected, and the exchange will be conducted upon a businesslike basis.

The Master Carpenters, Contractors and Builders have recently reached an agreement with the Carpenters' and Joiners' Union, whereby a day's wages, up to June 1, will consist of nine hours, with wages at 25 cents per hour. After June 1 a day's work will consist of eight hours, and the scale of wages will be 30 cents per hour, or $2.40 per day.

The first regular monthly meeting of the exchange, since the reorganization went into effect, was held on April 5. One of the most important matters discussed was the patronage of each other by the members of the exchange in preference to going outside for subletting work or turning over contracts.

Findlay, Ohio.

Indications point to a very active season for architects and builders in and about the city. The prospective work will be confined largely to new residences and business blocks, a number of which will be put up before the season closes. A prominent architect expressed the opinion that the work already in prospect will be a great stimulus in the way of bringing new work. He did not believe that the seemingly high prices of building materials would prove any serious drawback to new undertakings. Lumbermen express the view that there will be what might be termed a "boom" in the lumber business in the city the coming summer. Prices are regarded as being very little if any higher than they were before the panic of 1893, and the restoration of the prices now is thought to be due to the extraordinary activity in building.

Indianapolis, Ind.

The increase in prices of building materials does not seem to have had any serious effect in the way of checking building operations. The builders are looking forward to a brisk season, contracts having already been let for a number of business blocks, flat houses and residences.

The carpenters and plumbers settled the differences with their employers early in April, concessions being made on both sides. The agreement calls for a minimum scale of 30 cents an hour, eight hours to constitute a day's work, with time and a half for overtime and double time for Sundays. The scale went into effect Monday, April 9, and is to remain in force until the same date in 1901.

Jersey City, N. J.

Many of the architects of Jersey City and Hudson County who are members of the New Jersey Society of Architects are much interested in the bill lately introduced into the Assembly relating to the regulation of the practice of architecture. It provides for the appointment of a commission of five architects to examine and pass upon all applications for licenses to the practice of architecture. Applicants must be over 21 years of age, and pay a fee of $5. If the examination is satisfactory to the majority of the commission, a license will be granted upon a further payment of $15. Those who are already engaged in the practice of architecture and present affidavits to that effect, or who are members of the American Institute of Architects, may receive a license upon payment of a fee of $5.

The bill also provides that a person who advertises or acts as an architect without this license is subject, upon conviction, to a heavy penalty.

Lowell, Mass.

The prospects in Lowell are not particularly promising at the moment, as very little work in the building line has yet been offered. Some take the view that this is owing to the high price of materials, while others are inclined to think that it is due to the taxes, which are regarded as being too high to guarantee profitable returns. In the majority of cases rental property must be very cheaply built in order to correspond with "cotton wages." Local builders, however, are fairly well occupied on small job work, alterations, &c.

The Builders' Exchange will hold its annual meeting and banquet on Wednesday, April 18, the committee in charge of the banquet being Charles P. Conant, Frank L. Weaver and James Dow.

New York City.

A number of leading dealers in masons' and builders' supplies in the city have recently formed a protective association, and incorporated it under the name of the Masons' and Builders' Building Material Association of New York City. The object of this incorporation has been for protection against loss. It is stated that last year the members of the new organization lost a great deal of money by bad debts; the larger part of it could have been avoided if its members had been protected against fraudulent contractors. Under the rules of the new organization there will be a radical change. According to a member of one of the concerns belonging to the association, if a building in course of construction changes ownership, and there are any claims against it for material supplied by members of the association, who practically control those commodities in the city, nothing can be obtained on credit or for cash until all original debts are paid.

There has been more or less friction in various branches of the trade during the past month, and operations in the suburban sections have been considerably interrupted. This applies especially to Portchester, Rye, Harrison, Mamaroneck, Greenwich, Orange, Newark, Staten Island and Mount Vernon, where, at the hour of going to press, many men among the journeymen carpenters, plumbers, painters, masons, steam fitters, &c., are idle.

The Chamber of Commerce have announced the completion of their million-dollar fund for building operations, and there is considerable speculation as to the site on which the contemplated structure will be erected. Building operations in the city, as might naturally be expected, show a heavy falling off, as compared with the same period in 1899, which was a record year.

There is some talk of a Woman's Athletic Club, to be modeled after the Chicago organization, and it is stated that plans have already been drawn by a Chicago architect for a structure to cost $1,000,000, and which will be located at Fifth avenue and Forty-seventh street, on the site formerly occupied by the Windsor Hotel.

Philadelphia, Pa.

At an adjourned meeting of the employers of Journeymen Carpenters, held in the rooms of the Builders' Exchange, a resolution was adopted declaring it as the sense of the meeting that on May 1 the hours for a day's work for journeymen carpenters of the city of Philadelphia should be eight hours, and the pay 35 cents per hour.

Reading, Pa.

The Builders Exchange of Reading was fully organized the second week in March by electing the following officers and directors:

President, Hon. Thomas P. Merritt.
Vice-president and treasurer, Frederick Shunk.
Secretary, E. F. Keever.

Directors.

Hon. Thomas. P. Merritt,	Frederick Shunk,
Daniel C. Roth.	G. A. Haage,
E. F. Keever,	D. E. Dampman,
Ernst Epp,	John H. Printz.

Salt Lake City, Utah.

Present indications point to one of the most active years in the building line which the city has seen for a decade.

The favorable weather during the past few months has permitted a great amount of work to be done, and the progress which has been made has been such as to insure early in the spring a rapid completion of all buildings now under way. Architects and builders seem to be of the opinion that the outlook has never been so bright, although the increased prices for structural materials have for the time being, at least, caused several building propositions to be laid aside.

Savannah, Ga.

The Builders' Exchange recently organized by the contractors and dealers in builders' supplies in Savannah for business protection and the collection and dissemination of information relating to the building interests, have elected officers as follows:

President, John R. Eason.
Vice-presidents, John F. Freeman and William Armitage.
Treasurer, L. A. McCarthy.
Secretary, Henry M. Ward.

The secretary informs us that the exchange will be very glad to receive copies of catalogues of manufacturers of and dealers in materials used in building construction.

South Omaha, Neb.

The Master Carpenters of South Omaha recently perfected an organization with the following list of officers: President, N. E. Carter; vice-president, Theodore Schroeder; treasurer, Carl Benyer, and secretary, George E. Dunscombe.

Worcester, Mass.

At a recent meeting of the Board of Directors of the Builders' Exchange Henry W. Sweetser was unanimously elected secretary to succeed C. A. Fenner, resigned.

The annual banquet of the exchange was held at the State Mutual Restaurant, and was largely attended, the Banquet Committee consisting of O. S. Kendall, J. G. Vaudreuil, E. J. Cross and F. D. White. President B. C. Fisk presided, introducing J. H. Searles of the Flexible Door & Shutter Company as toastmaster. Among the speakers were Hon. H. M. Knowlton of New Bedford and William Woodward. Music was furnished during the evening by the Alhambra Mandolin and Harp Club. The occasion was delightful in every way, and a decided success.

Youngstown, Ohio.

The leading contractors and dealers in building materials, to the number of 40, recently met in the office of Architects R. F. and E. R. Thompson, and effected the organization of a Builders' Exchange, to be conducted on the lines of such organizations in the larger cities throughout the country. Any reputable contractor, architect or dealer in the city is elligible to membership, and the association is to be incorporated under the laws of the State of Ohio.

The election of officers resulted in the choice of J. E. Nutt as president, Louis Heller as vice-president, Arthur G. Young as treasurer and E. R. Thompson as secretary.

A Committee on Constitution and By-laws was appointed, consisting of George T. Hess, George H. Dingleby and A. S. Miley.

Notes.

The builders in La Crosse, Wis., expect to have a busy season, notwithstanding the high prices of building materials. It is thought, however, that not so expensive houses will be put up as have been the case had last year's prices ruled.

The contractors of Attleboro, Mass., granted the demand of the journeymen carpenters and masons for a nine-hour day, with the same pay as they had been receiving for ten hours' work, the new schedule going into effect on April 1.

The carpenters and contractors in Westerly, R. I., have settled their differences, and the men have been granted a nine-hour day, with compensation same as formerly paid for ten hours' work. The agreement will go into effect on July 1.

It is stated that on account of the unprecedented activity in building in Colorado Springs, Colo., there is an unusual demand for good carpenters. The new Mining Exchange Building, the addition to the Alamo Hotel, the new Antlers Hotel, and numerous other buildings under construction have offered employment to skilled labor to such an extent as to render it somewhat difficult for the contractors to obtain all the help they desired.

Fort Wayne, Ind., reports last year as having been the greatest in the building line the city has ever known. Contractors and builders report a good business, and while not many large business blocks are likely to be put up, there is a great deal in the way of dwellings and repairing.

Reports from Waterloo, N. Y., are to the effect that never before in the history of the place was there such an amount of building as at present. Carpenters and masons are said to have been busily employed all winter, and the outlook is good for the coming season.

There is a gratifying degree of activity in the building line in Richmond, Va., and it is estimated that during the next six months at least $600,000 will be paid out in construction work, without regard to the improvements on a large scale by two or three railroad companies.

PROTECTING IRON CONSTRUCTION FROM CORROSION.

At a discussion of the Franklin Institute not long since, W. C. Furber, in speaking on the structural design of buildings, said:

On the question of rust protection, I may be taking advanced ground when I say I believe that entirely too little attention has been paid to this matter by designers, yet the liability of corrosion is so great, through exposure and improper covering and the lack of preparation of the metal to receive and hold the covering, that I think the use of the sand blast or some equally efficient means to remove the mill scale and permit the direct application of the protective covering to the actual surface of the metal is not only justifiable but imperative. When the skeleton is once inclosed, examination is difficult and repair practically impossible, and as the life of the building is coincident with the life of the frame work, and the value of the investment is determined primarily by the integrity of the finished structure, a short-sighted and temporarily apparent economy should not be allowed to curtail a proper expenditure on the skeleton, which, if intelligently made, will assure the building a practically indefinite existence.

As to the best means of providing against rust, the information already at our disposal seems to me sufficient to indicate a safe course to pursue. Ledebur, in an "Essay on Oxidation of Iron and its Admixtures, Rusting, and the Influence of Liquids upon Iron," points out that three factors are required to produce rust—that is, the hydrated oxide—viz., water, pure oxygen and an acid. Portland cement, by furnishing a base for the absorption of any acid likely to be found, will eliminate one of these factors, and will thereby prevent rust. So that, with the other valuable qualities it possesses, it forms a protective covering of great value. But while this is true if the cement is in direct contact with the metal, we know that as the shapes come from the shops they are covered with mill scale, and that any covering applied to them adheres to the scale, and that a mechanical separation of the scale is easily possible.

Should water penetrate the cement or other covering, through cracks, and find its way between the scale and the actual surface of the metal, the scale being electro-negative to the body of the metal, the elements of a battery exist, and the degree of corrosion is a matter of time. We also know that as concrete is frequently put in place the voids are not filled up, and spaces are left for the accumulation of water, which may be present, forming, with the scale already there, rust producing factors.

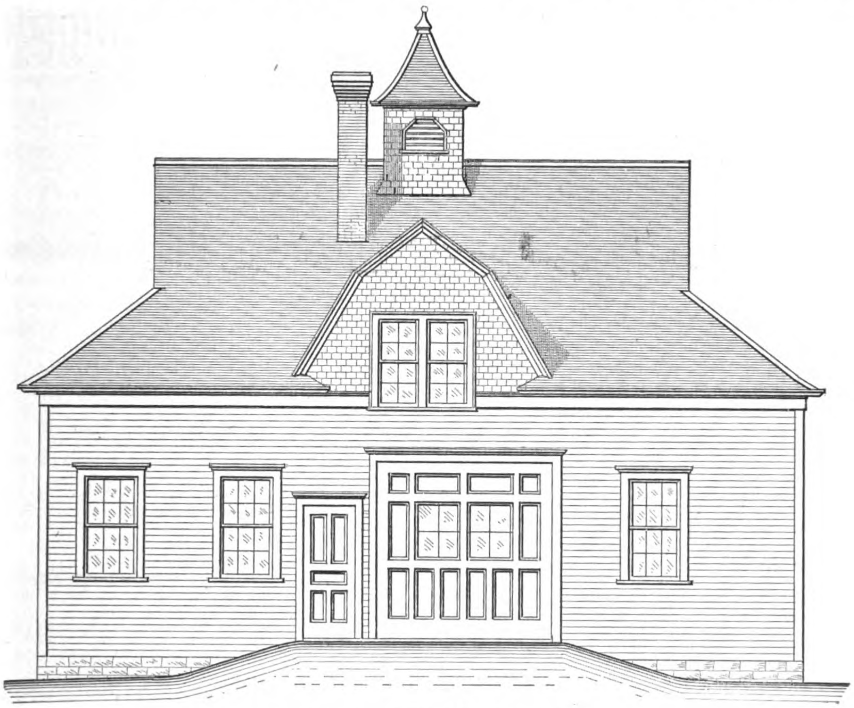
It is not an uncommon thing, where iron footings are placed below the water level, to find that the water has dissolved and washed out all the cement which the concrete originally contained. I have seen more than one building standing with its feet wet, the cement having been washed out before the concrete set, leaving but the stone and sand remaining.

I believe, and have followed it out in my own practice, in placing all iron above the line of saturation if at all possible, and in the Harrison Building, which has been referred to here to-night, and for which I was the designing engineer, the grillage of I-beams in the footings is above the water level, the foundations below this being entirely of concrete; but when for any reason the grillage or underground metal work has to be placed below the water level most extraordinary care should be used to see that the metal work is free from scale and unpainted; that the trenches or pits are so lined that no part of the excavation comes in contact with the beams; that the concrete contains a large proportion of cement, with the aggregate or filler in small particles, so as to allow being rammed easily into a dense mass without voids. In the placing of long girders underground it is not an uncommon thing to see the earth fall in around the girders, and to see the concrete filled in without the earth being removed. It is needless, perhaps, to say that whenever this occurs a fault is formed in the concrete, and rust must inevitably follow.

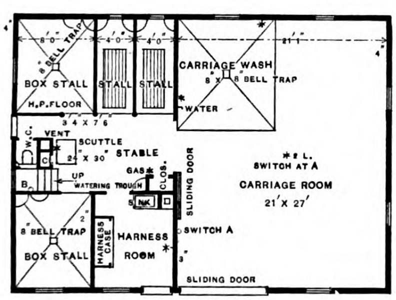
DESIGN FOR A FRAME BARN.

IN the picture forming our supplemental plate this month is seen just at the rear of the house of Mr. Edward Moulten of Worcester, Mass., a frame barn of neat exterior, the drawings of which are presented upon this and the page immediately following. An examination of the main floor plan shows the arrangement of the single and box stalls, harness room, carriage room, &c. The timber employed in the construction of the barn is spruce, the sills being 4 x 7 inches; inches to the weather. The gables are covered with cedar shingles laid 5 inches to the weather, and the roof with 16-inch cedar shingles laid 4¼ inches to the weather. The roof and gables are stained with one coat of oil stain.

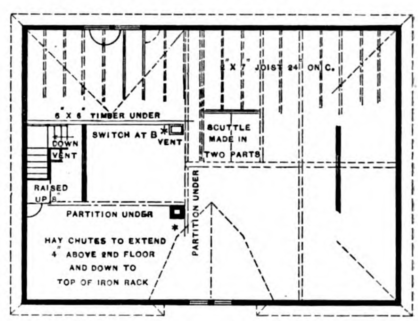
The large front doors of the barn are 2¼ inches thick, with chamfered stiles, rails, &c., and glazed sash. They are hung to slide at the top with the Coburn door hanger. The cupola is fitted with ⅞-inch ventilating slats, the



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



First Floor.



Second Floor, with Outline of Roof.

Scale, 1-16 Inch to the Foot.

Design for a Frame Barn.—John P. Kingston, Architect, Worcester, Mass.

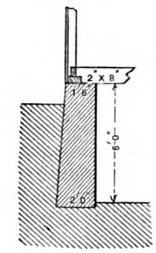
the first floor girders, 8 x 8 inches; the second floor girders, 6 x 8 inches; the first floor joist, 2 x 8 inches, placed 16 inches on centers; the second floor joist, 2 x 7 inches, placed 24 inches on centers; the collar beams, 1 x 6 inches; the rafters, 2 x 6 inches, placed 16 inches on centers; the corner posts, 4 x 6 inches; the wall studs, 2 x 4 inches, placed 24 inches on centers; the partitition studs, 2 x 3 inches, while the posts for the trusses are 4 x 6 inches and 3 x 8 inches. The joist on each side of the stall pans are 6 x 8 inches.

The frame is covered with hemlock sheathing boards, on which is placed Neponset building paper, this in turn being covered with 6-inch spruce clapboards laid 4½ base is shingled, and on top is a wood finial 18 inches high.

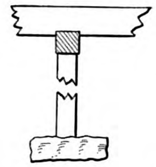
The whole of the first story has a lining floor of 1⅛-inch planed and matched spruce boards, while the box stalls and the carriage wash have a lining floor sunk in the center about 2 inches to pitch to the trap. The top floors are of ⅞-inch strips of spruce not more than 6 inches wide, laid with close running joints. The carriage wash and box stalls have a top floor of matched Georgia pine not more than 3½ inches wide, laid running to the center. All hard wood flooring is rift grain. The harness room also has a top floor of Georgia pine, blind nailed. The single stalls are fitted with Lynn's improved stall basin and floor complete, the slats being of maple. The stalls around the slatted portion have a maple floor of ⅞-inch matched spruce, with two thicknesses of tar paper under, and a finished floor of hard pine, ⅞-inch thick, with two thicknesses of tar paper underneath. The partitions are 5 feet high to a distance within 2 feet of the head of the stall, from which point forward they extend to the ceiling. On top of the lower

with Coburn hanger. The box stall doors are of the same thickness and have three vertical panels at the bottom, the top of the middle rail being same hight as the stall partitions, and the space filled with wire guard. The other doors are 1⅜ inches thick, with four panels and beveled edges.

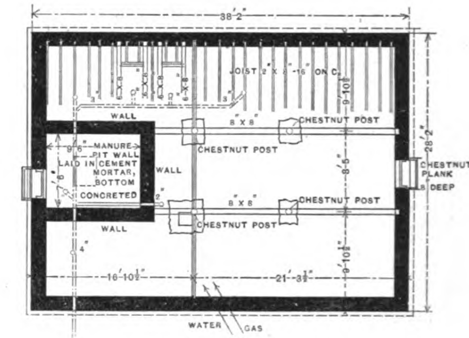
All exterior work is treated with two coats of best lead and oil paint, of selected colors, while all interior



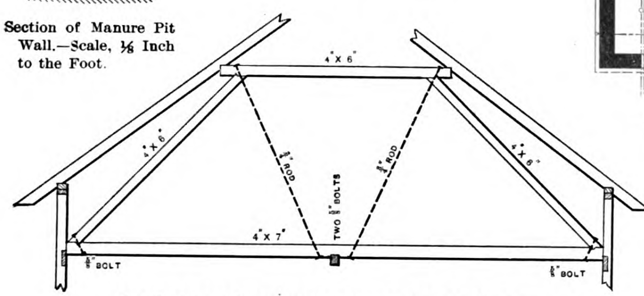
Section of Manure Pit Wall.—Scale, ⅛ Inch to the Foot.



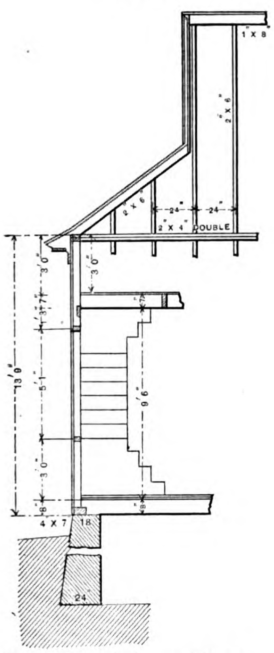
Section of Girder Post on Pier Stone.—Scale, ¼ Inch to the Foot.



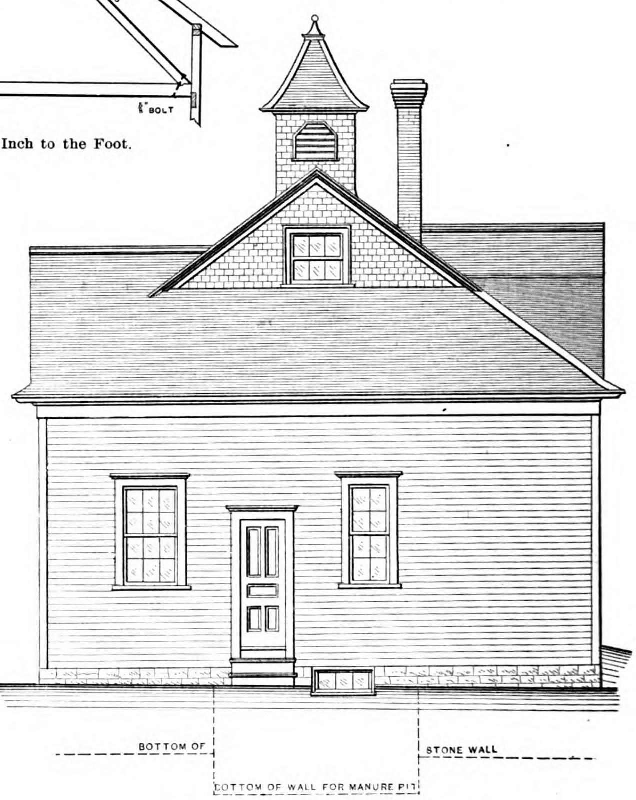
Cellar Plan.—Scale. 1-16 Inch to the Foot.



Detail of Roof Construction.—Scale, ⅛ Inch to the Foot.



Section through Frame of Barn.—Scale, ⅛ Inch to the Foot.



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

Design for a Frame Barn.—Miscellaneous Details, Plan and Elevation.

part of the single stall partitions is a wire wall guard 6 feet 6 inches long, and on the box stall there is one to conform to the length.

The walls, partitions and ceilings of the entire first floor are covered with ¾-inch beaded North Carolina pine sheathing, with a ¾-inch quarter around in all angles, including the floors. The sliding door between the stable and the carriage room is 1¾ inches thick with chamfered edges, two panels high and four wide, hung

finished work has one coat of best linseed oil and one coat of Heath's No. 40 Preservative. The floors of the harness room and box stalls are finished with one coat of paraffin oil.

The watering trough, 12 inches deep and 17 inches on the straight sides, is one of W. A. Snow's, with patent overflow and plug strainer. In the harness room is a Miller iron sink, 24 x 16 x 6 inches. The center light in the carriage room is wired for electric lighting by means of a key at A, as shown on the floor plan, while the light in the second story is operated by means of a key at B, near the foot of the stairs.

The drawings in this case, as in those of the house of Mr. Moulten, were prepared by Architect John P. Kingston of 518 Main street, Worcester, Mass. The contract was executed by Builder Fred J. Y. Goff of that city.

Professor Cummings on Trade Unions.

In a recent lecture on "The Trade Union," Prof. Edward Cummings of Harvard University among other things, said:

The modern trade union represents one of the efforts to regulate the modern conditions of machine labor. Two conditions are essential to the success of the trade union. You must have a class of people who never expect to rise above the condition of laborers. You must also have a class which has intelligence to furnish leadership and organization to carry on business on a large scale. But such a class leaves the wage earners and joins itself with the employers. That is the reason of the failure of trade unions in America during the last 50 years. The wage earners have lacked leaders. One of the penalties which a wage earning class pays for the opportunity to rise from the laborer to the self-made man is lack of efficient leadership. The men who deal most harshly with the trade unions are the self-made men, who, half a generation ago, were working at the bench themselves. In England, because the opportunity to rise has been relatively small compared with that of the United States, the success of trade unions has been so much the greater, because they have had capable leaders who have had no chance to rise to the rank of employer.

Lack of stability on the part of our population, the fact that the center and character of our population has completely changed in our country within a few years, has played an important part in weakening the success of our trade unions. The real difficulty which gives grievance to society and the employer is that the trade unions, if they are going to control business, must do business. The right to sell labor for future delivery carries with it the obligation to business as well. People who undertake this social reformation must undertake it righteously.

Law in the Building Trades.

SPECIFICATIONS AND SERVICES OF ARCHITECT.

Where one was awarded a building contract for a lump sum, in pursuance of a call for bids based on plans and specifications to be furnished by the bidders, he was not entitled to recover for the plans and specifications on abandoning the contract; and where the owner completed such building the latter was entitled to recover for the services of an architect employed by him in completing it, even though the contractor was an architect, and agreed to give his services free of charge. —Watson *vs.* Dewitt, Texas, 46 S. W. Rep., 1062.

WHEN OWNER WAS NOT LIABLE FOR ORDERED EXTRAS.

Where a building contractor, on the promise of the owner's son to see him paid, and at his request, furnished extras in erecting the building, charging them to the son, to whom he extended the credit, and who when asked to pay for the extras made no other objection than that he had no money, a finding that the debt was that of the son, and hence not within the statute of frauds, was warranted, even though the son was not pecuniarly benefited by the transaction.—Phelps *vs.* Stone (Mass.), 52 N. E. Rep., 517.

"EXTRAS" WHEN OTHERS FINISH CONTRACT.

Where a building contractor abandoned the work, and other contractors were employed to finish it, charges for cementing at the sides between the new cellar bottom and the old foundation, not included in the original contract, are not allowable against the original contractor, in a settlement with the owner. A charge of the architect of $100, as against the original contractor for new plans and specifications, and his supervision of the work, is excessive, and should be reduced to $50, in settlement between the owner and the original contractor, where it appears that no demand was ever made on such contractor for the plans and specifications which had been in use at the building. A reasonable charge for extra work and furnishing new materials will be allowed, where furnished under the directions of the owner's architect, though the contract called for a certain price and the use of old material. Where a building contractor makes an extra charge for certain doors, which he claims were ordered, and the architect or the owner denies it, there being no motive on the part of the contractor to incur the extra expense unless he had an order, the charge will be allowed. Where the contract provides for certain work and material, and the owner requires more difficult work and better material, the contractor is entitled to an allowance.—Isaacs *vs.* Reeve (N. J.), 44 Atl. Rep., 1.

LIABILITY FOR DEFECTIVE CONSTRUCTION OF BUILDING.

Where a party erected and properly constructed a building on his lot, and the building on an adjoining lot continually encroached thereon by the settling of the walls, whether by fault of its original construction or because such wall gradually weakened and bulged out, and crowded over against the wall of the house of the other party, so as to compel the latter to tear down his wall because of its dangerous condition, caused by such encroachment, the adjoining land owner is liable for the damages.—Hofferberth *vs.* Myers, 59 N. Y. Supp. Rep., 88.

Course in Heating and Ventilating Engineering at the Massachusetts Institute of Technology.

In place of the comparatively simple systems employed a few years ago we have to-day in our large buildings a variety of heating and ventilating apparatus, the proper selection and arrangement of which calls for engineering ability of a high order. The faculty of the institute, recognizing the changed conditions, aims in the new course to thoroughly acquaint men with the theory of the subject and to familiarize them as far as possible with the practical details. Most of the latter must, however, be acquired later in the offices of engineers or contractors.

As to the field for employment in this line, it may be said that, while at present there are few heating and ventilating engineers who work exclusively on a commission or time basis and do no contracting whatever, it is pretty generally conceded that this field will present gradually increasing opportunities. The United States Government and many States and cities have their corps of engineers in this department. The large heating contractors, fan manufacturers and makers of heating boilers and steam specialties have need of men well schooled in the branches included in this new course.

To men so fortunate as to combine commercial with engineering ability, good positions are always open. As the field enlarges the principal architects in our big cities will doubtless have their heating and ventilating plans laid out by their own engineers. The institute course will at first consist of a fourth year option, seniors in the department of mechanical engineering having a choice of mill, marine, locomotive or heating and ventilating engineering.

In addition to lectures covering the subject, frequent visits will be made to representative pieces of work; the men will have some shop practice in pipe fitting and much work in the drawing room making plans for different systems and computing the sizes of the various parts. The solution of the problems given will require a pretty thorough knowledge of the laws of heat, the properties of steam, hydro-mechanics and the mechanics of gases.

The course will be in charge of Prof. S. Homer Woodbridge, who for a number of years has given lectures on heating and ventilation to the students in the courses of mechanical engineering and architecture. Added to his qualifications as a teacher, Professor Woodbridge has had the advantage of an extensive office practice for the past ten or twelve years, and has been identified with a large number of important installations in a great variety of buildings. While the course is intended primarily for regular fourth year students, others having the necessary qualifications may take it up, either separately or in connection with special lines of study.

The New York Trade School.

The nineteenth annual commencement exercises of the New York Trade School, First avenue and Sixty-seventh street, were held on the evening of Wednesday, April 4, in the presence of a very large gathering of friends and relatives of the graduates. The assembly room was profusely decorated with the national colors, producing in the bright illumination of the electric lights a very pleasing effect. The programme was an interesting one, and the audience manifested a deep interest in all the proceedings.

The exercises were opened with a brief address by President Cutting, who called upon the graduates to apply what they had learned to the business of taking care of themselves and making a success of their future lives. He told them that when they did a full day's work for a full day's pay they were doing their part to stimulate the prosperity of the land. He pointed out that education itself was not always a success, as it was sometimes put to the basest ends, but he urged his hearers to take the road to industry and honesty. "There never was a time," he said, "when true and able men were so much in demand as to-day. What we want you to do is to trust in yourselves, in the God within you, in the ambitious spirit you have to-day, and in the power to overcome the temptations which may beset you. We have done the best we can for you, and we send you out in the hope that you will be numbered among the cleverest, truest and noblest young men in the industrial world."

Certificates were presented by John Noll to the evening classes in house, sign and fresco painting, and the day classes in house and sign painting. Those to the evening and day classes in carpentry, bricklaying and plastering were given out by Frank Reynolds, while Anthony Schwoerer presented certificates to the class in sheet metal cornice work. The classes in steam fitting received theirs from Henry B. Gombers; the classes in electrical work from H. D. Moeller, Jr., while the members of the day and evening classes in plumbing received their certificates from the hands of James Muir and Edward Murphy.

The medals of merit, donated by the Master Steam Fitters' Association to the most proficient student in the day and evening classes in steam fitting, were presented by J. J. Smith. The winner of the medal in the day class was Calvin P. Bascom of Rochester, N. Y., and in the evening class, George A. Schmidt of New York City. The William O. Allison medal of merit for the most proficient student in the painting class was given to Leo Schroeder of Chicago.

The various instructors received substantial evidences of the appreciation of their efforts by the pupils, E. L. Barr of the steam fitting department being presented with an umbrella and a diamond pin, his assistant, Harry Hartman, receiving an umbrella and a meerschaum pipe. A. R. Ackerman of the painting class received a silver match box and an umbrella, while Thomas J. Carey of the bricklaying class was presented with a silver service.

The commencement address was delivered by W. Bourke Cockran, who spoke for half an hour, his remarks commanding the closest attention on the part of the large audience. After a few words from President Cutting the exercises were brought to a close.

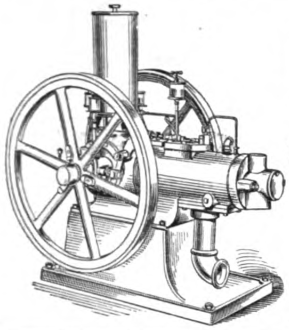
The total number of students enrolled during the year was 658. The total number graduating, 359. The number of graduates in the carpentry evening class was 11; day class, 5. Bricklaying evening class, 13; day class, 11. House painting evening class, 9; day class 8. Plastering, 3. Fresco painting, 19. Cornice class, 25. Electrical work, evening class, 26; day class 19. Plumbing, evening class, 82; day class, 83. Steam fitting, evening class, 8, and day class, 11.

GEORGE EASTMAN of the Eastman Kodak Company has donated $200,000 in cash to the Athenæum and Mechanics' Institute of Rochester, N. Y., which amount will be devoted to the purchase of land and the erection of suitable buildings thereon for the enlargement of its sphere of usefulness.

AMONG the improvements in progress on the upper west side of the city is a 12-story apartment house which is expected to be ready for occupancy late in the fall next year. The structure will occupy the site at the corner of Broadway and Seventy-first street in Sherman square, and will be erected in accordance with plans drawn by Janes & Leo, architects of this city. The first three stories of the façade will be of Indiana limestone, and the upper stories of red pressed brick and terra cotta. The structure will be fireproof throughout, and in its architecture will follow the style of Louis XVI. The building will possess among many features of interest a room in the basement for automobiles and a plant for charging storage batteries. It is estimated that $750,000 will be required to complete the building.

A UNIQUE feature of the building trades strike in Chicago one week was the sight of 12 boss stone cutters, whose capital aggregates $4,000,000, at work with their aprons on in the yards of the John Tait Cut Stone Company of that city, helping the firm to finish a contract on time.

CONTENTS.



The MIETZ & WEISS

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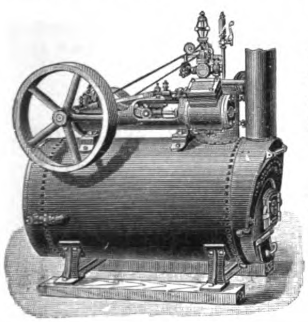

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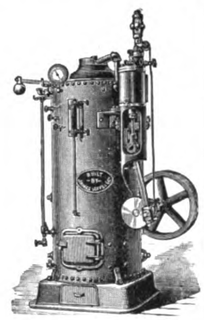

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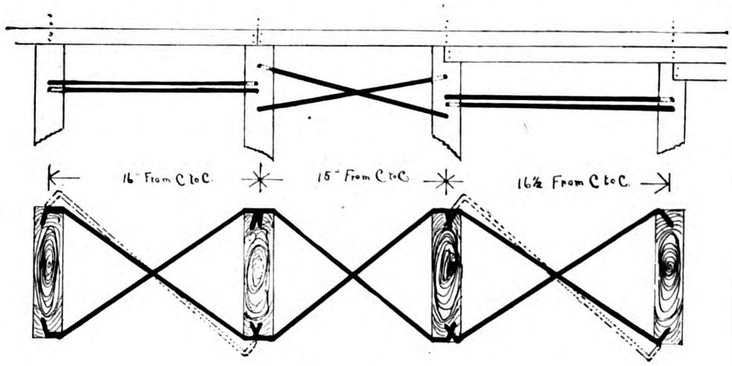
NOVELTIES.

Nelson's Metallic Tension Bridging.

A form of bridging which is likely to interest architects and builders is that now being introduced to the trade by the A. H. Peirce Mfg. Company of 110 North Green street, Chicago, Ill., and which is illustrated in Fig. 1 of the engravings. It is known as Nelson's metallic tension bridging, and the manufacturers claim for it economy both in time and material. The bridging is made of 3-16 wire, with ends pointed



Novelties.—Fig. 1.—Nelson's Metallic Tension Bridging.

and bent oppositely at right angles, these ends being driven into the upper edge of one joist and into the lower edge of the next, after the floor is laid, thus making the floor a unit of tensile strength. It is claimed to be cheaper than 2 x 4 wood bridging, requires no nails, necessitates no loss of time in recutting, is lighter in weight than wood, and it can be rapidly put in place. The manufacturers point out that the use of this bridging overcomes the irregularity of spaces between joists, which in the wood necessitates the drawing out of nails and recutting, in order to properly fit the space. Reference is also made to the fact that in factories, basements and other buildings, where the joists are exposed, wood bridging collects a great deal of dust and dirt, which is constantly dropped by the jarring of the floors, which objections are largely overcome by the use of the metallic bridging. The engraving which we present herewith represents a cross section through the floor joists, and also a plan view with a portion of the floor removed, showing the bridging in place.

St. Paul Method of Fire Proof Construction.

The St. Paul method of fire proof building is most interestingly described in a ten-page pamphlet which has been issued by the St. Paul Roofing, Cornice & Ornament Company of St. Paul, Minn. Briefly stated, the construction involves the use of a metallic facing, a carrying lath and a plastic filling. The studding are put up in the same way as in ordinary frame construction, and on the outside, instead of sheathing, lattice work is nailed on common lath, or, in the case of larger buildings, a metallic lath may be employed. Upon the outside of this lattice work is fastened one of the various forms of metallic siding which the company manufacture, thus completely inclosing the building and closely fitting at all window and door openings. After this has been done, and before the inside finish is put on, a plastic mixture of cement and sand is applied from the inside between the studding and pressed through the latticed spaces solid against the inside surface of the outside metal covering. This material is put on so as to cover the lath ½ inch or more in depth, clear across, between the studding, the cement and sand hardening into what is practically a fire proof, air tight, non-conducting wall, which is claimed to be perfectly impervious to moisture. The manufacturers point out from 25 to 45 per cent. in cost of insurance has been saved under this method of construction, and at no greater cost of building than for wood, while it was much less than for brick veneer or solid wall. The pamphlet is illustrated by means of half-tone engravings, showing some of the buildings erected in accordance with this form of construction, while several testimonial letters show the favor with which it has been received by some of those who have had experience with work of this nature.

The Mietz & Weiss Pumping Engine.

There are many places where a small pumping engine is required, or can be used to advantage, but where for one reason or another, gas or oil may be the most available fuel for generating the power. Doubtless the are many of our readers who have occasion to make use of such an engine, and who will, therefore, be interested in the brief description which we give herewith of the Mietz & Weiss pumping engine, adapted for gas or kerosene oil, and manufactured by August Mietz of 128 Mott street, New York City. The three sizes manufactured have an approximate capacity ranging from 500 to 2000 gallons per hour, and the maker points out that as the success of an engine getting into the hands of persons not familiar with the use of machinery is, in the first place, due to its automatic action, he has, in designing the pumping engine shown in Fig. 2, placed the responsibility of the performance of its duty on the mechanism, rather than on the user. Its construction embodies the latest improvements, including the compression principle, by which the compression and burning of the mixture of air and fuel, together with the expulsion of the exhaust, are all performed at a single turn and in the most direct and simple manner. A closed copper tank or oil receiver is firmly screwed to the cylinder and has a capacity for running the engine ten hours. From this tank the kerosene is forced by means of a small pump directly into the cylinder and there vaporized and mixed with the air of combustion. The resulting pressure, acting directly on the piston, constitutes the driving force. Some of the other points to which the manufacturer refers are the inclosed crank shaft, thus excluding dust and dirt, the absence of cams, valves and side shafts, thus doing away with all danger to inexperienced attendants; rigidity of the crank shaft bearings, perfect lubrication, and the prevention of smell caused by leakage past the piston, which is often noticeable in open cylinder engines by a disagreeable odor; cleanliness and silent and smooth running.

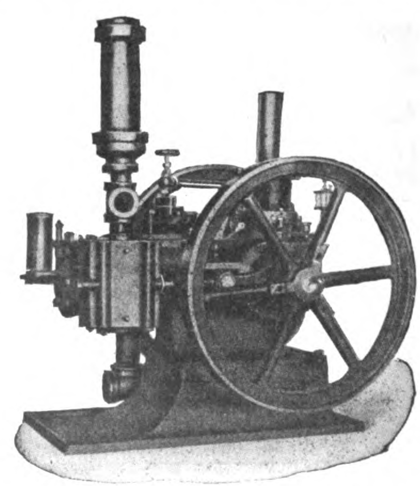


Fig. 2.—The Mietz & Weiss Pumping Engine.

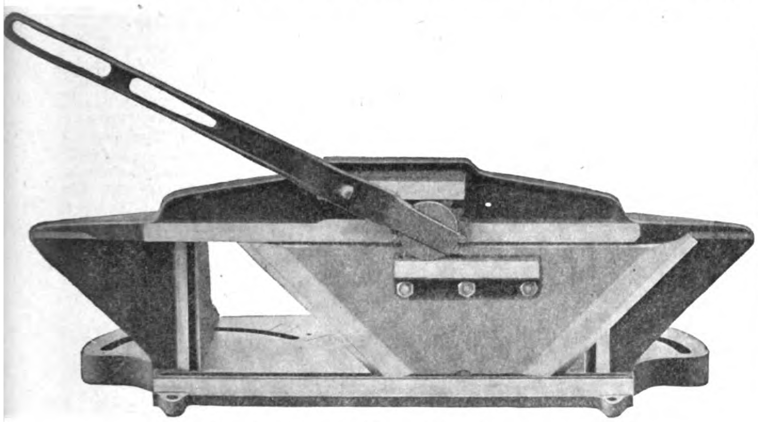
Stable Sliding Door Locks.

Sargent & Co. of New Haven, Conn., and 149-153 Leonard street, New York City, have just put on the market a sliding door lock for stable and fire engine door use, which is likely to interest architects and builders. The lock is extra heavy, has heavy bronze metal inside work with bronze metal front and strike, an important feature being the protection afforded the sides of horses when passing in or out. The concave face of the lock contains the latch bolt, which does not project beyond the face. The strike is convex to match the face of the lock. All edges and corners are rounded, so that there is no possibility of injury to horses. They are made in three finishes, there is a range of 200 key changes, the works have three steel tumblers and two nickel plated forged steel keys are packed with each lock. The locks can be supplied to order with master key if desired. The company also make a new stable sliding door lock for similar purposes at a much lower price, which is also made to protect the horse from injury in entering or leaving the stable.

The Oliver Wood Trimmer.

Some important modifications have recently been made by the American Machinery Company of Grand Rapids, Mich., in the Oliver wood trimmer, and now, instead of having a pair of knives bolted to a sliding knife head in the usual way, the trimmer has a solid knife, which acts as a knife head also. The object of this is twofold; as there is no joint made by bolting the knives to the knife head, there is less liability to be looseness there, and in sharpening the knives, which it is necessary to do frequently in order to receive satisfactory service, there are no screws to be removed in taking the knife out, all that is necessary being to tip the machine upon edge to throw the handle clear around. The rack bolted to the back of the knife, as shown in Fig. 3, does not interfere with the use of an oil stone on the bevel side. Owing to the thickness of the knife a double bevel is placed at the cutting edge, so that while using an oil stone in honing up the knife it is only necessary to hone a narrow space.

It will be noticed that the gear and rack are above instead of below the knife, and there is no clogging up with dirt and chips. In order to overcome any tendency to tip and bind in cutting across a piece of wood the short lower bearing of the knife is fitted to a steel shoe that exactly fits the groove in which it operates. The shearing edge of the gauge, instead of being square, as is usual, has the back finished off at an angle of 45 degrees to the face, thus leaving only the point for a shearing edge. By cutting this off in this way it is possible to cover angles back of the 90-degree or square line, this feature being shown in the engraving. A spring roller attachment, on the principle of the shade roller, is used. This draws the gauge firmly up against the side frame all the time.



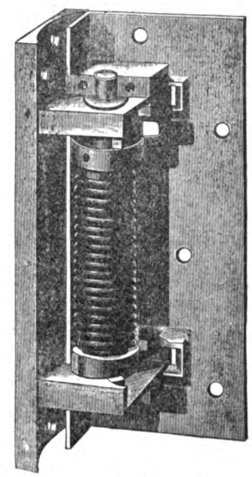
Novelties.—Fig. 3.—Side View of the Oliver Wood Trimmer.

The Drake Acetylene Generator.

The International Heater Company of Utica, N. Y., are directing attention to the Drake Acetylene generator, which they are putting on the market. It is designed for use in connection with a condensing chamber and a floating reservoir, which by rising and falling as the gas is generated and consumed trips a lever and another charge of carbide is dropped into the generator. The carbide holders are supported around a central shaft, and have levers arranged to drop the bottom when the holders are brought over a chute leading directly to the generating chamber. By this means a large charge of carbide is divided so that only a small portion is dropped into the water at one time. The carbide chute is so arranged that traps prevent the escape of gas except through the proper pipe. Should an excess of gas be generated through any accident the rise of the floating bell above the normal point will open a valve and allow the surplus to escape through a pipe leading out of doors, and thus all danger is avoided. It is pointed out that the carbide cans are sealed tight, and that the carbide can be left in them for months without disadvantage. When changing the water in the generator or flushing it to remove refuse no air is admitted to cause danger or annoyance. A large draw off cock is arranged so that the apparatus can be directly connected with a sewer.

New Idea Double Acting Spring Hinge.

Architects and builders generally will be interested in the double acting spring hinge which is being turned out by the Stover Mfg. Company of Freeport, Ill., and which is shown in Fig. 4. Here one part of the leaf is displaced to show the coil spring with the buttons, pintle and other parts of the hinge in position. The jamb plate, shown separately in Fig. 5, is flat at the back and concave at the face, the purpose of the concave being to give room for the door to swing freely without having to round off the corners. The leaf consists of two similar parts, duplicates of each other, except that one is provided with a small slot through which the key is passed when adjusting the tension of the spring after the door is hung. Four machine screws are used to fasten the two parts together. It is explained that the construction of the hinges is such that the door does



New Idea Double Acting Spring Hinge.—Fig. 4.—Hinge with One Leaf Removed, Showing Spring in Place.

not oscillate much, but that it comes to rest quickly in closing; also that the door is prevented from sagging. The door is attached to the hinge between the two parts that form the leaf, this preventing the screws working loose.

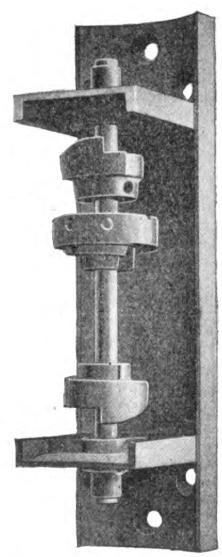


Fig. 5.—The Jamb Plate.

The Howard Thermostat Company of 111 Water street, Oswego, N. Y., lately received a very flattering testimonial letter relative to the satisfactory operation of one of their Sprague damper and valve regulators which had been placed in the house of W. M. Brinckerhoff of Albany, N. Y., for the purpose of equalizing the temperature by controlling the dampers of the furnace. In this connection it may be interesting to remark that Mr. Brinckerhoff has been identified with heater manufacturers for several years, he being managing director of the mutual legal, equitable and commercial interests of a long list of stove and furnace manufacturers, as well as many other industrial concerns. Mr. Brinckerhoff in his letter states that the thermostat question previous to the Sprague was largely a matter of speculation, and so far as he has known of them they have been so constructed as to be of short life and unreliable. With regard to the Sprague, however, he says he sees no reason why it would not run with entire satisfaction all winter as well as three weeks, which is the length of time he had had one in his house at the time of writing his letter.

Metal Ceilings.

"A New Idea in Metal Ceilings" is the title of a daintily printed pamphlet which is being distributed from the St. Louis office of the Berger Mfg. Company and which relates to "Berger's Classified Designs." The engravings, showing various patterns of metal ceilings, are well executed, and the binding is in paper covers of a shade of terra cotta which forms a pleasing contrast with the design, largely typographical in character, on the front cover. The designs of ceiling and siding shown include combinations of the Romanesque style, Rococo, Empire, Colonial, Italian Renaissance, German Renaissance and the Greek. In offering this little pamphlet to the trade the manufacturers point out that "in decoration, as in architecture, design and fitness are fundamentals which should always be considered, and whatever artistic style is selected should be adhered to throughout, while at the same time it should be appropriate to its architectural surroundings. To properly define, develop and classify the decorations employed, and thereby facilitate the carrying out of fundamental decorative principles, is, in brief, the new

Novelties.—The Fry Patent Drafting Table.—Fig. 6.—General View of Table Ready for Use.

idea in metal ceilings ushered in by Berger's Classified Designs."

The Fry Patent Drafting Table.

Every one having occasion to make a drawing will be interested in the illustrations here given in Figs. 6 and 7 of the Fry patent drafting table, shown both open and folded. The frame of this table is made of the best quality of gray iron, thoroughly braced and bolted together, and is finished in black enamel with bronze trimmings. No springs or set screws are used, their use being avoided because of their liability to weaken or loosen. The table is made with a box or tray under the top in which paper or drawings can be kept. It also has a polished oak drawer or tray attached to a swinging arm which can be hung on either end of the frame. The top or drawing board is hinged to the rear end of the box or base, and by means of an iron lever under the front edge of the top and the tilting device on the frame, it can be adjusted to almost any

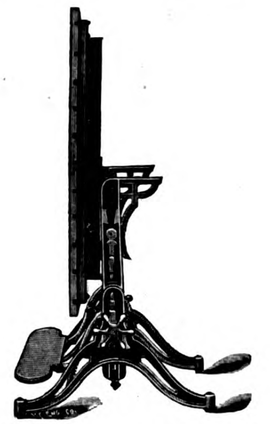


Fig. 7.—The Drafting Table Folded.

angle required. The hight can be changed to any point from 34 to 42 inches without the draftsman moving from his seat. It is fitted with a neat and substantial foot rest, easily changed from one side of the table to another. The top of the table is made of 4-inch strips of Michigan pine, thoroughly kiln dried, tongued and grooved, and glued together with hard wood ledges secured to the back with heavy screws running in oval slots with metal bushing. Side ledges of cherry are put on by an improved method, making a hard, smooth surface. Every care is taken to reduce danger of warping. The table is manufactured by tne J. K. Alexander Mfg. Company, Grand Rapids, Mich.

The Shirk Refrigerator.

In the refrigerators which are being put on the market by the Shirk Refrigerator Company of Grand Rapids, Mich., the arrangement of parts is such as to interest a large class among our readers, more especially those who contemplate building and equipping homes of their own. In this refrigerator the air first comes in contact with the ice and is cooled. From the ice it falls through a cold air flue to the provision chamber, through which it rises and enters the flue at the opposite end, carrying away all odors from the provisions. It is particularly pointed out that in this system all conflicting currents of air are avoided and pure cold dry air is furnished to the provision chamber. All danger of condensation under the ice chamber or dripping from the ice rack is avoided by having no opening in the center. The system of insulation is the result of many years of experimenting and experience, which has taught the company that cork is the best non-conductor. Three linings of charcoal sheathing are used, with both inner and outer walls made of 1-inch lumber, the space between the walls being thoroughly filled with granulated cork. The manufacturers call particular attention to their nickel lining. Nickeloid is a new metal, being described as a combination of nickel and zinc amalgamated by passing through hot rolls. The company state that it will not peel off or discolor by use and is unaffected by grease or acids. Furthermore, as it can be cleaned with soap and water, it can be kept in the condition of a china dish.

Electric Fan With Direct Connected Inclosed Motor.

A new type of electric fan with direct connected inclosed motor has been constructed by the B. F. Sturtevant Company of Boston and is illustrated in Fig. 8 of the engravings. The field ring of the motor, which is of wrought iron, is attached to the side of the fan, and forms a part of the inclosing frame of the motor. Within this frame is placed a cradle or double yoke, carrying two ring oiling bearings, which are self adjusting, and necessarily are kept in constant alignment. This cradle is held in place by four bolts, as in-

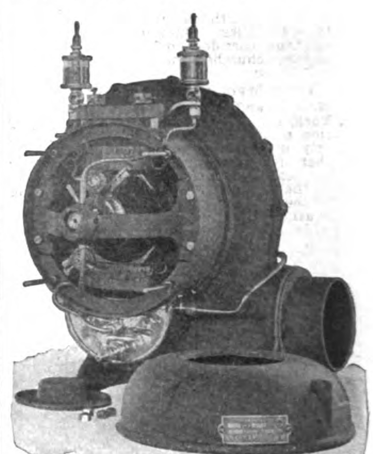


Fig. 8.—Electric Fan and Inclosed Motor.

dicated in the side view of the fan. The armature shaft is of large diameter, carrying the fan wheel upon its extended side, and projecting through the casing of the fan itself. The armature is of the drum type, and the commutator constructed of drop forged segments. Carbon brushes are used, with self feeding and adjustable holders of the socket type. A cast iron hood or casing with removable center is employed to inclose the entire motor, which is thus kept free from dust. A fan of this type, being small in size, and therefore readily portable, is serviceable for all purposes where a movement of air is desired, while the inclosed feature of the motor makes it possible to operate it in a dusty atmosphere. Sight feed oil cups supply oil to the bearings, and the overflow therefrom passes to a tank suspended beneath the frame, whence it may be removed at intervals.

TRADE NOTES.

THE JOSEPH DIXON CRUCIBLE COMPANY, Jersey City, N. J., are calling the attention of the trade to the special merits of their silica-graphite paint as a durable protective paint for smokestacks. It is a severe test for paint when a metal surface is exposed to the combined influences of both great degrees of heat and climatic conditions, but this company cite several striking examples of endurance and durability, showing that they have succeeded remarkably well in meeting the requirements necessary.

THE ARCADE MFG. COMPANY of Freeport, Ill., direct attention elsewhere in this issue to the Freeport parlor door hanger, an illustration of which appeared in these columns last month. The hangers are independently adjusted and are attached without cutting the door. The manufacturers point out that the hanger is made entirely of steel and malleable iron and will not break. Those interested in goods of this character can secure a copy of the company's catalogue, together with prices, on application.

A MATERIAL which is referred to as being especially adapted for floors in places where there is a great deal of wear is being brought to the attention of architects under the name of Asbestolith, the sole rights for the manufacture and sale of which in the United States and Canada are vested in the Asbestolith Company of 717 Bennett Building, New York City. The material is said to consist of a solid mass, is fire proof and water proof, and can be laid on any solid base, such as cement, stone, wood, iron, &c., as well as on partially worn floors. The claim is made that it is more durable than tiling, is a good non-conductor of sound, will not crack, warp or bend, and is easy to keep clean. It can be furnished in various colors and designs for wainscoting, bases, walls, &c. The company state that it will be found particularly desirable for floors in factories, laundries, bathrooms, kitchens, corridors, office buildings, school houses, churches, hospitals, restaurants, stores, &c.

PIKE MFG. COMPANY, Pike Station, N. H., and 151 Chambers street, New York, have prepared for the Paris Exposition a very handsome exhibit which cleverly utilizes the goods manufactured by them for decorative as well as constructive features. Among the unique features of the exhibit will be the largest oil stone in the world, consisting of a solid piece of Washita stone, 4 feet long by 8 inches wide and 6 inches thick, weighing 205 pounds, and valued at $250.

FREDERICK REISSMANN of West Point, N. Y., has recently made some improvements in his Perfection Rule gauge as regards the manner of indicating degrees. The gauge as now made has upon the index plate lines indicating angles ranging from 5 up to 45 degrees, while other lines marked by reference letters show a right angle, pentagon, hexagon and octagon, with another indicating the pitch for door or window sills. In order to obtain the desired angle it is only necessary to move the rule clamp so that the line on the clamp coincides with the line on the index plate, and then secure it firmly by the thumb screw underneath the plate. One end of the rule or straight edge is then secured in the movable clamp by the screw provided for the purpose and the tool is ready for work, until a change is necessary for some other miter or angle. An ordinary rule or straight edge used with the Perfection rule gauge will enable any one to cut his work to any required width, depth or thickness, and to obtain the miter for any desired angle, bevel, circle or square.

THE W. & E. F. FITCH COMPANY of New Haven, Conn., show in their advertising space this month an illustration of the Fitch sash lock, which is referred to by the makers as thoroughly "up to date." The proof of the pudding is in the eating, and the company suggest that the lock be proven by practically demonstrating its merits. A catalogue and a working model will be forwarded to any architect, carpenter or builder sufficiently interested to make application.

THE PIKE MFG. COMPANY of Pike Station, N. H., are distributing with their compliments a combined paper weight and knife sharpener, which in its way will be found both useful and ornamental. It consists of a small stone measuring 1½ inches in width by nearly 3 inches in length, to which is cemented a piece of beveled glass a trifle thicker than the stone, and showing, as one looks down upon it, the picture of a pike bearing in its mouth a whetstone. The printing above and below the picture appears in red and reads as follows: "Compliments of the Pike Mfg. Company of Pike Station, N. H. World's headquarters for scythe stones, oil stones, razor hones, &c. Send for catalogue." The company are also distributing a leaflet calling attention to the brands of stones which they are prepared to supply and pointing out which are best for the use of carpenters. Among other things the leaflet states that "the Pike family have been 70 years in the whetstone business and thoroughly understand it, so they know just what is wanted for the different tools, just where to get it and how to make it into the right shapes." The company announce that a complete illustrated price book, giving full description of all kinds of scythe stones, will be sent to any address on application.

THE Globe ventilator and Globe ventilated ridging form the subject matter of a 44-page publication issued by the Globe Ventilator Company of Troy, N. Y. Several pages are devoted to a description of their well-known patent ventilator, and a number of illustrations are given of important public buildings, factories, business buildings, and private houses where Globe ventilators and ridging are in use. These ventilators are made in brass, copper and galvanized iron, and are fitted with glass tops, or with square bases if required. They are manufactured in sizes from 2 to 84 inches in diameter. A small model of the Globe ventilator, 2 inches in diameter and 4½ inches high, issued by the company, shows in a practical way the principle on which the device is based.

THE ILLINOIS SUPPLY & CONSTRUCTION COMPANY, St. Louis, Mo., are directing the attention of architects and builders to the Grath steel wall ties, which are referred to as being adapted for bonding walls of every description. The claim is made by the manufacturers that it is the only tie where the center as well as the ends prevent pulling out, and that it is the only tie with a diagonal center. It is made in all sizes and is claimed to be especially well adapted for the purpose.

AULD & CONGER of Cleveland, Ohio, in another part of this issue call the attention of architects and builders to the fact that they manufacture genuine No. 1 Bangor union and ribbon slate, mammoth vein, Poultney, sea green, purple and variegated. The company can also furnish lightning slate dressers and tools, nails and felt. Those of our readers who desire them can secure prices on application to the company.

THE thirteenth edition of the prospectus of the Workingmen's College at Melbourne, Australia, contains a great deal of very interesting matter relating to the courses of study pursued in that institution. These include, among others, architectural drawing and building construction, color and sign painting, modeling, wood carving, carpentry and joinery, plumbing and gas fitting, as well as many other branches of industrial education.

THE WHEELING CORRUGATING COMPANY of Wheeling, W. Va., have leased the spacious four-floor building at 47 Cliff street, New York, for the accommodation of their Eastern branch. H. C. Mechling, the company's Eastern manager, will move his office there from the Fulton Bank Building, and the company's warehouse, at present located at 292 Pearl street, will also be removed to the new location, where a heavy stock of the company's products, including black and galvanized sheets, tin and terne plates, sheet metal roofing and siding, metal ceilings, &c., will be carried for the supply of the trade throughout the Eastern States.

THE ILLINOIS ROOFING & SUPPLY COMPANY, 73-83 North Ashland avenue, Chicago, Ill., have issued an eight-page circular directing attention to some of their specialties. The illustrations show Imperial pressed steel brick and rock face brick, rock face stone and siding in different styles, corner trimmings formed ready to apply, pilasters, continuous rock face stone, &c. At the close are small illustrations of window and door caps. In connection with the illustrations sizes and prices are given.

THE AMERICAN MACHINERY COMPANY of Grand Rapids, Mich., present in their advertising card this month an illustration of the Oliver wood trimmer, for which many claims are made. The device is referred to as being especially valuable on interior finish, cabinet work, stair work, newel posts, fancy doors, over mantels, &c., as well as for trimming and mitering lap siding. We present in our Novelties Department this month an illustrated description of the Oliver wood trimmer as recently modified.

THE STOVER MFG. COMPANY of Freeport, Ill., have just issued from the press a 40-page catalogue, which will be found of special interest to architects, contractors and builders. It relates for the most part to their New Idea double acting spring hinge, which is made in a great variety of styles and sizes, adapted to meet varying requirements. The manufacturers point out that in order to be a good one a double acting hinge should prevent the door from sagging and should also be capable of such perfect adjustment of the spring as will close the door quickly and gently, yet not force it past the closing point in a series of violent oscillations. It should possess neatness when the door is opened or closed, and should admit of the door fitting closely against the jamb, while at the same time it should hold the door in perfect alignment when closed. Another point brought out by the manufacturers is that the device should also be of easy and convenient application in hanging the door. These features, it is claimed, are to be found in the New Idea. The catalogue before us describes the construction and operation of this hinge, numerous illustrations being presented, showing some of the styles of finish in which it is offered, as well as the sizes in which it is made. There are also tables giving dimensions of the hinge and of blanks, together with directions for applying the hinge. Several pages are devoted to testimonial letters from some of those who have used the hinge, and there are pictures of buildings in connection with which it has been employed. Reference is also made to the Ideal hinge, the Ideal window sash lock and Ideal sash pulley.

WE are indebted to W. J. Burton & Co., Detroit, Mich., for a little vest pocket memorandum book, giving a good supply of blank pages and incidentally calling attention to some of the goods made by the company. The front cover advertises W. J. Burton & Co. as being quick shippers, which is a very admirable characteristic. The goods that they can ship quickly are enumerated on one of the back pages, and include roofing of all kinds, tin plate, paints and a variety of sheet metal articles of interest to roofers and others.

THE BROHEAD DOOR HOLDER is the subject of an announcement presented elsewhere in this issue by the Brohead Company, Hutchinson street and Columbia avenue, Philadelphia, Pa. The device is operated by the foot and is claimed to be "the only perfect door holder made." It is offered in three sizes, and the company state that over three millions are in use in the United States.

WE have received from Samuel E. Rabbitt of 918 F street, N. W., Washington, D. C., a copy of an interesting pamphlet which he has issued, illustrating and describing his patent partition, which is referred to as being rat proof, vermin proof, as well as fire proof. The construction is such as to present a solid partition of wood and plastic material of a thickness which is claimed to result in a saving of 4 inches in every partition. Special reference is made to the strength and rigidity secured, and when required to carry the weight of floors above a patent girder can be used at very slight additional cost. For apartment houses where there are many kitchens, bathrooms and closets the advantages of the Rabbitt partition over the 6-inch hollow stud partition are pointed out in the little pamphlet in question. In presenting this partition to architects, builders and contractors, the claims are made that the cement does not corrode nor rust the wood lath, as in the case of iron lath; its weight is much less per foot than other partitions; the cost to build is much less, for it is simple in construction and can be built by any carpenter or plasterer. A large portion of the pamphlet is taken up with testimonial letters and half-tone engravings of buildings in connection with which the Rabbitt partition has been employed.

THE catalogue of the Syracuse University for the collegiate year 1899-1900 presents some very interesting information relative to the various courses of study afforded by this institution. The course in architecture is so arranged as to give to the student a thorough preparation for his life work, and, while taught as a fine art, due attention is given to the study of problems of construction that must be solved before a building can be erected. There are two courses, one being of four years, and a special course of two years, the latter being arranged to meet the requirements of those draftsmen of two or more years' experience who are desirous of pursuing a course in architecture but who cannot take the time to pursue the four years' course.

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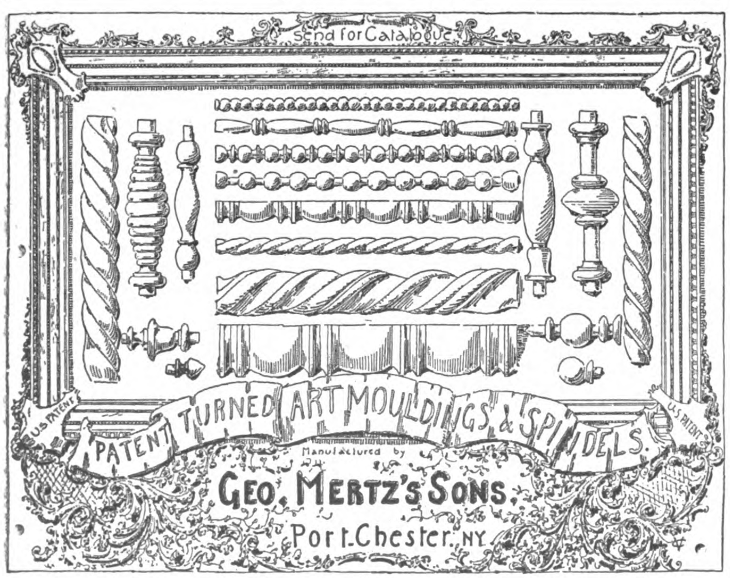

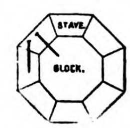

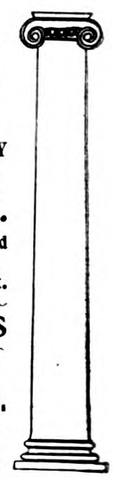

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JUNE, 1900.

Trade School in Cleveland.

At a meeting of the Builders' Exchange of Cleveland, Ohio, held early in May a project was started for the establishment of a trade school in that city, and a committee was appointed to present the matter to the attention of manufacturers and others who are endeavoring to promote the industrial development of Cleveland. It is hoped that the suggestion will be acted upon. The necessity for the more thorough and systematic training of American boys in the trades is impressing itself with increasing force upon the business men of this country. The matter of technical and trade instruction has for some years past been carefully studied and acted upon in Germany, Great Britain and other foreign countries, and, as President Hadley of Yale forcefully pointed out in an address at the National Export Exposition last fall, if the United States proposes to maintain her leading place among the manufacturing nations of the world, the youth of the country should be given the best facilities obtainable for the acquirement of the necessary technical knowledge and mechanical skill which shall enable them to hold their own with their foreign competitors. The marked success which has attended the work of the New York Trade School during its existence of 18 years should stimulate the establishment of similar institutions in every large center of population throughout the country. It is gratifying to learn that steps are being taken for the starting of a trade school in Boston, also. But the business men of the country at large seem surprisingly slow to appreciate the advantages of these schools. The benefits of an institution that will provide him, at a moderate cost, with sound instruction in the theory and practice of a trade should be within reasonable reach of every American boy.

The Paris Exposition.

Late reports from Paris indicate that the great exposition is rapidly getting into shape and orderliness. As compared with previous large undertakings of the kind, the Paris Exposition, from all accounts, presents a degree of forwardness and comparative completion unusual at the end of the first month, reflecting much credit upon the foresight and energy of the management. The keen interest taken in the enterprise by the various nations of the world is demonstrated by the extent and representative character of the exhibits, making the exposition, in many respects, the most extraordinary undertaking of its kind yet accomplished. Never before has there been so great a variety in the display of the world's science, industry and art. Moreover, these products seem to be arranged with unequaled skill and intelligence, and artistic adaptation of means to ends. The fact that, next to France itself, the United States takes about the foremost place in respect of the extent, diversity and value of her exhibits, clothes the exposition with a special interest to Americans. It provides our manufacturers with an unrivaled opportunity for pushing their wares in foreign markets, and, although the absence from the list of exhibitors of a few of our most important manufacturing concerns is to be regretted, the thoroughly worthy and representative character of the United States exhibits shows that the opportunity has been well utilized.

New York's Fire Waste.

In the annual report of the Fire Marshal of New York City on fire losses in the boroughs of Manhattan and the Bronx during the year 1899, special attention is called to the dangerous risks incurred through the use of swinging gas jets and of gas and lamp brackets placed in too close proximity to curtains or other draperies. To these causes, together with an unusual number of suspicious fires, the Fire Marshal attributes largely the serious increase in the fire losses of last year as compared with 1898. No less than 5393 fires, or an average of nearly 15 a day, were brought to the attention of the New York Fire Department in 1899, as against 4239 in the previous 12 months. This increase in the actual number of fires was large enough to be serious, but the increase in the value of property destroyed was still more deplorable, rising from $4,155,191 in 1898 to $7,458,840 in 1899. It seems strange that with all the modern improvements that have been introduced in fire fighting methods and appliances the fire waste in a city like New York, provided, as it is, with one of the most efficient fire departments in the world, should show such a tremendous increase. As a partial check to this waste, the Fire Marshal recommends legislation for the prohibition of swinging gas jets and the rigid inspection of gas and lamps, so as to prevent their location near inflammable hangings. He also advises that more care should be exercised by insurance companies in the acceptance of risks where the slightest suspicion of moral hazard exists. The number of suspicious cases has been increasing rapidly of late years, and it is intimated that the laxity of insurance companies, who in their eagerness for business accept risks too readily, is responsible for a serious growth of incendiarism. Whether this be a fact or no, the situation in New York City is evidently one that calls for earnest consideration by both the municipal authorities and the insurance corporations.

Forest Fires.

The waste incurred annually in this country through forest fires, which have been so remarkably prevalent of late, is assuming alarming proportions. According to official data compiled for a long series of years past, the loss from this cause in the United States is estimated at not less than $20,000,000 annually, and it probably runs considerably above that sum, as figures relating to the Pacific Coast States are only partially complete. Under the direction of the Forestry Division of the Department of Agriculture, a thorough investigation of the causes, effects and means of prevention of forest fires in the West is to be carried out this summer in Washington, Oregon, California, Arizona, New Mexico, Utah, Colorado, Wyoming, Montana, Idaho and South Dakota, with the view of discovering means to check the evil, which is making such serious inroads into the timber resources of the country. Accounts of over 5500 disastrous fires have been obtained in seventeen other States already examined. These records have been taken chiefly from newspapers, and where it has been possible to compare them with the figures of practical lumbermen, it has been found that the tendency of the press has been to underestimate the damage. Michigan, Minnesota and Wisconsin have been the severest sufferers from forest burnings, so far as at present ascertained, but when the records of the great lumber regions of the Northwest are obtained it will doubtless be found that the losses in those States reach startling proportions.

Dankmar Adler.

Since our last issue went to press the architectural profession has lost one of its well-known Western members, Dankmar Adler, who died of apoplexy in Chicago, April 16. Born at Langsfeld in Saxe-Weimar, July 3, 1844, he came to this country when ten years of age, his parents settling in Detroit. In 1859 he went to Chicago, where he passed the greater portion of his life. Mr. Adler began his professional career in the office of E. W. Smith, in Detroit, and after the Civil War entered the office of O. S. Kinney in Chicago. In 1871 he formed a partnership with Edward Burling, the firm designing many of the buildings erected immediately after the great Chicago fire. In 1879 Mr. Adler began practising alone, and this he continued until 1882, when he formed a partnership with L. H. Sullivan, under the firm name of Adler & Sullivan. It was during the existence of this firm, which ended in 1895, that Mr. Adler's most important work was done. He was a Fellow of the American Institute of Architects, a member of the Illinois Chapter, A. I. A., and of the Chicago Architects' Business Association. He was at various times president of the Western Association of Architects, of the Illinois Board of Examiners of Architects, secretary of the American Institute of Architects, and he was a member of the Board of Architects of the World's Fair.

What is a House?

In a recent case in England the plaintiff and defendant were owners of adjoining plots of land forming part of a building estate, and these plots were each subject to a covenant that not more than one house was to be built on each plot. The defendant wished to build a block of flats upon each of his plots, but the plaintiff complained that this was a breach of the covenant, and sought for an injunction to restrain the defendant from erecting these buildings. The motion was refused by the Judge, who was of opinion that each block of flats was one house only, and not a series of houses as was contended, and the plaintiff appealed, but the Court dismissed it; the Master of the Rolls confirming the Judge's opinion. In his opinion, the word "house" in the covenant did not refer to the mode in which the building was to be subdivided and let, but to the aggregate of the rooms making up the building. When the word was applied to a covenant of this description it did not refer to the interior portions of the building, but to the whole thing. One of the London papers says that the decision is important as affecting all future restrictive covenants, as if a block of flats is intended to be excluded it ought to be so described.

A Very Old Church.

The Augustus Lutheran Church, at La Trappe, Montgomery County, Pa., was built in 1743, and is probably the oldest Lutheran church in America, and stands to-day as it was built, no alterations ever having been made. The church was founded by Henry Melchior Muhlemberg, and was built by the farmers and their wives, the latter forging nails, cutting shingles, &c. The walls of the interior are whitewashed, and the pews are made of plain pine board, unpainted and well seasoned by age. In the loft are the remains of the first pipe organ ever imported into this country; the pipes and keyboard have long since been carried away by relic hunters, and nothing remains but the frame.

Among the many illustrious Germans buried in the old burying ground surrounding the church are Gen. Peter Muhlemburg, one time Speaker of the House of Representatives, and Governor Shunk, twice Governor of Pennsylvania. The church was used as a hospital by the Colonials during the Revolution, and later as a stable by the British. In 1854 a more modern structure was erected alongside of the old building, and services are now held in the former. An annual service is still held in the old building.

Architectural Training.

Architecture can to-day fairly be classed as one of the learned professions. In conversation a short time since with one of our most successful architects, says a writer in the *Brickbuilder*, the fact was developed that his training previous to starting in business for himself had been limited to less than a year in the office of an architect whose work certainly does not rank among the best, followed by a single trip to Europe. While this, perforce, answered the purposes of a man of undoubted genius, it is surely not enough, if we may judge by the average practitioner, who feels called upon to devote four years or more to technical training in the schools of this country, several years of hard study and travel abroad, and in addition four or five years in an office. The duties and responsibilities of the profession are increasing so fast and are so much in excess of anything that was thought of 30 years ago that, although there are some most notable exceptions, the qualifications of a modern architect are acquired only after long years of training. Professor Ware used to be quoted as saying that an architect did not become of age until he was at least 30, implying that his architectural childhood extended over a long period of probationary years. We can see nothing but hope in a situation of this kind, for, realizing how vastly extended the scope of the architect's possibilities becomes by reason of a thorough preliminary training, taking into consideration also the fact that no one feels we have yet anywhere near approached the meridian of our architectural development, it is a thoroughly good sign that our architects are not only called upon but are willing to devote long years to careful preparation.

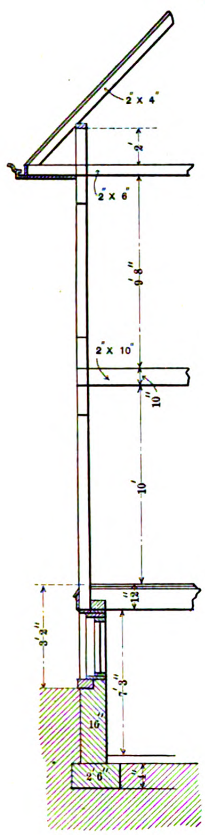
Norman Buildings.

The Norman architects displayed their liberality and skill in all the buildings which they erected. Chapels and churches, small houses and palaces, exhibited doorways, windows and sculptures designed and wrought with the utmost care and the most finished taste. Strength was an indispensable requisite—strength often to superfluity—but in some cases it saved labor (for our ancestors were sometimes economists), and it insured for many ages the safety of their buildings. Material was of little account, and labor perhaps of not much more, but huge beams were often applied where half the quantity would have sufficed. Thus the labor of sawing was avoided, and the scantlings of masonry were not more nicely regulated. It must be admitted that the ancients had the advantage of the moderns in the uniform choice of good materials. They seem to have used only one of the several kinds, and that the best, and when to this they applied sound workmanship and adopted a method or style, applying with it so much taste and judgment that the designation of their buildings cannot be mistaken, we have reason to admire their abilities as architects, and assuredly their works are worthy of our praise and imitation.

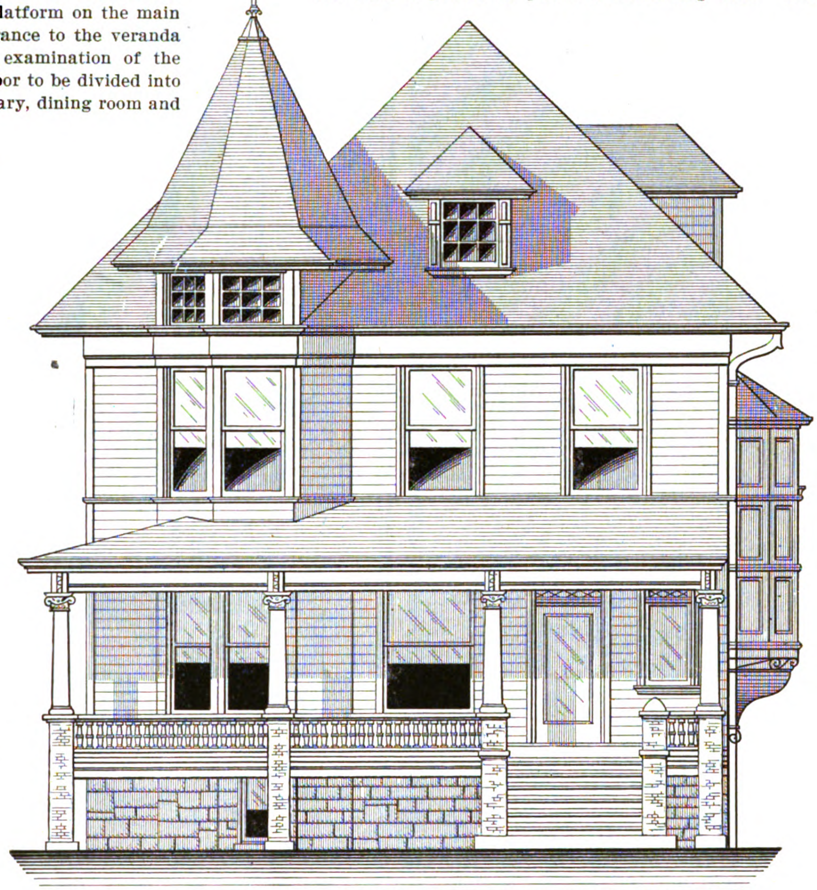
The second annual convention of the Architectural League of America will be held at the club rooms of the Chicago Architectural Club Art Institute, Chicago, Ill., June 7, 8 and 9.

HOUSE IN A CHICAGO SUBURB.

THIS month we present for the consideration of our readers illustrations of a two story and attic frame residence, located in Rogers Park, one of the many attractive suburbs of which the city of Chicago can boast. The half-tone supplemental plate which accompanies the paper, shows the appearance of the finished structure, while the floor plans on a following page indicate the arrangement of rooms. Interesting features of the exterior treatment are the tower at the corner, the broad veranda, extending across the entire front and around a portion of the side, the projecting window at the right which lights the platform on the main stairs, and the side entrance to the veranda and dining room. An examination of the plans shows the main floor to be divided into parlor, sitting room, library, dining room and



Section.



Front Elevation.—Scale, 1/8 Inch to the Foot.

House in a Chicago Suburb — W. L Klewer, Architect, Chicago, Ill.

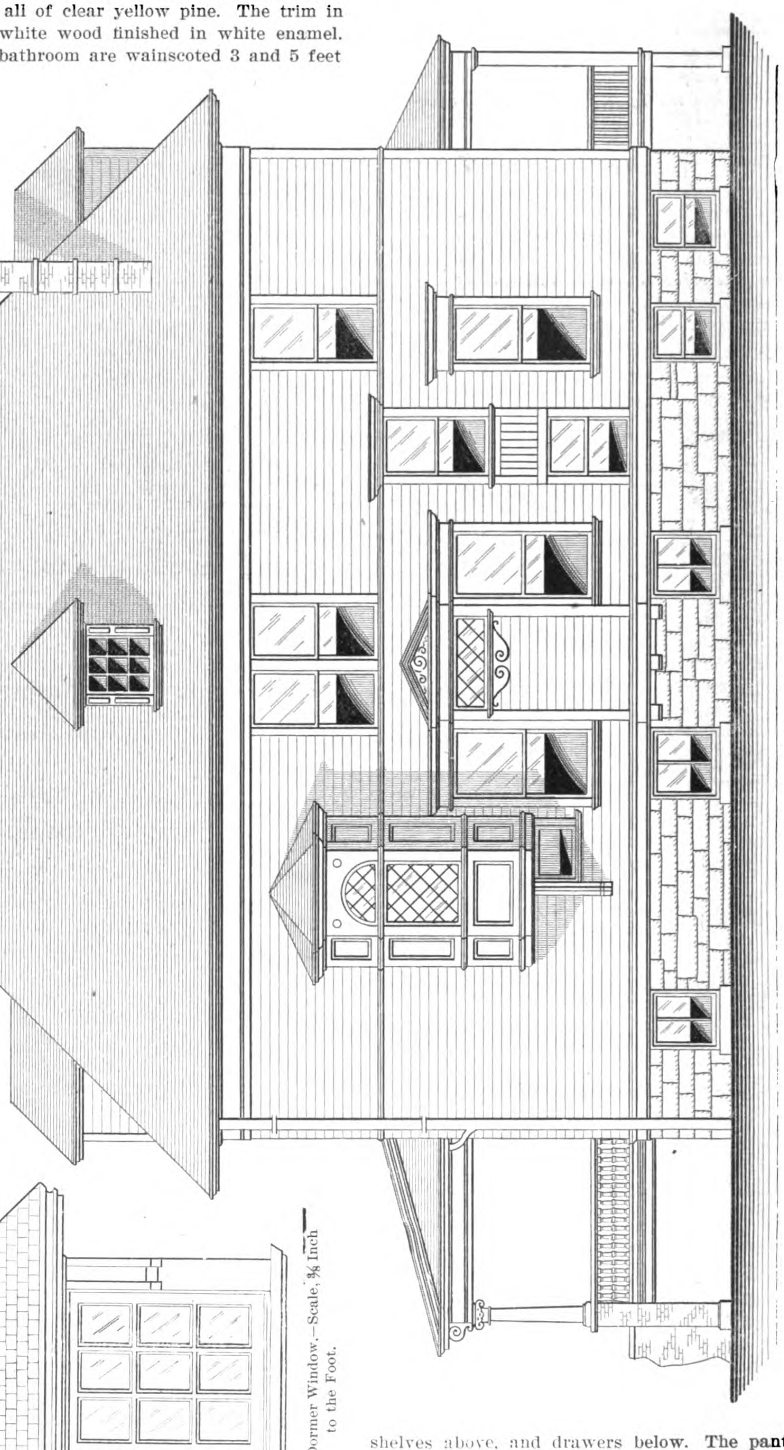
kitchen, with commodious pantry, china case, &c.; while on the second floor are five sleeping rooms, a sewing room and bathroom.

According to the specifications of the architect the foundation of the building is constructed of rubble stone, hammer dressed and pointed with Portland cement, the cellar having a cement floor. The girder in the basement is 8 x 10 inches, supported by square posts resting on rubble stone footings. The first and second story joist are 2 x 10 inches, the attic joist 2 x 6 inches, and the rafters 2 x 4 inches, all placed 16 inches on centers, while the collar beams are 2 x 4 inches. The rafters run down to meet the attic joist on the outside face, and rest on the 2 x 6 plate spiked to the attic joist, as indicated on the section. All outside studs are 2 x 4 inches, spaced 16 inches on centers. The inside studs are 2 x 4 inches, and have 2 x 4 inch top and bottom plates. The entire exterior of the house is sheathed with matched and dressed fencing flooring, closely laid. On top of this is a layer of No. 2 felt, the whole being covered with 4-inch clapboards, laid with 1-inch lap. The roofs are covered with dressed boards 6 inches wide, so placed as to leave 1-inch open joints, and these in turn are covered with shingles, laid not more than 4 inches to the weather. The shingles were stained before being laid.

The entire walls and ceilings of all the rooms of the first and second stories have two coats of plaster, the first being a brown mortar coat well floated down, and the other a plaster of paris hard finishing coat. The walls and ceiling of the laundry are also plastered two coats, and the basement ceiling one coat, also the basement side of the laundry partition.

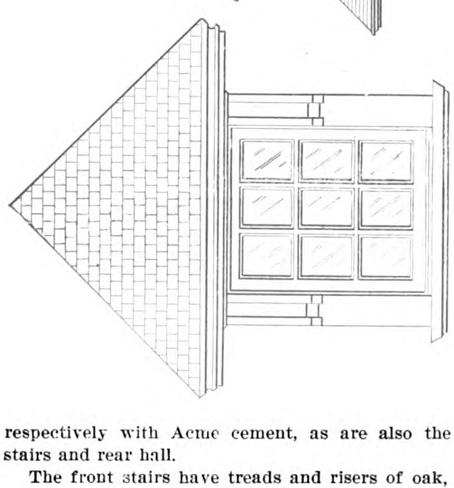
All under floors in the first and second stories are of matched and dressed fencing flooring, while the finishing floor of the parlor, sitting room, dining room, library and reception hall is of 2¼-inch quarter sawed red oak. The kitchen, rear passage, second story hall, toilet and bathroom have 2¼-inch white maple flooring, closely laid and wedged and blind nailed. The floors of all other rooms in the first and second stories are of 2¼-inch Georgia pine, laid the same as the maple floor and scraped for oiling. The second story floor is deadened with one layer of Eureka deafening felt. The arch between the parlor and sitting room has 4¼-inch square molded oak columns with ornamental carved capitals and carved molded base, with perforated side grills.

The door and window trim for the reception room, parlor, sitting room, library and dining room is 4½-inch red oak, with 8-inch architrave heads, and molded cornice, all of quarter sawed red oak. The balance of the finish on these floors is 4½-inch molded trim with 6-inch architrave heads, all of clear yellow pine. The trim in the bathroom is white wood finished in white enamel. The kitchen and bathroom are wainscoted 3 and 5 feet



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

House in a Chicago Suburb.

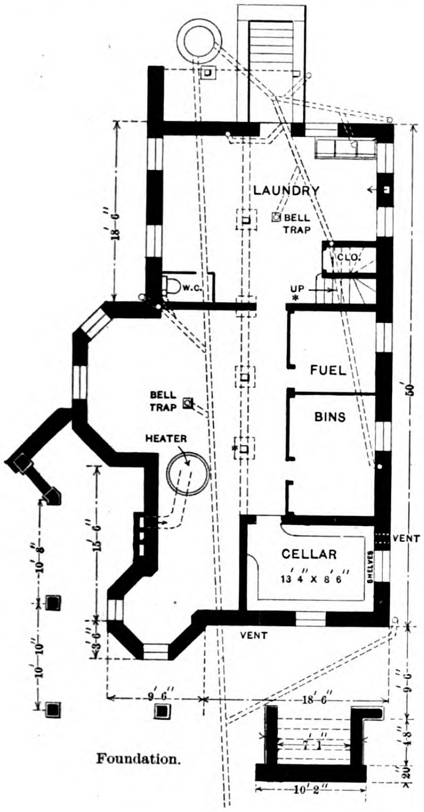


Elevation of Dormer Window.—Scale, ⅜ Inch to the Foot.

respectively with Acme cement, as are also the back stairs and rear hall.

The front stairs have treads and risers of oak, while the rail, newels and balusters are of red oak. The china closet has a cupboard with sliding doors and movable shelves above, and drawers below. The pantry has a nest of drawers with five shelves above. The sideboard in the dining room has plate glass doors above, while below are two turned columns with carved caps and beveled mirror on shelf wall board, with drawers below.

The plumbing is of the modern type, with 40-gallon boiler in the kitchen. The tub of the bathroom is of white enameled iron with combination cocks, plug and chain. The wash bowls are 14 x 17 inches, oval in shape, marbleized and fastened with brass clamps to pink Tennessee marble tops and having Tennessee marble back pieces 12 inches high. The bathroom is fitted with Wall-



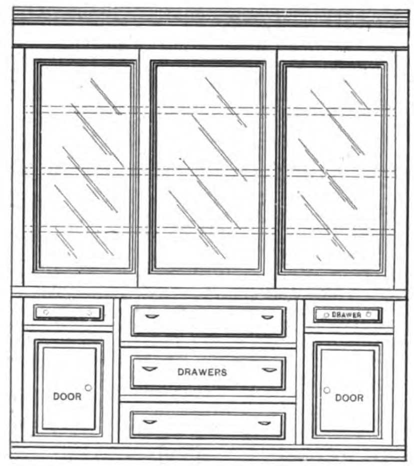
Foundation.

cott & Webster's "Mona" closet and copper lined siphon tank.

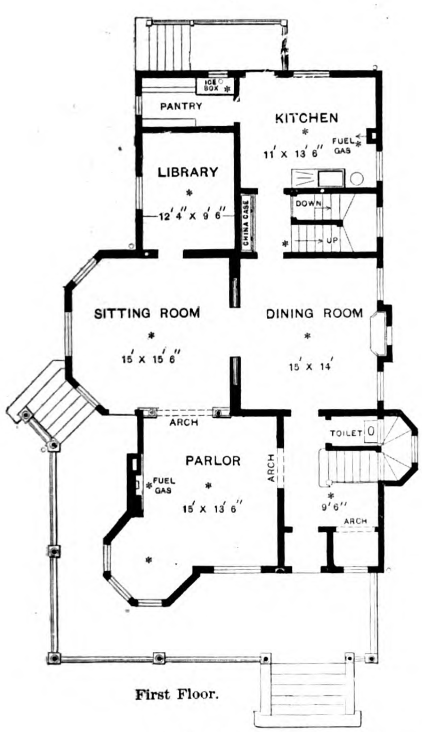
The colors of the house are a deep bronze green body with corner boards, cornices, frieze boards, columns, brackets, &c., of pure white. The basement has rock foundation with black joints, and the front veranda piers below columns, as well as the curb of the front and side steps, are of light buff pressed brick. The roof is a moss green.

The house here shown is pleasantly located on North Hermitage avenue, in Rogers Park, and was erected for Nicholas Wietor, in accordance with drawings prepared by William L. Klewer, architect, of 1506 Schiller Building, Chicago, Ill.

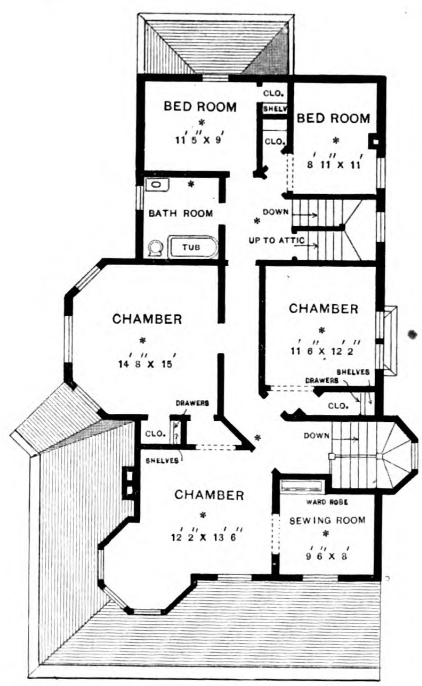
Work will soon begin on a new 12-story fire proof office building, which will be erected at 51 Maiden Lane, this city, at an estimated cost of $400,000, from plans filed with the Department of Buildings by Hill & Turner. The structure will cover a plot 39.2 x 133.2 feet, and will have a front of brick and limestone with marble trimmings.



Elevation of China Case between Kitchen and Dining Room.—Scale ⅜ Inch to the Foot.



First Floor.



Second Floor.

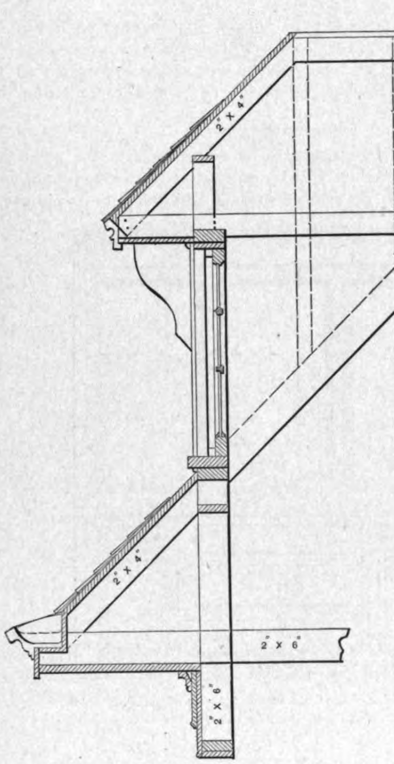
House in a Chicago Suburb.—Floor Plans.—Scale, 1-16 Inch to the Foot.

Blue Printing.

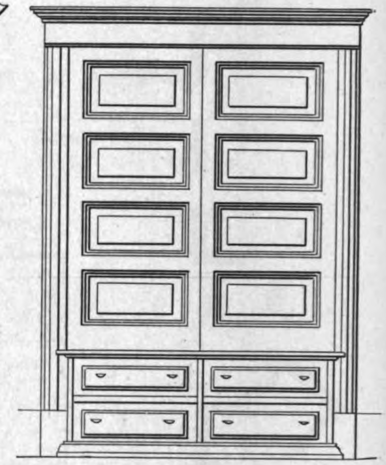
The subject of making blue prints has evidently aroused a great deal of interest on the part of our readers, and while much has been written about it, the numerous suggestions which are being offered by various correspondents indicate that it has by no means been exhausted. In this connection the following by A. B. Babbitt may not be out of place:

Blue printing is a process by which a number of copies may be made from one tracing, and is accomplished by exposing to the sunlight the tracing placed over a sensitive paper which possesses the property of changing color by exposure to the light. The sensitive paper is a tough, perfectly white paper coated on one side with a chemical solution.

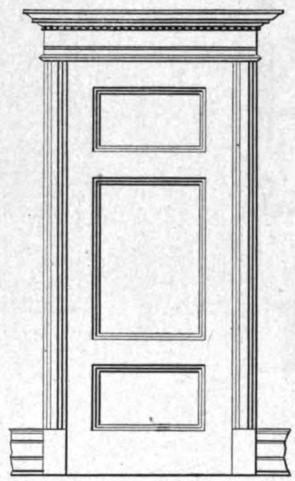
If this paper is placed in water before exposing to the sunlight the chemicals will wash off, leaving the pure



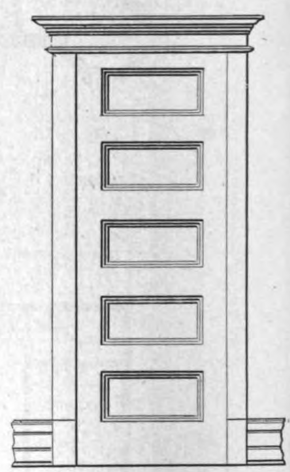
Detail of Dormer Window.—Scale, ⅜ Inch to the Foot.



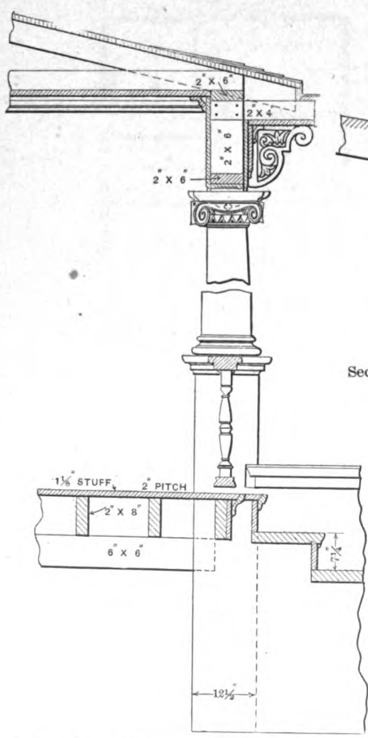
Elevation of Wardrobe. Scale, ¾ Inch to the Foot.



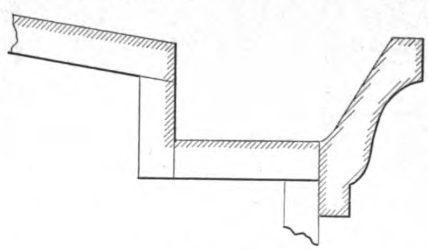
Elevation of Door and Trim in Parlor, Sitting and Dining Rooms.—Scale, ⅜ Inch to the Foot.



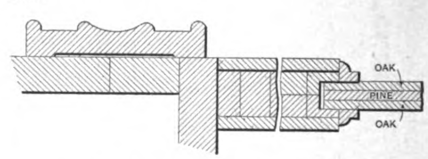
Door and Trim in Bedrooms, Kitchen, &c.—Scale, ⅜ Inch to the Foot.



Section through Front Porch, Showing Method of Construction.—Scale, ¾ Inch to the Foot.



Section through Porch Gutter.—Scale, 3 Inches to the Foot.



Section through Stile of Door and Trim.—Scale, 3 Inches to the Foot.

Miscellaneous Constructive Details of House in a Chicago Suburb.

RESIDENCE OF MR. NICHOLAS WIETOR, IN ROGERS PARK, CHICAGO, ILL.

W. L. KLEWER, ARCHITECT,

SUPPLEMENT CARPENTRY AND BUILDING, JUNE, 1900.

white paper, but after being placed in the sunlight a certain length of time and then immersed in water the sensitive side of the paper will turn blue.

With these two facts being known let us consider the effect produced by placing a drawing over the sensitive paper when exposing to the sun. We can readily see that the sun cannot penetrate the lines of the drawing, hence that part of the sensitive paper directly beneath the lines will not be affected by the sun's rays, while the rest of the paper having simply the paper or cloth on which the drawing is made between it and the sun, will be acted upon by the light.

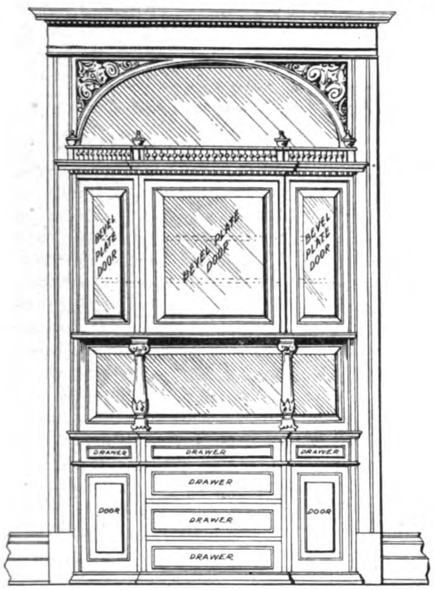
Upon placing in water, that portion of the chemicals unaffected will wash off, leaving the white of the paper, while that part which has been touched by the light rays will be turned blue. This will give an exact copy of the drawing in white lines on a blue field.

Blue print paper can be purchased from the manufacturer in rolls varying from 10 to 50 yards in length, and from 24 to 48 inches in width. It is also made in three thicknesses—namely, thin, medium and heavy.

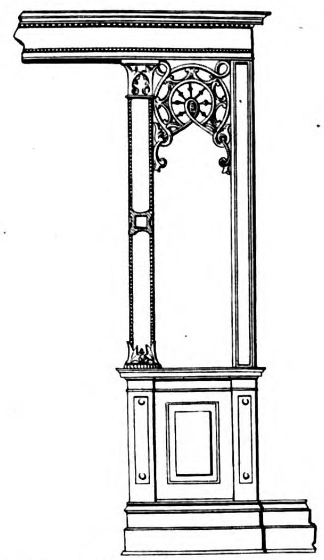
length of exposure is dependent upon three conditions: First, the sensitiveness of the blue print paper, whether quick or slow printing; second, the thickness of the paper upon which the drawing is made—the sun will penetrate thin tracing cloth or paper much quicker than bond paper; prints cannot be taken through buff paper; third, the intensity of the sun's rays—the paper would have to be exposed longer at 4 p.m. than at midday, and longer during winter months than in the summer. Practice and observation alone will give the experience necessary to take good prints.

The sun's rays should be as nearly perpendicular to the plane of the paper as possible, so that there will be no danger of the light shining underneath the lines of the drawing, thus making the lines of the print indistinct. For the same reason the sensitive side of the plue print paper should be held in close contact with the tracing, and to accomplish this a device known as a printing frame is used, which consists essentially of a frame encircling a piece of glass and a removable back, held in place by springs or some similar device.

The tracing is placed with the ink side next to the



Elevation of Sideboard in Dining Room.



Detail of Ornamental Arch Between Parlor and Sitting Room.

House in a Chicago Suburb.—Details.—Scale, ⅜ Inch to the Foot.

Paper of different degrees of sensitiveness can also be obtained, known as "quick printing" and "slow printing."

The quick printing paper, because of its great sensitiveness, is a convenience in cloudy weather, but is correspondingly difficult to handle on bright days. It will spoil much quicker than slow printing paper, especially in summer weather.

It is cheaper and better to buy the paper from the manufacturer than to prepare it for oneself. If, however, it is desirable to prepare it, chemicals in the following proportions may be used:

One ounce red prussiate potash in 5 ounces water.
One ounce citrate iron and ammonia in 5 ounces water.

These solutions should be kept in opaque bottles in a dark place and mixed just before using. Apply with a sponge or soft wide brush, and dry in a dark place. All these operations should take place in a dark room. The sensitive paper when dry should be kept in a dark, dry, cool place—dark, because affected by light; dry, because affected by dampness; cool, because affected, especially in summer months, by the humidity of the atmosphere.

From one to six minutes' exposure in a bright sun should give a good copy. Too short an exposure will produce a pale blue background; too long an exposure, a gray background with a very indistinct blue line. The

glass and the blue print paper with the sensitive side next to the tracing. The back of the frame is next adjusted and the springs locked in their proper place. These springs accomplish the double purpose of holding the back in place and also of clamping the paper and tracing between back and glass, thus insuring close contact.

After exposing the proper length of time the blue print paper should be washed thoroughly in clear water —running water preferred—and then hung up to dry. The quick printing paper will require a much longer washing than the ordinary paper. From one-half to three-quarters of an hour is none too long to wash a print.

Wood Working in the Philippines.

A correspondent of one of the Boston papers, writing in relation to wood working operations in the Philippine Islands, says:

These islands are thickly grown with some of the finest and best hard woods in the market. Mahogany grows in very many places, and is so common and so cheap that the native carpenters use it in great logs for foundation work in the erection of heavy buildings. The flooring of all native houses is made from woods which, if in America, would be exceedingly valuable. So much of this hard wood is used in the erection of the better classes of native store and house structures that the buildings are of slow burning construction. That is, the overturning of a lamp or a moderately light fire will burn itself out before it will ignite the hard, iron like wood fiber. Black walnut is grown in large quantities all over the country, and is so plentiful and cheap that thousands of chests are made from it and shipped to other countries. These chests are of the ant-proof design, and the local carpenter trade has built up quite a name for the making and finishing of these strong little chests. Nearly every soldier buys one as soon as he arrives to seal up his woolen goods in a moth and ant-proof box. Ebony grows here, too, but there is no pine.

With all this quantity of valuable hard wood to handle, the processes of sawing the timber and putting it into shape for market are of the oldest and crudest sort. All logs are split by hand sawing, and two natives push the saw for a long time before they cut off a single board. Their saws are all old, and probably made 100 years ago. But the cheapness of labor for carpenters makes it possible to work the timber into buildings at a low cost. Carpenters' wages are about 25 cents per day in American money. There are no machines for planing the boards, so that as soon as a board is sawed from a log another set of native workmen go at it with planes, with which they manage to scrape a fairly smooth surface on the board after a quarter of a day's hard labor.

All woods for boxes, coffins, wheel tires, wagons, &c., must be cut out by hand, and every tool used bears the marks of great age. A chisel, a hammer, a saw, or whatever the tool may be, invariably shows indications of about 100 years' service. Yet with these ancient tools the workman manages to carve out wagon tires, ladders, steps, handles for brooms, turnings for house building work, &c. The turning tools they use are even more than 100 years old. There are from two to four shops in the average town, and in each of these the only turning device will consist of a hand wheel turned by a boy for driving the article to be turned out by means of a band running from a groove in the driving wheel to a little grooved wheel on the spindle of the article being turned.

ESTIMATING SHEET METAL WORK.

IN making estimates for sheet metal work, it is necessary that persons estimating should have a proper knowledge of the method of reading and measuring plans, and this can only be acquired by cornicemen after long, careful and close study and observation. The following hints, says a writer in the *Canadian Architect and Builder*, will, in some measure, supply what some may lack in these important qualifications: When the amount of sheet metal is determined that will be required to do a certain job of cornice work, the next question that presents itself is, how much time and labor will it take to do the work ? There are almost as many ways employed to arrive at the result sought for as there are ways of doing the work itself. Some guess at the time, comparing the work under consideration to that of a similar character and design done before. Knowing, of course, the amount of time that it has taken to do the preceding work, a nearly correct estimate can be made as to the time that may be required to do the work now in hand. The method as described is used in a good many shops with sometimes widely differing results as to the actual time required, sometimes being too low an estimate and quite often too high to be in any way near correct. The way that is most prevalent for sheet metal workers to bid on work is by lump figures; that is, the plans and specifications of certain work are submitted by the architect to the metal worker, and he gives a figure for whatever amount he is willing to do the job complete for, in a lump sum. It also sometimes occurs that a bid is asked for a cornice or other work by the running foot, or by the square foot for the work complete on the building. If the result has been obtained in a manner as shown by the "snap" rule, it is only necessary to divide the work on which the price is based into feet, and discover the price of this per foot, then multiply the number of feet of work to be done by the amount per foot cost of the work finished, which will give some idea of a correct estimate. This method, though well enough in the absence of a better one, is not to be commended, as it is a sort of haphazard way of arriving at a result that ought to be correct, but rarely is, as many a sheet metal worker has found to his cost.

Correct Method.

A reliable way to estimate is to figure upon the entire items of a cornice or other work separately, such as: 1, Work in the shop on the cornice; 2, transportation from shop to building when the work is to be put up; 3, cost of scaffolding; 4, the cost of putting the work on the building; 5, cost of materials, including tinned nails, solder and sheet metal. In some large establishments the following plan is used to determine the cost of almost any member of a complete cornice: We take, say, a bracket, or any member of a cornice, for that matter. The first step is to make a drawing of the desired shape full size, and cut out a pattern; note the time very carefully, also note the general character of the design, size and shape; next the work done on the forming, bending, joining and soldering together of the various parts of the work. When the member is completed, the weight, including cuttings and waste, size, general description of the work, and the precise time it has taken to complete the work, future calculations for all similar work can safely be based on the results obtained. The same method is used to obtain the price of all the different parts of cornices, or other works coming under the sheet metal workers' department, thus securing for all time a safe and reliable guide for future estimates and calculations. While the foregoing would hardly be applicable to small shops in our country towns, still it is to be recommended to the careful and prudent workingman to keep a close record of all the work he does for future reference. For those who have not had a great deal of experience in this most important branch of the cornice business, the great number of catalogues sent out by wholesale houses who sell to the trade, the illustrated price-lists, &c., will prove of great value to the beginner, insomuch as he will find therein the prices charged to the trade for almost every conceivable shape or pattern of cornice or other work he may require, and as these lists are subect to a trade discount, the country metal worker will generally find it to his interest to purchase the work ready to put up from the wholesale dealer.

Rusting of Nails.

Referring to the question as to the durability of nails which are exposed to the weather we have the following communication from a correspondent in Boston, who has given a good deal of attention to the matter:

Our experience is that steel cut nails are quite as bad as steel wire nails, and they are produced by the same process, so that the free acid remaining in them is acted upon by the atmosphere and quickly destroys the nails. We have had our attention repeatedly called to this in case of shingling, but not until recently have we heard the same story with regard to slate nails.

We have in our office samples of both cut and wire nails of steel, which have been rusted to utter worthlessness within two years.

TRUSSES FOR FLAT ROOFS.

By F. E. Kidder, Consulting Architect.

By a "flat roof" is meant a roof having an inclination not exceeding ¾ inch to the foot, the usual inclination being about ½ inch to the foot. Such roofs are quite commonly placed over halls, lodge rooms, &c., and the problem of supporting such a roof is one that may come to almost any builder.

As a general thing the space to be covered is rectangular in shape and the roof has an inclination in only one direction, although this inclination may be either lengthways or crossways of the roof, according to whether the gutter is to be at the end or side of the building. If the roof is over a hall or lodge room a finished ceiling will be required, and an air space is desirable between the roof and ceiling.

The general construction of the roof will therefore naturally take the form shown in Figs. 1 and 2, if the inclination is lengthways of the building, and of the form shown in Fig. 3 if the roof pitches across the building. That is, the roof and ceiling are supported by trusses placed across the building in parallel lines and from 12 to 16 feet apart. If the roof pitches, as in Figs. 1 and 2, both the top and bottom members of the trusses will be horizontal, and the trusses will be regulated in hight to conform to the inclination of the roof. If the inclination of the roof is across the building then all of the trusses will be alike, and the top member be parallel to the roof, as in Fig. 3, or it may be level and the purlins blocked up from it, to give the desired fall to the roof.

In supporting the roof from the trusses either of two methods may be adopted. The more common method, probably, is to rest the ends of the rafters directly upon the top chords of the trusses, as shown in Fig. 3. This method answers very well for wooden roofs of moderate span, but when the span is 60 feet or over it will be more economical to support the rafters on purlins, as shown in Fig. 2. The advantages of the latter method are that the purlins, being placed over the joints of the trusses, no transverse strain is produced in the top chord, and the long side of the building is better tied to the roof. The use of purlins also permits of smaller sizes for the rafters and for the top chord, and the trusses may be spaced further apart. By bracing the purlins, as shown at A in Fig. 2, the trusses may be spaced from 20 to 24 feet apart. The purlins should always come either over the end of a brace or close to it.

When the rafters rest on the top chord, as in Fig. 1, the latter must be computed as a strut beam—that is, a beam which is also subject to direct compression—and as any bending effect is very weakening in a post the writer considers it unwise to use this method when the distance between the vertical rods is more than 8 feet, or the truss heavily loaded.

The ceiling joists will naturally extend from truss to truss, either resting on top of the tie beams, as shown at B in Fig. 1, or framed between them, as at A. If framed between the tie beams, the bottom of the joists should be dropped ½ inch below the bottom of the truss beams, to allow for furring the latter, unless the laths are nailed to furring strips, in which case the joists and tie beam may be flush.

If the spacing of the trusses exceeds 16 feet it will be more economical to support the ceiling joists from the tie beams of the trussed purlins. There is not so much objection to a transverse strain on the tie beams as on the top chord, because the tension in the bottom chord tends to straighten it and thus resist the bending tendency, while a compressive stress tends to increase the bending.

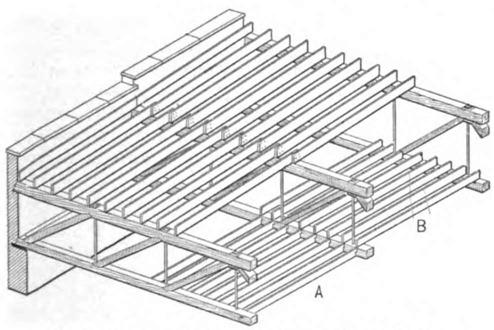


Fig. 1.—Roof where Rafters Rest on Top Chord of Truss.

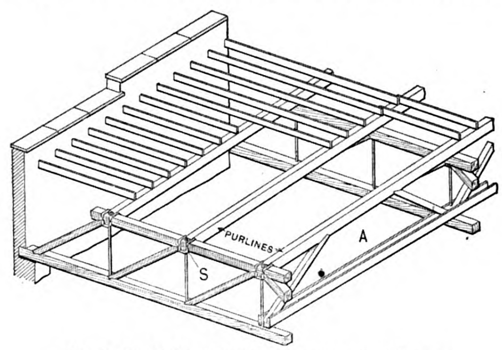


Fig. 2.—Roof where Rafters are Supported on Purlins.

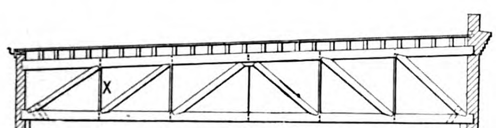


Fig. 3—A Lean-To Truss.

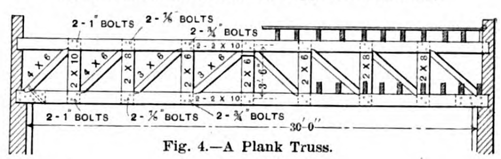


Fig. 4.—A Plank Truss.

Trusses for Flat Roofs.

The Truss.

For supporting the ordinary flat roof, with a ceiling below, the type of truss shown in Figs. 1 to 6 is undoubtedly the most satisfactory of any that can be devised for wooden construction, and, except in localities where iron work is very expensive, it will be as economical as any. There is no special name for this type of truss that is in general use, the term "horizontal truss" being perhaps as frequently used as any. The writer prefers the name of "Howe truss," as it is essentially a Howe bridge truss without the counter braces. For spans up to 30 feet and for light loads this truss may be built of planks, as in Fig. 4, but it is always much better to use rods for the vertical members, and generally there will be but a slight difference in the cost. For heavily loaded trusses and for spans in excess of 30 feet rods should always be used.

Howe trusses of wood with steel or wrought iron rods are practicable for spans up to 100 feet, and might be used for even greater spans, but for a span of over 120 feet some form of arched truss would probably be used.

For deck roofs the top chord may be inclined upward toward the center, to conform to the shape of the roof, as shown in Fig. 5. For a deck and mansard roof the center panels should have counter braces, as shown in

Fig. 5, to resist the wind pressure against the sides of the roof and any unequal disposition of snow.

Rules to be Observed When Designing a Howe Truss.

Hight.—The hight of the truss, always measured from *center to center* of the chords, should never be less than one-ninth of the span, and it is not economical to make the hight more than one-fifth of the span. As a general rule a hight of from one-seventh to one-sixth of the span will be most economical. When the top chord is inclined, as in Fig. 3, the hight at X—that is, at the shortest rod—should not be less than one-ninth of the span.

Number of Panels.—A panel is the space between two adjacent rods, or between an outer rod and the end joint (see Fig. 6). The number of panels into which the truss is divided should be such that the distance between any two rods shall not be more than one and seven-tenth times the hight. Thus, if the hight is 8 feet the distance between rods should not exceed $1.7 \times 8 = 13.6$ feet. The reason for this rule is that the inclination of the braces should not be less than about 35 degrees, as a less inclination will produce excessive strains in the braces and joints. It is best to keep the inclination of the braces about 45 degrees, especially if the rafters rest on the top chord. There is no objection to making the inclination greater than 45 degrees, except

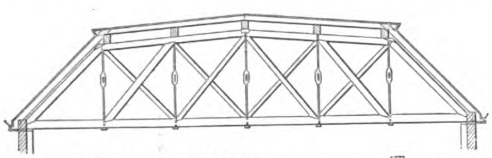


Fig. 5.—A Deck Roof Truss

that it will usually increase the cost. It is not material whether there be an even or odd number of panels.

Counter Braces.—If there is any chance of the truss being more heavily loaded on one end than on the other, counter braces—that is, braces in the opposite direction to that of the regular braces—should be placed in the center panels, as shown in Fig. 5. When the load is practically uniform no counter braces will be required.

Spacing of Trusses.—The most economical spacing of the trusses, all things considered, will usually be from 12 to 16 feet for spans up to 60 feet, and 14 to 20 feet for greater spans.

Spacing of Purlins.—For a roof such as is shown in Fig. 2 the most economical spacing of the purlins will be from 10 to 12 feet, center to center, as this will permit of using 6-inch rafters. As the purlins should always come over the end of a brace, the spacing of the purlins will determine the number of panels; hence, in locating the purlins the width of the panel should be considered as well as the size and span of the rafters.

When it is desired to keep the truss as low as possible, it may be an advantage to make the panels quite narrow and only have a purlin over every other joint, as in Fig. 6.

Bearing on Wall or Post.—The point where the center lines of end brace and of tie beam intersect should always come over the support, and generally at least 6 inches beyond the inner face of the wall.

Laying Out Roof and Truss.

The first step is to decide whether the trusses shall be placed lengthways or crossways of the building. Unless there is some special reason for doing otherwise, the trusses should be placed so as to have the shortest span.

The second step is to decide upon the number of trusses to be used, which will, of course, determine the distance between them. It will then be necessary to decide whether to support the rafters on purlins or directly on the trusses. If it is decided to use purlins the spacing of the purlins in connection with the number of panels should be decided. Last, the hight of the trusses should be determined. If it is thought best to support the rafters directly on the truss the hight of the truss should be fixed, and the number of panels made such that the braces will have an inclination of about 45 degrees, but the width of the panels should not exceed 8 feet.

Very often some special load on the roof or ceiling will fix the position of one of the rods, and, to a great extent, determine the number of panels.

(To be continued.)

Orders of Architecture.

In discussing the Orders of Architecture a writer in one of our London contemporaries says that the proportions of the principal members of a Greek temple were determined by rigid geometrical rules, in which was conspicuous the very systematic genius of the Greek people—lovers of proportion and symmetry in every sense of the words. At the same time these strict geometrical principles lent themselves very readily to the gratification of æsthetic sentiment, and fell easily into a series of combinations, of which the chief examples were the Doric, Ionic and Corinthian orders. Each of these orders resulted logically from the various proportions assigned to the column. The Doric order, in which the hight of the column is less than six times its diameter, expresses solidity, severity and strength. The Ionic, in which the hight of the column is eight or nine times its diameter,

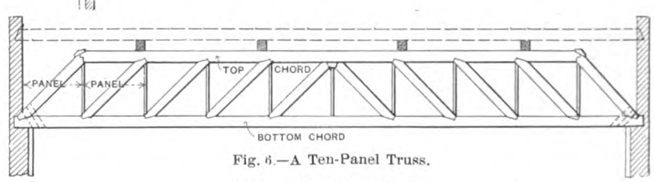


Fig. 6.—A Ten-Panel Truss.

Trusses for Flat Roofs.

expresses lightness and elegance. The Corinthian column is still more slender than the Ionic.

All the parts of the column in each of the three orders were so conceived as to contribute with absolute certainty to the general effect. Thus the Doric column, like a tree springing from the earth, has no base, and its capital is confined to the slight enlargement which is absolutely necessary for the support of the entablature. The Ionic column stands upon a base and possesses a capital of volutes, which recalls ideas of flexibility and grace, but is still far from possessing the richness and magnificence of its Corinthian rival.

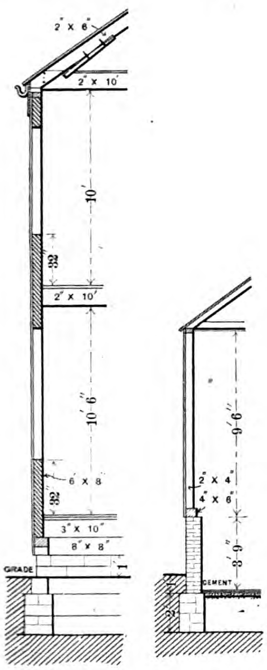
The logical development does not end here. The diminant idea expressed by each order of columns becomes in a sense the motive for the whole monument, thanks to a series of mathematical calculations proceeding naturally the one from the other. The character of sturdy strength which distinguishes the Doric order became progressively attenuated through the Ionic and Corinthian styles, and gave place to the elegance and richness which is their special characteristic. Following a similar course, the severe ornamentation of the first named order gradually developed itself through the other two, till, in the last, it came to border on exaggeration.

C. M. SCHWAB of Pittsburgh has decided to erect a new building for the manual training school at Homestead. The school was established in 1896. A foundry department has lately been started, and when the new building is completed there will be added a forge department and a school in which girls can be taught cooking and sewing. All the mechanical arts and drawing are taught in the school. The pupils come from the public schools and number 227 boys and 16 girls.

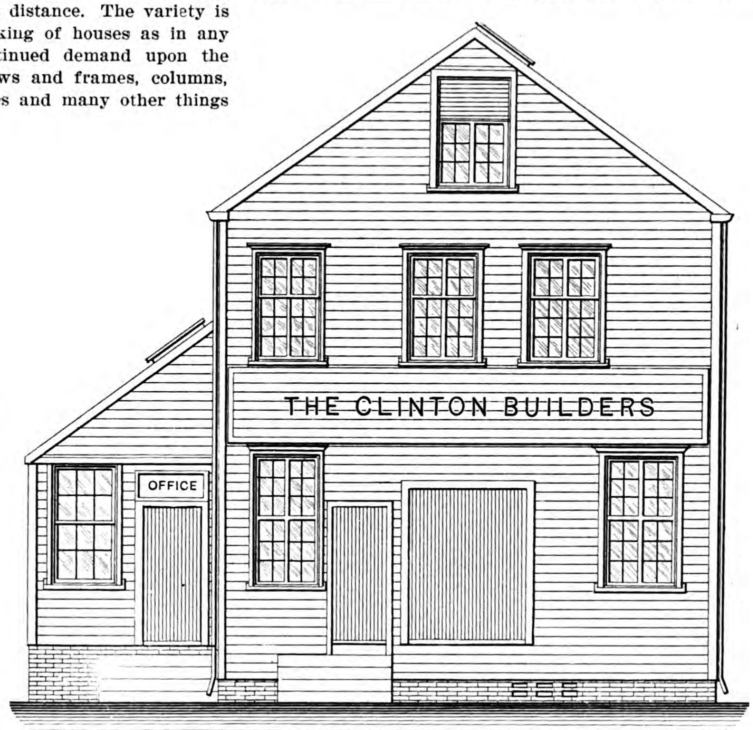
COMPETITION IN SMALL WOOD WORKING SHOPS.

THE design awarded under the conditions of the contest the third prize in the Competition in Small Wood Working Shops was contributed by Karl G. Johanson of 197 Middle street, New Bedford, Mass., and we take pleasure in presenting herewith illustrations made from his drawings, together with the descriptive particulars.

The small wood working shop is practically the builders' shop, because he is the man who is called upon to make odd things and execute special orders. We all know that those pieces of a house which can be made in quantity by the larger supply shops can be had cheaper from them, although the pieces are sometimes made and brought to hand from a great distance. The variety is generally as great in the making of houses as in any other industry, and the continued demand upon the builder for odd doors, windows and frames, columns, brackets, rails, panels, cornices and many other things



Sections through Walls of Main Building and Office.—Scale, ⅛ Inch to the Foot.



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

Competition in Small Wood Working Shops.—Awarded Third Prize.—Designed by Karl G. Johanson, New Bedford, Mass.

make it necessary for him to have a shop, and just what this shop should be is quite a problem. I feel that many others besides the present readers of *Carpentry and Building* will commend the publishers for the manner in which they have treated this subject. The plans which I submit for a small wood working shop represent the idea that has developed during my connection with the business.

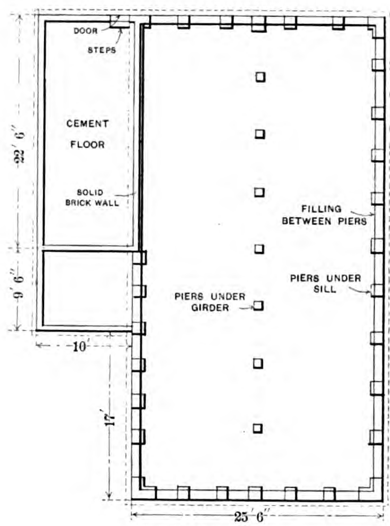
In preparing the foundations of the building, the soil should be removed under the main and office part of the structure, to a depth of 1 foot, and in the fuel and boiler room to a depth of 1 foot, 6 inches, the excavation being carried 6 inches outside of the building on each side. For the piers located under the principal studs, and under the girder the excavation should be carried to an additional depth of 2 feet. The foundation for the brick wall in the boiler room under the main sill should be laid at the same depth as the piers and should be 18 inches wide, the wall above the first excavation being 12 inches. All piers should be 18 x 18 inches at the bottom and 12 x 12 inches at the top or under the sill. The filling between the piers should be 8 inches thick. After the building is completed the fuel and boiler room should be filled 3 inches deep with pebbles and screened gravel, having 1 inch of cement on top. In doing this work only one kind of cement should be used.

The three girders and posts under them should be of hard pine. The first, second and third girders should be dressed 8 x 12, 6 x 12 and 6 x 10 inches respectively, while the posts under the second girder should be dressed 10 x 10 inches, and under the third, 8 x 8 inches. The other parts of the frame should be of spruce, and the ledger and studs should be dressed. The main sill should be carried straight through between the engine and boiler. The studs should be placed 3 feet on centers, but the 3 x 6 studs are generally placed as window studs, and when the windows are more than 4 feet apart there should be a 2 x 6 stud between the others. The first story joist should be placed 18 inches on centers and braced midway between the girder and wall on each side of the girder and spiked to the studs when possible. The lower half of the plate should first be mortised on top of the studs and then the other half spiked on, lapping over the joints of the first half. The floor joist should be spiked firmly to the plate, and one rafter placed close to every other one of the floor joists, which will bring the rafters 36 inches on centers.

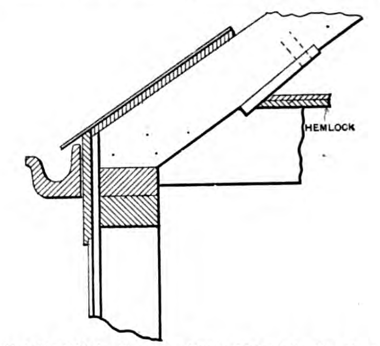
The sides of the frame and roof should be covered with second quality matched spruce flooring, on which should be laid building paper and shingles. The first floor should be 2 x 6 inch dressed and grooved spruce plank. The two joist for the shaving carrier should be put in position, and the under and upper rests for the carrier made before the floor is laid. The second floor should be of ⅞ hemlock, laid smooth side down and covered with matched spruce 1¼ inches thick. The third floor should be double and of hemlock, each half being ⅞ inch thick, with the rough sides laid together. The partitions and doors should be made of ⅞ matched and beaded cypress, the doors to be framed and fitted on tracks where shown. The windows of the first floor should be put in stationary, and those on the second floor should be in two parts and fitted with weights. The scuttles should have the usual trimmings, although they will not be used so much, owing to the fact that at most times sufficient ventilation will be secured from the gables.

Heat should be omitted on the first floor, and on the second floor there will be a current of warm air from the dry room, which can be regulated by fitting the fan with a cone pulley. The opening with ladder should be kept closed, and the current will enter the attic at the opening over the turning lathe. In damp seasons the vent on the side of the building in the attic should be kept closed by means of an inside shutter. The heat in the dry room is furnished by a radiator, using the waste steam from the engine. There should be an opening not more than 20 square feet under the roof of the boiler room, so as to allow the heat of that room to pass into the dry room. The office should have a small radiator. The power should be furnished by a steam boiler of 50 horse-power and an engine of 35 horse-power. The iron smoke stack rises above the ridge of the roof at the point shown on the floor plan, although it does not appear on the elevations.

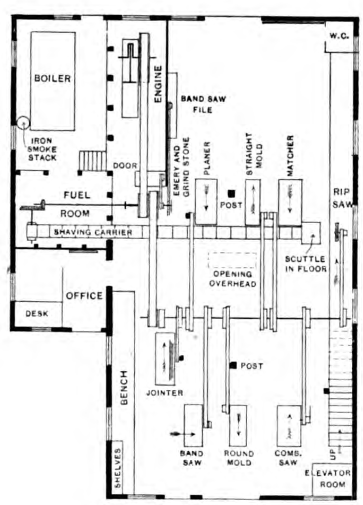
We all know that water power is best and cheapest if obtainable, otherwise for a wood working shop I prefer a steam boiler, so as to burn up the shavings. The power which I have named is just enough to run all the machines at the same time, if it should be necessary so to do, while the space is sufficiently large for the required machines with good working room about them. The heat in a wood working shop is generally regarded to be of minor importance. On the first floor no extra heat is needed, as the workmen there are for the most part moving about planing and sawing. On the second floor, where the bench work is done, some heat is needed. It is therefore planned to establish a current from the dry room, thus using to good advantage the warm air which would otherwise be wasted, for it is a well known fact that in order to have a good dry room the air in it should be continually changing.



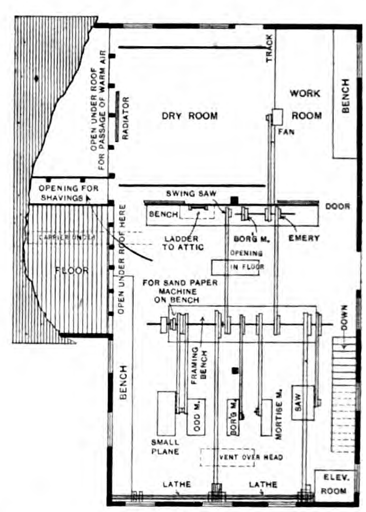
Foundation.



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



First Floor.



Second Floor.

Scale, 1-16 Inch to the Foot.

Competition in Small Wood Working Shops.

The lumber should be placed in the dry room on trucks at the farther end from the radiator. The trucks should have end pieces of hard wood bolted together, so that they may be readily taken apart if necessary. For instance, after a truck load has been moved away from the door or the farther end, for the purpose of giving room for new lumber and the truck unloaded, it can be taken to pieces, transported through the work rooms, then through the door in the partition where the fan is located and be made ready for a new load. By placing the lumber away from the radiator it will receive, as it should, only a small amount of heat at first.

Hollow Block vs. Frame Houses.

One of the papers read at the recent annual meeting of the Ohio Tile, Brick and Drainage Association considered the relative advantages of hollow block and frame houses the viewpoint being that of the brick maker rather than of the architect or builder. Among other things the author, E. F. Darnell, said:

In preparing a paper on this subject it will not be my object to give you prices on how cheap a building you can build out of hollow blocks, but I will endeavor to show you the superiority of hollow blocks as a building material over all other material.

The superiority of hollow blocks over frame houses is so great that there is no comparison; a frame house is a constant expense after it is completed, requiring painting every third year if you wish to preserve and keep it in good appearance; a hollow block house that is built out of good, well-burned blocks will last for ages and does not require any paint to preserve it.

The first cost of a hollow block house is not as much as a frame building built of first-class material, painted and finished as a building should be.

Some may ask why a building can be built cheaper of hollow blocks than of any other first-class material. In the first place, when a bricklayer lays one 12-inch hollow block he lays equal to five common brick; the labor on a building constructed of hollow blocks is only about one-half as much as common brick, and no more than frame. These are facts, as I have built both kinds.

A building constructed of one thickness of hollow blocks, that is, a 9-inch wall of hollow blocks, makes a more substantial building than a 13-inch wall of common brick. The mortar joints are the weak places in any brick wall.

In manufacturing hollow blocks for a building a uniform length should be made. You will need different lengths to fill out, but a block 12 inches long, laid with the joints broken in the center, makes a much better looking building than one hit and miss. In belt courses and water tables the long blocks should be used.

I have been asked as to the dampness of the walls. I have never seen any moisture on a wall built of hollow blocks where they were properly laid and the joints pointed; in fact, I have never had a complaint from a building I have built.

We brickmakers must set the example; we cannot expect others to buy our material if we do not use it ourselves. How many brickmakers live in brick houses? Not one-half of them, and I doubt if one-third. And why? They themselves cannot tell. If every manufacturer of hollow blocks would build a good up to date residence of his own product, it would only be a short time until hollow blocks would be generally used in place of wood in the construction of residences, as they are the coming building material.

The insurance companies will write insurance on hollow block buildings for two-thirds what they charge for frame buildings. A frame building is a veritable fire trap. They are the most inflammable building that could be constructed out of the studding and joists are air flues that carry same amount of material. Between the fire all over the building. Why do people continue to build these inflammable dwellings? Simply because they do not know hollow blocks are cheaper. The public must be educated to any new material, and the sooner we commence the better off we blockmakers will be.

No bricklayer will oppose hollow blocks. They know that one of the objections to hollow brick is the cost of laying them up. If hollow block houses can be built at a less cost than frame, of course they will take the place of wood in the construction of buildings, and that will give the bricklayer a new field to work.

What person could ask for a finer residence than one

Side (Right) Elevation.—Scale, 1/8 Inch to the Foot

Competition in Small Wood Working Shops.

built cut of rock faced hollow blocks all of uniform color? It is a perfect imitation of granite and almost as durable. A residence built out of hollow blocks is frost proof, fire proof, warm in winter and cool in summer. What more could man ask?

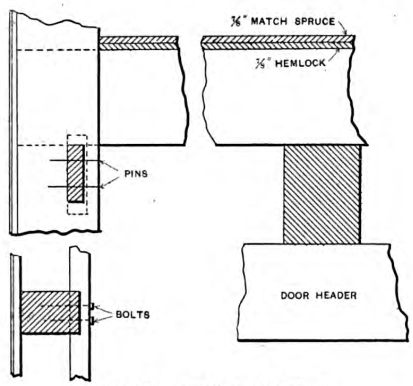
In the discussion of the paper which followed a member described his idea of construction as follows:

My plan is to have a foundation of rock faced blocks to the proper hight; then use nice faced brick for an outside course, lining it up with hollow block of the proper size on the inside, and make a wall 12 inches thick, putting the plaster right on the hollow block wall. Then build all the partitions in the house, where possible, of thin hollow block, having the partitions about 4 inches thick. Where there is any support, or even not much support, it is perfectly safe to put in hollow brick partitions, as long as there are supports under them at the corners.

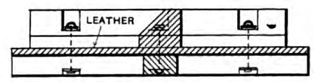
THE plans for a 12-story fire proof bachelor hotel, to be erected in West Thirty-sixth street, New York city, have recently been filed with the Department of Buildings, the architect being F. R. Comstock of this city, some examples of whose work we have at intervals had the pleasure of laying before our readers. The structure will cover an area 60 x 88 2-3 feet. The basement, first, second and third stories are to be of granite and marble, and the remainder of brick and terra cotta. The entrance is very elaborate, with double rows of polished granite pillars. Plate glass will be used throughout the building, which is estimated to cost $300,000.

Utility and Beauty.

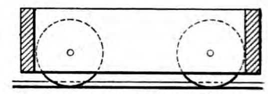
It was always considered that whatever is useful in architecture should be rendered pleasing, and what is beautiful should be necessary. The uses of a building must be studied before its ornaments; and ornaments, however small or subordinate, must contribute to the general effect, and arise out of or be grafted upon the construction itself. Beauty of architecture is greatly dependent upon construction. The figures that give such sublimity to our churches and all our vast edifices are vaults and domes; and these at the same time confer upon them their most essential and most noble attributes. A building may admirably fulfil its intentions in respect of utility, but it would be cold without the additional charms of painting and sculpture; yet these arts, and all decoration, should never screen any imperfections, but should highten the general character and mark its destination. It requires for its perfection the introduction and union of all the arts; and such a skillful management of these that the effect of one shall not impair the effect of another, but each aid the other and add to the great impression of the whole. In a perfect cathedral we see the most successful achievements of the grand requirements of architecture—the profound significance and meaning of everything—the highest utility and beauty combined; materials invested with all the magic hues of poetry, and in their forms and colors so beautifully symboling forth the religion as to be called by Coleridge "petrifactions of Christianity."

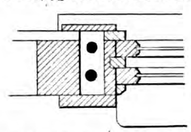


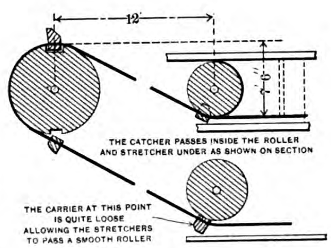
Detail of Second-Story Framing.



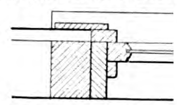
Detail of Shaving Carrier.—Scale. 1½ Inches to the Foot.

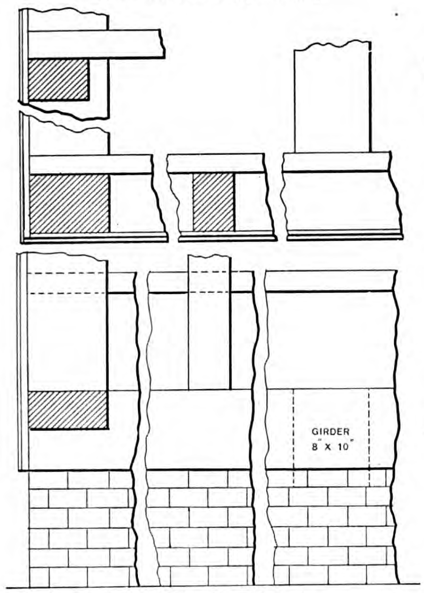

End View of Dry Room Truck.—Scale, ½ Inch to the Foot.


Horizontal Section Through Window Frames in Second Story—Scale, 1½ Inches to the Foot.



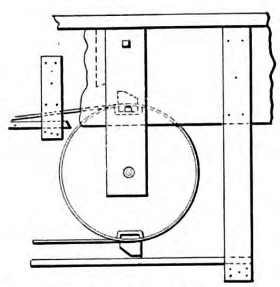
Detail of Mechanism of Shaving Carrier.

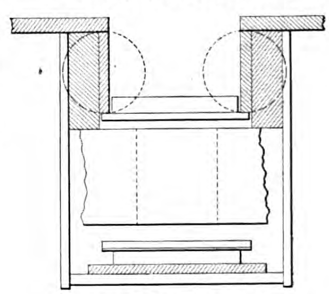

Horizontal Section Through Window Frames in First Story.—Scale, 1½ Inches to the Foot.



Detail of First-Story Framing

Scale, ¾ Inch to the Foot.


Roller for Shaving Carrier.


Section of Shaving Carrier.

Scale, ¾ Inch to the Foot.

Competition in Small Wood Working Shops—Miscellaneous Details of Construction.

THE TENDENCY IN HOME ARCHITECTURE.

IT is generally conceded that in the country residence the highest exemplification of home building ideals is being worked out at the present day, as it is here that the home is unhampered by inartistic surroundings of brick and mortar, unsightly pavements and, as some put it, "impossible conditions." In touching upon the great advance which has been made in home architecture Frank E. Mead of the well-known firm of Philadelphia architects, Keen & Mead, expresses the following sentiments:

The change in taste in country home building is most marked and gratifying. There is at present a decided tendency to make the residence and its surroundings an artistic whole. This tendency has developed very recently. A few years ago the average home builder was content with a very ordinary house with ordinary accommodations. If there was any attempt at æsthetic adornment it found expression in tasteless tinsel and hybrid decorations that bore no relation to the purposes of a home, or any ideal of art.

This is all changed now. Every man who is building a country house wants the architect to embody artistic principles that are basic. He wants his house livable. He desires primarily to plan his house to fit its surroundings. He demands the combination of comfort, convenience and utility with a harmonious artistic effort. Dignity in simplicity is the keynote of the present tendency. It is the keynote of success in architecture, as it is in everything in life. This tendency is taking us back to the old colonial principles in house construction. And therein is being laid the foundation of a greater architecture than the world has known, with the possible exception of the Greek. Conditions in America are specially suited to such a development.

Landscape Architecture.

There is no more beautiful scenery in the world than you will find outside Philadelphia. The climate is equable. Practically everything grows—an important feature in the development of your architecture on lines of co-operation with nature. Every country house now wants its garden. The love of flowers demands concentrated organization. Here is a decided reversion to old colonial days. The best examples of floral development about the country house to-day are seen in quaint colonial gardens, with winding paths, trim box rows, cool nooks and corners, flowers and shrubbery.

More attention is being given to the location of the house, so as to take advantage of environing scenery. Every detail of comfort and pleasure is worked out with exacting care. Bed chambers and living rooms must face south, or southwest, if possible, giving the fullest advantage of Summer breezes and protection from the north winds in winter.

The modern architect is no architect at all unless he is a landscape gardener as well.

Leaning Toward the Colonial.

The new country house of Samuel Megargee, near Bryn Mawr, illustrates the radical reversal toward old colonial principles, the best extant examples of which are seen in the James River Valley in Virginia and in old Chester county farms, with their heavy masses of white columns supporting the heavy overhanging roofs. There is a total absence of anything ornate for its own sake. Whatever decoration is there is thoroughly simple and structural. This applies both to the exterior and interior. The highest art is gained by a rigid conformity to nature. Gingerbread decoration is fortunately dying out. The people really want better art than they can get, or could get heretofore; for it is the fault of the architects themselves that we have had a gingerbread architecture. The people really want a combining of wholesome, strong, simple effects, and especially good, livable things, with fair and moderate cost. And that is what the present generation is getting at last.

A fine example of the tendency back to the old colonial principles is seen in the Red Rose Inn at Villanova. Here is exemplified pure common sense in building. It embodies the colonial ideas in the selection of the site for advantageous scenic effect; the beautiful garden adjoining the house; a thoroughly simple and well built house, with heavy timbers showing inside and outside; dry and well seasoned lumber, well burnt bricks, great columns, heavy doors, large and airy windows, with small panes of glass, ponderous exterior chimneys and great, massive roofs of unbroken shingles.

The early colonial was based on Doric ideas, which were extremely severe. Inside you had the large airy halls, giving a big sense of welcome and hospitality. You had the great living rooms, with their wide, generous fire places filled with the heavy pungent logs. The color treatment was borne in mind, as shown in the Megargee house. The basic line of the exterior is white, the great shingle roof being stained a dark old greenish brown, reproducing a weather-beaten effect.

The Parlor Doomed.

The most marked tendency in present interior construction looks to the entire elimination of the parlor. Ordinarily the parlor is a useless room. The great central hall is the thing nowadays. The plan of dividing houses into a lot of little, uncomfortable apartments is giving way. That means that the house now boils down to a great open central hall, combining in itself all necessary things, with library and living room in one. About the great fire place are lounging seats. There is plenty of fresh air, and comfortable, easy stairways open to upper floors. This is an important step in the common sense direction.

The dining room is isolated. There servants can prepare the tables quietly and without disturbing those in the living room. Of course, the kitchen is separated, and this is a most important apartment. Proper sanitation is here paramount. The architect must know a good deal about cooking and cleaning. The offensive odors of cookery must be taken into practical consideration.

Houses are now getting down to two stories, with servants' apartments in a partial third story. Ventilation of the upper stories, which are devoted to bed chambers, is receiving practical attention. Servants are receiving much more consideration than heretofore in suitable accommodations, including baths, &c.

Interior decoration is important. The tendency in country houses is toward quaint, old effects, produced by a high, simple wainscoting, brick and wooden floors, great fire places with massive andirons supporting heavy logs, large flues, which prevent smoking, &c. It is now quite common to follow the old colonial method of carrying the side paper on to the ceiling, thereby producing another quaint effect.

In the use of the word "colonial" I do not mean the present so-called colonial architecture. The colonial has been hashed beyond recognition. But properly used, as indicating the fine old, simple, common sense, livable construction, there is nothing more desirable in truly artistic house building. And it is a notable fact and a gratifying one that the dominant tendency is back to this beautiful and comfortable and honest architecture of our sturdy forefathers.

COOPER UNION in New York City has come into an unexpected windfall in the shape of a bequest of the greater part of the estate of the late John Halstead, a retired tea merchant of New York. The bequest is estimated to be worth about $300,000. The recent gift of a similar sum to the institution by Andrew Carnegie, added to Mr. Halstead's legacy, will enable the trustees of Cooper Union to make important extensions of its work. Strangely enough, Mr. Halstead was not known personally to any of the trustees or officials of the institution, nor was he known to be interested in its work during his life time.

THE ART OF WOOD TURNING—VI.

(SECOND SERIES.)

BY FRED. T. HODGSON.

THE gears or cog wheels of a proper size, and having the correct number of teeth, are generally sold with screw cutting lathes, and are properly fitted to the shafts or mandrels, and are ready, without any alteration, to commence work with as soon as received from the manufactory. The choice of lathe rests altogether with the buyer, but I think I am safe in saying that the lathes offered for sale by any of the noted makers advertising in *Carpentry and Building* will give satisfaction to the owner if he only selects his lathe with a view to adapting it to turn out fine ornamental work. I have used lathes of two of the makers referred to, and in both cases found the tools do all that was required of them without much trouble.

Generally a full set of wheels will number 16, whose diameters in inches will be 7¼, 6⅛, 5, 3¾, 3⅛, 2¾, 2⅝, 2½, 1⅞, 1⅝, 1 5-16, 1⅛, 1, 15-16, ⅞. The number of teeth in these wheels, following the same order, will be: 144, 120, 96, 72, 60, 53, 50, 48, 36, 30, 24, 20, 18, 16, 15. Equipped with this set of gearing, and the attachments described, and to be described, ornamental work will be of a straightforward kind.

Having put together an attachment, as shown in the last issue, we will now make a special chuck for the purpose of regulating the spiral movement of the work, and as this is made somewhat on the lines of the index plate described in a former number, the reader should not have much difficulty in understanding its construction and use. This chuck may be called a dividing chuck, a section and front view of it being shown in Fig. 54. It is provided with a ratchet wheel of 96 teeth, with a detent, or dog, for the purpose of holding the same at whatever tooth or division in which it may be required. The chuck is made from a solid casting, the body of which, as seen in Fig. 54, is long enough to admit of the wheels being fitted to it to work in the same plane as those in the arbor when fixed to the radial arm. The casting must be held in a jaw chuck by the projection A; it is then turned all over and screwed to fit the mandrel nose. The distance or thickness where the wheel fits up to it at B must be very carefully set out, so that the wheel, when fixed thereto, will line all right with the wheels on the arbors. When the wheels are thus fitted, the thickness must be marked, and a fine screw thread then cut on the projecting part D, as shown, for the purpose of receiving a steel nut with a washer of the same material in front of it. The nut is made in a circular form, or a ring, Fig. 55, in like manner to the circular nut described in my last, with reference to the nut on the end of the main screw of the slide rest, which was formerly drilled on the face and a pin wrench or tommy is used to tighten, or to make it loose.

The fitting for the wheels, in fact the whole of the chuck, must of course be turned in the mandrel nose; the front fitting A also turned slightly taper, and when this is done the chuck is held by it in a carefully turned boxwood chuck while the screw is cut and fitted to the nut, Fig. 55. A thin washer is fitted to go in front of the nut. The extreme end is then turned down below the thread D; but only just below, as it will be seen that we require all the diameter of the face we can get, as it is at this point that it bears against the face of the mandrel.

Now let us examine the front dividing wheel, which is made as shown in Figs. 56, 57, 58 and 59. The main body of the same, Fig. 56, should be held, in the first place, by the front A, while the other parts are carefully turned all over; the projecting pin B is ultimately accurately fitted to the previously bored hole E, Fig. 54. These fittings should, from preference, be made slightly taper; they are then more easily fitted. The pin B, Fig. 56, is tapped at the end, and a screw and washer retain it in its place. The washer has a square hole, which fits over a corresponding form filed on the end of the pin. The screw and washer both pass into the recess turned at the base of the hole E, which is tapped to fit the mandrel nose, which is necessary, and by adopting this mode the chuck can be made of less length than if the same projected beyond, in which case the depth of that part would have to be increased to accommodate it. This form of fitting the wheel, as per recess in Fig. 56, is a very good one, and a great improvement is found by having this recess in the wheel, as the projection A of Fig. 54 can fit into it, making the whole machine snug and compact. The wheel must be turned out carefully with a slight taper. When thus fitted the necessity for the center pin to accurately fit the hole is dispensed with, as the fitting in the recess of the wheel will cause the movement to be true and precise, when moved from one point to another for the subdivision of the work. This wheel, in consequence of its bearing close to the

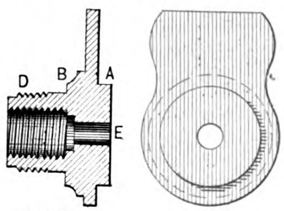
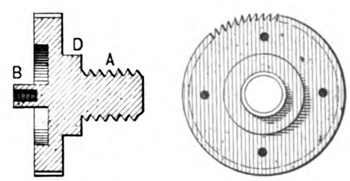


Fig. 54.—Spiral Chuck.



Figs. 56 and 57.—Views of Division or Ratchet Wheel.

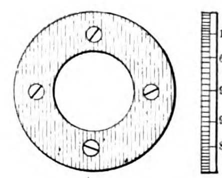


Fig. 58.—Cover or Front Plate with Side View Showing Index.

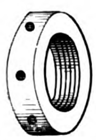


Fig. 55.—Circular Nut.

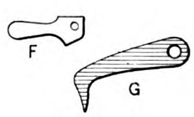


Fig 59.—Dog and Cam.

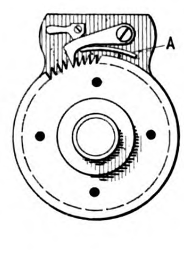


Fig. 60.—Showing Position of Dog and Cam at Work.

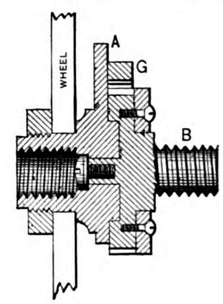


Fig. 61.—Sectional View of Complete Chuck.

The Art of Wood Turning.

face of the chuck, Fig. 54, must not have any projection, except a very slight amount to relieve the friction. This wheel, of course, works with, or independently of, the chuck, Fig. 54, as will be seen hereafter.

The correct circular fitting of the wheel is necessary, whether working alone or in conjunction with the chuck, as it tends to avoid any lost motion or side play, and, as will be seen by the illustration, the face bearings are between the wheel and the thin steel washer, so that any lost motion would seriously impede the working of the machine.

Having followed the directions so far, we may say that the best plan to insure success is to make the chuck an exact counterpart of Fig. 54, except, of course, that we shall not require the wing or projections, as seen in the front view, but simply a circular block of cast iron, from which the affair is made and to which the wheel must be firmly screwed. After this the front part must be turned up true and the rack teeth, to the number of 96, cut in it in the manner shown in Fig. 57. To cut a wheel of this kind will not be a difficult job to a careful workman. In the first place, a circular cutter must be made. This should be fitted to the spindle of the horizontal cutter and turned to the proper shape, and so notched and hardened that when in rapid motion it will cut the teeth in the rack wheel, which, of course, must be properly divided into 96 parts. Where a gear cutting machine is available it will always be better to make use of it in cutting the rack wheel than to cut it as suggested in the foregoing.

The front plate of the chuck is shown in Fig. 58, and which must be nicely fitted over the projection D, Fig. 56. In diameter it must be exactly the same as that contained in the wheel rack at the top of the teeth. Thus fitted, it must then be attached to the front of the wheel by four screws, as shown in Fig. 58. It is next carefully divided into 96 equal parts on the periphery, which means a line over the point of each tooth in the rack wheel. It is figured at every sixth line, and a further denotement at every third line, as shown in the side view. This being done, we may regard the whole wheel as finished, except the cutting of the thread on the nose A to correspond with that on the mandrel, whatever that may be. This part, however, should be the last to finish, as the blank end is so much used when putting the chuck together, which operation has to be gone through a number of times during the making of the tool, and if the screw were cut it might get damaged, and, at any rate, would be inconvenient.

We now arrive at another important item in the construction of this chuck—namely, the necessary means of arresting and retaining the wheel at any given point throughout its diameter. This is effected by a steel dog and spring, shown at G and F, Fig. 59. The dog, when approximately roughed into the shape shown at G, should be fixed on the chuck, and that part which fits between the teeth of the wheel made to exactly correspond with that space when held to its place by the cam at F. This method of holding the dog or detent is recommended, as it will be seen at once that when the dog is in place and the cam forced in position, as shown in Fig. 60, the ratchet wheel cannot move accidentally. Another advantage in connection with this cam is that it will hold the wheel securely while ordinary pressure is exerted to remove a chuck that may have been screwed on the nose unduly tight. By reference to Fig. 60 the mode of fixing the spring A is seen; also its position with reference to the dog or detent. The best way to hold the spring securely is to make a mortise in the face of the chuck in the required position and let a bent projecting end of the spring fit well into the same, and when thus fitted it will only remain to drive it gently home, allowing the blade of the spring to work quite free from the face. When so far in its place it may be bent with a pair of pliers to the curve which will best suit its purpose, after which it may be removed and hardened. The safest way to accomplish this is to heat it to a deep blood red and then dip it in clean oil, and afterward blaze it off, which consists in holding it over a flame until it fires, and when the oil has all burned out dip the spring in water to cool. By this process a good, durable spring will be produced.

A careful examination of Fig. 60 will give a better idea to the reader of the machine than anything I can say, only in the example there are but a few teeth shown, whereas these teeth are cut all around the wheel. I think this is sufficiently clear. When the cam is thrown back the spring will lift the dog out of the teeth, thus releasing the wheel, which may then be turned on the mandrel, either to the right or left, at will, without moving the chuck proper.

Screws or spirals of multiple threads or twists, either right or left, may have two, four, six, or, in fact, any number of threads or grooves. These wind or turn consecutively round the same axis, and may be cut with any of the trains of wheels referred to at the commencement of this chapter, the multiplex threads or grooves being obtained by the movement of the wheel of the chuck to the division necessary to the number required. For instance, if two grooves are desired, then the first one is made with the wheel locked at 96; the wheel is then partially rotated to 48 for the second, and is then locked with the dog while the work is being operated upon. If the character of the work will be better suited by having three twists, then the consecutive cuts must be made at 96, 32, 64, and so on, according to the various patterns that taste may deem the most effective. The divisional wheel will, of course, give any number of threads within the range of 96. Care must be taken with regard to placing the dog in the proper notch to get the threads or grooves in the right positions or the spaces between them will not be equal. It must also be seen to that the dog is kept firmly in place while the individual grooves are being operated on. The section, Fig. 61, shows the chuck complete, ready for action, A showing the projection or wing for holding G and F, as in Fig. 54. The projection marked B is of the same dimensions and has the same pitch of screw as the nose of the mandrel, so that any wheel or combination of wheels may be screwed thereon the same as the mandrel. The reason of this will appear quite obvious.

Cost of Cottage Building.

Low cost houses are always interesting subjects for discussion, both by reason of their internal arrangement and the items of their cost. In one of the London papers not long ago the question was asked if it was possible to build a workman's cottage for £100, or approximately $500 in American money? In reply to the query Dr. F. W. Bussell, vice-president of Brasenose College, Oxford, says: "I venture to say it is quite possible, provided two are built together. I have just erected a pair on Shelland Green, near Stowmarket, in Suffolk. I have attempted to retain all of the old-fashioned features of the houses which lie near. The material is red brick, and the outside plaster work artistically ornamented in patterns in the style dear to lovers of East Anglia. The windows are diamond panes in leaden sockets, and all of them open. The accommodation is, in the larger house of the two, a good parlor, 15 x 14 feet; a kitchen, with copper fitted and baking oven, besides range complete; larder and storehouse and back door. Above, three bedrooms, two with fireplace; and staircase and landing to itself, and not opening into any room. In the smaller house, parlor and kitchen as before; but two bedrooms only, both with grates. These I built in the most substantial fashion for £200, complete, architect's fee and supervision being included. When some friends of mine last harvest thanksgiving went over the houses, the verdict was that they were fit for any one to live in; and they have been, from the side of substantial work, passed by the Board of Agriculture.

ESTIMATING FOR STONE WORK.

ESTIMATING, as known by those who are conversant with the subject, is not a matter in which the haphazard or rule of thumb methods should be tolerated by contractors; and yet, it can be safely stated that fully one-half of all the estimates made for stone are based on guess work. In the absence of a correct system of collecting values, many contractors bid on work when the amount of their bid is excessively high or ridiculously low: or if the bid should be near what it ought to be, it is more through accident than the result of a nicely wrought system which should enable them safely to determine the cost of production, if not exactly, so near to it that at all times, so far as their listed values are concerned, they can be as certain of their "net cost" being as nearly correct as under existing conditions it is possible to make it. And until a contractor is certain of this, he cannot, in these days of close competition, be sure of how he stands with regard to a contract until all of the work is completed, all of the outstanding bills paid, and all moneys paid in connection with the work, which may be due him, collected; and then he is apt to find that he has lost money on his contract, which is a fact that has been demonstrated only too often.

The writer has in mind the methods of some contractors that are not governed by the rules deduced from the science of bookkeeping; but, rather, is the ever-ready system which they carry under their hats! They require no system which entails the use of averages to enable them to figure closely on any work that may come before them, the result being that no man, however competent to do the work of estimating under the proper conditions, can ever hope to be able to fix the value of work during the absence of the contractor himself, whereas, under a proper system one qualified in every other respect to do the work as it should be done would have no difficulty in estimating to the satisfaction of all concerned. In other words, the business would run itself, so far as relates to estimating, responsibility could be fixed to an absolute certainty, and the mental comfort resulting from a well organized system such as herein indicated would more than repay the small amount of labor required to institute it. It is this class of contractors, says F. T. Mallon, in a recent issue of *Stone*, to whom this paper is addressed.

Avoiding Loss.

Following the completion of a contract in which a loss has been sustained, it is but natural that a contractor should ask himself: Who is to blame for this state of affairs, and how can it be avoided?

It is evident that a proper presentation of the subject demands that this question should be answered in its relation to the one who superintends the work, the one who figures the work and the contractor for whom the work is figured, inasmuch as all three, either directly or indirectly, affect the estimate; and it is also evident to those who have given the matter serious thought that the contractor himself is often to blame for poor work that is done in his office.

In order that a contractor may justly exact a prime quality of work from the one whom he employs to do his estimating, he should endeavor to place at the command of the estimator every facility necessary to insure full and correct data, as well as to give him ample opportunity to study work in all stages of its production, and to keep thoroughly in touch with those whose duty it is to see that the work comes out to the best advantage, unless, perchance, the man who does the estimating should be the man that gets the work out, in which case he would be in a position to watch the cost of production to a nicety. It is not possible for the contractor to secure the best service from the man in charge of the estimating in any other manner; and he would do well to bear in mind that, with a man who is honest and capable in other directions for assuming the responsibility of fixing the figure at which a contract shall be taken, he will best subserve his own interest by reposing full confidence in him as to all that relates to his work; affording him full opportunity to post himself as necessity may require; consulting with him fully at all stages in the preparation of an estimate; and, in a sense, making him, for the time being, one of the firm, in which the interest is mutual. In this way the estimator is encouraged to take the fullest interest in his work; will feel that his best efforts are thoroughly appreciated; and, if there is no manhood lacking in his composition, can be relied upon by his employer to exert himself for the best interests of the firm. Failure to observe the principle involved in this statement has often resulted in heavy pecuniary losses to the contractor, in lost reputation to the estimator, who, perhaps, was thoroughly qualified to do his work safely had he not been compelled to work under adverse conditions.

Net Cost.

Given the opportunity as outlined above, the contractor may reasonably expect that the estimator may be able to produce an estimate which shall represent the net cost of production and should understand that this estimate is governed solely by the cost of getting the work out in his own shop, whether it be higher or lower than that which may be expected from the shops of his competitors, as it is obvious that any difference in the cost of production in his shop, as compared with that of his competitors, is chargeable to the methods of operation in vogue in the shop, the degree of difficulty in working the material, as well as to the means of handling work which may be at the disposal of those charged with the conduct of operations—this under the assumption that his competitors, as well as himself, work along the lines indicated herein, according to a correct system. Insomuch as the contractor fails to observe these principles he is justly blamable for losses which may accrue from a failure to do so, always implying that all other requirements for the production of a correct estimate are not wanting in his shop.

An estimator who is thoroughly qualified to undertake the task of fixing the value, or net cost, of the stone work for a building, for instance, should, first of all, be a practical man; and the more practical he is as a stonecutter, the more extensive his knowledge of the stone to be figured, and the working of it, the more valuable he is as an estimator. Indeed, without this experience and knowledge all other qualifications necessary, too, in the estimator, become practically inoperative. In fact, outside of the simple, plain figuring, without practical knowledge which comes from the use of the tools and observation in the shop and at the building, no person can honestly lay claims to being capable of producing an estimate which can be considered safe in any particular. Then the estimator must, as a prime requisite, be prepared to figure correctly from such units of value as may be gathered from the shop records, but he must also be ready and able, by reason of previous experience in a practical sense, to determine the values of such intricate or new work to which the shop records have no reference; for it is evident that only a man who is qualified through practical experience and trained observation is able to ascertain the value of such work safely. The contractor cannot reasonably look for close and safe estimates from an estimator who is not qualified as stated, even though his ability to read or make drawings remains unquestioned. Even then, as noted before, the estimator must be in touch with the shop and the ever changing records to be capable of producing the best results.

(To be continued.)

ON one of the historical landmarks of Wall street, this city, a new 18-story structure is to be erected from plans drawn by Clinton & Russell. It will be one of the most imposing buildings in the financial district.

CORRESPONDENCE.

How to Read Architectural Drawings.

From C. H. M., *Perry, Oklahoma.*—I received my January number of the paper in due course and was much pleased with it. I can see quite an improvement in the last nine months of the journal, and I hope it will increase in size and in number of subscribers. I notice it is the intention of the editor from now on to bring up new things for the paper and keep old ones that are good. The object of this letter is to say that I wish there could be a department of "How to Read Drawings." There are but very few carpenters who can r properly. Sometimes they are delayed and have to write to the architect for an explanation of some part of the drawings. Probably the editor would be surprised to know the large number of readers who cannot properly read details, and taking those who do not read mechanical journals, there is a still greater number. I would suggest that in explaining the reading of drawings the start be made with the wall line and then on up to the cornice line. After that explain everything in connection with the details. It is not necessary for me to write upon this matter in its various stages. There are drawings for wood and for iron, brick, stone, plumbing, arch work, &c., and in my opinion there are not over one in 25 of the readers of the paper who can read drawings

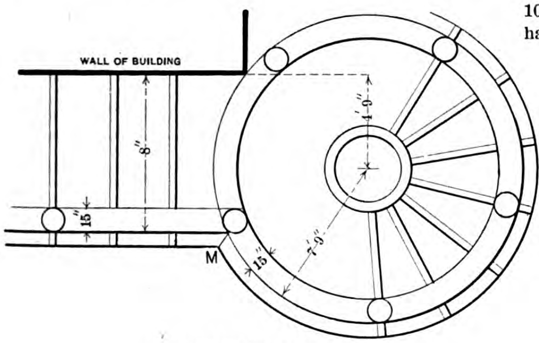


Fig. 1.—Plan of Porch

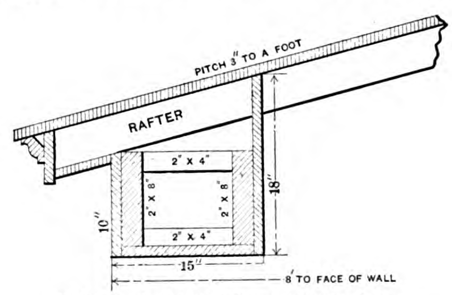


Fig 2—Vertical Section Showing Square Frame.

Laying Out Planceer for a Circular Porch.

complete. There are men competent to write upon this subject, and if the editor approves of the suggestion and devotes a whole page in each number it would not complete the course in a year. Newspaper men and men in all stations of life read and study your journal, and I often hear it spoken of by those whom I did not suppose were readers of *Carpentry and Building.* If you should start this subject in earnest in the paper, I think you will be surprised at the letters you will receive. It will be like new life to the journal, and one of which its readers stand more in need than any other in the building line, as far as printed instructions are concerned. Probably the editor can remember that some time ago one of the readers asked what the little stars were for which appeared on the floor plans. The point is obvious. I have known men to get extra pay for such knowledge as would be derived from a study in the line indicated, and I can mention a planing mill that tried hard to get such a man, and when they found one they gave him $100 per month and no lost time. The same man told me he was offered $125 per month to take charge of a planing mill in a Northern town, and the offer would hold good for a year. I could write a good deal on this subject, as in my estimation it is a most important one.

From Galveston, Texas.—I have noticed often when an architectural drawing comes into the shop that it takes two, three or four men to read it. Now, to come down to the real fact, none of the men can read the drawing correctly. All of them are guessing about it. One man says "It is this way;" "No," says the other man, "it is this way," and by guessing and helping one another, little by little, they come to understand what the drawing means. But should it prove too much of a problem, the contractor is called in and finally, if necessary, the architect, and lo! it is all as plain as plain can be. But to tell any of those men that they cannot read the drawing—that would be a deadly insult. Such, however, is the fact, and if convenient, I should like very much to see published some articles explaining the A, B, C of reading a drawing. I think such a series would confer a favor on many readers without hurting their pride.

Laying Out Planceer for a Circular Porch.

From J. W. S., *Paterson, N. J.*—I would like to have some one tell me the best way to lay out a planceer to go around a circular porch of the same pitch as the straight part—that is, 3 inches to the foot. I inclose a sketch, Fig. 1, which shows what I mean, the planceer being continued around the circle, the same as on the straight part, and mitered at M. Perhaps "C. H. C." of Jackson, Miss., can give us something as practical as his "Circular Head in Round Corners," which was very good. I would also like to know the best way to build up the frame at the circular part, or architrave, which has a soffit 15 inches wide, and is built up with a 10-inch frieze outside and 18 inches inside, the planceer having a projection of 7 inches, with crown facia, showing 2 inches, and crown molding. The shingle roof starts from the molding. The columns on the circle are 9 feet ¼ inch on centers. What I would like to have explained is the strongest way to build it, so that there will be no sag between columns. The rafters are 6 x 8 and are to show when finished, the ceiling between them making panels. There are to be 15 rafters in all, with one at each column and two between, all as shown in Fig. 1. The square frame shown in Fig. 2 is made by taking two 2 x 8's and blocking in between for soffit nailing and for rafters. I think this may interest other readers as well as myself. Later on I will send sketches showing how the work was actually done.

Does Owner or Contractor Assume the Loss?

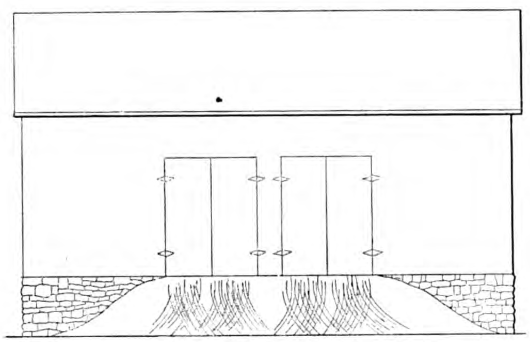
From F. K. T., *Raleigh, N. C.*—It seems to me that the question raised by "W. S. W." of Washington, Ia., in the March issue, would furnish good material for argument by the ever ready lawyer. If there was no clause in the written contract or no verbal contract regarding the point in question, the fact that the owner had or had not made payments to the contractor for the labor and materials furnished would, in my judgment, decide the case. In making partial or full payments on the labor and materials in the building, the owner practically accepts such work and materials and it becomes his property; consequently he is responsible for any damage that may happen to it. On the other hand, if the contractor had not received payments on the work, he would, in turn, be responsible for all damage. It is always best to have a carefully worded contract covering any work, so that there can be no cause for misunderstandings, as in the case suggested by "W. S. W."

Design for Stone and Frame Barn.

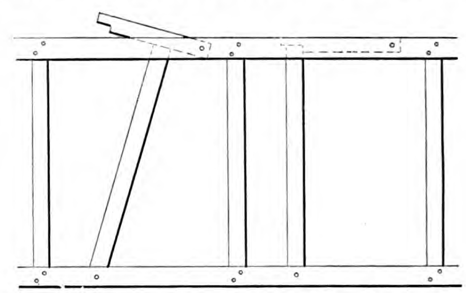
From I. H. W., *Greenwood, B. C.*—I inclose sketches of a frame and stone barn in answer to the question recently submitted by "D. S." of Belmont. The barn measures 65 x 45 feet, outside, and the first story, or basement, is of stone. The horse stable and granary are 2 feet higher than the cow barn, although this does not clearly show upon the plan. There is a door 4 x 7 at each end of the stable. There is also a flight of stairs at the far end of the stable leading to the upper floor, while a flight at the near end leads into the cow stable. The cattle are tied facing each other, and there is a passage between the mangers to which the feed is shot down from above. There is also a passage at this end

Do 4 or 6 Inch Shingles Make the Better Roof?

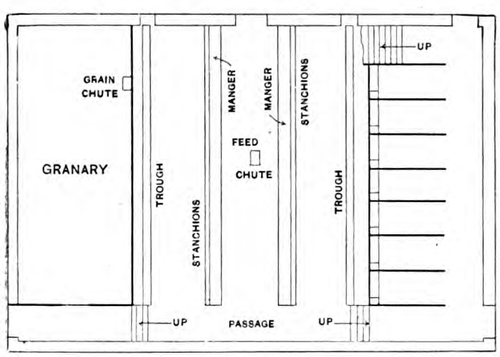
From T. H. F., *Ontario.*—Replying to "E. H. E.," Canadian, Texas, permit me to say that experience has proven over and over again, that shingles 6 inches wide, when properly laid, make a better roof than shingles only 4 inches wide. The reasons for this are that there are one-third less joints in the roof, less nailing is required, and, of course, less joints to "break" in each course. Every shingle should be fastened down with two nails, and this on a roof covered with 6-inch shingles would place the nails 3 inches apart, whereas a 4-inch shingle would require the nails to be 2 inches apart, and thus increase the chances of a leak near a nail, which means corrosion and eventually a leak. "E. H. E.," however, makes a mistake when he says that if a 4-inch shingle is split in the middle, an opening would be left right through the roof. Shingles are always 1 or 2 inches longer than three times the "weathering." Thus a 16-inch shingle will lay 5 inches to the weather and still have 11 inches to take the next course. Now, if another



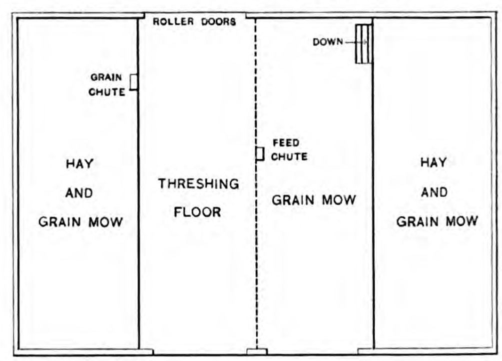
Front Elevation.



Detail of Stanchions.—Scale, ¼ Inch to the Foot.



Basement.



Threshing Floor.

Design for Stone and Frame Barn.—Plans and Elevations.—Scale, 3-64 Inch to the Foot.

of the horse stable leading into the cow stable, which is 2 feet lower than the former and which has only a 7-foot ceiling. There is a trough behind the cattle 14 inches wide, running the full length of the stable, and a door 2 x 2 at the far end for cleaning out. At the far end of this passage there is another 4 x 7 door. At the left, also at this end of the stable, there is a door leading into the granary which is 2 feet higher and has an 8-foot ceiling. On the second or threshing floor there are three mows for hay and grain. The mow at the right above the horses is 3 feet higher than the next floor, and feed can be dropped into the mangers by means of lifting trap doors just in front of the horses' heads. The hay and grain mow at the left, which is over the granary, is also 3 feet higher, and chutes can be placed at different points, so that the grain can be let into the different bins from the threshing machine.

Paint or Polish for a Staircase.

From A. E. P., *Huntsville, Ont.*—Will some of the many readers of *Carpentry and Building* tell me what is the best paint or polish for a staircase ?

course be nailed on 5 inches to the weather we still have 6 inches for the third course, so it will be readily seen that should a shingle split in the middle there will always be the third shingle to carry the water to the next course. It is a truism both in roofing and shipbuilding, "that the lesser the number of joints the less the chances of leakage."

From J. C. W., *Pine Hill, Pa.*—Allow me a little space in your interesting paper to discuss the letter from "E. H. E.," Canadian, Texas, regarding width of shingles. He says that in the case of 4-inch shingles, should one of them split in the middle the crack would register with the joint in the course below, and thus leave an opening right through the roof. Now I cannot understand how this can be or wherein lies the difference, whether it be a 4-inch or a 6-inch shingle, or in fact one of any other dimensions. He says that should a 6-inch shingle split there would still be two shingles beneath to protect the roof. What I would like to know is, why the two sizes in width would not be put on the same way, except, perhaps, that one would have a 3-inch lap while the other would have a lap of only 2 inches. For my part I must agree with the editor's views as expressed in the note following the letter of "E. H. E." in the December number. Why do we use narrow flooring, siding, &c.? I would much rather go from 4 to 3 inches than from 4 to 6 inches, as I believe the former would give the best results for the reason stated in the editor's note. I should say that all good shingle roofs are put on with courses three shingles thick with 2-inch underlap. The way I get the distance in the weather is taking 2 inches off the full length in inches and dividing the balance by 3. For example, 20 inches, less $2 = 18 \div 3 = 6$ inches to the weather, which holds good on any length. Therefore I cannot see why "E. H. E." has two thicknesses beneath

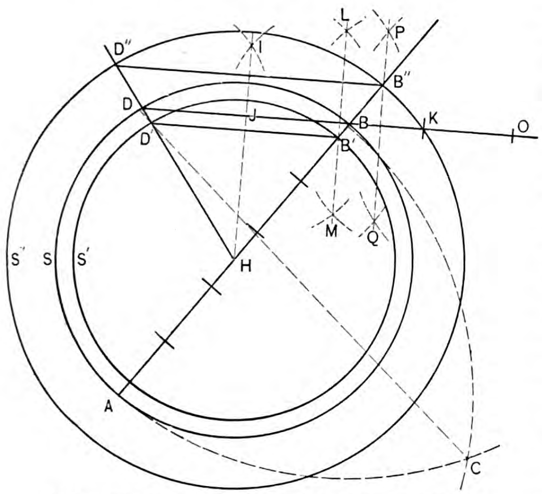


Fig. 1.—Showing Method of Laying Out Regular Polygon to Definite Scale

any convenient radius, using D and B as centers, describe two regular arcs meeting at I. Draw I H, cutting the line D B at its center, J. Prolong the line D B to the right and lay off upon it from J the dimensions of one side of the polygon, 6 feet, as from J to K. Bisect J K, and, with J and K as centers, using a radius sufficiently great, strike the arcs intersecting at L and M. At the point where a line drawn through these intersections cuts H B, as B', will indicate the radius of the circle S'. At the point where the circle S' cuts the line H D, as at D', draw D' B', which will be one side of 6 feet. Space off on the circle the distances D' B' and connect the various points, thus completing the polygon.

Suppose, for example, a polygon is wanted, the sides of which are 9 feet. Lay off on the line D B from the point J 9 feet and bisect with lines meeting at P and Q. Draw the line P Q, and where it cuts H B at B'' will indicate the radius for the circle S''. Prolong H D, cutting the circle at D''. Draw D'' B'' for the 9-foot circle. It will be noticed that laying off the 9-foot side brings it outside of the circle S, while the 6-foot sides are inside. All regular polygons are equiangular and equilateral, consequently from any indefinite scale can be obtained a desired scale by the above method.

In laying out difficult work I generally use a rectangular board having a hole in one corner, so that it can be hung up when not wanted, 2 x 3 feet being the best size for the board. Whenever convenient, in laying off work I make use of a 1½-inch scale—that is, ⅛-inch equal to 1 inch—so that close work can be done. In scribing circles I use a trammel or sharp pointed dividers, pressing lightly so that the indentations will not be too deep. Both sides can be used at the same time. When through with each plan dress off the board, and it can be kept until it is less than ¼ inch thick.

The method of laying out irregular polygons is shown in Figs. 2 and 3 of the sketches. Referring to the former, the polygon A B C D E is indefinite as to scale. It is desired to construct another, making the side A B equal 5 feet, keeping the other sides relative to it, as in the original. Extend the base line A B so that it will meet

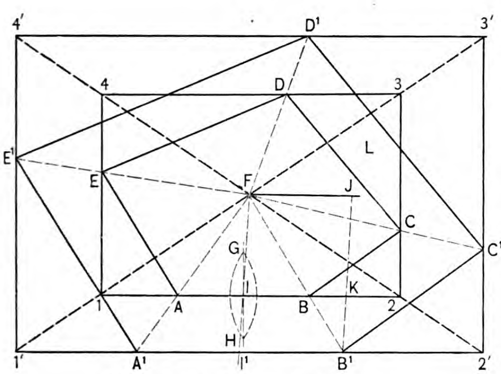


Fig. 2.—Laying Out Irregular Polygons.

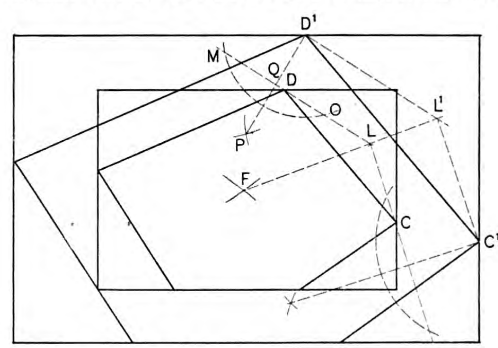


Fig. 3.—Method of Laying Out an Extra Angle, as at L.

Laying Out Regular and Irregular Polygons.

with his 6-inch shingle and not in the case of the 4-inch shingle roof.

Laying Out Regular and Irregular Polygons.

From R. J. H., *Chicago, Ill.*—In answer to "J. B. W.," Washington, who inquired in the April issue how to lay out a polygon to a definite scale, I submit herewith sketches, one intended for a regular and the other for an irregular polygon. Fig. 1 illustrates the method of laying out a regular polygon to a definite scale. Scribe any indefinite circle, as A S D B, and draw the diameter A B, dividing it into as many parts as the polygon is to have sides. From A and B as centers, with radius A B, describe arcs meeting at C. Draw a line passing through the second division and cutting the circle at the point D; draw D B, which will give one side of a regular polygon. Now, from center H draw the line H D, and with

perpendiculars let fall from the angles E and C, meeting at 1 and 2. Extend the lines 1 E and 2 C until they meet a right line drawn through the angle D. This completes a rectangle inclosing a polygon. Draw the lines 1 3 and 4 2 diagonally across the rectangle, extending them indefinitely. At F, where these lines cross, is the center. Draw a line through F parallel with the side of the rectangle 1 2. From F set off this line the distance F J, equal to one-half the desired length of the side, or 2½ feet. Now, with radius greater than one-half of A B, describe two arcs from A and B, meeting at G and H. Through the intersections thus obtained draw the line G H, cutting A B at I. Lay off the distance I K equal to F J. From J draw J K, prolonging it indefinitely. From F, through B, draw the prolonged line F B, and where it cuts the line J K, as at B¹, will be the point from which to construct a similar polygon to the desired scale. From F, through A, draw the prolonged line F A. Parallel with the side A B draw A' B' indefinitely, and the point where it intersects the line, as at A', will be 5 feet from B', or the length of the side wanted. Prolong the line A' B' until it intersects the diagonal lines F 1 and F 2. At 1' and 2' erect perpendiculars until they intersect the diagonal lines drawn through 4 and 3. Finish the rectangle 1', 2', 3', 4'. From F draw lines through the respective angles E D C, and where these intersect the rectangle 1' 2' 3' 4' at E' D' C' are the angles of the newly constructed polygon. Connect these points, thus finishing the polygon.

A similar polygon can be constructed to any desired size by first making the distances F J and I K equal to one-half the length it is desired to have the sides A' B'. Suppose that between D and C there should be an extra angle, as at L. Since it does not come in contact with any side of the rectangle it cannot be laid off like the others. To obtain this additional angle in the enlarged polygon first draw lines from L, D and C, extending them indefinitely, as indicated in Fig. 3. With D' as center and any radius greater than D' D, draw an arc cutting L D at M and O, and from M and O as centers and any radius greater than M O, draw arcs intersecting at P. Draw D' P, cutting M L at Q, and from any point on D L near L set off the distance Q D' in a direction parallel to Q D', and through the point thus obtained draw D' L', thus making it parallel with D L. Proceed in the same manner from the point C', as shown in Fig. 3, thus obtaining the lines C' L' at L'; then will the angle D' L' C' be a duplicate of D L C. In order to prove the angle L' draw a line from F through L, and if it passes through the point L' it is correct. The proportions of the circumscribed rectangle change with different irregular polygons, but this method of enlargement is equally applicable.

Hexagon Rafter Table.

From E. E. H., *Knoxville, Tenn.*—As the subject of hexagon roof framing is receiving some attention in the Correspondence department, I send herewith a hexagon rafter table, which I hope may prove of interest to some of the readers. I prepared this table with several others about four years ago, and so far as I know they are a little different from anything of the kind in use. I have a table prepared for laying out regular polygons of from 3 to 20 sides, which I will send for publication if it will be of interest. I have been a subscriber to *Carpentry and Building* two years, and have for some time intended to show my appreciation of the paper by adding my mite to the Correspondence department.

Hexagon Rafter Table.

1 Rise. Inches.	2 C. R. F.	3 H. F.	4 T. H. S. B. Inches.	5 B. H. S. B.	6 F. J. Inches.	7 J. S. B. Inches.
1.......	0.8690	1.003	8 and 13.89	12 and 6.94	41.72	6.93 and 12.04
2.......	0.8780	1.010	8 and 14.00	12 and 7.00	42.14	6.93 and 12.17
3.......	0.8927	1.023	8 and 14.18	12 and 7.09	42.85	6.93 and 12.37
4.......	0.9129	1.041	8 and 14.42	12 and 7.21	43.82	6.93 and 12.65
5.......	0.9382	1.063	8 and 14.73	12 and 7.36	45.03	6.93 and 13.00
6.......	0.9682	1.090	8 and 15.10	12 and 7.55	46.48	6.93 and 13.42
7.......	1.003	1.120	8 and 15.52	12 and 7.76	48.12	6.93 and 13.89
8.......	1.041	1.155	8 and 16.00	12 and 8.00	49.96	6.93 and 14.42
9.......	1.083	1.192	8 and 16.52	12 and 8.26	51.96	6.93 and 15.00
10.......	1.127	1.233	8 and 17.09	12 and 8.54	54.11	6.93 and 15.62
11.......	1.175	1.277	8 and 17.69	12 and 8.84	56.39	6.93 and 16.28
12.......	1.225	1.323	8 and 18.33	12 and 9.16	58.79	6.93 and 16.97
13.......	1.277	1.371	8 and 19.00	12 and 9.50	61.29	6.93 and 17.69
14.......	1.331	1.422	8 and 19.70	12 and 9.85	63.87	6.93 and 18.44
15.......	1.386	1.474	8 and 20.42	12 and 10.21	66.54	6.93 and 19.21
16..	1.443	1.528	8 and 21.17	12 and 10.58	69.28	6.93 and 20.00
17.......	1.502	1.583	8 and 21.93	12 and 10.96	72.08	6.93 and 20.81
18.......	1.561	1.639	8 and 22.72	12 and 11.36	74.94	6.93 and 21.63

Hip cuts, 13.86 inches and rise.

In explanation of the table would say that column 1 headed "Rise" contains the number of inches rise the common rafter has to the foot run, the table being made for pitches from 1 to 18 inches rise to the foot run.

Column 2, marked "C. R. F." (Common Rafter Factor), contains the factor by which the side of the hexagon must be multiplied to obtain the length of the common rafter. This length is measured on top of the rafter from the plumb line at the face of the plate to the extreme points of the roof. The length of the side is measured on the face of the plate.

Column 3, headed "H. F." (Hip Factor), contains the factor by which the side of the hexagon must be multiplied to obtain the length of the hip rafter measured from the plumb line at the outer corner of the plates to the extreme points of the roof.

Column 4, headed "T. H. S. B." (Top Hip Side Bevel), contains the bevel for fitting the top of the hip against the common rafter set at the center of either plate from which the hip starts. This bevel will also fit all the hips together at the top.

Column 5, headed "B. H. S. B." (Bottom Hip Side Bevel), contains the bevel for cutting the bottom end of the hip off on a line parallel to the plate. If desired, this cut may be applied to the top of the hip to fit it against the hip rafter, the base of which is parallel to either side from which the hip starts. It is, of course, a matter of choice as to how the roof is framed together at the top. If a hexagonal block be used at the top against which to cut the hips, then half of its thickness measured perpendicular to the plumb cut must be taken off the calculated length of the hip.

Column 6, marked "F. J." (First Jack), gives the length of the first jack in inches, in hundredths when the rafters are spaced 24 inches from the centers measured on the face of the plate. To obtain the length of the first jack when not spaced 24 inches from centers, multiply twice the distance from the center of jack to the center of hip by the factor in column 2. Half the thickness of the hip must be taken off the top end of the jack in the usual manner. The length of the second jack will be twice that of the first, and so on.

Column 7, marked "J. S. B." (Jack Side Bevel), contains the side bevel for fitting the top of jacks against hips. In all bevels given in columns 4, 5 and 7, the last figures represent the cut side. For example, one side of a hexagon is 14 feet, and the rise of the common rafter is 16 inches to the foot. Then the length of the common rafter or the middle jack is $14 \times 1.443 = 20.202$ feet (column 2, line 16). Multiplying the decimal part of a foot by 12 to reduce to inches we have $0.202 \times 12 = 2.424$ inches. To change hundredths of an inch to sixteenths of an inch, divide by 6, as there are six and one-quarter hundredths in one-sixteenth, and the result will be close enough for all purposes. Hence, $0.42 \times 6 = 7116$, and the length of the middle jack is 20 feet 2 7-16 inches from the plumb line at the face of the plate less one-half the thickness of the hips at the top.

The length of the hip is $14 \times 1.528 = 21.392$ feet, which equals 21 feet 4¾ inches (column 3, line 16).

The bevel to fit hips together at the top is 8 and 21 3-16 inches (column 4, line 16). The length of the first jack when spaced 24 inches from centers is 69.28 inches, which equals 5 feet 9¼ inches (column 6, line 16). If the jacks were spaced 20 inches from centers the length of the first jack would be $20 \times 2 \times 1.443 = 57.72$ inches, or 4 feet 9¾ inches (column 2, line 16).

The hip, horizontal and plumb cut is 13.86 inches and the rise of the common rafter in inches to the foot run, as is given at the bottom of the accompanying table. The factors and cuts for other pitches can easily be worked out, and I think this is a much safer plan than drafting and scaling, as it is accurate.

Note.—We trust that our correspondent, as well as other readers, will feel free to write an occasional letter for the Correspondence department, as there are always questions concerning which an expression of their views would be both interesting and instructive.

Use of Red Cedar Shingles.

From H. S. W., *Watkins, Ohio.*—Will brother "C. K. S." of Wayland, Iowa, please tell us what kind of shingles we have on the market? Are they red wood or cedar? In 1888 I laid 14,000 red cedar shingles which were sold on a guarantee not to shrink, swell or cup. Now the shingles which are sold here for cedar cup badly. Why is it?

WHAT BUILDERS ARE DOING.

THE records of the Building Department of Boston show that during the month of April there was a gratifying increase in the number of permits issued for new buildings, the total being 133, as compared with 80 for March. When, however, the figures for April are compared with the same month a year ago the showing is not so satisfactory, as there is a falling off of 59. For the first four months the story is much the same, for without a single exception the 1900 figures fall far below those of the corresponding period of recent previous years. For the first four months permits for brick and wood structures were issued to the number of 325, as compared with 567 in 1899, 618 in 1898 and 904 in 1897.

There has been more or less friction in the trade, one of the troubles being the strike of the carpenters for an eight-hour day, at a minimum wage of $15 per week. The strike has been in progress for several weeks, and as we go to press there seems to be some prospect of a satisfactory settlement. The statement is made that about 185 firms are now working eight hours, and the men have the promise, they claim, of a number of others coming into line at an early date.

Cleveland, Ohio.

Building operations in Cleveland are brightening as the season advances, and what promised in January to be one of the dullest years on record will probably round out in good average. For April the number of permits issued was 302, as compared with 282 last year, but the buildings were smaller, aggregating only $382,600. Early summer will find contractors fairly busy on numerous residences, remodeling jobs, shop and factory additions, and churches and schools.

The Builders' Exchange has taken up the question of establishing a trade school, a great deal of enthusiasm having been shown over this subject at the last regular meeting. J. A. Reaugh, a leading general contractor, volunteered to start a subscription for this purpose with a gift of $500. A committee has been appointed to consider the proposition. Another matter which the exchange is agitating is the restriction of unsightly billboards on residence streets and contiguous buildings. In this move the press and public heartily join.

During the winter an Exchange Bowling League was organized, and the members of the various teams derived both recreation and exercise from this popular sport, the winning team receiving a handsome silver cup as a trophy. A base-ball league has now supplanted the bowling, the younger element thus finding pleasant relief from routine drudgery.

Columbus, Ohio.

The outlook for spring business in the building line is regarded as very encouraging, although the high prices of materials entering into the construction of buildings has had more or less effect upon the volume of operations.

The Carpenter Contractors' Association, recently organized, is for protection against strikes and for the purpose of elevating the business. About all the contractors of the city have joined the association, and journeymen have been granted a rate of wages of 30 cents an hour, eight hours constituting a day's work.

Lowell, Mass.

The annual meeting of the Builders' Exchange was held on April 18, when the following officers and Board of Directors were elected:

President, Wm. H. Fuller.
Vice-President, Patrick Conlon.
Secretary, William F. McElholm.
Treasurer, Joseph B. Varnum.

The above, with Frank W. Cheney, James Dow, Joseph L. Cushing, Thos. E. O'Day and John Mannel, constitute the Board of Directors.

After the business meeting had been concluded the annual banquet was held in the evening, which was in every way a most enjoyable affair. James T. Smith, secretary of the Board of Trade, delivered an interesting address, other speakers being Amasa Pratt, W. H. Wiggin, M. F. Davis, Hubert R. White and William F. McElholm.

Some little anxiety has been manifested on the part of several of the builders, in view of the labor agitations. The bricklayers on one mill job struck for an increase of 3 cents per hour, which was as promptly given as demanded. The master carpenters have expected trouble, but no attention has been paid thus far to the demands, owing, no doubt, in a large measure, to the fact that there is little work being offered and consequently there is little about which to raise trouble.

Milwaukee, Wis.

The outlook at the present time in the building line is not altogether encouraging. There are quite a number of small buildings under way, and there is more or less repairing. Some of the few large jobs include two churches, several manufacturing buildings and a new Young Woman's Christian Association Building, in addition to which a large office building is going up on the site of the old post office. The report of the Building Inspector for the first four months of the year shows the estimated cost of the new work in the building line to be $819,245, as compared with $1,470,015 for the same period last year. The opinion seems to prevail that the fall in the price of iron and in some grades of lumber has not been without influence on building operations, as people do not seem to care very much about investing on a falling market. The hope is expressed, however, that the season may yet turn out better than expected. Up to the date of our latest advices there have been no labor troubles of moment, and contractors and builders do not anticipate any for this season.

The Builders and Traders' Exchange is gradually but surely increasing its membership, and matters are moving along smoothly. The Entertainment Committee of the exchange was kept busy during the past season, providing a series of card parties and musical entertainments for the members and their ladies, these being well patronized and proving enjoyable in every way. A general outing and picnic is in preparation for June, and this, in addition to Carnival Week, will keep everybody in good humor for a while.

New York City.

There is a considerable amount of building going on in the city and vicinity, notwithstanding the labor troubles which have developed in a number of suburban sections. The amount of building, however, is not up to the volume of last year, and this is not altogether surprising, as 1899 was a record breaker in the Greater New York. Commissioner Brady of the Bureau of Buildings recently issued his report, covering the operations of the department for the first three months of the year, showing plans to have been filed for 838 new buildings, estimated to cost $16,042,814, with plans for alterations to existing buildings numbering 1480, involving a cost of $2,231,076. The total number of permits issued for the first quarter of the present year was 3412, calling for an estimated outlay of $18,377,689, as compared with 4677 plans for which permits were issued in the corresponding quarter of 1899, the estimated cost of these improvements being $38,410,597. Bringing the figures down to the time of going to press, the estimated cost of the new buildings projected since the first of the year in the boroughs of Manhattan and the Bronx was $22,242,395, as compared with $48,479,952 for the corresponding period of last year. From these figures it will be seen that the falling off this year has been very marked.

At a meeting of the Builders' Material Exchange, held at their rooms, 18 Cortlandt street, officers were elected for the ensuing year, as follows: President, Robert B. Waldo; vice-president, Walter H. Redman, and treasurer, Benjamin Cochran.

The Master Carpenters' Association, recently organized in this city, has a membership roll containing some of the best known names in the trade. The officers of the association are: President, Robert Christie; vice-president, William F. Miller; second vice-president, A. G. Nason; secretary, James S. Herrmann, and treasurer, William C. Smith.

Pittsburgh, Pa.

Building operations during the month of April made a new record so far as the estimated cost of the improvements is concerned. According to Superintendent J. A. A. Brown, the figures were $1,205,647, which are $436,482 more than the cost of the improvements for the same month of last year. The number of permits issued for new buildings was 217, of which 104 were for brick structures, 84 for frame, 16 for brick veneer and 4 for brick and stone. There were 97 permits issued for additions and 12 for alterations. The increase in permits, as compared with March, was 21, and in the estimated cost $322,070. The figures for April indicate one of two things; either that the houses now building are of a better class, or that the cost of material and labor has increased proportionately.

The revised plans for the new Union Station of the Pennsylvania Railroad Company are nearing completion, and provide for a structure 352 feet long and 175 feet wide, and 11 stories in hight. It will be of steel frame construction and is expected to be one of the handsomest in Pittsburgh.

San Francisco, Cal

The building situation seems to be in good shape. The number of structures, great and small, now going up or in contemplation, both in San Francisco and in the State at large, is greater than it has been for several years. This seems to be largely due to the improvement in grain and fruit prospects, but is also, in part, the effect of the general business prosperity and the increasing trade of San Francisco. Architects report a rush of work in the matter of suburban buildings.

The plans for the new Carnegie Library Building at Oakland, Cal., have been adopted, Bliss & Faville of San Francisco being the architects. Plans were submitted by 51 architects, including ten from the East.

From San Diego comes the report that the new Carnegie Library Building at that place, to cost something near $50,000, is now well under way. The State Normal School addition in that place, also costing $50,000, will be ready for occupancy in September of this year.

James Moffitt of Blake, Moffitt & Towne of San Francisco is now receiving bids for the construction of a new building at Los Angeles, Cal., to be used by the big paper company. The cost of the building is limited to $100,000, and it is expected to be completed by October 1.

Ground has been broken for the erection of the new County Court House of Orange County, in Santa Ana, Cal. The building proper will be 135 x 90 feet and 50 feet in hight, with a tower reaching 135 feet from the ground. It is intended that the building shall be entirely fire proof. The cost of construction is estimated at $95,000.

The Board of Directors of the Masonic Hall Association of Nevada City, Cal., will shortly erect a new two-story building on their Pine street property, in that city.

The Pacific Art Mfg. Company, who were recently incorporated in Los Angeles, Cal., have the plans and specifications for their manufacturing building well under way. The principal building will be 570 feet front by 185 feet deep, and will be of brick and stone, with ornamental front. The central part of the structure will be four stories high.

A new school building is now being aranged for by the School Trustees of Oakdale, Cal. A number of architects from San Francisco have submitted plans.

The Protestant Episcopal Church of Spokane, Wash., has incorporated a society for the purpose of erecting a new St. Luke's Hospital, to cost $50,000.

St. Louis, Mo.

Advices from St. Louis under date of May 14 indicate a rather dull condition of affairs in the building trades and with no immediate prospects of increasing activity. The carpenters are on a strike for 45 cents per hour, and it is understood that the builders are not willing to concede more than 35 cents per hour. The painters, also, went on strike for $3 per day of eight hours, and this demand was granted. There are, however, new disturbances arising all the time in the various branches in the trade, and the local contractors and builders do not consider the outlook at present as being at all encouraging. The trouble was also further augmented by the monster car strike, reports of the probable settlement of which reach us at the hour of going to press.

Utica, N. Y.

The annual banquet of the Builders' Exchange was held at the Auditorium on the evening of Thursday, May 3, there being something like 60 members present. The toastmaster of the occasion was William Fisher, who first called upon John F. Hughes to respond to the toast, "Our City." F. H. Gouge spoke as the representative of the architects; John Doyle responded briefly for "The Ladies," and John Redmond spoke for "The Builders' Exchange." Among the other speakers were C. Y. Fuller, representing the cut stone trade; Jacob Agne, Jr., who also spoke for the architects; Joseph Weeks and W. C. Hughes, who upheld the cause of the plumbers; Barney McDermott responded for the masons; Daniel Sabine and W. J. Paddon for the painters, and Fred S. Kellogg for the lumber dealers.

Worcester, Mass.

The opinion seems to prevail among the leading architects, contractors and builders of the city that the volume of business this season will be fairly large in the aggregate, although they point out that the advance in prices of building materials has served to check some enterprises. In consequence of the sale of the Boston & Albany Railroad, and the change in connection with the wire works, quite a large amount of money has been distributed among the stockholders in the city and vicinity, and some of this capital is likely to seek investment in real estate and building operations. Lumber, although higher, has not taken such a jump as iron, and for several reasons dealers express the opinion that the advance in lumber will be maintained, so it is concluded that a large share of the buildings to be erected will be of moderate cost, rather than of an expensive nature.

Mr. Sweetser, secretary of the Exchange, writes under recent date that the members have more or less work on hand, and speak encouragingly of a good spring business.

Notes.

From present indications there will be a considerable amount of building in Madison, Maine, during the present season, as a number of new houses have been projected and a town hall is to be put up at a cost of $12,000.

The carpenters and builders of Great Barrington, Mass., are looking forward to a good season, and we understand contractors are refusing work from out of town.

The labor troubles which have existed between the granite manufacturers and the cutters of Quincy, Mass., since March 1 have practically ended, the men being granted an eight-hour day with a minimum wage of 33 cents per hour, the existing piece bill of price to be advanced 14 per cent., and the same to hold good for several years.

Charleston, S. C., is enjoying a general improvement in the building line, and a number of new buildings are in process of construction.

The Soft Stone Cutters' Union and the Granite Cutters' Union of Atlanta, Ga., have settled their differences, the men to be paid a rate of 37½ cents an hour and a day to consist of eight hours' work.

Permanence in Building.

We have frequently deprecated in these columns, says the *Brickbuilder*, the excessive haste which characterizes modern work, accompanied as it generally is by neglect of good construction. The discouraging tendency of haste upon good architecture is an element which counts for more in our national development than we perhaps sometimes appreciate. The policy of "good enough" is what has transformed many a promising young architect into a mere commercial hack, who though theoretically in love with his profession is simply after the dollars. It takes so much time to study that unless an architect will be most strenuous in demanding the opportunity he will find himself drifting in the wrong direction. There used to be a saying among some of the salesmen who had to do with architectural goods in this part of the world that it was easier to give a Boston man what he wanted than it was to persuade him that something else was better. The truth of this can hardly be questioned. though we fancy that its application need not be restricted to Boston; but the architect who lets that fancy influence his design will sooner or later find himself adrift. Broadly speaking, the conscientious architect will never allow considerations of cost or time to influence his judgment or decision as to what is, under the circumstances, right or best for the building. This implies neither rank extravagance nor oblivion to the client's wants, but is, in fact, the truest consideration of the real necessities.

We had an illustration brought to our notice a few days ago of the deplorable results to every one concerned of undue haste in building. An architect had made a very clever design for a small structure. He had hit it about right without being obliged to spend a great deal of time in study. The contract was let to a thoroughly good builder; but the condition of the steel market and some labor agitations conspired to so delay matters that the building, which was to have been completed within a year, and could have been done in proper manner in that time, had hardly more than the foundations laid six months after the contract was signed. The owners insisted on the structure being completed on contract time. The builder was able and willing to do so, and though the architect protested, his protest was neither sufficiently loud nor efficacious, and the result is that today we have a building which was, to be sure, completed in contract time, but in which the finish is making faces at all beholders, the masonry is settled, several of the sills cracked, and there is about this structure, less than two years old, a general air of dilapidation, which is the natural concomitant of too much haste.

Roman Concrete Walls.

The chief objection to rubble and concrete walls is the roughness of the surface, but the ancient Romans got over the objection in various ways. At first they faced them with the large blocks of tufa, such as had previously been used in the time of the kings (rubble walls only came in with the Republic); afterward, in the latter days of the Republic and in the early Empire, they faced them with small wedge-shaped blocks of tufa; the square surfaces of those small blocks being placed diamond-wise, resembling in appearance a small net, hence called network, or reticulated work. Afterward they used bricks or tiles of a triangular shape, with the long surface outward, and thus these also formed a sort of wedges, but the mortar held them so tight that even if held by the point only the brick or the block of tufa will break before it can be pulled out. The smooth surfaces are then frequently plastered and painted, or covered with marble. In building such a wall the wedge-shaped blocks or tiles were placed in order and filled up with the broken stones to the depth of about a yard before the cement or hot-lime grouting was poured in. The whole was thus bound together in one solid mass, with openings left for doors and windows.

A NOVEL business in London is that of dealer in second-hand plate glass. Large plates of glass are insured when placed in a window, and when any of them are broken the owner of the injured glass usually prefers that the insurance company should replace the broken plate, rather than pay its value. The insurance companies dispose of the injured plates to dealers in second-hand plate glass, who utilize what remains of the unbroken plate, cutting it into panes of smaller size and disposing of them to various firms.

NOTES OF THE PARIS EXPOSITION.

DOUBTLESS there are many readers of these pages who will not find it convenient to attend the Paris Exposition, but who are interested in the architectural features of some of the more important buildings, and it is for this reason that we devote considerable space this month to a communication from our own correspondent on the ground, and who accompanies his letter with the photographs from which the illustrations are reproduced. Writing under date of April 10, he says:

When this reaches the readers the formal opening will be over. The President of the Republic will walk through some of the principal buildings, and then the labor of installation will be resumed with the wonted display of well tempered activity. While the number of exhibits actually in place is very small, and it is useless to attempt any description of what little there is, the buildings themselves have taken shape so far that a very good general idea of their character and their arrangement may be obtained. A few pictures will best serve the purpose, although there are lost, of course, in the photographs the color effects which play so important a part in the general scheme. The group reproduced herewith was taken from the Alma Bridge up and down the Seine, the bridge being about midway between the Champ de Mars and the Invalides sections, connected as they are by a narrow strip on both sides of the river. A good deal more has been made of the section along the banks of the Seine than was done in 1889.

Fig. 1.—Looking Down the Seine, Left Bank, Showing Mexican and Hygiene Buildings, Eiffel Tower in the Distance.

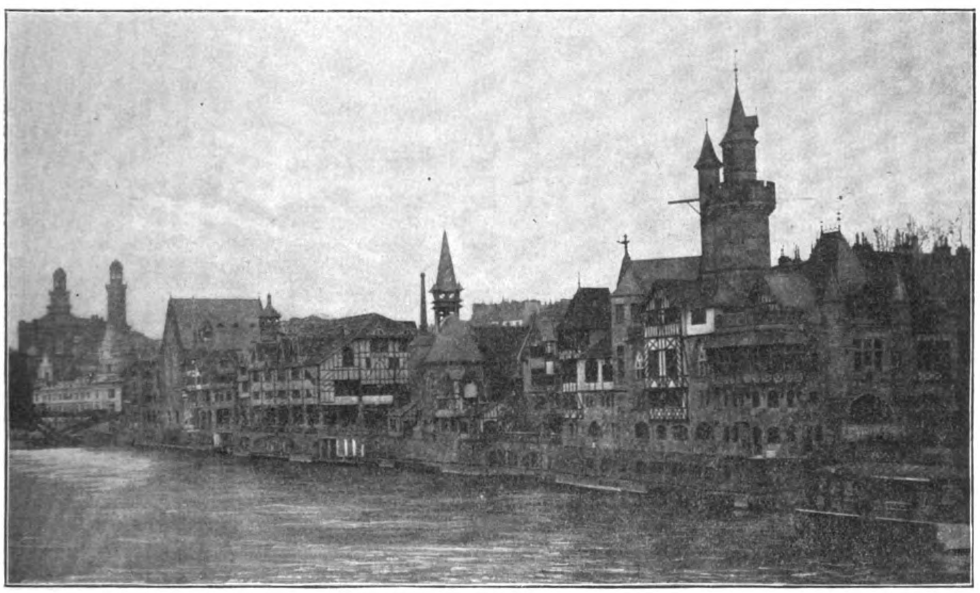


Fig. 2.—Looking Down the Seine, Right Bank, from the Pont D'Alma.

Notes of the Paris Exposition.

Fig. 1 shows a view of the left bank of the Seine looking down the river. The Eiffel Tower in the distance will locate the position with those who are familiar with Paris. The first building in the foreground is the Mexican Pavilion, while the structure still in the builders' hands is the Palace of Hygiene. Beyond is the beginning of the Army and Navy Building. In the distance is a part of the smaller structures which cluster at the foot of the Trocadero. A foot bridge is under construction across the Seine to connect the banks within the grounds.

The opposite bank of the Seine is shown in Fig. 2, Along the Seine there are in their order, from right to left in the picture, Servia, Greece, Sweden, with the tower still under construction; Monaco, Spain, Germany, with the turreted tower, Norway, and in the distance, only partly revealed, Great Britain, Hungary, Austria, the United States, Turkey and Italy. In some cases the pavilions are so close together that a child could throw a stone from one to the other.

Our fourth picture gives a view, upstream, from the Alma Bridge, of the right bank, showing in the foreground the Palace of Social Economy, in which the great number of congresses are to hold their meetings. Be-

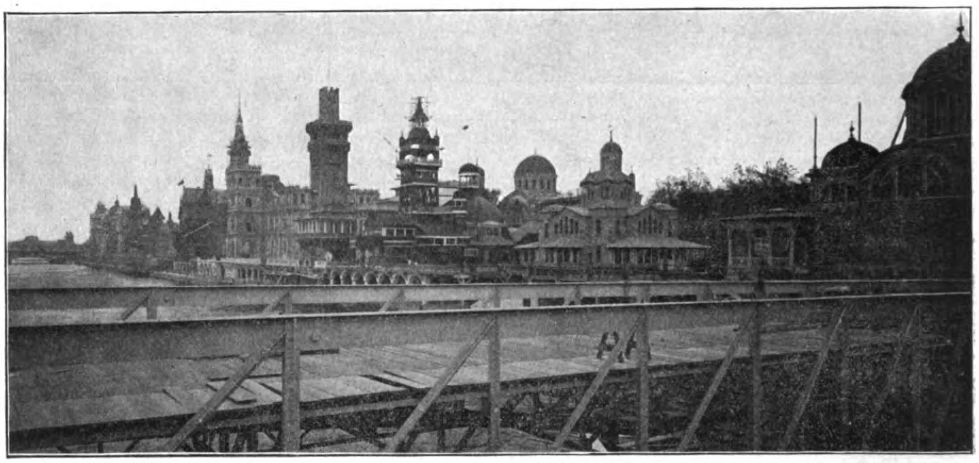


Fig. 3.—Looking Up the Seine, Showing Pavilions of All Nations.

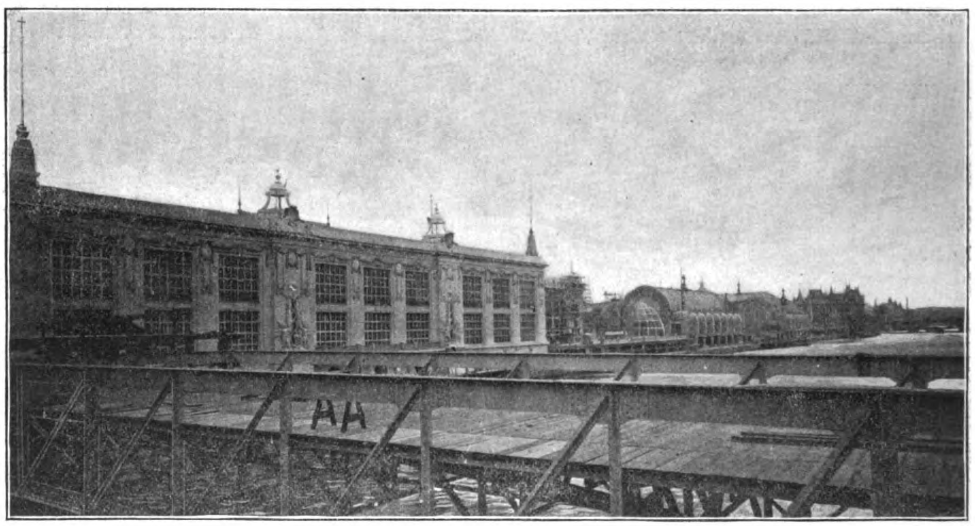


Fig. 4.—Looking Up the Seine, Right Bank, Showing Palace of Congresses and Horticultural Hall.

Notes of the Paris Exposition.

the foreground, including the building just beyond the church, being a reproduction of Old Paris. In the distance are the towers of the Trocadero.

The foreground of Fig. 3, looking up the Seine at the left bank, is occupied by a foot bridge close to the Pont d'Alma. Paternal officialism would not allow the photographer to risk his life upon a structure not formally opened to the public by authority. The picture, however, affords a good glimpse of that extraordinary jumble of architecture, the pavilions of all nations. Between the short distance from the Alma Bridge to the Invalides Bridge there are crowded in two rows 23 pavilions. yond lie the magnificent two greenhouses for the exposition of Horticulture and Tree Gardening, with the Aquarium between them. In the distance is the graceful Pavilion of the City of Paris.

The one sensational feature of the Exposition, the Water Castle, is still so far behind that a photograph would fail to convey an adequate conception of its features. From the second story of the façade of the Electricity Building, which faces the Eiffel Tower, and connects the two main buildings of the Champ de Mars, a cascade of water falls from a hight about 90 feet above the general ground level from a niche about 75 feet in diameter. This is to be illuminated at night with varied bright colors, and will undoubtedly produce extraordinary effects. From a grotto back of and through the falling sheet of water the Eiffel Tower, and, in the distance, the Trocadero, will be visible.

One of the most beautiful groups, likely to prove most attractive to the general visitor, will be the two Art Palaces, with the magnificent Alexander III Bridge, and the series of buildings on the other bank of the Seine beyond, the center of the picture in the distance being the gilded dome of the Invalides.

The two Palaces of Fine Arts are practically complete. Both of them are permanent structures. Our illustration, Fig. 5, shows the large palace. The small Palace of Fine Arts, which is to house an historical display of French art, was built from the designs of M. Girault. The main entrance, flanked by fine groups of statuary, gives access to a rotunda lined with handsome marble and surmounted by a high dome. Right and left, along the façade, extend two lofty galleries. The most striking feature, however, is the open court, bounded by a semicircular colonnade, broken by two arched doors. The court is occupied in part by three porcelain lined basins, hemmed in by bright mosaics, and conforming in a general way to the semicircle of the colonnade. Hightened by a frieze, partly gilt, and by gilt statuary, the effect is admirable.

The two main galleries along the façade end in rotundas for staircases, and from them there stretch two semicircular galleries, in which exhibits are being installed, the one receiving its light from the court, and the other from the flanks of the building.

The large palace of Beaux Arts, Fig. 5, occupying the other side of the wide causeway, has a main entrance, subdivided by two groups of two pillars, the main façade having a series of columns masking it. The frieze is ornamented by a series of enamel mosaics, representing art in Assyria, Egypt, Rome, Greece, Arabia, &c. The main building consists of an elliptical main hall roofed by a splendid steel structure, from which extend on either side great roofed transepts and a nave, the whole being an admirable example of modern steel construction. A series of salons are arranged in two stories which communicate with the roofed court. It is in this great building that the exhibits of modern painting and statuary are to be installed. Quite a considerable number of works of sculptors are collected in the court, ready to be placed in position.

The Alexander III Bridge is an admirable example of the combined efforts of the engineer and the architect, the former represented by Résal and Alby and the latter by Cassien-Bernard and Cousin. The bridge, which has a span of 342 feet, consists of 15 steel arches built up of steel castings, their total weight being 2200 tons. Hammered copper groups, not yet in place in the picture, are to mask the key of the arch. Ornamental pillars, with large gilt equestrian groups and a series of exceedingly handsome figures, give the whole an admirable finish.

Standing on the bridge, the view of the Exposition buildings along the Esplanade des Invalides is well shown in Fig. 6. They consist of two wide structures parallel to a main thoroughfare, with the dome of the Invalides in the background, as indicated in the photograph. Near the bridge there is a widening of this lane, the end façade being marked by the four turrets shown, which consist of a cupola upheld by four groups of female figures. The faces of the narrowed structures nearest the bridge are ornamented with four large, bright mural paintings, and generally the dazzling white is relieved by patches of color and by gilding.

The whole of the buildings on the left of the picture have been reserved for French exhibitors of furniture, domestic art, jewelry, cutlery and varied industries, a good deal of space being given to the national industries of Sevres and Gobelins. The buildings on the right side are devoted to similar products of other nations.

As a whole, so far as the buildings are concerned, he will be disappointed who expects the classic, almost severe, beauty of the Court of Honor at Chicago. The tones are gayer, the outlines more varied, and occasionally *bizarre*. The triple arch of the Monumental Entrance, with its crowning statue of the modern Parisienne in particular, is the subject of many irreverent remarks. Yet one cannot escape the belief that under the brilliant skies of our own country greater freedom in coloring and in decoration would be appropriate and effective.

A trip along the Seine emphasizes the need in our country of a closer co-operation between the architect and artist with the bridge engineer. The brutally utilitarian character of the vast majority of our structures of this type ought to be softened by the touch of the artist. Public conscience should be awakened more than it is to an intolerance of monstrosity in form and utter lack of decoration in public structures. In many directions Americans have proved their ability to create and appreciate the artistic and the graceful, and development

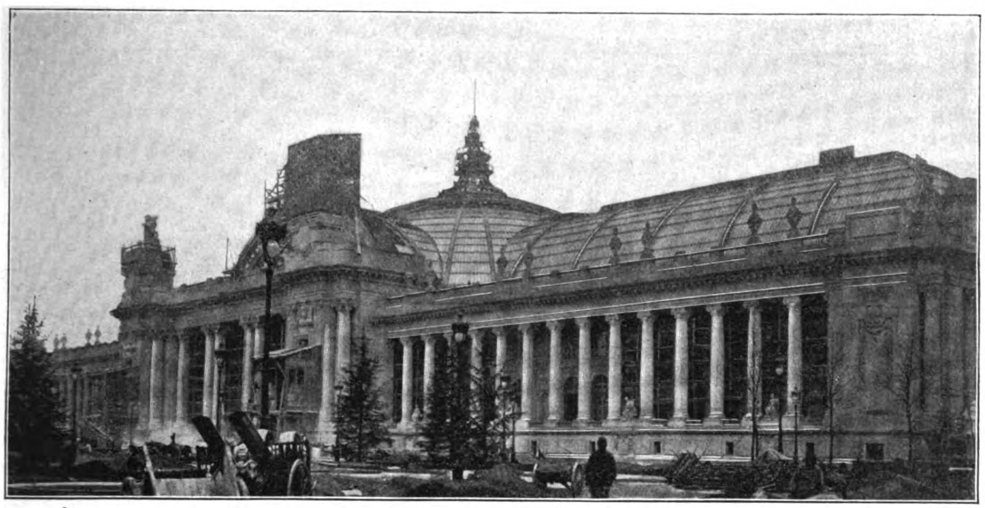


Fig. 5.—Large Palace of Fine Arts.

Notes of the Paris Exposition.

in that direction in one field is sure to operate favorably in branches in which progress aids much toward commercial success in others, particularly when foreign markets are concerned. In tools and appliances our products have that grace and beauty which comes from the embodiment of the best means to a useful end. No one can accuse us of being clumsy, but that is only one step, though an essential one, toward perfection. One gathers the impression, which may be strengthened by a later study of the exhibits of other producers, that Americans have most to learn and have an important field for development in this direction.

Writing under date of April 17 our correspondent says, after referring to the formal opening of the Exposition:

The great hit of the Exposition from a popular point of view is the moving sidewalk, a strip of which, it will be remembered, was in operation in Chicago in 1893. It had been running experimentally off and on during the last two weeks and aroused some attention, particularly when an occasional bicyclist speeded along. But it sprang into instant popularity on the afternoon of the opening day, and seems destined to become a favorite amusement and a common means of travel from point to point. It is installed on a light elevated steel structure and encircles the irregular triangle along which stretches, on the Avenue de la Bourdonnais, on one side the palace of Mining and Textile Arts of the Champ de Mars, on another the Rue Fabert, flanking the buildings of the Invalides, and on the third the Street of All Nations, &c., along the Seine. Paralleled throughout its length it competes with an elevated electric road and like it gives a good general view from a high point of the buildings along which it passes. Both lines furnish an excellent and convenient means of communication, but evidently the moving sidewalk is bound to secure the lion's share of the traffic of those who are not foot weary. The entire circuit is about 3000 m., or, approximately, 2 miles, and the traveler has the advantage of being able to leave the moving sidewalk at any place to quietly survey his surroundings. The first moving platform, by the side of the stationary platform, has a very slow motion, while the second platform, slightly higher, travels at a speed of about 5 miles an hour, so that a brisk walk on it causes quite a lively rate of travel. The institution has already been pronounced by the Parisians one of the *clous* of the exposition.

Fig. 6.—View of the Esplanade des Invalides, Taken from Alexander III Bridge.

Notes of the Paris Exposition.

French Workmen.

To judge from the fact that it is a matter of general and somewhat contemptuous comment among the Americans connected with the work here, the capacity and the characteristics of the French workmen must have been the burden of many reports and letters home during the past few weeks. Their deliberate movements, the frequency of their adjournments to *déjeuner* and the length of these meals, the long pauses for conversation and comment, their eagerness for a *pourboire* and their utter irresponsibility as to future engagements have been exceedingly exasperating to those who expected co-operation and sympathy in their eagerness to rush work to completion. From personal observations your correspondent is willing to assent to all these strictures, and the contrast between the French workmen at the exposition and the few American workmen who have come over to aid in installation is indeed very striking. The latter, however, were in all cases picked men.

But admitting all that has been alleged to be true, your correspondent is convinced that a serious injustice may be done to the laborer of our Sister Republic, and that erroneous and therefore dangerous conclusions may be drawn. In matters of this kind it is well to be frank. To begin with, those Americans who have employed French workmen have had no experience in selecting their crews. The majority of them, not having command of the French language, have been unable to handle them effectively. Many have attempted to drive them and have neglected or failed to give them gratuities to which custom entitles them. But, after all, the principal reason why it is unfair to judge of the characteristics of the French workmen from those with whom American exhibitors have come in contact themselves, or have observed at work for others, is that the exposition has gathered together the floating working population of Paris and of the whole of France. That such should be the case is natural enough. Exceptional wages are being paid, and the temptation to visit Paris and the exposition has undoubtedly been a strong factor. The great majority of the men know that their employment is only temporary, and many undoubtedly have been deliberately "soldiering" in order to nurse their jobs. While such an occasion may bring some of the pick of the men, it is quite clear that the great majority must be naturally considerably below rather than above the average of the working population of France.

AMONG the notable exhibits at the Paris Exposition from this side of the water will be that of the George A. Fuller Company, the well-known builders, who will show a miniature 16-story steel construction building about 20 feet high, also a full sized terra cotta office building entrance, the latter being the reproduction of a fine entrance in a New York building erected by them. Other features of American office building construction will be exhibited and explained in detail.

Italian Brick Work.

Italian bricks are by no means of very fine quality, save where molded bricks are used, but the Italian architects differed from others in the extent to which they made use of stone intermixed with the brick work of their buildings. The arrangement refers not only to the occasional introduction of stone voussoirs in the arches, but to the commonly recurring system of horizontal courses of stone alternating with courses of brick in the walling. Sometimes, says an English writer, this is regularly carried all over a wall, sometimes only a course of stone is introduced here and there to mark some line or feature which appeared to require considerable emphasis. Sometimes again, as in the Romanesque apses of San Fermo Maggiore, Verona, a single course of brick is introduced between all the courses of stone, and the effect of this is delicate and good. The same church contains many examples of very ingenious mixture of stone and brick, and, on the whole, few examples are altogether more valuable. Sometimes we find, as in a wall in San Stefano, Bologna, the wall diapered regularly in brick. Here the diaper is made with thin red bricks arranged in diagonal lines all over its surface, the squares contained within them being all of yellow brick. This kind of work is never pleasant save for the filling in of a spandrel, or some such place where no strength is required. It gives, of course, the impression of being a veil to the wall and not the wall itself.

Forestry at the Paris Exposition.

One of the many interesting American exhibits at the Paris Exposition will be that of the Division of Forestry, which will be wholly distinct from the commercial features of lumbering to be shown in another department.

The display will be in the form of a hall or pagoda, the walls of which consist of large transparencies illustrating American forest conditions. These walls will be double and illuminated by interior electric lights. The pictures range in size from 3 x 5 to 4 x 6 feet. There will be two transparencies, 6 x 10 feet, portraying groves of red fir and California big trees, two of the most impressive American trees.

A point will be made of the relation of forestry to agriculture, and such subjects as protective forests, the use of trees in preserving water supply, the management of woodlands, &c., are fully illustrated. The extent of the timber resources of the United States will be shown by pictures from all important lumber regions. The distribution of forests will be shown by maps. Twenty of the most important American woods will be represented by sections of trees.

Concrete Without Cement.

A kind of concrete made without cement is said to be in favor with Parisian architects. It is composed of 8 parts of sand, gravel and pebbles, 1 part burnt and powdered common earth, 1 part of pulverized clinkers and cinders, and 1½ parts of unslacked hydraulic lime. These materials are very thoroughly interspersed while dry into a homogeneous mixture, which is then worked up and well beaten. The result of this is a hard and solid mass, which sets almost immediately, becoming very strong in a few days. It may be made still stronger by addition of a small proportion—say 1 part—of cement. Among other constructions to which this material has been applied is named, as an example, a house 65 x 45 feet, three stories high, standing upon a terrace which has a retaining wall 200 feet long and 20 feet high. Every part of this structure was made of the hard, economical concrete, including foundations, cellar vaulting, retaining wall, and all exterior and interior walls, together with the cornices, moldings, string courses, balustrades and parapets. There was no bond iron used in the walls, and no wooden lintels, beams or posts were required. It is claimed for this material that it is not liable to crack or scale, while it is extremely cheap, as it can be made almost wholly from material to be found anywhere.

New Publications.

THE PREVENTION OF LOSS BY FIRE. By Edward Atkinson. 96 pages. Bound in paper covers. Published by Damrell & Upham. Price 25 cents.

This little work is in effect 50 years' record of factory mutual insurance, based on 35 years' personal experience of the author, with suggestions for the protection of cities from conflagrations. The opening pages are devoted to a statement of facts and figures regarding the early system of factory mutual fire insurance, which was founded by the late Zachariah Allen of Providence, R. I. The bulk of the matter, however, has to do with the remedy for excessive fire loss, and what is presented may be found of interest to underwriters and to those who are concerned in organized methods of preventing great conflagrations in cities.

SYSTEM OF MEASUREMENTS. Size, 9 x 12 inches. 60 pages. Bound in cloth covers. Published by *Painters' Magazine*. Price, $1.

Some years ago the National Association of Master House Painters and Decorators of the United States appointed a committee consisting of three well-known employing painters of Boston and Cambridge, Mass., to draft a uniform system of measurements for painters' work, the idea being to obviate much of the unfair competition which arises from ignorance of the principles of correct estimating, rather than from any desire to take work for less than it is really worth. After laboring with the subject for some time the committee finally submitted a report which was so comprehensive that it was decided by the association to publish it. The original intention was to confine its circulation to the members of the association for their sole use, but it has now been thought advisable by them to offer it to members of the trade or any one sufficiently interested to purchase a copy. The work is illustrated by means of six lithographic plates showing the application of the system to houses of various designs, and different interior and exterior details. There is no attempt to give prices, but the work consists of a comprehensive system of rules for reducing the various surfaces, moldings, balustrades, &c., to an equivalent number of square yards of plain surface that will represent an equal cost to the painter of the same quantity of work required to be done. It is therefore necessary only to measure the work in accordance with these rules and apply the local prices per square yard to plain surfaces, which of course is governed by cost of material and labor, to be able to correctly estimate the most complicated job of painting. In addition to the rules there is a glossary of architectural terms.

MODERN SUBURBAN ARCHITECTURE. By William A. Lambert, architect. Size, 11¼ x 15 inches. 56 pages. Bound in paper covers. Published by the author. Price, $1, postpaid.

This work contains plans and exterior and interior views of suburban cottages, most of which have been erected in the vicinity of New York. The illustrations are direct reproductions from photographs, thus rendering the book an exposition, as it were, of current work. The designs represent a wide variety of houses, ranging from those of small cost to the more elaborate and expensive, and have been designed by the author. Among the introductory pages are to be found many suggestions relative to various features of home building, and the volume, taken as a whole, can be regarded as an interesting contribution to architectural literature.

General Society of Mechanics and Tradesmen.

We take pleasure in calling the attention of our readers in New York and vicinity to the opportunities for evening study afforded by the General Society of Mechanics and Tradesmen. This society, founded by master mechanics and engineers in 1785, has had an honorable and useful career for more than a century. It started its free schools for teaching drawing to young mechanics long before public schools were instituted, and has helped many young men to better positions and higher salaries. Within the last year the society has moved into the spacious building formerly occupied by the Berkeley School, in West Forty-fourth street, New York City, and has fitted up the greater portion of the building as school rooms, where instruction is given three nights each week in all branches of mechanical, architectural, free hand and ornamental drawing and mathematics. The equipment of the school is modern, and the instruction practical and thorough. The society's extensive library is accessible to the students, as well as a complete set of models, which have recently been purchased. The course begins early in October, but to insure registration, application may be made now by calling at the school building, 20 West Forty-fourth street, any Monday, Wednesday or Friday evening, between 7.30 and 9.30.

Liquid Wood Filler.

In answer to a correspondent asking the best way to make liquid wood filler the *Painter's Magazine* suggests the following: Take 2 pounds of finely pulverized silex or China clay, which stir into 1 pint of good liquid drier; beat into a fine mass, then strain through an ordinary sieve with the aid of a brush, so that all the lumps are thoroughly broken up. Add to this paste, while stirring continuously, say 3 quarts or 1 gallon of a good, pale furniture varnish. Let it stand awhile and then strain through a fine strainer or sieve. See, above all, that the silex or China clay used in the mixture is bone dry. The suggestion is also made that the correspondent may find it cheaper to buy the liquid filler ready made, after counting up the cost for material and labor.

Law in the Building Trades.

WHEN CERTIFICATES ARE NOT SUBJECT TO REVISION.

Where the progress certificates on which payments are to be made are limited by the contract to such portions of the building as have been constructed in a manner satisfactory to the supervising architect under the contract they are not subject to revision at all, in the absence of some provision to that effect in the contract; and an accompanying provision to the effect that such certificate shall not be conclusive shall be construed to extend only to defects that were discoverable by the exercise of ordinary care prior to the giving of the progress certificates.—Ashland Lime, &c., Company *vs.* Shores (Wis.), 81 N. W. Rep., 138.

WHAT IS NECESSARY TO SHIFT RESPONSIBILITY FROM OWNER.

A building having fallen by reason of a defective foundation, injuring a workman in the building, the owner, to be exonerated through the architect, must show that the latter was skilled and competent, that he relied on him both for preparation of plans and superintendence and inspection of the work, and that he did not interfere with him in the discharge of his duties.—Fox *vs.* Ireland, 61 N. Y. Supp. Rep., 1061.

LIMITATION ON RIGHT OF ACTION BY CONTRACT.

Where the balance on a building contract was payable within 60 days after completion, inspection and acceptance by the architect, action would not lie within such 60 days, whether the architect accepted or refused to issue the certificate.—O'Connor *vs.* Adams (Ariz.), 59 Pac. Rep., 105.

WAIVER AS TO DEFECTS.

Where a building contract provides that a supervising architect representing the owner shall inspect the material and construction as operations progress, with power to reject any and all material and construction not deemed by him to conform to the contract, a failure to promptly reject any material or construction for defects discoverable by the exercise of ordinary care after a fair opportunity for exercising the duties of inspection constitutes a waiver of such defects.—Ashland Lime, &c., Company *vs.* Shores (Wis.), 81 N. W. Rep., 137.

CONTRACTOR MUST EXPLAIN UNREASONABLE DELAY.

A contractor's delay of 51 days in completing alterations in a building, after the expiration of the three weeks within which he agreed to make, is *prima facie* unreasonable, and places on him the burden of proving that the conditions justified such delay.—McLaren *vs.* Fischer, 61 N. Y. Supp. Rep., 808.

QUESTION OF PERFORMANCE TO BE DETERMINED BY THE JURY.

On the trial the evidence tended to show that the contractor used the material called for in the specifications, in the quantity and of the quality called for, under the direction of the city engineers; that they made no objection to same, nor to the method of construction; that the contractor complied with the specifications and contract in every particular, and that the plans and specifications as designed and embodied in the work were not sufficient to make the cellar water tight. On completion of the work it appeared that the cellar was not water tight. It was held, on appeal, in an action by the contractor for the price, that the question of whether or not the plans were sufficient to produce the result desired, and whether the contractor had performed according to the plans and specifications, was properly a question for the determination of the jury.—McKinight *vs.* City of New York (N. Y.), 54 N. E. Rep., 661.

CONTENTS.

Carpentry and Building

WITH WHICH IS INCORPORATED

The Builders' Exchange

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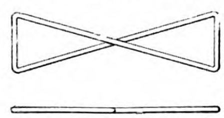
NOVELTIES.

The New York Wall Tie.

Another candidate for popular favor in the way of a tie for binding brick walls together is being introduced to the trade by Hurd & Co. of 570-576 West Broadway, New York City. It is known as the New York wall tie, and an idea of its construction and some of its applications may be gathered from an inspection of the accompanying illus-



Novelties.—The New York Wall Tie.—Fig. 1.—Edge and Plan Views of the Standard Form of Tie.

trations. It is possible there may be some who are not thoroughly familiar with the special uses to which a wall tie may be adapted, or that wall ties are employed as a substitute for "headers" in the construction of brick walls. Formerly a brick was laid at prescribed intervals transversely to the ordinary course of "stretchers," so that the ends of the brick were visible, according to the form of bond employed. With wall ties only the "stretchers" are used, so that the bricklayer is in a position to do his work much more rapidly than heretofore. The New York wall tie, here illustrated, consists of a small piece of galvanized wire bent to form two inverted wedges. Like any wall tie, it is laid so as to connect two bricks with the mortar or cement actually locking it and thus binding the wall together. It is used for binding face brick, terra cotta and hollow walls. While it has been upon the market but a comparatively short time, it has met with great favor, and is, we understand, being used in many of the buildings in course of construction in New York, Boston, Chicago and Pittsburgh. The tie is referred to by the manufacturers as being cheap, strong and easy to handle. It is in one piece and has one thickness. The standard form, of which plan and edge views are shown in Fig. 1, is made of No. 8 galvanized wire. It is 6¾ inches long and 2 inches wide at the base of each wedge, so that it is absolutely bed locked. The "drip"

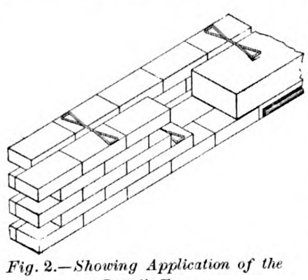


Fig. 2.—Showing Application of the "Drip" Form.

form, for walls with air space, the application of which is shown in Fig. 2, prevents moisture from traveling to the inner wall, a series of sharp points on the under side of the wire between the wedges assisting the moisture to form small globules and thus allowing them to drip. The goose neck form, shown in Fig. 3, is intended for veneer work and is designed in one piece, so that no staple is necessary. The bevel on the top part of the spike causes the tie to closely hug the brick. The barbs on the sides of the spike, like those on a fish hook, prevent its being pulled out from the wooden wall. We understand that those interested in goods of this character can secure samples and catalogue on application to the makers.

Composition Capitals and Brackets.

One of the handsomest trade catalogues which it has recently been our privilege to examine is that received from the Decorators' Supply Company of 209-219 South Clinton street, Chicago, Ill., illustrating some of the composition capitals and brackets which they manufacture in great variety of designs. In fact, the ever increasing demand for capitals has prompted the company to confine the catalogue solely to illustrations of the kind of goods indicated. These capitals and brackets are manufactured in different materials, and the designs range in style from the Grecian and Roman classics to the different periods of Renaissance, as practiced most successfully by the Italians, the French and our modern

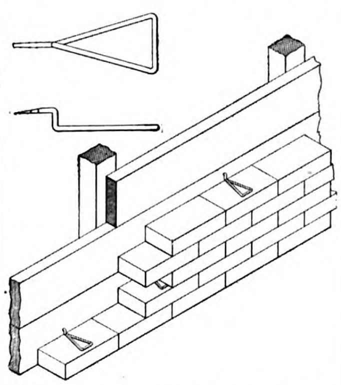


Fig. 3.—Form of Tie Used for Veneer Work

architects. The aim of the company has been to bring forward in this publication a large number of correct examples of those periods for the purpose of enabling architects and builders to select from the company's large stock of models the nearest example to the requirements of the building under way, and thus enable them to secure at reasonable cost the exact result desired.

The goods are made in what the company designate as exterior composition, which is warranted to stand any climate; interior composition, made with the grain to match any wood, and having a solid wood body, requires no core on the column; also fibrous plaster, used in conjunction with interior plaster finish. The exterior composition is used extensively for the ornamental features of buildings, and is said to combine with a very low price a fine artistic finish. It is particularly adapted for capitals, brackets, cornices, friezes, panels, arches, shells and gables With regard to the interior composition, the company state that when properly applied and finished it gives the same results as wood carving.

A striking feature of the catalogue is found in the handsome engravings of capitals, pilasters, brackets, &c., these being produced directly from photographs of the finished designs. In connection with the engravings are tables giving the various dimensions as well as prices of the different styles manufactured. The company announce that they are constantly adding new sizes to their stock and will make upon request any size desired. In presenting the catalogue to the trade the company desire to emphasize the fact that the goods illustrated within its covers are only a small percentage of their products, and, as they intend to embody the different articles manufactured in separate catalogues, they have refrained from illustrating anything else in the work under review. The catalogue is a fine example of the printer's art, and is bound in substantial cloth covers, with a side title in old gold.

Little Giant Brick Handler.

A brick handler which is being put on the market by Logan-Gregg Hardware Company, Pittsburgh, Pa., as general selling agents for the United States, is of such a nature as to hold ten standard bricks, or 16 Pompeiian bricks, thus making counting accurate and simple. It is stated that one man with a handler will do more work than four men without it, and have no breakage; also that a strong man can work with a handler in each hand. Ordinary men, it is further stated, with one handler, save 50 per cent. labor and 100 per cent. breakage. The device may be used on a hoist either single or double. The grip is sure, it is pointed out, with no possibility of the bricks slipping. It also may be attached to an endless chain elevator as readily, it is remarked, as one piece of terra cotta. The device is recommended by the company for the use of handlers of brick about brickyards, for mill work on large buildings as an economizer both in labor and breakage.

Double Hollow Chisel Mortiser.

Among the new machines likely to interest workers in wood which have been brought out by J. A. Fay & Co. of 513-533 West Front street, Cincinnati, Ohio, is the No. 5 double hollow chisel mortiser, illustrated in general view in Fig. 4 of the cuts. The machine has been designed for making two mortises at one stroke and is adapted for a great variety of work, the manufacturers pointing out that it will work mortises from

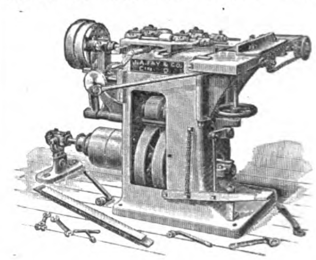


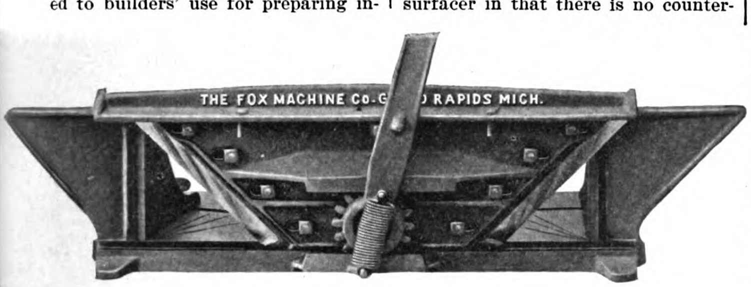
Fig. 4.—Double Hollow Chisel Mortiser.

6 to 13 inches apart. It is constructed on a substantial cored frame having ample floor support. The table is of iron, supported on the frame in a gibbed slide, and is adjustable vertically 6 inches. It also has a horizontal adjustment regulating the depth of the mortise. The back of the top plates is fitted with a **T** slot to receive the adjustable back and end stops. One of the features of

the machine is a fence provided for receiving the thrust of the chisels. The table is automatically brought to the chisels and is controlled by a foot treadle.

The Fox Medium Capacity Bench Trimmer.

The Fox Machine Company of Grand Rapids, Mich., have just added to their extensive assortment of wood trimmers a new size, which is referred to as being especially adapted to builders' use for preparing interior finish, &c., and can be utilized in the shop or taken to the job on which work is being done, thus making of it a very handy tool. It is known as No. 5-A, and makes a cut 1 inch higher than the company's No. 4-A. The construction is clearly indicated in the front view of the trimmer, which we present in Fig. 5 of the illustrations. The knives, which on each size of the machine are protected by shields, are made by the company with great care, and their long experience enables them to guarantee accurate cutting knives with a perfect temper. The makers also point out that one of the exclusive features of their knives is the full bottom, which is left so as to stiffen the cutting edge where it is used the most, and preventing it from cutting into the bed. The machine here shown, it is claimed, will trim the end of a roughly sawn piece of wood accurate and true on any angle, and will give such a smooth finish that sandpaper will scratch it. Workers in wood will readily appreciate these points, especially when they are called upon to do work where accurate joints are essential. This trimmer has a capacity for making a cut 8¼ inches in length and 5 inches in hight, the size of the bed being 9½ x 20 inches.



Novelties.—Fig. 5.—The Fox Medium Capacity Bench Trimmer.—Front View.

A Six-Roll Double Surfacer.

A machine embodying a number of important features which cannot fail to command the attention of wood workers generally is the new double surfacer recently designed and introduced to the trade by the Goodell & Waters branch of the American Wood Working Machine Company of Philadelphia, Pa., and which is illustrated in Fig. 6 of the engravings. The machine differs somewhat from the ordinary double surfacer in that there is no countershaft or other impediment at its infeeding end, thus leaving that portion of the floor free and unobstructed for the movement of the operator. Aside from the question of room, an important consideration is the fact that the operator is not compelled to stand in close proximity to the rapidly turning shafts or between fast running belts or pulleys; but he has a clear space in which to handle his material and to feed the machine with every facility. Another important feature in connection with the machine is the new method of belting, which is done by what is called a "triangular" system, as shown in the engraving. It will be seen from an inspection of the cut that the sub-counter is placed near the end, but not extending beyond the machine. The belt extends around the pulleys on the main counter shaft, also around the pulley on the sub-counter and over the pulley of the upper cutter head. The arrangement is such that the strain of the belt is always down and steady on the pulley. The manufacturers point out that a belt driven in this manner runs with less vibration and has much better adhesion to the cutter head pulley than when it is run around the pulley and immediately returned to the main counter shaft. The machine here shown has divided rolls and pressure bars in order to admit at one time two pieces of unequal thickness, and has the capacity to double surface 28 inches wide by 10 inches thick. The bed is raised and lowered by power on four large screws. The under cutter head slides out so as to give access to the cutters as well as for any care and attention the head may require. This lateral movement of the under head is controlled by a crank at the outfeeding end of the machine.

Another feature which the manufacturers emphasize is the advantage resulting in many instances from a division of the cut, as the full reduction may be made in passing the material through once, and better work is done than if the whole cut was required of the upper head. Among some of the features referred to in connection with the machine may be mentioned removal of counter shaft from objectionable position, giving free access to all parts of the machine; dividing the cut between the upper and lower heads, which can be done accurately and quickly without stopping the machine, and the improved method of belting already referred to. Although the machine has been introduced but a short time, an evidence of its popularity may be gathered from the fact that in a single factory there are now seven of the machines in operation. The American Wood Working Machine Company have salesrooms at 136 Liberty street, New York City, also at 45 South Canal street, Chicago, Ill., from which territory adjacent to these cities can be supplied.

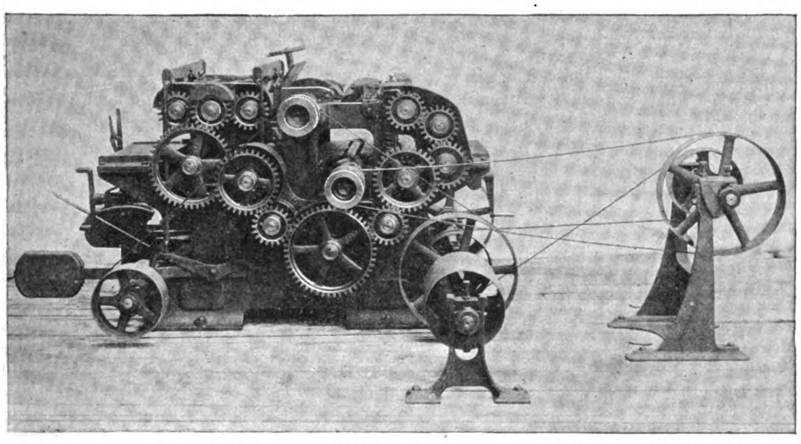
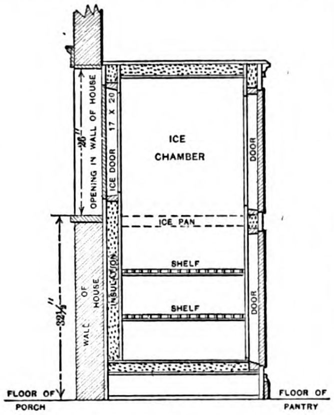


Fig. 6.—Six-Roll Double Surfacer.

The Herculean Terra Cotta Arch.

Henry Maurer & Son, 420 East Twenty-third street, New York City, have issued an attractively illustrated pamphlet describing a novel method of fire proof construction that has been brought out by them. Their method of floor construction dispenses with steel beams and girders. Hollow terra cotta blocks, grooved on the sides, are used which are 12 to 18 inches long and 4 to 14 inches deep, the sizes governed by the span of the arch contemplated. The arch is sprung from wall to wall, and T-shaped iron bars are inserted in the grooves on the sides of the blocks. These grooves are so placed that each bar locks two rows of blocks. The bars are thoroughly imbedded in cement, and, fitting into the terra cotta grooves, are perfectly fire protected with a covering of never less than 2 inches of material. The shapes of the blocks and the method of their union with the tie rods form an arch of such strength that it is adapted to spans up to 25 feet. The firm have made extensive tests of an arch of this construction spanning 20 feet in the clear and 12 inches in depth. This arch, loaded with 510 pounds to the square foot, and the load left on for several months, showed a deflection of but



Novelties.—McCray's Modern Family Refrigerator.—Fig. 7.—Vertical Cross Section, Showing Construction.

9-16 inch in the middle. The load being removed, the arch sprung back to its original position.

McCray's Modern Family Refrigerator.

A design of refrigerator which will strongly appeal to house owners, while possessing at least incidental interest for architects and builders,

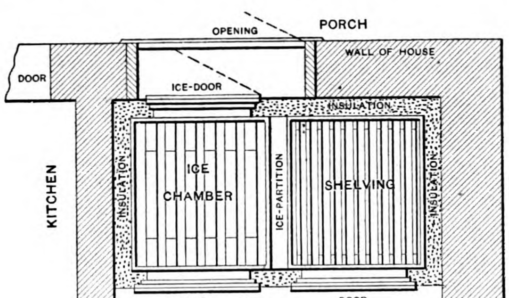


Fig. 8.—Plan Showing Position of Refrigerator in Pantry and Doors for Icing from the Outside.

is the McCray family refrigerator, which we illustrate in the accompanying engravings. The arrangement of parts is such that the ice can be placed in the refrigerator from outside the kitchen or pantry in which it may be located, and, as the manufacturers put it, "keep the iceman out of the house, his fingers out of the refrigerator, and at the same time save the anoyance of cleaning up after him whenever the refrigerator is iced." The construction is clearly indicated in Fig. 7, which represents a vertical cross section, while Fig. 8 is a plan view showing the position of the refrigerator in the pantry with the door for icing from the porch. This style of refrigerator is made by the McCray Refrigerator & Cold Storage Company of Kendallville, Ind., and with Chicago office at 182 West Van Buren street. The company suggest that every one having plans drawn for a new residence request their architect to write for full information as to the proper place to locate the outside ice door, as many fail to get the door in the right place, and then it has to be changed, a procedure which the company regard as a needless expense. The vertical section, Fig 7, shows the hight of the ice door from the floor of the back porch, also the position of the ice chamber and the shelves. It will be observed that the door of the refrigerator swings out clear of the outside ice door.

The company state that they manufacture any size of refrigerator to order and fit them for any space. In reply to those who claim they have no place for a special refrigerator made to order, the company explain that they have, when occasion required it, adapted them to homes by cutting out a hole in the wall the size of the refrigerator needed, setting it so as to be flush with the room inside, while the bulk of the refrigerator projected on the back porch. By this arrangement the front of the refrigerator was convenient to the pantry and kitchen, while the ice was put in it from the back porch. The company construct refrigerators for homes already built as well as for new residences.

Akron Pocket Level.

The Akron Level Works of Akron, Ohio, have recently brought out a handy little pocket level, which is shown full size in Fig. 9 of the engravings. It will be noticed that the space between the ends is wholly of glass, but the manufacturers state that the construction is such as to prevent its being easily broken. The mountings are handsomely finished in nickel, and, as the name indicates, its size is such as to render it convenient to carry in the pocket. It is not only well adapted for use by mechanics, but will be found useful by the householder. The device is known as No. 16, and is referred to

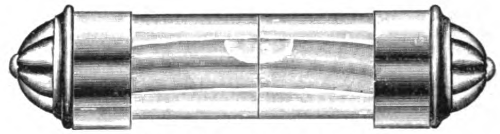


Fig. 9.—The Akron Pocket Level.

by the makers as accurate, strong, handsome and cheap. A little pamphlet which the company have issued calls attention to this level, as well as to other lines manufactured. The pocket level is put up one in a box and 12 boxes in a carton. As many as half a dozen levels can be sent by mail, but any quantity in excess of this is forwarded by express.

The Wagor Wall Tie.

One of the recent additions to the variety of wall ties now on the market is that brought out by the P. R. Wagor Mfg. Company of Springfield, Mass., and which is shown in general view in Fig. 10 of the engravings. It is known as the Wagor wall tie and is made of galvanized wire of any size desired. The point is made by the manufacturers that the tie has a sustaining capacity of over 6 inches at each end, and, as there are no soldered joints and no pro-

Fig. 10.—The Wagor Wall Tie.

truding or loose ends, it is readily applied, and at the same time is not likely to become tangled with others and thus hinder the workman in laying the wall. Owing to the fact that the ties are made of galvanized material they are not likely to rust, and at the same time the manufacturers refer to their great durability and strength.

The Fox Wood Trimmers.

The Fox Machine Company of Grand Rapids, Mich., have just issued from the press a very attractive catalogue of 18 pages, bound in yellow paper covers, illustrating and describing the Fox Universal wood trimmers. It is known as "Catalogue No. 16," and in the introduction briefly refers to the development of the machine for trimming pieces of wood smoothly and accurately on any angle, the trimmer being patented by the president of the company, W. R. Fox, in 1879, and first placed on the market in 1885, since which time the company have been granted 12 patents covering their methods of construction. Every part of the Universal wood trimmer is built in the company's own plant, fitted with modern machinery, the greater part of which is of the company's own design and made by them expressly for the production of their trimmers. An interesting feature of the catalogue is the illustration which appears on the second page of the cover, this being a group cut showing ten sizes and four styles of the improved Fox Universal wood trimmers. The illustrations scattered through the catalogue show front and rear views of the various trimmers, while the accompanying letter press calls attention to the salient features of construction. There are also given dimensions, weights, prices and code words, all of which will be found of interest to wood workers requiring machines of the character indicated.

TRADE NOTES.

BERRY BROS., LIMITED, the well-known varnish manufacturers of Detroit, Mich., are distributing an interesting advertising novelty in the shape of a card to which are attached three small disks of celluloid, representing the primary colors. These disks are riveted eccentrically to the card, so close together that they may be turned in a way to overlap each other. By means of these three disks all the colors of the spectrum may be produced, besides intermediate hues and shades. The card is being distributed as a practical lesson in color blending, and the disks illustrate a very interesting branch of natural science in a simple and practical manner. One side of the card calls attention to the fact that any one building or refinishing who desires advice on the best way to finish wood work and floors in order to produce the best results, and would like to see finished samples of wood, may have both by addressing the concern named.

WE have received from the National Sheet Metal Roofing Company of 339-341 Grand street, Jersey City, N. J., an interesting little pamphlet relating to modern sheet metal roofing, in which, as the manufacturers put it, "beauty and symmetry are joined to unique durability, and cheapness is illustrated by the highest possible excellence obtainable at moderate cost." Attention is called to Walters' roofing and to Cooper's Queen Anne and Clover Leaf sheet metal shingles. There are also given a number of testimonial letters showing the estimation in which the company's goods are held by those who have frequently demonstrated their merits. A four-page folder which the company are sending out presents a number of reasons why Walters' and Cooper's galvanized steel and oxidized shingles should be used by architects, builders and house owners. Another little folder contains suggestions to architects and builders relative to these goods. The company state that they also issue a little book of 100 pages which supplies in a condensed form a great deal of practical information which will be found of value to the intending builder. It treats among other things of the architect selecting a site, foundations for cellar, brick work, chimneys, mortars, the cistern, ventilation, floors, heating, gutters, painting, interior construction, &c. We understand that the company will send a copy of this little compendium by mail post paid upon receipt of 10 cents in stamps.

THE AKRON LEVEL WORKS of Akron, Ohio, show in their advertising card in another part of this issue a view of the Akron spirit level, for which strong claims are made. The goods are warranted first-class in all respects, and can be furnished in cherry or mahogany. The catalogue which the manufacturers have issued calls attention to these goods in a most convincing way and shows the varieties which can be supplied.

AT the recent annual meeting of the stockholders of the Joseph Dixon Crucible Company, held at the company's office in Jersey City, N. J., Edward F. C. Young, John A. Walker, Daniel T. Hoag, Richard Butler, William Murray, Alexander T. McGill and Joseph D. Bedle were elected directors. After the stockholders' meeting the directors organized and elected Edward F. C. Young, president; John A. Walker, vice-president and treasurer; George E. Long, secretary, and Joseph D. Bedle, counsel.

WE are indebted to the Howarth Reversible Sash & Sash Center Company of 15 and 17 Gilman street, Detroit, Mich., for a copy of a catalogue and price-list for 1900, which they have issued, relating to the Howarth reversible sash centers. It consists of 30 pages profusely illustrated, and sets forth somewhat in detail the merits claimed for the goods named. Several reasons are given why the use of the Howarth reversible sash centers are desirable, among which may be mentioned that by means of them any window can be pivoted; that the centers are so constructed as to secure a double stop all round the sash, thus making a weather proof window; that all windows can be reversed for cleaning purposes, thus doing away with the danger and inconvenience of climbing outside to do the work; that every center has machined finish bearings; and, finally, that they are less expensive to use than other centers. One of the special features in connection with the catalogue are folded sheets of details made half full size and showing the manner in which the centers are applied to windows. The goods are finished in black iron, polished brass and plain bronze metal, but can also be furnished to match other hardware. The make-up is attractive and the catalogue will be found of special interest to architects, builders and contractors. The New York City agents for the goods are Brainerd-Tanner Company, 90 Chambers street.

THE architectural firm of Rawson & Paunack have recently been formed, with offices at 25 North Pinckney street, Madison, Wis. They request manufacturers and dealers in building supplies and materials to send them catalogues and samples of their goods.

THE WILLER MFG. COMPANY of Milwaukee, Wis., are directing the attention of architects, builders and householders generally to the fact that they make a specialty of wire window screens and screen doors. Many of our readers are likely to be interested in goods of this kind, as they are a necessary adjunct of the house during the season when flies and mosquitoes are prevalent. The manufacturers state that they have screened thousands of the finest buildings throughout the country, and that they furnish the screens complete, covered either with black, galvanized or bronze cloths, fine or coarse mesh, and include all necessary hardware. To all those who are desirous of securing them the company will forward prices and catalogues on application.

I. P. FRINK of 551 Pearl street, New York City, has recently installed his special patent window reflectors in the new store of Rogers, Peet & Co., at Broadway, corner of Warren street, built to replace the structure destroyed by fire a year ago last December, when the modern skyscraper adjoining was subjected to such a severe fire test. These reflectors were some time ago installed in the company's Thirty-third street store, where they were so much liked that they have been placed in the new store.

THE NEW CENTURY MFG. COMPANY of 48 East Eighth street, New York City, present in their card in another part of this issue some of the merits claimed for their New Century automatic safety revolving window fixtures, illustrations of which appeared in our Novelties department some time since. Among the points which the manufacturers emphasize are that the fixtures are easily attached to any ordinary window; that an entire window can be cleaned from within the room while the window is tightly closed, thus avoiding all drafts and liability to accidents; that they raise and lower the same as any window; no weather strips are required, and that even in rainy weather ventilation can be secured without draft, as the window can be adjusted to any angle. Another point made is that the adjustable flat springs render the window storm and dust proof, while at the same time preventing the window from rattling. It automatically adjusts itself to the shrinkage and swelling of the window. The fixtures are especially adapted for dwellings, schools, hotels and other buildings. We understand that agents are wanted for the introduction of the goods in various sections of the country.

THE LORD & BURNHAM COMPANY, Broadway and Twenty-sixth street, New York City, have issued a 74-page catalogue, descriptive of greenhouses, which is a work of art. Photographic reproductions are shown of a large number of constructions, and being printed on heavy highly finished paper, every detail is brought out clearly. Various methods of framing are illustrated, in which steel is almost exclusively employed.

UNDER the title of "Twentieth Century Cement" the Marine Record Publishing Company of Cleveland, Ohio, have issued a *résumé* of a series of articles on cement, its manufacture, application and recent improvements, by Theo. Zwermann, vice-president of the German-American Technical Association of Baltimore, Md. The text deals with the substitution of sand tests for neat, this being brought about by the adoption of fine grinding, which is referred to as one of the greatest improvements of recent years. Another improvement to which reference is made is the rotary kilns, although in many instances the ring oven is regarded as somewhat better. Still another improvement, and one referred to as likely to exercise considerable influence on Portland and hydraulic cement in the near future, is the discovery made two or three years ago of a way in which to combine cement and lime in equal proportions by the introduction of carbon and hydrocarbon. This is regarded as really carbonizing the free lime of cement and at the same time running up the percentage of lime to its highest desirable figure.

OUR readers will be interested in the announcement of our old friend, George Hayes, which appears in another part of this issue. Mr. Hayes established himself in the sheet metal and skylight business in 1868, and is to be found at the old stand, 71 Eighth avenue, New York City. He calls attention to his skylights, metallic lathing, fire proof construction, &c.

THE BENTEL & MARGEDANT COMPANY of Hamilton, Ohio, manufacturers of wood working machinery adapted for all purposes, call attention in their advertising space to the jointer or hand planer which they are prepared to furnish. Their productions are referred to as of the latest and most improved design, and will be found especially useful in planing mills, furniture, cabinet, sash, door and blind factories, pattern shops, technical schools, &c.

IN one of the shops of the United States Cast Iron Pipe & Foundry Company, Cincinnati, Ohio, the company have fitted up a room with drawing tables, boards and T-squares as a study room for the use of a number of their employees who are students of the International Correspondence Schools, Scranton, Pa. The class, which numbers about 50 men, and includes the general manager, studies on "company time" and is supplied with drawing paper by the firm. We understand that all promotions in the shops will hereafter be made from students of this class.

THE PHENIX MFG. COMPANY of 034 Centre street, Milwaukee, Wis., point out in their advertising space this month some of the merits claimed for the Phenix combined window screen and awning, an article which will be found most desirable at this season of the year, and especially during the heated term. The construction of the device is such as to prevent flies from entering when the awning is being raised or lowered; it can be hung or removed from the inside, is easily operated and possesses other advantages which are fully set forth and described in a catalogue which the company have issued, and a copy of which they will send to any person on application.

THE question of power for small shops is always a most interesting one, and in connection with the subject it may not be amiss to refer to a catalogue just received from Charles W. Percy of 200 Summer street, Boston, Mass., relating to the Shipman automatic steam engine. These engines can be supplied in various sizes, ranging from 1 horse-power upward, and are adapted for using kerosene as a fuel. The 18 pages of which the catalogue consists present a great deal of interesting information relative to the engines, and those who have need of small horse-power can secure a copy of the catalogue by sending to the address given above. In his advertising space this month Mr. Percy calls attention to the engine and to some of the advantages claimed for it.

THE increasing demand for the roofing specialties of the Montross Metal Shingle Company, Camden, N. J., manufacturers of metal shingles and tiles for churches, residences and all classes of buildings, has necessitated their removal to larger quarters, and they have taken the building at 107 to 113 Erie avenue, putting in new machinery and thereby largely augmenting their facilities for the rapid filling of orders. The Eastlake and Octagon shingles which they make have a wide popularity, and the appreciation of the goods is shown by the number of orders now on hand in this department.

THE Matchless door spring hinge is the subject of a brief announcement presented in their advertising space this month by the Lawson Mfg. Company of 24 Sentinel Building, Milwaukee, Wis. This hinge is referred to as being double acting and having ball bearings. The makers point out that the Matchless hinges have stood the test since 1894 and that their 1900 model is "perfection." The hinges will swing doors from 1 to 4 inches.

THE New York wall ties are the subject of an announcement presented in another part of this issue by Hurd & Co. of 570-576 West Broadway, New York City. The announcement refers to our illustrated article of these goods, which appears in the Novelties department of the paper. The manufacturers state that they will send copies of catalogue, as well as quotations and samples of the goods, to any parties on application.

THE E. E. SOUTHER IRON COMPANY of St. Louis, Mo., are directing the attention of architects, contractors and builders to Souther's new metal shingle, an illustration of which they show in their advertising space this month. The shingle is furnished either galvanized or tin, and is referred to as being easy of application and when put on is perfectly water tight.

Carpentry and Building

WITH WHICH IS INCORPORATED

The Builders' Exchange

VOL. XXII. No. 7. NEW YORK, JULY, 1900. Ten Cents a Copy. One Dollar a Year.

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CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

JULY, 1900.

The Strike Epidemic.

The conditions just at this time seem to be favorable for a spread of the strike fever, and it has broken out locally with exceptional severity. Such conditions always exist immediately after a period of general prosperity and high prices. So long as manufacturing operations are contined at high pressure, and employers are eager to keep labor contented and avert disagreements of every kind, the unions steadily gain strength and acquire confidence in their ability to enforce their demands, whether reasonable or not. When the high water mark is reached and passed, and there are indications that the ebb is about to begin, the necessary readjustments are effected with difficulty. Labor fights with more than Boer persistence for every inch of territory gained under prosperous conditions, often showing great unwisdom in insistence upon trifles which, if conceded, would help protect the more important and valuable advantages thus imperiled. There is also a general feeling among prosperous wage earners that an early summer strike is equivalent to a vacation, and this feeling secures easier assent to the plans of the union leaders than could be had at any other period of the year. It is the misfortune of the labor movement that so few of those who manage it have yet learned that there is a higher capacity for leadership than that which is expressed in the ability to bring employers and workmen into such relations that a peaceful adjustment of their differences is impossible. Diplomacy offers no field for the powers of those who are temperamentally belligerent, and who love a quarrel for its own sake; and such men, because noisy, dogmatic and self assertive, are very apt to come to the front in the unions and dominate in their councils.

May the Beginning.

With the advent of May the strike epidemic of 1900 began. In most instances the unions have been notably successful. In many trades the eight-hour day is established, and other important concessions have been secured with much less trouble than would have been possible under any other conditions. It is scarcely probable the old standards will ever be restored, especially in the several branches of the building trades. The claim is made, and not without reason, that the conditions of work in this country are such as to put brain and muscles under a strain which cannot be maintained for more than eight hours in 24, and that a longer working day would be no more productive. In support of this contention it is claimed that the masons of this country, working eight hours and receiving better than average wages, put up a wall at a less cost per thousand bricks laid than has ever been done in Europe, where the ten and eleven hour days are the standard and wages per day are not much more than half what they are here. However this may be, there is no prospect in this country of the permanent re-establishment of the ten-hour day. The fact that the wisdom of longer hours is a moot question gives labor the argument. Outside the building trades, several fierce strikes, creating local conditions very closely resembling anarchy, have attracted public attention and created grave uneasiness. The St. Louis street railway strike, for example, has closely resembled a revolution, in which the rights of the public have been utterly disregarded, the ordinary police powers suspended and the arm of the civil authorities paralyzed.

Employers to Blame.

Employers have themselves to blame in many instances for the exceeding bitterness of the quarrels in which they find themselves involved, and it is to this phase of the question that we wish to call attention. That labor is often unreasonable, and sometimes unnecessarily offensive in the method of making its demands, is true. The best way in which to eliminate this element of needless friction from the relations of employers and wage earners is to avoid giving any excuse for it. To employers who note with more or less anxiety the increasing restlessness of labor, and who look forward to the materialization in the near future of the nebulous issues which have been for a year or more shaping, we commend the sage advice of the philosophical humorist, Josh Billings, to the effect that when you have made up your mind to "take the bull by the horns," stop and consider whether it is not wise to take him by the tail instead, since you can hold on just as well and let go a great deal easier. There is much practical wisdom in this sage pleasantry, and the manger of industrial operations who has to deal with the ever changing phases of the labor movement should keep it in mind. An effort to ascertain on what points agreement is possible often permits the irreconcilable points of difference to be brushed aside as negligible. When this effort is made courteously, patiently and in evident good faith, agreements are seldom difficult to reach.

The Allegheny Observatory.

It is confidently expected that the finest observatory in the country, will, when completed, be the structure which will crown the highest summit in River View Park, Allegheny, Pa., and by reason of its eminence will be visible from places many miles away. It appears that the scheme of an observatory has existed in the minds of several public spirited citizens of Allegheny for some years past, but it was not until the middle of May that they saw their hopes likely to be realized in the awarding of the contract for the beginning of the work. The new observatory will represent largely the efforts of Professor J. A. Brashear, the well-known scientist of Allegheny, assisted by Professor F. L. O. Wadsworth in forming the detailed arrangements. The plans were drawn by F. L. Billquist. The new observatory will have a total length of 212 feet east and west, and 175 feet north and south. The tower on the southeast corner will be fitted with the 13-inch telescope now in the old observatory, and will be for the use of the public. It will be about 50 feet high, and the dome surrounding it will be 27 feet in diameter, inside measurement. The tower on the northeast corner will be somewhat higher and 30 feet in diameter. This will contain besides many small instruments, a large one which will extend obliquely through the structure down into a sub-basement 20 feet below the surface of the earth. The main tower and dome will be nearly 100 feet high and 62 feet in diameter, and will form the extreme west elevation of the structure. Here will be mounted a 30-inch telescope, which will have a focal length of about 40 feet, and will, it is said, be the third largest in America. The first floor on the east side will contain a lecture hall, reception room and a number of rooms for strictly scientific work, while the second floor will be devoted to rooms for carrying on the astronomical work. In the main part of the building will be located rooms for the director and his assistants, a large library room extending through both stories; several rooms for chemical work, store rooms, &c. The library room will have a balcony at the second floor level, and will be the home of the astronomical library of the Allegheny Observatory, which is claimed by Professor Broshear to be one of the finest and most complete in existence. The building will be constructed of steel, stone, brick and terra cotta, and the three domes will be of steel coated with copper. About the two entrances and encircling the large telescope tower will be 12 terra cotta columns each 19 feet high.

Architectural League of America.

The Architectural League of America held their second annual convention in Fullerton Hall, Art Institute, Chicago, on June 7, 8 and 9. The address of welcome was made by J. C. Llewellyn, president of the Chicago Architectural Club, the response being made by Albert Kelsey, president of the Architectural League of America. Mr. Kelsey also delivered his annual address, which received earnest attention on the part of his hearers. The report of the treasurer, Herbert B. Briggs of Cleveland, was received, showing a balance in the treasury. A considerable amount of routine business in the way of appointment of committees, reading of communications and reports of special committees was transacted, after which the session adjourned. Most of the evening of Thursday was devoted to an illustrated address on the subject of "Municipal Improvements" by President Kelsey.

Friday morning there were interesting reports from clubs on the year's work, also on schedule of circuit exhibitions. These were followed by reading of papers on "Philadelphia's Traveling Scholarships," by William C. Hays of Philadelphia; "Indigenous and Inventive Architecture," by Elmer Grey of Milwaukee; "The Education of the Architectural Student," by Prof. A. B. Trowbridge of Cornell University, and on "The Architect," by Frank L. Wright of Chicago. The afternoon of Friday was devoted to a coach ride through the parks and boulevards, and along the Lake Shore drive to Lincoln Park. After the ride the members went to the Bismarck Garden, where dinner was served during the concert.

Saturday's session was given up to the reading of papers and unfinished business, of which considerable was left over from the previous sessions. Ernest Flagg had a paper on "American Architecture as Opposed to Architecture in America," A. E. Elzner of Cincinnati presented an interesting paper on "The Licensing of Architects," and J. F. Harder of New York offered a basis for discussion by his paper on "Progress Before Precedent."

In the evening the visiting delegates were entertained at dinner by the Chicago Architectural Club at the Auditorium. Several hundred guests gathered in the main banquet hall, where D. H. Burnham of Chicago acted as toast master. The speakers included A. B. Lacey of Philadelphia, who responded to the toast, "The Architectural Club as a Factor in Public Affairs;" L. H. Sullivan of Chicago to the toast, "The Young Men in Architecture," Arthur D. Rogers of Boston to the toast, "Are Architectural Societies and the Architectural Press Fulfilling Their Whole Mission?" and Dwight H. Perkins of Chicago, who spoke on "The Convention." In responding to the toast of welcome by the toastmaster, the newly elected president, James C. Llewellyn, predicted that when the next convention assembled in Philadelphia the number of delegates would be increased so as to represent every leading city in the United States.

A Noise Proof House.

It is stated that a man in Chicago has recently completed what is claimed to be a noise proof house, as a protection to himself and his family against street dins. The house is pointed to by the anti-noise agitators as a possible solace to persons suffering from midnight cat cries, dog barks and railroad whistle screechings, and daybreak crowing of roosters, banging of delivery wagons and rattling of coal shovelers.

The plan is the filling of all cracks and apertures in the house which might admit sound with a material so constructed as to afford access to air while shutting out noise. The material which the owner says discriminates between noise and air is in the form of strips of rubber, perforated with zigzag holes.

Through this the air is admitted, while the noise is softened or completely deadened, the sound waves dying out in repeated reflections in the crooked passages. These strips of rubber have been placed over all cracks around the doors and windows of the house, and two months' experience with the plan has convinced the owner, he says, of its practicability.

New Kind of Chimney Brick.

A German system of chimney building has been recently introduced into this country, the chimneys being of round construction, and built of radially molded bricks perforated. The perforations serve as a dead air space, preventing radiation through the walls, resulting in better average draft and causing same to be less affected by atmospheric changes. A sufficient number of sizes and shapes of these are carried in stock to enable the builder to produce a circle of any diameter and thus to build a chimney of any size, and to conform to the diminishing radius as the hight increases. These bricks are much larger than the common form, and the joints are correspondingly fewer. No attempt is made to make the perforations register. They serve simply to give the mortar a better hold and to furnish dead air spaces which retard the radiation. It is possible, too, that they serve a useful purpose in the uniform baking of the brick. The perforations are said to increase the adhesion of the joint about threefold.

THE fire loss of the United States and Canada for the month of May, as compiled by the New York *Journal of Commerce*, showed a total of $15,759,400, which is an increase of nearly $7,000,000 over the figures of May, 1899, and more than $4,500,000 above the loss of May, 1898. This brings the total loss of the first five months of the current year up to the enormous sum of $82,017,900, which is nearly $23,000,000 above the figures for the corresponding period of 1899, and $33,000,000 above that of the first five months of 1898. The phenomenally heavy loss of April, caused by the big conflagration at Ottawa, Canada, added to the losses for May, seems to indicate that the current year will be an exceptionally severe one for the insurance companies. The sentiment in fire insurance circles is said to be in favor of raising rates all around, as the only method of avoiding absolute disaster.

SOME of the electrical workers in Philadelphia, Pa., who have been out on strike for some time past, have returned to work, the basis of the settlement being 35 cents an hour for an eight-hour day, time and a half for overtime and double time for Sundays and legal holidays.

BRICK DWELLING FOR TWO FAMILIES.

THE design which constitutes the basis of the half-tone supplemental plate accompanying this issue of the paper represents a double dwelling of brick erected for the Allegheny County Work House, at Claremont, Pa., and embodies features which may afford valuable suggestions as regards the arrangement of a house for two families. An inspection of the plans shows the house to be divided in the center, and each family having a separate entrance. On the first or ground floor there are parlor, dining room and kitchen, and on the second floor a bathroom and three bedrooms, one of which has a large alcove. In the attic there is sufficient space for one or more sleeping rooms in case of necessity.

According to the specifications of the architect the cellar walls are of rubble stone, while that portion of the foundations above grade is rock faced blue sandstone laid in regular courses. All other stone trimmings, such as sills, lintels, blocks in the chimney and cornice are rock face. The joints in the range work are pointed with Portland cement. The outside walls and partition wall separating the house into two parts are laid with local common brick, while the outside face of the walls and the chimneys are of selected stock brick of a dark red and uniform color. All outside brick is laid in white mortar, while the heads of chimneys are laid in cement mortar and capped with a 4-inch sawed flag.

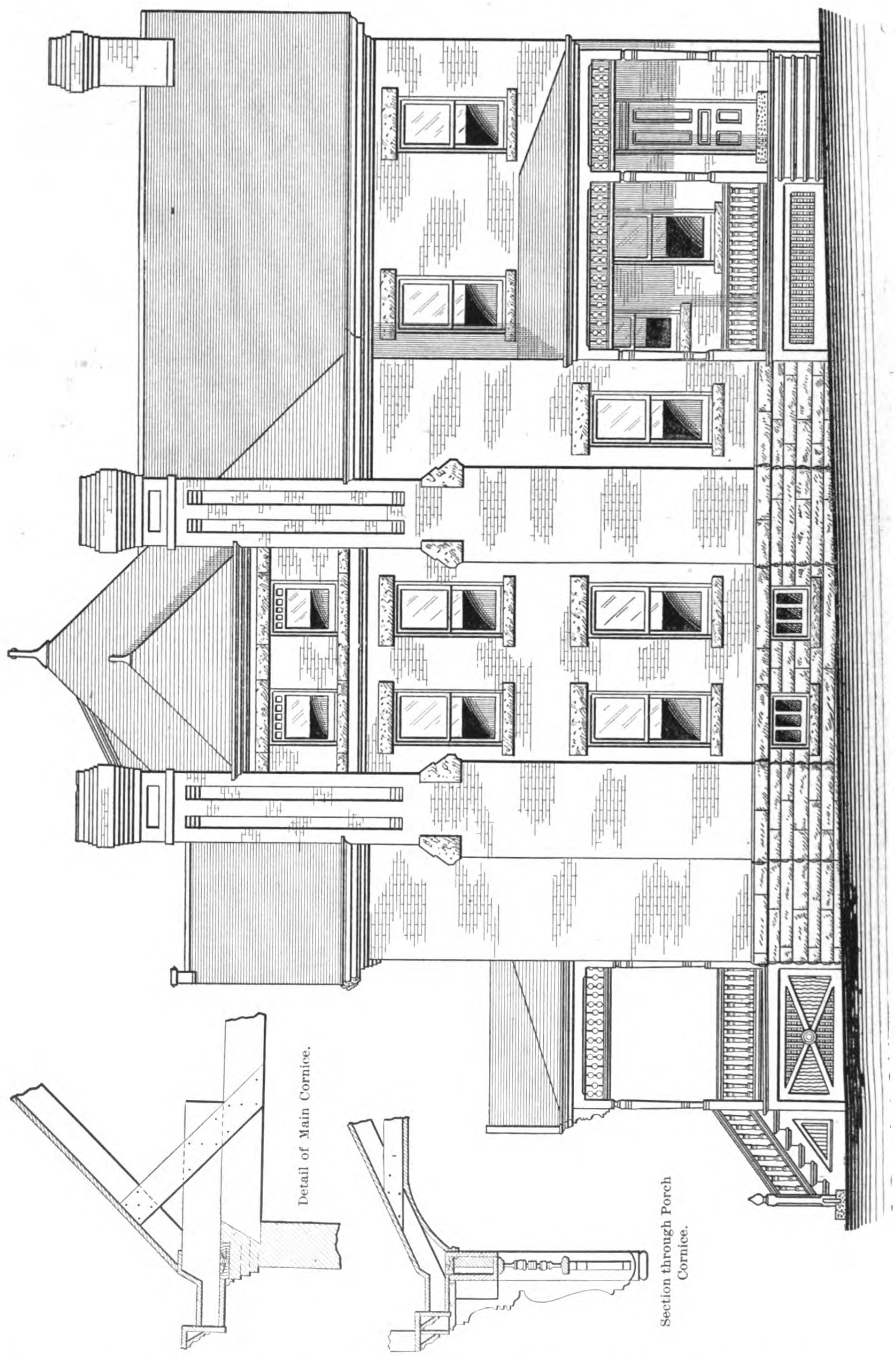
All wood walls and ceilings are plastered with Fitzgerald's patent wall plaster, while the brick work is plastered with lime and sand mortar. All plastered surfaces are finished with prepared lime, plaster of paris and white sand troweled to a smooth finish.

The first, second and third floor joist are 2 x 10 inches, spaced 16 inches on centers; the girder under the first floor is 6 x 10 inches, set on locust posts which rest on 18 x 18 x 8 inch stone footings; the hips and valley rafters are 2 x 8 inches doubled, and all other rafters 2 x 6 inches. The studding are 3 x 4 inches and 2 x 4 inches with 2 x 4 inch sills and plates. All rough framing is of hemlock with hemlock sheathing planed one side for the roof. The porch sills are 4 x 8 inches, the joist 2 x 8 inches, and the rafters 2 x 4 inches. The roofs, except those of the porches, are covered with 10 x 20 inch Bangor slate laid with 3-inch lap.

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

Brick Dwelling for Two Families.—J. K. A. Biles, Architect, Sharpsburg, Pa.

The front doors are 1¾ inches thick, with raised panel and raised molding outside, and ogee stiles and raised panels inside. The vestibule door is of the same general design, with plate glass above the lock rail. The sliding doors are of the same thickness, with molded margin strips around the face of doors, both sides, for protection when sliding into the pockets. The sash are 1⅜ inches thick, except the large window in the parlor, which is 1¾ inches thick, filled with plate glass 3-16 inch thick. All other sash are filled with Pittsburgh A glass, double strength, and hung with Silver Lake sash cord. The casing is 5 inches wide, set on molded plinth blocks at the doors and on 1⅛-inch stool at the windows, all mitered at the top. In the first story rooms, main hall and second story hall, the baseboard is 8 inches, surmounted by a 3-inch rabbetted base molding. For the rooms on the second floor there is an 8-inch solid molded base, all with quarter round at the floor. The kitchen



Side (Right) Elevation.

Brick Dwelling for Two Families.—Side Elevation.—Scale, 1/8 Inch to the Foot.—Details.—Scale, 3/8 Inch to the Foot.

is wainscoted 3 feet high, and the bathroom 4 feet high, with Southern pine. The porch ceilings are of the same material. The mantels at all fireplaces are of slate, and the hearths are of tile. The interior wood work is grained, except in the attic, where it is painted in plain colors.

The plumbing is of the open or exposed type and thoroughly vented. In each house is a 4-gallon instantaneous water heater. The kitchens are fitted with an 18 x 30 inch cast iron enameled sink, while each bathroom has a 5-foot cast iron enameled tub, porcelain siphon jet closet and a 12 x 15 inch porcelain oval basin with marble slab. All fixtures have nickel plated trimmings. The houses are also piped for natural gas.

The dwellings here shown were completed in the spring of 1898, in accordance with plans drawn by J. K. A. Biles, architect, of Sharpsburg, Pa.

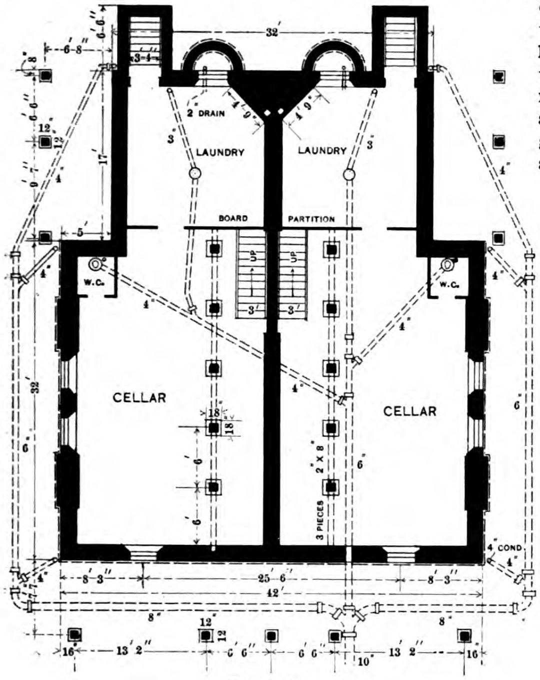
DOUBLE BRICK DWELLING ERECTED FOR ALLEGHENY COUNTY WORKHOUSE AT CLAREMONT, PA.

J. K. A. BILES, ARCHITECT.

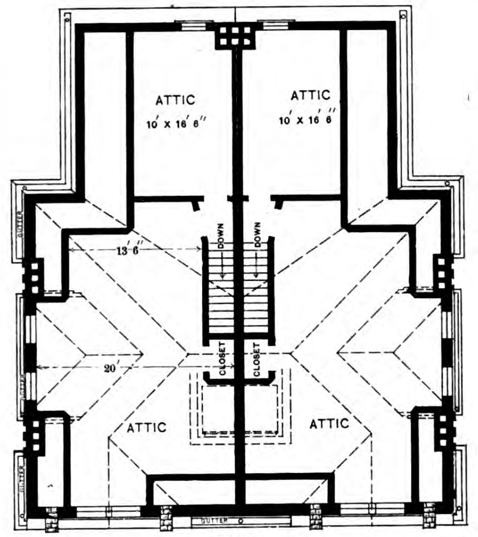
SUPPLEMENT CARPENTRY AND BUILDING, JULY, 1900.

Greek and Indian Country Houses.

A writer in one of the London architectural papers comments on the above subject as follows: Up country in India the traveler may pass through a whole palace, and the only furniture in it will be rugs and pillows, and, of course, the cooking pots and pans and gold and silver vessels for eating and drinking, and the wardrobes and caskets and graven images of the gods. But the sight is simply entranced by the perfect proportions of the rooms, the polish of the ivory-white walls, the frescoes round the dado, and the beautiful shapes of the niches in the walls and of the windows, and by the richness and vigor of the carved work of the doors and projecting beams and pillars of the veranda. One feels that the people of ancient Greece must have lived in something of this way, and the houses of the rich in the old streets of Bombay, built before the domestic architecture of the people was affected by Portuguese influences, constantly remind us, especially in their wood work, of the houses of the Ionian Greeks, as the learned have reconstructed them from their remains. The wood work is the essential frame work, the solid skeleton, of native houses in Bombay, and is put up complete before a stone or brick is placed on it. The strict rectangular ground plan also of Bombay gardens, and the orderly and symmetrical method in which they are planted, two different species of trees—it may be the cocoanut palm and the mango, or the cocoanut palm and the areca nut palm—being planted alternately all round the boundary, with other trees, pomegranates, oranges, jasmines, guavas, roses, cypresses, oleanders and custard apples, in regular rows and sections, is identical with the ground plans of the ancient Egyptian and Assyrian gardens.



Foundation.



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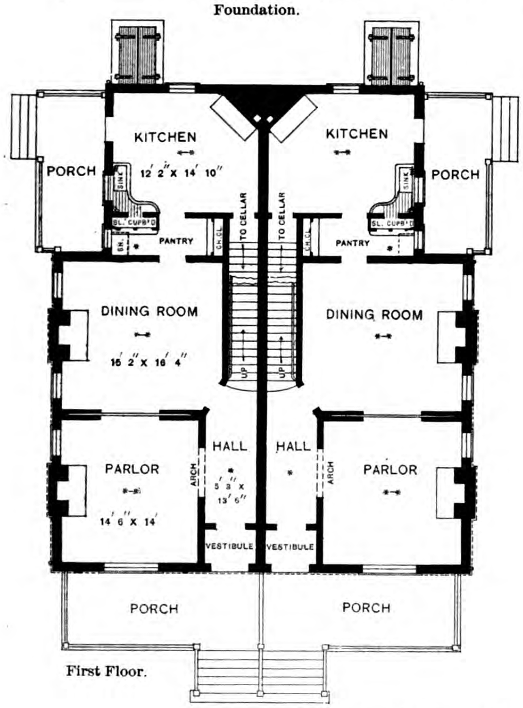
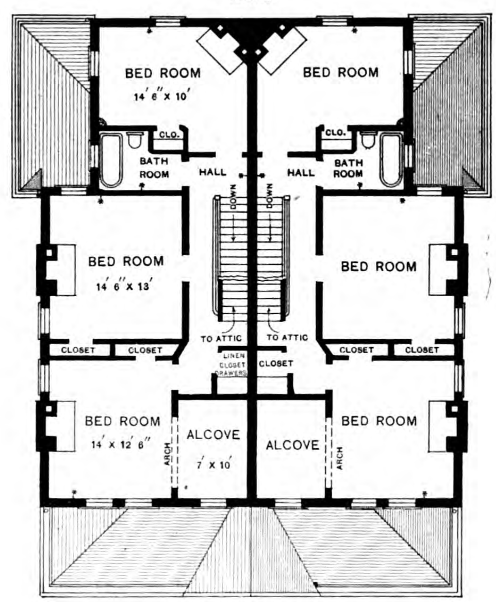
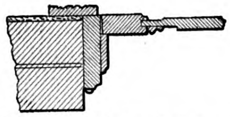


First Floor.

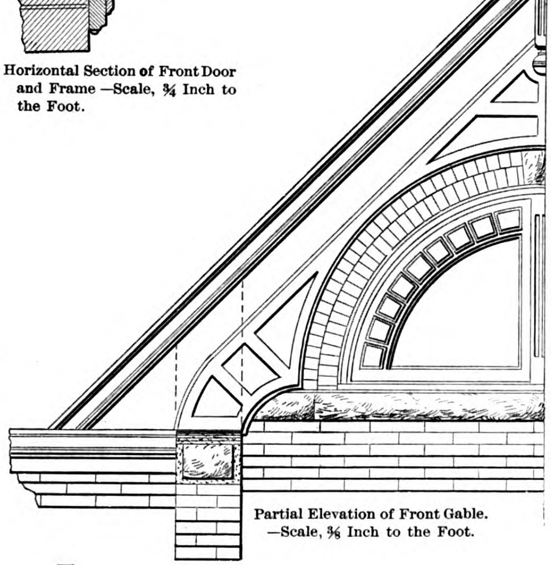


Second Floor.

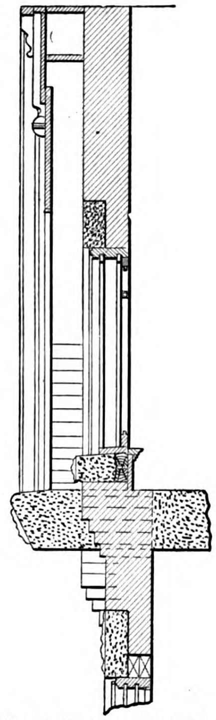
Brick Dwelling for Two Families.—Floor Plans.—Scale, 1-16 Inch to the Foot.



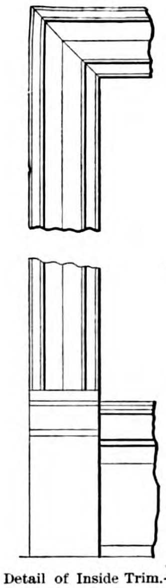
Horizontal Section of Front Door and Frame —Scale, ¾ Inch to the Foot.



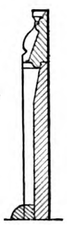
Partial Elevation of Front Gable. —Scale, ⅜ Inch to the Foot.



Vert'cal Section through Front Gable. —Scale, ⅜ Inch to the Foot.

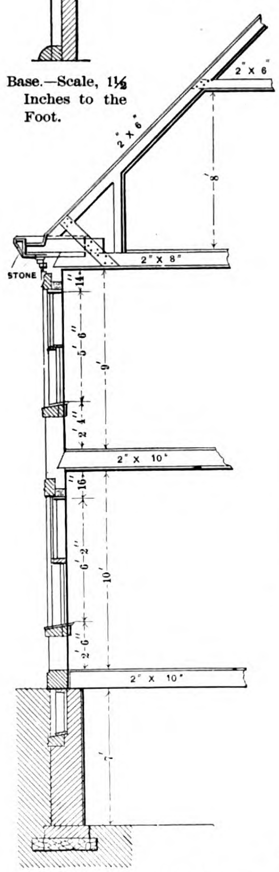


Detail of Inside Trim.— Scale, ⅜ Inch to the Foot.

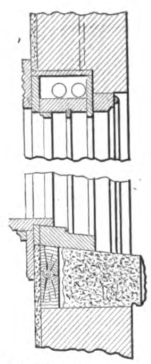


Base.—Scale, 1½ Inches to the Foot.

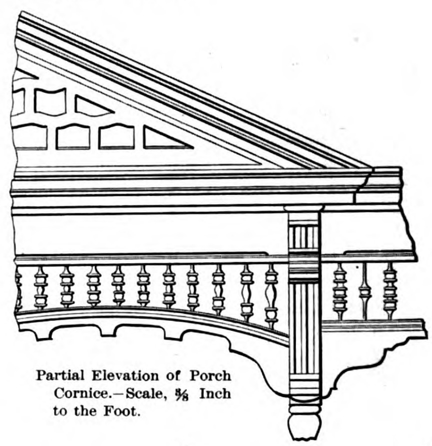
Section of Hand Rail.—Scale, 1½ Inches to the Foot.



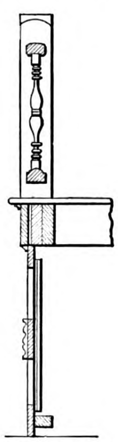
Section through Outside Walls.— Scale, ⅛ Inch to the Foot.



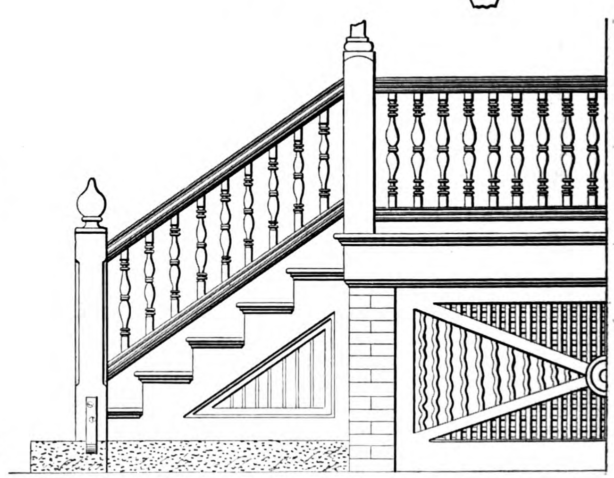
Horizontal Section through Box Window Frame and Vertical Section through Stone Sill —Scale, ¾ Inch the Foot.



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



Section through Porch Floor and Rail. —Scale, ⅜ Inch to the Foot.



End Elevation of Steps and Porch.—Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of Brick Dwelling for Two Families.

TRUSSES FOR FLAT ROOFS—II.

BY F. E. KIDDER, Consulting Architect.

IN any truss supported at the ends and having horizontal top and bottom chords, the chords resist the tension and compression due to the bending moment or transverse strain, and the rods and braces transmit the loads from the center to the supports.

Thus the load w_3, Fig. 7, is directly supported by the rod R_3, which carries it to the joint above. Here it is added to W_3, and one-half goes down the brace at the left and the other half down the brace to the right. The rod R_2 receives the load w_2 and also the vertical component* of the stress in B_3—which is equal to $\frac{1}{2} W_3 + \frac{1}{2} w_3$—and transmits the combined loads to joint 4, where the load W_2 is added to it. The sum of these loads is transmitted by brace B_2 to joint 3, and so on to joint 1.

The actual stresses in the different members of a six-panel truss, as Fig. 7, may be computed by the following rules, provided that the truss is symmetrical about a vertical line drawn through its center:

Rods.

Tension in $R_3 = w_3$ . . . . (1)
Tension in $R_2 = \frac{1}{2} w_3 + \frac{1}{2} W_3 + w_2$ . . . . (2)
Tension in R_1 = tension in R_2 plus $W_2 + w_1$ . . . . (3)

Braces.

Compression in brace B_1 = one-half the total load times length of B_1 divided by the hight H . . . . (4)
The total load is the sum of the loads at top and bottom.
Compression in brace B_2 = stress in R_1 less w_1 times the length of B_2 divided by H . . . . (5)

We will first find the stresses in the rods.

By Rule 1 tension in $R_3 = w_3 = 0.9$ ton.

By 2, tension in $R_2 = \frac{1}{2} w_3 + \frac{1}{2} W_3 + w_2 = 0.45 + 1.5 + 0.9 = 2.85$ tons.

By 3, tension in $R_1 = 2.85 + W_2 + w_1 = 2.85 + 3 + 0.9 = 6.75$ tons.

Next find the stresses in the braces.

By Rule 4 compression in brace $B_1 = \frac{1}{2}$ the total load times length of B_1 divided by H.

The total load = 19.5 tons and one-half of this = 9.75 tons.

The length of B_1 may be found by squaring H and P_1 and taking the square root of their sum—$H^2 = 64$; $P_1^2 = 100$. The square root of 164 is 12.8 feet, which is the length of B_1, B_2 and B_3 between centers of joints.

Substituting these values in the rule, we have:

Compression in $B_1 = \frac{9.75 \times 12.8}{8} = 15.6$ tons.

By Rule 5 compression in B_2 = stress in R_1 less w_1 = 6.75 − 0.9, or 5.85 times length of B_2 divided by H = $\frac{5.85 \times 12.8}{8} = 9.36$ tons.

By Rule 6 compression in $B_3 = \frac{1}{2} W_3 + \frac{1}{2} w_3$, or 1.95 times length of B_3 divided by H, or $\frac{1.95 \times 12.8}{8} = 3.12$ tons.

By Rule 7 tension in tie beam at $a = \frac{1}{2}$ total load times P_1 divided by H, or $\frac{9.75 \times 10}{8} = 12.19$ tons.

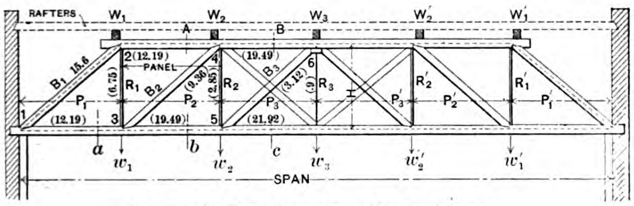


Fig. 7.—A Six-Panel Howe Truss, Showing Stresses.

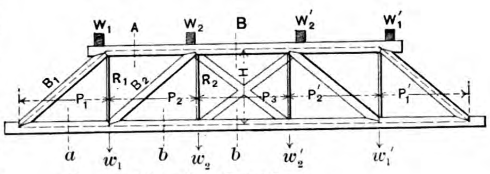


Fig 8.—A Five-Panel Howe Truss.

Trusses for Flat Roofs.

Compression in brace $B_3 = \frac{1}{2} W_3 + \frac{1}{2} w_3$ times length of B_3 divided by H . . . . (6)

Tie Beam.

Tension at a = one-half the total load multiplied by the distance P_1 and divided by H . . . . (7)
Tension at b = tension at a plus horizontal component of B_2 . . . . (8)
Tension at c = tension at b plus horizontal component of B_3 . . . . (9)
The horizontal component of the stress in any brace is found by multiplying the stress in the brace by the width of the panel, and dividing by the length of the brace, measured from center of joints . . . . (10)

Compression in Top Chord.

Compression at A = tension at a. Compression at B equals tension at b.

It will be seen from the above that the stress in the chords is greatest at the center, as in a beam, and that the stress in the rods and braces is least at the center and increases toward the supports.

Example.

To illustrate the application of the above rules we will compute the stresses in a six-panel truss of 60 feet span, P_1, P_2 and P_3 being each equal to 10 feet and with a hight, H, of 8 feet. If the trusses are spaced 13 feet apart and support a gravel roof and plastered ceiling the loads W_1, W_2, W_3, &c., will each be about 3 tons, and the loads w_1, w_2, w_3 0.9 ton each. This gives all of the data necessary for determining the stresses.

* The components of a stress were explained on page 109 of the April number.

By Rule 8 tension at b = 12.19 plus horizontal component of B_2.

Horizontal component of B_2 = stress in B_2 times P_2 divided by length of B_2, or $\frac{9.36 \times 10}{12.8} = 7.3$ tons.

Then tension at $b = 12.19 + 7.3 = 19.49$ tons.

By Rule 9 tension at c = tension at b + horizontal component of $B_3 = 19.49 + \frac{3.12 \times 10}{12.8} = 19.49 + 2.43 = 21.92$ tons.

As the compression in the top chord at A and B is the same as the tension at a and b, we have now computed the stresses for all of the different pieces of the truss, the stresses being symmetrical each side of R_3. The stresses above obtained are shown by the numbers in parentheses in Fig. 7.

The above rules apply to any six-panel truss, provided the truss is symmetrical about the center rod. It is not necessary that P_1, P_2 and P_3 shall be equal, nor that W_1 shall be equal to W_2 or W_3, but W_1 must equal W_1' and P_1 must equal P_1'.

The stresses in trusses of five or seven panels are computed in a similar manner to those in a six-panel truss, although there will be a slight difference in the formulas, due to the difference in the number of panels.

Rules for Finding the Stresses in a Five-Panel Howe Truss, Fig. 8.

Tension in $R_2 = w_2$.
Tension in $R_1 = w_2 + W_2 + w_1$.
Compression in brace $B_1 = \frac{1}{2}$ total load × length of B_1 divided by H.

Compression in $B_2 = w_2 + W_2$ times length of B_2 divided by H.

Tension at $a = \frac{1}{2}$ total load times P_1 divided by H.

Tension at b = tension at a plus horizontal component of B_2.

The horizontal component of the stress in any brace is found by multiplying the stress by the panel width and dividing by the length of the brace. Thus, if the length

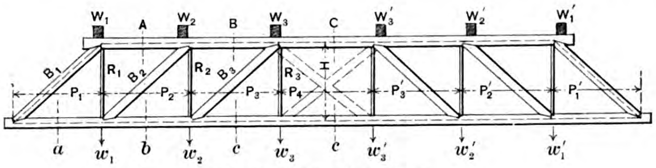


Fig. 9.—A Seven-Panel Truss.

Trusses for Flat Roofs.

of B_2 is 10 feet and the distance P_2 is 8 feet, and the stress in B_2 is 5 tons, the horizontal component of the stress $= \frac{5 \times 8}{10} = 4$ tons.

Compression at A = tension at a.

Compression at B = tension at b.

To Find the Stresses in a Seven-Panel Howe Truss, Fig. 9.

Tension in $R_3 = w_3$.

Tension in $R_2 = w_3 + W_3 + w_2$.

Tension in $R_1 = w_3 + W_3 + w_2 + W_2 + w_1$.

Compression in $B_1 = \frac{1}{2}$ total load $\times$ length of B_1 divided by H.

Compression in B_2 = stress in R_1 less w_1 times length of B_2 divided by H.

Compression in $B_3 = w_3 + W_3$ times length of B_3 divided by H.

Tension at $a = \frac{1}{2}$ total load times P_1 divided by H.

Tension at b = tension at a plus horizontal component of B_2.

Tension at c = tension at b plus horizontal component of B_3. (For horizontal component see explanation above.)

Compression at A, B and C = tension at a, b and c, respectively.

The value of W_1 is found by multiplying half the sum of P_1 and P_2 by the distance between trusses, and this product by weight per square foot of the roof, including allowance for weight of truss and snow. For W_2 take one-half the sum of P_2 and P_3 and multiply as for W_1.

If panels are all equal then W_1, W_2, W_3, &c., will be equal. and each will equal the product of the panel width by the distance between trusses, multiplied by the load per square foot.

The values for w_1, w_2, &c., are found in the same way, substituting the weight per square foot of the ceiling for the roof load.

For a lath and plaster ceiling on 2 x 6 joists the weight should be taken at 13 pounds per square foot at least, and more if there is any chance of the loft being used for storage.

If there is no ceiling to be supported the same rules may be used, omitting w_1, w_2, &c., as these would be 0.

When the rafters rest on the top chord the same rules apply as where purlins are used, and W_1, W_2, W_3, &c., are found in the same way, only the top chord must be computed to resist both the compressive stress and the transverse load from the rafters.

These rules apply, however, only when the truss is symmetrical and symmetrically loaded.

Tables of Dimensions for Howe Trusses.

For symmetrical trusses having panels of uniform width and uniformly loaded the stresses in the different parts will be proportional to the span, number of panels, hight of truss, spacing of trusses and the weight per square foot. It is therefore possible to prepare tables giving the dimensions of the parts for such trusses. The following table, computed by the writer, gives the dimensions of the parts for six-panel trusses, with hights of one-sixth and one-eighth of the span, and three different spacings. These dimensions are for a flat roof of either tin, sheet iron or composition, and for a snow load of 16 pounds per square foot, which is equivalent to about 24 inches of light, dry snow; also for a lath and plaster ceiling supported by the tie beams, the chords and braces being of Norway pine and the verticals wrought iron rods.

These dimensions apply only when the rafters are suported on purlins placed at the upper joints, as in Figs. 7, 8 and 9. When the rafters rest on the top chord, as in Fig. 3, the dimensions of the latter must be greatly increased, and special calculations should be made therefor.

The dimensions given in the table may be used for trusses having a greater hight than that given, but not for trusses with a less hight, as the less the hight the greater will be the stresses.

Wherever the conditions of load, span, hight and spacing are not exactly as given in the table special calculations should be made of the strains and corresponding dimensions, but even in such cases the table will serve somewhat as a check upon the calculations.

Dimensions for Six-Panel Howe Trusses,

Span.	Distance Apart C to C.	Total hight.	Top chord.	Bottom chord.	Braces. A	Braces. B	Braces. C.	Rods (not upset). D.	Rods (not upset). E	Rods (not upset). F
Ft.	Ft.	Ft. Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
36....	12.	6 7	6x 6	6x8	6x 6	6x4	6x3	1⅛	¾	⅝
		5 2	6x 8	6x8	6x 6	6x6	6x4			
	15.	6 8	6x 8	6x8	6x 6	6x4	6x3	1¼	⅞	⅝
		5 2	8x 8	8x8	8x 6	6x6	6x4			
	18.	6 8	6x 8	6x8	6x 8	6x6	6x4	1¼	⅞	⅝
		5 2	8x 8	8x8	8x 8	6x6	6x4			
42....	12.	7 7	8x 6	8x 8	8x 6	8x4	6x4	1¼	⅞	⅝
		5 11	8x 8	8x 8	8x 6	8x5	8x4			
	15.	7 8	8x 8	8x 8	8x 6	8x5	6x4	1⅜	⅞	¾
		5 11	8x 8	8x 8	8x 8	8x6	8x4			
	18.	7 8	8x 8	8x 8	8x 8	8x6	8x4	1½	1	¾
		6 1	8x10	8x10	8x 8	8x6	8x4			
48....	12.	8 8	8x 8	8x 8	8x 8	8x6	8x4	1⅜	⅞	¾
		6 8	8x 8	8x 8	8x 8	8x6	8x4			
	15.	8 8	8x 8	8x 8	8x 8	8x6	8x4	1⅜	1	¾
		6 10	8x10	8x10	8x 8	8x6	8x4			
	18.	8 8	8x 8	8x 8	8x 8	8x6	8x4	1½	1	¾
		6 10	8x10	8x10	8x10	8x6	8x4			
54....	12.	9 8	8x 8	8x 8	8x 8	8x6	8x4	1⅜	⅞	¾
		7 6	8x 8	8x10	8x 8	8x6	8x4			
	15.	9 8	8x 8	8x 8	8x 8	8x6	8x4	1½	1	¾
		7 7	8x10	8x10	8x 8	8x6	8x4			
	18.	9 10	8x10	8x10	8x10	8x8	8x6	1⅝	1⅛	¾
		7 7	10x10	10x10	10x 8	8x8	8x4			
60....	12.	10 9	8x 8	8x10	8x 8	8x6	6x6	1⅜	1	¾
		8 4	8x10	8x10	8x10	8x6	8x4			
	15.	10 10	8x10	8x10	8x10	8x6	6x6	1½	1⅛	¾
		8 4	10x10	10x10	10x 8	10x6	8x4			
	18.	10 10	10x10	10x10	10x 8	10x6	8x6	1¾	1⅛	¾
		8 4	10x10	10x10	10x10	10x6	8x6			
70....	12.	12 6	8x10	8x10	8x10	8x6	6x6	1½	1	¾
		9 7	10x10	10x10	10x 8	10x6	8x6			
	15.	12 6	10x10	10x10	10x 8	10x6	8x6	1¾	1⅛	¾
		9 9	10x12	10x12	10x10	10x8	10x6			
	18.	12 6	10x10	10x10	10x10	10x6	8x6	1⅞	1¼	⅞
		9 9	10x12	10x12	10x12	10x8	10x6			
80....	12.	14 2	10x10	10x10	10x10	10x6	8x6	1⅝	1⅛	¾
		10 10	10x10	10x10	10x10	10x6	8x6			
	15.	14 2	10x10	10x10	10x10	10x8	8x6	1⅞	1¼	⅞
		11 0	10x12	10x12	10x10	10x8	10x6			
	18.	14 4	10x12	10x12	10x12	10x8	8x6	2	1⅜	1
		11 1	10x12	10x14	10x12	10x8	10x6			

THE new manual training school which is to be erected in Washington, D. C., from designs of Henry Ives Cobb, will be located at the southeast corner of Seventh street and Rhode Island avenue, which in many respects is an admirable site for the purpose. The plans provide for a three-story and basement structure fronting 84 feet on Rhode Island avenue and 200 feet on Seventh street. The exterior walls will be constructed of Bedford stone and gray Roman brick, with steel columns and girders and hollow tile floors. The corridors and wainscot will be of cement, and the entire building will be trimmed in cabinet oak.

THE ART OF WOOD TURNING.—VII.

(SECOND SERIES.)

BY FRED. T. HODGSON.

IN order that as much information as possible on the subject of ornamental turning may be compressed into these papers I will make an effort to explain as briefly as possible the manner of making spiral moldings with the apparatus as we have now got it. First, when work must be done, we release the radial arm, raising it in such a manner that the wheels connecting the chuck with the lathe are thrown out of gear. This done care must be exercised to prevent the least movement of the wheel on the main screw of the slide rest. The mandrel may then be turned to one-half, one-third, one-quarter or any required part of a revolution, which, it will be seen, will carry the whole train of wheels as arranged; but, having been disconnected with that on the slide rest, it, of course, remains stationary. Having turned the mandrel to the required distance, the radial arm must be again lowered to gear the last wheel in the train of the arm to that on the slide rest. It is then locked or fixed by the means prepared for that purpose. It is a matter of convenience to count the teeth of the large wheel of the train on the arm, and in some way mark those teeth that give the number required for each consecutive movement. The markings, of course, must not be of a permanent kind, as with each change of work new markings will be necessary, and too many markings would lead to confusion. A pencil mark will be quite sufficient, and it can be obliterated when the work in hand is completed. When cutting a spiral of, say, one turn in 5 or 6 inches, the whole apparatus must be moved by the hand, as it is quite obvious that the same could not be obtained from the revolution of the driving pulley of the lathe mandrel, in consequence of the same making only one complete turn while the cutting tool traverses throughout the entire length of the work. This hand feeding is of decided advantage, as the apprentice can then regulate the feed to suit the hardness of the material being wrought, and it makes no difference in the shape of the work, as the rotary cutter in the rest traverses the same lines whether the feed be rapid or slow. The reverse, however, is the case when a fine thread or screw is to be produced; the movement is then obtained from the lathe pulley and the overhead attachment is not used, and, as a consequence, the cutting tool is fixed solid in the slide rest.

The Overhead Attachment.

It must be understood that in the use of the spiral chuck, as described and illustrated in this and the previous papers, the overhead attachment is always to be considered, for by it the rotary cutters in the slide rest are driven, and, as the methods of driving and the shapes of cutters have been described, it will be unnecessary to refer to them again.

In Fig. 62 the chuck just described and radial arm attachments, all ready for operation, are illustrated merely to show the reader how the machine will appear when ready for work. It will be seen that the gearing is connected to the slide rest, on which is fastened a small pinion which is so arranged as to regulate the travel of the rotary cutter that it may cover a distance of a certain number of inches in a straight line while the material in the lathe makes a part, or whole, or several revolutions. It has not been thought necessary to show in this illustration the overhead attachment, as that has previously been considered.

It must be understood that in using this spiral chuck all the ornamentation on the work must be made by revolving cutters that are driven by belts or cords from an overhead attachment of some suitable kind. If spirals are required on material the whole length of the lathe bed, then the overhead work must be made so that the driving belt connecting the cutter with the drum or other attachment will be able to travel the length of the bed and still be in line with the pulley on the cutter mandrel. Another thing which I may mention here is that revolving cutters having their points in a line with the axis of the cutting mandrel can only be employed in making flutes, dadoes, reversed astragals and incised work. Reeds or raised work of any kind made on spiral work must be made with cutters having their cutting surfaces rotating in a line with the axis of the material being operated upon. In other words, the cutter must be attached to the mandrel the same as the cutters in a shaping machine, and attached to the spindles. This must be quite apparent to every workman, for a cutting tool intended to form a half round, revolving on its own axis, would make a series of circles with a domical teat in the center.

This fact creates another condition which is met as follows: Instead of having the axis of the cutting mandrel exactly on a line with the axis of the work operated upon, or, in other words, in a line with the fixed center of the lathe, we simply so arrange it that the end of the mandrel carrying the cutters overlaps the work, and the center of the cutting iron lines directly over the line of lathe centers. This necessitates a heavier mandrel, as the cutters are projected over the work at same distance

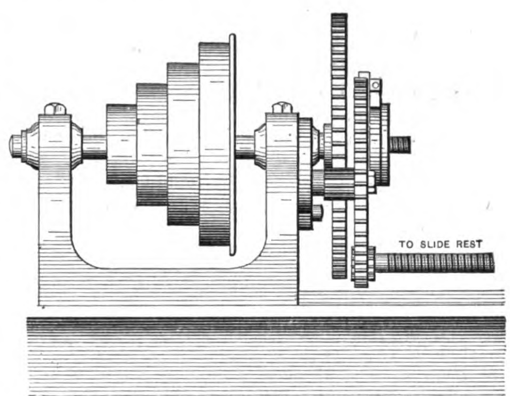


Fig. 62.—View of Chuck Attached to Lathe.

The Art of Wood Turning.

from the bearings. Some extra provision will also have to be made for raising and lowering the cutter bar while in motion—a very simple matter to the trained mechanic. Again, for tapered work the tail block would have to be raised just half the amount of the taper, in order to meet the new condition. With a cutting mandrel arranged in this manner, and an ordinary plain square cutting iron used, balusters, newels or similar work could be made with any number of equal sides; the number, after being determined upon, could be easily worked off by aid of the index wheel. In fact a chuck of the kind described, if added to by a little ingenuity on the part of the workman, will be capable of performing innumerable ornamental things that cannot even be hinted at in these papers.

The invention of the spiral chuck described is due to J. H. Evans, and is partly illustrated and described in his "Ornamental Turning," but it must not be supposed that this is by any means the only spiral chuck in use. There are at least a dozen others, some of which I will describe and illustrate in future papers. This chuck, however, though rather expensive, is among the very best for the purpose.

It will now be in order to describe as briefly as may be the various movements and different ways to employ the chuck to attain desired results, and to this end a few rudimentary examples are presented, the originals of which were obtained by following out the descriptions given, and these in their turn will lead up to works of a more complex and ornate character, for, as the principle of the chuck becomes better understood, the combinations of ornament will become quite an easy matter.

A large number of screws can be cut with a usual train of wheels, and when it is required to employ only three wheels the single arbor may be used, as the wheels all gear in the same plane. When the three wheels are used in this manner it must be clearly understood why, and here a little explanation will not be out of place. Two wheels alone would give the same result as to the pitch or use of the screw or spiral produced, but it will be observed that when they are put in motion they revolve in opposite directions, and this would cause a left handed spiral—that is, assuming the main screw of the slide rest is a hight handed one, which it ought to be. By the intervention of a third wheel it will be seen at once that the two wheels which determine the result of the spiral are made to rotate in the same direction, the intermediate wheel revolving in the opposite direction to the other two, and, in consequence, a right handed spiral is obtained. It must be clearly understood that the intermediate wheel, no matter what number of teeth it may have, has no influence on the pitch of the spiral so cut, as it is, in fact, simply a wheel of communication or a carrier. The intermediate arbor, which I have already described, is that which is usually employed for the purpose; at the same time any of the several wheels comprised in the set may be placed on either of the changeable arbors, and an instance of this requirement will be found, if any reason, such as an increased diameter of the work, necessitates the removal of the slide rest to such a distance from the center of lathe axis that the terminal wheel of the train would not conveniently reach the center one, and here it is that wheels of the larger diameter may be required.

Pitch of Spirals.

For the purpose of ornamental turning it is seldom that spirals of such a pitch as result from the use of two wheels only in the same plane are employed; those of a large pitch or twist being more decorative and appropriate for the various objects they are to surround. When it is required to cut a spiral of this character the intermediate arbor with the 30-tooth wheel is removed and replaced by the double arbor, or that arbor which is capable of two wheels, and which obviously revolve together. The trains will then consist of four wheels—that is, one on the dividing chuck, which is on the mandrel, two on the double arbor, and the fourth on the main screw of the slide rest. It is now evident that the four wheels revolve in two distinct planes. As an example, let us adjust the apparatus so that it will produce a spiral of one turn in 7 inches of the length of the material being worked on, or, to be precise, 7" — 2"'. In this the wheel will be 144 on the chuck, 16 on the double arbor, 120 on front of the lathe, geared to 15 on the slide rest. Now the two wheels on the double arbor, revolving together as they do, produce the same result as the intermediate arbor in the train of two wheels—that is, with regard to the direction of the spiral, which will be a right handed one—and it will be at once seen that they are more serviceable in accommodating the various diameters of work it is desired to cut the spiral or helix upon. When the twist reaches the proportions mentioned they are generally termed "Elizabethan twists." The varieties to be obtained by the set of wheels range from two turns in 1 inch to one turn in 7 inches, and if it is found necessary for any reason to go beyond this it is accomplished by the intervention of the additional arbor, which I may describe in a later paper. This can be arranged to suit a twist to any degree or length within the capacity of the lathe, when used in combination with proper gearing.

Left handed turning of spirals is often necessary to meet some particular style of decoration, and in order to obtain this with the train of wheels running in two planes the intermediate or reversing arbor is again brought into use and is placed between the 144 wheel on the chuck and the 16 wheel on the double arbor. By this means the direction of the spiral is reversed, there being now five wheels geared together.

The Cutting Part.

Let us now consider the cutting part of the apparatus and its adjuncts. It is quite evident that as soon as we begin to cut spirals of long twist, that the motion must be given to the arrangement by the rotation of the main screw attached to the slide rest, and this, it will be equally noticeable, will necessitate rotary cutters as before described, in some of their forms. The dividing or spacing of the several cuts must be decided by the partial rotation of the dividing chuck. The rotary drill can be made to perform many important functions, such as the cutting or studding the numerous parts with beads, pearls or concave incisions, and it is a safe tool to use, particularly for a beginner, and a number of sizes would be an important part of the outfit. Plain flutes, or recessed moldings of certain contour, may also be worked with revolving cutters on the end of the cutting mandrel, but these moldings are limited in number. Another thing that must be looked to is the centering of the cutter, as on this depends the success or not of the work in hand. Should the center of the cutter or drill be either above or below the axis of the lathe it will cut out a larger amount of material from one side than the other. To make it more clear, if the penetrations be not precisely radial to the axis of the work in hand the cuts will be of unequal depth, and the accuracy and elegance of the work, if not ruined, will be greatly depreciated. This particular setting must, therefore, claim considerable and careful attention.

Setting Up the Apparatus.

To aid in setting up the apparatus ready to go to work the following suggestions are offered: The first thing to do is to place the radial arm on the circular fitting, and fix partially only. Next, place the wheel desired on the chuck, followed by those on the double arbor. Move the lathe gently along the mortise till the wheel on it engages with that on the chuck; it must only be so placed in gear that it will revolve freely upon turning the mandrel by hand. The arbor is then securely fastened to the arm, which is then released and lowered until the second wheel thereon will gear with equal freedom into that on the slide rest screw, the arm being secured by its tightening screw. Should the wheels be too tightly geared it will cause an uneven motion; but, on the other hand, if not sufficiently deep there will be a considerable amount of back lash, or loss of time. But by careful adjustment a deal of this may be prevented; at the same time a certain amount is inevitable. This brings us to another important point for consideration, and this is, to always make it a rule of cutting each and every spiral in the one direction—that is, from right to left, or from the tail block to the head block. When cutting a left hand twist, of course, this process must be reversed.

Now to work! Having made the initial cut to the required depth, also in length, determined by the fluting, stop, withdraw the tool, run the rest and tool back to starting point; and I may say right here, to avoid loss of time, the tool should be taken a short distance beyond the commencement of the cut, and again moved forward. By this we are assured the tool will follow the original course. The depth of cut must be found by making one or two cuts, according as wanted. When once all right the tool can be gauged to suit for each flute or molding.

CORRESPONDENCE.

Laying Out a Hand Rail Around a Landing

From J. A. Forsyth, *McKinney, Texas.*—In answer to the inquiry of "R. N.," Stockton, Cal., who asks in the May issue of *Carpentry and Building* for the best and easiest way to lay out a continuous hand rail around a landing, I submit the following as giving the least possible number of lines to find the pattern, together with drawings showing their practical application: Referring to the drawings, Fig. 1 represents a plan of the rail, Fig. 2 a projection giving side and end views of the rail in position, showing the application of the bevel F for working the twist in the rail to a level line on the landing, while Fig. 3 gives the working lines with which to find the pattern. In this diagram *a o* is the radius and *a e b* is the center line of the rail on plan. With *a b* as radius draw the arc *b* B. At right angles to *a o*, as at *a*, draw the line *a* B; continue the line *o a* to A, making the distance *a* A equal the hight, then *b* will be above *a* on the rake of the stairs. Upon the base X B draw A B; make the distance D E equal to *d e* of the plan. Draw an arc to the points A and B through E, which will give the center line on the pattern.

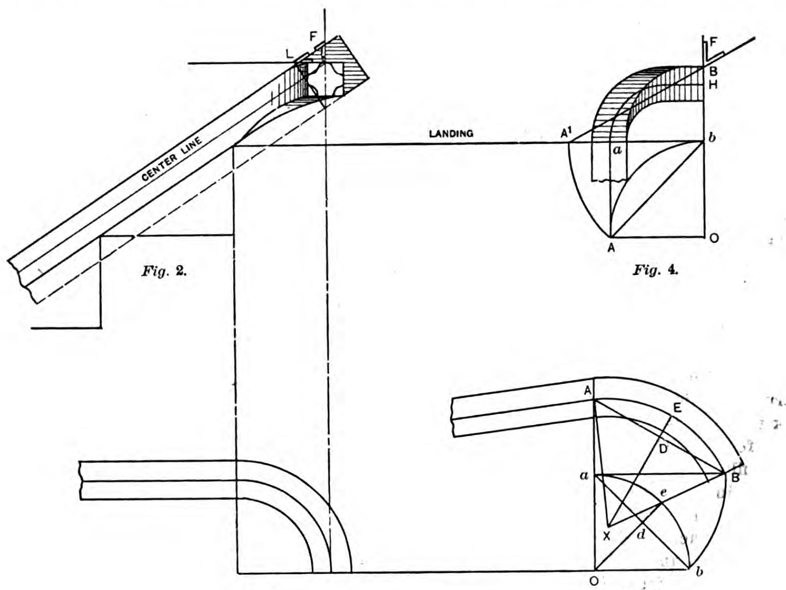


Fig. 2. *Fig. 4.* *Fig. 1.* *Fig. 3.*

Laying Out a Hand Rail Around a Landing.

In Fig. 4 is shown a projection of the rail as viewed going up the stairs, *a* B being the pitch line of the rail, but as the point B is too high for the balusters on the landing, it is necessary to ramp the rail, bringing the center down to the point H on a plumb line, as indicated at F of Fig 2. By following the above instructions the easing leaves the straight rail on the same rake, being ramped at the opposite end on a plumb line down to the proper hight for the balusters on the landing, which will form a graceful wreath and in perfect line with the well hole of the landing.

Proportioning Gambrel Roofs.

From G. H., *Baltimore, Md.*—What is the rule of proportion in laying off what is known as gambrel roofs? For example, if the upper part of the roof is inclined to an angle of 45 degrees, what should be the slant of the lower part of the roof? Also the right proportion to make the dormers?

Note.—We do not know that any particular rule is followed in laying off roofs of the character indicated, as the determining factor is largely that of individual taste. It is possible, however, that some of our architectural friends make use of a definite proportion, and we shall be very glad to have them take up the question and discuss it in the light of their own knowledge and experience.

Comments on Wood Pattern Making.

From A. G. T., *New York City.*—In *Carpentry and Building* for March and May are two articles on pattern making, and, while I do not wish to criticise the method of the author of these articles, I would state that I would do the work in a very different way. In regard to shrinkage I would state that in New York City and vicinity all shops allow 1-10 inch to the foot, instead of 1/8 inch. In the case of the beveled wheel the article says that "the circles should be sawed out and glued on top of each other at right angles." I should say that this method was out of date, as segments are far superior, no matter how small the pattern may be, and even turned out of a solid block is better.

As to the use of templates, I should not regard them in this case as necessary; calipers are sufficient for the purpose. I would also leave the hubs loose, as this plan would suit the molder much better. In the case of the loose flange I would on no account make it in two thicknesses, as one pulls against the other. I would make it in three or more thicknesses if segments, or even one course of segments with "feather" is much better than two; also mold in a two-part flask instead of three. Cut the loose flange in a number of pieces and pirk in, or leave entirely loose. The molder can make cake core to suit. Templates are seldom used in modern pattern shops.

Referring to the flanged elbow described in the May number, there are, in my opinion, too many templates and the dowel pins are shown too near the center of the pattern. They should be in the core prints. In turning the L the author is correct about it being cheaper to turn the whole piece, throwing away half. If one makes use of templates in turning it is necessary to have a chuck much larger than really needed. All that is required is a little care in chucking it. Mark one end of half the diameter to be turned, say a 5-inch pipe, then work it off with a chisel, and we have the size to which to turn without templates. I would not use center plates on anything under 12 inches.

How to Build a Row Boat.

From A. E. P., *Huntsville, Ala.*—Will some reader of the paper tell me how to build a rowboat ?

Note.—This subject has received more or less attention in the past, and there have been presented several articles telling how to construct a rowboat or skiff. Our correspondent does not give any idea as to the size or style of boat which he requires, and it is, therefore, impossible to furnish specific instructions as to the way in which the work should be done. It is possible, however, that he may obtain valuable hints and suggestions from the article which will be found on page 93 of the issue of *Carpentry and Building* for April, 1898.

Finding Capacity of a Cistern.

From C. M., *San Mateo, Cal.*—Will some one kindly give me through the columns of the paper the rule for obtaining the cubic feet in any given circular cistern or well?

Answer.—We would refer our correspondent to the reply given to S. L. M., which will be found in another column.

Some Comments on Saw Filing.

From C. K. S., *Wayland, Iowa.*—Saw filing is one of the tricks of the trade, and, indeed, a very important one. I read the article from " S. A. M.," Parowan, Utah, which appeared in the April issue for 1899, and it is, in my opinion, the best article on the subject I have seen. Now Brother " F. R." of Coalville, Utah, could not file a saw for me, for no person can file one edge of a saw as small as a hand saw and then file the other without touching the edge already filed. Now to all the brothers who have not yet perfected themselves in saw filing I would suggest that, if they ever hope to come anywhere near mastering the art, they write to Henry Disston & Son and ask them to send a book on saw filing entitled " Hand Book for Lumbermen." Then purchase one of Disston's saw filing guides and clamps and follow the directions given in their book, and they will soon learn how to file a saw. In following these instructions you are following the practice of men who have made saw filing a lifelong study, and who handle more saws in one week than we see in a lifetime. I got one of these filing guides and clamps, as well as one of their books, as soon as I decided to follow the trade as a business. A carpenter who has followed the trade for 18 years got one at the same time, and went to using the clamp and hung up the guide, and when this last summer we both happened to work on the same job he soon decided to use his filing guide, and is still using it, and he was considered a good saw filer. I also had the privilege of having a man who has followed the trade for 20 years pick up my saws and use them when I was not around, and afterward say he wasn't in it with me in filing saws. Nor will I stand back from any of them when it comes to filing saws, if I do say it myself. I also wish to say to my brother chips that they should get one of Pike's Perfect saw jointers, and when the saws have been filed lay them down flat on the bench and run over them once or twice with the oilstone, and it will be found that the saws will run with perfect ease. To further better the filing outfit get a good saw set, but you may have all the things mentioned, yet if you do not observe the proper way of doing the work you will be no better off than before. That is where I have found the greatest fault with so many young men, for when they are at work on a job their minds are on something else, and when a few days later you give them the same work to do they can do it no better than they did the first time.

Give the Young Men a Chance.

From N. O. T., *Cuyahoga Falls, Ohio.*—If the editor will allow me a little space in *Carpentry and Building*, I would like to say a few words to the young men who wish to properly learn their trade. In the first place most contractors take their work at a very close margin, and if they are paying the going wages they cannot make a training school of their jobs. Young mechanics will find that working from drawings is not the snap some might think. and who will the contractor hold responsible for the blunders that are likely to occur upon a job where every one is his own boss and has free use of the drawings? I have found that a person has to study the plans and specifications thoroughly before he can handle a job of any size, and handle it profitably for the contractor by whom he is employed. Too many young carpenters are troubled with what is commonly known as " big head." To such I would say, try and cure yourself of it; never think that you know it all. If you wish to learn a trade, buy some of the best books you can procure and study them thoroughly. You can profit by what some one else has studied out, and make a good mechanic of yourself if you try hard. If you are working with a better mechanic than yourself, ask him his way of doing things; it will not do you any harm. Attend strictly to business during working hours and you will soon find that instead of looking for work you will be employed all the time, and better jobs will be in sight for you as you become a better mechanic. I speak from my own experience.

From G. L. S., *Champaign, Ill.*—I have been reading *Carpentry and Building* for a considerable time and find many interesting communications therein. I am somewhat surprised at the position of some of the boss carpenters as regards the young men being allowed to inspect plans. The writer has had an experience of 15 years in various parts of the country, most of which time has been spent as foreman in charge of splendid work, employing from 10 to 25 mechanics all the while, and it has always been my experience that the man who has no access to plans or knows nothing of them when he has access to them, never makes a complete success at the trade. I cannot see how any boss or foreman in charge of work can deny his men access to the plans at the proper time.

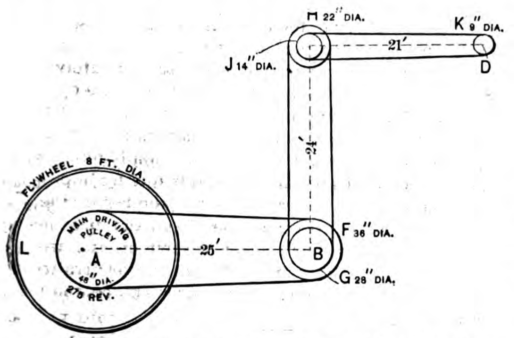
I do not think, however, that the young chip should run to the plans to monkey and scale them over with a rule for every little thing he has to do. It is such conduct as this that makes bosses tired of young men looking at plans. The proper time for the young man to study plans is at the noon hour or before work time in the morning, at least until he has become sufficiently familiar to read them with ease. Indeed, the successful mechanic is the one who studies the plans sufficiently to keep himself informed at least a few hours ahead of this work. Men who keep themselves posted in this way are always of more value than the man who finishes the last course of shingles, runs all over the building to find the foreman and asks " What next?" only to be sent back to nail on the saddle board. No, sir! give me men who are eager to study plans and who seek them out at noon hour, instead of spending their time in idleness and otherwise.

Nailing Red Cedar Shingles.

From J. W. C., *Mt. Vernon, Mo.*—If the editor will allow me a little space I will say a few more words on the art of nailing on red cedar shingles and their use. I wrote a few lines for the November issue of the paper, but have not seen any satisfactory reply. Some of the carpenters in our town split the shingles so as not to have any shingle more than 7 inches wide, putting two nails to a shingle. My idea is to take into consideration the kind of shingles it is intended to use. I never split a red cedar shingle, no matter how wide it may be. I put in two or more nails, according to the width of the shingle. The kind of cedar shingles we have here will neither shrink, swell nor cup; and the less joints to break the less the chances for a leak. I put on 50,000 shingles last summer of this kind and in this way, and never had a single leak. If I was going to use cypress or white pine shingles I would split the wide ones down to about 6 or 7 inches, and put two nails in each shingle. If any of the readers of the paper agree with me, or even if they do not, I should like to hear what they have to say.

Rule for Figuring Number of Revolutions of Pulleys.

From J. J. D., *Cornwall Station, Cal.*—I wish to ask for a little space in the Correspondence department of the



Rule for Figuring the Number of Revolutions of Pulleys.

paper in order to present a pulley problem in connection with which I send inclosed sketch. The large wheel L is a fly wheel 8 feet in diameter, and makes 275 revolutions per minute. A represents the main driving pulley, which turns on a shaft 5 inches in diameter. The second pulley F is 3 feet in diameter, and is distant from the first one 25 feet, measuring from A to B. G is another pulley measuring 28 inches in diameter, and at a distance of 24 feet from B are two other pulleys, H, measuring 22 inches in diameter and J 14 inches in diameter, the shaft being 1½ inches in diameter. At a distance from these pulleys of 21 feet is a pulley, K, measuring 9 inches in diameter, and turning on a 1-inch shaft; all the pulleys having 6-inch faces, and three-ply belting is used. I wish to know the rule for figuring the number of revolutions the shafts and pulleys make, also if the distance has very much to do with the speed.

Note.—In figuring the speed of pulleys a rule given by an authority on the subject is to multiply the diameter of the driving pulley by its revolutions per minute, and divide by the diameter of the driven pulley. The distance between the pulleys has, theoretically, no bearing on their speed.

Laying Out Planceer for a Circular Porch.

From J. W. S., *Paterson, N. J.*—Referring to my letter which appeared in the June issue, relative to the best method of laying out the planceer for a circular porch, there occurred a slight error in connection with the plan view, in that only the center of the circle was given from one corner of the building, which is 4 feet 9 inches and should be 6 feet 3 inches the other way. A few additional particulars regarding the problem may not be out of place, and I give them accordingly. The center ring is 6 x 8 inches, spruce, planed, and all the rafters fit against it, notched in so that the joints will not show from the bottom. The frames are 13¼ inches wide in the rough and 15 inches over all with fascias on. The planceer was sent to me worked out for an 8 foot 4 inch radius, but no allowance was made for the pitch of the roof. To overcome that, I saw kerfed the top of the planceer, and as we sprung the crown fascia around we raised the planceer up, and it was just as good as if it had been worked. Now, what I should like to know is the method of properly obtaining the bevel radius, as intimated in my last letter. Will some of the practical readers come forward and help me in this matter?

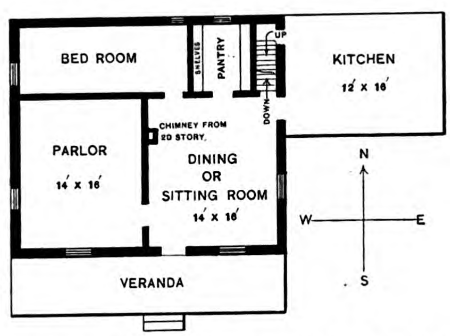
Note.—We have a reply to the above from "A. O. C.," Lake Charles, La., but it reaches us too late to prepare the illustrations for this issue. It will appear in the August number.

How to Place Corner Blocks.

From W. W. S., *Waterbury, Conn.*—In the April issue of *Carpentry and Building* "H. A. McK." asks for the proper way to place corner blocks. I would like to say that, in my opinion, the grain should run horizontally, so that, in case the corner block should curl up across the grain and open a joint, it would not look very bad, as the open joint would be on the side casing. On the other hand, if the block was placed so as to have the grain run vertically the bad joint would be against the head casing and make a very ugly looking job.

Remodeling an Old House.

From G. A. W., *Crary Mills, N. Y.*—I send inclosed a sketch of the floor plan of an old house which I wish to remodel, and lay the matter before the readers of the paper for their consideration. The kitchen and veranda are to be taken away and the kitchen used for a woodshed. I want to place the pantry and stairs, both up and down flights, in some convenient shape for a farmhouse. I also want to take off the roof and give it a better elevation, having a gable toward the front, and the roof to run lengthwise, as at present. I want to build a new kitchen, having it larger than the present one, and the pantry so placed as to be convenient for kitchen and sitting room. I want to go down cellar out of the kitchen or pantry and not land against the wall of the cellar. I would also like to raise the second story a little, as it is very low, being only 7 feet in the clear.



Remodeling an Old House.—Plan Furnished by "G. A. W."

I would like to have four bedrooms with closets on the second floor, and would also like to have a closet in the bedroom on the first floor. I want a neat and attractive exterior at the least possible expense. Could the new addition be built on in front and make it look well, using the sitting room for the kitchen? If some of my brother chips who have had experience in remodeling old houses will discuss these questions they will greatly assist in the solution of this problem.

Cold Storage for Private Use.

From H. S. W., *Watkins, Ohio.*—I have been a reader of your valuable paper for some time, and am much pleased with the questions asked and answered by brother chips. Now I come for assistance. I have a cold storage to build for private use. The size of the room is 6 x 8 x 6, and what I want to know is the size of ice space required around this and what size timbers should be used overhead on the inside room. The inside walls are to be of brick, laid in cement. Will some of my brother chips give me the size, also the thickness, of the outside walls?

What Figures on Steel Square Give Cut of Planceer and Fascia on Octagon Roof?

From A. O. C., *Lake Charles, La.*—If the editor will allow me space in the Correspondence Department of the paper, I would like to ask my brother carpenters a question. It is this: In an octagon roof of two-thirds pitch, 16 inches rise to 1 foot run, what figures on the square will give the cut of planceer and fascia? The house has a rake cornice. What I want is a rule that will apply to any pitch. I am a constant reader of *Carpentry and Building* and like the paper very much.

Roof Plan Wanted.

From BUILDER, *Grafton, W. Va.*—I inclose a plan of a one-story house and I would be very much pleased if some of the readers of the paper would furnish for publication design of a roof sufficiently steep to admit of two or three small rooms to be finished in the attic. The

Roof Plan Wanted by "Builder."

porch plan may be changed if necessary, in order to suit the roof plan.

Good Advice.

From R. D. R., *Long Island.*—As is well known, the object of a trade journal is to instruct its readers in everything pertaining to their line of business, and as the younger members in any and every trade prefer to be entertained rather than instructed, it too often happens that the trade journal is neglected in order to give time to the perusal of journals of a saffron hue.

As we are all creatures of habit, it is just as easy to acquire a habit of reading regularly something which will prove helpful as it is to acquire any other good habit; bad ones may be more easily acquired, but do not pay so well, there being very little demand for them while the production is unlimited.

It is really surprising in how short a time a young man can acquire a taste for studiously reading the trade journal which is published in the interests of the trade in which he is engaged. Having some knowledge of the subjects under discussion makes it easier for him to become interested; and the less knowledge he possesses the more necessary it is for him to interest himself.

The mechanic of to-day who does not keep informed as to what his fellow craftsmen are doing and how they are doing it is either a "has been" or soon will be; for most tradesmen are giving more thought to the theory of their trade than ever before, and are invoking the aid of the trade journal in doing so. So that he who disdains the use of book information will find that his more studious competitors are extending their business along with their knowledge, and that means a loss of trade to him. It will do him no good to "trek" to some other town, as he will find that the some conditions obtain there. The only thing for him to do is to keep in touch with the advances made in his line, and no better method of doing so has yet been found than by making an intelligent and thorough use of the trade journal. Young men especially should cultivate a closer acquaintanceship with it, as they have the advantage of not being too old to learn.

Meaning of the Term "Pair" as Applied to Hinges.

From O. G. C., *Athens, Pa.*—An order for builders' hardware was lately received in which was included the item "22 pair blind hinges." When the order was filled the purchaser insisted that 22 pair of blind hinges meant 22 sets, or 44 pairs. The bid was made on 22 pair as stated. Would the purchaser be entitled to 22 or 44 pairs?

Note.—According to the Standard Dictionary, the word "pair" means "two persons or things of a kind, especially when joined or related more or less intimately." In view of this definition we should interpret the order for 22 pair of blind hinges to mean simply 44 hinges. A "set" of blind hinges we should regard as a number sufficient to hinge the blinds for a window—if outside blinds four or six hinges would constitute the set, and if folding blinds 12 hinges, more or less, according to the number of the folds. It is, of course, possible that local practice or custom may govern the matter to some extent, and we lay the letter of our correspondent before our readers to the end that they may express their views on the point in question.

Durability of Ready Roofing.

From W. A. R., *Burritts Rapids.*—I have roofed a small building with Ready Roofing, by some called mica roofing, and I have been asked by a number how I like it, and if it is durable. To the first question I would say, I like it very well, but I cannot answer the second. If the editor will be kind enough to place the question in the columns for some one who has had experience with this kind of rofing to answer, I shall take it as a great favor.

What Is a Lady-Toed Brace?

From J. J. D., *Cornwall Station, Cal.*—I saw some time ago the name "lady-toed" brace, and I would like very much to know what it is, as the term is new to me.

Cleaning Skylight Glass.

From C. J. S., *Ohio.*—I will thank you very much if you can give me a method of cleaning skylight glass set in skylights. The dirt and soil seem to be ground right in the glass.

Answer.—The usual way to clean soiled or stained glass is to use white sand and muriatic acid, by dipping the rag in the acid and sand and rubbing until the stains disappear. Then rinse with clean water. When cleaning too much pressure should not be exerted, otherwise the glass will be scratched.

Capacity of a Tank or Cistern.

From S. L. M., *Houston, Texas.*—Please give me a rule to figure the capacity of a tank, say 6 feet 4 inches in diameter and 7 feet 8 inches high, so that I can find how many gallons such a tank will hold.

Answer.—The rule for finding the capacity of a cylindrical tank is to multiply the area of the bottom in square inches by the hight in inches and divide by 231, the number of inches in a gallon. In the case in point the diameter of 6 feet 4 inches is equivalent to 76 inches, and the area of a circle 76 inches in diameter is found by squaring 76—that is, multiplying it by itself, which will give 5776, and multiplying the product by 0.7854, the result being 4536.47 square inches. Multiplying this by the hight, 7 feet 8 inches, or 92 inches, gives 417,355.24 cubic inches for the capacity of the tank. Dividing this by 231, the number of cubic inches in a gallon, we find the capacity of the tank to be 1806.7 gallons.

THE COST OF BUILDING IN NEW YORK.

IN view of the advance which has taken place during the past year in the price of nearly all materials entering into the construction of a building, a discussion of the present cost of building, and the outlook for the future does not appear to be out of place at this time. In fact the questions are just now receiving no little attention at the hands of contractors and intending builders. A great deal has been said about the effect of prices upon building operations, and arguments have been presented to show that a vast amount of work is being held in check pending a decline in the cost of materials. In its issue for June 9 the *Record and Guide* has an article on "The Cost of Building," which covers many points likely to prove of interest to our readers, and we therefore present the following extracts from it:

The building situation in this city, and for that matter, in all other cities of the country, is not only full of disappointment for the builder, but it is in a way even exasperating.

It is disappointing, for every one feels he is entitled to his share of national good times, and it is exasperating to see that one's proper portion of prosperity is withheld in part because of the fullness of the abundance that has fallen to others. Yet that is somewhat the situation as it exists for the builder. He has not yet received a single cent from the recent great increase in commercial activity, and this unequal distribution is in large measure due to the fact that makers of building materials have been able or have been forced by conditions to put up the prices of their goods to a point that tremendously retards building operations.

Our weekly statistics have shown how great and how general has been the falling off of work. An immense number of projected plans have not been carried out, and the investor has withdrawn from the market until more profitable conditions exist. In this way the spring season of this year, to which every one was looking forward expecting brisk business, has been lost, and, to-day, instead of figuring on contracts in hand, the builder is figuring as to the probable day when he will get his share of what is going.

We want, if possible, to give a little help in this calculation. With this in view, we present below a table showing the cost of erecting a tenement house of the standard type, on lot 25 x 100 and six stories high. We have taken two periods, January 1, 1899—that is, prior to the advance that occurred last year—and January 1, 1900, just past:

Cost of Principal Articles Entering into the Construction of a Tenement House, on Lot 25 x 100.

	January 1, 1899.	January 1, 1900.
Digging work	75c. to $1 a cu. ft.	75c. to $1 a cu. ft.
Mason labor	$1,700	$2,000
Brick, ordinary	1,500	1,800
Brick, front	200	210
Cement	450	500
Lumber	750	1,000
Plastering	1,300	1,800
Cut stone and labor	1,000	1,000
Framing work	480	600
Trim	2,500	3,000
Trim labor	640	800
Tinning	400	500
Painting	480	600
Plumbing	1,600	2,000
Iron work	1,300	1,500
Total, excluding digging	$14,300	$17,310

We have taken the tenement house as the subject of our figures because it represents an important part of building operations, and in a general way the results arrived at hold good certainly for all the cheaper kinds of edifices that are not built fire proof and with steel construction. From the figures it will be seen prices advanced last year something less than 25 per cent. Probably it would be safe to say that they advanced fully 25 per cent. Larger figures have sometimes been given for the increase that occurred, but upon investigation we doubt whether a higher percentage would stand analysis. Probably in those cases where buildings cost more than 25 per cent. additional, there were some special circumstances, such as poor credit of the builder, &c. Our figures are taken direct from the books of one of our most solid builders, and represent actual transactions, the buildings being precisely similar. Indeed, they were produced from the same plans. How serious this advance of 25 per cent. is, perhaps, can be better appreciated if we state it in this way: The man building on January 1, 1900, could erect only four tenement houses for the same amount of money that practically would have given him five had he commenced his work 362 days earlier. Besides it must not be forgotten that even the figures of January 1, 1899, were not by any means the lowest that have prevailed. But the prices given under date of January 1, 1900, represent the high water mark. During the last few months prices have been falling. There has been a distinct decline. The withdrawal of the buyer from the market brought about by the sharp advance left building material manufacturers rather short of orders as soon as the first rush of business was over. Moreover, production has been greatly increased. At the present moment manufacturers and dealers are energetically seeking orders. To attract purchasers they are ready to make, and are making, substantial reductions. Indeed, it is coming to be generally recognized that only a very limited business can be done at the price prevailing at the opening of the present year. There is no danger, therefore, in prophesying that prices will come down, if indeed they are not now down, to the level necessary to bring the investor once more into the market.

We would probably to-day see a revival of activity were it not that in the case of certain classes of buildings this is not a propitious time of year to begin operations. The starting of the building is, no doubt, an important point in the tenement builder's venture, but, in a sense, the date of the completion of the building is financially even more important, for then it is that he has to obtain his permanent loan. November and December of all years are bad months to have anything to do with mortgages. The holidays are at hand, money is not procurable, &c. In Presidential years we must add to the list of bad months the month of October. Thus it happens that the delay occasioned by high prices in the early part of the year has retarded operations for the whole 12 months. It is now better for the builder to wait until the beginning of winter and then start his work, so that it can be completed by May 1 next.

The outlook, therefore, is that nothing much will be done in the next few months, but that toward the end of the year we shall see some activity. We wish we could say "great activity," but our high taxes are an element of doubt in the situation. Quite as much as high prices, these enormous taxes now exacted from real estate and the uncertainty as to how much higher they may go have retarded building. Capital is very sensitive to a matter of this kind. With the increased cost of building added to the greater taxes, mortgagees are by no means as free as they were in lending money. This explains the anomaly that it is easier to obtain 4 per cent. money to-day than 4½ or 5. A 4 per cent. loan usually covers 50 to 55 per cent. of the total valuation of the property mortgaged; a 4½ per cent. loan, 55 to 60 per cent., and a 5 per cent. loan, 60 to 66 per cent. Under the conditions that exist to-day the ordinary lender prefers the lowest rate and the greatest amount of security.

CHARLES F. BINNS, who has for a number of years been principal of the Trenton Art School, has accepted the position of director of the New York State School of Clay Working at Alfred University, Alfred, N. Y. Mr. Binns will superintend the erection of the buildings and select the equipment for the school, which opens September 11. He is well known among the ceramists of the country, being vice-president of the American Ceramic Society.

ESTIMATING FOR STONE WORK.

ANOTHER qualification of the estimator is his ability to read drawings. And he is still better qualified if he is skilled in making of all kinds of drawings which are to be found within his sphere of duty; because he is thus able to see with the draftsman's eye and discover, accordingly, much that is necessary to the proper discharge of his duties, and which, otherwise, would escape his notice. Of course it must be admitted that there are estimators who are not draftsmen by profession, and who are thoroughly reliable as to estimating, but long practice or exceptional opportunity has developed in them the draftsman's eye—the ability to see as the draftsman does; and consequently that being the reason for the estimator's possession of this qualification, it cannot argue against the necessity for it. Then, too, the more thorough the estimator is as a draftsman the more thorough he is as an estimator. His ability in this direction is only secondary to the necessity for being practical as hereinbefore shown, both being necessary, his ability is proportionate to his strength of knowledge of each—draftsmanship and practical stonecutting, which includes, of course, all that relates to the practical working of the stone, from quarry to building, if we would aim at perfection in this matter.

Mathematical Qualification.

Next to the estimator's ability as draftsman comes the mathematical qualification, which, in general, is simply arithmetical, although there are moments when he can advantageously use his knowledge of practical, descriptive and rational geometry, as well as plane trigonometry. This is so obvious a necessity that it is simply mentioned here as a qualification and dismissed from further consideration; but the last and very important requirement of the estimator, outside of "taking off quantity," which is understood to come within the bounds of draftsmanship, is the preparation of the "quantities" for estimate. This presupposes that the estimator is well versed in the science of construction as applied to buildings, &c.,; that he understands from the drawings and specifications where to expect, and look for, all stone work in connection with the contract, whether it is a "girder block" hidden away in the brick backing, or stone work plainly shown on the elevations, plans, &c.; that he understands how the stone work butts against the different materials, whether they be iron, brick, wood, &c.; and in general that he understands from the requirements of the drawings and specifications exactly how the stone work should be cut and set in the wall; for then, and then only, will he be prepared to say fully how much stock shall be used in the execution of the contract; and how much labor must be involved. This being settled, we will consider the preparation of the quantities for estimating purposes. It is not intended here to elaborate a system, but simply to point out a few facts which are essential to good estimating, and which, taken in conjunction with what have been stated before, serve to show the duties of the estimator, and what should be required of him if he is not to be chargeable with inefficient service.

Grouping Similar Stones.

In arranging the quantities for estimating it should be determined upon, at the outset, that all similar stones shall be grouped; that is, all of the same size, profile and finish should be written in a column together, with the three dimensions and cubes, so that the calculations may be simplified as much as possible, on the principle that simplicity in this respect means speed and safety. Next in the order is the arrangement of those pieces which cannot be classified as similar. Having listed in this way all the stone in the building, the cubes should be brought out, and added, in order to determine the amount of stock and the cost of freight and handling. Before doing so, however, the estimator would do well to scan closely the specifications and read them all through carefully and ascertain whether some particular stones are hidden away which are not shown on the drawings, as contractors often find to their chagrin, when shipments of stock take place, that there is some more work that they never figured on. The next step for the estimator is to determine the labor, and to find the net cost, all as has been indicated herein. These are his plain duties, and it is manifest that if he should be found wanting, as herein shown, the contractor has just cause for charging him with incompetency, and he is one cause of failure as pointed out before.

The Superintendent.

The next to be considered is the superintendent of the shop, and, perhaps, the quarries. It can be truthfully said that in him should be found all the qualifications of the estimator. His duties as superintendent require of him, if not at one time, at another, all the qualifications already described, and he should, in a well regulated establishment, be charged with the preparation of the estimates; as it is obvious, unless a check be contemplated on the figuring, that he is in a position, with reference to all that which enters into the cost, to render the best service available.

After a careful consideration of what has been said here it will become apparent to the contractors for whom this paper is intended that it is of paramount necessity for the success of their business that they should, first, systematize it so far as it relates to the work; and, secondly, having secured the services of those well qualified to direct the work, and pass upon the value of it, there should be no difficulty in avoiding the financial pitfalls into which so many contractors have plunged unwittingly, and which can be easily guarded against, when seen. Then the contractor will know that when he fails to get a job his figure was safely high, and that, if his figure is much lower than his competitor's, he is safely low—in all cases he will know exactly how he stands with regard to a bid before he signs a contract.

Continued from page 186, June issue.

To Clean Dressed Stone.

A writer in a late issue of the *Stonemason* suggests the following method of cleaning dressed stone:

Clean off all grease and as much dirt as possible with strong soap and water, then cover with a paste of quicklime and water. Let it remain for 24 hours, and wash off with soap and water. Afterward apply diluted muriatic acid, and be careful to wash this off thoroughly.

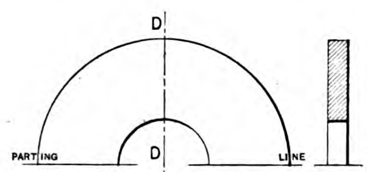
AMONG the fine office buildings in process of erection in the city of Baltimore may be mentioned that which is being put up for the Continental Trust Company, at the corner of Baltimore and Calvert streets. It occupies a site 75 x 134 feet, and when completed will tower 15 stories above the sidewalk and two below, making practically a 17-story building. The drawings were prepared by D. H. Burnham of Chicago, and call for a building to cost in the neighborhood of $100,000. The three lower stories of the building will be of New Hampshire granite, and the remaining ones of brick and terra cotta. The ground floor will be divided into five stores. The Trust Company will occupy the whole of two floors. It is intimated that when completed the banking offices will be among the finest of the kind in the country. The interior finish of the building will be in mahogany, the corridors tiled and wainscoted 6 feet high with white Italian marble. The building will be fire proof throughout, heated by steam, and lighted by electricity. A feature is the structural iron work, which is unusually heavy, owing to the necessity of strong wind bracing, and the small number of steel columns which run through the building.

MAKING WOOD PATTERNS.—XIII.

BY CHARLES J. WOODSEND.

AFTER the piece shown by Fig. 88 in the May issue is ready for the lathe, turn it up, as indicated, making the groove for the flange so that it will fit snugly. The fillet of the flange will be turned out in the same piece as the flange itself, so that whatever thickness of flange is required the fillet must be added to it, in order to give the thickness to the stuff from which the flange is to be made. In practice, it is better to have the material a shade thicker, so as to allow of truing up the face of the flange in the lathe. In Fig. 91 is shown half of the flange already sawn out, while Fig. 92 represents a section of it upon the line DD.

Take the piece, Fig. 88, out of the lathe, stand it up on the large end, and if the pieces to form the flange are correctly sawn, they should fit neatly in place. Be careful to have all the lines of the parting come together, When this is completed, drive a couple of dogs across each joint to hold it in place, and toenail the three pieces together. It will be noticed from this why the drawing board should be substantial, straight and out of wind. If it were otherwise the pattern would not come together true as it should. Remove this half of the pattern from the drawing board, put in a few toenails across the joints on the side that rests upon the board, and smooth down any slight irregularities there may be; repeat the operation for the other side, with the difference that it is put together upon the finished half of the pattern, instead of being held in place by putting in dogs across the parting. After all this is completed, putty up all nail holes and the holes made by the dogs; rub down with sandpaper and give another coat of shellac. In cleaning up the ends of the core prints they should be left rounding a



Figs. 91 and 92.—Plan of Half Flange, with Section Upon Line D D.

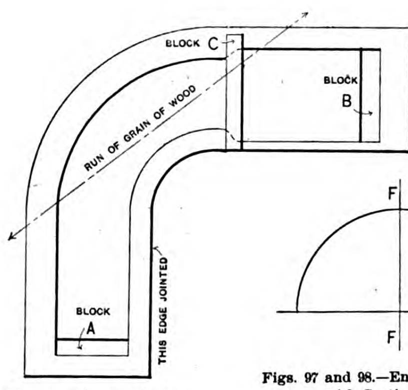
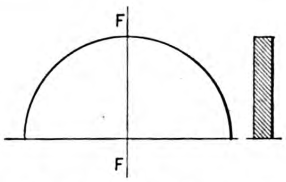


Fig. 94.—Plan of a Core Board, Showing Lines of Core and Position of Blocks A, B and C.



Figs. 97 and 98.—Enlarged Plan of Block B with Section on Line F F.

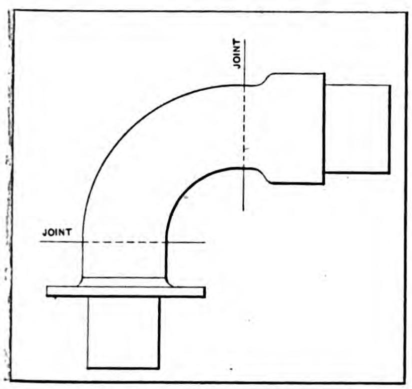
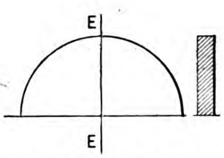
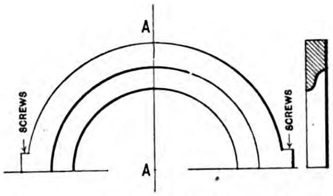


Fig. 93.—Plan of Drawing Board with Half of Pattern in Position.



Figs. 95 and 96.—Plan of Block A Enlarged, with Section on Line E E.



Figs. 99 and 100.—Enlarged Plan of Block C, with Section on Line A A.

Making Wood Patterns.

then nail fast in place. Nail through from the side on which is the core print, toeing the nails, so as not to interfere with the turning. Put the piece back into the lathe and turn up the flange and its fillet; sandpaper down the shellac as explained before. After this is all done, remove the piece from the lathe, take off the center plates, remove the screws and pry the two pieces apart. Then cut them at the joints, also cut the end pieces from the core prints and plane the joints true, or trim them upon a trimmer, if that be more convenient.

We are ready now to begin the assembling of the pattern. First, however, take one of the quarter circles forming the turn and lay upon the drawing board; mark the lines of the joints upon each edge of the parting, and cut them near these marks, leaving a little material for future trimming. Now take half of each end of Fig. 88, and lay upon the drawing board, fasten them with hand screws, or they may be toenailed if the nails are left so as to be easily withdrawn.

The next step is to fit the quarter turn to these pieces.

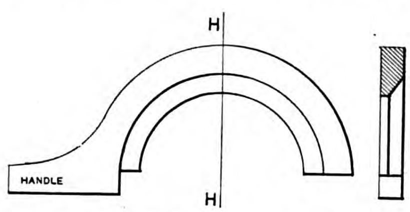
little, so as to draw better. The core prints may be shellacked with black shellac and finishing touches put to the whole.

The next thing to consider will be the core boards, Fig. 94. There should be two of these required—right and left handed. They should be made of white pine, and should be free from knots and pitch, the grain of the wood to run in the direction indicated by the dotted lines with arrow heads at the ends and have good battens at the back. The faces of the boards should be straight and out of wind, and the inner edge jointed true. In laying down the boards to obtain the shapes, the inside line should be anywhere from ½ to 1 inch clear of the greatest width of the core required. The lines upon Fig. 94 will doubtless explain what is required. The outside may be as much as one may choose, so that it is wider than the core.

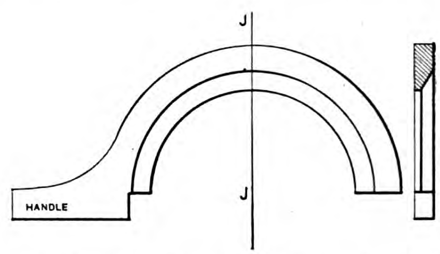
The blocks A and B shown in Figs. 95-98 are to be a trifle smaller than the semi-diameter of the cores for their respective ends. This is to allow the strike to slide over without catching. After the core boards are made and the blocks A and B sawn out, lay half of the pattern on each board and mark the positions for the three blocks, A, B and C. After this has been done nail the blocks A and B fast.

The next thing is Block C. This forms the ogee made by the change in the size of the pipe forming the socket. The inside portions of Block C should be turned out in the lathe. The two pieces required may be put together upon the chuck and turned at one operation. They should also be shellacked, but the rest of the core board may be left white.

After the blocks C are screwed in their places the strikes will require attention. These are shown in Figs. 101 to 104, and by examining them it will be noticed that the handle projects down more than the other side. This projection, when the strikes are used, runs against the inner edge of the core board, thus making a guide for the core maker to build his core. It is very necessary in making the strikes that the inner radius should not be more than the radius of the core prints, neither should they be smaller. In one case the finished cores would not go into the mold, and in the other the metal of the pipe would be thicker on one side than upon the other.



Figs. 101 and 102.—Enlarged Plan of "Strike" for Core from Block A to C of Fig. 94, with Section on Line H H.



Figs. 103 and 104.—Enlarged Plan of Strike of Core from Block B to C, with Section on Line J J.

Making Wood Patterns.

Education of the Architectural Student.

One of the papers read at the second annual convention of the Architectural League of America, held in Chicago, June 7-9, dealt with the education of the architectural student, the author being Prof. A. B. Trowbridge of Cornell University. What he had to say is of such general interest that we present the following extracts:

The profession of architecture as well as the vast thinking public have cause to be thankful that the schools of architecture are taking a stand for conservatism in teaching. If we were to allow ourselves to be carried away by the delusion that we might achieve fame by experimenting upon our students in the search for an original style of architecture, we would be infamous. We would be betraying a trust more sacred than any trust that is encountered in the practice of architecture. In practice an architect has the responsibility of disposing of his client's money and of so using it that the community concerned will be enlightened and educated. His is a trust which should not be broken through this egotistical belief in one's power to revolutionize architecture. How much greater is the responsibility of the professors of architecture who have in their hands the futures of a group of young people.

Our duty toward our students is: 1, to teach them to construct according to modern practices; 2, to express themselves in black and white, in color, and in plastic materials; 3, to habituate them to good methods of study in the art of designing. Add to this the various courses in history of architecture, history of art, &c., and we have in a nut shell an outline of a course which is conservative and yet capable of the development of a perfectly safe amount of originality. It is not necessary to go into the details of the many courses which are required of students in developing them in the three directions stated. It is sufficient to remark in passing that the essential policy for success in the development of a school is insistence upon a stiff entrance requirement and alertness in keeping to the standard set by the best architectural students in the world—the French. Mr. Dean is mistaken in holding that because some of the recently returned students of the Paris school have the bad taste to erect French buildings in our cities, that therefore both European and American schools are at fault. Because one dog goes mad it does not follow that all dogs should be muzzled and their mothers shot.

The ideal education of an architect is for him to first take an A. B. degree in some college or university where contact with professors and fellow students in the so-called liberal studies will broaden his attitude toward the world. Then let him take his professional course of four or five years in a conservative school where good principles, not original theories, are taught. If he be a genius his four years in a professional school cannot possibly repress him. His individuality will show through all that conservatism of his teaching. If he have not great talent, as is the case with many students of architecture, his conservative teaching will have been his profesional life preserver. Not only he, but the community with which he is connected, will fervently thank the men who, believing in and loving originality and invention, still had the courage and common sense to teach traditions.

To Remove Oil from Marble.

The following recipes for removing oil from marble are taken from the *Stonemason*, and may prove of interest to some of our readers:

Mix 2 ounces of aqua ammonia, 1 quart of rain water, 1 teaspoonful of saltpeter and 1 ounce of shaving soap, shaved fine, and see that the soap is well dissolved. Then apply to the marble, and after a time wash it off. If the marble be so saturated that one application is not sufficient, renew it.

Another method is to mix 1 part of soft soap, 2 parts of fuller's earth and 1 part of potash into a thin paste with boiling water, and lay it on the spots and let it remain for a few hours, then wash off. If the marble is saturated the oil may be removed from the surface, but after a time will reappear from underneath, when another application will be necessary.

PROBABLY no more convincing proof of the general prosperity of the country can be presented than the increased deposits of the working classes in the savings banks at the large centers of business and population. Savings bank officials generally report that the increase in the number of depositors and in the aggregate of deposits this year has been remarkably large; in many cases the heaviest in the history of their institutions. The new customers, they add, come mostly from among the wage earning class.

WHAT BUILDERS ARE DOING.

FOR something like six weeks there has been friction between the workmen and employers in the building trades in Albany, N. Y., but on the afternoon of June 4 a meeting of the Master Builders' Association and the Arbitration Committee of the striking carpenters was held, which resulted in an amicable adjustment of the difficulties. On the morning of June 5 a large number of the men returned to work on the basis of a scale which, it is stated, will bring the journeymen's weekly wages to an amount equal to that earned under the old scale for a nine-hour day, and in time will open new places for the men. The question of who is or is not to work upon buildings with the union men was left to the discretion of the employers, but it is understood that the men have been assured that they will have agreeable company.

This adjustment of the labor trouble is a matter of sincere congratulation to all locally, as many building projects have been faltering during the past month, in fear that the labor difficulties might interfere with their successful completion. The settlement of the troubles is especially gratifying, in view of the efforts of the new Chamber of Commerce to stimulate an interest in industrial projects and to attract large manufacturing industries to Albany. The real estate transactions have been upon an extensive scale this spring, especially in the outlying districts of the city, and upon these building lots many homes will be reared during the summer, thus giving prosperous employment to the members of the building trades.

Baltimore, Md.

The annual meeting of the Builders' Exchange was held in the Exchange Building at Lexington and Charles streets, on the evening of June 5, a large representation being present. The feature of the evening was the address of President P. M. Womble, who referred to the operation of the revised lien law as having been most gratifying, and that it will in time prove a great benefit to all builders, by diverting this extensive branch of building into its legitimate channels. He stated that during the year 1899 there were 2390 permits granted, of which 1861 were for new buildings and 529 for additional improvements. Of those completed, 1705 were new buildings and 383 additional improvements, with a total assessed valuation of $2,692,675. The president stated that if to this total could be added the prominent business buildings now in course of erection, or which have been completed since January 1, the amount named will be more than double, which he regards as a very encouraging prospect for 1900.

The president also referred to another encouraging feature, which was that, while there had been a large increase in the number of buildings, there were fewer vacant dwellings, business buildings and manufactories than in 1897. Among the features of the exchange to which he called special attention was the library, which has been started in a small way.

The reports of the secretary and treasurer showed a gratifying increase in the receipts, as compared with the year before, while at the same time, through judicious and economical management, the expenses of the exchange have been kept down to a minimum.

The expense account showed a decrease of nearly $870, as compared with the statement of the previous year. The annual election of officers resulted as follows:

President, Jefferson J. Walsh.
First Vice-President, John H. Short.
Second Vice-President, Joseph H. Hillen.
Third Vice-President, Hugh Sisson.
Secretary and Treasurer, John M. Hering.

BOARD OF DIRECTORS.

H. L. Black,	D. A. Leonard,
Joseph T. Lawton,	H. A. Seim,
J. D. Cashner,	George B. Roche,
Joseph Lamb,	John J. Kelly,
E. M. Noel,	Harry L. Starr,
George J. Dufur.	Theodore Mottu.

Buffalo, N. Y.

Building matters in the city are rather quiet at the present time, although the erection of buildings for the Pan-American Exposition Company is keeping the carpenter contractors pretty well occupied. Thus far the buildings for the Exposition have been temporary structures, but the Art Gallery and State buildings are to be permanent, and will be for the most part of marble construction. Out of eight buildings the Buffalo contractors have carried off the contracts for six, which is regarded very favorably by the local trade. During the second week in June the contract was awarded for the Emergency Hospital and also for the Ethnology Building of the Pan-American Exposition.

At the quarterly meeting of the Builders' Exchange, held on May 28, a resolution was presented, endeavoring to have all city, county and State work let by the measure plan, rather than by the present plan of lump contract. This matter, we understand, will be taken up in conjunction with the various other exchanges of the country.

Buffalo has been getting her share of the labor troubles, and members of the exchange hardly know how to act if they don't have some sort of a strike on their hands. The opinion is expressed that it is only a question of time before the unions' arbitrary ideas will disgust their own members, and it is stated that owing to the attitude of the United Trade Council, Bricklayers' Union No. 45 withdrew from that organization.

Chicago, Ill.

Ever since the labor troubles commenced in Chicago, something like six months ago, efforts have at frequent intervals been made to bring about an amicable adjustment of the differences existing in the building trades, but thus far without avail. The latest phase of the situation warrants the belief that a settlement is a matter of only a short time, but there are so many phases to the question that what may be a hope to-day may prove a disappointment to-morrow. One of the suggestions by which a temporary truce in the labor war would be secured and building operations immediately resumed and continued, pending a final settlement, was that of Henry Ives Cobb, the architect for the Federal Building. His idea was to adopt the following temporary rules, and that if any question arose either between the contractors and the men, or between the men, it should be referred to a joint committee, whose decision should be binding:

"Eight hours shall constitute a day's work.

"The scale of wages shall be $4 for bricklayers, $4 for plumbers, $4 for stonecutters, $4 for gas fitters, $4 for steam fitters, $4 for plasterers, $4 for engineers, $4 for tile setters, $4 for iron setters, $3.50 for marble setters, $3.40 for sheet metal workers, $4 for carpenters, $3.20 for iron workers, $3 for painters, $3 for gravel roofers, $2.40 for plasterers' laborers, $2 for laborers.

"Double pay for Sundays and holidays and pay and one-half for overtime."

The joint committee should formulate the agreement between the two organizations that should continue for not less than three years.

A disagreeable feature of the situation has appeared in the results of a special meeting of the Manufacturers' Woodworkers' Association, held on the evening of June 12, when it was decided unanimously to refuse the demand of the Amalgamated Woodworkers' Council for the 10 per cent. increase in wages over the scale now paid under the local contract expiring July 1.

For the month of May 295 building permits were issued, which is an increase of 93 over April, but which compare with 460 in May last year. A feature is that 167 are for one-story stores, cottages and cottage additions. This is said to be the lightest business in May on record, and the aggregate cost is only $1,122,000. This affords some idea of the result of the strike in the building trades, and shows how that industry has been paralyzed by the fight between the labor unions and the building contractors.

Des Moines, Ia.

With the decline in the prices of some of the materials entering into the construction of buildings local architects are regarding more hopefully the prospects for the immediate future. A great deal of large building which was planned in the city last year has not yet been carried through on account of the advance in the prices of materials, and with the markets again lower there is a good prospect that this construction work will be put through. Just at the present time the greater portion of the work under way consists of dwellings and flat houses. Some architects estimate that there are now under way, or will soon be commenced, no less than 400 residences, and that the year will show a net gain of at least 500 houses, if not more. The buildings vary in cost from $500 to $20,000 each, while the average cost will probably closely approximate $2500.

Louisville, Ky.

The outlook is regarded as promising for an active building season in Louisville and vicinity. Reports indicate that the trades are in better condition than has been the case for several years, and that the number of large buildings in progress at important centers indicate the faith which real estate owners have in the future. The movement for better office buildings is perhaps as good an indication as could be had of improving business, and the progressive spirit which has evolved. Real estate agents intimate that there is a much better rental demand for both business buildings and dwelling houses, all of which is regarded as an encouraging sign.

New Orleans, La.

The architects of the city recently held a meeting to complete the formation of what is known as the Louisiana Architects' Association. The officers elected were Albert Toledano, president; Samuel Stone, vice-president, and Professor William Woodward, secretary and treasurer. A committee was appointed to draft a constitution and by-laws, and another appointed to confer with the City Engineer and the Legislative Committee of the City Council, with a view to drafting a bill with regard to the establishment of a State Board of Architects. The idea is that firms applying for license will be forced to come before this board for examination. It is expected that within a short time the association will exert a powerful influence in architectural circles, and strong efforts will be made to raise the standard of the profession and protect those who are competent against those who are not.

New York City.

Building operations in the city are rather quiet, although in the aggregate the total is what would ordinarily be regarded as large, but which in comparison with a year ago makes rather a poor showing. An idea of the condition of affairs, as compared with last year, may be gathered from the statement that up to the end of the first week in June the number of permits issued in the boroughs of Manhattan and the Bronx was 822, as compared with 2311, and the estimated cost $27,215,440, as against $59,547,672 for the corresponding period of 1899.

The annual agreement between the Mason Builders' Association and the Brick Layers' unions of Manhattan and the Bronx has been renewed after a two months' consideration before the joint Arbitration Board, the agreement being substantially the same as that of last year.

The strike of carpenters which has existed for nearly two months past in Mt. Vernon and the Bronx district has been settled, the contractors agreeing to pay $3.50 for an eight-hour day, and give the men a half holiday Saturday.

It has been suggested by the Assistant Corporation Counsel that the Charter Revision Committee consider whether architects, engineers, builders, building superintendents, or any who assume supervisory control of building operations in the city should not be required to take out a license before taking charge of any construction enterprise. We understand that this has been suggested, by reason of the many violations of the building law, either through ignorance or otherwise, and that the license scheme would tend to obviate this difficulty.

The Builders' League of New York held their annual meeting on June 7, which resulted in the election of John P. Leo as president, Judson Lawson as first vice-president, J. A. Rossman as second vice-president, W. D. Holmes as secretary and L. E. Landon as treasurer. The financial statement presented at the meeting showed a gratifying balance on the right side of the ledger.

Youngstown, Ohio.

The Builders' Exchange of this city has recently rented new headquarters in the Brandmiller Block on West Federal street. The members have taken the entire third floor, which has been fitted up to meet the requirements of the members. We understand that the membership now consists of 45 contractors and dealers in supplies for the building trades, and there is a surplus of something like $1000 in the treasury. A prominent member expresses the opinion that when fully located in their new quarters all building will be done through the exchange, as architects will take their plans to the exchange rooms, place them on the tables and the members will bid on the work. This, it is thought, will eliminate the necessity of advertising for bids, while the public can secure information at the disposal of the exchange by calling at the headquarters, which are open from eight in the morning to five in the afternoon.

Porosity of Cement Mortar.

While the requirements of submarine work call for materials and mortar of great density or water-proof resistance, the conditions of building for above ground habitation are somewhat opposite, if we may accept the views of the *Schweizerische Bauzeitung*.

In the so-called "high" construction, it seems, a reasonable amount of porosity is of advantage on account of the less amount of conductivity of heat and cold, although the porosity should not be too great, as it would then become a detrimental absorbent of moisture in rainy weather.

So far, there are but few records of the exact porousness which would admit of air passing through or absorption by capillary actions of different cement and lime mortars. One of the most noteworthy, which is determined by careful tests, was made by Professor Lang, who made examinations of different artificial building blocks, mortars and cements, both in their dry and wet condition, of which the following table shows the proportion of air passing through different materials at ordinary pressure or exposure:

Materials.	Dry.	Wet.
Lime mortar	1.00	0.07
Portland cement mortar	0.15	0 00
Portland cement concrete.	0.40	0.00

The above shows that there is no communication of air through wet cement work of any kind, under natural, ordinary conditions as occurring in general buildings. In the dry state, cements have about 1-7 the porosity of common lime mortars.

It is estimated that with the density and nonaffinity for air the ability of drying out or evaporation of moisture from cement work is also lessened, which goes forward comparatively speedy in lime mortars.

CONCRETE as a building material for walls of high structures is to have a test in Washington. There is a factory so constructed in Bayonne, N. J., and a church in Brooklyn, and the Washington permit, recently issued, is for a seven-story structure, with both the inside and outside walls of concrete. Twisted iron rods are to be used in connection with the concrete, and the thickness of the outside walls is to be 12 inches.

(*Concluded from page* 206.)

There are a few details that may be briefly touched on as being important in first-class work.

Veneering.—Veneered work is undoubtedly superior to solid work, if the veneering is properly done, and certain kinds of hard wood finish, such as doors, wide panels or friezes, must be veneered to give any sort of a job. Even a first-class pine door should be veneered. The advantages of veneering are that the wood, being very thin, is thoroughly dried, and when applied to a core built up of small, dry pieces of pine there is no tendency to warp or shrink. Two kinds of veneer are used in house work. The more common kind is about 3-16 inch thick, and is always sawed. Many of the mills saw it from ⅞-inch boards as needed. The other kind is only about 1-20 inch thick, and some kinds, such as bird's-eye maple and curly birch, are made by cutting off a thin layer around the log. These thin veneers are only made from selected stock, and can be obtained in pieces 2 or 3 feet wide, so that a panel 3 feet wide can be veneered without showing a joint. With the thicker veneers it is necessary to match the pieces, when the work is over 12 or 14 inches wide. Some persons probably have an idea that it is cheaper to use thin veneers than to use solid wood. This is not so, except in the case of very rare woods, and where a factory is especially fitted up for that kind of work. The ordinary wood working establishment finds it cheaper to use mahogany even 1⅛ inch thick than to veneer it, and the very thin veneers are but little used outside of furniture shops and a few mills in Chicago and the Eastern States.

Veneered work should always be veneered both sides where there is any chance for the work to warp, otherwise it will warp and twist badly. Doors, especially, if veneered on one side, must be veneered on the other, if only with pine. Sash for outside windows, however, may be veneered on one side only, if they are 1¾ inch thick or more. The writer usually has the outside sash for windows showing in rooms finished in hardwood, veneered, and has always found them satisfactory.

Panel work should always be put together with loose panels. Doors should be made with a spline to receive the moldings, otherwise it is difficult to secure them without gluing or nailing to the panels.

Hard Wood Flooring.—Most of the hard wood flooring now used is manufactured in the lumber regions by concerns that make a specialty of flooring, and is sold to the different lumber dealers throughout the country. Oak and maple are the most satisfactory woods for floors. All of this "stock" flooring is matched, and the best quality is also matched on the ends and bored for the nails. The usual width is 2¼ inches on the face. The stock is supposed to be well air seasoned and kiln dried before it is stuck, and considerable pains is generally taken to keep it dry afterward. For a furnace heated house, however, it should be put in a kiln or hot box for two or three weeks just before being laid. To obtain an absolutely perfect job of flooring the boards should be rejointed by hand as the floor is laid.

Parquetry.—When something handsomer than a plain oak or maple flooring is desired it is best to use parquetry flooring. This is now manufactured by several parties in this country, and a very good quality of flooring, in almost any design or any combination of woods, can be obtained. The common thickness is 5-16 inch, and it is usually made up of slabs 12 or 18 inches wide and 3 or 4 feet long for centers, and 6 to 24 inches wide and 12 feet long for borders.

Thin parquetry should be laid upon a double floor, the upper thickness of which is of kiln dried clear white pine, furred up if necessary so as to be perfectly level, and smoothed and traversed by hand as if for a finished floor. On top of this pine flooring the parquetry is laid, commencing either with the center or with the border as may seem best, and secured by 1¼-inch wire brads. The brads are driven through from the top and sunk for puttying, from 15 to 20 brads to the square foot being used where the pattern is in small pieces. Gluing the parquetry to the floor is not recommended.

SHEET METAL IN INTERIOR DECORATION.

THE application of sheet metal plates to side walls is, compared with the application to ceilings, simple in detail. Very little staging is necessary, and the plates being as a rule much longer than those used for ceiling work, some styles being fully 10 feet long, fits and adjustments are quickly made. Many of the shallow styles of ceiling plates, however, are also applicable to wall use. In many cases furring strips, similar to the strips used on ceilings, are employed, but as a general thing cheap sheathing is better, both to work on and as regards solidity. Where furring is resorted to the rules covering ceiling plate applications are observed. Where close sheathing is used the application of the plates is a much simpler operation. In this case there are no center lines to strike for furring; but one is necessary from which to locate the first plate.

In decorating a wall it is necessary, of course, to lay out the work in plan form exactly as followed in ceiling installations. The plates calculated to give the best effect to the apartment, hall, or corridor, as the case may use of one style of plate, a molding dividing the wainscoting from the field, and a difference in the coloring making the division more pronounced.

Fig. 29 shows another wainscoting effect, the wainscoting and field being composed of different patterns of plates. In Figs. 28 and 29 the field and wainscoting plates used are large enough to cover the required space without cutting or fitting, making their application, with the division molding, an easy matter.

The plain style of wall decoration is seen in Fig. 30, where one style of plate is used to cover the wall from frieze to baseboard.

Fig. 31 shows the dado style, with the introduction into the field of a fancy panel. This is a style of decoration popularly applied to cafés, restaurants and other public resorts, the panel adding greatly to the general effect of the decoration.

Stairways.

The method of application of plates to side walls is also followed in the decoration of stairways. The plates

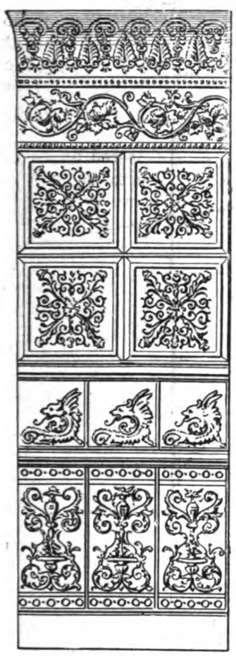


Fig. 27.—Dado Style of Decoration.

Fig. 28.—Wainscoting Effect.

Fig. 29.—Another Style of Wainscoting Effect.

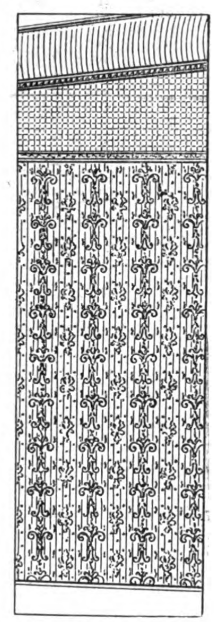


Fig. 30.—Plain Style of Wall Decoration.

Sheet Metal in Interior Decoration.—Application of Plates to Side Walls.

be, are first chosen, the measurements of the room largely governing the selection. It is possible with a little judgment to so lay out the work that the corner joints may be made by end to end contact of plates. In other cases cutting is resorted to. Rounds, bends, or irregular surfaces, such as jogs or half columns, chimney breasts, &c., present no difficulties, the plates being easily bent to any surface that does not approach an acute angle.

In the selection of wall plates there are perhaps three styles of decoration commonly used. These may be termed dado, wainscoting, and plain styles. The dado style of decoration is shown in Fig. 27. Here a section of wall is shown in which panel plates are used throughout. Commencing at the top the cove is distinguishable by its curve. Then follow the frieze, field of four plates, dado of three small panels, and wainscoting of three long panels.

Fig. 28 shows the wainscoting effect produced by the

Concluded from page 118, April issue.

for stairways are furnished in sizes corresponding in width to that of the stair steps. The stiling used is, as a rule, plain, so that the cutting to the angle of the stairway does not mar the general design. A molding strip is used along the top of the baseboard, and another molding strip in line with the handrail completes the wainscoting and dado, if one is used.

Fig. 32 shows a neat design of stairway decoration, and Fig. 33 shows a stairway decorative scheme in conjunction with a ceiling and side wall.

Painting.

Sheet metal decorative plates lend themselves to a variety of schemes for color effect in ornamentation. The configurations, in the hands of a skillful artist, owing to their being actually in relief, are aids to the securing of the most pleasing light and shadow effects, impossible to obtain in the richest fresco decorations on flat, smooth surfaces. A plain tint in a single color scheme produces a richness not secured in any other decoration, while with the working of several tints in harmony and the addition of bronze or gold leaf to prominent portions of the relief a most beautiful effect is obtained.

The sheet metal plates as they come from the manufacturer are generally painted one heavy coat each side with an oxide of iron, red lead and linseed oil paint. This painting is said to act as a preservative for the plates, and lends a more permanent brilliance to the lead or zinc coatings which follow when the plates are in position. Two lead or zinc paint coatings should be given the plates after installation. These insure durability of the ornamentation under frequent washing, and obviate the necessity of repainting until the color used becomes monotonous to the eye and a change proves desirable.

Fall of a Defective Scaffold.

The courts have just decided a case of special interest to builders and contractors involving as it does the results of the fall of a defective scaffold. A man named Ferguson was a contractor engaged in the construction of a large building at Hunter's Point, Long Island, upon which Andrew C. Stewart worked as a bricklayer. The building had progressed until the bricklayers were at work upon the wall between the sixth and seventh floors. A scaffold, built at that point, upon which they were standing, gave way and Stewart fell through five floors and was killed, while others were seriously injured. The case had three trials, and a judgment for $5000 was awarded to Thomas C. Stewart, as administrator, on the third trial of his action brought to recover damages from Ferguson for the death of Stewart, this being affirmed by the First Appellate Division.

On the first trial the complaint was dismissed, the accident being held to have resulted from the negligence of one of Stewart's fellow workmen. The Appellate Division ordered a reversal and new trial, holding that since the enactment of the Labor law of 1897 such a scaffold was to be regarded as a place furnished by the master, upon which the servant was to work, and that the duty devolved upon the master not to permit such place to be unsafe, unsuitable, or improper, and that a servant of the master in erecting the scaffold acted as the master himself.

A recovery by the plaintiff on the second trial was reversed because the trial court erred in refusing to charge that "if the jury believe that the scaffold fell because of the defective bracing, and also believe that Stewart, the decedent, assisted in the erection of that part of the scaffold which fell, and observed and was fully acquainted with the details of its construction, the plaintiff could not recover."

The only question before the Appellate Division upon the third appeal arose upon the refusal of the court to charge on the trial that the happening of the accident created no presumption of negligence on the part of the defendant. Justice Rumsey, who gives the opinion on appeal, says the trial court had already charged in reference to contributory negligence, and holds that "whether the plaintiff stands upon the undisputed failure of the defendant to perform the duty which the statute imposed upon him, or upon the unexplained falling of the scaffold which he was bound to make safe, suitable and proper, in either case the court was correct in saying that when such a scaffold provided for an employee fell without any reason for its failure, that fact of itself was evidence of negligence upon which the jury might base a verdict that the defendant had not performed his duty."


Fig. 31.—Dado Style with Fancy Panel.

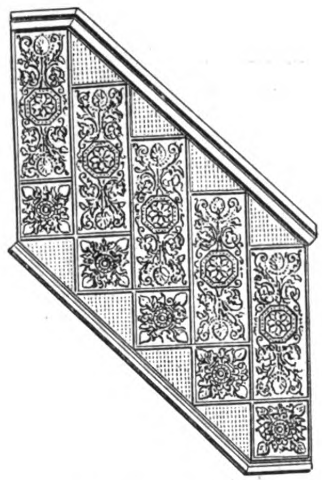


Fig. 32.—Design for Stairway Decoration.

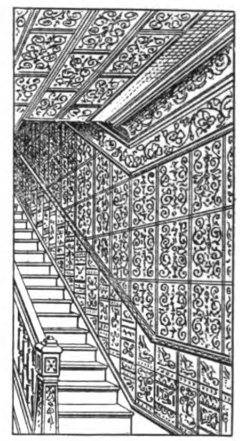


Fig. 33.—Stairway Decoration in Combination with Ceiling and Side Wall.

Sheet Metal in Interior Decoration.—Application of Plates to Side Walls.

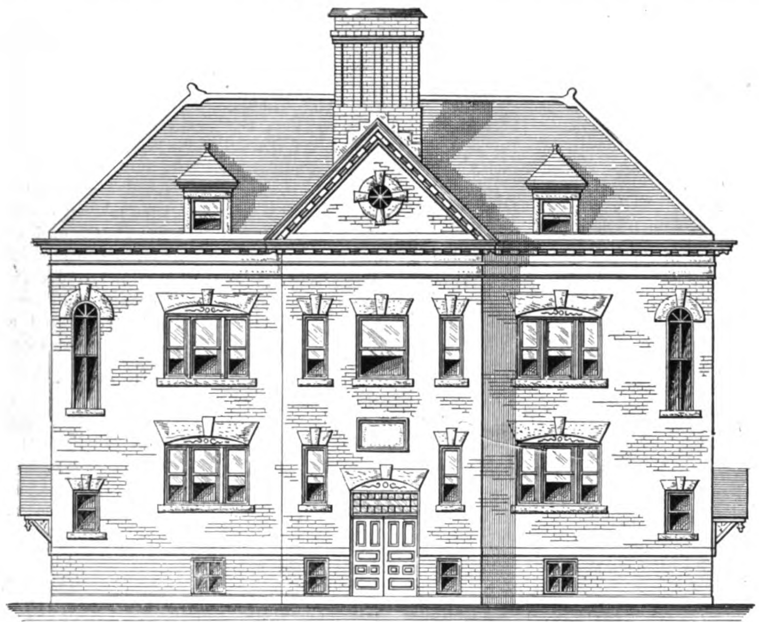
It is the plan of the management of the Pan-American Exposition, to be held at Buffalo, N. Y., next year, to make it the greatest electrical exposition ever held. Its proximity to Niagara Falls will greatly facilitate this plan, as nearly all the power used for the exposition will be drawn from thence. Electricity is to be used extensively in making attractive displays at night. For this purpose a steel tower, 348 feet high, has been designed, which will throw a brilliant light over the whole of the grounds, and especially upon the elaborate Court of the Fountains, giving beautiful effects in electrical illumination. More than 100,000 electric lamps will be used, all the large buildings surrounding the Court being outlined with a fringe of these lights, and the whole of the exposition grounds being brilliantly lighted up by their lavish use.

After a strike of several weeks the carpenters at Orange have been granted a wage of $2.75 per day of eight hours.

Design for a Four-Room School House.

Those of our readers who have made inquiries for designs of school buildings will doubtless be interested in the elevations and plans presented herewith, furnished by John F. Lape of Rensselaer, N. Y. According to the architect the building is to be of hard, burned brick with granite trimmings, slate roof and galvanized iron cornice. The interior finish is to include maple floors, with all casings, doors and woodwork of North Carolina pine, filled and varnished. The ceilings throughout are to be of steel. The stairs are to have oak steps 1½ inches thick.

An examination of the plans shows the playrooms and lavatories to be located in the basement, with two classrooms on each of the floors above. All side walls are to be plastered with two coats of King's Windsor cement, and the classrooms are to be fitted with slate blackboards. The pupils are seated in such a way that the light comes over the left shoulder. The heating is to be by hot air furnaces, with fresh air rooms and ventilating stack, as indicated on the plans.



Front Elevation —Scale, 1-16 Inch to the Foot.

Design for Four-Room School House.—John F. Lape, Architect, Rensselaer, N. Y.

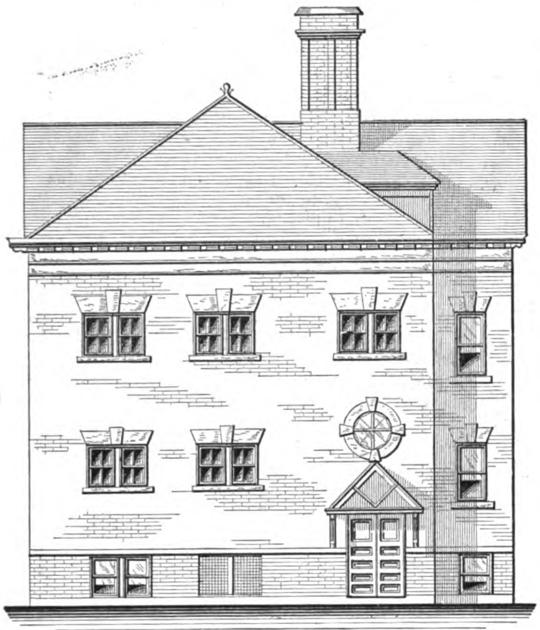
Painting the Country House.

The subject of painting is one concerning which the average building mechanic should possess more or less knowledge, and the following suggestions regarding the painting of a country house, taken from the *Painters Magazine*, cannot fail to prove of interest. The author, R. H. Forgrave, says regarding the painting of the clapboards and other siding:

Writing in the interest of the country painter, we shall dwell most on repainting, as there is quite an amount of it done throughout the country and in the villages, and, in comparison with repainting in the cities, the buildings are in much worse shape; while, on the other hand, city property owners are more liberal. As a rule, they allow their mechanics plenty of material. Brother Jonathan is eternally trying to create the impression that he is always " on his uppers; " and accordingly wants his work done on the poverty stricken plan. Although there are many liberal employers among the country gentlemen, the majority, however, are inclined to stint their mechanics in material to such an extent, sometimes, that it is an utter impossibility to do anything like a good job. And it is a fact, too, that this same class are usually the strongest in their demand for a good job. It is another fact that the painter is expected to do more and better work with less material than any other mechanic. This is because nine-tenths of the jobs in the country are figured too low on the cost. In many cases the money set apart for building purposes is all gone by the time the painter is called in. Then it is a financial squeeze the rest of the way. And the painting, that part of the job which is both preservative and ornamental, receives the least attention. As to repainting, no matter how bad is the condition of the surface, a job is demanded with two coats more often than otherwise. The average man cannot understand why two coats of paint won't cover one surface as well as it does another, until he sees it tried. I think the prevailing idea of doing exterior work in two coats is largely due to the efforts of manufacturers of mixed paint to boom their respective products. When they say that 1 gallon will paint 250 or 300 feet two coats and cover it well, they have in mind a surface on which the old paint is in such condition as to lessen the suction of the oil and hold the pigment out to a considerable extent; or else they mean primed work. But the man who has the job to let, and wants it done at the lowest possible cost, accepts the statement as meaning that 1 gallon will cover 300 feet of any kind of surface.

When a residence or other building is erected in a city in place of another, the other is torn down, but in the country, if it is a business house, additions are built to it. If a residence, the old house, if in any kind of shape, is repaired and retained for tenants' use. To do such classes of work as above mentioned cheaply and satisfactorily is the burden of this article.

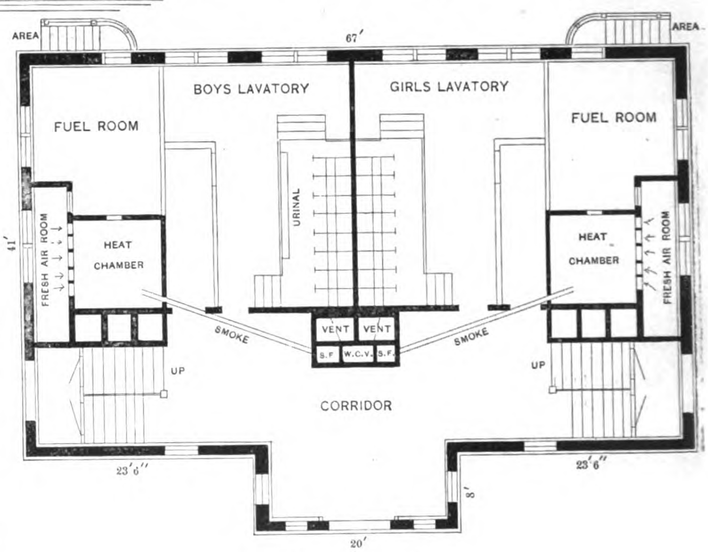
Let us begin with the job which has not been repainted for several years, on which the pigment has not worn off: retains its original color to quite an extent, and is uniform in its coating, showing no scaled off spots or other irregularities. If a bit of paint is put on this, in a few moments it will be noticed that the oil in the paint just applied has left the pigment in part and penetrated into the old paint, taking none of the pigment with it, as can be seen along the edge of the fresh paint. On the theory, then, the less paint it takes to get a good preservative surface the better, we reason that the surface only needs filling with oil—that is, if the color is not to be changed to a marked degree; then with a heavy coat of oil and pigment the job is complete. The cost of the pigment, which would have been used in the first



End View, Showing Boys' Entrance.

coat, would be saved. Not much, to be sure, but one saving of many, which will count in the aggregate, on many jobs. That two coats, the first being all oil, will cover such a surface as well as when pigment is in both I know to be a fact. In some instances, when pigment is used in the first coat on old pigment devoid of oil, it is a hard matter to avoid spots, particularly where the laps of the course come. When oil alone is used, if there be enough to thoroughly fill the old pigment, the surface will be uniform and devoid of spots, which is easily covered with one more coat. Time will not show the laps, as it sometimes does, through the last coat when done the other way. If the color is to be changed to a much lighter tone, it will be necessary to use color in both coats. The surest way to do this in two coats is to make the first coat pretty strong in color, apply plenty of it, thoroughly brushing out. In this way a considerable amount of oil penetrates the old coat, and also leaves oil in the fresh paint. If but little color be used, it is almost sure to be spotted, to such an extent sometimes it is difficult to so cover with another coat that the spots will not show in the course of time. The reason the spots show when the first coat is mixed thin is because there is more oil where the laps are. When the next coat is put on the places where the laps are do not draw as much oil from the last coat as that portion where there are no laps does, consequently the places where the laps are glisten with oil, while the other portions dry flat. But when considerable pigment is used in the first coat, and well brushed out, the surface is more uniform, drying flat at the laps as well as at the other parts. One might think, when only oil is used, there would be more of it at the laps. It seems there is not, however, when there is enough oil used to thoroughly fill the old paint. When pigment is used it holds the oil out after the old paint absorbs all it can hold, thus leaving places, usually where the reaches lap, which will not absorb as much oil from the last coat as the rest of the surface does. We find the cheapest way to repaint such a described surface is to fill the old paint with oil, then use one coat of paint of the color of the old paint.

The kind of surface which gives the painter the most trouble, particularly when there is a stint of material, is the one which has stood until all of the oil has perished and the pigment all off. From time to time we notice schemes in the trade journals describing cheap ways of doing lasting jobs, many of which are good. The most usual way is using the oil for the first coat in the form of an emulsion, mixing some cheap pigment, as whiting, with it. Such surfaces as these, especially when they have stood until they have become fuzzy, drink in oil almost like pouring it into a spout. Rather strong comparison, but, any way, what is wanted is something cheap that will fill, stick securely to the surface, and prevent suction of the oil. We know that glue will stick for many years if protected absolutely from moisture. On very bad surfaces, that gather moisture only from rains, a surfacer of glue, water and ochre is recommended, from the fact that ochre will fill and the glue that holds the particles of ochre together, and at the same time binds it to the wood, will prevent suction to a great extent. When this is covered with two coats of paint, it will be protected from dampness by rain. I know that it will both last and do the work, because I have tried it. There is no doubt that some of the oil penetrates into the ochre glue mixture. It is much better than a sizing of glue, water alone or any of the emulsions made of lime water, caustic potash, vitriol, &c., and linseed oil. I find that these so-called emulsions do not save much oil, very little, if any, on a surface which has much suction. The extender is water, the alkali being used only to make the water and oil mix. Thus it penetrates further into the board. The water evaporates, leaving the surface quite as porous as in-

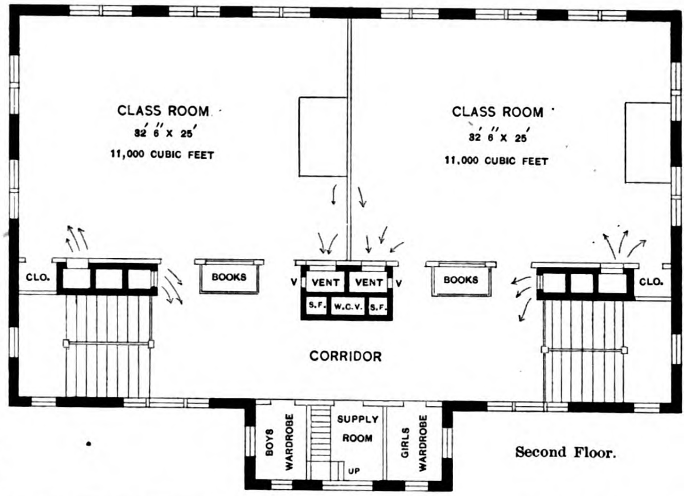


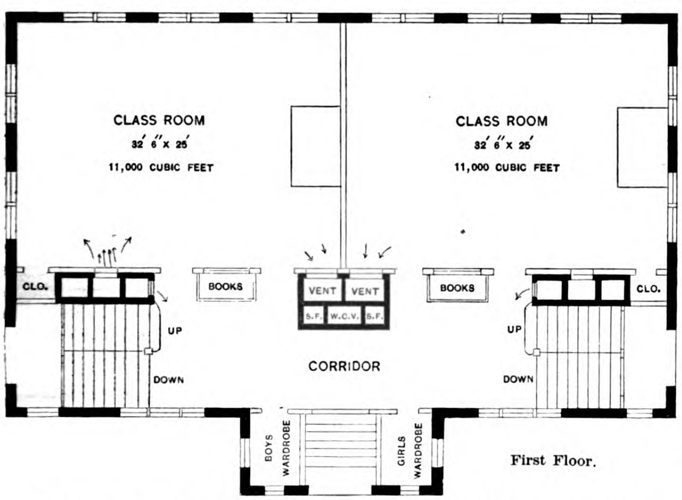
Plan of Basement.

Design for Four-Room School House.—Scale, 1-16 *Inch to the Foot.*

the beginning. The alkali plays the part of filler on a very limited scale. To mix a pigment with an emulsion to such amount as to serve as a filler results in blistering and scaling in at least three out of every four instances it is used. The plaster of paris products are meeting with considerable favor for priming fillers with painters in the Central and Western portions of the country. While they are good for filling old weather beaten surfaces, they do not save much oil, hardly any, for plaster of paris (rough) is porous and has quite as much suction as old boards. By mixing in glue water the suction is lessened, but they don't mix very well in glue water. The glue seems to make the plaster of paris products go on ridgy like. However, this may be a fancy only. We have now treated the best and the worst surface the country painter encounters in the line of exterior repainting, in ways which appear to us to be the cheapest and at the same time will last for a reasonable time. The condition of all other surfaces with but few exceptions will be found between these two extremes. It is not always the costliest paint that proves the most lasting under certain conditions. Paint made from old putty is recorded as often giving good service on old, porous surfaces. The cheapest way always in doing over weather beaten boards, where they can be preserved from moisture, is to use some cheap material that will fill the pores and crevices to some extent; also, that will stick to the boards and hold the oil and paint on the outside to receive the attacks of the elements.

Both white lead and ochre have their advocates respectively as a primer for new work. Both are good. Quite a number of the best students of paint maintain that, when white lead is extended with a good extender, it improves its serviceability in all other ways, except that of covering. If white lead and ochre, we will say, are both equally good individually as a primer, then white lead extended with ochre would be an improvement on either. Our experience leads us to believe that such a mixture is an improvement. The reasons to be seen are that white lead and oil used in the proportions they generally are for a primer do not make a very good filler. But ochre will brush into and fill the smaller checks, and the cementing nature of white lead binds the mass together and to the wood.





Design for Four-Room School House.—Plans.—Scale, 1-16 Inch to the Foot.

I have a barn to which additions have been added from time to time until it represents nearly all conditions of surface with which the painter has to contend in the usual run of the trade, on which I have made some experiments. I have discovered some things which are in direct opposition to ideas maintained by most painters. One departure from the general idea is that paint seems to do better when put on right in the hottest season than in winter. It takes a little more oil, or, rather, there should be more oil in paint used on a hot day than when used on a cold day to give the same condition of surface. The wood being dryer and warm, absorbs more. It goes deeper into the wood. This fact alone, all other conditions equal, should convince one that summer painting is the better. Will it not blister and scale more when done in summer ? I am convinced, if each coat is allowed time enough to dry well, and the proper amount of oil is used, it is not near so liable to scale as when done in winter. Scales do not always come from blisters. I think a great deal of scaling is due to moisture somewhere. There is more moisture connected with the operation of painting in cold weather, even if the atmosphere be dry, than on the average summer day. Moisture from a rain in summer does not take long to evaporate, but in winter it does. As we are not dealing with when is the best season to paint, we wi'l drop it until another time by saying that heat, rightly distributed during the drying process, gives a greater value to a painted surface than when it dries in freezing weather or on alternating cold and warm days.

I have also found that a good silicate, the particles of which are bound together with glue and protected from moisture that would soften the glue, makes a reliable surface for painting.

As I said in the beginning, no matter what the condition of the surface, most country people demand a fair job if repainting in two coats, and want it done with the same amount of paint that the "ready mixed" men recommend for two coats on a good surface. On some surfaces it is impossible to do it with that amount of paint. Of course, it can be done in two coats, making both heavy and giving it all it will hold on the first coat, but it will take more than 1 gallon of paint (two coats) to each 300 square feet. Extended oil is not a good thing for a very porous surface. It won't stop suction. The next coat will penetrate it, and often, if a third coat be used, there will be spots. Judging from experiments, I conclude the best way to treat a dry, porous surface cheaply, one that has long been exposed, is by using a good silicate paint in glue water as a filling size to stop, in some degree, the suction.

Some Comments on Interior Wood Work.

Never in the history of this country has such fine work been done in woods, at least for house finishing, as is being done to-day, says F. E. Kidder, the well-known consulting architect. It is true that some very good work was done in the Colonial period, especially in stair and mantel work, but most of the work was painted, and the members were not as fine as at the present day. It is, in fact, difficult to find a piece of Colonial work that would be considered first-class in execution by the architects of to-day. True, the Colonial work, being done entirely by hand, possessed an individuality that is lacking in machine work, but in the best modern work the individuality is obtained by special designs, inlaying and carving.

Even at the present time, however, a great deal of wood work is decidedly inferior to the average of that done 150 years ago, because of the rush with which everything is now done, and the low prices at which much work is taken. Then, again, house carpenters do not as a rule learn their trade as thoroughly now as in the olden times. Indeed, the modern house carpenter is employed mostly on rough work, and the only fine work he has to do is in putting up the finish, which has been worked, smoothed, sandpapered and largely put together at the mill. The trade of the joiner has merged into that of the cabinetmaker, and is followed only by those men who work in a mill or factory.

A First-Class Job.

To obtain a strictly first-class job of fine interior finish, outside of a few of the larger cities, is a difficult undertaking, and one that requires a great amount of watchfulness as well as technical knowledge on the part of the architect, great care in preparing the walls and rough work to receive the finish, good mill facilities, with ample floor space and skillful men to do the work and time to get it out, and much money to pay for it. As with nearly everything else, a beautiful room depends very largely upon the work and artistic thought put into it, and without these the work cannot be a success, no matter how rich the materials employed. For the best work, however, of course only fine materials should be employed.

The defects in interior wood work are due to many causes, the chief of which, perhaps, is that not enough money is paid and time allowed for the work. Even when these causes are eliminated, however, the finish may be only second or third class, because the walls were not dry, the grounds were not properly put on, the plaster was not true to the grounds, the wood was not thoroughly dry, the glue was poor or the work not skillfully done or properly put up.

A great amount of fine finish is nearly spoiled every year by being put against damp walls or in a damp house, and also because the walls have not been well grounded and carefully plastered.

Size of Grounds.

When a first-class job of wood finish is desired, it is important to specify that grounds of ample size be put behind nearly every piece of finish, and especially behind all casings, bases, wainscoting, wood cornices and even the picture mold; the grounds should also be put on perfectly straight and made solid, and in such position that they can remain in place and afford nailings for the finish. Unless this is done and the plastering brought perfectly flush with the grounds, it will be found that the plastering is wavy, perhaps out of plumb; and altogether in such shape that it is impossible to bring the finish to the plaster without twisting or springing it, and often it cannot be brought against the plaster, except in a few places. It has been the writer's experience that it is more difficult to get the walls properly prepared for the finish than to get good finish. The condition of the building when the finish is brought to it is also a very important factor. The plastering should be thoroughly dry, and the rooms as free from moisture as it is possible to have them.

The best time of year in which to finish a building is in the winter months, as the heating apparatus can then be kept in operation and the air kept dry. In the summer months the workmen cannot endure artificial heat, and the air in the rooms is consequently of about the same humidity as that outside. Even on the hottest summer day the air is not nearly as dry as in a furnace or steam heated house in winter, and in some localities dry air in summer is quite uncommon. The main point to be considered and attained as closely as possible is to have the wood dried in a kiln or "hot box" to such a point that the artificial heat in winter will not affect it, and to get it from the mill to the house and in place and varnished or painted without its absorbing moisture. This is something quite hard to do, but it can be done.

Designing of the Finish.

The designing of the finish—*i. e.*, in regard to the way the pieces of wood shall go together or be built up—also has a great deal to do with the final appearance of the work. That the finish shall be worth the labor and thought expended on it, it should obviously be of an artistic and appropriate design, but this can usually be attained in several ways, and it is better to use a comparatively plain finish that will stay in place and not show open joints than to use a more elaborate finish that will open at nearly every joint. In designing standing finish, therefore, the architect should first consider what the chances are for obtaining the requisite conditions for a first-class job, and if he thinks that it is doubtful about obtaining the necessary degree of dryness, and careful preparation for the work, he will do well to make the finish of such a character that it can be fitted to uneven walls and not be badly affected by shrinkage. It also makes quite a difference whether the work is to be painted or varnished, as in painted work open joints may be filled, but in varnished work any perceptible shrinkage mars the appearance of the work almost beyond repair. The ill effects of shrinkage may be largely overcome by avoiding miter joints and either using corner blocks or treating the casings as pilasters, with caps or corners made of a separate and slightly thicker piece. Pilaster casings with corner blocks, which may be carved if desired, is the simplest finish for avoiding the effect of shrinkage. For very fine finish, where all the conditions are favorable, the work should either be built up with several narrow members or the broad surfaces veneered on a pine back. The work should also be put together at the mill as far as possible, and painted on the back and filled and shellacked on the surface before it leaves the mill. In the best work the head and side casings are joined together at the mill, so that no joints have to be made at the building, and if the wall is perfectly true but very few nails will be required to hold the work.

When the casings are quite thin, however, unless the walls and grounds are perfectly straight and in line with the edges of the frame or jamb linings, it is better to put up the finish piece by piece, as if put together at the mill the joints are liable to open in fitting the finish to the wall. A better job of work can usually be obtained by using comparatively thick finish rather than thin. The best work in this country is largely put together with glue and perhaps a few screws. Such work, of course, must be very carefully done and requires a good deal of time and ample room in the shop. It is doing no injustice to say that not every mill is equipped for getting out first-class wood finish.

(*Concluded on page* 200.)

Designs of Ornamental Capitals.

In the designing of buildings, whether for public or private use, much dependence is placed for the architectural effects upon the style and degree of the detailed ornamentation. The field is so broad that almost any desired effect may be produced by a proper selection of the treatment to be employed, keeping always in mind the fact that the same order, or style should pervade the entire work, thus contributing to a harmonious whole. This tendency toward rich ornamental effects is perhaps more strikingly seen in the elaborate treatment of both the interior and exterior of some of the more important office buildings erected in recent years, where the opportunity is presented for the architect to more freely exercise his artistic taste. Certain forms of ornamentation appear to be growing in favor to such an extent that they are being reproduced in composition material with entire success, and with great promise for the future. As affording an idea of what may be done in this direction we present on this page some examples of capitals, furnished by the Decorators' Supply Company of Chicago, Ill., the first view representing a design executed in the Italian Renaissance style, and the second shows a capital of the Roman composite order. This class of ornamentation is furnished ranging in style from the Grecian and Roman classics to the different periods of Renaissance, as practiced most successfully by the Italians, the French and our modern architects. The material employed is a composition equally adapted for interior and exterior decorations, and when properly applied and finished, is said to give the same results as wood carving, having the same grain, and can be made to represent any wood, such as oak, mahogany, birch, &c.

Design copyrighted.

Capital of the Italian Renaissance Order of Architecture.

Thirteenth-Century Houses in England.

Changes in domestic architecture are observable during the thirteenth century, says the London *Architect*, that is, chiefly during the reigns of Henry III. and Edward I. The period of John's sway—viz., 1199 to 1216—was so much disturbed by civil and ecclesiastical commotions that social improvement was altogether disregarded. After the death of this monarch, however, the necessity for the erection of purely castellated buildings progressively diminished, while those that were built assumed more of a domestic aspect; and the size, convenience and decorative character of the structures generally increased in proportion.

This change was materially aided by the encouragement afforded to art in England, and in its widely extended development throughout the whole of civilized Europe in the thirteenth century, and more especially by the superseding of the Norman type of form, detail and decoration by the far more beautiful Pointed style of architecture, which now began to manifest in all directions its ever varying and luxuriant beauty. Perhaps in the earlier part of the century there was no very perceptible diversity of plan or general arrangement in domestic buildings from that which had previously existed. The hall was still the principal feature of the mansion—the old divisions of cellar and solar were still observable.

Little by little, however, changes crept in; a desire for increased convenience began to be displayed; the addition of other rooms for the master besides the solar became a matter of necessity; the walls were now plastered, and in some instances partial wainscoting was used; mural decoration and painting generally were introduced; the luxury of glass in the windows sparingly and but occasionally, lattices and hanging wooden shutters both inside and out being adopted for the admission of air and as a protection from wind and rain; the erection of chimneys and the use of large hooded fire places became general; provision was everywhere made (and on the whole to a greater extent than even at the present day) for domestic convenience in the shape of "latrines," or *cameræ privatæ;* and furniture, cooking apparatus and domestic utensils, though still rude in design, devoid of ornament and scanty in amount, were among the domestic requirements of the age.

A FRENCH architect, M. Letorey, has applied the captive balloon to the cleaning or decorating of cupolas, high roofs, towers and monuments. The balloon is raised or lowered from a wagon by a windlass and is steadied by stays from the side of the envelope. It has two platforms, one on the top, the other underneath, which communicate by means of a ladder up a central tube. The "balloon scaffold," as it is called, is claimed to be useful and safe in many operations, such as now require the services of steeple climbers. It is also adapted for use in wireless telegraphy, as an aerial station.

Design copyrighted.

Capital of the Roman Composite Order.

Designs of Ornamental Capitals.

Sheet Metal Construction in South Africa.

The use of galvanized corrugated sheet iron for building purposes is quite general in South Africa, according to a correspondent of the *British Trade Journal*. Its advantages are lightness, cheapness, suitability for transport purposes, and the rapidity with which buildings may be erected with it. To this must be added the fact that unwrought sheet iron can be imported duty free. The galvanized sheet iron required measures 15 inches broad and 2 yards long, or breadth 17¾ inches, length 2 yards. The weights mostly in use are about 100 pounds, 116¾ pounds in Cape Town, and about 111 pounds in Durban. The import duty amounts to about 7½ per cent. of the value for completely finished corrugated sheet metal, which is placed on the market in lengths of from 2 yards to 3 yards 2⅛ inches by about 25¾ inches broad. The roof is constructed in the usual way, the interstices or joints between the sheets—which are laid parallel to one another—being filled with roofing felt or asphalting. The ease and rapidity with which such roofs can be built has led to the erection of small corrugated sheet metal dwelling houses. Larger buildings, for lodging house purposes, are also being constructed entirely of sheet metal, a saving being effected of at least half the cost of building a dwelling house of brick with a slate roof.

Building Restrictions Abroad.

The building regulations of many English towns are founded upon those of London, without going quite so far in the direction of restraint. Those of the chief continental cities generally go somewhat further, especially in respect of the hights of buildings. Thus in Paris the front wall cannot, in the widest streets, be carried higher than about 65 feet; in Vienna the hight of dwelling houses may not, as a rule, be more than about 77 feet, while the floor level of the topmost story must not be higher than 62 feet, nor may there be more than five stories in the hight of the house. In London no limit of hight is actually fixed. The normal hight is 80 feet, but a wall may be carried as high as the public authority shall permit. In Sweden the regulations seem to touch the question of taste in a rather important way. The front of a house must not be painted white, but some color inoffensive to the eye. In other respects the continental regulations are generally more restrictive than ours—except as to balconies, the width of which, to the extent of about 4 feet, is legalized; while with us this (one of the most romantic features of the elevation) has, in every case, to pass through the chastening fire of the public authority, particularly if it overhangs the public way.

New Publications.

MODERN HOUSE PLANS FOR EVERYBODY.—By S. B. Reed. Size, 5 x 7½ inches; 243 pages; 175 illustrations. Bound in board covers. Published by Orange Judd Company. Price, postpaid, $1.

This is a revised edition of House Plans for Everybody in which the author has made little attempt to change the text or floor plans, but nearly all the elevations have been redrawn with special regard to modern ideas and tastes. In this the author has been guided by many years' experience in planning and superintending the erection of country buildings, and has selected from an extensive collection of original designs such examples as seemed best for purposes of simplicity, comfort and economy. The plans are sufficiently varied to present a diversity of arrangement, each one being accompanied by a detailed description of its convenience and construction, while its cost is shown by estimates made to correspond with uniform standard of prices at rates current at the time the book was compiled. In view of the great advance during the past year in the prices of all sorts of materials entering into the construction of a building, these figures will necessarily require important modification in order to make them conform to present local conditions. The bills of materials, however, are given in sufficient detail to render the work of changing a comparatively easy matter. Within the covers of the little volume are presented 40 designs of houses ranging in cost from $250 upward, and embracing country cottages, farm houses, frame and brick residences, as well as houses in blocks.

THE NEW ELEMENTS OF HAND RAILING. By Robert Riddell. Size, 11 x 14 inches. 126 pages. Illustrated by 40 full page plates. Bound in board covers. Published by John J. McVey. Price, $5.

This is a revised edition of the well-known work by Mr. Riddell on "The Elements of Hand Railing," and will be found of interest to those seeking an understanding of the subject indicated. The illustrations, which are accompanied with ample descriptive letterpress, cover a wide range of problems, showing among other things how to lay out winders for quarter circular stairs, the wall string being bent by kerfing; laying out straight stairs having a cylinder and wreath to land on a level floor; platform stairs, construction of stairs having two-quarter landings; construction of semicircular stairs; self supporting stairs; construction of wreaths for elliptical stairs, as well as a large number of other forms of stairs likely to arise in every day practice, the whole comprising a comprehensive elucidation of the art of stair building.

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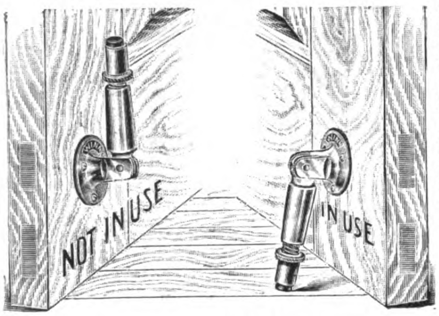
NOVELTIES.

Winn's Ball Bearing Door Holder.

A device which will doubtless interest many of our readers is Winn's improved ball bearing adjustable door holder, made by the Allen & Winn Mfg. Company of Chicago, Ill., and illustrated herewith. As intimated by the title, the holder is ball bearing, has a double action, and when it is desired to hold the door at any fixed point on the floor, or if the holder is placed on the inside of a door, it is only necessary to pull the door gently against the holder until it locks itself. In Fig. 1 of the



Novelties — Winn's Ball Bearing Door Holder.—Fig. 1.—Views of Holder when in and Out of Use.

engravings the view at the left represents the holder as it appears attached to a door and not in use, while the view at the right represents the holder in use. A general idea of the construction of the device itself may be gathered from an inspection of Fig. 2 of the engravings. When placing the holder on a door the arm should stand at an angle of about 45 degrees. If the door shrinks and draws further from the floor a turn or two of the bottom piece will lengthen the holder sufficiently for the purpose. The device can also be used as a buffer, by simply bringing the arm or fulcrum to a horizontal position. The holder can be used on either side of a door, and when placed

Fig. 2.—View of Holder, Showing Internal Construction.

on the inside answers the purpose of a secure night bolt, simply by giving it the necessary adjustment.

Stamped Steel Ceilings and Siding.

Some very attractive designs of stamped steel ceilings, siding and wainscoting are to be found in a 52-page catalogue issued by the Brooklyn Metal Ceiling Company, 283-285 Greene avenue, Brooklyn, N. Y. The pages are oblong in shape and are bound in paper covers with embossed side title in silver lettering. The manufacturers point out that they make metal panels finished in imitation of the various marbles, including the very finest kind of onyx. This work is considered to be finished in a very durable manner; is baked on the metal and will not chip or flake off with ordinary wear. The ceilings are made in panels 21 inches square, with ½ x 1½ inch molding around the edge of each panel, the molding being finished in a tint to correspond with the onyx, while the relief work is finished with a gold effect. The company also make a line of metal tiling finished in various tile finishes, including all tints, colors and metal effects. Several pages in the catalogue are given up to views of interiors, showing ceilings in rococo and Empire designs, as well as many other styles. The designs are of sufficient variety to meet many requirements, while the use of ceiling panels in combination with moldings, friezes, cornices, &c., permit of an almost endless variety of effects.

Toledo Gravity Level.

The Toledo Gravity Level Company, Toledo, Ohio, are bringing to the notice of building mechanics the level shown in Fig. 3 of the accompanying cuts. It is governed by a weight carried on friction rolls. The accuracy of the level is the result, it is explained, of gravity practically unimpeded by friction, and that no adjustment is required in either hot or cold weather to insure absolute accuracy. The manufacturers state that the level is neatly and durably made, and is guaranteed by them to give perfect satisfaction. The object of the invention is to provide a new and improved level simple and durable in construction, and so arranged as to indicate automatically horizontal and vertical positions and the angle of any deviation.

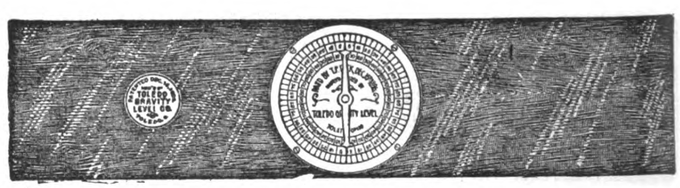


Fig. 3.—Side Elevation of Toledo Gravity Level.

Universal Wood Scraper.

A tool which will be found of especial interest to carpenters, floor layers, painters and others is the Universal wood scraper, illustrated in Fig. 4 of the engravings. It is manufactured by Britt & Page of 12 Temple place, Lynn, Mass., having been designed and patented by a practical carpenter and thoroughly tested. With it the claim is made that one man will do more and better work in a day than any two men can do in the same length of time by the old hand method. It is simple, durable and has no intricate parts to wear out. The blades, thumb screws, set screws, &c., are of fine quality of steel, and the finish is in nickel or aluminum, according to preference. All parts are interchangeable and easily adjusted. In a neat circular which the manufacturers have issued concerning the scraper they tell how to use and sharpen it. In using it, they say, grasp the handle with the right hand, place the left on the cap and draw from left to right, regulating the pressure on the surface by the left hand. In order to sharpen the tool for removing old paint or varnish, the manufacturers say, file to a slight

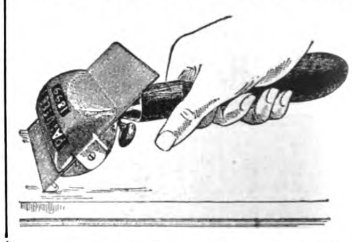


Fig. 4.—View Showing General Application of Universal Wood Scraper.

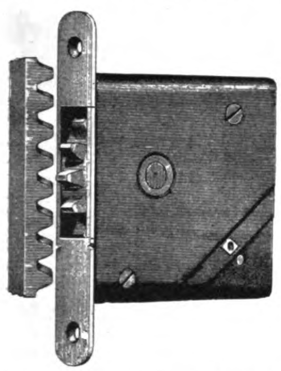
bevel with a flat file, leaving a fine saw tooth edge. To sharpen for use on floors or bench work, where a smooth, hard finish is desired, grind the blade to a bevel on a grindstone, then rub it on a whetstone and turn the edge with a steel awl.

Nonpareil Refrigerators.

The Williams & Hunting Company, Cedar Rapids, Iowa, furnish us with a copy of their new 1900 illustrated catalogue of Nonpareil sanitary refrigerators, made under Herrick's patent. These goods are built outside of solid oak, and are so constructed that the ice bed can be instantly changed so as to increase or decrease the capacity of the ice chamber. The drip spout is made square and open and can be readily taken out and cleaned at any time. The bottom of the interior of the refrigerator is flush with the door sill; the shelves are all made of wood and are adjustable from 5 to 10 inches, easily cleaned and quickly removed. The ice pan, rack and bed and the entire lining of the ice chamber are made of galvanized iron. The air circulates round the ice chamber between the lining of the box proper as well as down over the ice and out at the bottom of the ice bed, keeping the whole pure and sweet. The walls are packed with aluminum mineral wool. Among the goods shown in the catalogue are Nonpareil family refrigerators with two or three doors, four-door large sizes for boarding houses, hotels or grocers, and Nickeloid lined refrigerators in various sizes and styles. The latter are lined throughout with Nickeloid, which is a noncorrosive, nonporous and bright polished metal. Attention is also given in the catalogue to the company's Parlor City screen doors, of handsome design, made in five sizes.

Combination Window Lock.

A combination window lock embodying features of interest to architects, builders and house owners generally is being offered by the International Burglar-Proof Sash Balance & Lock Company, 101 Sabin street, Providence, R. I. In the illustrations presented herewith Fig. 5 shows the lock and rack, and Fig. 6 the interior of the lock. The fixture consists of a gear wheel journaled in a case, similar in appearance and shape to a mortise lock. The case is mortised



Novelties.—Combination Window Lock.—Fig. 5.—View of Lock and Rack.

into the jamb or runway of the window frame in the same manner that a lock is mortised in a door. The teeth of the gear wheel protrude through the face plate into the runway of the sash, where it engages a rack of cogs in the edge of the sash. The balancing power is furnished by a strong coil spring in a recess of the gear wheel, the action and balancing principle being similar to an ordinary window shade fixture. The gear wheel is automatically locked by two pawls engaging the teeth in opposite directions, which are disengaged by the action of a press button in the face board of the window casing, allowing, it is explained, the sash to be adjusted to any position, and instantly locked again when the press button is released. No weights, cords, pulleys, fasteners nor sash lifts are used in connection with the lock, which is made in sizes to balance all weights of sash. It is pointed out that the lock can be applied to old buildings which have not been provided with pockets, without changing the sash or frame. Anti-friction rolls are provided for all windows, which are placed on the edge of the sash opposite the lock. All that is visible after the fixtures have been applied to the window are two push buttons, one for each sash, upon the face board of the window frame. The following are among the advantages claimed by the manufacturers: That it is automatic, and cannot be left unlocked; that the sash can be left securely locked at any hight; that the device prevents rattling of windows by looseness from shrinkage, and that it does not interfere with the removal of sash for any purpose. The makers claim that the device will save $1 to $1.25 per window in the construction of brick or stone buildings, and 50 cents per window in the construction of wooden buildings.

New Power Feed Hand Planer.

We present in Fig. 7 of the illustrations a general view of a new power feed hand planer, which is manufactured by the Bentel & Margedant Company of Hamilton, Ohio, and for which many claims are made. In referring to the novel feed apparatus of the machine the manufacturers point out that it retains all the advantages of the sensitive hand feed, while it has none of the disadvantages; that it is elastic and sensitive like the hand, but differs from it because the feed is continuous and the application of pressure uniform; that a number of pieces can be fed at the same time, and that the whole width of the table can be filled up with narrow material, and the pieces fed in an unbroken line. Another important advantage which is claimed for the machine is that no expert operator is required to lay the material within the grip of the feed works, as an intelligent boy answers for this purpose. The manufacturers state that they have had such a decided success in applying this form of planer to various work formerly done by hand that they have constructed a greatly improved machine, which is strong and is supplied with a positive and powerful feeding apparatus, as an inspection of the engraving will readily show. The journal boxes support two large and wide face adjustable feed pulleys, any number of which can be placed on the shafts within the dimensions of the machine. The pulleys are flanged and carry heavy india rubber bands with wide face, traveling from one to the opposite feed pulley. The lower flat parts of the band from the vertical center lines of pulleys rest on the material and adjust themselves to any inequalities of surface and move it in regular speed of motion forward over and past the planer cutter head.

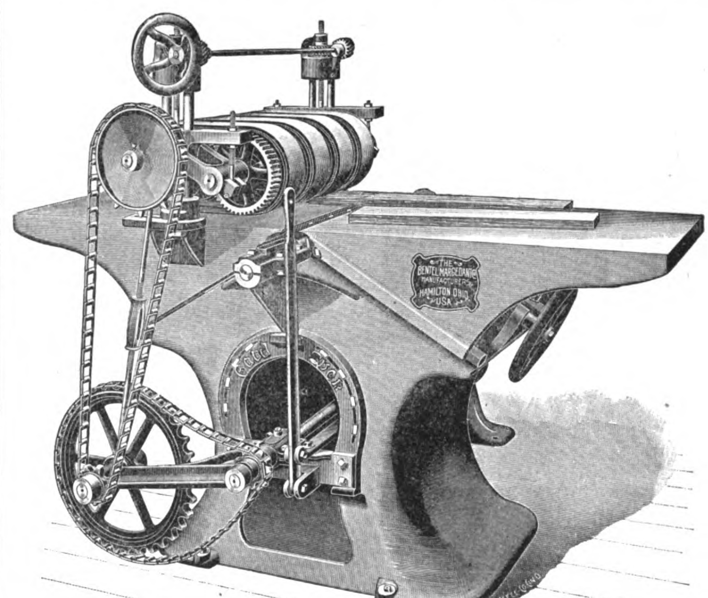


Fig. 7.—New Power Feed Hand Planer.

The amount of pressure for the reception of various thicknesses of material is adjustable, and the tables can be raised or lowered regardless of the feed apparatus. The machine is of substantial construction, the column frame being cast in one piece and provided with a top declining in angle on both sides. Each side carries a dovetailing slide bolted to the frame proper. The tables are long and heavy and arranged with inclined sides all cast in one piece, while the lower part is planed with dovetail slide surfaces and provided with adjustable slide gibs.

The Wheeling Corrugating Company

of Wheeling, W. Va., favor us with a copy of a very attractive catalogue of 76 pages, which they have issued, showing a large number of embossed metal designs adapted for ceilings,

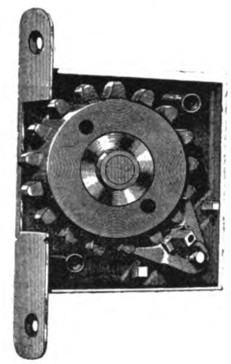
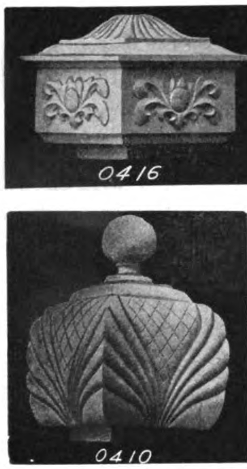


Fig. 6.—Mechanism of Lock.

siding, &c., and of such a nature as to meet all sorts of requirements. The makers state that the favor with which their productions have been received by architects, builders and buyers of ceilings generally has stimulated them to greater artistic efforts, and they claim they have sacrificed nothing in the simplicity of construction. The metal ceiling plates are shown by means of engravings of such size as to clearly indicate the beauties of the designs, while several full page illustrations represent interiors where the company's ceilings have been employed. Accompanying the catalogue is a price-list bearing recent date. The company have offices in New York, Chicago, St. Louis and Chattanooga.

Newel Tops and Moldings.

In the illustrations presented herewith we show some examples of the handsome work which is being turned out by the Waddell Mfg. Company of Grand Rapids, Mich. The designs are neat and effective, and the manufacturers point out that the work is cut out of solid material, well kiln



Novelties.—Newel Tops and Moldings.—Fig. 8.—Two Designs of Newel Tops.

dried, and is of an inexpensive character. In Fig. 8 of the engravings we show two designs of newel post tops which the manufacturers refer to as being well adapted for the purpose, and that being cut in solid wood is a great improvement over composition or staff. The company also manufacture moldings in numerous patterns, those shown in Fig. 9 affording an idea of the character of the work produced. Reference is made by the manufacturers to the smoothness of

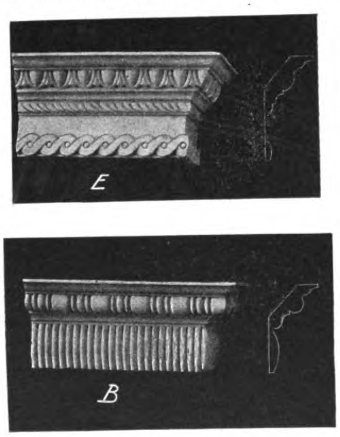


Fig. 9.—Views of Two Styles of Moldings.

the work and to the fact that there is no scraping or embossing, so that each piece is given a clean cut effect, which is not always the case in imitation work. The company are well equipped for the production of a wide range of specialties of this class, and call attention to the fact that they have been engaged for a period of twenty years in the manufacture of ornaments, giving employment to a large number of skilled mechanics. In fact, the company turn out almost everything ornamental in wood, prominent among which may be mentioned turned moldings and balusters, which are beautifully twisted and roped. A book of designs showing the class of work produced by the manufacturers has been issued, and those interested can obtain a copy by forwarding to the address above given 8 cents in stamps to cover postage.

Greenhouses.

We have received from the Lord & Burnham Company, with New York office in the St. James Building, Broadway and Twenty-sixth street, and general office and works at Irvington-on-Hudson, N. Y., a copy of a handsome catalogue of 74 pages, illustrating a great variety of greenhouses designed and erected by them in different parts of the country. The illustrations are for the most part half-tone reproductions from photographs, showing greenhouses, conservatories, &c., with their immediate surroundings, and making very attractive pictures. Several illustrations represent interiors, including the Palm House of Smith College, at Northampton, Mass.; a rose house for a private residence at Madison, N. J.; a view in the conservatory of a private residence in Flatbush, Brooklyn; another, of a conservatory in Boston, and still another of a rose house at Scarboro, N. Y. The illustrations convey an excellent idea of the wide range of work which the company are prepared to execute, and in presenting the catalogue they point out that their object is twofold—first, to give an idea of the grace and beauty to which it is possible to attain in the construction of greenhouses; second, to furnish a basis for correspondence to those who propose their erection. An interesting feature of the volume are sectional views through greenhouses adapted to general and special purposes, indicating very clearly the general arrangement of the company's standard iron frame, fitted with cast iron foot pieces, patent ice clearing eave plates, patent sash bar clasps, iron frame plant tables, ventilators operated by their improved apparatus, together with the usual arrangement of heating pipes. Among the introductory pages of the catalogue the company call attention to their extensive plant and facilities which they possess for turning out all work in connection with greenhouse construction, and they also refer to some of the most important improvements which have been made in this direction. They point out that they were the first to introduce small sash bars with supporting frames, thus increasing the light, and were the first to adopt long lines of ventilators in place of those scattered here and there, thus to a great extent doing away with drafts, which were an injury to the plants. They state that they were also the first to use elliptical or Gothic style of curves, as contrasted to the circular in roof construction, and that the arm, rod and worm gear ventilating machinery was invented in 1856 by the late F. A. Lord, founder of the concern, and has been largely employed throughout the country for ventilation ever since. The company also point out that they have been perfecting their construction for many years, and believe that their greenhouses now embody the highest art which has yet been attained in horticultural architecture. The catalogue, as already intimated, is a fine example of the printer's art, while the general character of the work represented renders the volume of special value to those interested in greenhouse construction.

Gauge for Carpenters' Use.

A device which cannot fail to attract the attention of carpenters and wood workers generally is the "B. B." gauge, which is being introduced to the trade by W. D. Browning, 1430 Cedar avenue, Cleveland, Ohio. The gauge, as shown in Fig. 10 of the illustrations, is made of two pieces and has a point of steel, the stem being marked in inches from the pointer, if desired. Instead of a thumb screw to hold the moving head to the stem, the latter is oval shaped to fit a like hole in the head, and by giving the stem a twisting motion

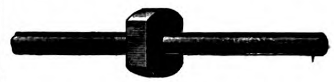


Fig. 10.—Gauge for Carpenters' Use.

the head is secured to it. The manufacturer points out that there are no screws to break or become lost, no wedges or patent clamps, and that "a simple twist of the wrist does the deed."

Babst's Perfection Miter Box.

A miter box possessing many interesting features of construction and which is being put on the market by Chas. Babst Company of Naperville, Ill., is shown in Fig. 11. The bed of the box is of 2-inch stuff, to prevent warping or splitting. Bolts pass through the wooden bed, the iron frame and legs, to hold all firmly together. A stiff oil tempered plate spring on the swinging lever holds the stop catch firmly in the angle notches on the semicircle, and added to this, it is explained, a wide bearing of the lever on the semicircle with

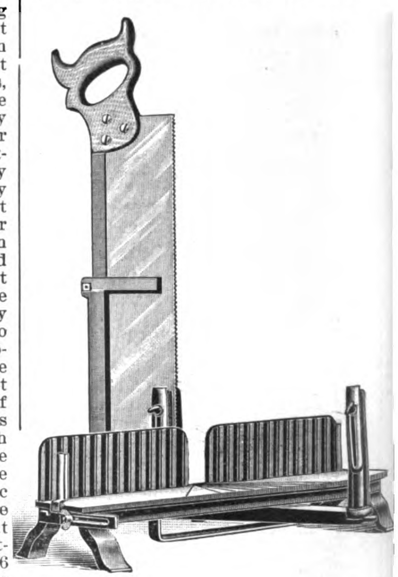
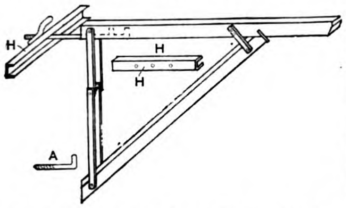


Fig. 11.—The Babst Perfection Miter Box.

the pressure of the spring bar underneath assures absolute rigidity of the lever. This, it is pointed out, is important, as the swinging lever is the backbone of the miter box, being the receptacle of the guide and saw, so that upon the lever depends the accuracy of the saw. It is stated that the spring, being confined, will never get weak, will always hold up firmly and take up any wear on stop catch. The box is provided with adjustable angle arms, which do not extend out from the box, and not being in the way, are less liable to be broken off. Emphasis is placed on the desirability of the saw guide. It is pointed out that having a large bearing surface it holds the saw firmly, obviating all swaying; that with this guide more accurate cut is possible, with rapidity and ease of operation, and that it is attached or detached easily and quickly. When not in use the saw is raised, with the guide, in a perpendicular to allow access to material and freedom of both hands to handle it. The miter box takes in stock 8½ inches at right angle and 5½ inches at miter. The box is referred to by the manufacturers as having few parts, as heavy and strong, and as well finished.

Danforth's Folding Building Bracket.

A bracket, which will be found especially useful to carpenters, builders, painters and others having occa-



Novelties.—Danforth's Folding Building Bracket.—Fig. 12.—View of Bracket as it Appears when Ready for Use.

sion to employ scaffolding for any purpose, is being manufactured and introduced to the trade by A. H. Danforth of Monson, Mass., and is illustrated herewith. The bracket is of such construction that it may be readily folded so as to occupy small space, and as the manufacturer puts it, "one dozen can be carried under the seat of a Concord buggy." The construction is so clearly indicated in the engravings that comparatively little description would seem to be necessary. Referring to Fig. 12, which represents the bracket open ready for use, the piece marked "H" is a three-holed channel iron to go across the studding on the inside of a building, in order to hold the bracket. It is made of soft steel, 4 x ⅛ inch, and the piece shuts into the bracket without in any way enlarging it, as is clearly indicated in Fig. 13, which represents the bracket folded. In this view H^2 indicates the

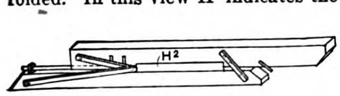


Fig. 13.—View of Bracket when Folded.

channel iron. The part marked A in Fig. 12 is a coach screw, to be used in places where it is impossible to bore through, as in reshingling buildings, &c. The bracket is light, and the manufacturer states it has been tested to 1500 pounds. The arrangement of parts is such that it can be changed for different width of studding in a minute's time. The bracket is referred to as reliable and safe, and is both a money and time saver.

Diamond Expansion Bolt and Shield.

A modification of the Diamond expansion bolt and shield, as shown in Fig. 14 of the illustrations, has recently been placed on the market by the New Jersey Foundry & Machine Company, 26 Cortlandt street, New York. The newer sizes are made to take 3-16 and ¼ inch brass or iron screws, and are especially adapted for plumbing work, fastening basins, &c., to marble, stone, brick or metal, outside signs, soda water fountains,

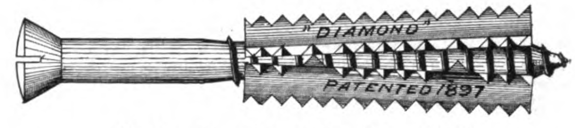


Fig. 14.—Diamond Expansion Bolt and Shield.

door jambs, lock and hasp work, repairing, &c. In addition to the style shown they can be furnished with a variety of heads, such as hanger screw, eye bolt, prison bolt, round, cap and other heads, with rings or hooks, or for almost any purpose to hold work to stone or metal, whether in small or large sizes. The hardware dealer can carry the shields only and supply regular screws from his own stock. This method of fastening is designed to supply a quick and efficient substitute for wood and lead plugs, split bolts and wedges, &c., and at a price commercially attractive. This company also make the shields as heretofore for bolts, lag screws, &c., in 5-16, ⅜, ½, ⅝, ¾, ⅞, 1 and 1¼ inch diameters, all lengths.

Ball Bearing Grindstones.

The Cleveland Stone Company, Cleveland, Ohio, have adopted new ball bearings which they are apply-

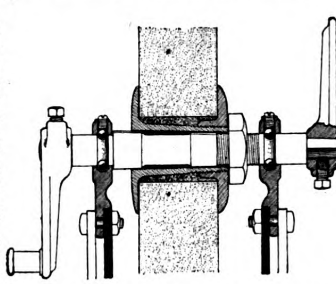


Fig. 15.—Ball Bearing Grindstones.

ing to the Schofield Bi-Treadle grindstone, also to their Samson and Ohio wooden frames, when desired. A sectional view of the grindstone, showing the application of the bearings, is presented in Fig. 15 of the cuts. The manufacturers remark that all parts are interchangeable, and that parties having the ordinary, or old style, Bi-Treadle Samson or Ohio grindstones can readily change them to the ball bearing pattern.

Slate Blackboards.

Architects and builders, more particularly those who have frequent occasion to execute school house work, are likely to find valuable suggestions regarding slate blackboards in an eight-page pamphlet which has been issued by E. J. Johnson & Co. of 38 Park row, New York City. The blackboards turned out by this concern are quarried and finished at their works near Bangor, Pa., the stock being taken from what are termed "big beds," so called because they are much larger than usual, and also because they are of the finest texture and free from imperfections. In making these blackboards the slate rock is first carefully cut out at the quarry in blocks weighing about 2 tons, and of irregular shape. These are placed on cars and conveyed to the factory, where the block is transferred to a large steam saw and cut to as large a size as it will permit, say, 4 x 6 feet. It is then split up into slabs of the required thickness for blackboards, a full ⅜ inch. The pieces, after being split, are placed on the rubbing bed and rubbed until the surface is perfectly smooth, after which they are placed on the rubbing table and the entire surface thoroughly rubbed with a stone by hand until the required smoothness is obtained. The board is then put on the jointer, and such ends as are to be joined to other boards are ground down so as to make a perfect joint, after which the boards are crated ready for shipment. A little pamphlet which the company have issued gives instructions how to set slate blackboards in a school room, these instructions being accompanied by a full sized detail, showing exactly how the work is done. These blackboards are being put up in large quantity in New York and Brooklyn schools, and the company are supplying blackboards for the principal cities of the country.

In addition to blackboards, the company are also prepared to furnish black, green and red grades of roofing slate, as well as shelving, flagging, treads, risers, base and all kinds of structural slate work.

Combination Window Pocket Cutter and Pulley Mortiser.

The Smith & Phillips Mfg. Company, with offices at 99 West Adams street, Chicago, Ill., are directing the attention of the trade to the combination window pocket cutter and pulley mortiser, shown in Fig. 16 of the illustrations. The construction of the device is such that the manufacturers claim one man can finish complete 200 pockets per hour, and that they

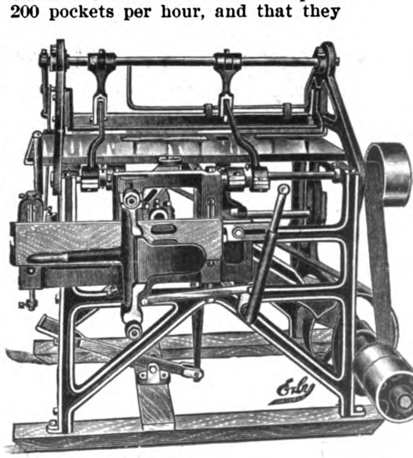


Fig. 16.—Combination Window Pocket Cutter and Pulley Mortiser.

require no planing, no fitting, no nails, no hand work and no bench work. The machine here illustrated is shown with sash pulley attachment, by means of which the mortise is cut for pulleys. The floor space occupied is 4 x 4 feet, and the speed of tight and loose pulley is about 900 revolutions per minute. The manufacturers refer to the small floor space occupied and to the fact that, in addition to cutting pockets and mortises for pulleys, it can be used as a dado and saw table. It is not confined to any patent or size of pulley and is referred to by the makers as rapid in operation and simple in construction.

TRADE NOTES.

HENRY BARNETT, president of the G. & H. Barnett Company of Philadelphia, Pa., manufacturers of the well-known Black Diamond files, died at his home in that city on May 22, after an illness extending over a long period. His death was due to a complication of diseases.

H. L. COPELAND AND W. H. DOLE, formerly with Ernest Flagg, the well-known architect, have formed a copartnership under the title of Copeland & Dole, and announce their removal to 51 Exchange place, New York City. The members of the firm are desirous of receiving copies of catalogues of those engaged in lines of business in which architects are likely to be interested.

THE TOLEDO GRAVITY LEVEL COMPANY of 11 North Superior street, Toledo, Ohio, call the attention of building mechanics to the announcement in their advertising space this month relative to the Toledo gravity level which they manufacture. This device is of special interest to carpenters, brick and stone masons, railroad bridge builders, machinists, and in fact to all having occasion at any time to make use of a level. The instrument is governed by a weight carried on friction rolls, and the company claim that no adjustment is required either in hot or cold weather to insure absolute accuracy. The object of the invention is to provide a new and improved level that is simple and durable in construction and so arranged as to automatically indicate horizontal or vertical positions, as well as the angle of any deviation of a degree when placed out of horizontal position, without the necessity of any adjusting for the purpose.

THE BERGER MFG. COMPANY, Canton, Ohio, with Eastern branch at 210 East Twenty-third street, New York, issue a card relating to "a mixture of styles," which they state may do for a crazy quilt, but is not the proper thing for a metal ceiling. In order to look right, every part of a ceiling should be in harmony. The style of decoration selected should be adhered to throughout, whether it be Colonial or Moorish, Gothic or Renaissance, Empire or Rococo, otherwise the result is bound to be a conglomeration. The manufacturers point out that conglomerated metal ceilings are no longer a necessity, as Berger's Classic Designs have made it easy to secure artistic harmony throughout. The company have issued a catalogue of their specialties and a copy will be mailed free to any address upon application.

THE PHENIX MFG. COMPANY, Center street and Humboldt avenue, Milwaukee, Wis., have issued from the press an interesting little pamphlet relative to the Phenix window screens, door screens, combined screens and awnings and reversible windows. Of special interest at this season of the year is the combined window screen and awning, which the company are making and which is referred to by them as simple, practical, and easily operated; can be hung or removed from the inside of the room; admits no flies when lowering or raising awning, requires no extra labor to put it in place or remove it; secures perfect ventilation, and at the same time prevents useless rattling.

THE E. E. SOUTHER IRON COMPANY of St. Louis, Mo., are having a good demand for metal ceilings, and for some time past have been obliged to work double turn to keep abreast of orders. Electric lights have been installed throughout their plant, and, with an increased force in the designing and drafting departments, they still continue to operate their works night and day. The company possess every facility for the manufacture of metal tiles, shingles, copper and zinc ornaments, ceilings, sidings and beam casings. Judging by the orders being received for stamped sheet metal this form of interior decoration is largely on the increase.

THE attention of carpenters and wood workers generally is directed to the announcement in another part of this issue by W. D. Browning of 1430 Cedar avenue, Cleveland, Ohio, relative to the "B. B." gauge which he manufactures. This device has no screws to become lost or break, no wedges or patent clamps, and the entire device consists of two pieces with a steel point. As the manufacturer puts it, "A simple twist of the wrist does the deed." Samples of the device will be forwarded by Mr. Browning by mail on receipt of 15 cents.

WE are indebted to the B. F. Sturtevant Company of Jamaica Plains Station, Boston, Mass., for a copy of a little pamphlet relating to the application of mechanical draft to stationary boilers. It is in substance a paper by Walter B. Snow, of the company's engineering staff, read before the recent meeting of the New England Cotton Manufacturers' Association, held at Boston in April.

THE McCRAY REFRIGERATOR & COLD STORAGE COMPANY of Kendallville, Ind., have recently issued some neat little folders, showing various styles of their tile lined refrigerators. The illustrations represent refrigerators built to fill special orders, the accompanying text directing attention to the many interesting features of construction. The refrigerators turned out by this concern are meeting with great favor, with the result that the company's business is constantly increasing.

ARCHITECTS, consulting engineers, owners and persons interested in the subject of protective paint for steel structures will receive a handsome card illustrating several 18 story steel structures upon which Dixon's Silica-Graphite Paint has been used, if they will send their address to the Joseph Dixon Crucible Company, Jersey City, N. J. The card also contains suggestions for specification of the paint, and its well-known durability has led to its specification and use upon many immense steel viaducts, bridges and manufacturing plants all over the world.

THE JAMES H. WATSON ESTATE, of Crawfordsville, Ind., show in their advertising card this month what is known as the crest-tile conductor, a combined cresting ridgeboard and electric conductor, which is made of galvanized sheet steel and is of the general style indicated in the company's advertisement. The statement is made that the company also manufacture eave trough and conductor pipe valleys, &c. Those who are interested in goods of this kind can obtain catalogue and prices on application to the address given.

THE WILLER MFG. COMPANY of Milwaukee, Wis., have issued what they are pleased to designate as "Booklet No. 2" for the season of 1900, which briefly describes and illustrates the different kinds of inside window blinds, window screens and screen doors which they manufacture. The company state that they carry no stock or ready-made goods, as everything is produced "to order." The goods are illustrated by means of well executed engravings, while accompanying each is to be found sufficient descriptive letterpress to make the features of construction readily understood. The pamphlet is of a size convenient to carry in the pocket, and the front cover is embellished with a design in colors, the central panel carrying a picture of the Milwaukee Public Library. The fourth page shows a bird's-eye view of the company's works.

IN the show window of the store of Edwin A. Jackson & Brother, 50 Beekman street, New York, was recently exhibited an interesting piece of antique heating apparatus in the shape of an old Franklin fire place heater, which stood for over 95 years in the Judge Jeremiah Smith homestead, at Exeter, N. H.; together with a pair of high brass andirons from the same place, bearing the figure of George Washington in full uniform as general of the Continental Army.

IN another part of this issue the Allen & Winn Mfg. Company of 85 Fifth avenue, Chicago, Ill., direct the attention of the trade to Winn's improved adjustable ball bearing door holder, for which they make strong claims. The holder is furnished in real bronze or brass of any finish desired and is guaranteed for a period of two years. In our Novelties Department we present illustrations of the device, as well as point out the manner in which it is used. The company announce that a sample holder will be sent to any address by mail on receipt of 50 cents.

THE DECORATORS' SUPPLY COMPANY, 213-219 South Clinton street, Chicago, Ill., present in their advertising space this month an interesting announcement relative to the composition capitals which they manufacture for interior and exterior ornamentation. They also turn out interior plastic relief work, fine grille work, brackets, &c. The company have issued an attractive catalogue of their specialties and request those interested in work of this kind to send for a copy.

CARPENTERS, builders, painters and others having occasion to make use of scaffolding in the execution of their work will doubtless be interested in the folding bracket which forms the basis of an announcement in our advertising columns this month by A. H. Danforth of Monson, Mass. This bracket is so constructed as to occupy comparatively little space, is simple and durable in construction, and has been tested, the manufacturer states, to 1500 pounds.

IN their advertising space this month the Clark Mfg. Company of Station C, Moline, Ill., direct attention to the "Perfection Barn Door Latch" which they manufacture. This latch is referred to as the only kind that holds and locks the door, either open or shut. The material used in the construction of the latch is malleable iron. The company will send a sample latch prepaid on receipt of 50 cents, and will also furnish special prices per dozen.

PRIMA VERA

FRESH PRIMA VERA (WHITE MAHOGANY), IMPORTED DIRECT.

We have just received direct from the West Coast of Mexico the finest cargo we have ever handled of this most Popular Wood, it being far above the average in lengths, widths, color and texture, and we are now prepared to furnish it in quantities and thicknesses to suit the trade. Architects and builders are invited to correspond with us in regard to it, and also in regard to all other woods used for Interior Finish and Decoration.

MAHOGANY.

Our stock of Mexican, Cuba and San Domingo Mahogany cannot be excelled in Grade, Texture or Color, and our prices are based on first cost without Storage Charges or Commissions to middle men. We assure you it will be to your advantage to give us a trial.

New York Branch, Cor. 6th and Lewis Sts. THE E. D. ALBRO CO., Cincinnati, Ohio, U. S. A.

WADDELL MFG. CO.,

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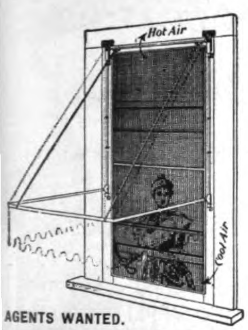

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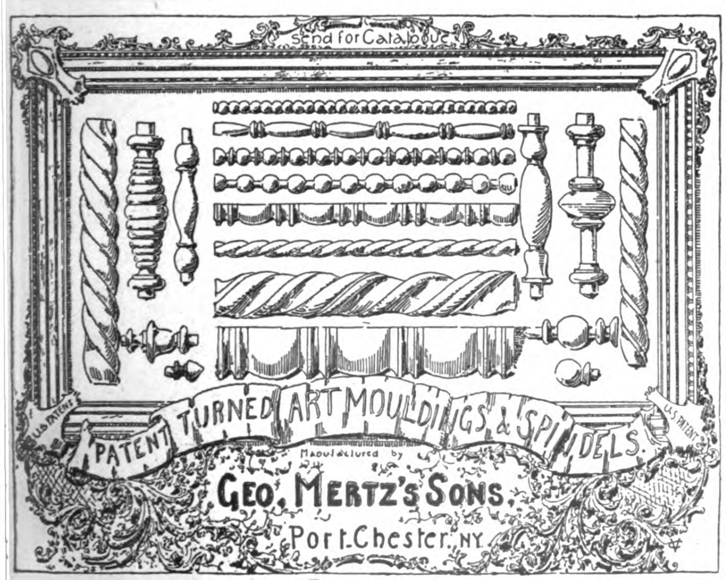

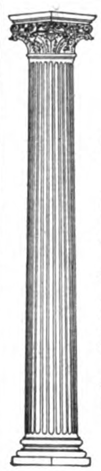

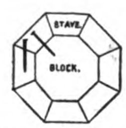

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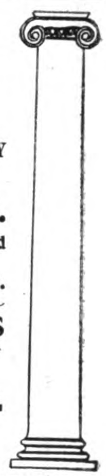

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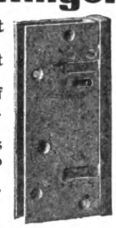

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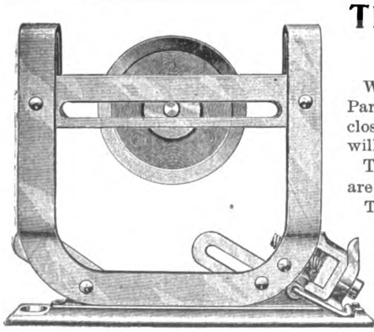

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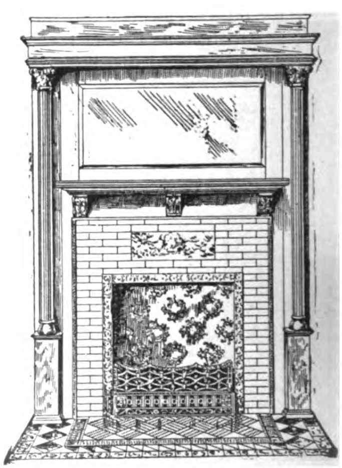

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DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

SEPTEMBER, 1900.

New Dormitory for Teachers' College.

The imposing group of buildings in the upper part of Manhattan Island which gives to University Hights its name is to have an important addition in the shape of a new dormitory for the Teachers' College, the plans for which have recently been prepared. According to the drawings the structure is to be ten stories in hight, built of brick, terra cotta and limestone, and corresponding in a general way with the other buildings on the grounds of the Teachers' College, and in more or less harmony with those of Columbia University and Barnard College close by. The architecture is of the Victorian collegiate gothic, a style which, we understand, has never before been employed, at least in this country, in a building of more than four or five stories. The new dormitory is designed in what is known as the pavilion form—that is, with a series of wings connected together, so as to give direct light to every room, and avoid the necessity of air shafts. The wings run east and west and are four in number, those in the center being intended for the women's dormitory, while the portions of the building at either end are devoted to apartments. There are two entrances to each of the side streets which lead to the housekeeping apartments. These contain kitchens and all other facilities for families, it being intended, we understand, to lease them to the officers of Columbia University, of which the Teachers' College is a part. There are also a number of bachelor apartments, of two rooms and bath each, and there are also central connecting rooms, with an adequate supply of bathrooms, sitting rooms and parlors on each floor. The two upper stories will be devoted to a restaurant and kitchen, the latter, together with the laundry and service rooms, being located on the roof story, with the dining halls directly below. The plans of the new building have been prepared by J. M. A. Darrach, a recent graduate of the Columbia School of Architecture, he being selected in a competition held last spring. It is the intention to begin the work of construction so that the building will be ready for use in about a year.

Magnitude of Office Building Foundations.

It is probable that comparatively few of the readers of this journal have more than a general idea of the magnitude of the work of preparing the foundations in connection with many of the towering office buildings which dot the lower portion of the city of New York, or of the cost of the work as compared with the amount involved in the erection of the entire structure. A short time ago we referred to the 20-story building which is to be erected at the corner of Broad street and Exchange place, pointing out that while it would be the largest office building as regards available floor area ever projected in this country, if not in the world, it would not necessarily be the tallest. In the case of this building the statement is made by the superintendent in charge of the work that before the structure reaches the level of the curb $500,000 will have been expended. The foundations are of the caisson type, and no less than 100 of these pillars of solid concrete running to bedrock, each containing 100 tons of material, will carry the great weight of the new building. The caissons are from 7 to 9½ feet in diameter, and are spaced at intervals of about 20 feet over the entire area of the plot. To support the party walls rectangular caissons 5 x 14 feet will be sunk, bed rock being reached at depths varying from 45 to 52 feet. There are several hundred men at work, divided into three eight-hour shifts, and it is expected that the last of the caissons will be down at the end of nine weeks from the time operations were first commenced. Work goes on night and day, and at the present rate of progress it may not be wide of the mark to expect that the company having the contract will make a time record on office building construction.

The Trend Cityward.

One feature that the census of 1900 is likely to present in strong relief is the increasing drift of the rural population toward the cities and towns of the United States. This tendency was very clearly demonstrated by the figures of the last census; but it will doubtless be shown to have grown with still greater strength during the past decade. The unprecedented increase of the population in the great cities of this country in recent years is far in excess of the natural increase from births and through immigration. It is caused in very large measure through the influx of young people of both sexes from the country districts. And the effect of this migration on the agricultural districts is equally marked. In general these sections are either standing still in respect of population or they are actually falling back. In fact, without its cities and towns, the United States to-day would be one of the most sparsely populated countries of its size in the world. This modern cityward tendency threatens to become a serious problem in the economy of the nation. Teeming centers of population are becoming more and more congested, while the wide country regions are gradually being denuded of the native bone and sinew that are needed for their development. Thus, at the present time, the farmers of the West are crying out vainly for men to harvest the crops. Every year there is an actual labor famine in the agricultural districts. And the lack of skilled tradesmen in the country is also becoming more marked year by year.

City vs. Country.

Meanwhile the fierce competition of life in the big cities is becoming ever keener, and the ranks of urban labor, skilled and unskilled, are being swollen far beyond the limit of usefulness. When business is unusually active there is not much heard about a lack of work in the large centers of the country, as labor of all kinds is pretty fully employed, but as soon as a lull comes there is the usual cry of distress from the legions of the involuntarily idle. At the same time the farmer and the country artisan are making living wages steadily, and running little or no risk of being suddenly thrown out of work with the prospect of want before them. Yet myriads of young country bred lads continue to pour into the big cities, attracted by the superior opportunities for fortune or fame which they suppose lie there, or to escape the drudgery of manual labor and enjoy what they believe to be the more luxurious life of the town.

It takes but little time for most of these country immigrants to become disillusionized. But they have made their bed and are prepared to lie on it. Consequently they stick and become further units in the vast aggregation of city life. Whether or not their preference is a wise one is a matter on which it is impossible to dogmatize. There is no doubt that the city offers advantages and prizes to the bright, smart, pushing youth that he could never find in the country. But for the individual of merely average gifts it would seem that the country offers equally good opportunities to make a comfortable living, along with a much more wholesome atmosphere than the city can afford.

Fire Proofing in Residences.

The splendid results which have followed the form of construction used in the modern office buildings and business blocks of this city have caused more and more attention to be given to its application to the better class of dwellings. A good example of the extent to which fire proof construction is being adopted in the more expensive residences is found on Riverside Drive in the dwelling being put up by the Clark estate. Here all the floors are of concrete arches between steel beams with cinder concrete filling on top, which in the bath and toilet rooms is covered with a water proof course of burlap and hot asphalt, flashed 6 inches high on all the walls, and protected with a 2-inch layer of concrete in which the floor tiles are laid. Where the water pipes run across these floors they are laid on the water proof course, and a row of bricks is laid flat on each side of them and covered with roofing slates. Then another strip of burlap is laid over the slate, lapping each side, and is swabbed with hot asphalt and covered with the upper layer of concrete, thus permanently inclosing the pipes and making a kind of trough, pitched to one end so that any water of leakage or condensation will be carried off to safe wastes provided for the purpose.

Present and Past Cost of Building.

The decline which has taken place in most lines of materials entering into the construction of buildings, more especially those intended for office and other business purposes, raises the hope that it may result in a revival of activity in the building trades. That the cost of construction is somewhere near the normal average is apparently being recognized, if one may judge from the increase of building projects undertaken on an investment basis. As showing the trend of prices the following schedule prepared by the *Sun* from notes furnished by a downtown architect and builder may not be without interest just at this time. The estimates are for a ten-story fire proof loft building on a corner plot, 50 x 100. A building of this description was selected for illustration because the rise of prices was most marked in fire proof construction and because lofts are a simple type of structure:

	January, 1898.	January, 1899.	August, 1900.
Mason contract	$78,125	$96,875	$87,500
Iron contract	43,750	62,500	50,000
Carpenter contract	15,625	22,500	22,500
Steam heating contract	6,250	8,750	8,125
Plumbing contract	3,125	4,375	3,750
Electric wiring contract	1,875	2,500	2,500
Elevator contract	5,625	6,250	6,250
Caisson contract	7,500	9,375	9,375
Totals	$161,875	$213,125	$190,000

Expressed in other words, the present cost of fire proof loft construction is about 27 cents a cubic foot, as against 30 cents in January, and 22 cents upward of a year and a half ago. According to the authority for the schedule, current prices were estimated conservatively high, and some care in the letting of contracts might reasonably be expected to result in a rate under 26 cents per cubic foot. Constructional cost some 18 months ago, it is universally admitted, was abnormally low, and competent opinion appears to be that no advantage will be gained by delaying building projects in the expectation of a further decline in prices. The net decline is certain to be outweighed by expenses for carrying unimproved property and by loss of interest and profit on working capital.

Removing Varnish or Paint from Hard Wood Floors.

In reply to a correspondent asking for the best and most economical method of removing varnish or floor paint containing varnish from oak or yellow pine floors the *Painters' Magazine* offers the following suggestions as being applicable to the case: Take caustic soda or concentrated lye and dissolve the same in boiling water, keeping the solution hot while applying it. Have rubber gloves on your hands while you make or use the solution, and apply it with a cotton swab, because it would ruin brushes. Oil paints can be removed in a few minutes and varnish paints or varnishes will yield in from 10 to 15 minutes. When the wood has been cleaned of paint or varnish it must be well washed with clear water, and if the wood has darkened from the action of the soda or lye solution, and this be objectionable, in case the floor is simply revarnished and not painted, the darkening can be corrected by brushing dilute muriatic acid over it, and when the wood has resumed its natural color it should be thoroughly washed with clear water, and, finally, with weak soda water to neutralize any traces of acid still remaining. For applying the acid use bristle brushes that are not bound with iron wire. Muriatic acid should not be used where iron or steel articles are lying about, and in using the soda lye linen or cotton clothes should be worn, as a single drop of the solution will burn a hole through woolen goods.

What is Fire Proof Construction?

So much has been said about " fire proof " construction and what is actually meant by the term that a comprehensive definition cannot fail to prove interesting. In a paper prepared by J. K. Freitag the term is explained, and according to his idea " fire proof " construction should embody not less than the following points:

1. (a) The exclusive use in construction of materials which are in themselves proof against serious damage by fire and water, or the use of materials which are adequately protected by fire and water proof coverings. (b) The materials employed must permit of easy reconstruction. 2. The internal plan or design must be made with especial reference to preventing communication between floor and floor, and between different portions of the same floor. 3. The exterior design to be such as to prevent the communication of fire from or to adjoining structures.

From these requirements it will be seen that fire proof construction is a matter of rational and scientific design or planning of all the general features of a building, as well as the matter of detail in regard to the materials employed and the precise methods of their employment.

A TOWN which is being laid out by coal operators in the Fairmount district of Pennsylvania promises to present a strong contrast to the old rough type of mining town. The town of Gypsy, located in the center of extensive new mining properties that are being opened up, is being laid out with wide streets and avenues, and will be provided with complete sewage and water systems. The houses will be modern and up to date in every particular. They are to be set on stone foundations, and will have slate and tin roofs, will be painted on the outside and artistically finished on the inside. A hotel and hospital, with other public conveniences, are also to be erected.

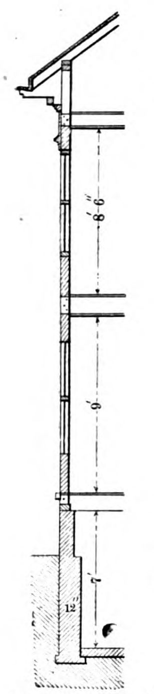
COLONIAL HOUSE AT PLAINFIELD, N. J.

WE have taken for the subject of the half-tone supplemental plate which accompanies this issue of the paper a colonial house embodying in its exterior treatment and internal arrangement a number of interesting features. The broad veranda extending across the front of the house will appeal to many, while others will find satisfaction in the central entrance which permits of spacious rooms each side of the hall. The main stairs rise from practically the center of the building, thus giving at the front a suite of three rooms, which, when occasions require it, can be readily thrown into one. Beyond the parlor and connected by sliding doors is the library, while the kitchen is found in the rear of the dining room and connected with it by means of a butler's pantry. On the second floor are four sleeping rooms, with ample closets, and a bathroom, all readily accessible from the main stairs, which land in the center of the house.

According to the specifications of the architects, the foundation is built of hard burnt brick, faced with selected brick laid in red mortar. The cellar bottom is covered with 4 inches of concrete composed of Atlas Portland cement and sharp sand, troweled smooth. The girders in the cellar are 8 x 10 inches, framed flush with the floor joist, the cellar ceiling being flush and plastered. The first and second floor joist are 2 x 10 inches, the third floor joist, 2 x 8 inches, and the rafters and ceiling joist, 2 x 6 inches, all placed 16 inches on centers. The plates are made of two 2 x 4's and spiked together. All side walls and ceiling throughout the house are plastered with Adamant plaster, and finished with patent wall plaster, treated with two coats of tinting in colors. The first and second floors are laid with 7/8 x 8 inch matched hemlock boards, placed diagonally, with a top floor of 1/2 x 2 inch yellow pine laid on felt. The outside studding is 2 x 4 inches, doubled at all openings. The inside studs are also 2 x 4 inches, placed 16 inches on centers. The frame of the building is sheathed and papered, and then covered with clapboards. There being no corner boards on the first story, the clapboards are mitered at the angles. The front columns, also the corner boards on the second story, have plastic composition caps, the corner boards having the base set on the sill course, and plastic brackets underneath. The wreaths on the front door and in the panels are also plastic decoration. A detail of the plastic treatment of the corner boards is shown on page 242. The roofs of the main house and dormers are covered with shingles of Washington red wood, while the roof of the piazza is of tin. The shingles of the roof are laid on 1 x 2 inch shingle lath.

Front Elevation.—Scale, 1/8 Inch to the Foot.

Colonial House at Plainfield, N. J.—Architects, J. A. Oakley & Son, Elizabeth, N. J.



Section.—Scale, 1/8 Inch to the Foot.

The trim of the house is of cypress. The first story hall is paneled 4 feet high on the side walls, and the grille at the foot of the stairs, with arched work over, makes a rather attractive appearance on entering the house, as may be gathered from an inspection of the details which are presented on a following page. The hall cornice is of wood and finishes around to intersect with caps over the doorway. The dining room trim is highly varnished throughout, with a crystal finish, which contrasts well with the dull finish of the walls. The main stairs are of oak, and the rear stairs of cypress. The kitchen and bathroom side walls, to a hight of 5 feet, are finished in imitation tile work, this being accomplished by lining off the plaster in 3 and 6 inch blocks while it is soft, and then finishing with three coats of paint and two coats of white enamel. This makes a wall that can be washed the same as if it were constructed of tiles.

The plumbing is of the open, modern type, all exposed pipes in the bathroom being nickel plated. The bathtub is of iron, porcelain lined, with nickel plated bibbs. The wash bowl is of Tennessee marble, with oval basin and nickel plated legs. The water closet is of the siphon jet type, with oak cabinet tank. The wash trays are located in the cellar, and have ash covers and tops. In the kitchen is a brick set range, 40-gallon galvanized iron boiler and a white enameled drain sink, set on iron legs. In the pantry is a china closet, butler's sink, &c.

The house is heated by means of a hot air furnace, the position of the registers being clearly indicated on the floor plans. The house is piped for gas, and wired for electric lighting, the fixtures being of the combination type, each ceiling light having a switch to operate the electric lights. There are also electric bells and speaking tubes in several rooms connected with servants' quarters, kitchen, &c.

The house is painted three coats, and the roof treated with creosote shingle stain. The roof is green, the clapboards a light drab, the trim pure white, the foundation a light buff, to match the pressed brick chimneys, and the blinds green. The windows on the front and two sides of the first and second story are glazed with American plate glass of the first quality.

The residence here shown is located on Sanford avenue, Plainfield, N. J., and was erected for J. B. Mills, in accordance with plans prepared by J. A. Oakley & Son, Architects, of Elizabeth, N. J.

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

Colonial House at Plainfield, N. J.

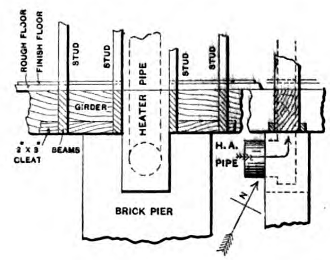
Model Tenement House Construction.

The question of the housing of the poor in the large and densely populated cities of the country is one which for a long period of time has received the attention of municipal bodies as well as of those given to large philanthropic work, and any movement of a practical nature looking to a solution of the problem cannot fail to be closely watched by all interested in the welfare of the masses. In the light of the statement that "over two-thirds of the people on Manhattan Island dwell in tenement houses unadapted to their wants and incompatible with their health and moral advancement," it is especially interesting to note the efforts which are being made by the City and Suburban Homes Company to provide model tenements for the poorer classes in New York City. As a result of a competition recently held in this city for the purpose, the plans of R. T. Short of Harde & Short were adopted by the company for a group of tenements which will be erected on the east side of the city.

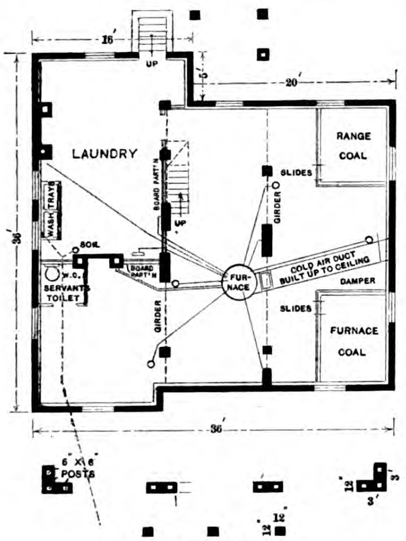
According to the architects, the projected improvements will consist of a building six stories in hight, each unit covering 70 per cent. of four city lots, and 30 per cent. being left vacant for light and ventilation. No part of the buildings will exceed two rooms from outside to outside. This has been called "the secret of the whole tenement-house problem," because it means that there are no dark interior rooms. Each building will contain ninety-two separate apartments, twelve on the ground floor and sixteen on each upper floor. Every apartment is to be a complete and attractive home in itself, consisting of two, three, and four rooms, with two or three closets, private hall and toilet; 75 per cent. of these apartments will have a front outlook.

The buildings will be semi fire proof. The entrances and staircase halls throughout will be entirely fire proof; the staircase hall will be inclosed with brick walls, and the floors of the halls throughout will be of fire proof construction. The stairs from the cellars to the roofs are to be fire proof, wide, and easy of ascent, well lighted and ventilated. One of the most important and an entirely original feature will be the arrangement of the staircases to secure cross ventilation through them from one court to another throughout the entire block.

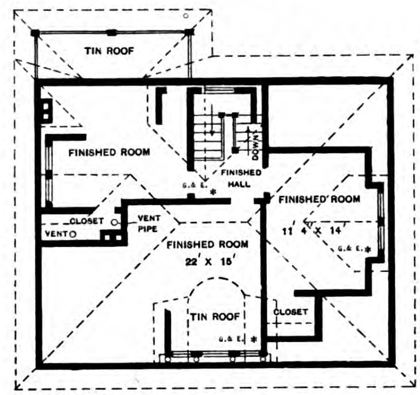
Every room in the buildings will be well lighted by large windows opening directly to the outer air. There will be no interior light wells, the space not built upon being concentrated into large open courts. The windows of the courts, where opposite each other, will be from the front to the rear in the prevailing type of 25-foot "double decker" tenements will be converted into rentable area. The buildings will be divided by unpierced brick walls into separate apartments, each with a 50-foot frontage. No rooms will open directly from the staircase halls, as each apartment is to have a private



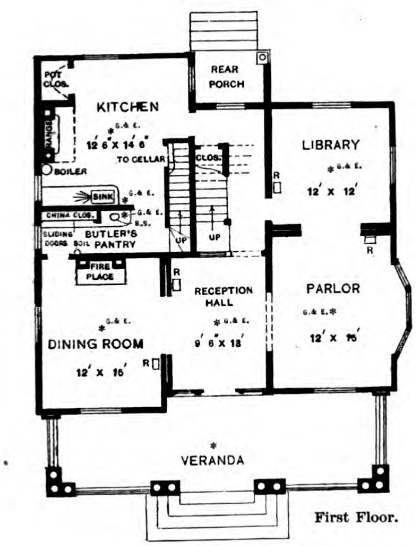
Section of Floor Beams and Girder at First Floor.—Scale, ¼ Inch to the Foot.



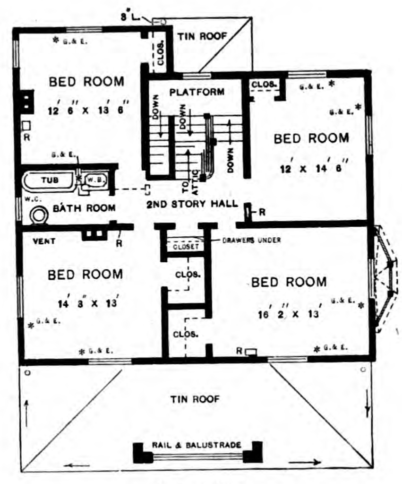
Foundation.



Attic with Outline of Roof Plan.



First Floor.



Second Floor.

Colonial House at Plainfield, N. J.—Floor Plans.—Scale, 1-16 Inch to the Foot.

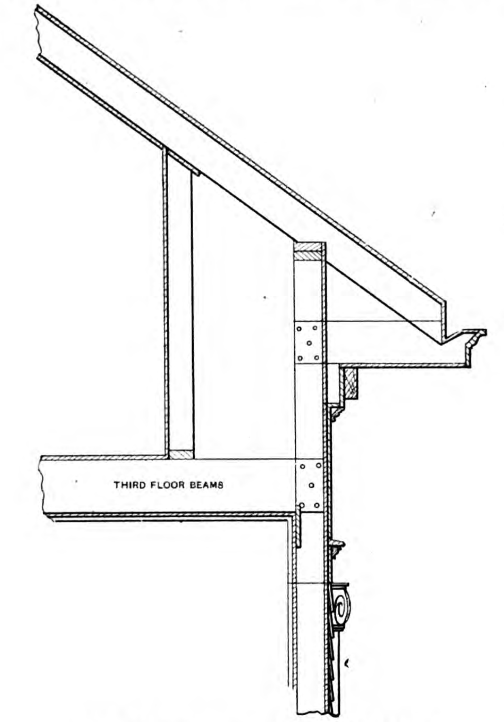
far enough apart to insure privacy and quiet and to prevent the spread of fire. The large center courts are to be open to the street, thus insuring a free circulation of air at all times. These open courts will be attractively though economically beautified by means of grass plots, flower beds, and fountains, and may be used as a playground by the children.

Common halls and corridors are to be dispensed with, except the first-story entrance halls and the staircase halls. The space devoted to long public halls running hall, insuring absolute privacy to the tenants. Each flat, whether of two, three, or four rooms, will contain a private toilet with windows to the outer air. There will be a space for a refrigerator in the private hall; also shelves and hooks for hanging hats and coats.

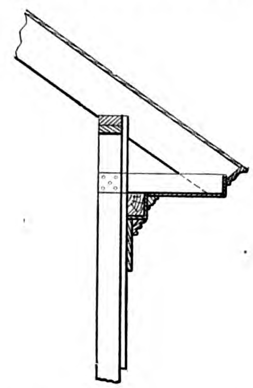
In the kitchens there will be a gas range, sink, stationary wash trays, supplied with hot water from the boiler in the cellar, and a large dresser, with closets, drawers, and shelves. The rooms are all to be unusually large, bedrooms being arranged for two beds, and each bedroom will be reached from the living rooms and private halls without passing through another bedroom.

The staircase halls and the apartments throughout are to be steam heated. The dumbwaiters will run from cellar to roof, will be self retaining, and inclosed with fireproof shafts. Speaking tubes are to be provided from the cellar to each apartment. Dust chutes for discharging sweepings, &c., will be built from the staircase landings on each floor to dust bins in the cellar. There will be ventilated garbage storage rooms in the cellar. Laundry and steam heated clothes drying chambers will be installed. Bathtubs and showers, with hot and cold water, are to be provided. These baths, together with the laundry and drying rooms, will be for the free use of the tenants.

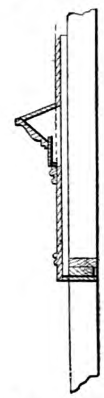
Baby carriage and bicycle storage rooms will be located on the first floor. General storerooms, workshops and one storage room for each tenant will be built in the basement. A flushing system has been planned, arranged so that the entire cellar may be readily flushed and thoroughly washed out at any time. The roof will be constructed and finished to permit its use as a roof garden. The cost, including steam heating, gas fixtures, window shades, &c., complete, ready for occupancy, will be $100,000 for each unit of 100 feet frontage. The rentals will average $1 per week for each room.



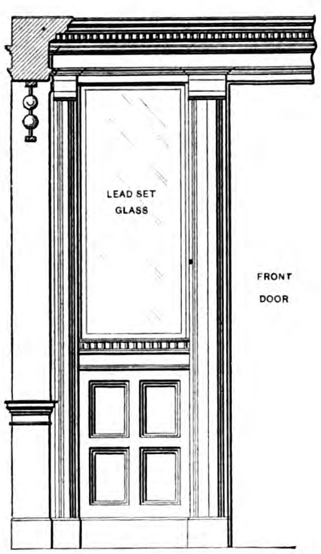
Detail of Main Cornice.—Scale, ½ Inch to the Foot.



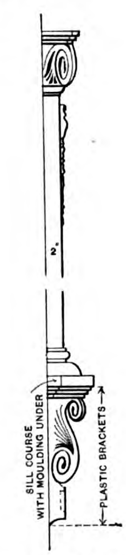
Detail of Dormer Cornice.—Scale, ½ Inch to the Foot.



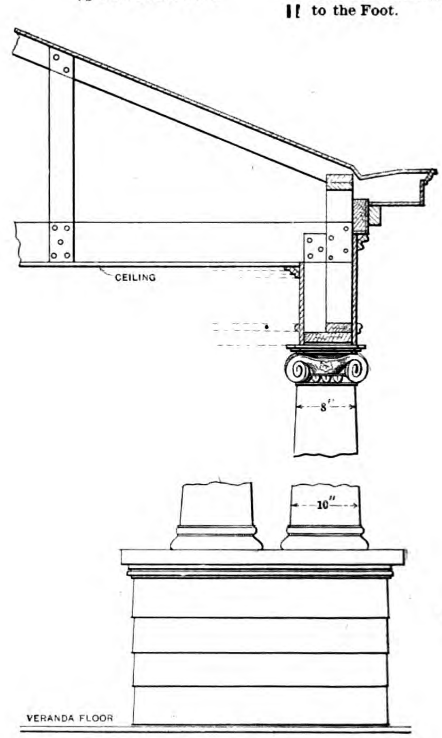
Detail of Belt Course over Windows.—Scale, ½ Inch to the Foot.



Detail of Front Door Trim —Scale, ⅜ Inch to the Foot.



Detail of Corner Boards at Second Story.—Scale, ¾ Inch to the Foot.



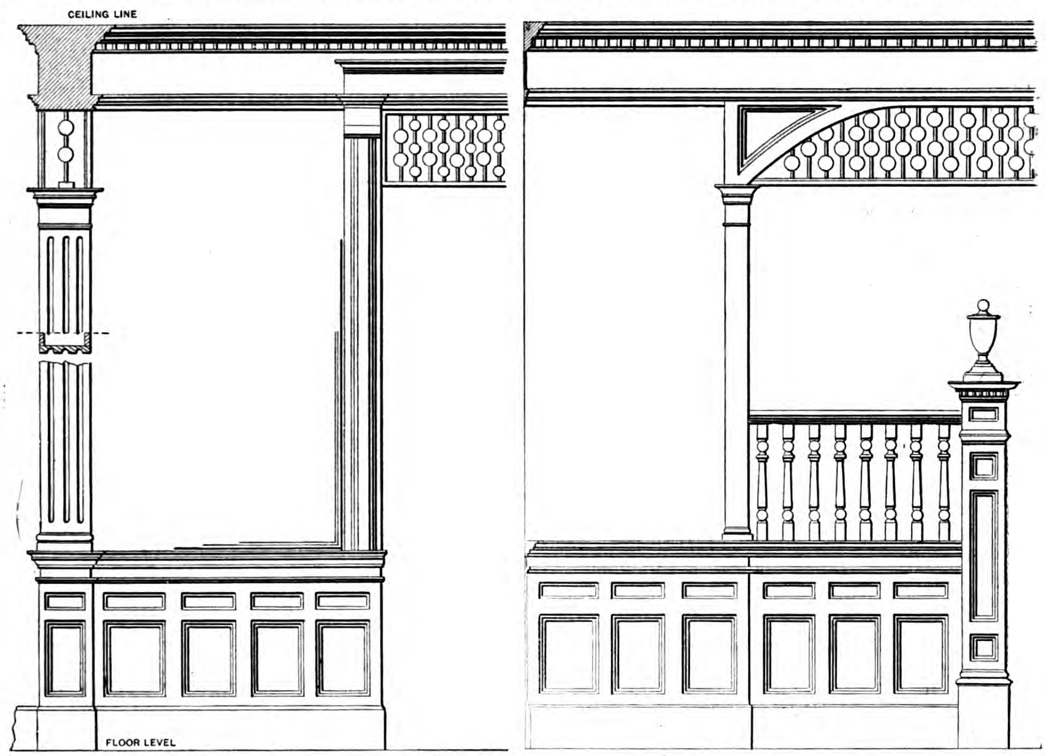
Details of Veranda Cornice, Column and Base. Scale, ½ Inch to the Foot.

Miscellaneous Constructive Details of Colonial House at Plainfield, N. J.

WHAT is said to be one of the largest and finest railway stations in England was opened a short time ago at Nottingham. It covers 12 acres and cost $4,866,500. Five hundred and eighty thousand cubic yards of material were removed from the site, and the platform frontage, of solid masonry, built to car floor hight, aggregates two miles. The station is located in the heart of the city, being entered from each direction by tunnels. It was built by the Great Central and the Great Northern railways, and will be used jointly by them.

Domestic Architecture.

In a city street which has completely changed in character there are evidences of a notable advance in commercial architecture. A number of residences have been transformed into shops, but not in accordance with the customary fashion of merely removing the stone work on the lower stories and putting in plate glass. Every one of these new shops has been arranged in accord with some distinctive style of architecture. One is old English, another is German, and to every one of the establishments has been given some characteristic touch which makes it different from the average street which undergoes what seems to be the inevitable transition from a residential thoroughfare to one devoted to business. If the same amount of imagination had been exercised in other streets it is safe to say that this city would be much more picturesque and less monotonous in aspect that it is to-day, although not everybody regards that as a virtue. "Sometimes I think that New Yorkers will look back to the days of the old brownstone fronts," said an architect, "with the thought that they were not so bad after all. They were at least characteristic of the city in the way that the homes of every other city are. In London and Paris the long blocks of city houses are characteristic of the city, but the same thing is not true of the newer buildings put up here. All kinds of styles are blended in the streets uptown, and it is possible to find on one block examples of nearly every kind of house from early English to modern German. These houses seemed an agreeable novelty after the monotony of the brownstone blocks downtown, and they were decorative enough until it began to look as if there would be no end to the variations of style and period to which the architects turned. If all of these styles had been combined by some really masterly hand, and the designs had always been made by men of experience, New York would doubtless have continued to enjoy these new qualities in its domestic architecture. But the search for something new became too fierce, and the whole history of architecture was ransacked that some style which would make a new block might be found. or at all events suggested by something that had gone before. The result was the confusion that now exists on some of the uptown streets, and I think there has already been a reaction in favor of the old brownstone block or something of the same subdued character."



Detail of Trim in Reception Hall.—View Looking Toward the Parlor.

Details of Newel Post, Grille and Panel Work as Viewed from Reception Hall.

Scale, ⅛ Inch to the Foot.

Miscellaneous Constructive Details of Colonial House at Plainfield, N. J.

THE new school building which is to be erected at Davenport, Wash., in accordance with plans drawn by W. W. Hyslop of Spokane, is said to be something unique in school architecture. The building is Mexican in style, with two artistic cupolas or belfries of the Mexican-Spanish order. A widely projecting roof, extending out 4½ feet from the walls, carries out the Mexican design. The quoins, basement and trimmings of the building will be of Spokane cream pressed brick and the body of the school of common brick. The building is to be two stories high, with a deep basement, which may later be finished for school rooms. The high school assembly hall and two recitation rooms will be on the main floor. The principal's office will be opposite the main entrance. On the second floor there will be four other recitation rooms and wardrobes for the scholars. The building is 86 x 50 feet in size and has a 16-foot corridor on the main floor.

FURNACES FOR EXPENSIVE HOUSES.

TEN years ago the architect who was employed to erect a residence on which expense was a minor consideration always sought a conference with the best hot air furnacemen when his plans had progressed to such a point that a consultation on heating the building would be of advantage. For several years the conditions in the business world have not been favorable to the erection of an abundance of this grade of buildings. But evidences of a change in this regard are becoming manifest to the furnaceman who does the best class of work. Within the last few months, in the vicinity of New York, leading architects have asked furnacemen to bid on the heating of a number of fine town and country residences of a size that will require three or four of the largest hot air furnaces. They are ready to receive suggestions as to the best arrangement and location of hot air flues, &c., and there is no doubt but that hot air furnaces will be used for some very fine and spacious buildings. This is a return to a system of heating that is found in many old mansions where a continual change of atmosphere attended with a comfortable warmth is among the luxuries desired.

The Character of the Work.

While the amount of the bid receives consideration, the most attention is paid to the method and materials. There is none of the struggle to reach the bottom cent that prevails in operation work; nor would the custom of making all pipes of one size be tolerated. The man who shows the necessity of providing special foot pieces, elbows, register boxes, collars and dampers, and of having odd diameters for pipes to special rooms, will be heard with interest where the talk of standard goods to save cost smacks too much of the operation freeze-the-tenants job to receive any consideration. There are furnacemen and furnacemen, and those who will receive the order to heat this class of buildings would never be awarded the contract for an operation job. On the other hand, neither would the operation contractor secure the order for this kind of work. His knowledge of heating is of a different order from that required. He would trust too much to chance to give satisfaction. He fails to see the need of a specially made boot, box or angle elbow, and shows that the features which make the best work are undervalued by him. Good judgment in laying out the work, correct knowledge of what to do to secure success, good workmanship in having all details carried out and finished properly and neatness and finish in the completed job must be clearly demonstrated both before the work is contracted for and at its completion.

Other Specialties Required.

In many instances fine buildings such as those referred to are erected on sloping ground, so that what would be a city cellar becomes a pleasant, well lighted basement, well suited for servants' dining and sitting rooms, as well as for kitchen and pantry. This leads to complication, as the hot air furnace cannot be placed in some otherwise unutilized space. It requires to be near the flues and registers which it is to supply with warm air. This interferes with the arrangement of the basement. which has superseded the cellar, and leads to the question whether the air cannot be forced to those distant registers in some way. Then a fan is remembered. The use of a fan to make the furnace a heater to a warm blast system would solve the problem. But it must be driven. If electricity is available there is no difficulty in driving the fan; otherwise a gas plant, if a gas supply is not at hand, and a gas engine are necessary and are best adapted in most cases. There is nothing to freeze up in such a system if the country house is closed for a portion of the winter. Or a part of the house may be heated by gravity without the use of a fan.

New Apparatus Needed.

Those who have looked into the use of a fan system have not found a satisfactory low priced motor that can be run at a small cost. It seems that from 5 to 8 horsepower is sufficient for a majority of cases, and it is possible that a motor can be adapted that will answer the purpose. The fans in the market have not been specially designed for furnace systems, but it is possible that some gain can be secured in that direction. Then both the motor and fan manufacturer should learn that the information in reference to their goods must be prepared specially to meet the requirements of furnacemen.

The furnaceman who studies and masters the adaptation of the blower system to the hot air furnace will find it profitable. Doubtless there will be changes in some of the rules, but many will apply. One who has acquired this knowledge can design a furnace system to heat a building no matter where the arrangement of the basement makes it necessary to place the furnace. The use of the fan with furnaces has made available their fullest heating capacity, with no increase in the fuel consumption in properly proportioned systems. Apparently the only increase in cost after the fan and motor have been installed is in the expense of operating them.

Gravity System.

However, as the popularity of the furnace heating system has been established without the use of fans, and as the fans will be needed for special residences, churches and other public buildings, it will be better for most furnacemen to learn how to do the best class of gravity work. Already there is a market and a demand for it. Men who are masters of the system know how to impress their customers with the fact that they will find it the cheapest to have in their houses. They will be able to accomplish better results than those who have been devotees of the lowest bidder style.

There is a wide field for study here, and the knowledge gained brings a good return on the expenditure of effort made to acquire it. It is not enough to know how to do the best work and to be able to do it. It is necessary to have the facts so recorded as to be able to present the evidence to all possible buyers, and impress upon them that when employing a furnaceman they get something more than a mere furnace. This is worth a great deal and the effort necessary to secure it should not be spared.

Wired Glass as a Fire Resister.

Wired and polished glass as fire retardents have recently been experimented upon at Philadelphia. Their resistent qualities seemed to be well established. The experiments, as described in *Fire and Water*, took place in a building constructed with skylights and windows in two sides—one containing double sashes. On the other sides were a fire shutter and Standard door, fitted with polished glass. For half an hour fire of 1600 degrees temperature was kept up, at the end of which time water was turned upon the sashes at 20 pounds pressure. After the test, which was the first of two, the sashes were found to be uninjured; the glass also had only cracked, and had not given away at any point. The next test, although it was severe in the intensity of its heat, allowed the spectator to stand close to the polished wired glass of the door and so to observe the effect of the fire inside. Under a temperature of 1800 degrees the inner panes softened, but those outside were not affected. and when the tests were finished there was no breakage or opening for fire or smoke at any point in the glass. The polished wired glass was of the "sandwich" type, with a wire mesh imbedded between two sheets of glass. It had never been tested before, and stood the test as well, if not better, than the other glass.

MAKING PERSPECTIVE DRAWINGS IN CONFINED SPACE.

By Ray S. Blinn.

It has always been a constant perplexity with draftsmen in making perspective drawings to find room on the drawing board to locate the vanishing points. The various machines and appliances invented and patented are, as a rule, so unwieldy, as well as expensive, that I present to the readers a simple home made appliance that will do the work as well or better than those that one could buy, and I hope it will be of assistance to architectural draftsmen.

After giving a description of this method, I wish to add a few simple trigonometrical formulas that any one can use in substitution whether or not they may understand trigonometry.

First: One needs only the ordinary sized drawing board such as architects generally use. It is, however, advisable to have the board true on three sides, as will be seen later. Obtain three cheap pearwood T-squares of the length suitable to the size of the drawing. If one is making a ¼ inch to the foot drawing get two 30-inch board for any drawing (Fig. 3) let the plan be set at an angle θ, with a line parallel to the horizon line at a distance O P.

The curve at A is set A O distance from O, making P A the distance from the nearest corner of the plan to point A. B O and C O are the distances of the other curves. Let R be assumed the radius of the lower curve, then R' and R" can be easily ascertained. Let us take θ to be the angle which the plan makes with the line at P.

Then $O X' = P X \cot. \theta$

And $O X = P X \tan. \theta$

For example, let the angle $\theta = 30$ degrees,

And let $P X = 40''$.

Substituting:

$O X' = 40 \times \cot. 30 \text{ degrees} = 69.26 \pm$

$O X'' = 40 \times \tan. 30 \text{ degrees} = 23.09.$

If the curve at B has been cut to a 48-inch radius, as has been suggested above, then $69.26'' - 48'' = 21''$ ap-

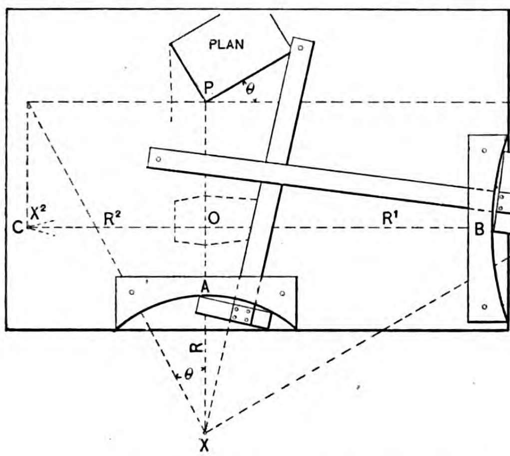


Fig. 3.—Showing Position of T-Squares and Curves.

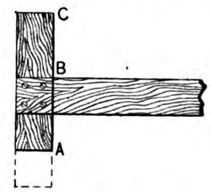


Fig. 1.—A Modified T-Square.

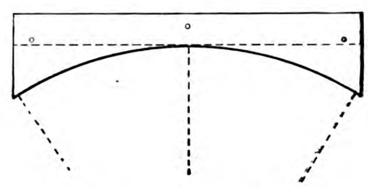


Fig. 2.—Form of Curve to be Used.

Making Perspective Drawings in Confined Space.

and one 24-inch T-squares. Saw off end of the head at such a point that the part A B = B C, as shown in Fig. 1. Then A C is a chord of any circle, having its center upon a line perpendicular to B.

Next one will need three curves, which should be cut from some hard grained wood 3-10 inch thick, which is just a trifle less than the thickness of the head of the T-square. Make them with the straight side parallel to the tangent of the curves, as in Fig. 2. These should be made of a size suitable to the drawings you are accustomed to make. For a ¼-inch scale drawing, where the plan sets at an angle of 30 degrees with the horizon line, make two curves 24 inches long, one with a 48-inch radius and the other with an 18-inch radius. Where the plan sets at an angle of 45 degrees with the horizon line make three curves, with a 24, 24 and 40 inch radius, respectively.

The positions of the T-squares and curves upon the drawing board are shown in Fig. 3. The curves are fastened to the board by three tacks each, and the T-squares run upon the curves to form the lines of perspective.

When only the two curves are used in the 30-degree angle drawing, one of the vanishing points lies invariably upon the board, and you can use a tack for the short vanishing point, with a straight edge to sketch the lines from that point instead of the T-squares.

To determine the position of these curves upon the proximately, the distance that the curve should be set, making B O = 21".

If the curve at A is an 18-inch radius $40'' - 18'' = 22''$. For convenience, the plan is placed above the horizon line. If the curve A be placed 6 inches, say, from O, then B is $22'' - 6'' = 16''$ from point P. No curve is needed at the right, as the point X" comes only 23.09" from O, and will be on the board. The curves having been located, they are tacked to the board squarely in position.

The T-squares are used, as in Fig. 3, so that the chord of the circle plays freely upon the arc, making the edge of the T-squares always pointing toward the centers. These are the vanishing points, since a line perpendicular to a chord at its middle point runs through the center of that circle.

I claim nothing original in the curves, but in the formulas for locating them.

It doesn't take long for those who travel in Germany to become aware of the almost autocratic power vested in the police of that country. A curious illustration of this has just been reported. The German courts, it appears, have recently decided that if the Berlin police should consider any color scheme of a house to be improper, or too gaudy, they can order the painter to change it. Fancy the New York or Chicago police acting as arbiters of taste in house decoration!

ARCHITECTS' CHARGES FOR ABANDONED WORK.

JUST what should be the charge by architects for work not carried out is a question which has been attracting some attention in England recently, and the results of a case cited by one of the London architectural papers may not be without interest to readers in this country. The statement is made that an architect brought "an action to recover his fees for professional services rendered to a client for work done in preparation of plans, elevations, sections and specifications, and obtaining a tender for building a villa. The defendant considered the tender, £5660, too high, and the building was not proceeded with. The plaintiff claimed 3 per cent. on the amount of the tender, in accordance with Rule 7 of the Institute schedule, which gives 2½ per cent. upon the estimated cost for the general plans and specifications, and for procuring tenders ½ per cent. in addition. The defendant said there was a verbal agreement between him and the plaintiff that if he decided not to build he (the plaintiff) would charge only for the time occupied in preparing plans and obtaining the tender. Evidence was given by a vice-president of the Institute in support of the plaintiff's claim, and two other architects gave evidence for the defendant to the effect that the Institute scale was not universally adopted in the profession, and that for the work done £75 paid into court was a reasonable sum.

"Justice Kennedy held that there was no such verbal agreement as was alleged and that plaintiff was entitled to a reasonable remuneration; that the rule of the Institute as to charges, not being a universal custom, was not binding in law and could not be accepted as an implied term of every contract; though it was right to take into consideration the profession, as shown by the rules of the Institute. His lordship thought the plaintiff was entitled to 2½ per cent. of the estimated cost of the building, and as the plaintiff admitted that the tender was rather high, the percentage was based on £5000, and the ½ per cent. for obtaining tenders was deducted and judgment was given for this amount."

In commenting upon this decision the *Building News* says: Under the circumstances the decision was a fair one, and ought to be a reminder to that large class of employers who think they have a right to assess the architect's remuneration, and to make all kinds of charges as to the incompleteness or defectiveness of the plans as a ground for a substantial set off. We have known all kinds of trivial objections, as: the plans were extravagant and beyond the cost originally contemplated; the architect had not followed the client's instructions; the plans were unsuitable or imperfect; or the client had changed his mind. Sometimes the fickle minded employer sees a built house he likes better which would be cheaper to buy than to erect a new one; or the site cannot be obtained and a new one has to be sought for, which necessitates revised plans. The market price of materials often goes up and the cost is thereby greatly increased when the tenders are invited.

These are all familiar incidents—any of them may postpone indefinitely the actual execution of the building or have the effect of changing the intention of the owner. All the same, the architect has done his work; his thought has been bestowed on the plan and external design, specifications have been written out and quantities prepared. The architect's work is practically over; all that remains is careful superintendence, which a clerk of work can do almost as well. But as the owner has not his building in the concrete—only a representation on paper—he hesitates to pay the architect for his labor, which he looks upon as merely preparatory. He does not consider that the same design cannot again be turned to account; it is useless for another building and therefore it ought to be paid for. The percentage allowed by custom for this larger half of the architect's labor is ridiculously small on buildings costing less than £5000. For designs not carried out there ought to be an agreed commission, in addition to any special services rendered for works of exceptional difficulty and requiring skillful planning and design. The defense set up in this case—that there was a verbal understanding that only a charge for the time occupied in preparing should be paid—was a poor evasion of the liability to payment for the architect's thought and skill.

The Future of Oak.

In speaking on the subject indicated by the above title a Chicago architect, who had been commissioned to purchase through a retail establishment the furniture for a house he had in course of erection which was finished throughout in oak, said that the time was coming when this material would be more in demand than at the present time—when it would be more highly esteemed than mahogany. The difficulty he said he had encountered in the selections he had been seeking to make was to find goods high grade in design in quarter sawed white oak. Continuing, he said: "Now oak is a dignified and democratic wood. In plain, stately designs it has more character than anything with which I am familiar. The mahogany, which is being so largely used in the best furniture I have seen here, is like silks and satins. If we wore silk and satin all the time we would get very tired of them in a short time and that is what will happen to mahogany some time. In chamber furniture, with plain, unornamented surfaces, I found little or nothing. Outside of a few designs the market offers absolutely nothing. I am told that there is little demand for the severe and classic goods made in oak, and that is probably the explanation why the goods are not being made in that wood in the most costly grades. But the time will come when this will not be the case. I have finished a number of houses in oak and furnished them throughout in that wood and secured some exceedingly satisfactory results. But it has been at the cost sometimes of special designs and specially made furniture, because the market has not afforded the plain, unornamented things which are made in mahogany and oak."

THE ART OF WOOD TURNING.—IX.

(SECOND SERIES.)

BY FRED. T. HODGSON.

IN describing the methods employed in forming spirals and twists on the lathe, it must be understood that it is not claimed that work executed by these methods can compete from a commercial point of view with any of the various machines specially made for turning out spiral or twist moldings in wood. For small work, however, and works of art in bone, ivory, ebony and the harder woods, much finer and better work, and work stamped with the individuality of the operator, can be turned out on the lathe with suitable appliances than can be turned out on the special machines, but, of course, at much greater cost. Turning in any of its departments is a beautiful art, and it is no wonder that the lathe is a universal favorite with amateurs possessing a mechanical turn of mind, and it is astonishing how many useful and artistic articles the ingenious workman who owns a lathe can turn out to beautify his own and the homes of his friends. Besides the methods given for turning spiral work, there are many others, and these papers would be far from complete if some of the better ones were not described in them.

A Mr. Wilcox, who was a noted amateur on lathe work, invented a rather curious apparatus for cutting spirals in the lathe, and, as the attachment is very simple, it may not be out of place to give it here, with description, as I find it published in "The Lathe and Its Uses." The work is here done by a leading screw or spiral and toothed gearing, the principle being that of the ordinary machine lathe. The attachment is shown in Fig. 68, and the following is the description as given in Mr. Wilcox's manuscript:

"The chuck shown at A, with cog wheel attached, holds the work as usual, the back center being also required. The cog wheel gears with one of less diameter attached to the end of the guide screw B. On the latter works the rest C, in which is a nut of the same thread as that on the guide screw, and which holds the tool in a notch or hollow upon its upper part. The tool is then used by hand, but is guided in its course along the surface of the work to be turned. This guide screw, with the rest and cog wheel, is mounted on a board as a separate piece of apparatus, and is, when used, clamped on the lathe bed. As the rest is after all little else than a large nut, it must be prevented from turning round, and must be arranged to bear the pressure of the tool, relieving the long screw from the strain that would be

worked by hand, or to the self acting screw cutting lathes, and is specially adapted for cutting spirals or other patterns in wood.

In the tool shown in Fig. 69, A represents a shank which may be made to fit any shape or pattern of tool holder. This shank is turned up and becomes a cylinder at B, like that of the ordinary revolving cutter. This part is bored and fitted with a steel spindle, which should be of strength proportionate to the size of stuff likely to be operated on. One end of the spindle is fitted with a brass pulley, from which a cord is to be attached to the overhead drum, the other end terminating in a round or hexagonal boss, D, round the margin of which are held securely bridles shown at F, or other similar contrivance, a pair or more of sharp gouges. This apparatus is put in the tool holder of the slide rest to the angle that corresponds with the rake of the screw or twist, and put in rapid revolution by means of the overhead apparatus. The whole rest, or merely the upper part, is then put in motion by one of the before named means, and the tool advanced to make the cut. However slow the movement of the work may be, the cutters will move with such velocity as to make clean and beautiful work. This may be applied to the slide rest described

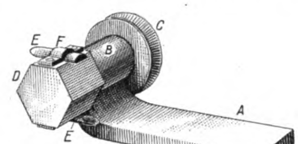


Fig. 69.—View of Cutting Tool.

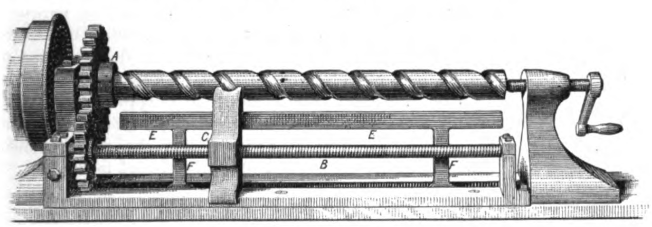


Fig. 68.—Attachment for Cutting Spirals in the Lathe.

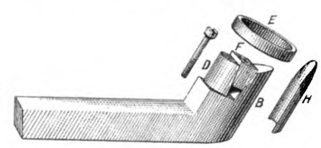


Fig. 70.—An Improved Tool Holder.

The Art of Wood Turning.

thus caused. This is effected by a long flat bar, like the rest of a chair maker's lathe, extending the full length of the bed, shown here at E, and supported by standards F F. A projecting part of the rest bears upon this, and slides along it with the tool. The work is begun with the rest on the right hand, and some care is necessary as it nears the cog wheel on the left, when the work must be stopped and the whole run back by hand to the starting place. This is one chief defect in this apparatus, for the rest very quickly traverses the length of the screw, and considerable delay is caused by having thus constantly to stop the lathe and reverse the motion. The closest attention is also necessary to prevent the rest from overrunning its mark and striking the cog wheel. It is evident that by using different pitches of cog wheels many screws of varied threads can be cut by aid of the foregoing attachment."

This arrangement is rather a simple affair, but the writer of the manuscript has overlooked one other important defect in his invention—namely, the difficulty of obtaining the requisite speed, a defect often found in contrivances of this sort for wood turning. If the work is put in rapid motion, without which wood will not be cut clean, the movement of the rest will be so rapid also, from the effect of the multiplying wheel, that the tool will be carried from end to end of the work in a few seconds. A modification of this and similar apparatus will be given here, which will allow the tool to traverse lengthwise slowly, but gives it immense rapidity in the necessary direction. The following is applicable to the lathe under consideration, to the ordinary slide rest

by Mr. Wilcox, or any similar contrivance. The overhead drum must be sufficiently long to admit of the driving cord to traverse the whole length of the stuff being operated on, and to keep the cord on the angle required by the inclination of the brass pulley. The gouges or other cutters used must not be placed radially, but tangientally to the circumference of the boss on which they are fixed.

An improvement upon the simple bridle to hold the cutters would be the substitution of Babbage's tool holder, four radial arms being substituted for the metal boss. This tool is fully described in "Holtzapffel's Mechanical Manipulation," from which work the following description is taken:

"This consists of a shank turned up at the end, as in Fig. 70, the outside, at B, being rounded to fit hollow gouges, such as shown at H; against this the hollow of the gouge is laid and opposite to it is placed a small piece. A band or hoop, E, is now placed over both the above, and between the two a wedge shaped piece, F, which is intended to bring the strain upon the hoop and tighten it round the gouge. This last piece is attached to the shank or holder by a screw passing through it into the shank. The tighter this screw is worked the lower the central wedge F is drawn down, and the tighter the hoop is made to embrace the tool. This holder is also modified to suit flat chisels. The tool cannot possibly slip, but can be released in a few seconds if desired." Such a termination of two, three or four arms revolving on a spindle in place of the boss would form the best possible cutter for shaping lathes.

CORRESPONDENCE.

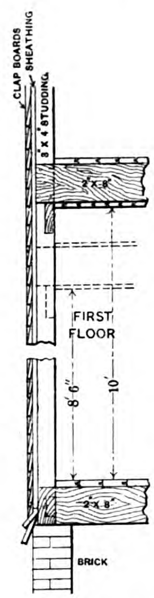
Miter for Rake and Level Frieze.

From E. H. A., *Pulaski, N. Y.*—Will some of the readers of *Carpentry and Building* inform me if a square miter will make a perfect joint on a frieze at the corner of a building where the eaves and rake come together. Some carpenters claim it will and others claim it will not. Please state what would be the proper cut to use. I should like very much to have the opinion of F. E. Kidder, the consulting architect, upon the subject.

Note.—Basing an opinion simply upon the statement of the case as given by our correspondent, we should say that a square miter will not give him what he desires, but that a raking miter is necessary. We shall be glad to have our readers tell how they would proceed in doing the work.

Remodeling a Frame Cottage.

From E. T. H., *Brooklyn, N. Y.*—I have a problem which I would like to have solved in the most practical manner, as I feel that it is one in which other readers



Remodeling a Frame Cottage.—Scale, ⅜ Inch to the Foot.

besides myself may be interested. I have a one and one-half story frame unfinished cottage, the hight of the lower floor being 10 feet. By reducing this hight to 8 feet 6 inches it gives me an opportunity for a full size story about 8 feet high on the second floor. The dimensions of the part which I wish to lower are 15 x 28 feet. Good flooring is now laid and the ceiling is finished with ⅜-inch ceiling boards; otherwise the house is unfinished and open on both floors, there being no studding or partitions.

I want to lower the first floor bodily without disturbing the flooring or ceiling. I expect, of course, to take up enough flooring on the sides to cut away the old plate and break away the nails securing each beam to the outside studding. I purpose, in the first place, to cut in the outside studding and set a new tie at the proper level, then draw or cut away the nails securing the second story floor beams to the outside studding. Before disturbing these beams, however, I purpose to secure temporarily a few new timbers above the present floor, in order to avoid any danger of buckling. Now I am ready to cut the old plate or tie between each beam, and before doing so expect to support the floor on studding from below. When this tie is cut and the old nails are all out, or loosened, I can gradually lower the floor bodily to its new position.

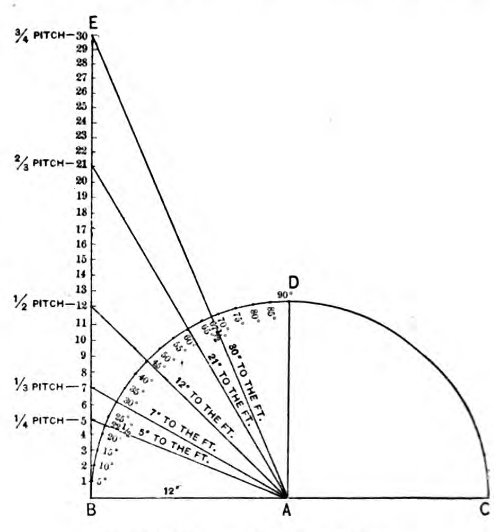
I should like to get a point from the practical readers on lowering this floor without the aid of screws, as there are none available, and also the best method of breaking away the old nails securing the beams, whether by punching the heads through the 2 x 8 beams or straining the fastening sufficiently to get in a wedge and draw them out. I would also like to know the most practical way to take up the flooring and ceiling, reset the beams in their new position, and then reset the flooring and ceiling, instead of taking chances in lowering them as above described. I send a sketch representing a section through the main wall, which will give an idea of the framing.

Proportioning Gambrel Roofs.

From F. F., *East Bloomfield, N. Y.*—In the July issue of the paper, "G. H.," of Baltimore, Md., asks for a rule of proportion for a gambrel roof. In reply I would say that the regular rule is half of an octagon, or half of a circle, the end of the rafter and the ridge striking the circle. This, however, makes the upper part rather flat, both as regards appearances and its effect on the durability of the roof, so I raise the upper part to what in this section is known as one-quarter pitch, or 26½ degrees, this making a much better roof. The pitch, however, can be slightly changed in either section and still have a good looking roof, if one is careful to keep both upper and lower rafters the same length. A gambrel roof is the best kind of a barn if built right, but there are more mistakes made in the shape of the roof and in the manner of construction than in any other style of barn built. I have been a reader of *Carpentry and Building* for 18 years and have learned many things from the Correspondence Department. I shall be glad to hear from others on the subject of gambrel roof barns.

Finding Pitch of Roof from a Circle.

From E. L. M., *Greenville, Iowa.*—It is possible that some of the readers of the paper may be interested in knowing how to obtain the pitch of a roof from a circle,



Finding Pitch of Roof from a Circle.

and I therefore inclose a sketch showing my method. I also send a short table to correspond with the drawing. Referring to the diagram, first draw a horizontal line, as B C; then describe a half circle, using A as a center and A B or A C as a radius. Draw a line from A to D. Now erect a perpendicular from B to E, dividing it into 30 spaces, each of which will represent an inch. Divide the quarter circle B D into 90 degrees, and space off 22½ degrees, 30 degrees, 45 degrees, 60 degrees and 67½ degrees. Draw lines from the center point A through the five points on the circle, extending them until they meet the line B E. The pitches will then be one-quarter, one-third, one-half, two-thirds and three-quarters, or any fraction of pitch desired.

The table which I present gives the pitch, the number of degrees of inclination, the rise and the length of the slant:

No. inches rise to the foot run.	Fraction of pitch.	No. of degrees slant.	Length of slant to the foot run.
5	¼	22½°	1.08
7	1-3	30°	1.16
12	½	45°	1.42
21	2-3	60°	2.06
30	¾	67½°	2.68

Making an Ice Chest or Box.

From A. F. L., *Batavia, N. Y.*—A plan for an ice box has been called for by "W. D." of Barroteran, Mexico, and in reply I would say that I invented an ice box several years ago which those who used them claimed that they gave very satisfactory results. The box is made of material inside and out. The tray for holding the ice should be made so that it will fit inside of the box and have a spout at one end to project through the side, in order to carry off the drip from the ice. Fig. 4 shows the general appearance of the ice tray, while Fig. 5 gives an idea of the appearance of the box complete. Make the tray of galvanized iron about 1 inch deep. The materials for the box cost in this locality about $2.50 and the work can be done by any mechanic. I trust that these hints may be of some value to the correspondent in Mexico, and possibly to other readers of the paper.

Laying Gravel Roofs.

From C. A. H., *Nebraska.*—In the article on gravel roofs in the August issue, page 222, the correspondent "F. G. B." does not make it quite clear of what his roof composition consists. Does he use roofing pitch or rosin and coal tar boiled together? If he uses the latter, how long must it be boiled to be just right? I am under the impression that there is a roofing pitch on the market which needs only to be heated to be ready to be used on gravel roofs without adding anything to it. If there is I should like to know where I can obtain it in the Western markets. I was very much interested in "F. G. B.s" article and should be pleased to have him or some other reader of the paper impart the desired information. What is the weight of 1-5 cubic yard of gravel?

Note.—We trust "F. G. B" will adopt the suggestion above and express his views on the points indicated.

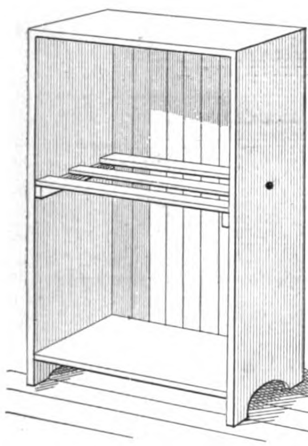


Fig. 1.—View of Interior of Box.

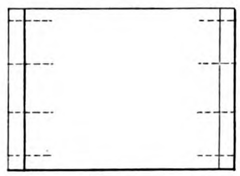


Fig. 3. — Elevation of Door with Dotted Lines Showing Cleats.

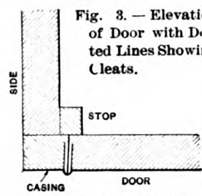


Fig. 2.—Section Showing Corner Construction.

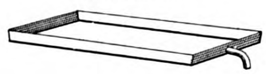


Fig 4.—Ice Tray with Spout.

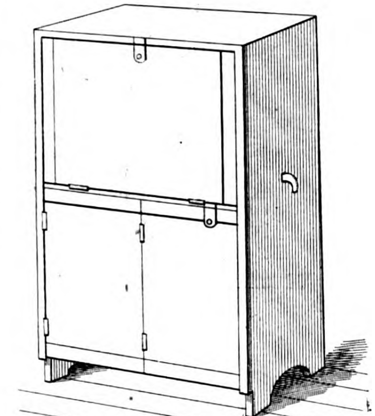


Fig. 5.—View of Completed Ice Box.

Making an Ice Chest or Box.

pine, white wood, or any similar lumber, the sides, top and bottom being of ⅞-inch stuff and the back of ½-inch matched. The boxes I made were for use in small families, but they may be made of any size required. Make the box 35 inches high by 25 inches wide and 16 inches deep, as indicted in Fig. 1 of the sketches. Let the sides run below the lower shelf a few inches, and 16 inches from the top nail three pieces across the box inside to support the tray which holds the ice.

Now, with regard to the front, place a casing on the top and sides of the ⅞-inch stuff, the casing being 1 inch on the face and 1⅛ inches next to the box, which leaves a good bevel for the doors, as shown in the sectional view, Fig. 2. Put a casing across the middle of the box on a line with the cleats which hold the ice tray. Then put a stop back of the casing for the doors to strike against. Make the doors of ⅞-inch stuff with cleats on the ends, as indicated in Fig. 3. Hang the upper door to the center piece, so it may be dropped down when the ice is put in. Fit the lower space with two doors, hanging one door to the casing and the other to the first door, as indicated in Fig. 5. Cover the outside of the box with several thicknesses of newspaper, tacking on smooth; then cover this with oilcloth tacked on tight and smooth, so as to make as neat an appearance as possible.

The doors need not be covered. Give the inside of the box two coats of shellac mixed with ocher, of any color to suit; also give the doors two coats of the same

From E. B. L., *Newton, Mass.*—The subject of gravel roofs seems to be in order just now, and it may not be out of place to offer a few comments based on my own experience. I would say that a gravel roof is a serviceable roof when it is put on right. I have known five-ply gravel roofs to last 25 years before needing repairs. They are actually cheaper than tin roofs when the extra lumber for framing and the labor are considered. I would say that under certain conditions they are cheaper and better than tin and I give these instances. In cities where the roof is used for a clothes drying yard for hanging out the wash a gravel roof is put on and then floored over. The chief thing that wears out a gravel roof is the sun. If it is in a shaded place it will last twice as long as a roof in a sunny place. If a tin roof was used under similar conditions with a floor over it, arranged so that it could be painted, with the dirt sifting through the floor and the dampness, it would not last over five years, even if it was the best tin made; but they are the ideal conditions for a gravel roof. On a boiler, dye house or where there is dampness, steam or much walking on the roof a gravel roof beats a tin roof hands down, and the framing would have to be just as strong for one roof as the other. In Massachusetts a roof would have to be built strong enough to carry a foot of snow, so I think there would be no extra expense on account of any difference in weight. The building laws specify the size of timber that must be used in the roof, and I have never seen heavier timber used than they call for. In the suburbs on dwelling houses, piazza roofs and many other places a tin roof is preferable, so I think that tin and gravel roofs do not come into competition with each other very often, and when they do the gravel roof wins in this climate on cheapness, durability and for standing hard use.

Hanging an Outside Door.

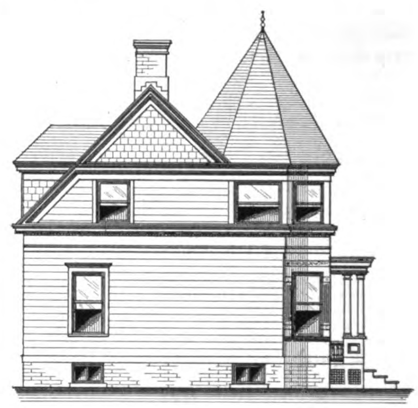
From E. D. G., *Buckland, Mass.*—I am a reader of *Carpentry and Building*, and would like to submit a question for the consideration of my brother chips. I want to know which side of an outside door should face out, the door having one pane of glass in the upper part and three horizontal panels in the lower part. On one side the molding is flush and on the other it is raised. The glass is put in from the flush side. Many of the carpenters here disagree as to which side should face outward, and as I am a young carpenter, I desire to know the correct way.

Answer.—The question raised by our correspondent is one concerning which there exists a considerable diversity of opinion, as it resolves itself largely into a matter of taste. As a usual thing a glazed door is hung putty side out, but it is possible to conceive of conditions which would readily change this plan. If the raised molding corresponds with the other doors in the hall or room, then it would seem that the outer door should be hung with the raised molding on the inside. If, however, there is nothing of this kind to serve as a guide, and our correspondent desires to make the exterior as attractive as possible, we would suggest hanging the door with the raised molding out. As intimated at the outset, however, it is largely a matter of taste, and we shall be glad to have the practical readers express their views on the subject.

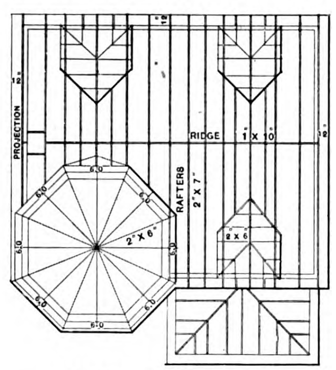
Suggestions for Roof Plan for "Builder."

From JOHN F. LAPE, *Rensselaer, N. Y.*—On page 194 of the July issue of *Carpentry and Building* a correspondent signing himself "Builder" asks for the outline of a roof to correspond with the plan of cottage which he gives. I send for his information front and side elevations, with roof plan, and a vertical section through the roof, which I trust will prove of interest. The elevations show how the house would look when worked out in accordance with the style of roof suggested.

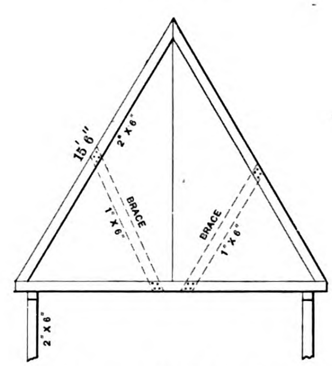
Front Elevation.



Side Elevation.



Roof Plan, Showing Framing.



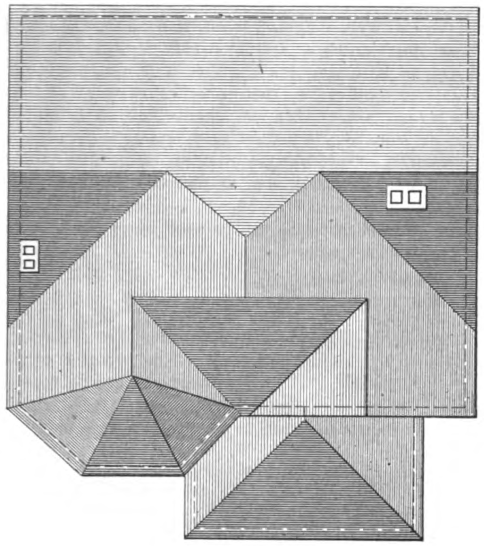
Vertical Cross Section through Roof.

Suggestions for Roof Plan for "Builder."—Contributed by John F. Lape.

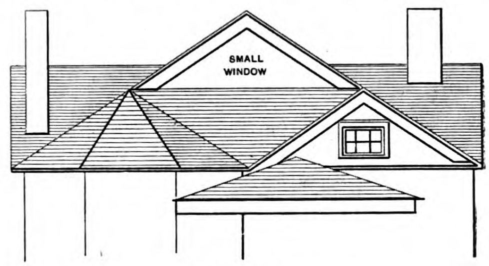
From C. P. F., *Waterloo, Iowa.*—In the July issue of *Carpentry and Building* I noticed a request for a design of a roof suitable for a cottage, the communication being presented by "Builder" of Grafton, W. Va. As being of interest in this connection, I send plans and elevations of a design for a roof worked out in accordance with the information furnished by "Builder," and which will allow two rooms of suitable size, in addition to a hall and several closets. I offer these as a suggestion to "Builder," and think that if he will construct his roof something after the manner indicated he will be able to obtain a satisfactory arrangement for his attic. The pitch of the front gable is 60 degrees, or 24 inches per horizontal foot. The end gable, or the one running lengthwise of the building, has a pitch of 45 degrees, or 12 inches per horizontal foot, thus making the ridges of the two gables the same hight and causing them to intersect.

The ceiling of the rooms in the attic inside the light dotted lines have a hight of 8 feet. From the light dotted lines the ceiling slopes down to the walls, meeting those which run lengthwise of the building at a hight of 6 feet, while in the front gable the ceiling slopes down, meeting the wall at a hight of 5 feet. The ceiling of the dormer window has a hight of 6 feet, but can be made greater by sloping part of the sides, as in the case of the rooms. The roof plan is shown by the light continuous lines. The center lines of the three light parallel ones indicate the centers of the ridges.

From H. A. L., *Minneapolis, Minn.*—I send herewith sketches showing roof for one-story cottage in reply to the inquiry of "Builder," Grafton, Va., in the July issue of *Carpentry and Building*. I have figured that the studding would be 12 feet and the first floor not more than 9 feet in the clear, the windows being 2 feet from the floor and about 6 feet high. Unless the proportion is about as I have stated, the porch roof will not go under the eaves of the main building. Much more light and room could be obtained in the attic by putting the gable the whole width of the building, at the rear—that is, extending the ridge of the main roof to the back of the house, instead of hipping it as I have shown.



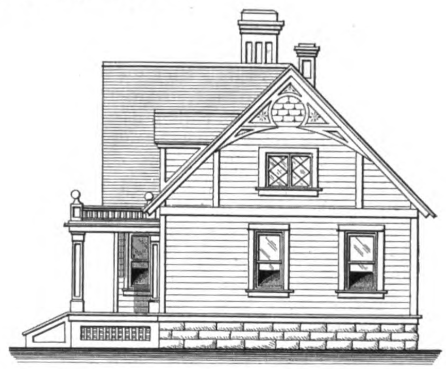
Plan of Roof.



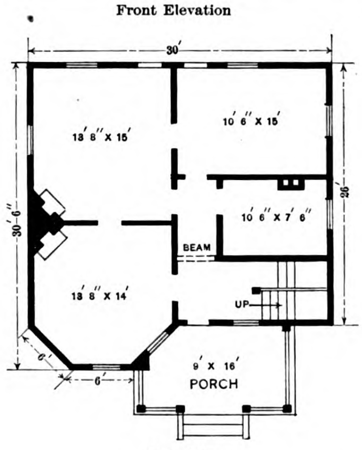
Side Elevation.

Contributed by "H. A L.," Minneapolis, Minn.

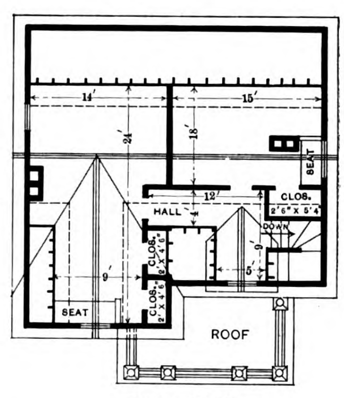
Front Elevation



Side (Right) Elevation.



Main Floor.



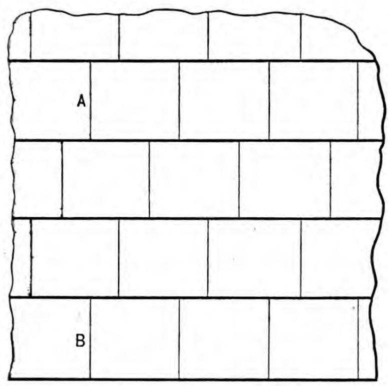
Roof and Attic.

Scale, 1-16 Inch to the Foot.

Suggestions for Roof Plan for "Builder."—Submitted by "E. P. F.," Waterloo, Iowa.

The Best Width for Shingles.

From A. O. C., *Lake Charles, La.*—I have noticed in the last few numbers of *Carpentry and Building* several articles dealing with the best widths for shingles. I think that it is generally conceded by all good mechanics that



The Best Width for Shingles.

narrow shingles make a better roof than wide. Wide shingles, however, make the prettiest and smoothest roof, provided they are laid so as to break joints on thirds—that is, let the shingle lap over one-third of its width on the one below. By laying them in this way we break joints for three courses, as indicated in the sketch which I inclose, and if a shingle should split directly under a joint there is no chance of a leak. In laying wide shingles they should be nailed as near the edge as possible, not over ¾ of an inch from the edge, and two nails to a shingle. The advantage in nailing near the edge is that when the shingle shrinks it will split at the nail, where there is the least resistance, and not somewhere in the middle, as it would if the nails were an inch or two back. By referring to the sketch it will be seen that the joint at A does not come directly over another until it strikes B three courses below, which, in my opinion, is a good feature.

Figures on Steel Square Giving Cut of Planceer and Fascia on Octagon Roof.

From G. L. S., *Champaign, Ill.*—In reply to the inquiry of "A. O. C." of Lake Charles, La., I submit the following, which I trust may prove of interest. Referring to the drawings, let *a b c d e f g h* represent the plan of the roof under consideration, and A B C D E F its elevation. By placing the square, as indicated in the elevation, a right angled triangle is formed, two sides of which are made by the square, and the other by the true profile of the common rafter. It will also be seen that the true angle shown by A C D when formed is the angle required to bevel the sheathing board, or planceer, across its face, and also to bevel the fascia across its edge. It remains therefore to find the numbers or figures which correspond to the sides of the square. First, it will be seen that the side D A equals the length of the common or principal rafter, while the side D C equals the distance from the corner of the building to the center of the seat of that rafter.

$$\text{Rafter} = \sqrt{\text{run}^2 + \text{rise}^2} = \sqrt{12^2 + 16^2} = 20 \text{ feet.}$$

The side C D equals one-half the side of the octagon. From the point *j* on the plan, erect the perpendicular *j i*, and from *k* erect *i k l*, then $\sqrt{12^2 + 12^2} = 17$, approximately the distance from *i* to *l*. Then 17 — 12 is the distance from *i* to *k*, which equals 5, the distance from *k* to *l*, or from *k* to *d*, which is one-half the side of the octagon required.

To lay out the bevel across the face of the planceer or sheathing board in this problem we therefore use 5 and 20, marking on the 5 side. Now, by reference to the diagram and section it will be seen that by producing or extending the face of the fascia board, another roof is formed, with base or span the same as before, but with a different rise. If we now figure the rise of this new roof and place the square as shown at B D G on the elevation, the problem becomes similar to the preceding one.

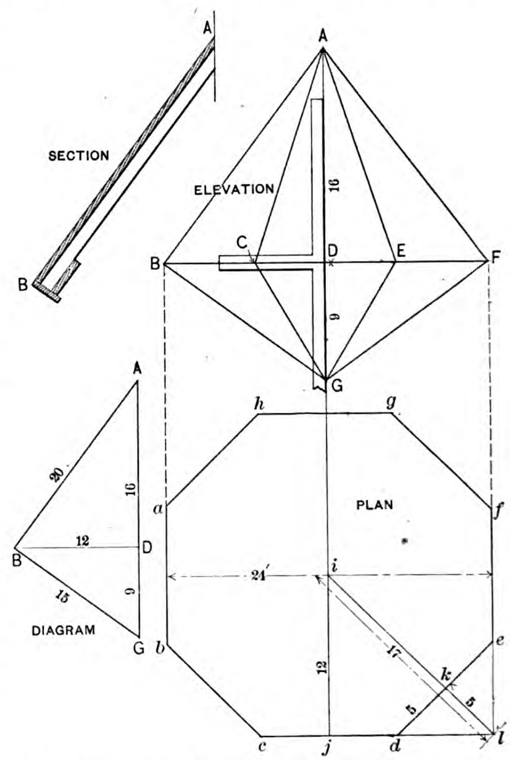
Referring to the diagram, it will be seen that the angle B A D plus the angle A B D equals a right angle. It will also be seen that the angle G B D, plus the angle A B D, is a right angle; therefore B A D equals G B D.

To lay off B A D with the square requires 12 and 16 on the 16 side, and to lay off G B D would require the same figures. Therefore the pitch of the imaginary roof below is 16 run and 12 rise, or just the opposite of the roof above.

Now similar triangles are to each other as their respective parts, therefore

$$\begin{matrix}\text{Run} & \text{Rise} & \text{Run} & \text{Rise}\\ 16 : & 12 :: & 12 : & x\end{matrix} = \frac{12 \times 12}{16} = 9,$$

the hight of the imaginary roof below. With 12 as run and 9 as rise, the principal or common rafter equals $\sqrt{12^2 + 9^2} = 15$ feet. Therefore the bevel of the face of the fascia board is made by taking 5 and 15 on the sides of the square and marking by 5. These figures will also



Diagrams Accompanying Letter from "G. L. S" of Champaign, Ill.

give the cut across the edge of the planceer or sheathing board of the opposite roof.

In the above problem I have assumed that the fascia sets at right angles to the main rafters and not plumb with the building.

PLANS for the construction of a Palace of Industries, to be erected in Lake Front Park, Chicago, have been adopted by the directors of the Commercial Association of that city. A great exposition building, to cost $2,000,000 and designed to accommodate 20,000 persons, is projected, the money for the enterprise to be raised by the sale of 50-year 5 per cent. bonds. It is expected that the earnings during the 50 years will be sufficient to retire the bonds and leave the property free of indebtedness. At the close of the 50-year period it is intended to turn the establishment over to the city.

COLONIAL RESIDENCE OF MR. J. B. MILLS, ON SANFORD AVENUE, PLAINFIELD, N. J.

J. A. OAKLEY & SON, ARCHITECTS,

SUPPLEMENT CARPENTRY AND BUILDING, SEPTEMBER, 1900.

PRISMATIC LIGHTING OF DARK INTERIORS.

AT a recent meeting of the Franklin Institute a paper was read by Dr. William H. Greene, which dealt with prismatic lighting of dark interiors. As being of interest to many of our readers we present it herewith:

The practical application of the refractive property of the lens of prism to change the direction of light rays passing through it, for the purpose of artificial illumination, originated with the French physicist, Fresnel, who first suggested its use in light houses for the protection of maritime coasts, about the year 1815; and the Fresnel lens in various modifications is to-day solely used for this purpose.

The Fresnel lens is designed for projecting a powerful beam of parallel light upon objects to be illuminated at a distance. The principal of this device is seen in Fig. 1, which shows a central plano convex lens surrounded by a series of rings or segments of lenses or prisms, to which successively diminishing curvatures or angles are given in order to give them a common focus.

Within the past four or five years the application of this principle has been made, and with decided success, to the illumination of dark interior spaces, where the amount of light naturally entering therein is insufficient for satisfactory illumination, and artificial lighting must occasionally or constantly be resorted to.

The requirements of public buildings and modern office buildings, in this respect, have been most urgent, and the various devices known generally by the name of "prismatic lights" have been extensively used for the purpose and have proved so useful that in one or another form they have come to be regarded by architects and builders, not to speak of a great number of householders, as indispensable.

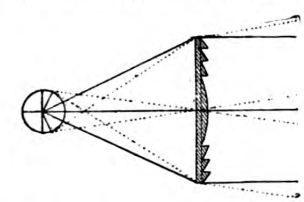


Fig. 1.—Showing Principle of the Fresnel Lens.

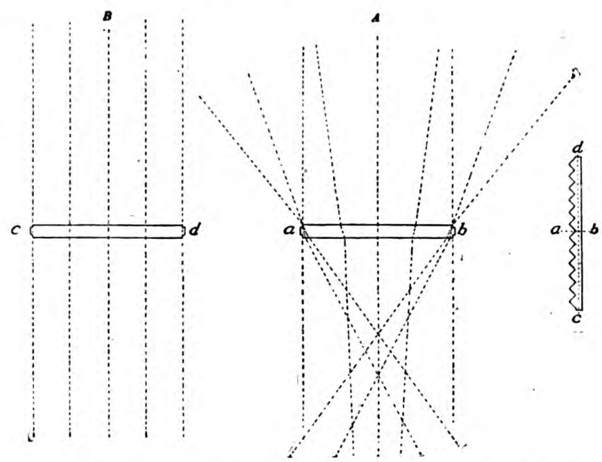


Fig 2.—Plan and Elevation, Showing Action of a Section of Prism Glass

Prismatic Lighting of Dark Interiors.

It is the purpose of this communication to give a brief review of the art of prismatic lighting, which, at the present time, is passing through the active stages of the course of evolution, to which all the arts are subject, in determining the survival of the fittest.

Omitting, for the present, consideration of the vault light for basements and cellars, where but one form of prism—namely, an approximately right angled prism depending on total reflection for its utility—is admissible, there are two general methods in vogue of installing prismatic lights to meet the requirements of service.

In one of these, the sheet of prismatic glass is placed in a window frame in the vertical position, thus taking the place of the window light. In the other, the sheet of prismatic glass is installed in a more or less inclined position, projecting outward from the window opening. This form of construction is known in the trade as a "canopy."

The question as to which of these two forms on installation will give the best results is determined by the extent of the sky opening upon which dependence must be placed for light.

Where this is of considerable area, as for example where the windows face a wide street, the prismatic glass set into the window frames in the vertical position will give satisfactory results.

Where the windows receive their light from a restricted area, as for example, in courtyards or the side yards of dwelling houses and generally in the many situations where high walls rising in close proximity cut off the free access of light from above, the projecting, canopy form of prismatic glass is preferable.

Speaking in a general way, the change from the vertical to the canopy form of installation will be indicated when the incident angle of the light falling on the window opening averages 60 degrees from the horizontal plane.

The popularity achieved by the use of light projecting devices of this general nature has called into existence a great number of patented inventions, some claiming special forms of prism construction (in combination, in certain cases, with a prismatic or lenticular formation on the reverse side of the glass), and of a far greater number of design patents and methods of glazing and other matters of minor detail.

For the purpose of this communication, these minor devices may be left out of consideration, and the several generic forms of prism construction only will be given attention.

These may be divided into two general classes:

1. Those in which the glass forming the light projecting device consists of sheets having on one surface a series of prisms or segments of lenses of any desired angle, the back of the sheet being a plane surface, and

2. Those in which the glass forming the light projecting device consists of sheets having on both surfaces a series of prisms or lenses.

The prism glass most generally known and used is that of the first named class.

The action of a section of prism glass of this construction is shown in Fig. 2, in elevation and plan. It is obvious that the general refracting effect of the prismatic surface in this and in the other forms of prism glass will be substantially the same, whether the refractive surfaces of the structure be straight (*i. e.*, prismatic), or more or less curved (*i. e.*, lenticular), irrespective of the angles of the prism sections or of the curvature of the lens segments. It is important, however, that these angles (or curves) be carefully considered, since upon the correct appreciation of this element the light projecting efficiency of the structure largely depends. Improper angles (or curvatures) may greatly diminish the efficiency of the device, by the dispersion and loss of light, caused by total reflections in the interior of the glass.

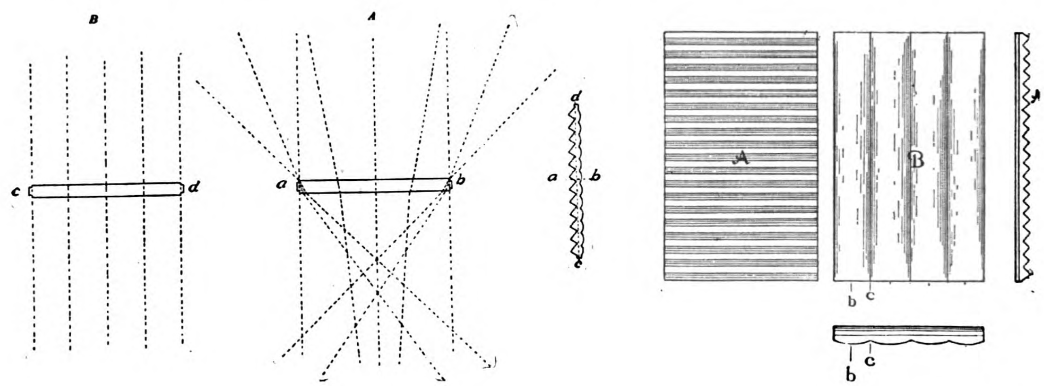
There is general misapprehension regarding the proper action of light projecting glass, which needs a word of reference. It is assumed by many that the prismatic light should be so constructed that all the exterior light transmitted from the interior boundary of the prismatic window, or canopy, should be directed in lines substantially parallel to the boundary walls, floor and ceiling of the apartment, and that the more nearly this condition is realized the closer will be the approach to the theoretically perfect mode of operation. Some of the manufacturers of prismatic glass endeavor to realize this condition by varying the angles of the prisms uniformly from the center to the edges of the sheets on the principle of the Fresnel lens.

A little consideration of what is intended to be realized by prism lighting of interiors will suffice to show that this view is an erroneous one and liable to result, in practice, in a much inferior interior illumination than can be otherwise obtained.

This criticism will be understood by stating the general proposition that the objects of prismatic lighting are, first, to direct as much extraneous light into the apartment as by the other method, its distribution is decidedly more advantageous, from the fact that the repeated reflections from the bounding surfaces of the apartment cause the practical obliteration of all shadows and a practically uniform diffusion of the light to all parts of the interior.

Returning now to the descriptive portion of the subject the *modus operandi* of the simplest form of a light projecting prismatic window is shown in the plan views in Fig. 2, A and B, in which the light from an exterior source falling upon the plane, outward surface of the glass is refracted at the boundary of the interior prismatic surfaces and projected into the room to be illuminated.

Fig. 2 A, which is a plan view of this construction taken on the line *a b*, exhibits the effect of the light distribution in vertical plane from the effect of refraction from the terminal portions of the prism, where the influence of the more oblique rays is not counteracted by a modification of the angles of the prism from the center line to the upper and lower edges of the glass. Fig. 2 B is a plan on line *c d*, showing that the light rays are not distributed divergently in the horizontal plane, but are all directed in parallel lines.



Figs. 3 and 4.—Showing Action of Prismatic Glass where Both Surfaces are Lenticular.

Prismatic Lighting of Dark Interiors.

terior as possible, and, second, to direct it in such manner as to derive the largest possible benefit therefrom.

In considering the relative merits of parallel and divergent light transmission by prismatic glass, it should be said that practically as much extraneous light can be directed into the interior space to be illuminated by the one as by the other arrangement of prisms or lenses. But when we come to consider the second portion of the proposition it can easily be shown that the system of transmitting the light in parallel lines cannot possibly be as effective as the method of divergent transmission, and, more especially, divergent transmission in both vertical and horizontal planes, and for the following reason:

It is well known that the best effects in interior illumination are realized when uniform diffusion throughout the apartment is obtained. This effect can be secured most effectively only when all shadows are obliterated by calling into requisition the action of the entering light reflected from all parts of the side walls, floor and ceiling of the apartment.

By the method of directing the transmitted light in parallel lines, the ill effects of shadows cast by opaque objects in the path of the entering light will be realized in the extremest degree, as there will be no ameliorating influence to counteract and neutralize the shadows by reflection from the bounding walls and floor of the apartment; and an inspection of the condition of an apartment thus treated will disclose this objection at once.

By the method of divergent transmission, while quite as much or more extraneous light is thrown into the

Figs. 3 and 4 represent the action of prismatic glass of the second class—*i. e.*, in which both surfaces are prismatic or lenticular.

Fig. 3 shows a form of light projecting glass that has lately come into use, and for which certain advantages are claimed over the construction previously described. The sheets in this form of prism glass have one surface furnished with prisms—commonly placed toward the room to be lighted—and the other surface formed of a series of lenses of small curvature, distributed in panel form, parallel to the direction of the prisms. This construction, as well as that shown in Fig. 2, manifestly exaggerates in the vertical plane the divergent distribution of the transmitted light, and consequently operates, so far as it goes, in the correct manner, utilizing the reflecting action of ceiling and floor in diffusing the light.

The construction shown in Fig. 3 possesses one obvious advantage over the several modifications of class 1—namely, that the lenticular form of exterior surface arrests and directs into the dark interior to be lighted a certain amount of the exterior light, which, with the plane exterior surface of class 1, would be lost by total reflection from the exterior plane surface. Practically all of this additional light thus projected into the dark interior would be gained if the angle of the prism and the curvature of the lens panels were correctly adapted to the length of the apartment to be lighted.

The latest modification of class 2 remains yet to be considered.

In this the interior prismatic surface of the glass is the same as that just described, but the exterior lenticular panels are arranged not parallel, but transversely, to the direction of the prisms. The details of this form of construction are shown in Fig. 4, A and B, while the *modus operandi* is best observed in Fig. 5, A and B.

The radical difference in the operation of this form of light projecting glass and that of both forms previously described resides in the fact that the light distribution in this form is exaggerated in the lateral as well as in the vertical plane. This feature is illustrated in Fig. 5 B, in which B is supposed to be a section of the prismatic glass taken on the line *c d*, from an inspection of which it will be manifest that the vertical arrangement of the exterior lenticular panels will serve a similar purpose in this construction in relation to the light falling sidewise on the exterior surface of the glass as the lenticular panels in the previous case serve in relation to vertical rays—namely, to arrest and refract into the dark interior a considerable amount of light in the horizontal plane which would otherwise be lost for useful purposes. All of the light thus collected and introduced into the dark interior by the lateral collecting action of this device is so much clear gain over the devices previously described.

Further consideration will show, also, that if the interior surface of the glass be provided with prisms of uniform angle, determined in each case by the length of the apartment to be illuminated, this form of construction will secure the same advantage in respect of the vertical diffusion of the entering light as will be obtained from the lenticular prismatic construction previously described.

On theoretical grounds, therefore, the last described modification of light projecting glass, belonging to class 2, should give the best results if intelligently installed. Comparative practical tests also bear out this conclusion.

An additional and important advantage possessed by prism glass of the last named construction (namely, a prism plate constructed with prisms on one side and prisms or lens panels arranged transversely on the reverse side) remains to be noticed.

Since all illumination by means of prism glass is thrown from a comparatively low point—namely, through windows—while all other artificial illumination is directed from a point above, the shadows produced by the prisms on objects in a room constitute a disadvantage common to most systems of lighting by means of prisms, as has been noticed in what has preceded. The light projecting glass last described, however, by reason of its diffusing quality, both in the horizontal and vertical planes, largely overcomes this objection. Where two such prism windows are used for the same apartment, the light thrown from one window completely overlaps that thrown from the other, thereby practically obliterating the shadows produced by prism lights of other constructions.

This construction also has the advantage of enabling manufacturers to produce more readily the larger sizes of prisms, from the fact that one surface has projections at right angles to projections on the reverse side, giving a bridge effect, thus adding to the strength of the plate. For this reason, likewise, it is not essential to have the thickness of the body of the glass as great as with other forms; and, inasmuch as there is a larger loss of light through absorption in passing through a thick than a thin medium, the loss of light from this cause may be very much reduced.

Finally, it may be said that all the various forms of light projecting prismatic glass accomplish, measurably, their intended purpose of considerably increasing the illumination of dark interiors over what would occur without artificial aid. In the selection of the kind of light projecting glass and the manner of its installation, the user should be guided by the personal observation of the effects produced, rather than by the claims of rival manufacturers.

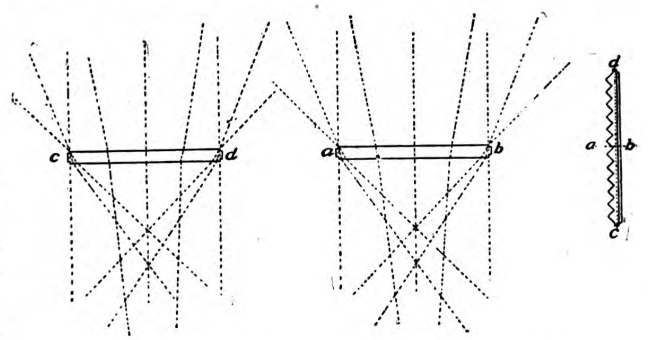


Fig. 5.—Showing Operation of Form of Construction Indicated in Fig. 4.

Prismatic Lighting of Dark Interiors.

An Indian Wood Turning Lathe.

That the lathe has come to us from ancient times, that it is, in fact, the earliest form of machine tool of which there is any record, is fairly well known; but it may be a matter of less common knowledge that even to-day, as found in use among the natives of India, it remains the same primitive apparatus that it was at the probable starting point of the art of turning. Holzapffel, in one of his interesting volumes on "Turning and Mechanical Manipulation," tells of this in the following account of the arrangement and manipulation of the Indian wood turning lathe in current use: When any portion of household furniture has to be turned, the wood turner is sent for. He comes with all his outfit, and establishes himself for the occasion at the very door of his employer. He commences by digging two holes in the ground at a distance suitable to the length of the work, and in these he fixes two short wooden posts, securing them as strongly as possible by ramming the earth and driving in wedges and stones around them. The lathe centers, scarcely more than round nails or spikes, are driven through the post at about 8 inches from the ground, and a wooden rod for the support of the tools is either nailed to the posts or tied to them by a piece of cocoanut rope. This rod, if long, is additionally supported by being tied to one or two vertical sticks driven into the ground. During most of his operations, the Indian workman is seated on the ground; hence the slight elevation of the centers of his lathe. The boy, who gives motion to the work, sits or kneels on the other side of it, holding the ends of the cord wrapped around it in his hands, pulling them alternately. The cutting thus is restricted to one-half of the motion—that of the work toward the tool. The tools themselves are almost confined to the chisel and gouge, and their handles are long enough to suit the distant position of the operator while he guides their cutting edges by his toes. He grasps the bar or tool rests with the smaller toes, and places the tool between the large toe and its neighbor, generally out of contact with the bar. It is interesting to note here that the Indian turner attains a high degree of prehensile power with his toes, and when seated at his work not only always uses them to guide the tool, but will select indifferently the hand or foot, whichever may happen to be the nearer, to pick up or replace any small tool or other object.

MODERN FACTORY CONSTRUCTION.

THE heavy framing which is required in connection with the erection of mills, factories, elevators and the like, together with the necessity of making the work fire resisting so far as may be possible, renders specially suggestive the illustrations presented herewith. They represent a most excellent type of the so-called "slow burning construction," the work being executed in strict compliance with the building inspection laws and the requirements of the Board of Underwriters. The result is a structure upon which the insurance premium is the minimum, this being accomplished not only by reason of the design and materials of construction, but also by the fact that the building is provided with the best appliances known for the prevention of fire and for meeting all danger of its spreading from floor to floor. In the designing of the building special attention was given to securing great strength, the entire structure being exceptionally heavy and al-

Next in importance was the matter of light, and in order to secure the maximum amount the piers were designed of great strength but as narrow as possible, the windows being 6 feet 8 inches wide and arranged so that the top of the upper sash is on a level with the ceiling. The upper two-thirds of each window in the basement and the lower two-thirds of each window in the upper parts of the building are glazed with prismatic glass, which further diffuses the light through the rooms and at the same time prevents the employees from having their attention attracted by passing objects.

The accompanying drawings show the principal details of construction. The foundations are of concrete, upon which rest cast iron shoes supporting the wooden posts, which are yellow pine varying from 10 x 10 inches in the upper story to 16 x 12 inches in the basement. The floor beams are of yellow pine 12 x 14, supported by cast iron bearing plates in the walls and by cast iron

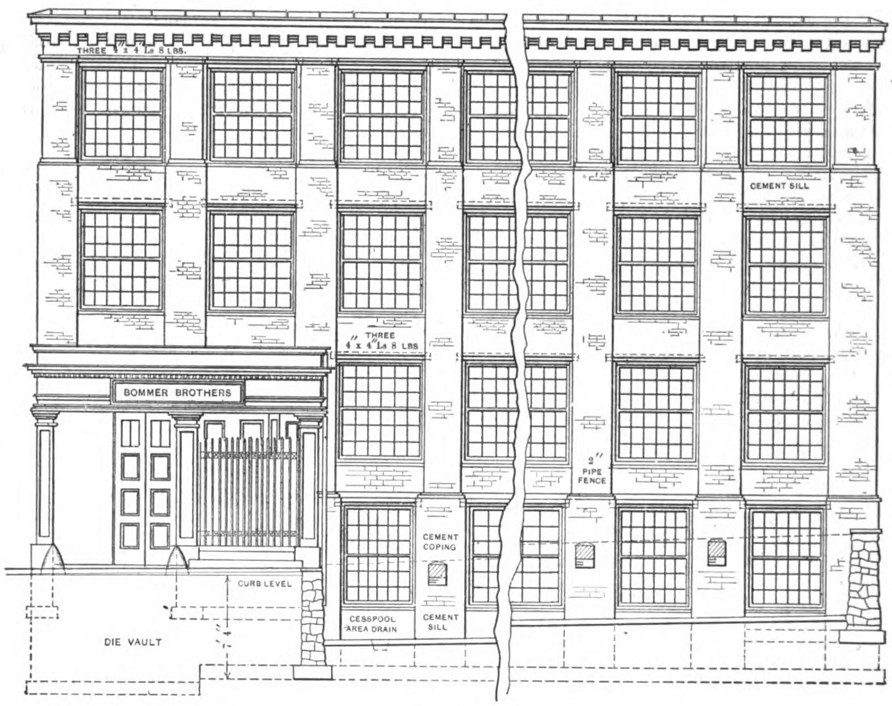


Fig. 1.—Front Elevation.

Modern Factory Construction

lowance being made in the plans for two additional stories which may be erected when needed.

The building was designed by William Bonner, assisted by J. G. Glover, to meet the special needs of Bommer Brothers of 257-271 Classon avenue, Brooklyn, N. Y., the well-known makers of spring hinges. Mr. Bonner also supervised the construction of the factory, which has recently been completed, his wide experience in the fire insurance building inspection departments and his training as engineer enabling him to so plan the work as to achieve the results mentioned.

The north wall, to the left in Figs. 1, 2 and 3, is provided with bearing plates ready to receive girders for the contemplated extension of 60 x 100 feet on that side. The elevator, storehouse and washrooms are placed in their present location along this wall in order that they may be central for both sections of the factory. In the same manner the power transmission, or boiler and engine rooms, are also laid out so that they will be as near as possible central to the two sections.

caps at the posts, as shown by Figs. 6 and 7. The floor consists of 4 x 6 yellow pine, with a diagonal covering of maple 1⅛ inches thick, as indicated in Fig. 3, interlined with water proof building paper.

The power equipment consists of two boilers of 80 horse-power each, designed to carry 125 pounds, located in a separate fire proof building to the east of the main structure, as shown in Figs. 8 and 9. The steam pressure is automatically controlled by a system of forced draft regulation which permits the burning of soft coal without smoke. For this purpose a 24-inch tunnel connected with the blower, which is located in the engine room, leads to the ash pit of each boiler. A 125 horse-power Watts-Campbell engine furnishes the power. This is arranged so that when the new wing is added the engine may be compounded so that a total of 200 horse-power may be developed. Power is transmitted directly from the head shaft to the main shaft in the basement, and then through a vertical drive to each floor. An idler is placed on each floor so that the power on any particular floor may be stopped without interfering with that of any other. The openings through the floors for the belts are protected with heavy metal hoods, so that there are no openings whatever to permit currents of air to circulate. These hoods are also intended to prevent the spread of fire.

In the plating room a special cement trough has been constructed in which all drippings flow, and after passing through a settling tank are led to the sewer. This trough is covered with loose planking which provides for its easy inspection and cleaning.

A driveway, Figs. 1 and 3, is arranged so that in making or receiving shipments the trucks are under cover and the sidewalk is left perfectly clear. Underneath this driveway, Fig. 2, is the fire proof vault for dies and special tools, the floor of which is lowered and arrangements made for flooding the department in order to preserve the temper of the dies in case of fire.

The elevator machinery is arranged in a specially constructed room under foot of stairway, obviating the usual disadvantages incidental to this class of machinery. Gas and water meters, sewer traps and main valves are in a fire proof, ventilated vault under the entrance steps.

The plant is lighted by electricity, furnished by a dynamo in the engine room, gas being held in reserve in case of any break down.

A complete interior telephone system, embracing 12 stations, and also the eco-magneto system, having 12 night watchman stations, have been installed.

The Apprenticeship Question.

The best way to dispose of the apprenticeship question is receiving more than ordinary attention at the

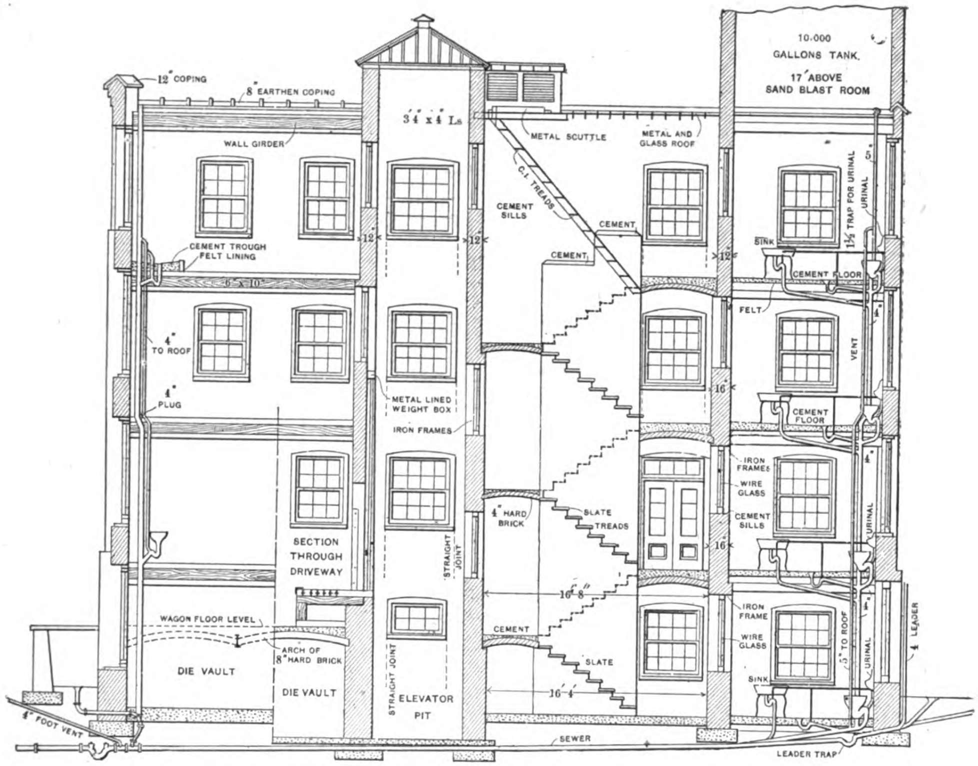


Fig. 2.—Vertical Cross Section through Building taken on Line of Stairs and Elevator Shaft.

Modern Factory Construction.

To guard against fire the building is equipped with Manufacturers' automatic sprinklers, wet pipe system, supplied from a 10,000 gallon tank placed 17 feet above the roof, and from the public water supply at 40 pounds pressure through a 4-inch main. A tee has been put in the main piping in the basement so that the 500-gallon per minute Underwriters' pump may be connected to the system. This pump is to be supplied from a 45,000-gallon cistern. The stairway, Fig. 2, is of metal, with slate treads, and all the doors of both elevator and stairway are of the fire proof automatically closing type. The washrooms, shown in section in Fig. 2, have cement floors with open sanitary plumbing in order that hose may be turned on when necessary and all parts thoroughly flushed.

The polishing room is equipped with the latest improved system for exhausting the dust and refuse, which is deposited in the coal bunkers and thence consumed with the fuel.

present time, and while the following comments deal with the subject largely from the viewpoint of the plumbers, they are of interest to members of other branches of trade:

Many people are of the opinion that the apprenticeship question has been disposed of by the customs which prevail in the majority of trades to-day, and which have prevailed for several years back. So far as plumbers are concerned it is only necessary to talk with any busy master plumber to find that he is conscientiously opposed to taking upon himself the obligations which go with the indenturing of a young man as an apprentice. There are two sides to such an indenture contract. One is that the master plumber agrees to teach his apprentice. In the past, when the master did more or less of the hand work himself and spent a great deal of his time with his workmen, he could watch and instruct his young apprentice. In these times such a course is out of the question in all large cities, and the customs of the trade make it equally impossible for the plumbers in the country. In view of this fact, does it not seem foolish to talk about the apprenticeship question ?

Modern Educational Advantages.

There is another condition which must be considered in connection with the custom of apprenticing young men. The fund of general information and education possessed by the boy of to-day who has reached the age and has the size to be available as an apprentice to the plumbing trade is very much greater than that possessed by the boy who was apprenticed at the time when the custom of apprenticeship was in vogue. Our public school system is far better and the result is that a boy everything to discourage such feelings in his first six months in any shop to-day. His education will lead him to be inquiring, oftentimes asking questions which those with whom he is working are unable to answer correctly, and which it is his right to know if justice is done him by his employer.

The Trade School.

There is no question but that the trade school has come to stay, the strength of its position lying in the fact that a boy can and will learn more theoretically and practically in the few months of his course at the trade school than he will in a year or more of work for his employer and with the best journeymen. He will come

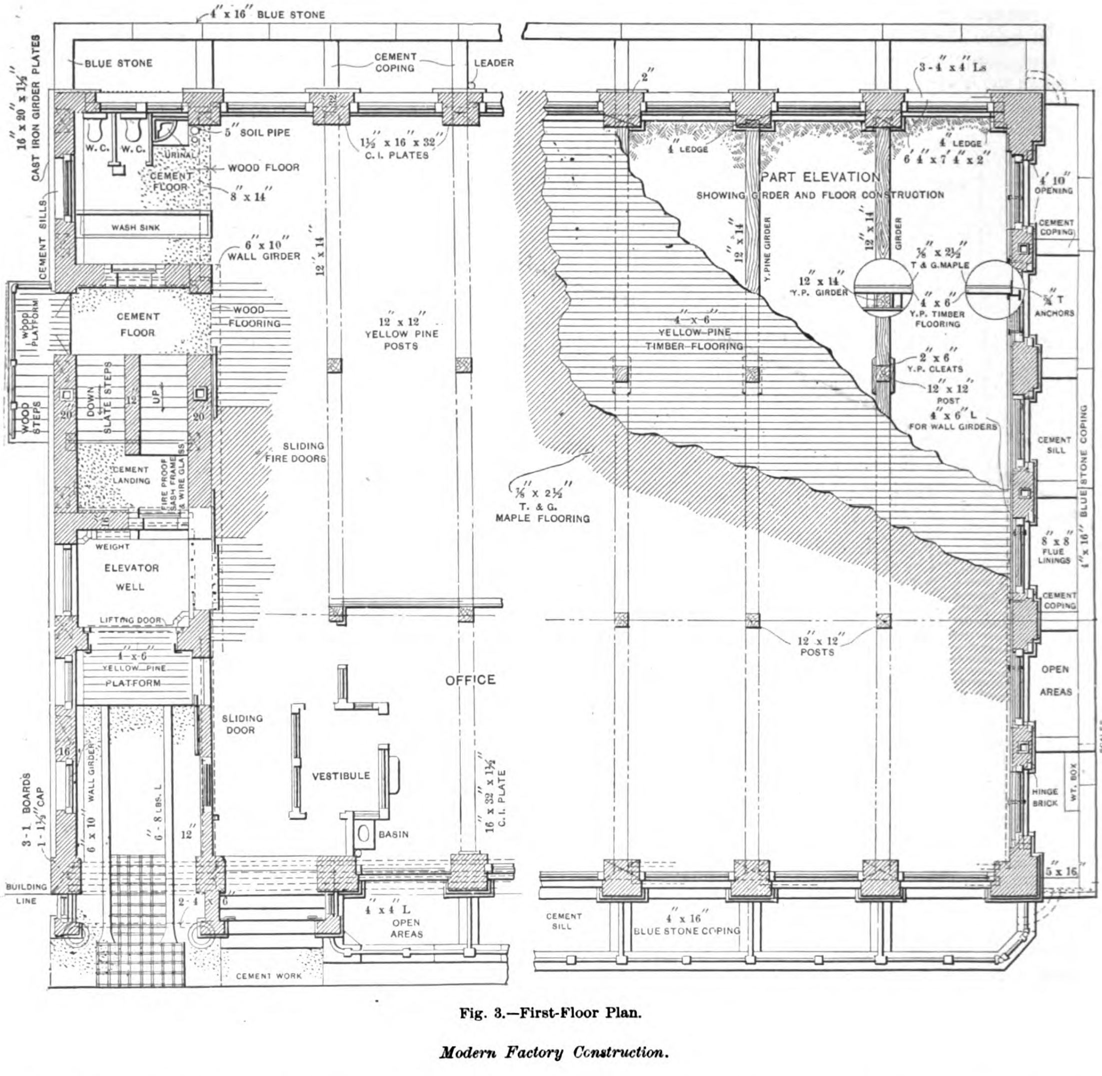


Fig. 3.—First-Floor Plan.

Modern Factory Construction.

who is old enough and big enough to go to trade possesses the intelligence to learn all that can be taught him in much less than a five years' apprenticeship. No father or mother having a conscientious interest in the welfare of their children would ever sentence a child to hard labor for five years, or call upon him to submit to the indignities and drudgery that are incurred in learning a trade under the old customs. Boys who have a good school education and are properly brought up are those who are needed in the plumbing trade, and not boys of low intelligence or breeding. A boy with a good education and of the age suitable for the trade will naturally have some self respect and dignity, which is commendable; but he will find, instead of encouragement, from the trade school, however, with an exalted notion of his knowledge and ability, which must be toned down in the school of experience in order to be of much value to him. The apprentice who has followed a journeyman plumber around from job to job, acting as porter, will gather a fund of invaluable information, while he watches a valve seat repaired here, a new washer put on there, a water back coupling tightened, a new joint wiped under difficult conditions, a water closet reset, the singing of a ball cock stopped and the thousand and one other things which the trade school boy has never seen or dreamed of. To my mind it would be a good thing to refuse to indenture any boy to the plumbing trade until he has a certificate that he has taken the course in the trade school in any locality where there is a trade school available. Then he can very quickly become a source of profit to his employer, by becoming a good workman.

Now we have hit on a most important feature of the case. Men never apprentice boys at any trade, at present, unless they hope to make a profit out of their labor. There can be no doubt that the apprentice has always been very much underpaid, particularly if he was bright and his employer was conscientious in teaching him as fast and as much as possible, so as to bring him early to the point of being an efficient workman. On the other hand, no one conversant with the trade will doubt that in far too many instances the journeymen with whom apprentices have to work interfere as much as possible with a boy making progress in his trade. This practice has discouraged many apprentices so that they lost interest in their business and became time servers, and at the end of their time had acquired very little of the knowledge which according to their indenture their masters were legally bound to impart to them. It has grown, under the business customs of to-day, to be

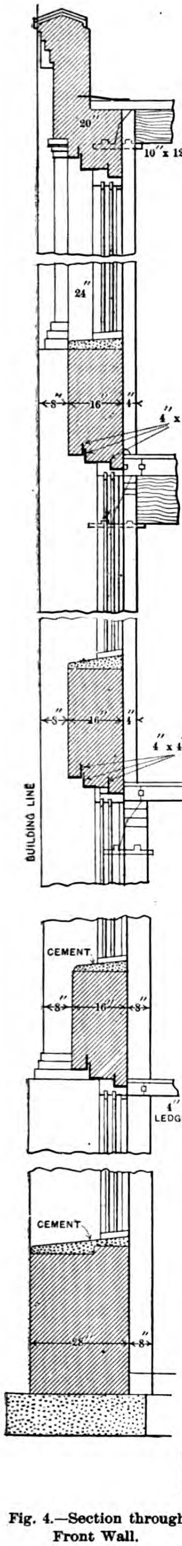


Fig. 4.—Section through Front Wall.

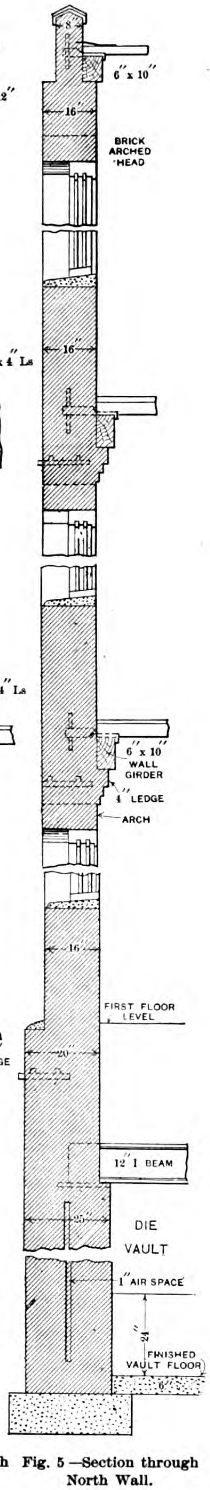


Fig. 5.—Section through North Wall.

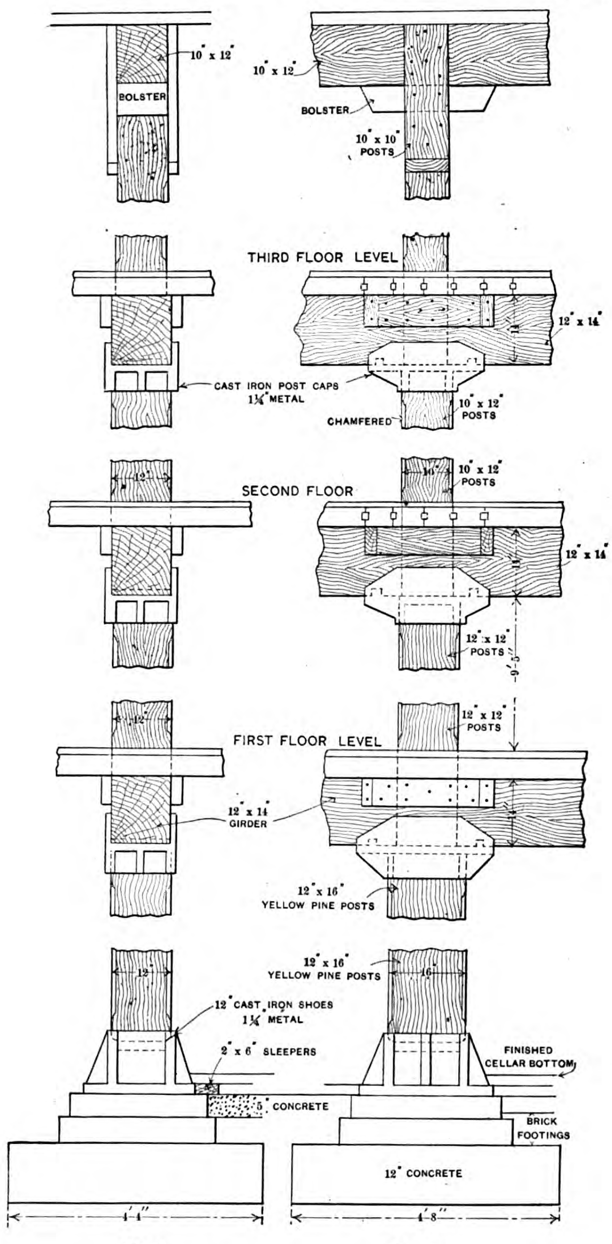


Fig. 6. Fig. 7.
Details of Posts and Floor Beam Connections.

Modern Factory Construction.

profitable to have apprentices. In many instances they are called upon to do work that ordinarily would be done by a laborer who would require twice as much money for the work done.

Restricting the Number of Apprentices.

The proposition to restrict the number of apprentices in a shop is clearly in the line of reducing the number of good journeymen plumbers, and thereby to hold up the wages. The very fact that the journeyman plumber has been paid good wages for a number of years and has had a boy to do most of the disagreeable and laborious work for him has made it the aim of many young men to become plumbers. It is doubtful if any legislation by the association can interfere with this ambition of the young men.

Shorter Apprenticeship Term.

If they are to be high grade workmen capable of doing the advanced work that will be required in the near future, it is a matter of public interest that they shall have a good chance to learn their chosen trade speedily and become masters of the theory and proficient in the practice of it. There is no better way of reaching this aim than to spend the necessary time and money in taking a course in one of the trade schools, either before entering upon an apprenticeship or during an apprenticeship. If this is followed it goes without saying that these young men will be able in three years' time to do their work as well as the apprentices under the old system were able to do it in five years' time. Consequently, I am in favor of a three years' apprenticeship, instead of a sentence to five years' apprenticeship to hard labor and drudgery.

An extraordinary spectacle was recently witnessed in Mix County, S. Dak., where six towns of from 1000 to 2000 population, including Edgerton, Old Platte, Castalia, Academy, Colvin and Jasper, have been moved bodily several miles to new locations on a branch line of the Chicago, Milwaukee & St. Paul Railway, recently constructed. Finding the railway route did not come near them, the inhabitants of these towns decided to move, bag and baggage, houses, business blocks and all, to new sites on the line of the road. Every structure in all these towns was, within a week, taken off its foundation, mounted on wheels, hitched to 24, and in some instances 40, horse teams and started on the long *trck* across the prairie. Arriving at the new location, they were set down in lots corresponding to their former places, and in an incredibly short space of time the new towns were settled. Only in the United States could such a thing happen.

A 12-story loft building having a frontage of 70 feet on Liberty street and 45 feet on Cedar street, New York City, is soon to be erected from plans by John T. Williams, Jr. This undertaking, coupled with other recent projects downtown, indicates that the renewed building activity is likely to be largely in the line of business blocks rather than buildings for dwelling purposes.

Canvas Ceilings for Churches.

The First Methodist Church, which has recently been completed at Los Angeles, Cal., embodies in its construction a number of interesting features, one of which is a canvas ceiling. The idea of using this material for such a purpose suggested itself to John Austin of the firm of Austin & Skilling, the architects who drew the plans

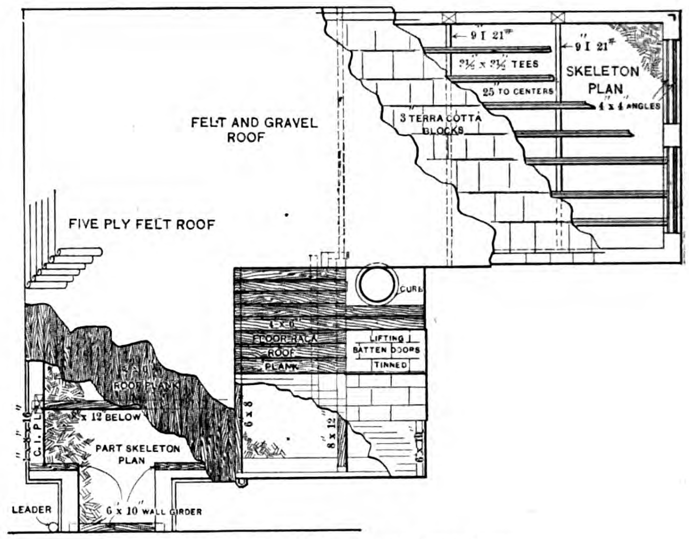


Fig. 8.—Roof Plan, Engine and Boiler Rooms.

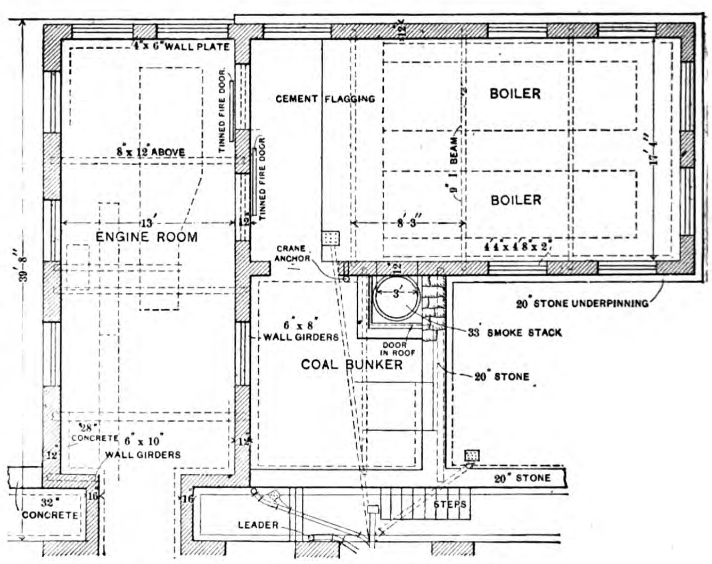


Fig. 9.—Plan Engine and Boiler Rooms.

Modern Factory Construction.

and superintended the construction of the building. The ceiling rises in a great dome broken by ornamental trusses and is daintily frescoed in soft colors, presenting a very pleasing appearance. In executing the work No. 6 tenting canvas was used, it being painted on one side and sized on the other, the frescoing thus making it thoroughly water proof and air tight. There are many advantages claimed for a canvas ceiling, some of which are its lightness and cheapness, the absence of danger of cracking and of sections falling by reason of becoming loose through vibration.

MAKING WOOD PATTERNS.—XIV.

BY CHARLES J. WOODSEND.

THE pattern that we shall take for our subject at this time is that for a manifold branch, and although somewhat complicated at first view, is in reality not particularly difficult to make. All the joints with their pipes are in this case to be made with flanges and to have the finish left on for the machinist. It will be noticed by referring to Fig. 105, presented herewith, that there are four large flanges and two smaller ones, Fig. 105 being in effect a plan view looking down from above. In Fig. 106 is presented a side view looking from the direction of the smaller branches A A. Fig. 107 is an end view with one of the large flanges removed. The dotted lines in Figs. 106 and 107 show the thickness of the material required.

The first thing to be done is to have a good drawing board, perfectly straight and out of wind, and of sufficient size to take in the pattern and the core prints. Lay the pattern down as shown in Fig. 105. The length of the core prints for C C C should be about the diameter of the holes in the pipe, a little more or less being of no particular account. The core prints for A A require to be a little longer than the length of the branches, the reason for which will be explained later on.

After the pattern is laid down upon the drawing board get out the stuff to make the long main part of the branch, making the parting as shown in Figs. 106 and 107, and putting the pieces together as shown in Fig. 88, published in the May issue. The dowels should be placed a little away from the flange, but not in the core print. Use the center plate upon the ends. This piece should be turned up carefully; use either calipers for the whole distance, or caliper at both ends and turn the balance to a straight edge. Shoulder down for the seat of the flanges as shown in Fig. 88; saw out the flanges, nail fast, and turn up, as explained in connection with Figs. 91 and 92; shellac and finish as for previous work.

The other two large pieces may now be prepared for the lathe in the same manner as the previous piece, making allowance for only one core print, all as shown in Fig. 108. The other end is to be turned, as marked "For Flange B." This is made any length, from ¼ inch up to ¾ inch, according to the thickness of the flange, while it must not go through. After this is turned, lightly mark the lines D D and E E. These lines are where the pieces strike the other parts of the pattern in the first place, and are merely for guides as to the length in fitting into position. The distance from these lines to the cut off should be a little more than the semi-diameter of the pipe. Shellac and finish as before.

The flange B, Fig. 109, may now be turned. The fillet will be turned on the flange, and it must be turned out neatly to receive the end of Fig. 108, marked "For Flange B." It must be turned out so that when the flange is in place there will not be any lateral movement, but at the same time it shall lift easily. The core print for this flange is to be a cone print and may be turned separately and screwed on to the flange afterward. It should have been stated before, although it is not too late now, that this pattern will require to be molded in a three-part flask. The lines of parting between the cope and the check will be inside of Flange B. The check will extend to the parting line, as marked in Figs. 106 and 107. The balance of the pattern will go in the drag.

We may now turn our attention to the small branches. These are treated exactly the same as were the others. It should be borne in mind that the core prints for these should be left, say, 1½ inches longer than they project from the large part of the branch. In fact, they should be long enough to balance the core in its bed. After these pieces have been prepared we will proceed to assemble the pattern.

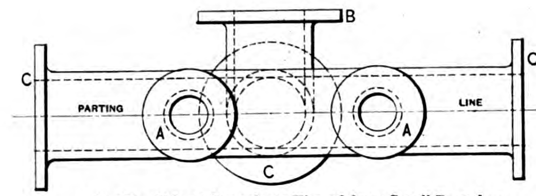


Fig 106.—Side of Branch, as Viewed from Small Branches.

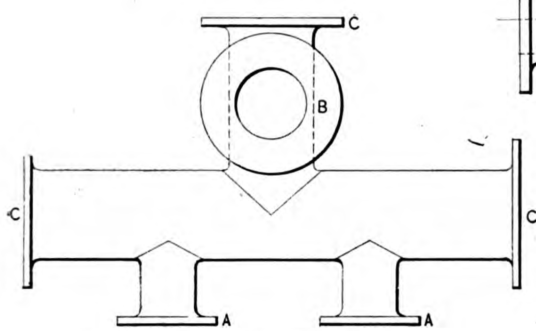


Fig. 105.—Plan of Branch as Viewed from Above.

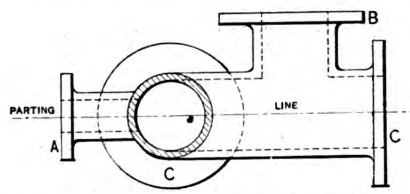


Fig. 107.—End View, with One Flange Removed; Also Showing Thickness of Metal.

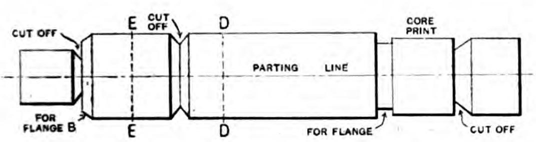


Fig. 108.—Method of Turning the Two Large Branches.

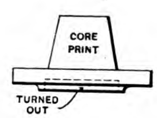


Fig 109.—Flange "B," with Conical Core Print Attached.

Making Wood Patterns.

WHAT BUILDERS ARE DOING.

AT the regular meeting of the directors of the Builders' Exchange Building Company of Baltimore, Md., held in the rooms of the Builders' Exchange, for the purpose of organization, the following officers were elected: President, J. A. Smyser; vice-president, J. L. Lawton; treasurer, B. F. Bennett, and secretary, J. M. Hering. At the monthly meeting of the Board of Directors of the exchange, held the early part of August, several new members were elected, and aside from routine business transacted, the Library Committee made a report recommending the appointment of a librarian for the exchange. The suggestion was adopted and the board appointed Addison H. Clarke of the well-known firm of William Wirt Clarke & Son. Mr. Clarke is well qualified for the office, and has taken a very deep interest as well as an active part in the establishment of the exchange library. Since the appointment of J. M. Hering to the secretaryship of the exchange the reading room has been greatly improved, a large number of valuable works have been added to the library, and the periodical list has been materially increased. Secretary Hering has also introduced a system of listing all work contemplated and in course of construction, which list is placed on the exchange bulletin, thus keeping the members thoroughly informed of all matters in which they are likely to be interested.

Boston, Mass.

A noticeable feature of the building operations in the city during the month of July was the encouraging record made in the number of permits issued for brick structures. This is said to have been the first month in the history of the city when the brick construction in sight exceeded that of wood. The permits for brick buildings issued in July were 75, as compared with 73 for wood, while they exceeded those for June by 40. The impression seems to prevail that the decline in the use of wood as a building material in favor of brick, stone and other factors of a fire proof nature will be more pronounced as time goes on. For the seven months of the year permits were issued for 215 brick structures, as compared with 411 for wood, these figures comparing with 415 for brick and 745 for wood in the corresponding seven months last year.

Buffalo, N. Y.

The building interests in Buffalo seem to be doing a little better than was the case a month or two ago, at which time nearly all the mason contractors were pretty much idle. To-day these same contractors have two or three jobs of greater or less magnitude; carpenter contractors are busy rushing Pan-American work, and along these lines the carpenters are making great progress. The latest Pan-American contracts which have been awarded are the Ethnology Building to Joseph Metz, the Temple of Music Building to John Feist, and the Plaza and Sunken Garden to Thompson, Hubman & Fisher. Numerous other contracts involving smaller amounts have been awarded within the past month, and various parties having obtained concessions by the Pan-American Exposition have already awarded contracts for constructing the necessary buildings. Altogether the Pan-American ground is quite an active place these days, and the people are beginning to realize that they are going to have a real show in 1901.

Labor conditions remain quiet just at present, although contractors and builders dare not hazard an opinion as to how long they will remain so.

The Builders' Association Exchange has recently issued a circular letter to those likely to be interested, pointing out the advantages resulting from membership and giving the reasons why all contractors should join the organization. The Builders' Exchange endeavors to inculcate just and equitable principles in dealing with contractors, subcontractors, material men, architects and owners; it endeavors to promote the highest class of workmanship; advocates a uniform rate of wages, and endeavors through its Arbitration Committee to adjust the differences arising between subcontractors, architects and owners.

Preparations are rapidly making for the annual outing of the Builders' Exchange, which will occur on Labor Day, September 3. A unique circular which has been issued states that the affair will be in charge of "Commodore" Geiger, assisted by Messrs. Ginther and Stygall, while Frank Carter, Otto Weyer and Harry Rumrill will also look after the interests of the excursionists. A minor attraction of the outing will be a ball game between two nines, composed of members of the exchange, and designated as "We-uns" and "U-uns." The circular states that the defeated nine is to be placed on rations of plain sandwiches and water the rest of the day of celebration, and to pay for an elaborate banquet at the Iroquois to the winning nine, umpires and score keeper. From present indications the affair will be most enjoyable in every way.

Chicago, Ill.

Just as we go to press advices from Chicago are to the effect that the carpenters', which is said to be the strongest organization of artisans in the Chicago Building Trades Council, have decided to withdraw from that body, and it is thought that within a few weeks at the outside most of the men probably will be at work. The move of the carpenters is the second big break in the central organization of the building trades workmen, who have been at loggerheads with the contractors for many months.

Cleveland, Ohio.

The decline in the prices of building material is having the effect of increasing the prospect for a good business in the building line during the fall and early winter months. There seems to be a tendency in many quarters to commence operations, and judging from the plans of buildings which are from time to time submitted to members of the Builders' Exchange for estimate, quite a little work will be done in the near future.

The members of the local exchange entertained on July 25 a party of about 130, consisting of members and friends of the Builders' Exchange of London, Ontario. Upon their arrival the visitors were met and escorted to the Weddell House for breakfast, after which they were conducted to the headquarters of the exchange in the Chamber of Commerce Building, where at 11 o'clock an informal reception was held. A series of athletic events occupied the entire afternoon, the day's entertainment concluding with a dinner at the Stillman, which began at 7 o'clock. James Young, acting president of the local exchange, presided at the dinner, in the absence of President McCormick, who was detained at home by illness. He welcomed the visitors on behalf of the local exchange, and President William Tytler of the London Exchange responded in a happy vein. The occasion was delightful in every way, and the Londoners left for home at 10 o'clock, well pleased with their reception and the day's doings.

The Cleveland Exchange had their quarterly meeting on August 6, adopting a new constitution, which has been under consideration for some time past, and which was made necessary in order to allow of a broader field of work due to the rapidly growing organization. A social feature of the evening was a "watermelon eat," with cider and sandwiches. At a meeting of the Board of Directors, held on August 7, a committee composed of Henry A. Taylor, John Callaghan, Jr., and Oscar Alexander was appointed to make preliminary arrangements for the annual outing of the exchange, to be held early in September. We understand that it has already been planned to visit Toronto and attend the annual provincial fair. The itinerary of the trip will be from Cleveland to Buffalo to view the Pan-American Exposition buildings, then to Niagara Falls, Lewiston, Toronto and home.

Columbus, Ohio.

The Builders and Traders' Exchange at a recent enthusiastic meeting adopted a daily 'change hour, the time being from 11 to 12. Heretofore more or less difficulty was experienced in an endeavor to locate members for the transaction of business, and the adoption of the 'change hour is expected to obviate this, as the members will gather at the time indicated for business transactions. An amendment to the constitution has lately been considered, providing for an assessment for social features. It was also decided to adopt the Vogelgesang heating system, and the apparatus will be entirely exposed so as to serve as an exhibit, as well as for heating purposes. A feature of the exchange is the exhibit of building materials, which is said to result in many sales to out-of-town customers. Materials are displayed in actual construction, which saves the time of prospective builders and architects in traveling over the city. It is said that some of the finest structures in the city, of recent date, have had selected all the materials from the exhibits at the exchange.

New York City.

Generally speaking, the building situation has remained comparatively quiet since our last issue, although there are signs of growing activity in many quarters. The declining prices in many of the materials entering largely into the construction of buildings have not been without their effect upon projects heretofore held in abeyance, and while there is less building of a speculative character, there is a growing activity in sections where substantial interests are planning to erect modern dwellings and apartment houses, the latter rapidly multiplying above Central Park, principally on the West Side. One of the largest of the building enterprises now being discussed is a new Astor hotel, on Broadway, between Forty-fourth and Forty-fifth streets, estimated to cost several millions of dollars.

An interesting development of the labor situation during the past month was the long talked of amalgamation of the Board of Delegates and the United Building Trades Council. It is stated that about 60,000 men are interested in the settlement of the trouble which has been going on for the last two years. It is intimated that the amalgamation will end a number of strikes and probably tend to prevent others.

At a meeting of the Electrical Contractors' Association, held August 2, at the Building Trades Club, Charles L. Eidlitz was elected president, A. J. Martin secretary and J. P. Hall treasurer.

Pittsburgh, Pa.

According to the report of Superintendent J. A. A. Brown of the Bureau of Building Inspection, the total number of permits issued during the month of July was 338, involving an estimated outlay of $826,130. These figures of cost show a decrease as compared with the month of June, notwithstanding the fact that 68 more permits were issued. The first part of the month gave indications that the value of the permits issued would surpass the same month of last year, when 265 permits were issued, involving an estimated expenditure of over a million dollars, but toward the latter part of the month there was a heavy falling off, and the record goes below that of July last.

The contract for the new Union Depot which is to be erected has been awarded to Roydhouse, Ayer & Co. of Philadelphia, and William Miller's Sons of Pittsburgh. The time occupied in taking down the old depot is said to have broken the record of house demolition in the city. Among the other important contracts awarded was one for the erection of a $100,000 house.

San Francisco, Cal

Advices under recent date are to the effect that July was on the whole a very quiet month with the building trades. A few large contracts in the earlier part of the month brought the total for the first half of July to a very respectable figure, but during the last few weeks very little new building has been planned. The fall in the price of structural iron is said to be responsible for revival of some of the larger projects, and architects state that with the present prices of iron and building material a number of other large sized building propositions may be looked for. But while the outlook for larger work seems to have improved, smaller building has been checked. In these buildings the price of iron cuts but little figure, while the condition of the labor market is the all important factor. Labor is now scarce in the building trades, and the recent action of the unions is taken to indicate either higher wages or strikes. Partly on this account, and partly on account of an unexpected shortage in the wheat crop, numerous small buildings recently talked of have now been abandoned.

There is a demand for good modern flats, and considerable building of this sort is contemplated in the near future. One large building containing 21 diversified flats has been commenced on the corner of Eddy and Franklin streets. This will have an exterior which will give the appearance of eight distinct dwellings. The kitchens will be located in the center, leaving the two rear sides for chambers and dining rooms. The inside finish will be pine, maple and rosewood.

William Mooser has been appointed Superintendent of Plans and Specifications for new buildings, changes, &c., for the Board of Public Works of the city.

On August 13 the Mill Men's Union, supported by the Building Trades Council, began its fight for an eight-hour day, and the strength of the movement will doubtless soon be determined. The lumber and planing mill owners have not yet decided whether the mills shall try to continue operations with non-union men or shall close down until an adjustment has been effected. The proprietor of one of the large mills is reported to have expressed the opinion that unless a speedy understanding was reached building operations in San Francisco and the bay cities would practically cease and the 15,000 men in the building trades be thrown out of employment. The union men ask for the same pay for eight hours as is now given for nine hours' work. The mill men say they cannot grant the demand and meet Eastern competition.

St. Louis, Mo.

Advices under recent date from St. Louis indicate matters in the building line as very quiet. The prospects for the fall trade are not considered particularly brilliant, although more or less work is in progress. A fertile field that has not developed to any great extent in the city is that of the fire proof apartment house. Various propositions looking to such buildings have been considered but as yet have not been carried to a successful issue. In one of the projected buildings the idea is to have the kitchen in the basement, with dumb waiter service to each apartment. The suites of rooms will not include a kitchen, and no cooking will be allowed in them. There are no buildings of large proportions just at present under way, although several are expected to be started in the near future. Among those may be mentioned the Washington University Building, which is expected to cost over $1,000,000, St. Ann's Asylum, the Centenary Hospital, and several buildings for business purposes.

Notes.

It is stated that contractors and builders in Omaha, Neb., were more busily engaged during July than for any corresponding month in a series of years. There have been times when more work was in progress for the fall months, but the present outlook is considered encouraging.

The records of the building department in Rochester, N. Y., show that during the first six months of the present year the increase in operations was very marked, as compared with the corresponding periods of 1899 and 1898. The increase this year over last is stated to have been $84,167 and over two years ago $261,108.

New Haven, Conn., is showing more activity in building operations, the most noticeable work in progress being that in connection with the large additions to Yale University.

Builders in Washington, Pa., are looking for something of a boom this fall, as improvements are contemplated which will result in the erection of a large number of buildings.

LAW IN THE BUILDING TRADES

CERTIFICATE WAIVED WHERE ONE DOES NOT EMPLOY ARCHITECT.

Failure of owner to employ an architect to supervise construction of building is a waiver of a stipulation in the contract that the work should be done agreeably to the plans and specifications, to the satisfaction of the architect "to be testified by a written certificate under the hand of said architect."—Diehl *vs.* Schmalacker, 62 N. Y. Supp. Rep., 1081.

RIGHT TO FILE LIENS.

A building contract provided that the contractors would not permit liens to be set up by subcontractors, or if any should be set up would cause them to be satisfied of record. The court held that such agreement did not prevent the contractors themselves from filing a lien.—Aste *vs.* Wilson (Colo.), 59 Pac. Rep., 846.

LIEN FOR MATERIAL ACTUALLY FURNISHED.

Where one included in his notice of lien material not contracted for or used in the building against which he sought a lien, in the absence of bad faith or intentional false swearing he was entitled to a lien for the material actually used.—Pierson *vs.* Jackman, 62 N. Y. Supp. Rep., 1145.

ARCHITECT ENTITLED TO LIEN THOUGH BUILDING NOT ERECTED.

An architect who performs service as such, for the owner of a lot, in preparing plans and specifications for the erection of a building thereon, is entitled to a lien on same for the amount of his services in preparing such plans and specification, notwithstanding the owner of the lot abandons the project.—Rinnaker *vs.* Freeman, 84 App. Ct. Rep., 283.

ARCHITECT'S ESTIMATES AND COMMISSIONS.

Where an architect agreed to build a house for a sum not exceeding $5500, but it appeared that such price was merely an estimate, and was found by adding 5 per cent. to the estimated cost of the building, which amount was indorsed on the plans, the architect was not liable for an excess of $185 in the actual cost of the building.—Bodine *vs.* Andrews, 62 N. Y. Supp. Rep., 385.

WHEN RETAINED PERCENTAGE IS RECOVERABLE.

Under a building contract providing for retention of 20 per cent. of the contract price till all the subcontractors have given written acknowledgment of payment, such amount may be recovered by the assignee of the contractor on such acknowledgment being obtained or danger of liens being removed by limitations.—Getty *vs.* Penn. Inst. (Penn.), 45 Atl. Rep., 333.

WAIVER OF DEFECTS IN BUILDING DURING CONSTRUCTION.

Where the party for whom a building was being constructed saw, during the progress of the work, that all specifications in the contract were not being complied with, and paid all but $100 of the contract price, and after the completion of the work promised to pay the balance as soon as he was able, he waived the defects in the construction of the building.—Diehl *vs.* Schmalacher, 62 N. Y. Supp. Rep., 1080.

CERTIFICATE A CONDITION PRECEDENT.

Where a contractor agreed to erect a building for a given price, payable in installments, on the architect's certificate, the obtaining of such certificate, or proof that same was wrongfully withheld, was a condition precedent to recovery of the final installment due under the contract.—Connolly *vs.* Hyams, 62 N. Y. Supp. Rep., 567.

LIENS MUST BE RELEASED PRIOR TO FINAL PAYMENT.

A building contract provided that the final payment should become due on the completion of the work and on the builder's furnishing to the other party releases of all liens that might arise in the performance of the contract. The court held that in a suit for recovery of the final payment the builder must establish either that the releases were tendered or that no such liens or claims existed when the suit was brought.—Turner *vs.* Wells (N. J.), 45 Atl. Rep., 641.

SUFFICIENT ALLEGATION AS TO ARCHITECT'S CERTIFICATE.

Where building contractors, in their complaint to recover the contract price, alleged due performance on their part, except the condition requiring them to obtain a certificate from the architect; that after the work was completed they demanded such certificate, and notified the owner of such demand, requesting him to cause same to be delivered, but that it was refused, such allegations showed that they were, on proof of such allegations, entitled to the certificate, and that if it was wrongfully withheld, and the facts constituted a sufficient excuse for their failure to produce such certificate.—Bird *vs.* Rector, &c. (Ind.), 56 N. E. Rep., 129.

New Publications.

USE OF THE SLIDE RULE. By F. A. Halsey, associate editor *American Machinist*, 84 pages, 3¾ x 6 inches; illustrated. Published by D. Van Nostrand Company. Price, 50 cents.

This handy volume shows that while the slide rule is based upon the principle of logarithms, it does not require a knowledge of logarithms in order that it may be made use of. The writer is of opinion that any attempt to acquire the confident use of this instrument on the "rule of thumb" basis will fail. What is required is simply an understanding of the working property of logarithms and of the manner in which the rule is made to take the place of a table of logarithms in order to use it accurately. The explanations are clear and concise, the engravings being true reproductions of the instrument, showing it properly set for solving various problems. The book should be of great value in dispelling the notion that the slide rule can only be employed to advantage by those who are thoroughly conversant with the theory of logarithms.

PRACTICAL HINTS ON JOINT WIPING. Size 5½ x 8 inches. 66 pages. 41 illustrations. Published by the David Williams Company, 232 William street, New York. Price, 25 cents.

This little work, which is designed to be a help for beginners, originally consisted of 43 pages. Its popularity made it sell through five editions. In presenting the sixth edition, 23 additional pages are given, so that now the beginner not only receives instruction how to properly prepare a joint for wiping and to make his wiping cloth and soil, but, as far as possible, the difficult art of joint wiping is explained. The additional matter will not only be of interest to the beginner, but to many old workmen, as it describes the methods of preparing and wiping a joint on copper pipe, brass pipe, iron pipe and tin pipe, besides giving a number of interesting expedients which have been used for the wiping of a joint in a difficult position. An important article on cleaning solder will enable those who have found trouble in getting their wiping solder to work properly to bring it again into a proper condition.

Water System of Pompeii.

Pompeii, like most Roman cities, had an excellent water system. While we are able to judge of the systems in other places only by the smallest remains, in Pompeii the whole system has been laid bare, and in "Pompeii, Its Life and Art," by August Mau, translated by Prof. Francis W. Kelsey, there is an interesting description of the water supply of the city.

Remains of the ancient aqueduct near Avellino, a dozen miles east of Nola, have been discovered, and this aqueduct followed the base of Vesuvius and furnished water to Naples, Puteoli, Baiae and Misenum, but the source from which Pompeii received its water supply has not been discovered. The construction of the older baths showed that a free use of water was contemplated. There were many fountains along the street, most of them at the corners. They were filled by pipes connected with the water system of that city, and these fountains bear witness to long use by depressions which have been worn in the stone by the hands of those who leaned forward to drink.

Water towers were found at the sides of streets; they were small pillars of masonry which were raised to the hight of 20 feet. There was a small reservoir of water on top, presumably of metal. In all the houses of any size and importance there were flowing jets. Thus in the famous house of Vettiti, which was discovered a few years ago, there were no less than 16 jets, and water was not stinted in any of the three pipes which have been discovered. The water pipes were made of sheet lead folded together, the transverse section somewhat resembling that of a pear. Their size was regulated by the pressure and the water was turned on and off by stop cocks which were much like those in use to-day.

Adhesiveness of Glue.

A writer in one of our foreign exchanges says that the adhesiveness of glue under favorable circumstances is equal to a force of at least 715 pounds per square inch. In an experiment performed, a force of 1260 pounds, applied gradually, was found necesary to separate two cylinders of dry ash wood, the ends of which presented a surface equal to 1.76 square inches, and which were glued together end to end and allowed 24 hours to set. Even this weight was sustained for two or three minutes before the joint gave way, and it was found, on examining the separated surfaces, that the glue was very thin and had not entirely covered the surface. The cohesive strength of glue appears, therefore, in this experiment to have been rather more than 715 pounds per square inch, while the cohesive strength of the wood thus united in a lateral direction was found to be only 562 pounds, thus showing that if the joint had been between the sides instead of the ends of the pieces of wood the wood would have given way before the glue. In this case, however, the glue was newly made and the season very dry, while in some former experiments made in the winter season with glue which had been frequently made, with occasional additions of glue and water, the cohesive force indicated was only 350 to 500 pounds per square inch.

CONTENTS.

— IT'S DISADVANTAGES.—"I don't value success in life as highly as I used to."

"Why not?"

"After people have won fame they have nothing to look forward to."—*Chicago Record.*

— "I SAY, Bridget, is your beau a gold or a silver man?" asked the head of the house.

"Shure he's neyther," answered the cook, who was in love with a policeman; "he's what you call a copper man, sur."—*Selected.*

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NOVELTIES.

Yankee Automatic Drills Nos. 41 and 42.

A device which carpenters, cabinet makers and others will find exceedingly convenient for boring wood for a variety of purposes is the Yankee

Novelties.—Yankee Automatic Drills Nos. 41 *and* 42.—*Fig.* 1.—*General View of Drill No.* 41.

automatic drill No. 41, illustrated in Fig. 1 of the engravings, and which is being introduced to the trade by North Brothers Mfg. Company of Philadelphia, Pa. This drill is provided with a magazine which is opened by loosening the nut at its lower end, thus causing the interior of the handle to move up and expose

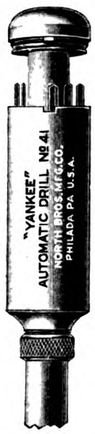


Fig. 2.—*Showing Interior of Handle Raised, Exposing Drill Points.*

all the drill points, as indicated in Fig. 2, thus enabling the user to quickly select and remove the drill required. The chuck is referred to as being of new and improved design and will hold drill points absolutely rigid. The construction is said to be such as to constitute an improvement on the chuck used in connection with the company's No. 40 Yankee drill. In using the device it is stated that pushing the handle down revolves the drill, while a spring pushes the handle back to its place. During the return movement the drill point revolves backward to clear the chips. The tool is nickel plated and finely finished, while the material and workmanship are of the best. The entire length of the tool, inclusive of the drill, is 11⅜ inches. There are eight drill points furnished with each tool, there being one each of 1-16, 5-64, 3-32, 7-64, ⅛, 9-64, 5-32 and 11-64 inch, these being the same as are used in the No. 40 drill.

The company are also bringing out the Yankee automatic drill No. 42, shown in Fig. 3. This is of the same general construction as the No. 41, except the magazine for the drill points. In this case there is a wooden instead of a metal handle, hence the tool is offered at a lower price. The drill points are put up in a small, round wooden box, there being eight, as in the case of the drill already described. All metal parts other than the spiral spindle are nickel plated and finely finished. The entire length of the tool, inclusive of the drill, is 11⅜ inches, the same as the No. 41.

Fig. 3.—*General View of Drill No.* 42.

Steel Ceilings.

A neatly printed catalogue has just been issued from the press by Lyles & Mills of 231 William street, New York City, showing an extended variety of handsome designs of paneled and embossed steel ceilings, which they manufacture suitable for all purposes. The printing is done in two colors; the engravings are well executed half-tones, while the binding is in deep green covers, with side title in old gold. The introductory pages are devoted to a brief argument showing the advantages of the use of steel ceilings as compared with plastered work, and to directions for putting up a steel ceiling. From a sanitary standpoint steel for ceilings is rapidly becoming popular in schools, and wherever repairs are made it is said to be superseding plaster altogether. The designs of ceilings shown in the catalogue, as already stated, are extensive, but do not begin to cover all the combinations which are possible, or which are turned out by the company. They are in effect merely suggestions, as various rooms require different treatment. The illustrations show panels framed, so far as possible, in appropriate moldings, as it is obvious that a lofty ceiling, as in the case of a church or public building, would demand that the panels be large and used in connection with heavy moldings, which, of course, would not be appropriate for a private house, or in a room with a low ceiling, as there the design must be less prominent. In addition to ceilings are numerous designs suitable for side walls, wainscotings, &c., together with cornices, girder coverings, borders, embossed and plain moldings, center pieces, &c. The manufacturers point out that their work being confined to the making and erecting of steel ceilings, they keep constantly in stock different styles of plates and moldings, so that orders can be filled with promptness.

Ogden Automatic Liquid Door Check.

The Ogden Mfg. Company of Newark, N. J., and for whom Wm. H. Quinn & Co., 103 Chambers street, New York City, are general agents, have recently put on the market the Ogden liquid door check and spring, illustrated in Fig. 4. The principal feature of this check is an automatic regulating valve on the inside of the check which regulates and fully controls its action and the movements of the door at all times and under varying conditions. It obviates the use of a small regulating screw and is said to properly govern the action of the check even if the wind blows 40 miles an hour. The main working parts are drop forged from steel. Every part is machined to fit and interchangeable throughout. A spe-

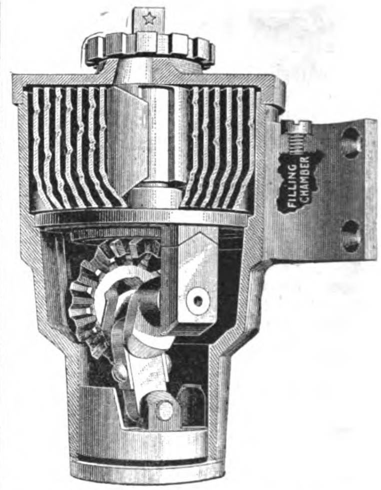


Fig 4.—*Sectional View of Mechanism in Ogden's Automatic Door Check.*

cially prepared non-freezing oil is used for the liquid in which all the working parts are immersed and revolve in when the check is in use, thereby assuring proper lubrication and reducing the wear to a minimum. Another feature is that the action of the door is controlled by the check during its entire swing. The door may be opened without any checking resistance at any angle from 5 to 180 degrees. The moment the door begins to close, the check, it is said, actually begins to work, the checking power gradually increasing as the closing point is reached, thereby giving a smoothness in closing peculiar to this check. A self contained coil spring which is easily removed from the case is used. To change from right to left, or *vice versa*, it is only necessary to remove the spring from the case, invert the spring and return it. The check contains double the supply of liquid necessary to operate it, there being no holes through the cup where the liquid can escape.

Vassar Reversible Cylinder Front Door Lock.

A new cylinder lock, which has the advantage of being reversible for either right or left hand doors by removing the cap, is the Vassar, now being introduced to the trade by the Reading Hardware Company of

Novelties.—Fig 5.—Vassar Reversible Cylinder Front Door Lock.

Reading, Pa., and 96-98 Reade street, New York. The lock is known as No. 1500½, with vestibule latch to match, and can be made right hand reverse bevel or left hand reverse bevel by simply changing the cylinder to one side or the other of the lock and turning the latch bolt to face in the required direction. The turn knob hub is made reversible by being secured to a movable attachment which fits into the cylinder hole on the reverse side of the lock. This lock, which is shown in general view in Fig. 5, can be adjusted to suit doors hung in any position, a feature which will doubtless be fully appreciated by dealers, who were formerly obliged to handle different locks for each of the above mentioned requirements. The interior mechanism is ingenious, though simple and very compact, the case measuring only ⅝ inch in thickness, the distance from the face of the lock to the center of the cylinder being only 2⅞ inches. This permits the lock to be used on doors having a narrow stile and of any thickness from 1¼ inches upward, a decided advantage, as it is frequently found to be impossible to use cylinder front door locks on account of the doors not being thick enough to accommodate them. The lock can be furnished with either one cylinder or two cylinders, to be operated by key from one side or both sides, as desired. The same key operates both lock bolt and latch bolt, making it impossible for the possessor of the key to be locked out. The outside knob can be set by stop. The latch bolt has the easy spring movement commonly used in first-class locks. The vestibule latch, No. 1505½, is also adapted for use on inside doors of office buildings and apartment houses.

Wind Mills.

We have received from the Stover Mfg. Company, Freeport, Ill., an exceedingly artistic catalogue, descriptive of the Ideal power wind mill and auxiliary goods made by this company. The seeker for information relative to the advantages and benefits to be derived from the use of wind mills will get a wealth of information from this publication, which comprises 64 pages and enters very comprehensively into the subject. All details appear to be thoroughly covered, not only with respect to the character of the machinery, but in connection with towers, gearing and many of the important purposes to which wind mill power can be applied. The catalogue is replete with illustrations of an unusually high order of excellence.

New Double Sawing Machine.

A convenient wood working machine, well suited for use in pattern shops, sash, door and blind factories, and, in fact, any establishment where wood is operated upon, is illustrated in Fig. 6 of the accompanying engravings. It is in effect a combined rip and cross cutting, beveling and mitering sawing machine, with two circling saw mandrels, tipping table and angling guide fence. The manufacturers state that the arrangement of the parts is such that the rip and cross cut circular saw blades can be fastened so that they lap each other when large circular saw blades are used, because the heavy circling frame passes around the blades, as indicated in the illustration, and forms another heavy supporting journal which rests in a second bearing. The quick changing from rip to cross cut sawing, and the positive holding of the saw blade in any hight of projection above the table top for light grooving or gaining up to cross or rip cutting light or heavy material is accomplished by means of the hand wheel shown in the illustration. This hand wheel engages a heavy worm gearing, which, it is claimed, will not move by accident and change the hight of the saw above the table. The saw table is adjustable on the frame of the machine, and is so arranged that it can be tilted to an angle of 45 degrees or less, and the pivot of the radial movement of the table is strictly in the line of the saw blade. The table is of extra length and width, being 48 x 34½ inches. The guide fence for ripping material is supplied with a rack and pinion, operated by the hand wheel shown, and by means of which the guide fence can be firmly and accurately set for any width of material within the scope of the machine. The manufacturers are the Bentel & Margedant Company of Hamilton, Ohio, who state that with the machine they furnish one 10-inch rip and one 10-inch circular cross cut saw, cutting material up to 2 inches in thickness. The machine will, however, take circular saw blades up to 20 inches in diameter for sawing material up to 7 inches thick. The tight and loose pulleys on the countershaft are of the company's patent differential pattern, the tight pulley being 10

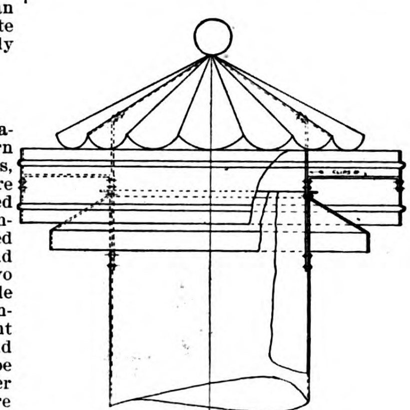


Fig. 7.—Skeleton View of Columbia Ventilator, Showing Construction.

inches in diameter and having a 5¼-inch face.

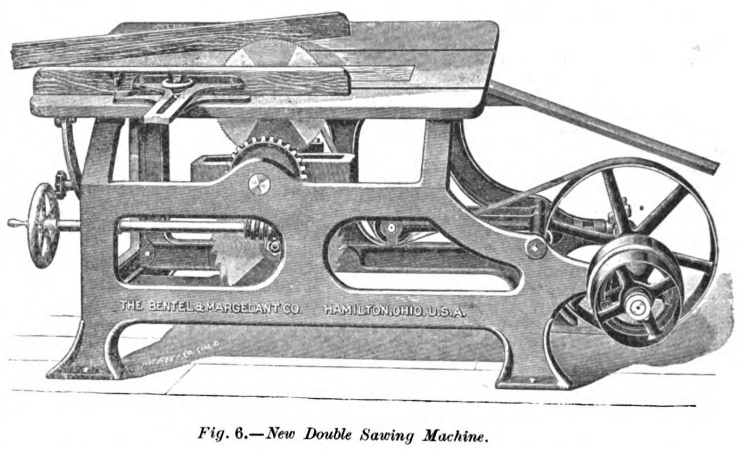


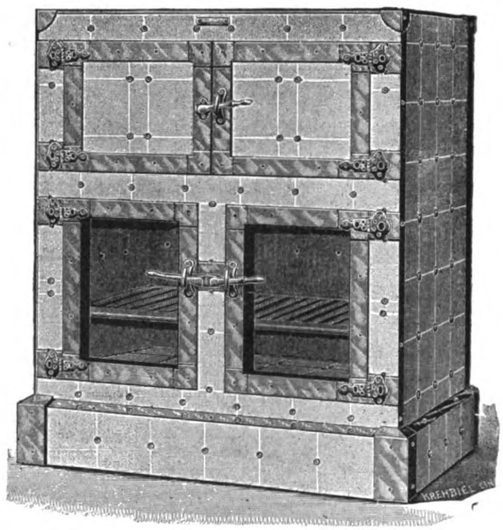
Fig. 6.—New Double Sawing Machine.

The Columbia Ventilator.

The E. E. Souther Iron Company of St. Louis, Mo., are placing upon the market the Columbia ventilator, a skeleton view of which is presented in Fig. 7 of the engravings. The claim is made that the construction is such that the device ventilates perfectly and yet does not admit water, while the shaft or pipe may be made in any length, according to requirements. The angular deflecting ring immediately encircling the top of the shaft is thoroughly soldered to it, as well as being riveted. Riser clips are riveted to the inside of the shaft and extend beyond it, for the purpose of carrying the corrugated cap or roof, the peak of which is surmounted by an ornamental ball. The cap clips are also made to carry the horizontal brackets, to which in turn is secured the vertical ring. The E. E. Souther Company make a specialty of iron and sheet metal roofing, as well as cornices, skylights, conductor pipe, eave troughs, &c. We understand that the company have recently turned out some new effects in stamped sheet metal ceiling, in which department of their business considerable activity prevails.

The Wilke Porcelain Refrigerators.

We present in Fig. 8 of the engravings a general view of one of a line of porcelain refrigerators made by the F. A. Wilke Company of Anderson, Ind. The refrigerator is tile lined inside and outside, including the ice chamber, the latter so protected, it is explained, that when the ice is put in it does not strike the tile. The walls are lined with a 4-inch course of mineral wool on the bottom, top, sides and back. The front is covered with tile, except the doors, which have a polished frame of metal, nickel plated, with double plate glass in each door or tile on both sides, as the cuts show. There is nothing cheap about the refrigerator, the manufacturers claim, not even the price. The point is emphasized by them that there is no zinc in the ice chamber nor in the provision chambers. The illustration represents a refrigerator designed for use by a family of five or six persons. A larger size is made of the same style, catalogued as No. 12.



Novelties —Fig. 8.— Wilke Porcelain Refrigerator No. 10.

Sagendorph's Metal Ceilings and Side Walls.

We have received from the Penn Metal Ceiling & Roofing Company, Limited, Hamilton and Twenty-third streets, Philadelphia, Pa., a 36-page illustrated catalogue, 14 x 10 inches in size, which they have issued, representing new work lately brought out by the concern in the line of Sagendorph's patent sectional metal ceilings and side walls. A number of novel and handsome designs in Empire, Louis XVI, Italian Renaissance, Gothic, Rococo, Moorish, Columbian and Roman styles, suitable for use in private dwellings, halls, churches, offices or public buildings, are shown by means of fine half-tone engravings. In addition to panel ceiling plates in large variety, many styles of side wall and wainscoting plates are presented, also molds, friezes, coves, center pieces, wall decorations and borders. Several illustrations are given of rooms, halls, churches, &c., showing the steel ceilings and wall coverings in place.

The Penn Metal Ceiling & Roofing Company are among the pioneers in this class of work, and they take a just pride in the excellence of their productions. All their ceiling plates are squared on four sides and provided with dust proof lock joints. They are manufactured in multiple of sizes that allow the designs to be brought out in harmony with artistic work. They claim to be able to produce 10,000 designs without a duplicate, each design having a separate set of multiples. The moldings vary in depth from 11-16 inch to 2¼ inches. A separate publication, also just issued and conforming in size to the catalogue, presents a large number of unsolicited testimonials of a flattering character from those who have had experience in the use of the company's products.

Mott's Roman Single Column Radiator.

The J. L. Mott Iron Works of 84-90 Beekman street, New York City, have brought out what they designate as a Roman single column radiator, which is a special adaptation of one of the radiators of a complete line which they manufacture. This radiator is made for both steam and hot water, and in all the regular hights for a radiator which is designed to be set up against the wall, and supported by the company's special concealed brackets. Besides the single column radiator mentioned, these goods are made in two-column and three-column styles. In setting up wall radiators it is necessary to put a strong wooden plate on the wall above the baseboard and coming out flush with it. This plate should be securely fastened to the studs in the partition, and then, when the radiator is placed on the brackets provided for the purpose, it will be as firm in position as if set on legs. This system avoids the necessity of cutting carpets and leaves the floor clear for laying carpets, cleaning, &c. It is pointed out by the manufacturers that this system simplifies the work and reduces the cost of connecting upper floor radiators. From the center of the tappings to the wall or base the distance is 2¾, 4 and 5 inches for the single, two and three column radiators respectively. Inasmuch as there is a complete line of radiators adapted for all purposes made in the design of the Roman, it is possible to furnish a building with a heating system which in its appearance harmonizes throughout, a point which is of special interest and advantage.

The Fay Double End Tenoning Machine.

The J. A. Fay & Egan Company of 221-241 West Front street, Cincinnati, Ohio, have just brought out and are now placing on the market what is known as the Fay No. 6 double end tenoning machine, a view of which is presented in Fig. 9 of the engravings. This machine is referred to as one of the greatest labor saving devices ever put into a wood working factory, is easy to operate and is not liable to get out of order. The claim is also made that the construction and capacity are such that it will do more and better work than can ordinarily be produced by three single tenoners. The frame is one casting, heavily braced and planed perfectly true, while the floor space occupied is sufficient to insure steady running. The capacity of the machine is such that it will cut off and tenon stock of any length from 6 to 78 inches between the shoulders of

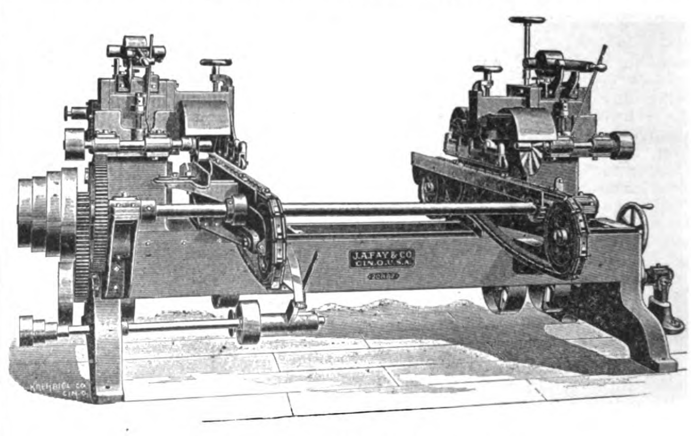
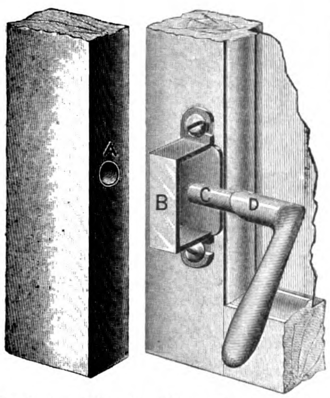


Fig 9.—The Fay Double End Tenoning Machine.

the tenon, and up to 20 inches in width and 7 inches in thickness. The feed is variable, entirely automatic and is controlled by a lever convenient to the operator. The stock is held rigidly in place by adjustable sectional pressure bars. The double cut off attachment is placed in advance of the cutter heads. The manufacturers point out that this machine will be found of special interest by sash, door and blind manufacturers, furniture makers and wood workers generally.

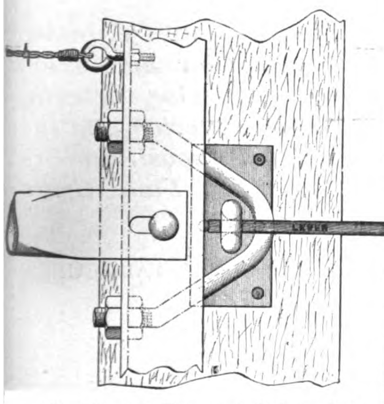
Dolber's Sash Fastener.

Architects, builders and house owners generally are likely to be interested in Dolber's sash fastener, shown



Novelties —Fig 10 — View Sh wing Operation of Dolber's Sash Fastener.

in Fig. 10, and which is manufactured and supplied to the trade by Walter W. Woodruff & Sons Company of Mount Carmel, Conn. The construction of these fasteners is said to be such that they not only fasten the window tightly, but admit of its being put on or taken off in much less time than by any other method. No screws or screw eyes are left in the edge of the casing to interfere with the sliding of outside screens, and where wooden shutters



The Monarch Farm and Railway Gate.—Fig. 11. Locking Device of Monarch Gate.

are used in closing a building for an entire season these fasteners, it is claimed, will be found desirable, as they do not admit of the shutter being opened from the outside. The fasteners are coated with japan to protect them from rust. Some leaflets which the manufacturers are distributing give illustrations of the fasteners, together with directions for applying them. The manufacturers also call attention to them in their advertising space this month.

Asphalt Ready Roofing.

Asphalt Ready Roofing Company, 136 Water street, New York City, are manufacturing a two-ply asphalt roofing material which is covered with both medium and fine gravel, according to the use for which it is intended. Rolls contain 110 square feet of surface. Each strip has a smooth edge, 2 inches wide, on one side, for the adjoining strip to lap so as to insure a tight joint, which is accomplished by nailing it to the roof with galvanized nails. On flat roofs this seam is also sealed with hot asphalt, but on pitched roofs it is not necessary, it being laid on the principle of clapboards or shingles. This material can also be used for sidings for buildings, as hot weather will not cause the asphalt to run as it would tar or pitch. This roofing can be laid without necessarily employing skilled labor, which makes it generally marketable. It is also claimed that a building covered with this material in No. 2 medium gravel coating is cooler in summer on account of the white gravel in connection with the sun's rays, and the fact that asphalt is a nonconductor of heat. For railroad buildings it is being quite extensively used, as it will not catch fire as shingles do. It is also recommended for railroad sheds near the track, as the sulphurous gases from locomotive engines, which attack the edges of tin roofing, do not affect it. It is also used by railroad managers, we are advised, because carpenters and other unskilled labor, so far as roofing is concerned, can readily apply it. It is referred to as a good article in the smaller towns, as few tools and implements are necessary, although it can be used on various kinds of roofs anywhere.

The Monarch Farm and Railway Gate.

The Keystone Wire Fence Company of Peoria, Ill., are offering a gate possessing many points of construction likely to interest some of the readers of this journal. The center bar of the gate consists of a welded pipe, flattened at both ends, and fastened to the front and rear upright bars, which are of angle iron, in such a manner as to permit the front end of the gate to be raised over snow drifts or other obstructions, but holds the gate, it is explained, perfectly rigid in every other way. The weight of the gate is carried by a cable brace running from the forward end of the horizontal center bar to the top of the rear perpendicular bar. If the post to which the gate is attached leans so that the gate sags, the gate may be raised by twisting the wire brace by means of an iron rod or stick, inserted in the loop in the center. The barb wires are fastened to the front and rear upright bars, as shown in Fig. 11, the forward ends being fastened into eye bolts, making each wire separately adjustable. The gate can be obtained with woven wire instead of barb wire, if desired. The locking device is shown in Fig. 11 as it would appear to a person approaching the gate. In opening the gate the lever is pulled toward the person, which disengages the lever from the staple in the post, and allows the gate to swing open. It is explained that the front upright bar being mounted on the flat portion of the horizontal bar by means of a bolt and slot, as shown, the upright bar will slide backward about ⅜ inch, to the end of the slot, thus carrying only a portion of the tension of the strand wires on the horizontal bar when the gate is open. This feature is referred to as one of the peculiar advantages of the gate, as the manufacturers state that they are enabled to produce a gate of satisfactory efficiency with a much smaller quan-

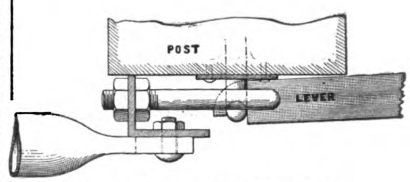


Fig 12.—Sectional View of Front Bar.

tity of material. Fig. 12 shows a section of the front bar and the mechanism as it appears when looking down upon it. The length of the slot is so adjusted, it is remarked, that while the extreme tension necessary to make the gate effective is released when it is open, there is still sufficient tension to keep the wires tight enough to preserve the good appearance of the gate. To shut the gate, it is closed against the fence post, and the hook part of the lever is engaged with the staple in the post, when the lever is swung toward the fence. It will swing slightly over the center and lock itself, at the same time drawing the upright bar forward and thus increasing the tension of the strand wires as much as may be desired.

Alcazar Design of Door Hardware.

Russell & Erwin Mfg. Company, New Britain, Conn., and 43-47 Chambers street, New York, have just

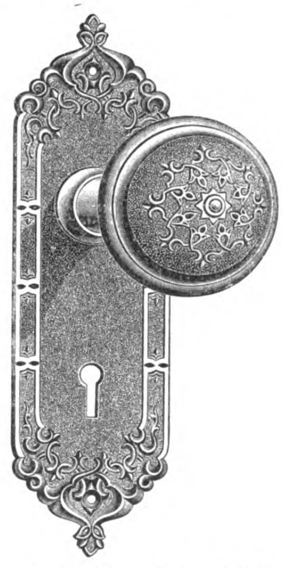


Fig. 13.—Alcazar Design of Door Hardware.

brought out the Alcazar Moorish pattern of hardware, shown in Fig. 13, for trimming front, vestibule and inside doors. This design is made in cast bronze, finished in old copper, mottled, and polished brass, natural color. There are also worked out in the same design various other pieces of hardware trimming, including push buttons, drop draw pulls, the various sash lifts, push plates, &c. They issue a monograph of 13 pages, fully illustrating the design in connection with the appropriate locks, giving dimensions and other necessary information.

The Robinson Tubular Furnace.

The prime requisite of a successful hot air furnace is a large expanse of heating surface to secure efficiency and economy. The Robinson tubular furnace, put on the market by the Robinson Furnace Company, 107-109 Lake street, Chicago, Ill., is made with these ideas in view. The Robinson tubular radiator is made with the top and bottom section of heavy cast iron, and a row of charcoal wrought iron tubes placed together inside of a heavy steel shell. At the rear there is an upper and lower smoke collar, with a cast iron elbow and a direct draft damper. In the front there is a large feed door and there are clean outs on each side. By this construction the tubes present a large amount of surface over which the air must pass before it can find its final outlet through the heating pipes, and before the air reaches the hot air pipes it is all thoroughly heated. The space between the tubes and the outer drum is divided into an upper and lower flue chamber by means of a horizontal partition. When the direct damper is opened the gases escape freely to the chimney, but when closed they rise from the fire chamber and are carried to the back of the drum, where they are spread right and left and pass in a lower chamber around to the front of the furnace, and then rise to the upper chamber and pass around to the smoke pipe. This construction not only makes an admirable hard coal furnace, but the furnace is also provided with a hot blast when soft coal is the fuel used, so that it can be burned without choking the furnace with the accumulation that would otherwise be deposited from the soft coal combustion.

TRADE NOTES.

EARLY in August L. A. Osborne, principal of the School of Design, Scranton, Pa., sailed for Europe, where he will make a study of the system of instruction in the principal art schools in England and France. We understand that Mr. Osborne has already visited many of the principal schools and colleges teaching ornamental design in the eastern part of the United States, in order that the course in that branch of study at the School of Design may embody the best material and be conducted upon the latest and most approved system. While abroad Mr. Osborne will visit the leading manufacturing districts of England and France, for the purpose of studying the theory of applied design as practically demonstrated by the designers employed in many of the plants in those countries.

THE KINNEAR MFG. COMPANY of Columbus, Ohio, are distributing among their friends in the trade a postal card of commercial size, one side of which carries illustrations of Kinnear's steel rolling doors and shutters and partitions. These are referred to as fire proof, simple and durable in construction, reasonable in cost and easy of operation. Special attention is directed to their automatic fire shutters, adapted for all classes of buildings; also to their fire proof elevator doors, freight, warehouse and factory doors, and to the partitions, as being particularly useful in churches and schools, where it is often desirable to divide a large room into several small ones, or *vice versa*.

"CREATING A GOOD WILL" is the title of a little folder especially intended to interest carpenters and builders, and just issued by the Cortright Metal Roofing Company of 50 North Twenty-third street, Philadelphia, Pa., and 134 Van Buren street, Chicago, Ill. The matter deals with the subject of roofing, more especially that furnished by the company named. They state that their roofing can be applied as easily as can wooden shingles, while the job will bring the customer the satisfaction which neither slate, tin or wooden shingles can possibly give. The company state that if the recipient of this folder is interested in the suggestions which they offer they will send him, on application, their illustrated book on roofing, containing a great deal of useful information on the subject.

THE SAWYER TOOL COMPANY of Fitchburg, Mass., present in their advertising space this month some interesting suggestions to carpenters relative to the combination squares which they are prepared to furnish. They intimate that the intelligent carpenter does not use soft pine but hickory when putting handles in chisels, and the company suggest that the mechanic will use the same judgment in buying combination squares. If the nearest hardware dealer does not keep them in stock they can be obtained by addressing the manufacturers as above.

THE LAWSON MFG. COMPANY, Milwaukee, Wis., advise us that their entire line of double acting matchless spring hinges has lately been improved to meet the requirements for fire proof buildings where steel beams are used, the extreme depth of hinge box for interior doors being now only 3½ inches.

THE BUSINESS of H. B. Ives & Co., New Haven, Conn., will hereafter be carried on as a corporation, under the name of the H. B. Ives Company, the *personnel* of the company being essentially the same as that of the old firm. The company have purchased a five-story factory at 11-17 Artizan street and equipped it with the most improved machinery, so that they can turn out a larger quantity and better quality of work than ever before.

THE RANSOME & SMITH COMPANY, 17 and 19 Ninth street, Borough of Brooklyn, New York, have issued from the press an attractively printed pamphlet calling attention to Ransome's patent concrete mixers, for which strong claims are made. The drum mixer, which is one of two distinct types, has a rotary barrel and is fed through an opening in the center of one of its heads. The material, after being mixed, is then automatically discharged through an opening in the other head. The other type of mixer is known as the continuous, which automatically measures and feeds the several materials separately in the required proportions, and then thoroughly mixes them. This mixer is built entirely of iron and steel and is placed on skids. It consists of four bins with easily adjustable openings, the bins receiving the cement and various aggregates, regardless of quantity or proportion. A number of pages in the pamphlet which has been issued are devoted to testimonial letters from engineers and others who have made use of the mixers.

THE KLAUER MFG. COMPANY of Dubuque, Iowa, have issued a new catalogue illustrating and describing the leading lines which they manufacture in the way of sheet metal cornices, skylights, roofing, siding, ceilings, &c. In their advertising space this month they call the attention of the trade to this fact and also show a style of cornice which they produce.

"METAL CEILINGS FOR SCHOOL HOUSES AND COLLEGES" is the title of a four-page folder, neatly printed in blue, which has been issued by the Berger Mfg. Company of Canton, Ohio. As might naturally be supposed from the title, the text is devoted to an exposition of the merits of metal ceilings and comparisons are made with plaster. Illustrations are presented showing the appearance of a schoolroom having a metal ceiling and of an interior showing the results which often obtain when plaster is used. The point is made that Berger's metal ceilings do not burn or wear out, and that they are nonabsorbent, cleanly, decorative and extremely economical. They are manufactured in both continuous and paneled designs, and the company make patterns appropriate for schools and other public buildings. Another point made is that the metal ceilings can be applied either to old plaster or wood, hence they can be used in old buildings as well as in new ones.

THE EGAN COMPANY department of J. A. Fay & Egan Company of 221 to 241 West Front street, Cincinnati, Ohio, have issued a large illustrated hanger showing nearly 100 of the different machines they make, and among them will be found some of the latest improvements in this line. A number of the machines have been patented since January 1, 1900, and an examination into their merits and capabilities cannot fail to prove interesting. The Egan Company will forward one of these hangers to any of our readers who may be interested and will write for it, and will also furnish prices and full particulars.

WALTER W. WOODRUFF & SONS COMPANY, Mount Carmel, Conn., are manufacturing Dolber's fasteners, for use on stationary outside window screens, storm windows and shutters. The fasteners are referred to as being particularly desirable where wooden shutters are used, inclosing a building for an entire season, as they do not admit of the shutter being opened from the outside. A feature of the fastener is that no screws or screw eyes are left in the ledge of the casing to interfere with the sliding of outside screens.

"SOME WORDS OF WISDOM ABOUT PAINT FOR THE MAN THAT PAYS THE BILLS AND THE MAN THAT OWNS THE ROOF" is the title on the cover of a little pamphlet which is being distributed by the Joseph Dixon Crucible Company of Jersey City, N. J. The text relates to Dixon's silica-graphite paint, the advantages of which are set forth in a way to interest the roofer as well as the builder.

Carpentry and Building

WITH WHICH IS INCORPORATED

The Builders' Exchange

VOL. XXII. NO. 10. NEW YORK, OCTOBER, 1900. Ten Cents a Copy. One Dollar a Year.

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JOHN P. KINGSTON, Architect.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

OCTOBER, 1900.

The Chicago Building Trade War.

The labor troubles in the Chicago building trade have been quite frequently reported to be on the verge of a settlement. In fact, so positive have been some of the statements thus made that the impression generally prevails outside of Chicago that the lockout has either been ended or is now comparatively insignificant in its extent and character. While this to some extent is true, owing to secessions of quite important firms from the ranks of the contractors, and while withdrawals of certain unions from their federation have occurred, the contest is still in progress. Each of these breaks, as it took place, has been considered an evidence of the disintegration of the opposing forces, and has, therefore, given rise to the belief that the end of the controversy was at hand. But despite the yielding of some of the wearied parties, the main fighting line has been preserved and the leading combatants still regard each other with stubborn determination. This is one of the longest labor conflicts of any magnitude in the building trades which this country has known, and its great duration may therefore be counted a sad commentary on our supposed progress toward the adoption of rational methods of settling labor disputes. Reflecting upon the conditions which have thus prevailed in Chicago for so long a time, it is surprising that a settlement of some kind has not been accomplished. A very large part of the business of the second city in the United States has been in a condition of paralysis for about nine months, awaiting a test of endurance between two sets of men. They are not the only ones interested, because the entire community is more or less affected by the great shrinkage in building operations, while manufacturers or producers of materials in quite distant localities have also suffered from the curtailment of their usual Chicago demand. Millions of dollars have been lost which cannot be made up, as the possible returns from this year's activity are irretrievably gone.

If the contest had been solely over rates of wages or hours of labor it is not probable that it could have continued so long, because in the nature of things a compromise would have been made after a reasonable test of strength. But this controversy is unique. The contractors are contending for freedom from the tyranny of walking delegates and for the abolition of restrictions on the amount of work a man may do in an eight-hour day. The fight over these questions had been brewing for a long time and it seemed inevitable. Coming this year it has prevented Chicago from reaping any large measure of the benefits of the prosperous times which the country in general has enjoyed. That this serious situation may speedily be ended is most earnestly desired. Winter is rapidly approaching, when but a limited amount of outdoor work can be done. On the one hand are the contractors and material men, who are suffering losses in their inability to conduct business, possibly facing bankruptcy in having obligations to meet, while on the other hand are thousands of workingmen and their families, whose income ceased when the head of the household was thrown out of employment early in the year. The city authorities and local charitable institutions will have a very serious problem on their hands this winter if the dispute is not soon settled.

Pittsburgh's New Office Buildings.

A building which will constitute an important feature of the architecture of Pittsburgh is the new 12-story structure which is being erected at the corner of Fourth avenue and Smithfield street for the Pittsburgh Bank for Savings. The bank will occupy the greater portion of the ground floor, while the second floor will be devoted to the Pittsburgh Stock Exchange, many members of which will doubtless occupy offices in the building. A feature of the equipment will be an ice plant in the basement for supplying the tenants with ice free of charge, and which is referred to as an innovation in office buildings in that city. There will be in each office a portable burglar and fire proof safe, while the bank itself will have a special vault two stories in hight. The drawings of the building were prepared by Alden & Harlow, and it is expected that the structure will be ready for occupancy by April 1 next. Another office building of the same hight has been designed by Architect Charles Bicker, for erection at the corner of Diamond and Grant streets, the estimated cost of which is placed in the neighborhood of $300,000. The new building will be constructed of light buff brick with stone trimmings, and the outside ornamental work will be of terra cotta. The entire first floor and vestibule will be laid with Georgia marble slabs and the main stairs will be of white Vermont marble. The corridors and halls above the first floor will have Tennessee marble, except the second story stair hall, which will have white Italian marble as a base. The floors will be laid in mosaics. When the building is completed it will rank among the most attractive in the city.

Wages and Living in Europe.

The theory that the European mechanic is able to live as comfortably, on his smaller wages, as his fellow workmen in this country, because of the cheaper cost of the necessaries of life on the other side of the Atlantic, does not tally with actual experience. While the rent paid by the average foreign workman may be less than that paid here, this advantage is in nearly all cases offset by the comparatively higher cost of food and clothing in Europe. As a case in point, a recent report by United States Consul Covert of Lyons on labor conditions in France contains some interesting comparisons that are worth quoting. The Consul states that while wages are much lower in Lyons, the second city of France, than in the United States, the cost of living is higher, if the quality and quantity of food be considered. In illustration of his first statement he presents the schedule of wages per hour in the building trades in Lyons at the present time, which is, for carpenters, 13½ cents; masons, plasterers and painters, 12 cents; plumbers, stone cutters and chimney builders, 11 to 12 cents, and laborers, 9 cents. The prices of fruit, vegetables, meat, fish and all prime necessaries of life are higher in France. Ordinary white sugar costs from 11 to 11½ cents per pound. An inferior article of coffee costs 33 cents per pound; a good article, from 60 to 90 cents. Tea costs from 50 cents to $1.20.

The tariff duty is 5 cents per pound on sugar, 13.96 cents on coffee and 18.25 cents on tea. Fish ranges from 20 to 60 cents per pound. Beef, mutton, veal and pork cost from 20 to 30 cents per pound. Everything sells in the butcher's shop—bones from 2 to 4 cents per pound, the latter figure including marrow. Liver brings 20 cents. While certain kinds of textiles, locally manufactured, cost from 25 to 50 per cent. less in France than in this country, the prices of ready made goods are about the same in both countries. Cotton goods, sheeting, ginghams and calicoes are generally cheaper and of better make in the United States than in France, and the same is true of house furniture, utensils, &c. Under the circumstances, the Consul concludes that if people live more cheaply in France than in America, it is because they do not live as well and have not the means to live better. And what is true of France is equaly true of Germany, Belgium and other Continental countries. In Great Britain the position of the working population is better, but still materially below that of the American craftsman. It may be taken as an incontrovertible proposition that the average American artisan enjoys twice the comforts and luxuries of his European contemporary. He has more and better food, is better clothed and possesses more household comforts and generally has more money saved up for a rainy day.

Rural Telephony.

It appears that the Western farmers can give our Eastern cities points in the matter of cheap telephoning. A wonderfully economical telephone system for the use of farmers is reported to have been developed in Indiana and other agricultural States in the West through the medium of the wire fences. A line on this plan, fourteen miles long, between the towns of Anderson, Pendleton and Ingalls, Ind., is in active daily operation and gives a service which is reported as comparing favorably with the lines of the regular companies. It employs as a conductor the top wire of a barb wire fence, the continuity of the line being assured by special devices at highway and railroad crossings. The builder of the line, in using the top wire of the fence, treated it to a generous coating of rubber paint to secure the proper insulation. At the fence sections common galvanized wire is used to continue the circuit to a connection with the next fence. A similar arrangement is carried out at the road or railway crossings, where, in order to carry the line across, the circuit is either placed beneath an inverted trough, covered by the material of the road, or is carried overhead by means of two poles, one on each side of the crossing. The cost of this telephone outfit is extremely low, as there is no expense for copper wires, and poles are only needed at the crossings, while the service secured is said to be all that could be desired. Local farmers say they have used the "fence line" to converse with friends ten miles distant, and this at a time when the fence posts were still saturated with the morning dew—a condition under which the line is supposed to work with the least satisfaction. So successful has been the system described that it has been widely copied, and farmers in various other districts have organized companies for the purpose of placing themselves in communication with their neighbors by means of the fence wires. If we remember aright, some such system has also been in use for some time in parts of Australia, where telephone communication over the fence wires has been carried on between farms as far as fifty miles apart.

AMONG the American architects awarded medals at the Paris Exposition were the following: Gold medals—Boring & Tilton, New York; McKim, Meade & White, New York. Silver medals—Cope & Stewardson, Philadelphia; Frank Miles Day & Brother, Philadelphia; Flagg, Benson & Brockway, New York; Peabody & Stearns, Boston; George B. Post, New York; Rutan & Coolidge, Boston; Warren Whitney, New York. Bronze medals—D. H. Burnham, Chicago; Bruce Price, New York; Haydel & Shepard, New York.

Position of Fuel Room in Wood Working Shop.

Some of the designs of small wood working shops awarded prizes in the competition conducted by this journal early in the year were republished by the *Wood Worker*, as likely to interest many of its readers. A correspondent of that journal, H. E. Kern, commented in a recent issue on the dangers likely to result from the position of the fuel room as shown in the design awarded the first prize. He says that "while the plan seems ideal in most respects, one feature of it would bring disaster by fire if the proper precautions were not used. That feature is the fuel room being immediately against the boiler wall, or forming a partition. If there is no air space between boiler wall and the wal forming one side of fuel room, should at any time the fuel rise as high as the fire under boiler, even if it be coal, the same would ignite through a wall, even if it be 2 feet thick. This no doubt has caused many fires.

"A hot fire under a boiler will cause, if there be a compact on the other side, the bricks to become red hot clear through, and will ignite the compact if same is combustible. A few years ago a large pile of coal, dumped against a boiler wall at our city water works was ignited that way, through a 2-foot wall. This seems incredulous, nevertheless is a fact. Having at the same time changed our mill and placed the fuel room in just the same proximity to the boiler wall, we had a practical illustration of consequences by the incident referred to. We changed our mind and have never used this room for fuel purposes, but have built one separated some distance, so that the walls of boiler do not form part of fuel room. We have the door opening near front of boiler, so the fuel can be drawn out when needed, and then tightly closed again. This door should be made of boiler iron, or lined with tin, and at night when the mill closes down, all fuel should be cleared from in front of boiler and the floor in front of boiler and fuel room should be dampened, to prevent communication of fire to fuel."

Buildings in Philadelphia.

An interesting statement showing the number of buildings in Philadelphia has been compiled by Assistant Clerk Theodore James from data furnished by the real estate assessors, says a late issue of the *Record* of that city. There are 258,685 dwellings in the city, 21,088 of which are partly used as stores, and 21,371 other structures, making a grand total of 285,056. Many of these include churches, hospitals, libraries and other public or charitable institutions exempt from taxation. The total assessed valuation of all that are subject to real estate tax is $879,295,355. Besides the dwellings enumerated, the following statistics of buildings were obtained: There are 5536 buildings used exclusively for business and store purposes, 2467 factories, mills and foundries, 2332 shops not coming under the head of factories, 130 breweries, distilleries and malt houses, 76 banks, savings and trust companies, 390 office buildings, 239 hospitals, asylums and other buildings used for like purposes, 147 schools under religious control, 12 colleges, 18 libraries, 261 theaters, halls, &c., 773 churches, 275 public schools, 328 other properties owned by the city, State or general Government, 234 railroad stations and engine houses, 10,463 slaughter houses, stables and hothouses, 689 warehouses and storage buildings, 1747 miscellaneous small buildings, and 254 steam power houses.

BRICK AND FRAME RESIDENCE AT WORCESTER, MASS.

WE take pleasure in laying before our readers this month the design of a modern residence, embodying a number of striking features, both as regards the external treatment and the arrangement of the interior. The half-tone supplemental plate which accompanies this issue is a direct reproduction of a photograph of the completed building, taken especially for our purpose, while the elevations, floor plans and constructive details found on this and the pages which follow, afford an excellent idea of the general arrangement and construction. The design is one which should attract more than passing attention by reason of the cobble stone second floor, where there is a commodious hall lighted from one end. On the second floor there are four sleeping rooms, a sewing room and bathroom, with commodious closets. Each of the sleeping rooms is lighted from two sides, thus giving plenty of light and ventilation. While there are no rooms finished in the attic, there is ample space for three, as well as for storage purposes.

According to the specifications of the architect, the foundation walls are built of junk quarried stone, laid dry and flush, pointed up on the inside. The underpinning above grade, as well as the work around the front

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

Brick and Frame Residence at Worcester, Mass.—John P. Kingston, Architect.

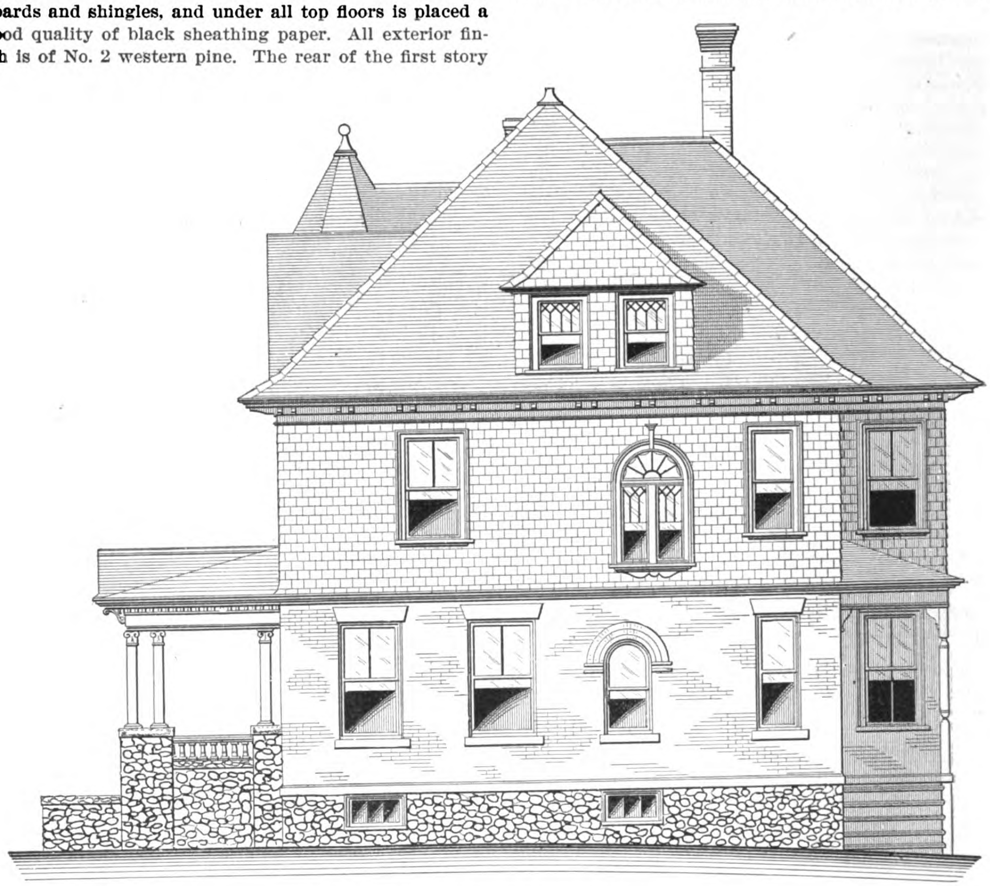
foundation for the main building and for the lower portion of the veranda, which extends entirely across the front of the house and part way round on the left side. An inspection of the photographic view and the elevations shows the first story to be of brick, and the second story, gables, dormers, &c., to be shingled. The central entrance gives a rather imposing effect, and at the same time offers an opportunity for spacious rooms at the right and left of the main hall.

An examination of the plans shows such a disposition of the entire space as to give rooms which are nearly square, while the position of the stairs renders them readily accessible from every room on the main floor. The front door may be reached from the kitchen without the necessity of passing through any other room, while communication between the kitchen and dining room is established through the butler's pantry. There is also a flight of stairs leading directly from the kitchen to the veranda, as shown, is laid up with selected dark cobble stone, with joints pointed in Portland cement and ruled. The cellar is 9 feet in the clear, and all exposed parts are whitewashed. The outside of the foundation walls is protected from the action of frost by 6 inches of rolling mill cinders, extending from the bottom of the wall to the grade line. The capping on top of the veranda walls is 5 inches thick. The water table is 6 inches thick, and the walls 5 inches thick, all of brown stone.

The front and two sides of the first story are veneered or covered outside of the boarding with light colored pressed mottled brick, laid in mortar to match. There is an air space of 1 inch between the brick and the frame work, the brick and stone trimmings being well fastened to the walls with metal ties. The chimneys are laid up with light mottled brick and lined from the bottom to the top with terra cotta flue lining.

The framing is of the balloon style, the lumber being sound spruce. The girder under the main partition is 8 x 9 inches; the sills, 4 x 7 inches; the first floor joist, 2 x 9 inches; the second floor joist, 2 x 8 inches; the attic joist, 2 x 7 inches; the collar beams, 1 x 7 inches; the rafters, 2 x 4 inches; the main partition studs, 2 x 4 inches; the minor partition studs, 2 x 3 inches; the corner posts, 4 x 6 inches, and the wall studs, 2 x 4 inches. The studding and posts are mill jointed, and the joist and studding placed 16 inches on centers, while the rafters are 24 inches on centers.

The inclosing boards are of ⅞-inch matched spruce. The roof boards are of hemlock, laid open from 2 to 3 inches. Under all outside finish, brick veneer, clapboards and shingles, and under all top floors is placed a good quality of black sheathing paper. All exterior finish is of No. 2 western pine. The rear of the first story



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

Brick and Frame Residence at Worcester, Mass.

of the house is covered with 6-inch clapboards laid 4¼ inches to the weather, and the upper story, as well as the gable, is covered with shingles. The roof is covered with best quality sawed cedar shingles. The floors of the veranda are 1⅛ inch Southern hard pine, and the ceilings are finished with ¾-inch hard pine sheathing. The front door is of quartered oak 1¾ inches thick, with leaded side lights, as shown.

The ceilings are cross furred with ⅞-inch spruce strips, placed 16 inches on centers. The lining floors are of ⅞-inch planed spruce, the second floor being laid diagonal. The finished floors in the kitchen, pantry, lavatory, rear entry, second-story hall and bathroom are laid with ⅞-inch matched birch, while the vestibule, front hall and dining room have selected red birch, with border. All other top floors are square edge pine.

The vestibule, front hall and dining room are finished in quartered oak; the parlor in white wood, painted; the sitting room in red birch; the kitchen and adjoining parts in hard pine, and the second floor in white wood. The kitchen and entry are wainscoted 3 feet 6 inches; the bathroom, 4 feet, and the pantry, 2 feet 8 inches high. There is a paneled wainscoting with chair rail in the dining room, detail of which is found on one of the pages which follows.

The staircase is of selected quartered oak, closed in with buttress, turned balusters and square paneled posts.

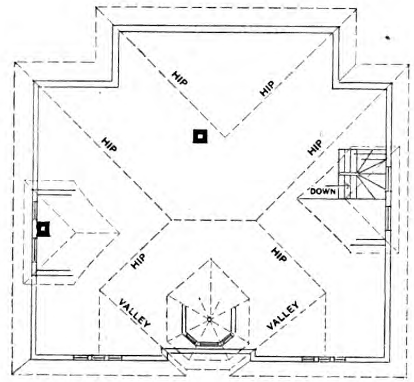
The outside of the house is painted two coats, the side walls and roof shingles being stained. The inside hard wood is filled, varnished and rubbed to get an egg shell finish. The second story and parlor are painted two coats of lead and oil.

The plumbing is of the exposed type. The sink and set tubs are of soapstone; the hot water boiler of copper, and the wash bowls with slabs of Italian marble. The bathroom is fitted with siphon closet and roll rim porcelain lined iron tub. All exposed pipe and fittings are brass, nickel plated, and the other pipe is of lead. The house is piped and fitted for gas lighting, and wired for electric, gas and incandescent lighting. The heating of the house is accomplished by a Kelsey furnace, made by the Kelsey Furnace Company of Syracuse, N. Y.

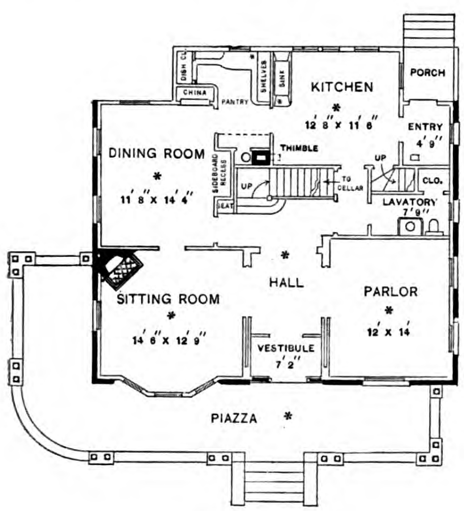
The residence here shown is pleasantly located on North avenue, Worcester, Mass., and was erected a little more than a year ago at a cost of $4500, for and by F. J. Goff, in accordance with drawings prepared by John P. Kingston, architect, of 518 Main street, Worcester, Mass.

Hints in Estimating Plastering.

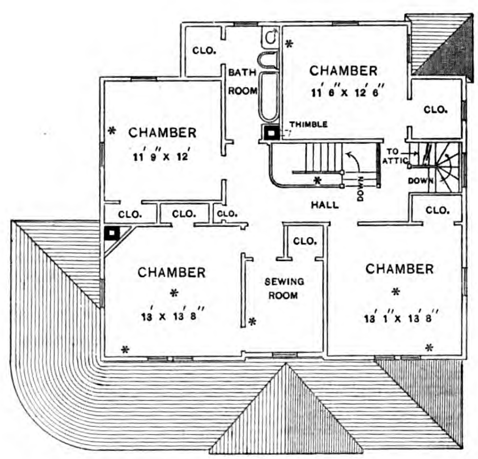
Plastering is generally measured by the yard superficial, and openings of less extent than 7 yards are not deducted. Returns of chimney breasts, pilasters or angles less than 12 inches wide, measure 12 inches. Base boards 6 or less inches wide are not deducted. In closets add one-half to the measurement. Circular or elliptical work charge two prices, and for domes or groined ceilings three prices. For each 12 feet in hight add 6 per cent. extra. Cornices and centerpieces in buildings more than 18 feet high in the first story, says a writer in the Canadian *Architect and Builder*, should have 5 per cent. added to cover scaffolding and extra labor and time in getting material up. Centerpieces, paneling and extra stucco work must be charged the regular prices for such work put in similar positions. Plaster brackets, consoles, rosettes, strap work or other similar productions must be charged at current rates. Rough casting on brick or stone in lime and fine gravel in two coats should be charged at the rate of from 16 to 20 cents per yard, according to cost of materials and labor. Rough casting on frame buildings, including all materials and lathing, two-coat work, lathing diagonal double, should be charged up at the rate of from 26 to 30 cents per square yard. Plain cornices and moldings, per inch girth and foot running, from 2 to 3 cents for each inch girth; so that a plain cornice measuring 15 inches girth must be charged from 30 to 45 cents per running foot, according to cost of material and rate of wages. This price also includes the dubbing out and putting up rough brackets wherever they are necessary and the extra lathing. All miters over four in number are to be charged each at the price of a foot running of molding, except in halls or small rooms under 14 x 16 feet; then all miters should be paid for extra. Lathing alone, laths and nails included, should not be charged less than 10 cents per yard super. Lath and plaster one coat, material included, 17 cents per yard. The same, set with fine stuff, 22 cents per yard. For two-coat work, floated, 26 cents per yard. For two-coat work, gauged in plaster of paris, 30 cents per yard. If done in Portland cement, one of cement and three of lime mortar, charge 26 cents per yard for one-coat work; if two-coat work, charge 32 cents per yard. For rendering on brick wall, one coat with common mortar, charge 10 cents per yard; for two coats and set with fine stuff, charge 25 cents per yard. For colored finish in stone, buff, salmon color, French gray, blue or lemon color, and 4 cents per yard to above prices. For lime washing in one coat, charge per one square (100 feet), 10 cents; if twice done, 20 cents per square; with whiting and size in one coat, 11 cents per square; for two coats, 21 cents per square. Scraping off old whitewash and stopping old walls to receive new wash, charge 15 cents per square. If the plaster is much broken, extra for putting on new plaster must be charged, and for this work about 3 cents per foot super must be charged for repairs of walls, and if color is to be matched, 4 cents per foot. For repairing ceilings, hacking off old plaster and putting on new, including scaffolding and material, from 4 to 6 cents per foot should be charged. If colored to match ceiling, add another cent per foot; if gauged with plaster of paris, add 1½ cents per foot. For taking down old plastering and lath, and removing rubbish to outside of building, charge 7 cents per yard, and extra if rubbish is removed to some distance from the building. For taking down old scantling or rough casting and removing rubbish to outside of building, including wetting, dubbing out, and other necessary work in preparing wall for receiving new plastering, charge from 7 to 8 cents per yard. Taking down old plastering or lathed walls or ceilings without renewing the lathing, including renailing the laths where necessary and removing rubbish to outside of building, charge 6 cents per yard. Walls which are warped or out of line should be screeded by applying horizontal strips of plaster mortar 8 or 10 inches wide and 3 or 4 feet apart all over the surface. These screeds should be made to project out from the first coat and form gauges or work-



Attic with Outline of Roof Plan.

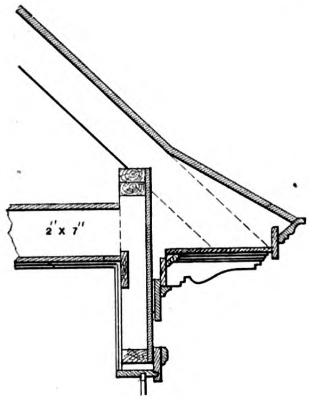


First Floor.

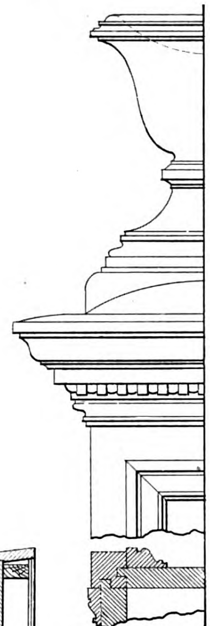


Second Floor.

Brick and Frame Residence at Worcester, Mass —Floor Plans.— Scale, 1-16 *Inch to the Foot.*

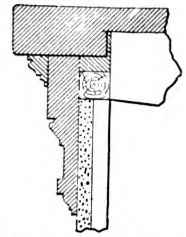


Detail of Main Cornice.—Scale, ½ Inch to the Foot.

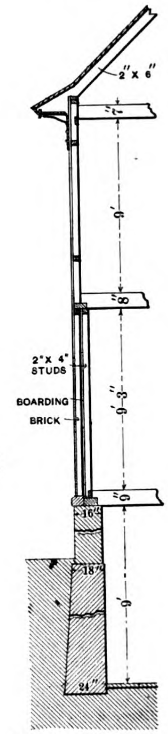


Detail of Newel Post. Scale, 3 Inches to the Foot.

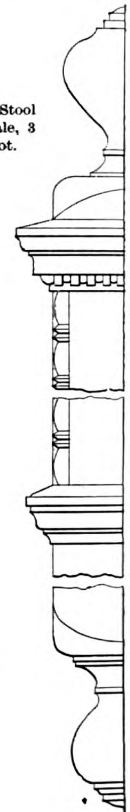
Detail of Baluster. —Scale, 3 Inches to the Foot.



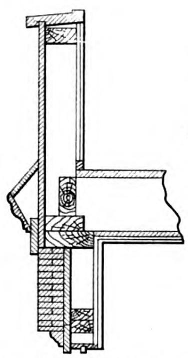
Detail of Window Stool and Apron —Scale, 3 Inches to the Foot.



Section through Main Wall.—Scale, ⅛ Inch to the Foot.

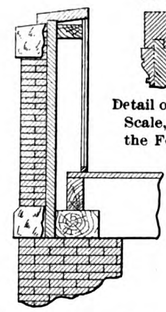


Detail of Angle Post at Landing on Main Stairs.—Scale, 3 Inches to the Foot.

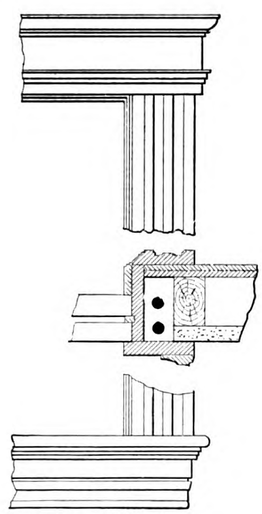


Detail of Belt Course. —Scale, ½ Inch to the Foot.

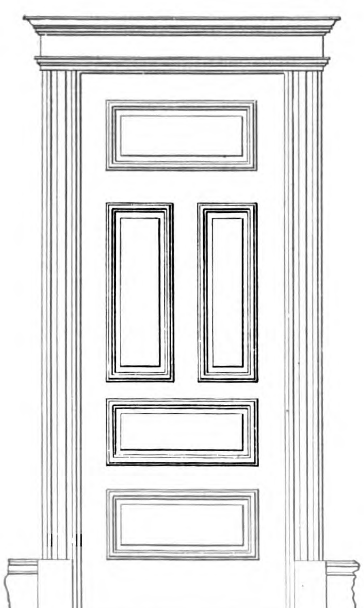
Base Mold. —Scale, 3 Inches to the Foot.



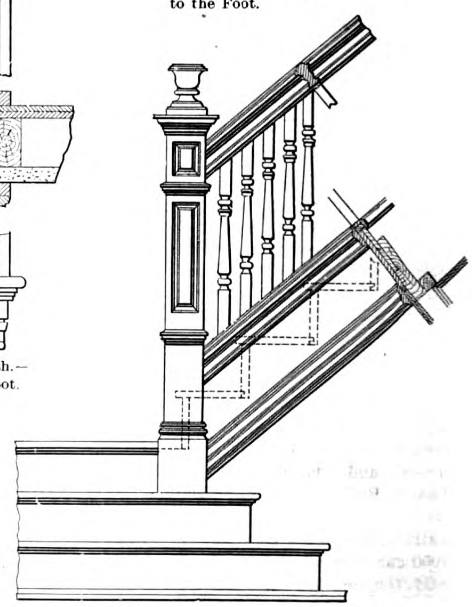
Detail of Water Table. —Scale, ½ Inch to the Foot.



Details of Window Finish.—Scale, 1 Inch to the Foot.



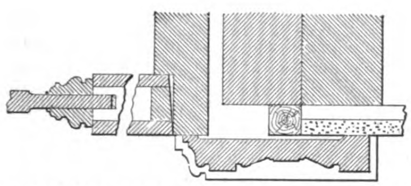
Style of Door on First and Second Floors.—Scale, ½ Inch to the Foot.



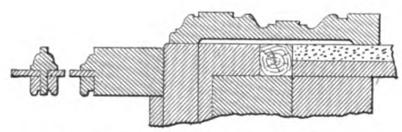
Partial Elevation of Main Stairs.—Scale, ½ Inch to the Foot.

Miscellaneous Constructive Details of Brick and Frame Residence at Worcester, Mass.

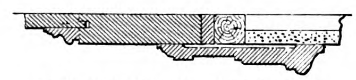
ing guides to which to fill up the hollow portions of the wall. They must be taken out of wind and be plumb with the walls; then a straight edge, reaching from one to another, will show the defects in the wall, which must be corrected by the workman. All this labor and material must be chárged up in estimating independent of the regular measurement per yard. This, of course, only relates to old walls. Pugging is the term employed to denote the method of lining in the spaces between the floor joists, which is usually done with coarse stuff, and is intended to prevent the passage of sound from one story to another. This is also termed "deafening with mortar." This may be charged by the yard or by the lump; if by the yard, which is the proper way, it is worth from 3 to 5 cents per yard, the lower price for the lower stories and the larger price for the upper stories. Mortar láid on roof boards under shingles, ½ inch in thickness, is worth from 1½ cents to 2 cents per yard, according to the quality of the mortar and the hight of the roof. This price, of course, includes labor and all materials.



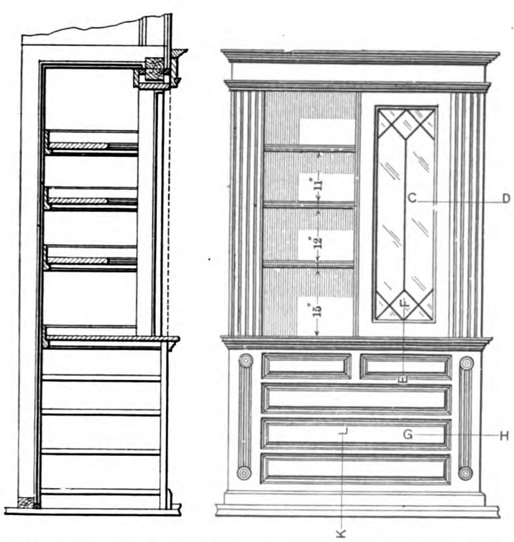
Detail of Side Finish in Vestibule, Halls, Parlor, Sitting and Dining Rooms.—Scale, 3 Inches to the Foot.



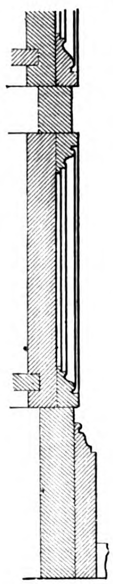
Section of China Closet on Line C D.



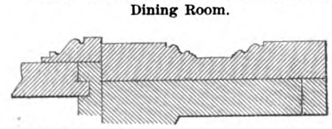
Detail of Panel Work and Chair Rail in Dining Room.



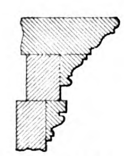
Section and Elevation of China Closet – Scale, ¾ Inch to the Foot.



Section on Line K L.

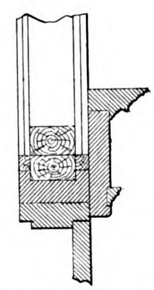


Section of China Closet on Line G H.



Section at E F.

Scale, 3 Inches to the Foot.



Top Finish in Vestibule, Halls, Parlor, Sitting and Dining Rooms.—Scale 1½ Inches to the Foot.

Miscellaneous Constructive Details of Brick and Frame Residence at Worcester, Mass.

Air Supply to Theaters.

Authorities differ materially on questions of air supply and ventilation. Some theorists advocate 3000 cubic feet of fresh air per person per hour, or 50 cubic feet per minute, and this amount is generally required, as in the Boston Building law for theaters. This amount is liberal compared with the requirements of other municipal authorities—as, for example, the law in Austria, requires 1050 cubic feet per hour per person—an amount less than half the former; but it stipulates there should be an interval of two and a half hours between matinee and evening performances, so that the air may be thoroughly changed. Still less in amount is the requirement of the Prussian Public Works regulations, which put the amount required per person per hour at only 700 cubic feet. It is stated also that Professor Pettenkofer recommends an air supply of 1410 to 1675 cubic feet per hour (23 to 28 cubic feet per minute). Dr. John S. Billings, an expert on ventilation, recommends 30 cubic feet per minute, or 1800 cubic feet per hour. The allowance made in some leading theaters, Continental and American, is also very conflicting. The Vienna Opera House, one of the best ventilated theaters in the world, has an air supply of 15 cubic feet per person per minute, while at the Madison Square Theater, New York, the supply is given as 25 cubic feet per person per minute, or 1500 cubic feet per hour. Between these two quantities it may be safe to rely. If we were to take the London theaters as a guide, the quantity of fresh air allowed is considerably smaller, to take their stuffy atmospheres in parts of the house. The Paris theaters are better provided. Many of them are ventilated on the downward system, as advocated by Gen. Arthur Morin, the air being exhausted by numerous openings under the seats. At the Théâtre Lyrique, Théâtre de la Gaité, and the Théâtre du Cirque, a combined system was carried out, the fresh air being admitted at both sides of the stage opening high up, and also through hollow floor channels for the balconies and boxes. In the gallery the openings were placed in the risers of the steppings and on the parquet; the air was exhausted by openings under the seats. In America the downward system of ventilation is largely followed in the leading theaters; but whether these are all successful we should not like to say. One German authority (Professor Fischer) declares that for audience halls lighted by gas the upward system is to be preferred. The great objection to the "downward" system is that the exhaled air from the higher tiers mingles with the descending pure air, and this is certainly objectionable.

ESTIMATING MASONS' WORK

QUESTIONS concerning the proper method of estimating masonry work are constantly arising in the practice of many building mechanics, and it may not be without interest to present a few suggestions contributed by a well-known writer to a recent issue of the *Canadian Architect and Builder*. According to this authority it is necessary to consider the following conditions in making estimates for wrought stone or for stone work in the wall:

For plain ashlar walling and paxwint walling the measurement must be super, net, for stuff and labor, the kind of face and average sizes of stones and bed considered, and allowance made where square blocks must be cut to suit shape of openings, molded or ramped to form curves. Reveals are always measured extra. Rubble walling up to 18 inches in thickness is generally measured superficial, or it may be measured cubic, as all over that thickness is. Other masonry is usually measured as described, labor and materials being kept separately, or when conducing to a better understanding of the work, as in strings and similar work, labor and material may be "figured" up by the running foot, making due allowance for work and number of joints, counting the ends, quoins and miters. Work on chimneys, cornices, towers, spires, &c., requiring special appliances for hoisting, or at any considerable hights, or of extra dimensions, to be kept separate so far as material, hoisting and setting are concerned, the labor of cutting being added, whether being done by the day or by piece work. The cost of cutting and finishing, mortising for lewis, bolts, &c., can only be estimated when the style of work and character of stone is known. The use of hoisting appliances of any kind must be charged for, according to the cost of such machines and the expense of running them, whether by hand, horse-power or steam. When measuring drawings for stone work ample allowance must be made for cutting, so that each stone will exceed net dimensions from 1 to 3 inches in all its dimensions. This is an important item.

Labor Estimate.

In estimating for labor alone, the beds and joints of each block should be measured and accounted for, and where courses are similar, one accounting will serve for all. Where a number of window or door openings are alike the figures for one window or one door opening will answer for all similar windows or doors. The various styles of work should be classified under different heads, and charged for accordingly, whether it be borted, tooled or polished, sunk, molded, weathered, sunk and weathered, straight, raking, single or double curved, raised or sunk paneled, or plain. All circular work should have the material charged up as square blocks having sides equal to diameter of the work if such are columns, capitals, finials or other similar work. Segment work will require square blocks as large as the plan and section of the segment.

Work to be paid for by "face measurement" should be girthed with a tape line taking in all projections and indentations, and all corners should be taken at their greatest dimensions. Where a wall has two faces—that is, both sides finished—extra allowance must be made, if wall is built per cubic foot; if built by "face measurement," then both sides of the wall must count. Holes left for flues or for timbers of any kind should be charged for, as much time is spent laying off and building in.

The setting of window and door frames with the bedding thereof must be considered, and charged up in accordance with their size, style and position in the building. Window and door sills vary in size and style, and this must be seen to, the actual size and style ascertained before price is determined, when each kind may be figured on separately. Tracery or other intricate work should be considered separately, as the labor on such work nearly always exceeds the cost of material and requires most costly skill to execute. Each piece or class should be estimated by itself, independent of its surroundings.

Columns should be girthed for circular work, with or without entasis, as the case may be, the latter being more costly than if parallel or straight taper; and flutes, for the labor, should be measured lineal, and number of stops counted and charged for; if of an extra length, an additional percentage must be added to the cost. Cramps and dowels must be charged up, with average size and weight when of metal, and for labor and material if of wood or cement. Copings, when worked out of flags or thin stones, may be measured lineal, or net when in place, including labor, cement, material and setting.

Stairs or Stone Steps.

Stairs or stone steps, with newels, balusters and rail, may be counted as complete, or they may be counted at so much per step, with rail, newel and balusters included, and all labor and material included. The cost will, of course, depend very much on the style and character of the work, which the estimator must consider. Landings, half or quarter spaces, or rests of any kind in stairs, may be measured per cubic foot, which may include all joints worked, edges, soffits, moldings, bases, plinths or other work, or they may be measured super with extra amount added to cover foundations and other hidden work. It is better, perhaps, to measure cubic and charge per foot.

Mason work generally requires very minute subdivision in taking measurements for estimating, and an intimate knowledge of the various methods of working stone, in order to get at anything like a fair estimate of the cost of any piece of work that is enriched in any way. Each necessary operation of the workman should be taken into account, although it may appear that the same surface, as in paneled and carved work, has to be measured more than once for different descriptions of work. The correctness of an estimate for stone work where there is much enrichment will depend altogether on the knowledge of masonry possessed by the estimator, and any contractor who is not experienced in the art should be wary of relying on his own figures in such cases, and, as is done by many firms, it is always wise to consult the skilled workman when any doubt exists as to the cost of any particular kind of stone work. It is better to be sure than to be sorry afterward.

Moving a Hotel.

One of the greatest pieces of engineering work in the building moving line in Boston or vicinity is the removal of the Hotel Wollaton, on Beacon street, Brookline, Mass. The brick and stone structure is said to weigh something like 40,000 tons, and is to be raised from its foundations by means of some 1000 jacks, and moved in all to a distance of 136 feet. We understand that the building was lately declared unsafe on account of the sinking of certain piles upon which the foundation was supported, and the present plan contemplates the removal to new foundations. In doing the work, it will be necessary to take down four sections of wall in the rear, and rebuild them, besides the removal of several hundred cubic yards of brick and stone masonry from the basement, and taking out 55 old piles and putting in 780 new ones. For the new foundations sound, straight spruce piles, not less than 9 inches in diameter when cut off at the grade, and not less than 6 inches in diameter at the point, will be used. Among the preliminary work will be the securely tying together of the outer and inner walls of the building, by means of iron rods and heavy wooden beams on the second, fourth and sixth floors.

CONSTRUCTING INSIDE WINDOW SHUTTERS.

A PIECE of work which the carpenter is occasionally called upon to execute is the construction of inside window blinds or shutters, involving features which are doubtless more or less puzzling to many among the younger members of the craft. The illustrations which we present herewith may therefore afford suggestions to those interested in this particular line. The engravings are made from drawings furnished by H. E. Barclay of 9 Newcombe street, Quincy, Mass., and from his description we take the following:

In laying out inside folding blinds it is necessary to consider the size of the window to be fitted, whether four or six folds are to be employed, and if pockets are provided into which they may fold when open. The arrangement here shown is intended for frame houses with 4-inch wall studs, pockets being provided into which the shutters may swing when open, and having paneled backs. The arrangement of the finish is such that when the shutters are folded back they appear as a paneled jamb, which renders them compact and convenient, with little waste room, and at the same time they do not interfere with the proper trimming of the window, as the shades and lace curtains are provided for, as clearly indicated in the detail representing the vertical section through the head.

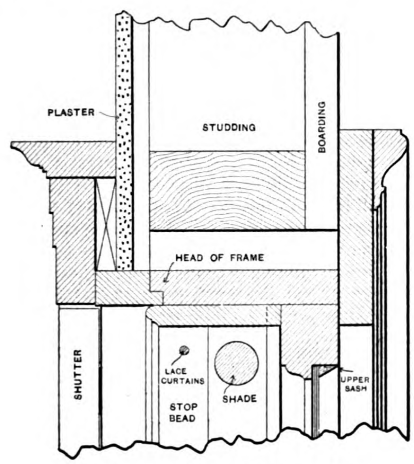
The different folds are hung so that they will swing in the same direction, the middle leaf occupying a position near the center when the shutters are folded in the pockets. This hanging cures the tendency which shutters have to swing out of the pocket. For windows more than 3 feet wide the same plan may be adopted by furring the finish 1 13-16 inches forward into the room, or by furring the walls until they will allow room in the pockets for six folds—three to a side.

The third folds are generally hung with surface hinges, while the outer or hanging fold can be hung with narrow blind butts, with loose pins and ball tips, so that the shutters may be easily removed without taking out screws.

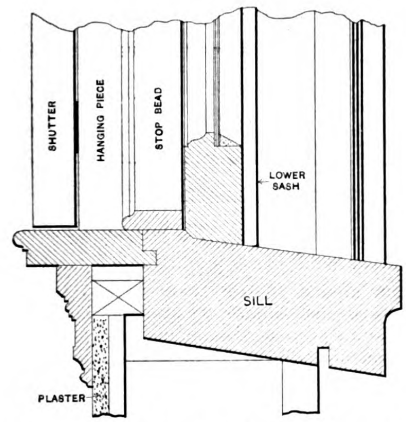
The usual method of fastening shutters at the center is by the use of shutter bars, which are made reversible, so that they can be used for either left or right hand. In order to pull the shutters from the pocket a small knob of porcelain or bronze should be placed on the upper face of the hanging fold.

The upper sections are usually fitted with rolling slats, and in the best blinds these slats do not have a rod in front, but are fitted with metal bars at the ends, which cause them to work better and take up no space. As a general thing the shutters are constructed of the same wood as the finish of the room, although this is not always the case.

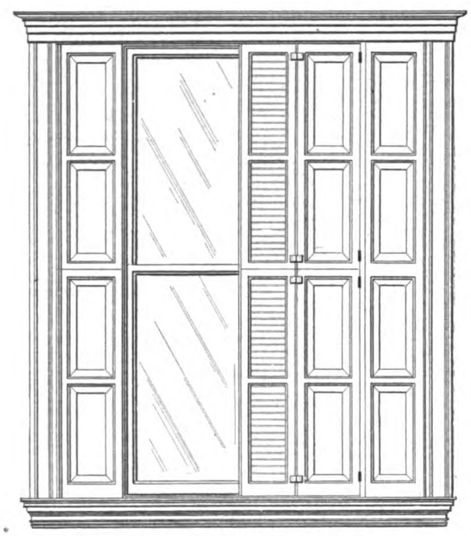
The drawings which are presented herewith show so clearly the general construction which I would adopt that further explanation would not seem to be required.



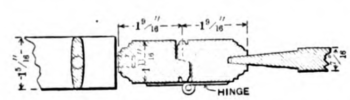
Vertical Section through Head of Window.



Vertical Section through Window Stool and Sill.—Scale, 3 Inches to the Foot.



Elevation of Shutters.—Scale, ½ Inch to the Foot.



Details of Stiles and Panels.—Scale, 3 Inches to the Foot.

Constructing Inside Window Shutters.

PLANS are being completed for the erection, in Kansas City, Mo., of a Labor Temple on a large scale. Organized labor and private citizens have granted $50,000 for land and $85,000 for the building of a seven-story fire proof structure on a lot 86 x 140. The first and second floors of the building will be let for office purposes, and the remaining floors will be devoted to the use of the labor unions of the city. Halls and offices will be let to labor organizations at a nominal rent, and workmen of any kind will be permitted to join the Central Association, and thereby secure privileges of the library, gymnasium, educational classes and lectures at a nominal cost.

Ancient Theaters.

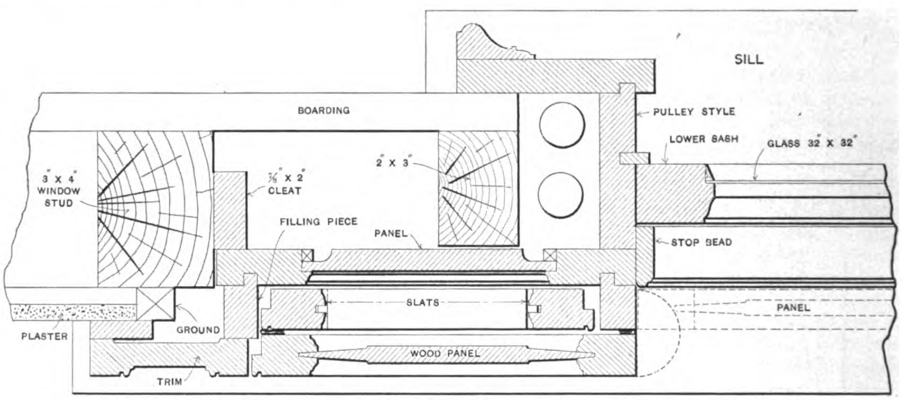
Among the objects of civil architecture few have had more influence on the art than theaters, both in their external elevation, in the application of the orders in relief on the pier and spandrel of the arch, and in the internal elevation, the scene, which has been the occasion of so much caprice and corruption of taste. The theater, being constantly employed for parliamentary assemblies, says a London writer, required a permanent scene as well as movable, and adapted to the performance. It was a subject of vast architectural study and expense.

Pliny tells us that Caius Antonius silvered the scene, Pretonius gilded it, Quintus Catullus clothed it in ivory. Scaurus surpassed them all; he raised 360 columns in three ranges—the first was of marble 38 feet high, the next was in glass, the third of wood gilt. Three thousand bronze statues ornamented the intercolumniations. Curion, unable to surpass Scaurus, built two theaters of wood, which, being back to back, could be turned so as to form an amphitheater for gladiators, displaying the skill of the Roman carpenters to great advantage. Vitruvius, lamenting the depravation of taste, tells us that Apaturius of Alabanda offered a design for a scene of two stories, the upper called Episcenius, filled with every caprice; centaurs did the office of columns, pediments were twisted in a variety of shapes, all of which pleased the people of Tralles, for whom it was designed; but Licinius, a mathematician, exposed its absurdity, and it was accordingly reformed on better principles. The scene of Laodicea was the most extensive, being no less than 254 feet in length.

The theater of Orange, lately published by M. Caristie, was a valuable addition to our information on the Roman scene. Palladio's scene of the theater at Vicenza gives the best idea of its feature of ancient architectural magnificence. Originally of wood, and continuing so for many centuries, it was not until the third century before our era (232 B.C., the theater at Epidaurus) that they were built in stone and marble. The Greek theater approached the amphitheater and was a horseshoe comprising 200 degrees or more, because the orchestra was reserved also for the performance; but the Roman theater did not exceed 180 degrees, because the orchestra was occupied by the Senators. The Odeum was a covered theater, chiefly for music; that of Herodes Atticus, at Athens, was the most magnificent in Greece and had a roof of cedar. The space covered was 240 x 159 feet. The construction of such a roof without obstructing sight or hearing or injuring external architecture offers a problem to the architect of no easy solution, and is one of great interest in the present times, as we are frequently called upon to cover large areas for occasional assemblies.

A Novel Portable House.

Portable houses are being used so extensively at the present day that it may not be without interest to briefly refer to a rather novel construction, which has just been brought to the attention of the public by a Chicago alderman. The house is made in sections, so that any sized structure may be secured, the materials being fiber boards and angle irons, thus making the completed house of less weight than a portable wooden structure of the same size. One form of house, which was erected on the lake front in Chicago and used by several visitors to the city during the recent G. A. R. encampment, was 16 x 20 feet in size, and the ridge of the roof 12 feet from the ground, the side walls being 7 feet in hight. There is an air chamber between the inner and outer walls, for the purpose of maintaining a uniform temperature, and the claim is put forth that the house can be used in the Arctic regions, as well as in tropical climates. The windows are of glass and swing open like a door. The weight of such a house as described is said to be 1500 pounds.



Horizontal Section through Window Jamb, Showing Pocket with Shutters Folded Within.—Scale, 3 Inches to the Foot.

Constructing Inside Window Shutters.

Portable Wooden School Houses.

In order to relieve some of the congested districts in Boston, Mass., the authorities are experimenting with ten portable wooden school houses, which have been set up in different parts of the city. The buildings are single storied and identical in size and construction. The dimensions are 25 x 35 and 22 feet to the ridge pole, or 11 feet 10 inches in the clear. The floor is composed of 12 sections, the side walls 20 sections, and the roof six sections. Thus the structure can be packed away into small space when taken down. The outside walls are boarded and covered with ship's siding—which is heavier than clapboards—and the interior sheathed with North Carolina pine. The city of Boston has in previous years erected temporary buildings, but never portable structures, and as a consequence these temporary buildings have been sold at a loss, for want of storage room, when the exigency for their use in the particular locality where set up passed away.

THE ART OF WOOD TURNING.—X.

(SECOND SERIES.)

BY FRED. T. HODGSON.

I HAVE dwelt at some length on spiral cutting attachments, because of the importance of the subject. No department in lathe work offers more attractions or fascinates the workman more than work of this kind, partly because of the innumerable variations of pattern that can be evolved by aid of a lathe having a spiral attachment and worked by an ingenious mechanic and partly because the character of the work is such as to demand attention and to possess a fair market value, and because of these qualifications and because of the value attached to them I feel that I should continue the subject further, at least so much further as to present and explain another style of spiral attachment which contains some special features not found in either of the spiral appliances already presented.

This attachment is to be used in connection with the radial arm or bracket shown in Fig. 43 of the issue of May, which admits of the geared wheels being arranged in two trains by aid of several arbors. This attachment or chuck, while based on the principles employed by Bergeron, is of modern adaptation, and the text and illustrations presented herewith are, to a large extent,

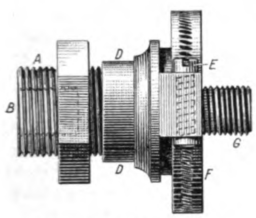


Fig. 71.—Indexed Chuck.

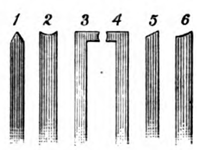


Fig. 72.—Fixed Cutting Tools.

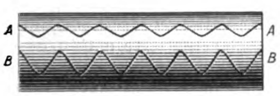


Fig. 73.—Wave Lines on Cylinder.

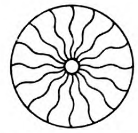


Fig. 76.—Wave Lines on Face Work.

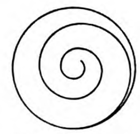


Fig. 78.—Spiral on Face Work.

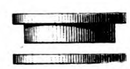


Fig. 75.—Eccentric Cam.

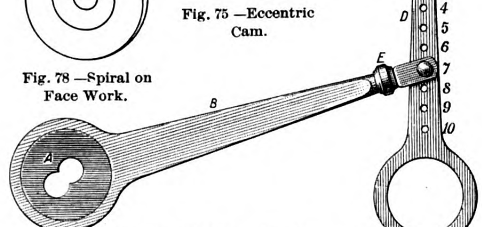


Fig. 74.—Side View of Reciprocator.

The Art of Wood Turning.

copied from a description of it given in "The Lathe and Its Uses," by "J. L."

"In the chuck shown herewith in Fig. 71, A is the body with internal screw as B, to fit the mandrel. The cog wheel of the chuck which gears into the first on the movable arm or standard, is cast with a large central hole to allow it to be stopped on at D, where it is retained by a nut, C. This permits a change of such wheel for one of different size, or for the apparatus to be presently described.

"Thus far the chuck is only applicable to the production of screws or spirals with single threads at each cut. F is a dividing plate with racked edge acted on by the tangent screw E, and carrying the screw G, a counterpart of that upon the mandrel. This plate carries 96 divisions or teeth. The latter may be used with a spring click if preferred, but the racked edge gives perhaps the more delicate power of adjustment. The spiral chuck constructed in this way is capable of producing any required number of screw threads or spirals, solid or detached, and of any ordinary pitch. It is, however, chiefly intended for the production of spirals or twists for articles of virtu. The method of proceeding has already been described, so that it is unnecessary to repeat the process. It is one rather of care than of skill, as the lathe apparatus insures the correct movement of the tool where the shape of the lathe determines the form of the thread, angular, round or molded at pleasure. A few of the tools required for this device are shown in Fig. 72. For finishing rounded threads Nos. 3 and 4 may be used, which are similar to those required for turning ivory rings, the one completing half the thread, the other applied in the opposite direction, meeting the cut of the first and finishing the operation. As it is necessary to get round to the back of the threads in this case, no inner mandrel can be used to support the work, and, therefore, great care and delicate handling are necessary to prevent breaking the twists. The stops should also be used upon the bed of the slide rest, to limit the traverse of the tool and prevent it from striking the shoulder and destroying any head or other molding formed there. This is more especially needed when there are two or more such twists rising from the same base—that is, when there are two or more threads to the screw.

"The additional apparatus now to be described adds considerably to the powers of the spiral chuck. It is called the reciprocating apparatus, and its effect is to cause a to and fro movement of the work, at the same time that the motion of the tool is continued in a horizontal direction. The effect produced as shown in Fig. 73 is the simplest, but is sufficient to give an idea of the capabilities of the attachment. The screw is commenced and carried to any desired distance on the cylinder. The action and horizontal traverse of the tool is continued, but that of the cylinder reversed, and the cut is thus carried upward. The tool may be a revolving cutter, the action of which, being continuous and in the same direction, would seem preferable, as the greater the speed with which the tool attacks the material, the better is generally the result in work of this kind. A fixed tool, moreover, must have a central edge chamfered above and below, and there is also a tendency with any such fixed tool to unscrew the chuck, as the resistance occurs in that direction in the upward cut.

"The details of this arrangement are as follows: Fig. 74 shows an eccentric A, capable of slight adjustment by the use of either hole, one being further from the center than the other. Fig. 75 gives another view of this eccentric, which is precisely similar to that used in model engines. It is turned as a circular plate of gun metal with one flange, the plate being 5-10 inch thick. A second plate forming another flange is attached by four small screws, after the ring of the concentric is in place. This ring is of iron, or still better, of steel, and is made in one piece with the arm B, which is 6 inches long; the main part of it is flat, but it is rounded toward the end and turned at E, after which it is again flattened to work against the arm D, or still better, forked to embrace the latter. It will be seen that D is also a flat plate with a turned ring similar to the first, but without the inclosed eccentric. In this is drilled a series of ten holes, into any of which a pin can be fitted so as to unite the arms B and D, the pin becoming a hinge or center of oscillation. The circular ring of the part D fits on the part D D of the chuck, Fig. 71, on which it can be secured by the nut C, the arm D being then in a vertical position. The holes in the eccentric can (either of them) be fitted over and secured to the end of the leading screw of the slide rest. The handle being then placed on the other end of the screw and turned by the hand, the eccentric will cause the arm D to oscillate to and fro through the medium of the converting rod B, thereby giving to the chuck and to the work attached to it a similar to and fro movement. The extent of this movement depends upon the length of the lever D, brought into action with the pin in the holes 1, 2 and 3. The oscillation will be inconsiderable, but with the pin in either hole numbered 8, 9, 10, it will be much increased. In the first, therefore, a short wave, A A, Fig. 73, will result; in the second case it will be more like the larger waves B B, on the same figure. This apparatus will completely alter the character of a spiral, which, if cut through a hollow cylinder, as in the case of detached twists, becomes a zig zag of curved sides, curious enough to behold. The apparatus, it must be understood, is worked entirely by the handle of the slide rest, the lathe cord being thrown off, unless the

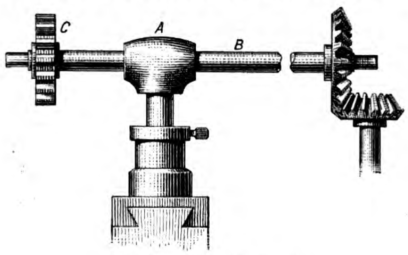


Fig. 77.—Gear Attachment.
The Art of Wood Turning.

latter is carried to the overhead instead, to put in action revolving cutters. The reciprocal action is, in fact, a self acting segment engine."

It has already been stated that for the production of spiral work revolving cutters are preferable to fixed ones, unless, indeed, it is required to finish up a perfectly round thread when Nos. 3 and 4, Fig. 72, are required. Revolving cutters must be placed in the frame of the universal cutter and set to the rake of the thread. Drills may be used for the reciprocating movement, as they make very clean work, and the rake need not with these be attended to.

In face work drills are specially to be used to produce patterns like Fig. 76, and others derived from this simple one. An additional apparatus, represented in Fig. 77, is required for the latter process, to enable the rest to be turned in its socket so as to face the work, and notwithstanding the alteration of its position, still to keep up the gearing of the wheels. A rest socket, to be made and mounted as usual, is fitted with a stem surmounted by an accurately drilled boss, A, through which passes a spindle fitted with the wheel C, to gear with that on the arm carrying the change wheels, and which may be changed for one larger or smaller size. This is for cutting such work as Fig. 78, which represents, of course, only a single spiral, very open, and of itself of no beauty, but which, by intersection of other spirals, can be converted into a pattern of great elegance. When it is desired to produce the waved spiral the eccentric is fixed to the rod instead of the wheel C, and the work proceeds the same as when a cylindrical surface is to be worked. In Fig. 68 the division plate of this chuck is, of course, used.

It is evident that the variations producible by working intersecting spirals and waved lines are very numerous, and these may be additionally varied by the combination of eccentric and spiral movements.

I will reproduce a few patterns of face work, which have been copied from "Ibbitson's Work," "Valicourt's Hand-Book" and Bergeron's work, all of which may be executed with the lathe and tools as now equipped. Rules for setting the index plate to get the desired results will be included.

Laying Gravel Roofs.

In the light of the discussion which has recently been in progress relative to the merits of gravel roofs, the following remarks from a well-known writer may not be without interest:

There is no reason why a gravel roof should not be a good one, if only proper care and good materials are used in its construction; at least it should be good for the money expended on it when compared with the cost of tin, galvanized or copper roofs. Of course a gravel roof is only suited for a low pitch or flat roof, as on a steep roof the gravel would eventually wash off and leave the paper or canvas exposed to the weather. Ordinary coal tar answers fairly well for a top coat before the gravel is spread on, if the roof is very flat. If the roof has a good pitch it is a good idea to mix 8 or 10 pounds of common rosin with the pitch while it is boiling, stirring the mass well with a stick before it is taken out of the boiler.

To prepare the roof before covering with tar after it is boarded tightly with matched stuff, the following rules should be observed: In all cases the grain of the roofing boards should run in the direction of the pitch—never across it—and all joints should be driven close and tight. The boards should be planed on the top side, and should be free from shakes or knot holes. Swab the whole roof over with a thick wash of Portland cement mixed with water to the consistency of thick paint. Let the roof dry for a few hours, then lay on a coat of good roofing paper—tarred paper preferred—having a lap of about one-third of the width of the paper. Over this give a thin coat of hot tar, in which ground asbestos, mica or Portland cement has been mixed, in the proportion of one bucketful of cement to four of hot pitch. Let stand until dry and hard. Over this lay another coat of roofing paper, and on this lay a thickness of rough sacking, which must be tacked down here and there with broad headed tinned nails, such as tinsmiths use in roofing. On this sacking lay a thick coat of the tar while hot, and then sprinkle coarse sand and fine gravel on the hot tar and leave to harden. The tar must contain the proportion of asbestos, mica or cement as described in the foregoing.

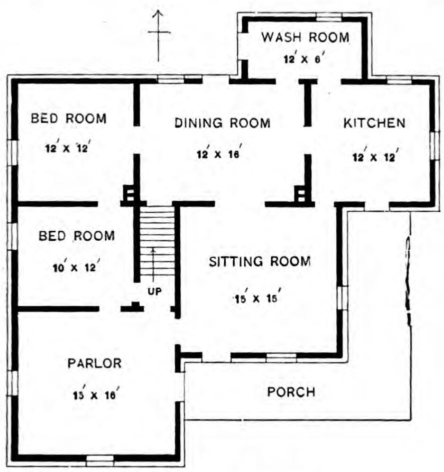
When the tar or pitch hardens it holds the gravel in place, and the rough sacking over the paper strengthens the whole roof covering and binds the whole together, and to a very large extent prevents the roof from cracking or blistering, faults which are common to gravel roofs and which cause a great deal of trouble and annoyance. A roof covered in the manner described will make a good serviceable one, and one that will hold for from seven to nine years, when it may be made good again by a generous coat of the prepared pitch and another layer of fine gravel. Metal roofers do not take kindly to roofs of this kind, but there are instances when no other kind of roof is available, and to meet these instances the above method is offered.

THERE is talk of a thirty-story office building to be erected at the southeast corner of Broadway and Thirty-third street, New York City, which, when completed, will represent, with the land, an outlay of nearly two and a half millions of dollars. The architect is said to be Hugh Lamb of this city.

CORRESPONDENCE.

Roof Plan Wanted for Cottage.

From I. H. L., *Keene, Ohio.*—I send inclosed floor plan of a house which I desire to submit to the readers of *Carpentry and Building*, with a request for sketches, showing how the roof should be constructed. I am somewhat puzzled to know just how to work the gables, and if the practical readers will express their views it will greatly assist me. I would also like some informa-

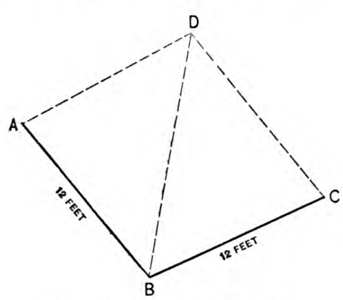


Roof Plan Wanted for Cottage.

tion as to the binding or fastening for a 4-inch brick wall on the outside of the frame, making what may be termed a veneered house. The outside of the frame is sheathed solid with inch boards, and in laying the boards how many courses should there be between bonds and how far apart should the ties be placed?

Miter for Rake and Level Frieze.

From G. L. S., *Temple, Ind.*—I desire to submit a reply to the inquiry of "E. H. A." of Pulaski, N. Y., which appeared in the September issue of the paper. The trouble with which this young chip is laboring is one that, simple though it be, bothers many carpenters, who seem never to stop and think for a moment. It is the same principle that underlies the beveling of all these joints in the roof where the hips or valleys meet the cripples and jack rafters. Most all mechanics know how



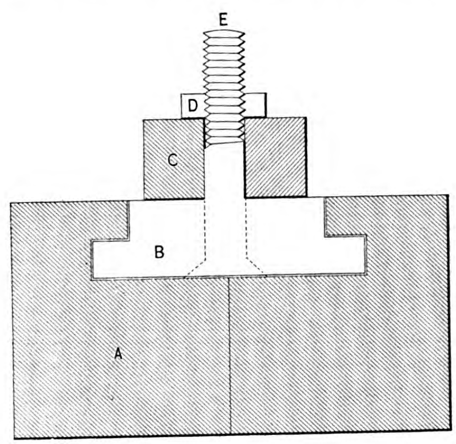
Miter for Rake and Level Frieze.

to mark off what "E. H. A." calls a square miter, by laying the square across a board, with the same number of inches on each side of the tool. This makes each angle at the base of the triangle the same, but as this board or rafter proceeds up the rake that side of the triangle becomes longer and its adjacent angle or level becomes smaller, hence the square miter spoken of will not fit in this case.

For illustration, suppose A B C D to represent the corner of a building 24 feet wide, with A B and B C the line of frieze running around the building on a level; then D B will be the line of the miter joint made by using 12 and 12 on the square. Now change and run the line B C on the rake, and the angle or miter D B C becomes sharper in proportion as the roof grows steeper. The figures on the square no longer remain at 12 and 12, but as the line B C becomes steeper that side of the square becomes longer, until at half pitch the cut becomes 12 and 17 on the 17 side of the triangle or square.

The rule or formula for such cuts is this: Take the length of the rafter on one side of the square, half the width of the house on the other side of the square, and mark by the side of the square which represents the length of the rafter.

What "E. H. A." needs, along with thousands of others, is a little drilling on the use of the steel square in forming these angles or bevels. Mr. Hodgson has partly covered this subject, but he stops short in this. He shows where and what bevels go at the top and bottom of rafters, &c., but fails to give the figures in most cases on the square, leaving most mechanics in darkness as to the method of obtaining them. Now, the average carpenter only knows the square when he sees it. He cannot reason and reach results by comparing angles, or proportioning triangles. Most of them know, however, that to use a certain figure on this side of the



Making an Ellipsograph.

square and another on the other side will produce a given bevel, and it is by methods of this kind they are to be reached.

The writer has given the subject a great deal of attention during years of practical experience, besides having studied nearly all the works on the subject mentioned in catalogues of mechanics' books. It is astonishing to see the number of otherwise good mechanics who cannot solve the simplest problems. Books is what they need, and every mechanic who expects to get abreast of the times should spend as much money for books as for tools, which I am sorry to say is little enough in some instances.

Making an Ellipsograph.

From G. A., *Memphis, Tenn.*—Some time ago I needed an elliptical trammel, capable of describing a rather large ellipse. The simple plan I adopted in its construction may be serviceable to others, so I ask for a small space in this valuable column. Having previously converted an old extension table into a bench, from which had fallen the extension gear, I reserved two of these pieces for the above purpose, halving them together at their centers and gauging a line ¾ inch from the bottom edge of both pieces, working from the top to the gauge line in one piece, and from the bottom up on the other. The dimensions are 1½ x 2¾ inches by 2 feet 10 inches. This will leave ¼ inch of solid wood in the upper half below the groove, which is ½ inch deep, thus allowing the guide block carrying the adjusting pins to move freely over the joint and to get both securely fastened together at right angles, so as to use a detachable wedge or key, cutting a slot for it above the gauge line, equal in depth to ¼ inch of solid wood, against which it acts. The trammel blocks carrying the adjusting pins were made by ripping open a double headed block found in the extension gear of the table, making them both square and working from end to end both ways. They were bored for tight fitting ¼ x 1½ inch bolts, the heads being countersunk on the underside. They were made so tight as to require a screw driver to run them into position. The tracing rod should be perfectly straight, ½ x 1 inch down its center, and bored for pencil or scribe, about 2 inches from the end, so grooved, and a hole put in for a screw through the side, that the pencil will be clamped in the desired position. From this center bore ¼-inch hole on the gauge line, to correspond to half the distance of the major axis, and another ¼-inch hole to correspond to half the distance of the minor axis. Place the guide blocks in the grooves and drop the tracing rod thus prepared on the adjusting pins, ¼ x 1½ inch bolts; put on the washer and screw up the nut tight with the fingers, so that all parts will move freely. The same tracing rod can be used indefinitely by simply boring other holes to correspond with the work in hand. The trammel must be correctly gauged, so that in placing it upon the work the gauge line will coincide with the horizontal and perpendicular line upon which the elliptical figure is to be constructed. The accompanying sketch which I send represents a full sized sectional view, and is, I think, self explanatory. In this sketch A represents the trammel, B the trammel blocks, C the tracing rod, D the nut, and E the pin or bolt.

Building a Barn with 30-foot Posts.

From E. C. N., *Boston, Mass.*—In response to the inquiry of "A. McN." in the August issue, for practical views on barn construction, using 30-foot posts, I would say that all the lumber he needs for a frame barn will be 2 x 6, 2 x 8, 2 x 10 and 2 x 12 stuff, and not much of the latter, which may be of random lengths. In this section of the country one may have the frame sawed to dimensions and delivered, if it is a "billing" point, cheaper than to buy random from the yard. The bill of materials includes posts, plates, rafters and upper tie beams, 2 x 8 inches; studs, braces and stringers, 2 x 6 inches, and sills, floorings, purlins, center stringers and lower beams, 2 x 10 inches. The basement stringers are 2 x 12 inches. The posts will be triple, making them 8 x 10 inches. The beams, rafters, floorings and braces are in pairs in the frame work, everything else being 2 feet between centers. The plates are to be double and put on top of the studs and posts. The stringers are to be notched into the posts, except in the basement, where they are to be nailed to the posts and the posts planked out, making them 10 x 12 inches. This will stand under wind and snow better than a frame of twice the dimensions. A tall barn, like the one under consideration, must be studded and then boarded horizontally.

In the winter of 1898-1899 I built in Hamilton, Mass., the largest barn in the county, it being 127 x 45 feet and 33 feet to the top of the plate. The basement was 10 feet deep. The construction was part wood and part stone, with monitor roof, the posts on this part being 36 feet from the top of the basement. There was a root cellar, 14 x 45 feet; stalls for 15 horses, pits for all manure and pigs, with storage rooms for all tools, in the basement. There were nine single and two box stalls for horses, 12 stanchions and two box stalls for cows, with corn barn for 300 bushels up stairs; two silos holding 280 tons of ensilage and 225 tons of hay. In summer and pleasant weather a trap door 1 foot wide opens at the top of the basement, the entire length of the barn, so that there is no moisture from below, and the sills, floor and backs of the silos are thoroughly aired. The basement has a cement and dirt floor. The sills are solid 8 x 10, there being nothing else larger than 2 x 10 in the building. At this writing it is being filled for the second year, and the only change the owner would make would be to make it 50 feet longer. It is 23 miles from Boston, ½ mile from the station, and within 20 rods of the railroad track. The barn speaks for itself and the owner is pleased to show it. It is the only plank frame of which I know in New England. There is some talk of parties erecting one next season.

The framing shown in Fig. 1 of the sketches for sustaining the roof—that is, the extra bearing—was not put in, as it was not needed. This sketch also shows the

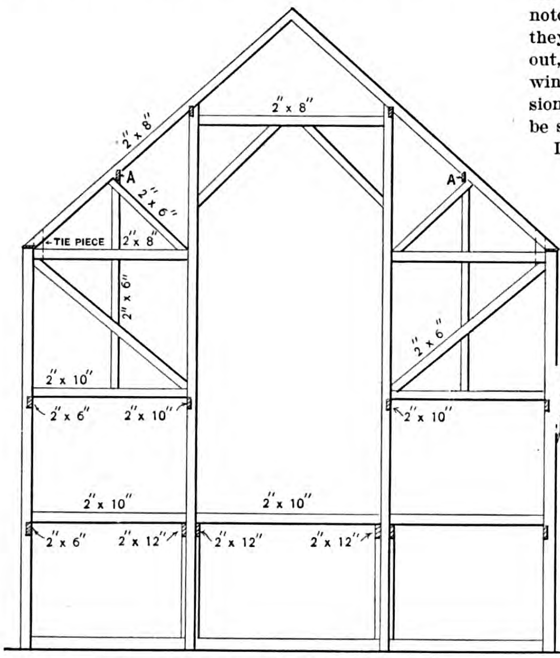


Fig. 1.—Cross Section Showing General Method of Framing, Bracing, &c.

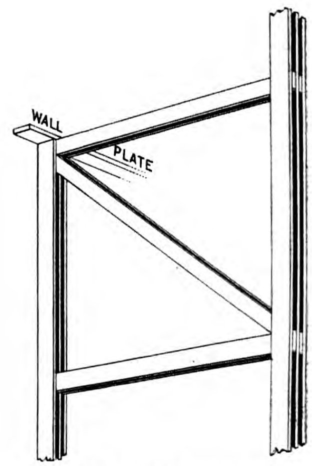


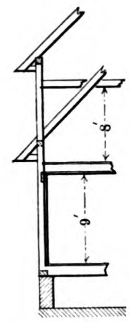
Fig 2.—Detail of Framing Just Below the Wall Plates.

Building a Barn with 30-Foot Posts.

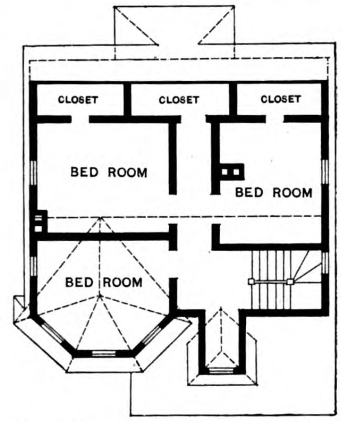
general construction employed, while Fig. 2 represents a detail just below the wall plate. Six men raised it and it was built by the day. Building materials were much cheapen then than at present, but the barn cost so comparatively little that scarcely any one believes it. The floors were spruce plank, 2 x 6, planed, jointed and butted to even feet, and laid ship fashion. I have seen inquiries as to a hip roof being put on a plank frame. I would say that if the plates are returned round the ends, the building may be treated like any other and one may put on what he pleases for a roof.

In regard to the plank frame construction, I would say no two pieces running in the same direction, except the plates and headers over the big barn doors, are nailed together. A piece running in the opposite direction comes between, thus making a weaving together, putting up one piece at a time. The beauty of the frame is the ease with which any change can be effected. In making the barn floor, for example, run across instead of lengthwise, all that it is necessary to do is to continue the beams right through the posts and leave out the stringers lengthwise. A brace can be put in anywhere and of a length to do some good. The stringers being notched into the posts 2 inches from the inside, brings them right against the studding and every flooring beam comes against a stud. In doing the work we stud the building clear round, taking no account of doors or windows, except the large doors, which I would suggest making 14 feet wide and 12 feet high. The sills can be solid, but in the true plank frame they go through the posts in the same way as the beams, with an extra piece on the outside of each post, thus making four pieces with a top bearing of 14 inches. It is in effect making a frame similar to a lock corner box, so if the wind gets at it the tendency is to turn the whole thing over, instead of its giving out in any one spot. If properly spaced, some one of the planks in the posts or double floorings will match with studs or other floorings, so that there will be no sawing, except around openings and the starting point, so as to break joints when it comes to boarding. No skilled labor is required except one man capable of marking out the work and cutting braces. Any man who can saw and use a hammer is all that is required, until it comes to the finish, if there is any to be put on. In making the frame of the barn the posts are raised and the beams and braces spiked on the posts, as indicated in Fig. 1. After this has been done, put on another set of posts and an extra roof support, then a set of beams and braces, and then the last posts. The tie can be put in after the rafters are raised.

Front Elevation.

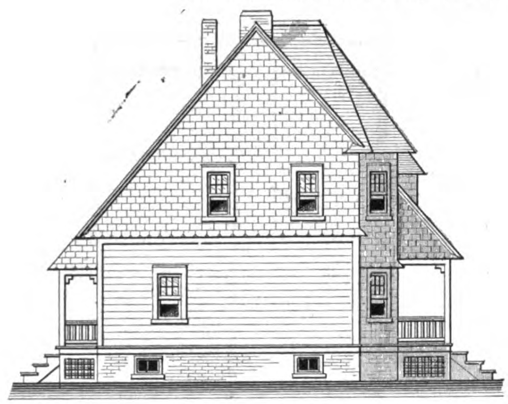


Section through Outside Wall.



Attic with Dotted Lines Showing Roof Plan.

Side (Right) Elevation.



Side (Left) Elevation.

Scale, 1-16 Inch to the Foot.

Suggestions for Roof Plan for "Builder."—Contributed by L. J. Aimar, Port Richmond, N. Y.

Suggestions for Roof Plan for "Builder."

From L. J. Aimar, *Port Richmond, S. I., N. Y.*—I send scale drawings of attic and roof plan, also elevations of the front and sides of a cottage, for the benefit of "Builder," Grafton, W. Va., trusting that the following suggestions will assist in working out the plan. He will find that I have changed the location of one chimney, so as to bring it in the partition, and if he will change the position of his door on the first floor the chimney might then be turned around against the hall partition, which will obviate the necessity of having it project to such an extent in the bedroom. This would not interfere with the range in the kitchen, as the pipe could be carried over to the flue with an elbow.

Should he desire it, the closets may be changed and a dormer cut through the roof in the rear, thereby making another window in either or both of the rear bedrooms. The ceiling in all the attic rooms is full hight—that is, 8 feet—while the first story is 9 feet, thus requiring 12-foot studding, except for the octagon, which will have to be carried up higher, as shown in the section.

There are no moldings on the eaves, and none are required, the soffit being simply ceiled level, with ⅞-inch matched boards, and the eave shingles projected over this about 2 inches. The projecting course should be cut "saw tooth," the points being about 1½ inches on centers. The eaves of the porches, dormers and octagon are finished in the same manner. There is no cornice up the gables, except a 4½ or 5 inch crown molding, over which the roof shingles project ½ inch. I would say that the day for ginger bread cut work and paneled brackets and shams, so far as suburban buildings are concerned, has gone by, except among those who have no poetry in their make up.

The gables and octagon, also the sides of the dormer, are covered with the same style of shingles as are used for the roof, while the roof itself may be stained some quiet tint, or left like those on the gables, to weather stain. Either effect will be more picturesque than painting, and they will last just as long. After the hips have been shingled up snug and tight strike a line 4 inches each side of the center, running a line of shingles up each side, and to the line, weaving in the laps. This is not a "Boston hip," but will appear like one from the ground and just as effective as a ridge roll would be in shedding water. The lower story from the water table up to the belt course should be covered with beveled siding. The columns should be 8 inches square, not chamfered, but have the corners taken off slightly.

Finding the Backing of Hip Rafters.

From G. L. M., *Tacoma, Wash.*—For the benefit of "W. S." and any others who may not fully understand my method of finding the backing of hip rafters, as given in the December issue of *Carpentry and Building*, let me say that G F is the gauge line to be run the length of the rafter parallel with the top edge and which marks the amount to be cut away in order to make the backing. The accompanying sketches more fully explain the principles of the rule and will enable any one once understanding it to find the backing for hip rafters of any angles or pitches of roofs, whereas the rules given by the other replies show the method of finding the backing for hips where the roofs meeting at the hip are at right angles to each other and at the same pitch.

Referring to the sketches, let A B C of Fig. 1 represent the plan of the plates at the corner of a building 20 x 24 feet, on which it is proposed to construct a hip roof meeting at a point at the top. Then D E G will be the plan of the seat of the hip where it rests on the plate. Fig. 2 shows the bottom cut of the hip with A B the line of the plumb cut at the corner B of the plate, Fig. 1. Now, from A of Fig. 2 and at right angles to A B draw A C; lay off on A C the distance A E, equal to E F of Fig. 1, and through E run the gauge line G E F parallel with the top of the rafter and its entire length. This will show the amount to be taken off to form the proper backing on the 20-foot side of the building, as shown at E C of Fig. 3. Make A I of Fig. 2 equal to G H of Fig. 1, and the dotted line J I K will show the backing for the 24-foot side, as represented by C I of Fig. 3.

The principle of this method is that when the hip is cut so as to leave A L of Fig. 2 the same as the corresponding dimension on the common rafter, and in placing the hip diagonally across the corner, while the center of the top of the hip at B is level with the common rafters over the edge of the plate, the point on the side of the hip over F of Fig. 1 is higher and must be cut away in order to bring it to the same level, and this makes the backing.

My only excuse for asking space on this subject again is that I always find it more satisfactory to have a method for finding cuts, the principle of which I understand, than to have a set rule, for the reason that in following a rule when one is not frequently using it he is apt to forget it and get it mixed with some other rule, whereas by understanding the principle on which the work is done all such danger is avoided and the method can be applied to different problems by simply varying it to suit the case. The above method will apply equally well to horizontal, heptagonal, octagonal or other angles, or to any pitch, by drawing the corner, as in Fig. 1, to fit the case in hand.

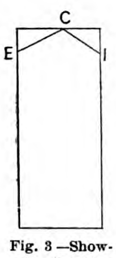


Fig. 3.—Showing Backing of Rafter.

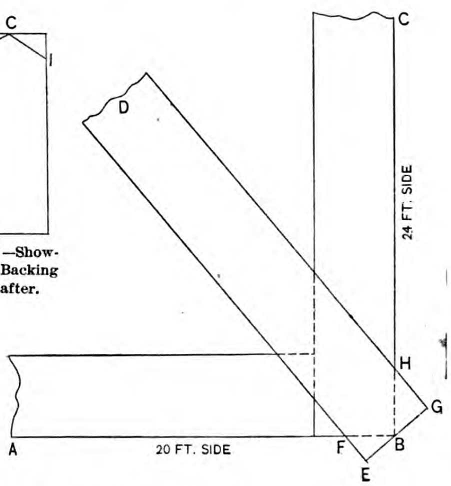


Fig. 1.—Plan of Rafter and Plates at Corner of Building.

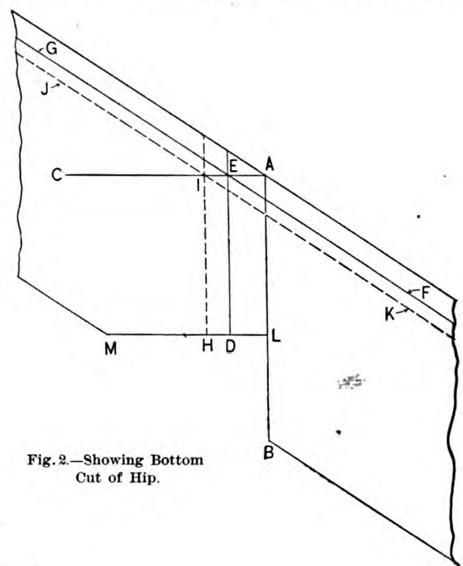


Fig. 2.—Showing Bottom Cut of Hip.

Finding the Backing of Hip Rafters.

Laying Gravel Roofs.

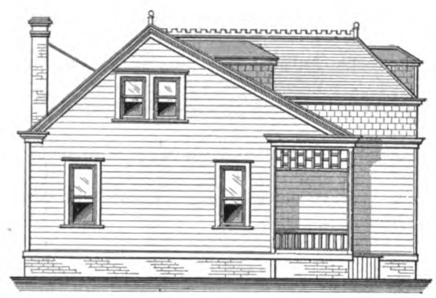
From K. C. L., *Kansas City, Mo.*—We have been interested in the different articles appearing in the paper concerning gravel roofs, and having had considerable experience in that line will give the following information as of possible interest to the readers, more especially to "C. A. H.," whose letter appeared in the September issue. One-fifth of a yard of gravel will weigh about 540 pounds. Coal tar and rosin boiled together should never be used, but straight run coal tar pitch only to secure the best results. This pitch is distilled from pure coal tar and is of the proper consistency, so that it will not run in summer heat, or crack or become brittle on the roof. Consequently it is a superior article for gravel roofing purposes. It is usually put up in barrels weighing from 300 to 600 pounds. No. 2 tarred felt weighing about 1½ pounds to the square yard or 15 pounds to 100 square feet, should be used. This is made in rolls weighing from 50 to 60 pounds each and is the standard grade used extensively for making felt composition and gravel roofs. A roofer's mop will be needed, also a kettle in which to melt the pitch and two or three buckets to handle the gravel and melted pitch. Commencing at the eave or gutter, lay four thicknesses of felt evenly and smoothly, putting roofing pitch between each thickness. Then drop back 7½ inches for each succeeding layer, cementing between each layer 8 inches wide with straight run coal tar roofing pitch. All openings, skylights and walls must be perfectly made, the felt being turned up 3 inches on the walls, and at least 6 inches on the skylights and other openings, and securely fastened with wooden cleats or copper flashings. The surface of the felt is then covered with a thorough coating of straight run coal tar pitch, and this is followed while hot with clean, dry gravel, the gravel to be spread with a wooden scraper. This roofing can be applied on buildings having a fall varying from ½ to 2 inches to the foot.

In the comments of "F. G. B.," in the August issue, he evidently in his instructions has reference to two and three ply prepared roofing, which consists of two or three layers of tarred felt with pitch composition between. The roofing is made by machinery, and is a complete roofing, requiring only to be nailed down and painted with an asphaltum coating, and is generally sprinkled with fine sand when completed. The prepared roofing is less expensive and put on with less labor than the regular four-ply gravel roofing, which is built right on the building with the single ply tarred felt and the coal tar pitch, and, although a cheap roof, cannot be recommended for permanent buildings to wear as well as a four or five ply gravel roof. All that is necessary to make a roof a four or five ply or more is to leave less of the tarred felt exposed to the weather in working up the roof. "C. A. H." can secure nearly all, if not all, of these roofing materials from the Barrett Mfg. Company, Kansas City, where they are manufactured for the Western trade.

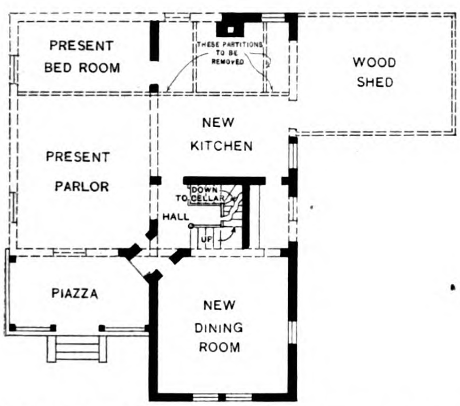
Remodeling an Old House.

From F. B. Fischer, *New York City.*—In reply to the inquiry of "G. A. W.," Crary Mills, N. Y., who asked in a recent issue with regard to remodeling an old house, I inclose sketches of floor plans and elevations, which I trust will prove of interest. As to the elevations, I would say the plans show that the stairs and pantry on the first floor have been removed from the rear of the house to more nearly the center, between the kitchen and dining room. The present kitchen will be occupied as a wood shed and the new extension as a dining room. The dotted lines on the first-floor plan are intended to indicate the building before it was remodeled, while the heavy lines show my suggestions. No changes will be made in the parlor and bedroom, except to make the bedroom shorter, so that the kitchen wall will run straight, and in the parlor a corner of the room will be cut off for the entrance from the piazza. Examination of the other plan will show that the second story is to be completely new, having four bedrooms and three closets.

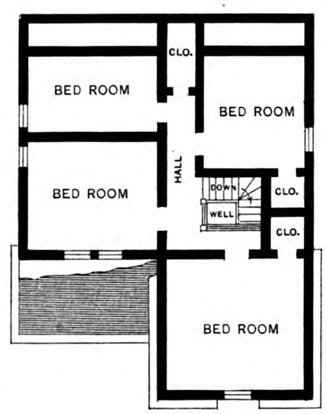
Front Elevation



Side (Left) Elevation.



First Floor, Dotted Lines Indicating the Original Plan of House.



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

Remodeling an Old House.—F. B Fischer, Architect, New York City.

One of the latest ideas in connection with high-class houses is to construct the kitchen, bathrooms and laundries with rounded corners, so that no dirt may collect and the room may be kept thoroughly cleaned.

Harmony and Contrast in Colors.

The architect and builder who desires to have at hand a list of colors which contrast and harmonize will find the following from the *Upholsterer* of interest and value:

White contrasts with black and harmonizes with gray.

White contrasts with brown and harmonizes with buff.

White contrasts with blue and harmonizes with sky blue.

White contrasts with purple and harmonizes with rose.

White contrasts with green and harmonizes with pea green.

Cold greens contrast with crimson and harmonize with olive.

Cold greens contrast with purple and harmonize with citrine.

Cold greens contrast with white and harmonize with blues.

Cold greens contrast with pink and harmonize with brown.

Cold greens contrast with gold and harmonize with black.

Cold greens contrast with orange and harmonize with gray.

Warm greens contrast with crimson and harmonize with yellow.

Warm greens contrast with maroons and harmonize with orange.

Warm greens contrast with purple and harmonize with citrine.

Warm greens contrast with red and harmonize with sky blue.

Warm greens contrast with pink and harmonize with gray.

Warm greens contrast with white and harmonize with white.

Warm greens contrast with black and harmonize with brown.

Warm greens contrast with lavender and harmonize with buff.

Greens contrast with colors containing red and harmonize with colors containing yellow or blue.

Orange contrasts with purple and harmonizes with yellow.

Orange contrasts with blue and harmonizes with red.

Orange contrasts with black and harmonizes with red.

Orange contrasts with black and harmonizes with warm green.

Orange contrasts with olive and harmonizes with warm brown.

Orange contrasts with crimson and harmonizes with white.

Orange contrasts with gray and harmonizes with buff.

Orange requires blue, black, purple or dark colors for contrasts and warm colors for harmony.

Citrine contrasts with purple and harmonizes with yellows.

Citrine contrasts with blue and harmonizes with orange.

Citrine contrasts with black and harmonizes with white.

Citrine contrasts with brown and harmonizes with green.

Citrine contrasts with crimson and harmonizes with buff.

Russet contrasts with green and harmonizes with red.

Russet contrasts with black and harmonizes with yellow.

Russet contrasts with olive and harmonizes with orange.

Russet contrasts with gray and harmonizes with brown.

Olive contrasts with orange and harmonizes with green.

Olive contrasts with red and harmonizes with blue.

Olive contrasts with white and harmonizes with black.

Olive contrasts with maroon and harmonizes with brown.

Gold contrasts with any dark color, but looks richer with purple, green, blue, black and brown than with the other colors. It harmonizes with all light colors, but least with yellow. The best harmony is with white.

Advantage of Arbitration.

One of the recent witnesses before the Industrial Commission, which is holding its sessions in the city of Washington, was W. H. Sayward of Boston, secretary of the National Association of Builders. According to the reports at hand, Mr. Sayward devoted his time to discussion of arbitration, voluntary and compulsory. He did not believe in compulsory arbitration, and pointed out the difficulty of securing a State Board of Arbitration which would be capable of handling the various matters which would naturally come before it.

He thought most of the difficulties which arose between employees were due to the reluctance of the former to enter into any negotiations with their employers.

He fully explained the system of arbitration between the builders and their employers in Boston, where an agreement is in force to the effect that when misunderstandings arise, each side shall choose five representatives, and the ten shall choose an umpire. If the arbitrators are unable to settle the question, it is then left to the umpire.

By this plan strikes and lockouts are avoided, each side binding itself to abide by the decision of the arbitrators or the umpire. So successful has this plan been in its operation that for the past nine years there has been no strike or lockout in the building trades in Boston, and only three times has it been necessary to call in the umpire.

Mr. Sayward thought all associations of employers and employees should be incorporated, but believed that labor unions were averse to incorporating themselves.

A New Fire Proof Material.

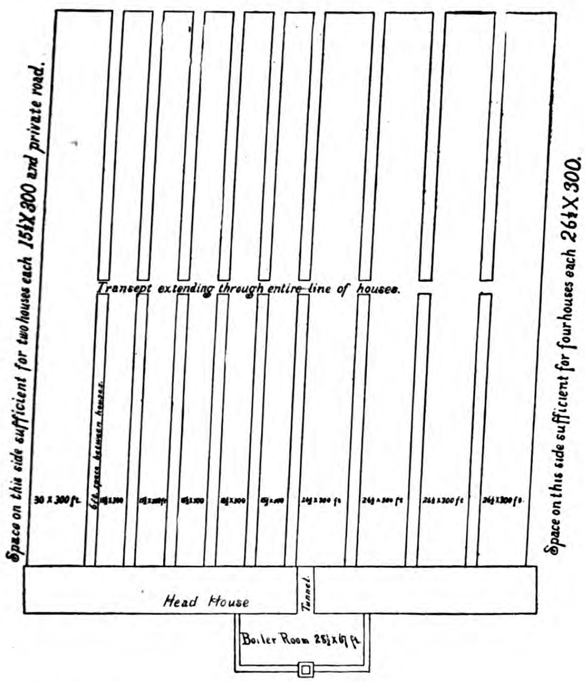
A new fire proof substance, called gypsine, has recently been officially tested in England with remarkable results, according to reports from that country. Its composition is plastic hydraulic lime, coke or sand and asbestos, compressed into bricks. To test its fire resisting properties a partition 10 feet long by 7 feet 9 inches wide was built of gypsine bricks laid in hydraulic mortar, with joints ¼ inch thick. The side of this partition, which was erected in the test hut, after having been coated with a thin layer of fire clay, was exposed to the action of fire for the space of one hour, during which time the temperature rose to 2050 degrees F. This tremendous heat was powerless against the gypsine bricks, and all through the test the temperature of the outer surface of the partition was never once so high as to cause a match to ignite upon it.

A MOVEMENT is at present on foot looking to the erection in the lower part of New York City of an 18-story structure, which will be known as the Maritime Building, for the reason that it will be devoted to shipping interests. It will be erected at 6 to 10 Bridge street, opposite the site where the new Custom House is going up. The active work of tearing down the old buildings on the present site, however, will not be commenced for some time, owing to the fact that the present leases run until April 1 of next year. The architect is H. J. Hardenbergh, and it is expected to have the building ready for occupancy early in the spring of 1902.

HEATING A MODERN GREENHOUSE.

AN excellent example of the way in which a large greenhouse may be successfully heated is presented herewith, the establishment being that of A. N. Pierson of Cromwell, Conn. The owner prepared the following particulars concerning the establishment for the *Florists' Exchange*, to which we are indebted for the accompanying illustrations:

The location selected for the houses was an east slope, with too much pitch for the houses, necessitating a cut at the upper end, averaging about 5 feet, with a grade at the lower end averaging about 10 feet, still leaving an incline of 3 feet per 100 feet. To hold the grade I built a heavy retaining wall about 6 feet wide at the bottom, 4 feet wide at the top; said wall forms back side of the head house, in which are placed the steam and hot water mains with the distributing pipes to each house.



A Modern Greenhouse Heating Plant.—Fig. 1.—Plan Showing Arrangement of Greenhouses and Boiler House

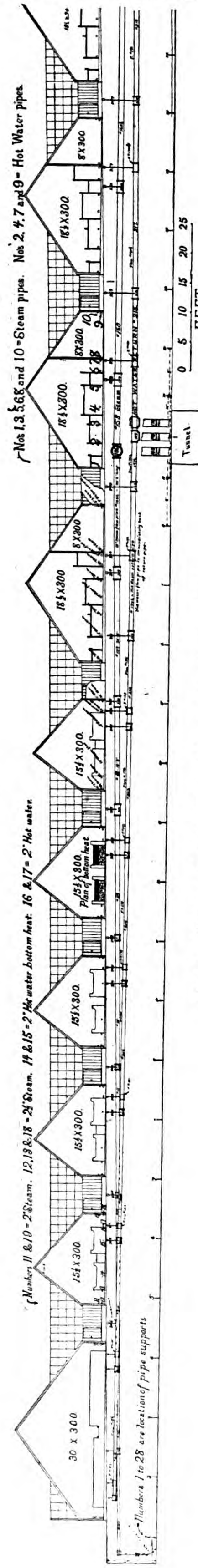


Fig. 2.—Elevation Showing End of Houses and Heating Pipes.

To prevent the houses from settling where the grading was done we excavated for each post and placed solid brick piers 12 feet deep, 3 feet into the original soil. The wisdom of this expense has been proven by the perfect alignment maintained by the houses, while the ground around them has settled. A plan showing the arrangement of the houses is given in Fig. 1, and Fig. 2 is an elevation showing the ends of the houses and the steam and hot water pipes along the rear wall of the head house.

Some of the houses are even span, some three-quarter span, with short span to the south, and some three-quarter span, with long span to the south. Back of the latter is a leanto containing smilax beds. The houses are iron structure. Near the center of the plant and immediately back of the retaining wall I built a large cold storage room with vent pipes extending up between the greenhouses. Being deep and well shaded it makes an excellent room for cold storage.

The floor of the head house is about 10 feet lower than the floor line of the houses; this makes the gable of the head house about 25 feet high. All of the houses, except those for smilax, have ventilators at the top and sides, making it possible to give a perfect circulation of air at all times. The ventilation is operated by the Evans Challenge ventilating apparatus, except where small ones were needed, in which cases I have used the Evans Little Giant. The drainage is accomplished by a system of underground pipes, so that the accumulation of water between the houses is carried into the main aqueduct which leads into the rear of the property, where it runs off on the surface.

With regard to the piping, I would say that, when I decided to erect these houses I simply

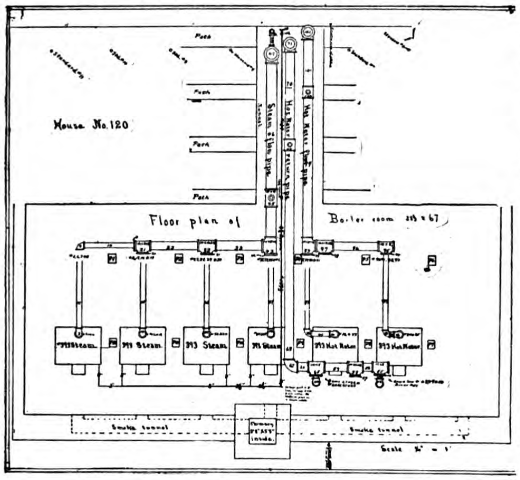


Fig. 3.—Plan of Boiler Room.

wrote to Mark Dean, president of the Dean Boiler Company of Boston, told him what I had to be heated, and stated that I wanted two separate systems—a steam plant with capacity for two-thirds of the heating, and a hot water plant with capacity for about one-third. My object in having hot water is to enable me to use underneath heat in solid beds, and I have found it to be very advantageous. Desiring this feature I also put in enough hot water piping so that in case of an accident with the steam plant I can force the hot water plant enough to keep the houses from freezing, which gives us a factor of safety which we otherwise would not have. I do not like hot water for fall and spring use, because there is too much to be disposed of after sunrise, whereas the steam can be cooled off quickly.

The steam piping which Mr. Dean planned for us is something new, and it has proved as valuable as it is novel. It is what is called the single pipe system. All of the piping was planned with the expectation that at some future time I would build more houses, which can be connected without making any changes by simply connecting to the main already installed.

To each boiler is connected an 8-inch steam pipe leading into one large common steam pipe, as shown in Fig. 3, which is a plan of the boiler room. Each of these pipes is provided with an 8-inch angle valve, so that any boiler, or number of boilers, can be shut off independently. There is also in each of these pipes a double swing joint, so that the expansion of the main or branches can in no way affect the boilers.

Leading from the boiler room through a tunnel under the head house, as shown in Fig. 4, is a 16-inch steam main, which rises near back wall of head house, passes over the hot water mains, emptying into two 12-inch steam mains, which run along the back wall of the head house, pitching downward in either direction, reducing the size as the branches are taken off.

To supply steam for each three-quarter span rose house and 8-foot leanto a 5-inch main is taken from the side of the large main, rising vertically about 2 feet, from which point it inclines upward 1 inch in 4 feet into the house, where it branches off to the heating pipes, as shown in Fig. 5. Each of the heating pipes continues to incline upward to the far end of the house, on the same grade as the houses—*i. e.*, 3 feet per 100 feet. At the far end the pipes are supplied with a cap and air valve. At the end of each house, next to steam main, each heating pipe has a valve which controls its respective line of pipe.

The heating pipes are only connected together at and controlled from one end of the houses, thus saving much valuable time walking from end to end of houses to open valves, as the houses are 300 feet long. These pipes are carefully supported so as to allow for expansion and contraction. They are 2 and 2½ inches in diameter, 2 inches being the smallest pipe that can be used on this system in houses of this length; 2½ inches is the size recommended for the houses.

There is not an independent return pipe for each of the different houses. The water condensed in each pipe returns along the bottom of same, back into the 5-inch pipe, which carries it to the large steam main, through which it flows in the same direction that the steam travels until it reaches the far end of same, at which place it drops down and returns to the boiler through an independent return pipe designed for that purpose.

For each 15½-foot house there is a 4½-inch branch taken from the side of the steam main, rising vertically, entering the houses, subdivided and valved the same as in the large houses, as shown in Fig. 5. By taking the pipe from the side of the main it gives a swing joint, so that the expansion of the large main does not have a tendency to rack or pull the houses apart. The 4½-inch branches for the 15½-foot houses are taken off between the houses, so that half of either house is supplied from these branches. This was done to save piping.

You will notice by the sectional view of the rear wall of dead house and main, given in Fig. 6, pipes shown on the upper left hand corner of the plan of piping, that we have a walk below the main pipes, and a walk above the main pipes, so that the pipes practically occupy little or no valuable space. For the same reason the large mains were brought across under the head house, to

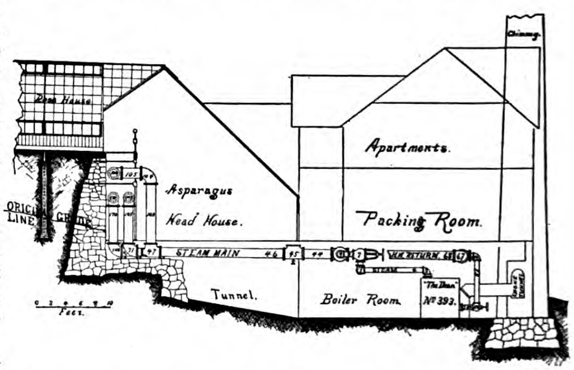


Fig. 4.—Elevation Showing Boiler Connection to Heating Mains.

avoid the shadow which they would make if placed overhead.

Referring again to the diagram, in upper left hand corner, showing section of wall, mains and supports for same, I wish to call attention to the special manner in which the pipes are supported. Over the horizontal pipes which are bedded in the wall and supported at the opposite end by upright pipes, were placed two iron hooks, into one end of which was connected an ordinary turn buckle. Into the bottom of the turn buckle and the hook opposite same was connected a heavy iron chain, and into same were laid the mains. This not only allowed perfect freedom for expansion and contraction, but was of great value when installing the piping, as a few twists of the turn buckle would throw the pipes into perfect alignment.

By referring to the elevation of piping given in Fig. 2 you will observe that the steam main leading to the right is quite large at the far end. It was left in this condition so that I could at any future time connect to same, and add the four additional houses as suggested on the ground plan, Fig. 1. By looking at the opposite side of the ground plan you will see that there is room for two small houses besides a large driveway. When all loose laid stones, on top of which is the soil. Through the bottom of the stones, in a little archway, are laid two 2-inch hot water pipes valved at both ends, so that in case of a leak at an unaccessible point they can be entirely shut off. These pipes are for underneath heat. The hot water pipes, both mains and branches, are supported in the same manner as the steam mains and branches. The main hot water return pipe parallels the main flow pipe along the rear wall of head house, and lies between it and the large steam pipe in tunnel. Being

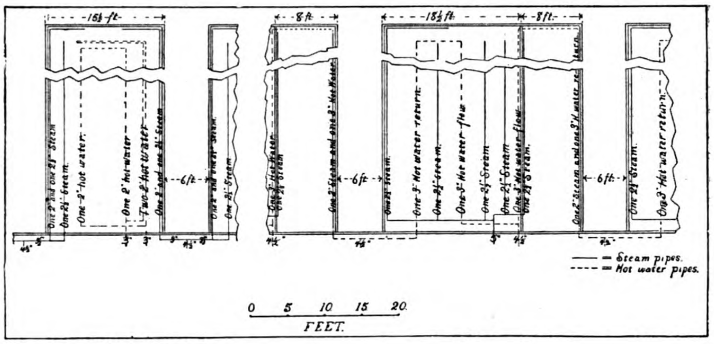


Fig. 5.—Plan Showing Connections for Heating Houses.

of these additional houses have been built the boiler house will be exactly in the middle of the plat.

To those who have not had experience with boilers it might appear that our pipes are unduly large, but in our old plant the largest steam main is an 8-inch pipe. During the winter just past water hammering became sufficiently severe to split a 6-inch pipe, making it necessary to replace same during severe weather. We have had no such trouble with our new plant, and do not anticipate trouble of any kind.

The connections to the hot water boilers, both flow and return. are 8-inch pipes valved with swing joints, the same as the steam pipes, but they are planned for two flow and two return pipes to each boiler. The 14-inch hot water main parallels the 16-inch steam main through the tunnel, rises up the rear wall of head house and distributes into two 10-inch hot water mains, which large pipe with sufficient capacity the hot water pipes in houses furthest from the boilers heat up as quickly as those in the houses nearest to the boilers, showing that the system is well planned. These hot water mains are planned for future connections for additional houses the same as the steam mains.

The hot water heating pipes in the three-quarter span houses with leantos are all 3-inch pipes, while those in the smaller houses are 2-inch pipes. The boilers are of the cast iron sectional type, each section being complete within itself—*i. e.*, each section forms its own outside wall surface, forms its own headers (through the large push nipple) for both steam and hot water, has its own direct fire surface in the fire pot, has its own indirect fire surface apart from the fire pot, forms its own ash pit and takes just one grate bar. This being so, the capacity of the boiler can be increased at will, by sim-

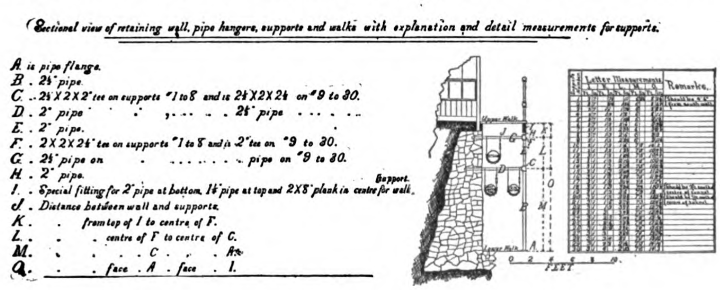


Fig. 6.—Elevation Showing Walks and Supports for Heating Mains.

incline upward in either direction, as shown in Fig. 7, with branches for each house taken out of the side of the main, rising vertically and entering the houses with distributing pipes, the same as the steam pipes. The pipe No. 3 is the 16-inch steam pipe and pipe No. 2 is the hot water flow main, while No. 1 is the hot water. The flow pipes rise gradually from the boiler to the far end of houses; and returns pitch downward from that point back to boilers.

For each three-quarter span house with leanto there is a 4½-inch hot water branch with its subdivisions inside of houses, as shown in Fig. 5, and for each 15½-foot house there is a 3-inch hot water branch, with its subdivisions. In the 15½-foot houses there are two solid beds, at the bottom of which there is about 1 foot of ply removing the front section, putting in one or more intermediate sections, and returning the front to its position. The heating surface in the boiler is confined to side wall and ceiling surface. The boiler is practically self cleaning.

The connections between the grate bars are all made outside of the boiler, which renders it very convenient to detach them whenever such is necessary. The manufacturer furnishes asbestos cement for covering the entire outside surface of the boiler, which retains the heat most effectively.

Last, but not least, I have found the boilers to be very economical in the consumption of fuel, which, in my estimation, is one of the points to be considered when placing an order for a boiler.

EXTRAS AND OMISSIONS IN BUILDING CONTRACTS.

THE subject of "extras" is one which has received a great deal of attention in the architectural papers and much interesting discussion has resulted. The practice which prevails abroad regarding this feature of building operations as well as the omissions in contracts is outlined in a most instructive manner in a paper lately read by E. H. Blake before the Surveyors' Institution, London, and the following extracts may prove of interest to builders in this country:

Building contracts have been described as the most complicated and most difficult, and, in many respects, the most unjust, contracts that commercial enterprise has ever been able to achieve. A contract to erect a building could never be a simple one, being arranged between two parties by a person who was no party to it, and yet had large powers under it, and being subject to a whole schedule of conditions. The contract might be unjust to either party. The builder might suffer from having to estimate for matters which were either in ignorance or by design left uncertain, with a view to getting competing tenders; and, again, plans and specifications from which a builder is expected to "erect a complete building" might in themselves be incomplete or impracticable. It was true that most architects or engineers would not shirk their own share of responsibility for imperfect plans; but there were important cases which showed that, where they did, the law was with them. One of the most difficult matters to settle was the question of extras and omissions.

All extras should be subject to a signed order from the architect, and the price be based on a previously deposited schedule. The avoidance of any misunderstanding should be secured before signing the contract, preferably by the care of the surveyor in taking off the quantities. The quantity surveyor's work must be exact, and not be matter of opinion, so far as labor and materials went. There was so much to be done and used or there was not; but insufficient descriptions were often responsible for inaccuracies.

Question of Liability.

The question of liability of the surveyor for inaccuracies depended much on his position and mode of appointment. The case of "Priestly *vs.* Stone" was well known. The quantities were taken out from unfinished drawings, and the architect afterward altered the drawings and specification and submitted them with the original quantities as a basis for tendering. It was held that there was no privacy of contract between quantity surveyor and builder, although in spite of this judgment it was still customary to hold the surveyor morally liable to the builder for inaccuracies. The moral aspect of the case as regards the owner, who might receive work for which he had not paid, must also be considered. Quantities should, of course, be prepared by a qualified man, and time should be allowed for their careful completion. The author recommended that they should be made part of the contract. It was unfair to issue bills of quantities for the purpose of tendering while repudiating all responsibility for their accuracy, merely allowing a week or so for the contractor to verify them. This practice was happily dying out. It was very important that in all stages of the proceeding the employer should be kept informed of his liabilities to the quantity surveyor and to the builder. A strong opinion had recently been expressed by the Lord Chief Justice, that quantities should be taken out by an independent person. The essence of a just contract was exchange, in strict equity, of cash for kind.

"Extras" were all works not included in a contract, for which instructions were given. "Omissions" might occur where quantities formed part of the contract. "Extras" might arise through exigencies not previously known to exist. Where they do not form part of the contract, works necessary to complete were not extras, though not shown or specified.

It has been held again and again by the courts that the plans, specifications, &c., were in the nature of information enabling the builder to tender, but no warranty of accuracy or practicability was implied. The cases seemed to indicate that some amendment of the law was necessary, and that meanwhile contracts must be very carefully drawn. The best way was, the author held, to make quantities the basis of the contracts, the contractor then being liable only to do work for which he had tendered a price, and the owner only entitled to receive value for which he had agreed to pay.

A contract for a complete work included everything necessary to the completion thereof, it being immaterial that such works were omitted from the drawings or specifications, or that certain things were impracticable, or understated or miscalculated. In the case of impracticable plans, where quantities were not part of the contract, authority given to the architect to order extras did not empower him to order work necessary to make plans practicable. Should he order as an extra anything indispensably necessary to the contract, unless his certificate was a final and conclusive one, neither he nor the employer was liable to the builder, who was held to know that the matter was necessary to the completion of the contract. If a contractor had no confidence in an architect, he should avoid a contract which gave the architect sole power to interpret the meaning of all points under the same. for in case of impracticability there might be a difference as to the mode of completion. If the contract contained an arbitration clause, it would be a matter of reference whether the proposed mode of completion came within the contract. An architect, if not generally empowered to order extras, must obtain the employer's instructions. If the contract demanded his written order, he must be careful not to certify for anything done without such order. If quantities did not form part of the contract he must not order as extras, or certify for as extras, anything indispensably necessary to completion.

Authority of Architect.

There was apparently no implied authority to an architect to order extras. He must be expressly authorized, and the question of his authority was one for a jury. It was, however, the custom to regard the architect as the employer's agent in the fullest sense of the word. Although a contract required written orders for extras, a final and conclusive certificate including amounts in respect of extras would render the employer liable. A verbal promise to pay for extras was valueless. All orders should be transmitted to the builder through the architect in every case. It had been decided that even where interim certificates described and included additional work such certificates did not dispense with the necessity for written orders. It was to be noted that the measuring surveyor had no authority with respect to performance under the contract. He had to deal with facts and matters placed before him by the architect. The granting of a final certificate required great care. If the architect certified as to extra work which had not been done, or was indispensable, the employer must pay unless he could prove negligence, or fraud, or collusion.

To come under the heading of extras, additional work must be done under orders issued during the execution of the contract, all subsequent orders coming as a matter of fresh transaction. In the case of considerable variations during the execution of the contract, the work must be considered "extra," provided there was evidence that the parties agreed to its being subject to contract terms. Where departure from plans involved a fresh class of work or material, such extra work was beyond the contract altogether. It was, however, customary to stipulate that no variations should vitiate the contract, but that all authorized extras and omissions should be measured and valued.

An architect had no power to substitute one class of work or materials for another without adjustment in the final settlement. All dealings between builder and employer should, as he had said, be conducted through the medium of the architect. If, from any cause, it were necessary to substitute other material or work for those specified, the architect must be appraised of any extra cost, and sanction must be obtained in the manner provided in the contract. If, however, the contract were one involving a necessity to complete, within a definite time, for a certain sum of money, it would be at the contractor's expense that other materials or work were substituted, subject to the sanction of the architect. If the cost to the contractor were less, the employer could not claim a reduction. The architect should have full power to reasonably extend the time for carrying out a contract if the delay were due to extras ordered. The important case of "Dodd *vs.* Churton," decided with reference to the case of liquidated damages for failing to complete within a certain time, that if the delay were consequent on orders for additional work the contractor was exonerated from payment of damages, unless there were an express agreement to the contrary. Great difficulty frequently arose from the adoption of old forms of contract with added clauses which overlapped the main clauses, especially in the clause referring all matters in dispute to an arbitrator and the clauses making the architect's decision final. No enmity should be allowed to influence the dealings between contractors and employers, and the proper duty of the surveyor was to eliminate as far as possible all uncertainties and points of dispute before the signing of the contract.

MAKING WOOD PATTERNS.—XV.

BY CHARLES J. WOODSEND.

IT will be noticed by referring to Fig. 105 of the September issue that where the branches join each other there is a fillet shown in the angles, but in the actual construction of the pattern these fillets are left out. They will be found upon the casting when made, but for the present we will ignore them.

The pattern was to be laid down—that is, drawn upon the drawing board—according to Fig. 105. Take one-half of the longest piece forming the pattern, the piece taken being the half with the dowels in it; drive the dowels back from the face of the parting, lay it down upon the board in its proper position and fasten down to the board by driving a few wire nails through the edges, leaving the nails projecting so they can easily be drawn out with pincers or pliers.

We will now fit the large piece to it. We take it for granted that the pieces to be fitted are cut off where shown in Fig. 108 and the ends of the core prints neatly trimmed, as was explained in connection with previous patterns. The line D D of Fig. 108 gives the length this piece is to project from the one upon the board when in its proper position. Take one-half of this piece, with the dowel in it, lay it flat down upon the parting, then cut a miter upon each side from the line D D and extending beyond it toward the cut off. This will give the lines showing the amount of wood to be taken off so that the piece will cope over the other and fit. In case, however, after the surplus wood has been removed it fails to fit neatly or is not exactly in line, rub a little red chalk upon the piece to which it is being fitted, then the joint against the chalked part will show where to take off. Repeat the operation as often as necessary. When the work is completed the chalk is easily removed by means of a wet cloth. When the fitting is done nail the pieces together, toenailing with wire brads.

The two smaller branches will be fitted and nailed in a similar manner. The short vertical branch will be the next to receive attention. It will be noticed by referring to Fig. 108 and the accompanying text, that this piece was turned with a parting. This, however, is not necessary, but it makes the fitting easier than it would if it were turned up solid. The miters can be cut up to the line E E of Fig. 108 and the surplus material worked off, then the two halves can be nailed together and the fitting completed. After the fitting is done it may be fastened temporarily in place with wire brads, left so they can easily be withdrawn. Now, remove the whole from the board; put one long stout screw through the other part of the pattern into the last piece fitted to hold it in its place, and counter bore the screw so as to sink the head below the parting of the pattern. The nails holding this piece may now be drawn out, the screw, if properly put in, being sufficient to hold it in its place.

Any inequalities of the parting may now be planed off with the jointer, and if the work is done correctly, a straight edge laid any way across the parting will show the whole true. Now drive the dowels back into their proper places, and point them off as shown for previous work. Fit the other half of the pattern upon the one already done, holding the pieces together by dogs driven across the parting. The short branches are to be nailed to the larger one, as in the first half fitted, and in such a way that upon completion the pattern will be free at the parting. Putty up all nail holes; rub down with fine sand paper and give a final coat of thin shellac.

We must now settle the matter in regard to the fillets where the branches join each other. With a brush of the requisite size and the black shellac, draw a black mark all around the angle formed by the two pieces, and of a width it is required the fillet shall be. This black mark is a sign understood by the molder to mean that the angle in the sand is to be taken off, rounding it up to the width shown by the black mark and form a fillet of that width, hence it is absolutely necessary that the black mark be made neatly and correctly so that no mistake may be made in the casting. Nothing has been said here in regard to the flange B of Fig. 109, as it is understood that it was properly fitted and finished before being taken from the lathe. Our attention will next be directed to the making of core boards.

Bricks from Glass Refuse.

Dr. Ormandy of the Gamble Institute, St. Helens, England, is reported to have succeeded in producing bricks of a commercially valuable character from the wasts heaps at glass manufacturing establishments. This refuse, of which millions of tons have accumulated, consists mainly of spent sand, minute particles of glass and about 3 per cent. of iron from the various processes; and it has hitherto been considered that the presence of iron prevented the use of the material in the manufacture of bricks. The experiments carried out by Dr. Ormandy have negatived this hypothesis and he has successfully established the fact that bricks can be produced out of the waste by special treatment.

IN many, perhaps a very large majority, of the high-class houses of the present day there are burglar and fire proof safes built into the walls of the dining rooms, these being large enough to hold the valuable plate. In a well appointed house every closet of any size may be illuminated by electricity.

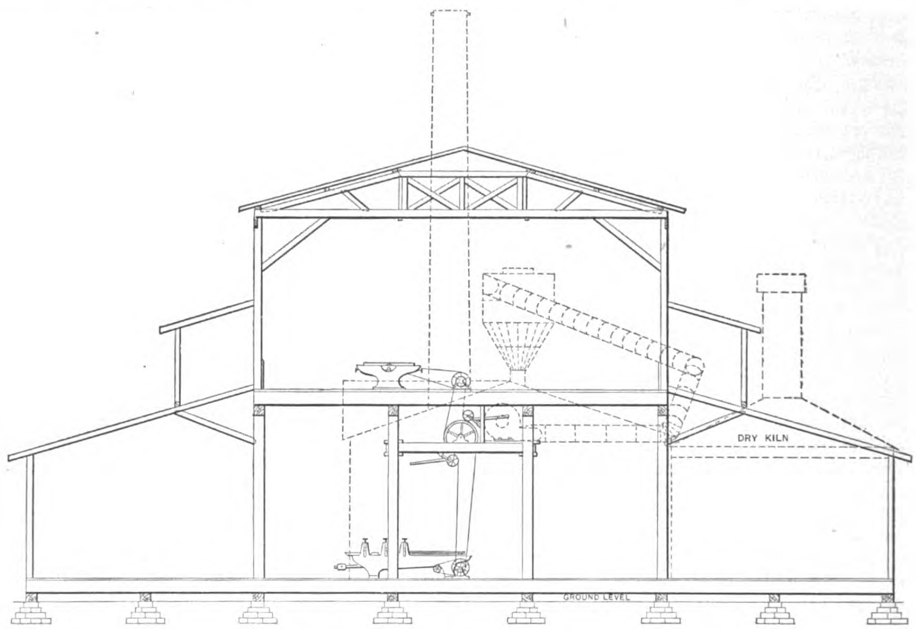
A SMALL WOOD WORKING SHOP.

THE construction and arrangement of wood working shops such as the small contractor and country builder might find desirable for the execution of his work have been the basis of more or less discussion in these columns during the past year, and as a further contribution to the subject we present herewith drawings showing the construction suggested by A. L. Shaw of Whitecastle, La. The design is referred to by the author as a small planing mill and sash, door and blind factory, which would be adapted to the requirements of a small town.

In presenting the design to the consideration of our readers, the author draws attention to the framing, which, while comparatively light, is yet strong and rigid, and sufficient, it is said, to prevent vibration. The lower floor of the planing mill is the only part of the building involving heavy frame work, the posts being 12 x 12, with floor joists 2½ x 14 inches, placed 16 inches on centers. The posts for the line shaft hangers are set far enough apart so as not to be in the way of the machinery, and the lumber can be turned without coming in contact with the posts. The building proper is 40 x 60 feet, with light sheds on either side, which makes the structure of good size, without adding to the expense of a heavy frame building of the same dimensions.

One of the main features, the author states, to which he desires to call attention, is the means of lighting. The shed is left open where it joins the main building and is lighted by side lights, as may be seen from the end elevation. This construction also affords a means of heating the upper part of the factory, as under the windows the boarding is not carried all the way up, thus leaving openings, which allow the heated air to enter while at the same time they serve as a means of ventilation in summer. The line shaft hangers are framed in the posts and are adjustable by means of keys. The hangers are also used for the blower loft which is floored, thus making it easy for the oiler. One of the worst things with which a planing mill man has to contend, says Mr. Shaw, and which is a source of great expense, without considering the annoyance, is a loose pulley; but in this shop he points out that there is no necessity for them. All the machines, upstairs and down, are run with tighteners, and when the weights are off, the machine is "dead," so that there is no danger whatever of getting the hands cut, which oftentimes occurs where there are loose pulleys. The cost may be a little more at the start, but he is of the opinion that they will pay for themselves in a short time.

The plan shows the heavy machines next to the engine, and so arranged as to carry the lumber right through in regular order. The lumber is put into the kiln on the other side and comes out through the planing mill; is run through the planer, then through the edger or rip saw, as the case may be; or the lumber can be run through the rip saws and then through the matcher, the re-saw or molder. All machinery can be arranged to suit the requirements of the work in hand, for it is well known that a set of machinery may be suited to one locality and not necessarily to another. Upstairs, however, the sash and door machinery must be arranged so that the work in hand will go straight through without any re-handling. A shop is not complete without a good supply of good, strong factory trucks, and the author says "never let any of the work set on the floor."



End Elevation Showing Framing.—Scale, 1-16 Inch to the Foot.

A Small Wood Working Shop.—Designed by A. L. Shaw of Whitecastle, La.

"The engine and boiler room, shaving room and kiln are all in one building, which may be either of brick or frame. It is isolated in case of fire, as it sets away from the main structure, with a platform running between, rendering it easy to truck the lumber. The dry kiln is back of the engine and boiler room, and on the same level as the planing mill floor. It can be run with exhaust steam in the day time and live steam at night.

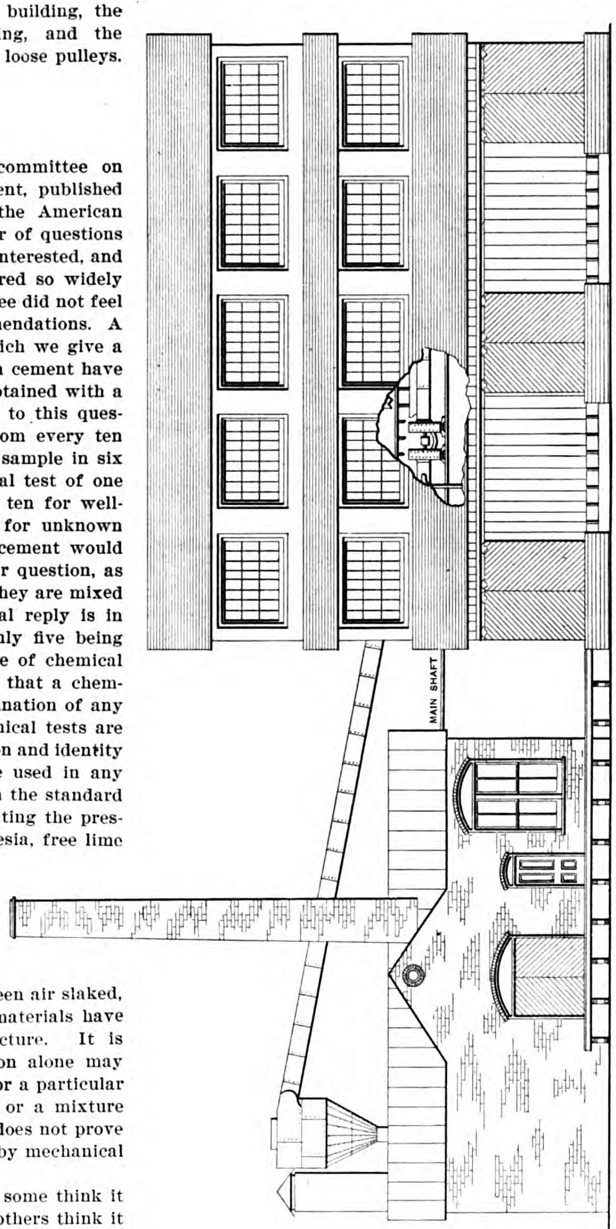
"My way of heating may be entirely new to some of the readers, but it is practical, and the difference in the amount of fuel used is not very large. An hour or so before starting up in the morning the door of the kiln can be lifted and the shop rendered nice and warm. This all depends, however, upon the heating surface of the pipes in the kiln. It is a good idea to have as much as can be laid together, with a double manifold at one end, and return elbows at the other, the condensed steam returning to the boiler.

"The plans here shown are not based on theory, but actual experience, and the planing mill can be built of larger capacity, with all the latest improvements; but in a small shop it would not be necessary to carry it to the extreme. The prominent features embodied in the design, and which I think will appeal to those interested, are cheapness and strength of the main building, the method of lighting, heating and ventilating, and the system of tighteners, thus dispensing with loose pulleys.

Tests of Cement.

The progress report of the special committee on the proper manipulation of tests of cement, published in a recent number of the *Journal* of the American Society of Civil Engineers, gives a number of questions sent to members of the society and others interested, and the answers received. These replies differed so widely in their recommendations that the committee did not feel justified in formulating a set of recommendations. A summary of the replies is given, from which we give a few extracts. To the question: How much cement have you been willing to accept on the result obtained with a single sample? The majority in replying to this question favored testing about one sample from every ten barrels. One was in favor of testing one sample in six barrels for tension, and making a chemical test of one in 100 to 300 barrels. Others say one in ten for well-known brands, and one in three to five for unknown brands. The kind and reputation of the cement would have to be considered. In reply to another question, as to how the samples are obtained, whether they are mixed or the packages kept distinct; the general reply is in favor of keeping the samples distinct, only five being in favor of mixing them. As to the value of chemical analysis, the average opinion seems to be that a chemical analysis is desirable in the first examination of any cement. Prof. H. Carmichael says: "Chemical tests are of service—*a*, in establishing the composition and identity of sample selected as the standard to be used in any work, and in detecting any departure from the standard sample which is specified; *b*, in demonstrating the presence of hurtful ingredients, such as magnesia, free lime in excessive amounts, and sulphate of lime; *c*, in demonstrating the presence of mere adulterants, such as fine sand, ashes, pulverized furnace slag, &c.; *d*, in ascertaining the amount of carbonic acid and moisture present, which indicate to what extent the cement has been air slaked, and, under circumstances, whether the materials have been properly combined in the manufacture. It is to be noted that the chemical composition alone may show the cement to be entirely unsuited for a particular use, as for instance that it is Rosendale or a mixture where a pure Portland is required; but it does not prove it to be good cement unless supplemented by mechanical tests . . . ."

The replies to this question are varied; some think it necessary for "all works of importance," others think it "indispensable," others again "unnecessary." Questioned on what elements or compounds should be determined, a large number agree in considering magnesia, sulphates and adulterations the only substances necessary to determine; others add lime, silica, alumina and iron. In certain instances it may be only necessary to determine the lime, magnesia and sulphates, in others a complete analysis may be desirable. To the question as to the best method of determining these compounds several learned chemical opinions are given, to which we refer the reader. Microscopical tests are generally considered unnecessary, though some think they are of use in determining the nature of adulterants and coarse material. The question as to the size of mesh to be used in testing fineness of Portland cement is answered so variously as to be difficult to summarize. Prof. J. B. Johnson says: "No fineness test by sieves is adequate, if we can do no better than use the finest practicable, which is, I think, 120 meshes per linear inch." He suggests a practicable washing method of testing fineness is desirable. Another, Prof. C. Richardson, says all cements should be sifted upon sieves known as 50, 100 and



A Small Wood Working Shop—Side (Left) Elevation.—Scale, 1-16 Inch to the Foot.

200 mesh. On the question of weight per cube foot, out of 28 members 19 consider this test valueless or of no importance. Professor Newberry thinks it useful for distinguishing pure Portland cement from mixtures; others say that requirement of a certain weight per cubic foot is a direct encouragement to coarse grinding.

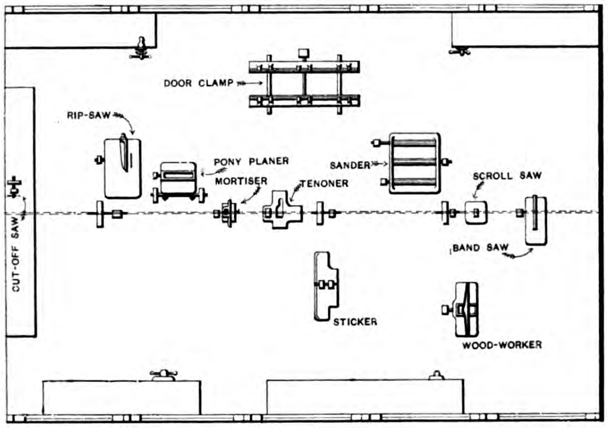
THE exports of builders' hardware, saws and tools in the fiscal year 1900 were the largest in the history of the country, amounting to $9,646,000, as against $7,842,000 in 1899, the next best year. Exports of typewriters have risen to $2,697,000.

Master Builders of Great Britain.

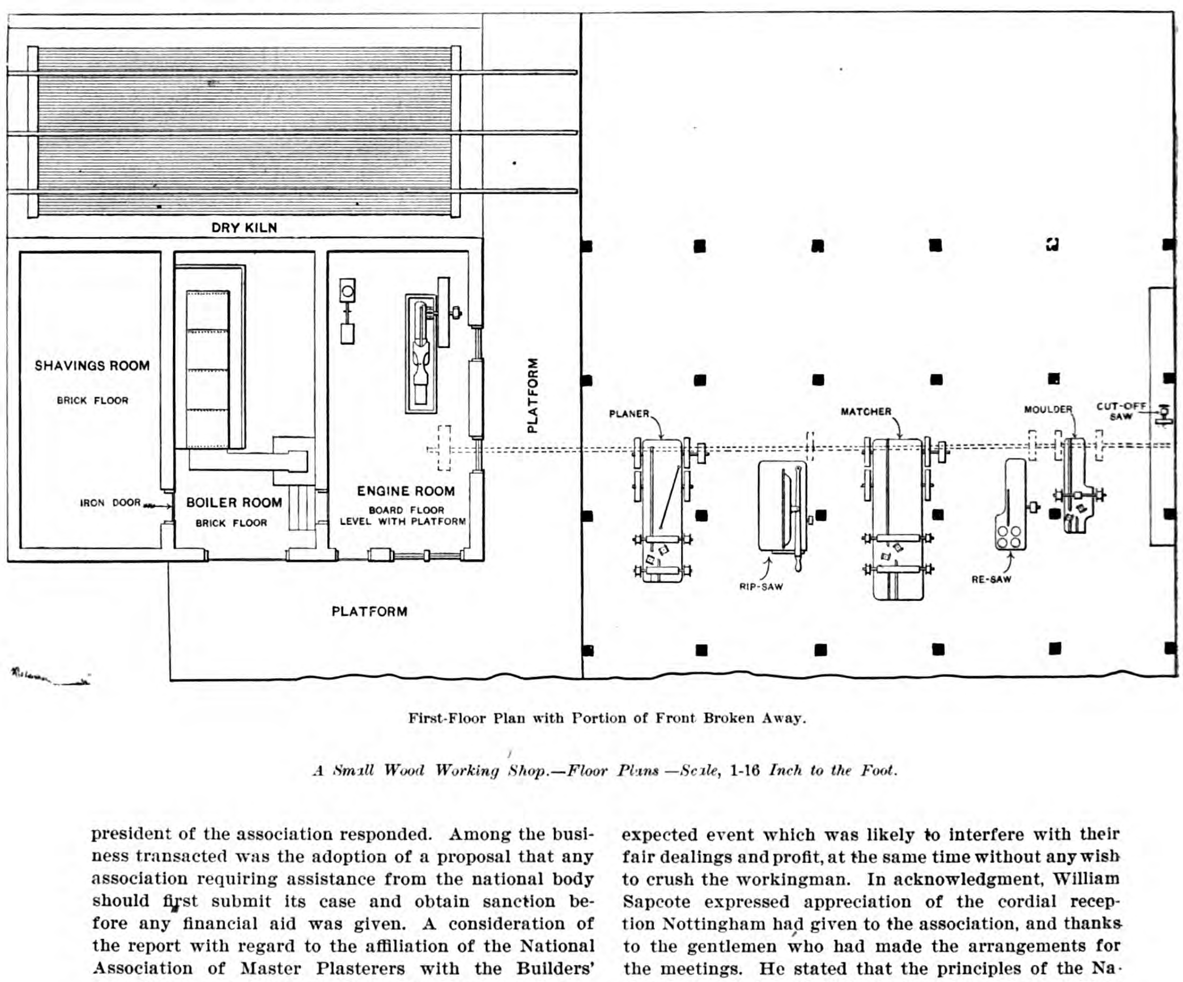
The National Association of Master Builders of Great Britain and Ireland recently held their half yearly meeting in Nottingham, with President William Sapcote of Birmingham in the chair. An address of welcome was extended by the Mayor of Nottingham, to which the president of the association responded. Among the business transacted was the adoption of a proposal that any association requiring assistance from the national body should first submit its case and obtain sanction before any financial aid was given. A consideration of the report with regard to the affiliation of the National Association of Master Plasterers with the Builders' Association was taken up, but after discussion it was decided to postpone final action until the next half yearly meeting, so that time might be given to ascertain the terms upon which the associations should be affiliated.

The question of builders' estimates was also considered, and it was recommended that a certain form of tender should be issued, and that all members should use it exclusively. With regard to the question of quantities, it was resolved that when a builders' tender had been accepted and the priced quantities deposited and the schedule of prices verified, that the said priced quantities should be placed under seal, and only used for the purpose intended—viz., the settlement of the accounts. Further, that when the account was settled the quantities should be returned to the builders, and in the case of installments the builders' verified copy should be used for sales and prices.

A feature of the meeting was a banquet tendered the delegates at the George Hotel. Among the toasts proposed was "The Architects, Engineers and Surveyors," in proposing which it was stated that the feeling at present between the master builders of Great Britain and architects and engineers was much better than it was 20 years ago. Sir Thomas Roe, in proposing the "National Association of Master Builders of Great Britain," referred in the course of his remarks to the contract system and the difficulties builders had to contend with in tendering for jobs which extended over one or two years, owing to the difference in the prices of materials. He wished success to the organization, which had as its object the desire to protect themselves against any unexpected event which was likely to interfere with their fair dealings and profit, at the same time without any wish to crush the workingman. In acknowledgment, William Sapcote expressed appreciation of the cordial reception Nottingham had given to the association, and thanks to the gentlemen who had made the arrangements for the meetings. He stated that the principles of the National Association might be expressed as follows: "They desired only to obtain relations with the men on fair and reasonable terms, and with architects and surveyors, agreements for carrying on work that were beneficial to all concerned."



Second Floor.



First-Floor Plan with Portion of Front Broken Away.

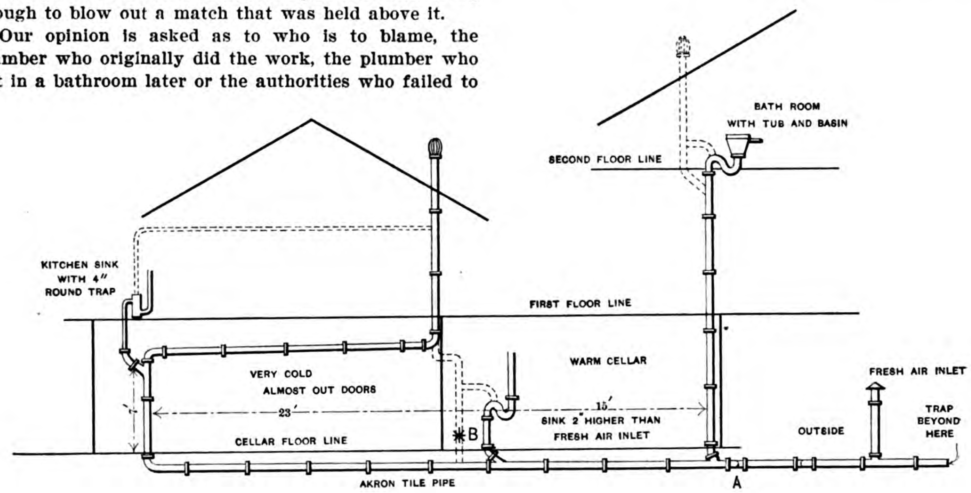
A Small Wood Working Shop.—Floor Plans —Scale, 1-16 *Inch to the Foot.*

PLUMBING WITHOUT REGULATIONS OR INSPECTION.

THE necessity of suitable plumbing regulations and provision for their enforcement under the supervision of a competent plumbing inspector have been frequently pointed out, but an instance where a city fails to take advantage of the State law, which provides for both the adoption of plumbing regulations and inspection, is brought to our notice by a Concord correspondent, who sends the sketch shown herewith of plumbing he found in a building in that city. In his letter he states that his attention was drawn to this case by being called in to adjust a stop and waste cock that worked hard. While doing this work he was told by the owner that he fancied he smelled sewer gas in the cellar near the sink. This sink in the cellar was only used once a week, on washing day, and on going to the sink it was found that the owner had stopped the outlet with a wooden plug to prevent the escape of the odor. When the plumber took this plug out the current of air issuing from it was strong enough to blow out a match that was held above it.

Our opinion is asked as to who is to blame, the plumber who originally did the work, the plumber who put in a bathroom later or the authorities who failed to take advantage of the provisions of the State law, and if a conscientious and competent inspector should not have jurisdiction over house plumbing. He points out that at the present time, although the State law provides that all towns must have a plumbing inspector, the city of Concord, where the law was made and where this piece of work has been done, has only an inspector of sewers. Originally the work was put in the house by Plumber A, and afterward changes were made by Plumber B. After the disadvantages of the system had been pointed out to the owner he rightly claims that the State long ago should have provided the law enabling the enactment of suitable regulations, and the city should not have delayed adopting regulations and having a competent officer to see that they were observed, and, further, this officer should have provided him with a certificate that his work had been done in conformity with the law and regulations. Our correspondent holds that in the interest of sanitary work the plumbing inspector should be, if possible, a practical plumber of broad information and sufficiently liberal in his views to consider all of the conditions bearing on plumbing work, including first cost, durability, and, most vital of all, the effect on the health of the people who are to occupy the building.

In this house the drain pipe is terra cotta. There is a running trap some distance beyond the fresh air inlet shown. Originally there was a water closet in the cellar at the point marked B. When the bathroom was put in, however, it was removed and placed in the bathroom without any trap ventilation. An enameled bathtub and a washbowl were connected with the same stack by means of a 1½-inch waste pipe. The dotted lines show changes which it is claimed should be made in the system to make it sanitary or in conformation with a proper set of plumbing regulations. No terra cotta pipes should have been used in the building, but extra heavy cast iron pipe throughout. When the water closet was located at B the plumber ran the pipe up to the roof, as shown. It is also claimed that the grease discharged with the water from the kitchen sink will accumulate in the 4-inch pipe at a point just beyond the sink connection, and that the bore of the 4-inch pipe will eventually be reduced to about the same size as the 1¼-inch lead waste pipe. Then, when the kitchen sink is used to such an extent that the full opening of 4-inch pipe is filled, the discharge through the small opening drives the confined air before it and causes the seal in the trap of the cellar sink to be broken, which allows the offensive odor to escape. This arrangement is justly considered by the plumber to be all wrong, and the dotted lines used in connection with the sink in the cellar show what, in his opinion, is the best way to overcome the trouble. The outlet from the sink in the cellar is connected on the side of the terra cotta drain pipe instead of along the top, as shown.



Plumbing without Regulations or Inspection.

There can be no doubt that the work shown would not pass inspection in any of the cities having modern plumbing regulations and a competent plumbing inspector, and clearly shows that the city of Concord should promptly take advantage of the provisions of the State law and provide both modern plumbing regulations and a competent inspector. The use of the large pipe to the kitchen sink invites the drain pipe to become clogged, and there can be no doubt that a rush of water from the kitchen sink would have a disastrous effect on the seal of the trap in the cellar, and it is quite probable that the discharge of the closet in the bathroom or the emptying of the bathtub would have an effect on the seal of the traps in the sink in the cellar and also in the kitchen, until the vent pipes are connected as suggested by the dotted lines made by our correspondent. In towns where no plumbing regulations exist, and even where they do exist and there is no competent plumbing inspector, it is not uncommon for just such work as is shown in this sketch to be done, showing clearly the necessity of both the regulations and inspector.

The New Boston Trade School.

The preparations for the new trade school, to be opened about October 1 under the auspices of the Massachusetts Charitable Mechanic Association, in the Mechanics' Building, Boston, are progressing satisfactorily. The association are fitting out rooms in the basement of the building for the accommodation of the classes. Three trades only will be taught at the start—namely, carpentry, plumbing and masonry. Instruction will be given in evening classes. Each of these three departments will be kept separate, with their own entrance and toilet rooms, &c. The carpentry and plumbing classrooms are being equipped with benches and the necessary tools, while the masonry classroom is supplied with bricks, trowels and the materials for making mortar.

Each trade is represented by two members on the committee having the school in charge, and these men will appoint the first teachers. William N. Young, vice-president of the M. C. M. A., and E. Noyes Whitcomb, both large builders, will appoint the teacher in carpentry; William H. Mitchell and Isaac Riley the teacher in plumbing, and Isaac F. Woodbury and Stephen H. Whidden the teacher in masonry. The above committee, together with President Horace H. Watson of the Massachusetts Charitable Mechanic Association, who is chairman of the committee, have visited the New York Trade School, and the scheme of the new Boston undertaking is being modeled largely on that of the successful New York institution, with, of course, adaptations to suit the peculiar conditions of Boston.

New Publications.

BLUE PRINT MAKING. Size, 5½ x 8 inches. 28 pages. Bound in blue paper covers. Published by David Williams Company, 232 to 238 William street, New York City. Price 25 cents, post-paid.

The extent to which blue prints are used at the present day in connection with building operations, as well as in various other branches of trade, renders interesting and valuable, contributions to the literature on the subject of preparing them. Numerous inquiries have been received in the past for a work on blue print making, and with a view to meeting these requirements we have arranged in book form some of the articles on the subject which have appeared in the columns of this journal. The little book in question embraces directions for constructing the printing frame, preparing the paper and making prints of various kinds. The articles are contributed by authors well known to readers of *Carpentry and Building*, and the subject is handled in a way to strongly appeal to the architect, builder, contractor or mechanic who is desirous of making blue prints for his own use. There are also included in the work a number of queries and answers, relating to blue print making, which lately appeared in the Correspondence department of this paper.

PROGRESSIVE CARPENTRY. By D. H. Meloy. 90 pages. Size, 5½ x 7¾. Bound in boards, with side title in gilt. Published by David Williams Company, 232-238 William street, New York City. Price $1, post-paid.

This work, with which our readers are more or less familiar, has been revised and enlarged, and is now presented to the student of roof construction as well calculated to fully meet his requirements. The author's system of framing roofs is elucidated by means of numerous diagrams, accompanied by carefully prepared text, the treatment of the subject being such that every member of a roof can be readily fitted without making extra drawings to obtain the cuts, bevels, &c., necessary for the work. The author tells among other things how to lay out rafters of all kinds, where the roofs are of the same pitch, and also where the pitches are unequal; how to frame curved roofs, octagon roofs, hip roofs that are not square; how to truss saddle roofs; splice truss beams; truss girder beams; the method of obtaining bevels for any pitch roof, as well as many other things in connection with roof construction which the carpenter is likely to encounter in his every day practice. Considered as a whole, the little volume will be found of great assistance to the ambitious mechanic who desires to thoroughly familiarize the subject of roof framing; at the same time it cannot fail to prove a valuable addition to his library of building trade literature.

Awards at Paris Exposition.

Among the American exhibitors awarded medals at the Paris Exposition and whose products are of interest to readers of this journal may be mentioned the following:

J. A. Fay & Egan Company, Cincinnati, Ohio.
L. S. Starrett Company, Athol, Mass.
Pike Mfg. Company, Pike Station, N. H.
Stanley Rule & Level Company, New Britain, Conn.
North Bros. Mfg. Company, Philadelphia, Pa.
W. F. & John Barnes Company, Rockford, Ill.
Bommer Bros., Brooklyn, N. Y.
American Machinery Company, Grand Rapids, Mich.
J. L. Mott Iron Works, New York City.
The Stanley Works, New Britain, Conn.
Stover Mfg. Company, Freeport, Ill.
Winslow Brothers Company, Chicago, Ill.
H. W. Johns Mfg. Company, New York City.

CONTENTS.

— EXCESSIVE POLITENESS.—Customer: "I haven't any change with me this morning; will you trust me for a postage stamp until to-morrow?"

Drug Clerk: "Certainly, Mr. Jones."

Customer: "But suppose I should get killed, or——"

Drug Clerk: "Pray don't speak of it, Mr. Jones. The loss would be but a trifle."—*Chicago News.*

— HE WANTED TO KNOW.—Johnnie: "Mother isn't blind, is she?"

Pa: "Of course not. What put that into your head?"

Johnnie: "Mrs. Bowser, who was here to-day, said mother'd never see forty again."—*Boston Transcript.*

— PROFESSIONAL INADVERTENCE.—"Dearest," asked the confiding girl, after her usual manner, "am I really your first and only love?"

"No, darling," said the young druggist, "but you are something just as good."—*Indianapolis Journal.*

Carpentry and Building

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The Builders' Exchange

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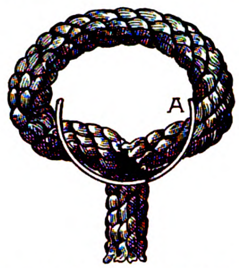
AUSTRALIAN OFFICES:.......MELBOURNE, 231 Elizabeth Street. SYDNEY, Palings Buildings.

ENTERED AT THE POST OFFICE NEW YORK, AS SECOND-CLASS MATTER.

NOVELTIES.

Giant Sash Cord Fastener.

A device for making and retaining a knot in connection with sash cord is the Giant sash cord fastener, which is being introduced to the trade by the Giant Sash Cord Fasten-



Novelties.—Giant Sash Cord Fastener.—Fig. 1.—First Stage of the Knot

er Company of 151-155 Greene street, Jersey City, N. J. The fastener, illustrated herewith, is claimed to carry without slipping the weight of any sash in connection with which cord is used, and thus avoid some of the many annoyances which occur when a tie knot is employed. Among the points to which the makers direct attention is the saving in time in making the knot, and also the saving in the amount of cord required. It is

Fig. 2.—The Knot Completed.

stated that the knot requires only 2 inches of cord, whereas for the common knot at least 6 inches of cord are necessary. The knot is small, can be easily taken out and used again, and will fit any sash hole. When used for the weight the cord hangs in the center of it, thus preventing the cord from rubbing against the frame and wearing out. In the formation of the knot a piece of metal, curved as shown in Fig. 1, is used, the length being about 1⅞

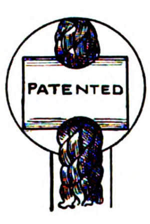
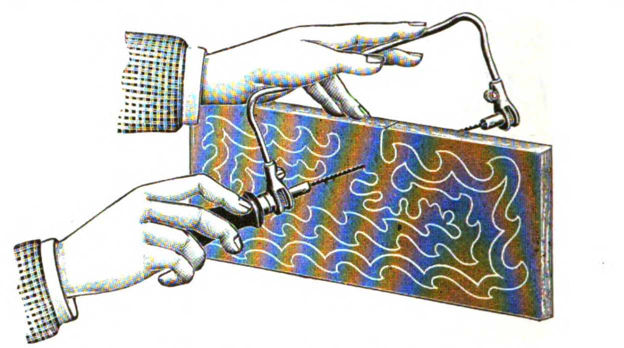


Fig. 3.—Appearance of Knot in Use.

inches and the width ⅝ inch. In this piece are three holes of a size to readily admit the sash cord, which is passed through the center hole, then through the hole near one of the ends, and, finally, through the third, as indicated at A of Fig. 1. The metal strip is then bent together, giving the knot the appearance indicated in Fig. 2, while in Fig. 3 is shown the completed knot in use. The fasteners are sold in 1 gross or 12 gross boxes, full particulars and directions being mailed with every order. The company announce that they will send by mail, postpaid, to any address a sample of their cord fastener, so that all who are interested may practically demonstrate its merits to their entire satisfaction.

Jones' Cable and Ratchet Saws.

The accompanying cuts represent two forms of saws put on the market by Jones & Dommersnas, 31 and 33



Jones' Cable and Ratchet Saws.—Fig. 4.—The Cable Arrangement.

Indiana street, Chicago, Ill. The saw with cable arrangement is shown in Fig. 4. The tubing is nickel plated, and is provided with a birch handle and cable arrangement to enable the operator to turn the saw blade at any angle. The cable consists of cable laid Italian hemp, which is referred to as strong and durable. Should it become worn and broken it can easily be replaced, it is explained. The ratchet saw, Fig. 5, is constructed with a steel back and ratchet arrangement, to enable the workman to quickly set the blade at

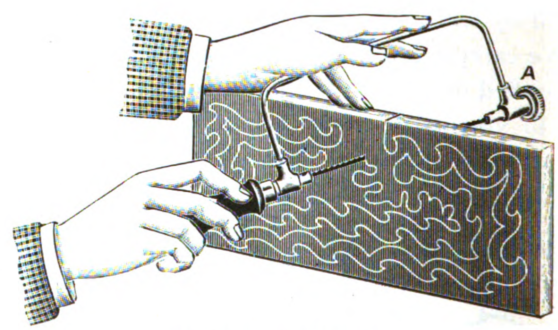


Fig. 5.—Jones' Ratchet Saw.

any angle by the use of the handle and the button A. Both kinds of saws are packed, one each in a pasteboard box, with six blades. The saws are designed for use by carpenters, pattern makers and all wood workers.

Hot Air Furnaces.

We have received from Giblin & Co., with office and works at 105 Broad street, Utica, N. Y., a copy of an interesting publication relating to furnaces which they manufacture, and containing suggestions concerning the purchase of heaters. The pamphlet is in effect a catalogue of the company's furnaces, thousands of which are said to be in use heating residences, stores, schools, opera houses and other public buildings throughout the country. Several improvements have recently been added to the furnaces, all of which, we are informed, tend to increase their durability, efficiency and ease of operation. The leading place in the catalogue is given to the Junior furnace, which is shown with the outer casing broken away, thus giving an idea of the air currents and the internal construction. There is also presented a skeleton view of the furnace, showing the essential parts of which the heater is composed. Following this, attention is given to the Standard furnace, which is offered in a number of sizes; the Standard Smokeless, for soft coal; the Standard Tubular, the Rival, the Rival Junior, the Standard Steel, which is shown with side collar and also with rear collar; the Standard Steel, 200 Series, and the Standard Combination Hot Air and Hot Water heater. These goods are all illustrated and described in a way to interest the trade, as well as to render their construction and operation readily understood by intending users. We also have from the same company a 20-page furnace dealers' catalogue, devoted to hot air furnaces and combination heaters. This is intended more especially for distribution among dealers and contains valuable information relative to location, setting, casing, &c., of furnaces, together with price-lists, directions for ordering, repairs for furnaces, also a number of useful hints concerning radiation, steam mains, hot water flow and return pipes, &c.

Mueller's Never-Twist Screw Drivers.

Braunsdorf-Mueller Company, 433-435 East Jersey street, Elizabeth, N. J., manufacturers of high grade mechanics' tools, for which Warner &

Rucker, 88 Chambers street, New York, are direct representatives, have put on the market Mueller's Never-Twist screw driver, as here illustrated, and for which patent has been applied for. This screw driver, as shown in Fig. 6, has a long cast metal polished ferrule, and the handles are handsomely finished in ebony and red. The peculiarity of this screw driver is in the ferrule and the

Novelties.—Mueller's Never-Twist Screw Drivers.—Fig 6 – General View of the Tool.

method of attaching the handle. The ferrule has a square socket, as shown in Fig. 7, and fits a similar shape on the end of the wood handle. On the end of the ferrule furthest from the handle the opening is square to receive the square shank of the blade. This construction prevents the blade from turning in the ferrule or the ferrule turning on the handle. The end of the blade which enters the handle is square, so that if a hammer is thoughtlessly used on it the metal shank will not split the wood as a sharp end would. The blades are made of tool steel uniformly tempered, and every screw driver is guaranteed perfect by the manufacturers,

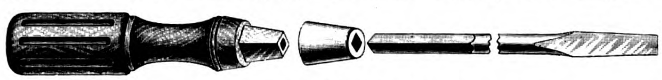


Fig. 7.—View with Parts Detached.

who will give any dealer one dozen of these screw drivers for every Never-Twist driver that turns in the handle. They are made in 3, 4, 5, 6, 8, 9 and 10 inch blades.

Combination Carpenters' Pincer.

H. D. Smith & Co., Plantsville, Conn, and 253 Broadway, New York, have just placed on the market the combined carpenters' pincer, tack hammer, tack puller and screw driver shown in Fig. 8 of the cuts. It is finely forged from steel. On either side of the jaws is a polished hammer surface. The goods are stamped S in a circle, which is used only on the company's best quality goods. The tool is made in 6, 8 and 10 inch sizes, each put up in a manila envelope

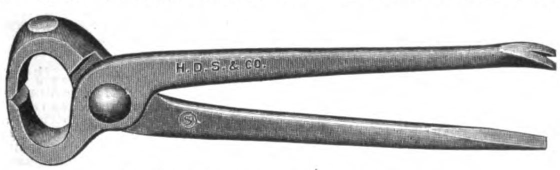


Fig. 8.—Combination Carpenters' Pincer.

with end opening and packed six each in double pasteboard boxes, with a label printed on the envelope.

The Youngstown Iron & Steel Roofing Company

of Youngstown, Ohio, have issued from the press an attractively printed catalogue relating to the specialties which they manufacture. The 80 pages of the catalogue are profusely illustrated and are bound in deep green paper covers, with a side title in old gold. Among the opening pages is to be found a general view of the company's warehouses, furnaces and rolling mills, together with a list of the principal offices, these being found in New York City, Chicago, Philadelphia, Denver, Cincinnati, Holyoke, Mass.; Indianapolis, Ind.; Detroit, Pittsburgh and Toledo. In offering the catalogue to the trade special attention is directed to the facilities possessed by the company for promptly and accurately filling all orders with which they may be intrusted. They point out that their goods are made from first grade of stock, that their machinery is of the latest and most approved designs, and that their factory is now four times its original size. The goods to which attention is invited include iron and steel roofing and siding, "T & C" metal lath, Youngstown corrugated and expanded metal lath, and Buckeye metal trough flooring for city and highway bridges and fire proof buildings. Some of the work in connection with which the metal troughs have been used is shown by means of half-tone engravings, which add to the pictorial effect of the catalogue. Attention is also called to the union metal corner bead for plaster corners. Among other things diagrams are given showing how to measure buildings in connection with which metallic flooring or siding is to be employed, and directions are presented for laying the Buckeye flooring on bridges and viaducts; also for laying Buckeye fire proof flooring. The catalogue has been arranged with a great deal of care and attention to details, and it will be found of special interest to architects, builders, contractors, roofers, and, in fact, to all having to do with sheet metal work.

Metal Skylights.

Owners of buildings needing roof lights are likely to be interested in the merits of the skylight made by E. Van Noorden Company of Boston, Mass., and for which they make strong claims. By means of steam power machinery a sheet of metal is struck from the flat, in dies, into a skylight bar, full length, without cross seams. The bar is provided with a resting place for the glass and a deep gutter below, so that when the frame work is put together, the glass bedded in putty and a metal cap placed over, the result is a structure which is claimed to be rigid, yet light, water proof from outside storms, fire proof and proof against dripping from the water of condensation formed on the under side of glass. Skylights put up by this firm 20 years ago are still in existence, as sound apparently to-day as when they were finished. Owing to the large floor space in the firm's shop, and the powerful and rapid machinery for making this work, the cost of these skylights has been reduced to such a low figure that it would seem as if no one could afford to use wooden ones. The firm have a complete skylight catalogue which they will send free to any one on request.

New Century Design of Door Hardware.

Russell & Erwin Mfg. Company of New Britain, Conn., and 43-47 Chambers street, New York, have just put on the market the New Century design of store door handle, as shown in Fig. 9. This style of ornamentation is Grecian in character, and it is the intention to ultimately carry it through an entire line of iron and bronze metal hardware for outside and inside trim. It is now obtainable in front, inside and sliding door lock sets, thumb latches and sash lifts, which in the future will be supplemented by the addition of other small articles used in trimming the interior of buildings, as sash fasts, draw pulls, push buttons, &c.

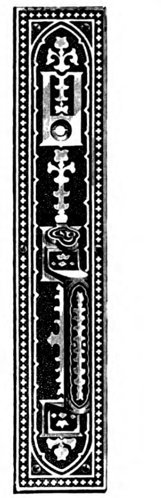


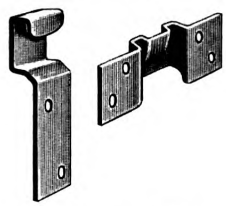
Fig 9.—New Century Design of Door Hardware.

Exhaust Fans, Blowers and Dry Kilns.

We have received from the William Bayley & Sons Company of Milwaukee, Wis., a catalogue dealing with their steel plate exhaust fans, blowers and dry kilns. The most desirable size of their progressive dry kilns—that is, the one in most general demand—is 85 feet long, 17 feet wide and 9 or 10 feet high. This kiln will receive 12 cars, each of which is capable of holding 4000 feet of lumber. In addition two more cars are needed in each kiln for the loading and unloading platforms. Thus each kiln of the dimensions given has a total capacity of about 50,000 feet, while the lumber dried on each day ranges from one-seventh to one-fourth of the total amount, depending largely, of course, upon the condition of the lumber. The material to be dried is loaded upon cars and run into the kiln upon stationary trucks at the rate of two or more cars a day. Thus, as each day's quota is added, those preceding are gradually sent forward to the further end of the kiln, where the temperature ranges from 70 to 100 degrees higher than at the entrance. In this way the lumber is subjected to an even draft, gradually increasing in intensity until reaching the climax at the exit.

Sensible Storm Window Hinge and Fastener.

R. G. Winter, 327 Nicolet avenue, Minneapolis, Minn., is manufacturing the Sensible storm window hinge and fastener, the various parts of which are here shown. It is made of wrought steel and sufficiently strong to hold any storm window. Its construction is such that it forms an absolute lock, so that the window or screen (it can



Novelties.—Sensible Storm Window Hinge and Fastener.—Fig. 10.—Upper Hinge for Sensible Storm Window Device.

be used on either) cannot be blown off the hooks in severe weather. Windows or all over screens can be hung from the inside of the house and easily detached at will. Fig. 10 illustrates the hinges to be used at the top, the operation of which is seen in Fig. 13. Fig. 11 illustrates their wire fastener No. 2, which is fastened to the sash by means of an eyelet. With the varying seasons this fastener can be used either on screen or storm window by twisting out the eyelet and removing from screw eye at other end. Fig. 12 shows their No. 1 Sensible storm window fastener, which is not intended for screens. This is made of wrought steel, japanned. With this device the storm window can be swung outward for ventilation or other purpose and fastened at either of the two holes. For the ordinary purpose, however, of a storm window designed to keep out cold air, rain, dust, &c., the storm sash can be pulled up close and, by means of the eccentric slot near the plate through which the button head passes, be drawn up by the lever snug and tight.

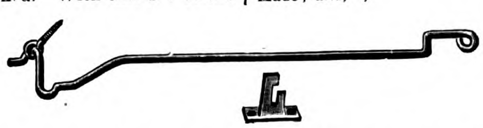


Fig. 11.—Wire Fastener for Storm Window or Screen, No. 2.

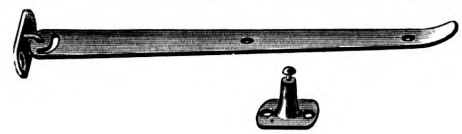


Fig. 12.—Fastener for Storm Window, No. 1.

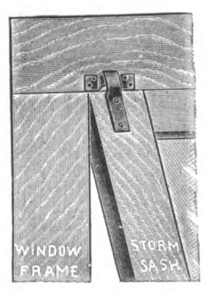


Fig. 13.—View of Hinge in Position at Top of Window.

Union Ratchet Screw Driver.

The attention of the trade is being directed to the Union double action ratchet screw driver, which is illustrated in Fig. 14, and which is manufactured by George E. Gay of Augusta, Maine, for whom John H. Graham & Co., 113 Chambers street, New York City, are direct representatives. The cut represents the vest pocket size for bicycle and similar purposes, but the goods are made in regular sizes for carpenters' use in 3, 4, 5, 6, 8, 10 and 12 inch blades, with correspondingly longer handles. This screw driver has a movable knurled sliding ring; if moved toward the blade it can be used to drive in a screw; moving the ring toward the handle will permit of withdrawing a screw. When the ring is midway between the two extremes the blade is stationary and can be used either to drive or withdraw screws, the same as an ordinary screw driver. The handles are black polished hardwood, and the whole device is nicely finished.

Fig. 14.—The Union Double Action Ratchet Screw Driver.

TRADE NOTES.

THOSE who are thinking of putting weather strips on their doors and windows to keep out the elements, will be interested in the announcement presented in another part of this issue, by F. P. Burcaw of 2316 North Thirty-first street, Philadelphia, Pa. Attention is there called to the weather strips which he manufactures, and which are claimed to fit doors and windows of all kinds. Mr. Burcaw is desirous of securing agents for these goods and states that there are big profits for carpenters handling the all-wood concave lock weather strip he manufactures.

SAMUEL H. FRENCH & CO., York avenue and Callowhill street, Philadelphia, Pa., have issued an interesting booklet, entitled "Portland Cement," describing the Dexter Portland cement, for which they are the sole selling agents. The subject is treated under three heads, 1, Portland Cement—What It Is; 2. How It is Made; and, 3, How It is Used. The first section is devoted to the nature and history of cements. The second, to a description of the method of manufacture, taking the reader from quarry to the shipping room of the Dexter Cement Company's works. In the third section various instructions are given for the use of cement, the character of materials to be mixed with it, manner of mixing them and information in general for its use. The booklet is attractive, as well as instructive, and is illustrated with numerous half tone engravings.

THE ST. PAUL ROOFING, CORNICE & ORNAMENT COMPANY of St. Paul, Minn., have just issued a new catalogue relating to the various lines of sheet metal work which they manufacture, and in their advertising space this month they direct attention to their metal ceilings and metal window frames and sash, which are rapidly growing in favor with the trade. The company also manufacture galvanized iron and copper cornices, ridge rolls, cresting, skylights, ventilators, weather vanes, finials, spun balls, zinc ornaments, &c.

A FOLDER which is intended to interest architects as well as builders is being distributed under the title of "Professionally Speaking," by the Cortright Metal Roofing Company of 50 North Twenty-third street, Philadelphia, Pa. The text of the folder points out that the duties of an architect in these days of new ideas are manifold and exacting, and that in his work he must be able to select from among manifold devices the one from which the best results are obtainable. The company state that many architects and builders have adopted the Cortright metal roofing as giving entirely satisfactory results, and the claim is made that it is adapted to any roof having a pitch of 3 inches in a foot. They claim that "it is lighter and tighter than slate and has a greater durability than slate, tin or wood shingles; that it cannot be blown off; that it can be removed and relaid without injury; that it will not warp, crack, curl or burn like wood shingles, and that it can be laid by any carpenter or tinner, as it requires no expert.

THE G. DROUVE COMPANY, Bridgeport, Conn., are unusually busy and are running their plant to its fullest capacity in order to fill the contracts which they now have on hand. Among the larger contracts recently taken are those for the metal work on the new hotel which Norcross Bros. are building at Garden City, L. I., consisting of 800 feet of cornice and 125 dormer windows; also the copper and metal work of a large residence at Palm Beach, Fla., for H. M. Flagler, and the copper work on W. K. Vanderbilt's new residence at Oakdale, L. I.

AMBITIOUS mechanics who desire to obtain better positions and higher wages should investigate the many advantages afforded by the correspondence method of instruction in the theory of the trades and engineering professions. Without leaving home or losing time from work, the student pursues a thorough course of study under the direction of able instructors who are always ready and willing to assist him. Instruction papers, prepared especially for teaching by mail, are furnished free. These papers, written in clear and concise language, as free as possible from technicalities, are much superior to ordinary text-books on the subjects of which they treat. In addition, special information regarding any difficulties in their studies is furnished students without extra charge. It should be the ambition of every man to advance in his trade or profession. A mechanic with practical experience supplemented by theoretical education can command a better position than a man without such an education. The results of long experience in teaching by mail show that no other method so fully meets the requirements of men who have but little time for study.

A PROFUSELY illustrated catalogue has been received from the Lasar-Letzig Mfg. Company of St. Louis, Mo., showing their many patterns of wrought iron and wire fences, window guards, counter railings, office partition railings, elevator inclosures, ornamental wrought iron or steel window guards, stable fittings, malleable iron roof crestings, weather vanes, steel door mats, metal lawn furniture and the like. The designs are all exceedingly attractive and serve to illustrate the great variety of patterns manufactured by the company.

POINTS ABOUT BOOKS

ARCHITECTURAL DRAWING. By C. F. Edminster.

In acquiring the correct principles of architectural drafting, the student will find no book more thorough and competent as an instructor and guide than this volume. It is a work of special value to the student, the mechanic and the man that is looking to better his position. It is practical and up-to date, treating the various subjects it covers in a simple, concise and comprehensive manner.

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This is another elementary text book on drawing prepared by a practical writer. The subject is treated in the simplest manner to the exclusion of problems not comprehensible to building mechanics who have had no technical training. The examples which are given as lessons in drawing embrace a wide range of work, the aim of the author having been to select only such figures for practice as are likely to meet the wants of working mechanics. 94 pages. Illustrated. Oblong. Cloth..................**$1.00**

ESTIMATING FRAME AND BRICK HOUSES. By F. T. Hodgson.

This book tells how to estimate, step by step, the cost of labor and materials necessary in building frame and brick dwellings from the work of excavation for the foundations to the finishing of the building. It is the only book which may be said to give a careful analysis of each item of cost of construction, all being demonstrated in order and by means of figures and data. All these methods and rules of figuring costs are brought out in the clearest and simplest manner, and may obviously be applied in determining the cost of constructing any dwelling. 147 pages, cloth bound...**$1.00**

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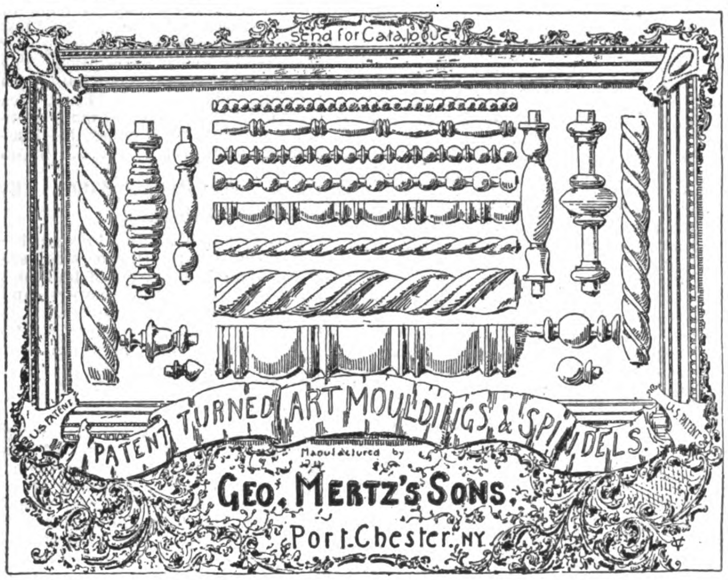

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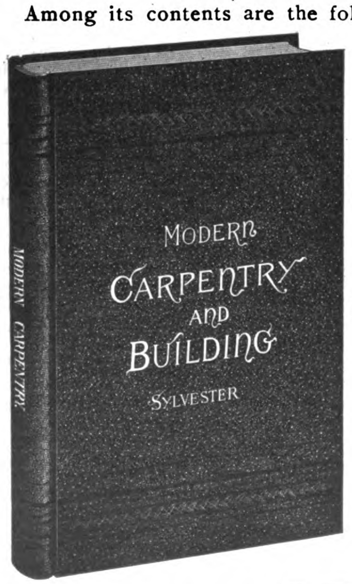

There is also an article entitled "*How to Plan Houses*," and there are two dozen unusually fine *Modern Floor Plans*, a complete set of *Modern Framing Plans*, a dozen full-page *Photographic Views* of fine Modern Residences, showing Beautiful Round Bays, Spires, Broad Piazzas, etc., and instructions are given how to scale these views so they can be used as working drawings; also a *Set of Specifications, Building Contract*, with terms of payment, and a complete *Glossary of Architectural Terms.*

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— NOTHING.—A statesman has nothing to say in something the same sense that a woman has nothing to wear.

Carpentry and Building

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The Builders' Exchange

VOL. XXII. No. 11. NEW YORK, NOVEMBER, 1900. Ten Cents a Copy. One Dollar a Year.

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SUPPLEMENT CARPENTRY AND BUILDING, NOVEMBER, 1900.

CARPENTRY AND BUILDING

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THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
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NOVEMBER, 1900

Chicago Building Trades Trouble.

The labor troubles in the Chicago building trades, which have almost the entire year interfered seriously with building operations in Chicago, now appear to be on the verge of settlement. The issues at the beginning of the year between the contending sides were quite numerous, but they have gradually disappeared from view, until recently the question seems to be whether a central organization should be maintained of the building trades unions. The contractors insist that the workmen should withdraw from the Building Trades Council and remain out of it and every similar organization. The workmen claim that they have a right to unite in a body of this character, but are disposed, however, to change the organization so as to overcome the objections to it which were held by the contractors. Disinterested citizens of Chicago are of the opinion that the contractors were asking too much when they demanded that the workmen should not unite in a confederated body, and have endeavored to get the contractors to agree to the continuance of an organization of this character, but under proper direction. It now appears that the contractors and the unions are getting together on an arrangement of this kind, and a central organization is about to be perfected which is probably to be limited in its membership to representatives of unions directly connected with the work of the contractors, the trades which are simply allied to the building trades being kept out of the new organization. It is stated that the effect of such an arrangement would be to prevent sympathetic strikes in behalf of unions which are only remotely connected with the trades unions and the building contractors.

Preventing Sympathetic Strikes.

This view of the situation is strongly borne out by developments which have recently occurred in connection with some of the important trades unions. One after another has withdrawn from the Building Trades Council, until it looks as if this organization would shortly pass out of existence. A new association could then be formed on different lines and be conducted in a way much less objectionable to the contractors. The way for a better feeling between the contractors and the workmen is being paved by the action of the structural iron workers, the steam fitters and the plumbers in deciding to accept work if at union wages, even though non-union men may be employed on the same jobs. The spirit of liberality thus shown is a strong indication of the growth of a more reasonable feeling on the part of the workmen, which will enable proper relations to be established. If the trouble can be adjusted soon all connected with the building trades believe that next spring will see a very great revival of building in Chicago. Many building projects have been held up this year on account of the labor imbroglio, while new ones are beginning to take shape which will be put under way when the next building season begins. The restoration of friendly relations between the contractors and the unions is of very great importance to vast business interests, not only in Chicago but outside of it.

A French Labor Object Lesson.

In view of the troubles which have occurred of late in the building trades in various parts of this country, a recent report to the State Department by Consul John C. Covert of Lyons, regarding the labor conditions in that branch of industry in Lyons, the second city of France, is of current interest. As is the case with all classes of labor in that country, the employers and employees in the building trades are organized into associations called "syndicates," for mutual protection. The employers' syndicate in Lyons comprises 625 members. Its object is "To further the interests of builders, to study and propose improvement in buildings, to secure the employment of the best material, to give opinions upon questions relating to the work of building; to decide, with the aid of experts, all disputes relating to the execution or the interpretation of contracts; the fixing of prices; and, if deemed advisable, to establish yearly, with the aid of whomsoever it may concern, a list of prices for building work; to study, devise, and employ every method to advance the interest of its members." This syndicate was organized in 1862. Since that date, twenty-three strikes have occurred among the workmen in the building trades, all of which have been settled with but little friction or expense, between a committee of the striking employees and representatives of the employers' syndicate. No outside parties, not even the Government board of arbitration, have ever been permitted to interfere in the adjustment of matters in dispute in the building trades. One of the cardinal principles of the syndicate is to enforce all agreements between employers and employed and the syndicate, it is stated, will not recognize or support any member who seeks to violate a contract once entered into with his workmen.

An Arbitrating Body.

The syndicate is often asked to investigate and report upon disputes arising between contractors and men or corporations for whom they are doing work, or between furnishers of materials. Nearly five thousand cases have thus been sent to the syndicate by the courts under a provision of the code, which obliges the parties in litigation to abide by the decision of the syndicate. This decision, however, can be appealed from. Between 1863 and 1899, seven thousand three hundred and ten cases were tried before the syndicate, of which five hundred and forty-two were appealed to a court. All these cases were settled in a very short time, and at small expense. In connection with a committee appointed by the workingmen the society also fixes the wages of all persons employed in the building trades. This schedule of wages, however, does not prevent strikes. It is expected to last only until the workmen think they can exact better terms from their employers. But it provides a uniform scale through the industry. It is through this syndicate, moreover, that the price for constructing a building is fixed. A committee named by the syndicate agree upon what will be charged, according to cost of material and current rate of wages of carpenters, stonecutters, masons, &c. The findings of this committee are revised by a committee appointed by the city council, consisting of members of the builders' syndicate, architects, contractors and landlords. No builder ever charges higher than the prices thus fixed. They sometimes charge less. The builders' syndicate of Lyons, in fact, appears to be a very useful and efficient body, whose functions and organization might be studied with advantage by those interested in the building trades in this country. No industry suffers more from strikes, labor disputes and troubles of various kinds, and any plan that would do away with them, or at least mitigate their severity, would be a boon to the community at large.

The Place of the General Contractor.

Architect, engineer, superintendent and contractor—all are involved in the question, Shall the contract be let entire or in detail? The old plan, to parcel the work out to each of the several contractors and to manage them all from the architect's office through the medium of an active superintendent, is still adhered to faithfully by some architects in all their work, says an English writer, as they claim that they can get better results by giving their personal attention to each contract; but some of the architects of large work believe this plan has its limitations, and that while it may be all right for smaller buildings, like residences, it is not to be recommended for larger enterprises.

When an office building, or a large factory or warehouse, or a great flat building is to be erected, this question becomes of prime importance, and it is then that the general contractor appears on the scene as a mediator between architect and workman whose value is recognized. He takes the contract entire, and is responsible for every detail of it. He gives ample bonds for the whole work, and shoulders the responsibility which otherwise would be divided up among two dozen or more smaller and perhaps less responsible contractors. If he is an enterprising and up to date contractor he employs a superintendent who is a practical engineer, and who takes upon himself almost all the load of providing the proper material whenever needed; guarding against delays by keeping the several contractors moving in their regular order, one moving out of the way of another; inspecting and regulating the work from the standpoint of an engineer quite as much as of a superintendent. Such a man is valuable in smoothing over rough places in the busy architect's life, and in reflecting credit on his employer, the general contractor.

Conventional and Natural Forms in Carving.

From the period when the constructors of the early Christian stone edifices raised their massive round pillars and solemn circular arches in the eleventh century down to the fifteenth ecclesiastical architecture was the predominant art which absorbed all others, and made them either subservient instruments of its resplendent glory or humble imitators of its stately devices. It is a remarkable thing, indeed—deserving of more attention from the curious and inquiring than it has ever, as far as we know, received—that everything ornamental, in whatever kind of work, within the period called the Dark Ages took its tone, and not only that, but its tangible form, from the ecclesiastical edifices of the day. In the decoration of churches, says a London exchange, it may be perhaps natural to find this peculiarity; yet it seems strange that wood should be carved into those forms which are necessary to meet the difficulty of creating lofty piles of stone work; and, taking analogy from other kinds of work, we would expect the stonecutter or statuary, who has a marble slab to deal with, rather to take advantage of his compact homogeneous material than to imitate all the shifts and peculiarities which the constructor has to adopt, who must fit one stone above another.

Look, for instance, at the carved wood work, so rich and varied, in the King's College Chapel of Aberdeen. All objects of art or of nature in all the material kingdoms were in the artist's choice to select from as objects of imitation, but his choice rests on architectural arcades, church windows and turrets. These representations are pleasing as imitations of architecture, but they are not the natural forms to which wood carving would have adapted itself had there been no such architectural supremacy as we have alluded to, leading the ancillary occupation of the carver after it in its own exact footsteps. Nay, had there been no Gothic architecture to be so imitated, and had the handler of the chisel cut his wood from his own devices into such forms as these architectural ones which we so admire, they would not have been then admirable, because we would have been without a main element in the beauty of the original device—the adaptability to give to masonry lightness and elegance of form consistently with its retaining sufficient strength. The artist of the carved wood in this chapel has crowded it with representations of Gothic windows, many of them really exquisite ones, of that rich foreign style which the French call flamboyant.

But it is from our admiration of that skill which can make solid stone rise in slender mullions and branch itself out as if in sheer beautiful wantonness into all airy and fantastic shapes that we first acquire our admiration of the form, so as to be gratified by its repetition on a flat oaken board, where it takes its merit from the imitative rather than the inventive skill of the artist. But for a still more striking instance of the application of edible forms to carved ornaments we turn to that gorgeous tomb of Bishop Kennedy in St. Andrews. Here are abundance of tiny clustered pillars, with groined arches over them and multitudinous windows. The imitation is carried so far that we have not only little towers careering aloft, with windows in line round the figure, making it look as though outlined in black paint. This plan, when skilfully used, has a most striking effect.

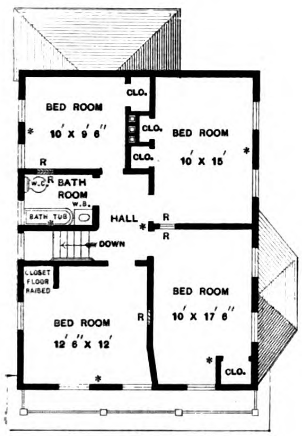
THE Year Book of the Armour Institute of Technology, Chicago, Ill., just issued for the season 1900-1901, gives complete information regarding the work of that institution, courses of instruction given, &c. The Armour Institute of Technology includes a Technical College, which embraces courses in mechanical engineering, electrical engineering, civil engineering, architecture and science; also the Armour Scientific Academy, which provides instruction adapted to prepare students to enter the Technical College, or any of the leading universities. In connection with the course of instruction in mechanical engineering, the general principles of heating and ventilation are considered. Under this head are treated various systems of piping, designs of steam and hot water systems, forced blast systems of heating and ventilating, regulation of temperature, radiating surfaces, pipe and fittings.

THE Industrial Union of Chicago have made arrangements with the Lewis Institute of that city to establish a trade school for the benefit of apprentices in the various building trades. It is proposed to furnish instruction on two evenings of each week, for a period of ten weeks in the year, the entire course to cover three years. The Industrial Union are now only awaiting the approval and co-operation of the employers in the building trades before definitely arranging for the opening of the classes.

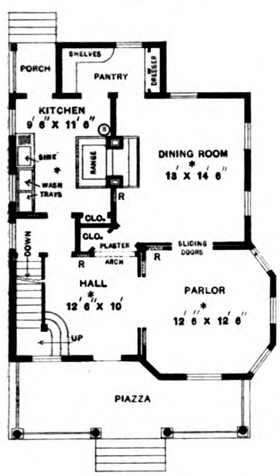
ACCORDING to the September Bulletin of the Bureau of Labor Statistics of New York for the year ending June 30, 1900, the number of labor organizations in the State at that date was 1603, with an aggregate membership of 247,602. This was an increase for the year of nearly 400 unions and of over 59,000 members. In no previous year has there been so large a gain in membership or in the number of unions, and this increase has taken place largely outside New York City.

COTTAGE IN A BROOKLYN SUBURB.

THE design which we present herewith is that of a two-story frame cottage, well adapted for execution upon a suburban site, and embodying features of construction and arrangement likely to interest many of our readers. The treatment of the exterior has been handled in a way to produce striking effects, particularly noticeable being the shingle and rough cast work in the front and side gables. The appearance of the finished structure is shown in the half-tone picture which forms our supplemental plate, and which is a direct reproduction from a photograph taken especially for the purpose.



Second Floor.

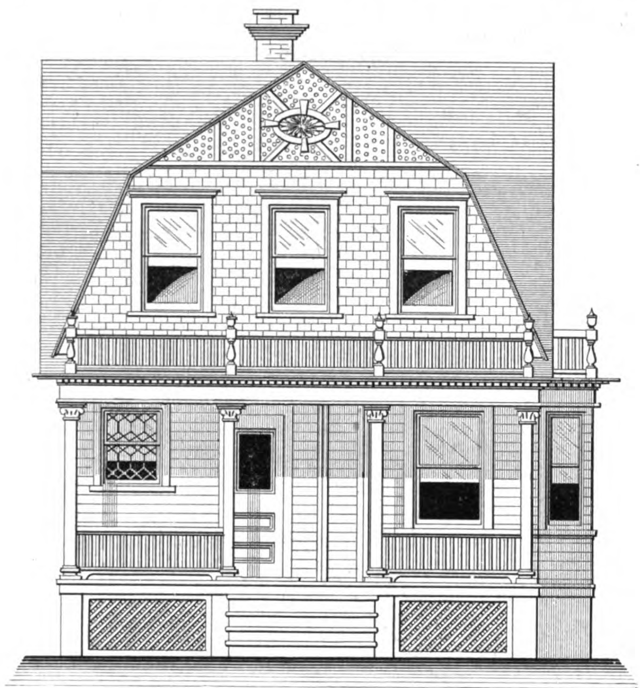


First Floor.

Scale, 1-16 Inch to the Foot

An examination of the plans found upon this page shows three principal rooms on the first floor, with commodious front hall, having direct communcation with the kitchen, dining room and parlor. A closet placed just within the plaster arch separating the hall from the dining room can be utilized for a variety of purposes, but more especially serves as a receptacle for out of door wearing apparel. The position of the main stairs is such as to give a front hall that may be used as a reception room, should circumstances require it, while at the same time opportunity is afforded for the stairs to the cellar directly under the main flight. In this way the space required for the two flights of stairs is reduced to a minimum. On the second floor are four sleeping rooms, with bathroom, all of which are readily accessible from the head of the main stairs which land in the center of the house.

According to specifications of the architect the foundation walls, which rest on concrete footings 8 inches deep and 20 inches wide, are 12 inches thick below grade and 8 inches above. The cellar bottom is cemented 4 inches thick with 1 part Rosendale cement and 2 parts sharp sand or gravel, well mixed together. The house is of balloon frame, the timber used being first quality spruce, except where otherwise specified. The sills are 4 x 8 halved together at the angles; the beams for the first and second stories are 2 x 10 spruce, and the ceiling beams 2 x 8 inches, all placed 16 inches on centers and having two rows of 1 x 2 inch spruce bridging. The



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

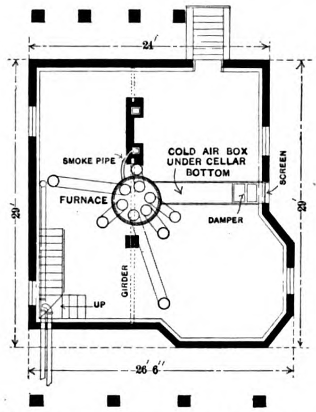
Cottage in a Brooklyn Suburb.—Stanley A. Dennis, Architect, New York City.

posts are 4 x 6 inches; the girder in the cellar is 6 x 8 inches; the plates are 2 x 4 inch wall strips doubled and spiked solid; the studding are 2 x 4, placed 16 inches on centers and doubled at all openings and angles; the hip and valley rafters are 2 x 8 inches; the common rafters 2 x 6 inches, placed 16 inches on centers, and the ridge pole is 2 x 10 inch hemlock. The studding has a 1 x 6 inch spruce ribband strip cut in to carry the floor beams, the whole being well spiked together in a most substantial manner.

The outside of the frame is covered with 1 x 10 inch surfaced hemlock boards put on diagonally, over which is placed No. 70 Empire sheathing paper well lapped and extending under all window and door frames, corner boards, &c, this in turn being covered with beveled clapboards. Those portions of the second story so indicated on the elevations and half-tone engraving are covered with cedar shingles laid not more than 5½ inches to the weather. The upper parts of the gables are treated with what is known as "pebble dash," or rough cast work. laid off in panels. This rough cast work consists of Portland cement and sand laid on wire lath, furred off from the sheathing. The mixture is in the proportion of

2 parts cement to 1 of sand, and while soft, small white pebbles are imbedded in it at random, giving the general effect shown in the half-tone engraving.

The shingles of the main roof rest on 1 x 2 inch spruce

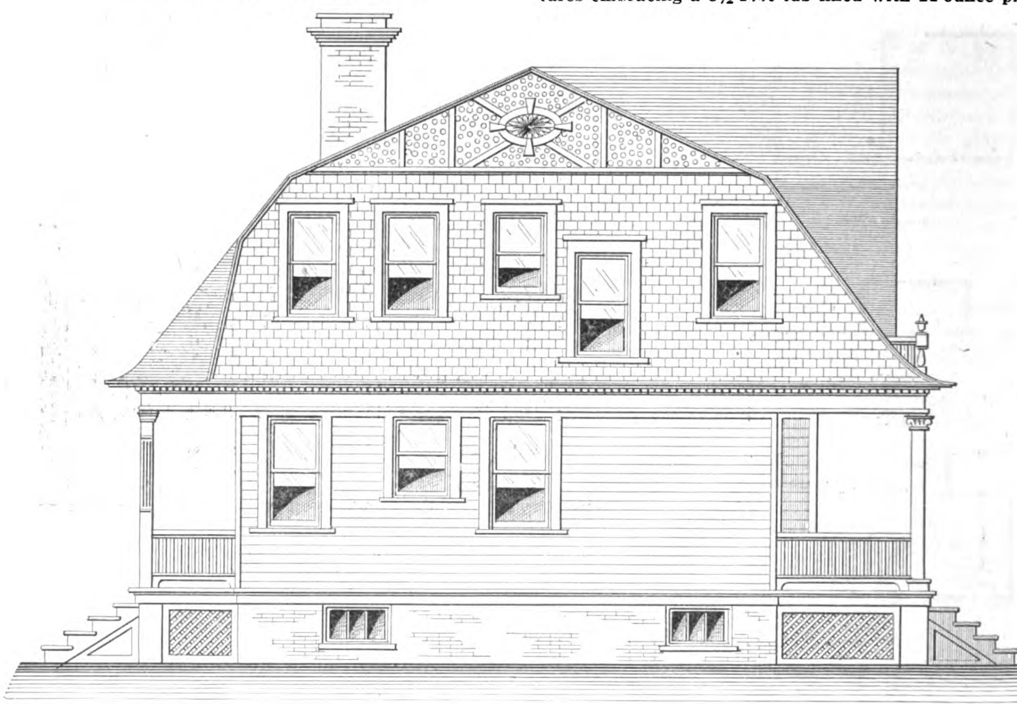


Foundation.—Scale, 1-16 Inch to the Foot.

x 3 inch faced North Carolina pine flooring boards, tongued and grooved and blind nailed. The front door is of white pine with raised panels and moldings on the outside and flush moldings on the inside, the top panel being glazed with plate glass. The trim for the doors and windows of the house is 5-inch molded casings, turned corner blocks, 1¼-inch plain base blocks, and 1¼-inch wall moldings. The windows in the parlor, hall and dining room have panel backs, and all others 1¼-inch molded stools and beaded aprons. All trim is kiln dried cypress.

The dresser in the pantry is built of cypress with a counter shelf 3 feet from the floor and 20 inches wide. Under the counter shelf are drawers on one side and closets on the other. The dresser extends to the ceiling and is provided with glass doors. The sliding doors between the parlor and front hall, and between the dining room and parlor, are of cypress, equipped with Lane Brothers' parlor door hangers. The main stairs are finished in oak, with the space from the strings to the floor laid off in small panels. All interior wood work is finished in the natural wood, with one coat of liquid wood filler and two coats of hard oil finish.

The bathroom is fitted with open plumbing, the fixtures embracing a 5½-foot tub lined with 14-ounce plan-


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

Cottage in a Brooklyn Suburb.

lath and are laid 5 inches to the weather, all shingles being treated with Cabot's stains of appropriate colors. The water table is of ⅞ x 6 inch pine with ⅞-inch cap and moldings, while the corner boards are of 1¼-inch white pine 3 inches wide and having a ⅞-inch quarter round in the angles. The sills of the front piazza are 4 x 8 inches, and the beams 2 x 8 inches placed 20 inches on centers. These are covered with 1¼ x 3 inch white pine flooring boards, blind nailed, and laid in white lead joints. The piazza is ceiled with center beaded North Carolina pine ceiling boards laid on 2 x 4 inch wall strips placed 20 inches on centers. The columns are 8 x 8 turned white wood of Koll's patent, made by Hartman Brothers of Mount Vernon, N. Y., the caps of the columns being of composition material.

The floors of the first and second stories are of ⅞

ished copper, with nickel plated bath bibbs, a round porcelain wash basin set in a 22 x 22 inch countersunk marble slab, with nickel plated compression faucets, and a washout closet with hard wood tank. The house is heated by a Thatcher hot air furnace, and is piped for gas. All exterior woodwork, including the blinds, is treated with two coats of F. W. Devoe's ready mixed white lead and linseed oil paints of appropriate colors.

The cottage here shown is located amid picturesque surroundings on East Thirteenth street, Oak Crest, Brooklyn, N. Y., and was erected for R. Durland, in accordance with plans prepared by Stanley A. Dennis, architect, of 150 Nassau street, New York.

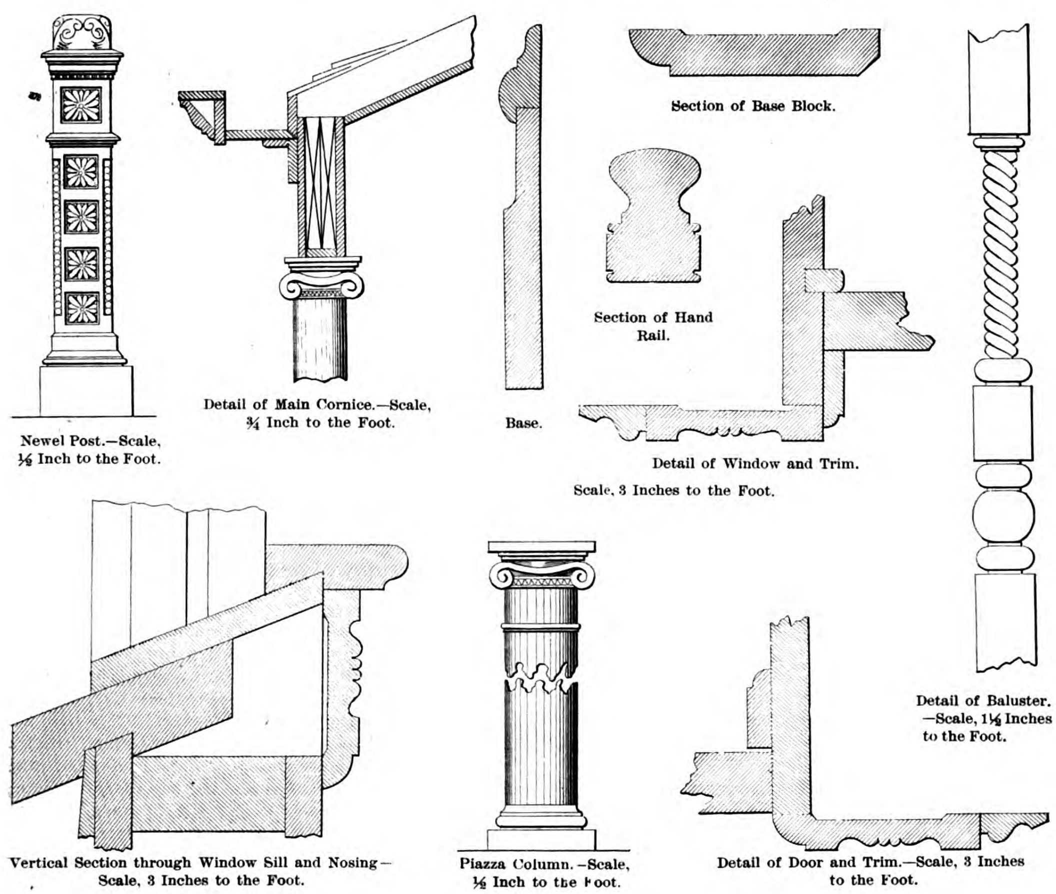
WE understand that it has been decided to erect a separate building at the Pan American Exposition for exhibits in forestry, the structure to be formed of hemlock logs put up in stockade fashion. The new building will be about 160 feet long.

Conciliation and Arbitration in New Zealand.

New Zealand is a country in which labor, as a class, is perhaps more influential than in any other civilized community. There the workingman is the strongest factor in the political world, and labor legislation consequently has been furthest developed. It is therefore interesting to observe the way in which labor questions have worked themselves out under these conditions. Particularly is it of interest to note the stress laid upon the principle of arbitration.

Six years ago the New Zealaud Parliament passed a law establishing a comprehensive system of conciliation and arbitration in industrial disputes, which has had time to justify itself by its fruits. During the period in which the law has been in operation the prosperity of the community in New Zealand has been steadily increasing. The legislation apparently has not borne heavily upon the employers, while it has materially benefited the workers, and it has almost completely eliminated the strike as an industrial factor. Originally the law applied to industrial workers alone, but it has just been extended so as to cover "any person of any age and of either sex, employed by any employer to do any skilled or unskilled manual or clerical work for hire or award in any industry." The definition of "industry" is also extended to embrace "any business, trade, manufacture, undertaking, calling or employment in which workers are employed." This extends the operations of the law to all trades and their employees and not merely to manufacturers and their workpeople, as in the past. The law applies, however, only to such employers and employees as are registered as members of an industrial union, independent employers and workers not being recognized. Under its provisions not less than five persons in the case of employers, or ten in the case of workers, lawfully associated for the purpose of protecting or furthering the interests of employers or workers in any specified industry in the colony, may be registered as an industrial union. This registration makes the members subject to the jurisdiction of a board of conciliation and a court of arbitration, respectively, established by the law.

The boards of conciliation consist of five persons, two elected by the workers and two by the employers, together with a chairman elected by these four. Any industrial union of workers can bring the corresponding union of employers, or the individual employers, before the Board of Conciliation on any industrial dispute relating to work done or to be done by workers or the privileges, rights and duties of the employers and employees in any industry, to questions of wages, hours of employment, qualifications of workmen, claims of members of industrial unions to be employed in preference to non-members, or on matters of established custom or usage. The Conciliation Board hears evidence on both sides and makes a report or recommendation. This recommendation, if accepted by all parties, may be made a basis of an agreement, which shall be in force for not less than six months, nor more than two years. If not



Miscellaneous Constructive Details of Cottage in a Brooklyn Suburb accepted, either party can bring the dispute before the Court of Arbitration.

This court consists of three members appointed by the Government, one on the recommendation of all the associations of employers, and one on the recommendation of all the unions of workers, the third being a judge of the Supreme Court. The Court hears the case, with evidence on both sides, and gives a decision, either by majority, or, if the members present are equally divided, the decision of the president is the decision of the Court. The Court may dismiss frivolous or trivial complaints, and may award costs and apportion them. The award made is strictly binding upon the parties under fixed penalties, not exceeding $2500. The Court may fix a minimum rate of wages or other remuneration, with special provision for a lower rate in the case of any worker who is unable to earn the prescribed minimum, and the decision is enforceable, like any other order of the Court.

The effect of this law is naturally to impel both employers and employed to combine. Consequently the principle of trade association has received a great stimulus in New Zealand.

Whether such legislation will, in the long run, be beneficial to the community it is too early as yet to judge. It has not so far undergone the test of hard times and business depression, for, as previously remarked, the industrial condition of New Zealand has been prosperous during the six years of its operation. But, as far as can be judged, the system tends, it would seem, to benefit both employers and workers. Those employers who have been subject to the competition of others who have paid low wages and worked their employees long hours will be put on the same footing and will be relieved from such injurious competition, while the employers who have made a living by improper and depressive methods will be driven out of the field, which would hardly be a cause of injury to the community.

The Color of Blinds.

The remarkable and widely varying properties of the elementary colors which compose white light suggest that the employment of screens, as in the blinds placed over windows, should be founded on a scientific basis. Our knowledge of the properties of each individual section of the spectrum is not exact, says the London *Lancet*, but this much we do know, that the rays of least refrangibility, the red rays, are without direct chemical effects, they occur at the heat end of the spectrum. On the other hand, the rays of the highest refrangibility contain the violet rays which chemically are exceedingly active. It is these rays which are concerned in photography and doubtless also in the great processes of vegetable nutrition and growth.

The object of blinds is, of course, two-fold—to keep a room cool and to screen out some of the light, so as to avoid the bleaching of coloring materials of the carpets and furniture. At the same time sufficient light must be admitted so that the occupant may see without difficulty. Wht, then, is the best color for this purpose? Since light exerts the peculiar action due to the actinic rays which materially and wholesomely affects the air of a dwelling room, care should obviously be taken not to exclude all the rays that are so concerned. Thus, ruby or orange red material would be contra-indicated.

Abundance of light is inimical to the life of micro-organisms, so that a material in some shape of a compromise should be selected. The best for this purpose is probably a delicately ochre-colored fabric. This would screen part of the active light rays, and if of a fair thickness, the greater part of the heat rays, while admitting sufficient active rays to allow of a wholesome effect upon the room and its surroundings. Venetian blinds do not allow of the graduation, which is desirable, of the tone of light that may be adjusted with cloth fabric. As is well known, exclusively red light has been used as a therapeutic agent, and apparently with encouraging results, in measles.

The Best Paint for Galvanized Iron.

The painting of galvanized iron, so that the coating will adhere firmly and neither crack nor peel, says Joseph Griggs in the *Painters' Magazine*, is a problem that many of the craft have tried to solve in the past without success. In our daily travels through the streets of large cities, if we keep our eyes open, we can see coats of paint, plain and sanded, hanging down in large shreds from galvanized iron bay window sheetings, cornices, awnings, &c., leaving the metal exposed, and this peeling will take place in anywhere from two months' to one year's time after painting. To prevent such a result we must of necessity first look to the causes that bring it about. In the first place galvanized iron is prepared by first pickling black iron in a solution of sulphuric acid and water, so as to remove mill scales, rust and greese, in order to make the subsequent galvanic bath take the proper hold. This bath, which consists of melted zinc and tin, produces a coating on the iron which is of very much the same nature as sheet zinc, and every painter of experience knows that ordinary oil paint will not adhere to metallic zinc. Next it will be observed that the handling of the metal in course of erection is liable to make its surface greasy, and it is but natural that unless grease and dust, &c., be removed preparatory to first coating the paint cannot adhere to the metal. A wash with strong soda water, or soft water to which some ammonia has been added, and subsequent rinsing with clear water, will remove the grease. A still better wash is diluate muriatic acid, which will, on drying, produce a grayish film that should be rinsed with clear water and the surface allowed to dry before beginning to prime.

As to the paint for first coating galvanized iron, beware of white lead, because it remains soft and eventually peels; of zinc white, which will crack and flake; of any of the light carbon paints which require much oil to spread, because these will wrinkle and later on part. The cheap, ordinary mineral paints will not serve the purpose either, because these are most liable to peeling. Red lead, as a base for an all-oil paint, has given best service, but it, too, has given away at times, and the cause of the trouble appears to be that in an all oil paint the oil is attacked by the metallic zinc. The writer has found, after many trials, that a paint made from a heavy pigment that requires a small percentage of thinner for spreading will serve the purpose of first coating galvanized iron best of all. Thus a mixture of equal parts by measure (not weight) of dry red lead and first-class mineral brown, ground together dry and then mixed by hand with equal parts of pure raw linseed oil and pure spirits of turpentine, without the use of any japan or liquid drier, has given the most durable and effective results. Over this priming any good oil paint may be applied, and permanent adhesion may be looked for.

The reason for employing dry red lead is to let the paint oxidize on the surface rather than to have it saponify the oil in the pot, as there is ample proof that such paint is most liable to peel, it having lost its cementing qualities. Let it be noted, however, that this semi-flat, yet fairly elastic paint is to be used for first coat only and not as a finish. It is intended to isolate the oil paint from the metallic surface, to prevent the latter from acting on the oil. And under no consideration should boiled oil be used in mixing this first coat for galvanized iron. If a good grade of mineral brown cannot be had, a fine, chemically pure oxide of iron, such as Indian red, may be used in its place and serve the purpose even better. And no more of the paint should be made at any time than can be used the same day.

DESIGNS OF SCISSORS TRUSSES.

BY F. E. KIDDER, CONSULTING ARCHITECT.

THE scissors truss is a distinct type of truss much used in roofing churches and halls for the reason that it permits of a high ceiling with comparatively low walls, and is also well adapted to wooden construction. Although thousands of these trusses have been put up in all sections of the country, the writer believes that not more than half of those built even at the present time are correctly designed, and many persons seem to find it difficult to comprehend the principles of this truss and how the pieces should be put together.

The simplest form of the scissors truss is that shown by Fig. 1. When the length between joints 1 and 2 is more than 12 feet it is desirable to introduce a brace on each side, when the truss takes the shape shown in Fig. 2. If a level ceiling at the center is desired, either the truss shown by Fig. 3 or by Fig. 5 will generally be the best form to use. For spans of from 40 to 50 feet the truss shown in Fig. 6 may be used to advantage. This shape can also be used where the roof is hipped. Either one of the trusses shown by Figs. 3, 5 or 6 is well adapted to the support of elliptical ceilings.

In all of these trusses the parts shown by single lines, and the shaded or etched portions are in tension, the other parts being in compression. The single line members should preferably be rods, although in light trusses boards or planks may be used instead. When the members and joints are properly proportioned, none of the trusses shown will exert a horizontal thrust on the walls.

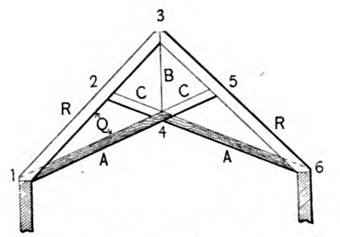


Fig. 1.—Simplest Form of Scissors Truss.

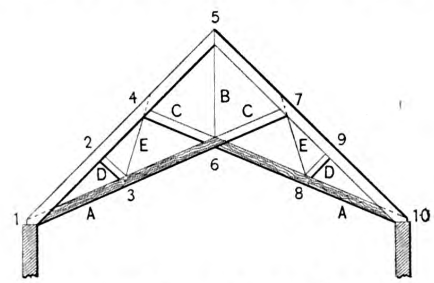


Fig. 2.—Simple Form with Brace on Each Side.

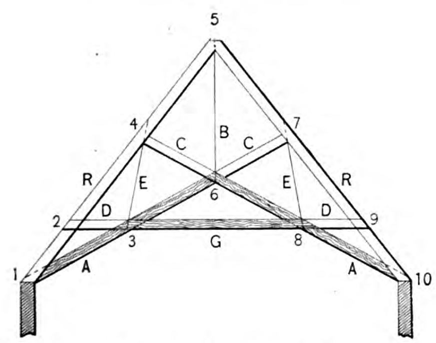


Fig. 3.—Form of Truss when Level Ceiling at Center is Wanted.

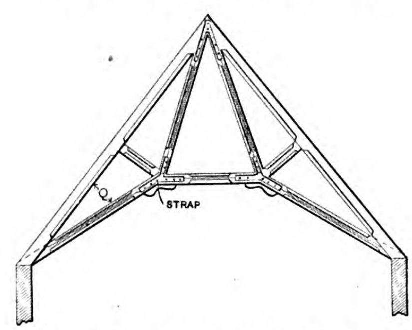


Fig. 4.—Truss with Main Tie held in Place by Two Ties from Peak.

Designs of Scissors Trusses.

Principle of the Scissors Truss.

The manner in which the strains act in a truss of the type shown by Fig. 1 is perhaps best illustrated by Figs. 7 and 8. The loads tend to push the rafters out at the bottom or to cause the truss to spread. This tendency to spread is resisted by the rod *b* and the tie *a-a*, which may be considered as a flexible rod or rope passing through a ring on the end of *b*.

It is evident that if *b* were cut in two, the rafters would immediately spread until *a-a* became straight, as in Fig. 8, hence the purpose of the rod *b* is to hold up the center of *a-a*. The object of the braces *c-c* is to prevent the rafters from bending under the loads W_2 and W_3. The members *a* and *b* in this truss could be made of rope, so far as resisting the strains caused by the roof loads is concerned, and if there were no ceiling to be supported it would be better to use rods for the members *a-a* than timbers, but where there is a ceiling to be supported, as is generally the case, it is much cheaper and more practicable to make the tie beam of wood, as in Fig. 1. Moreover, in actual construction the same piece of timber generally forms the tie *a* and the brace *c*, as in Fig. 1, because it is easier to build the truss in that way, but it should be remembered that the portion below joint 4 of Fig. 1 is in tension while the portion above is in compression.

The truss, Fig. 2, acts the same as truss 1, except that it has an additional brace and tie on each side. Whenever the brace D is inserted the tie E should also be added.

Truss 3 is the same in principle as truss 2, except that joints 3 and 8 are connected by a tie which reduces the strain in the center rod, and also serves as a beam to support the ceiling joints.

The truss shown in Fig. 4 differs from the first three trusses in that the main tie is held in place by two ties from the peak instead of one; for example, if the ties were of wire or rope the truss would be built as in Fig. 9. For spans of 34 or 35 feet this truss is often built entirely of wood, as in Fig. 4, the timbers being finished or cased, for ornamental effect, and secured at the joints by ornamental strap plates, bolted on each side of the timbers. When the truss is concealed the construction shown by Fig. 5 is preferable.

The truss Fig. 5 gives the same shape of ceiling as truss 3, and when the span is greater than 36 feet it is generally the better form to use, as, there being two rods to the peak instead of one, they can be made smaller.

Fig. 10 shows a still different type of scissors truss, which is adapted to spans up to about 32 feet, but is not desirable above that limit. In this truss the cross piece *c* is in compression and the ties *a-a* are in tension their full length; for example, from 1 to 4, and from 5 to 2.

Stresses.

No simple rules for determining the stresses in the scissors truss can be given, because scarcely two trusses have exactly the same proportions. The stresses in this type of truss are most easily determined by the method of graphic statics, the principles of which will be explained in a future paper.

For the same span and loads the smaller the angle Q, formed by the rafter and main tie, the greater will be the stress in all the principal members; hence, when designing a scissors truss, it should be borne in mind that the steeper the rafters and the flatter the ties the less will be the strain of the truss.

The scissors truss is a dangerous truss to guess at, as the stresses in it are much greater than in a truss with a horizontal tie beam, and the strain at some of the joints, particularly that at the support, is very great.

Several good examples of scissors trusses, both rough and ornamental, are illustrated in "Churches and Chapels," recently published by the writer.

Examples of light scissors trusses may also be found in the following numbers of *Carpentry and Building*, namely: May, 1899, Fig. 2, p. 127; and July, 1899, page 187. The truss Fig. 2, page 219, of August, 1900, is of this type, although the horizontal tie is lower than usual.

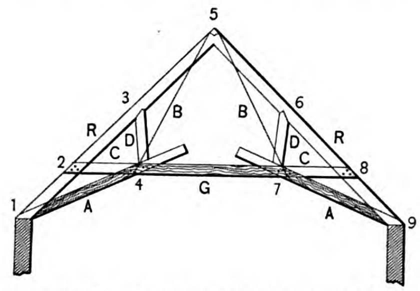


Fig. 5.—Another Form of Truss where Level Ceiling is Desired in the Center.

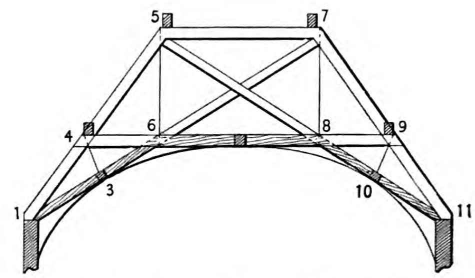


Fig. 6.—Good Form of Truss for Elliptical Building.

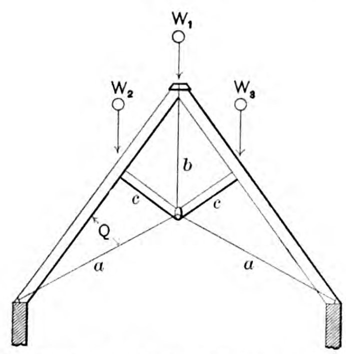


Fig. 7.—Showing how Strains Act in Truss like that in Fig. 1.

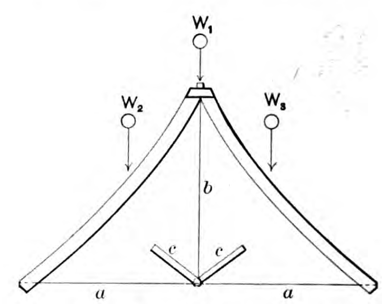


Fig 8.—Effect Produced if Rod *b* were Cut.

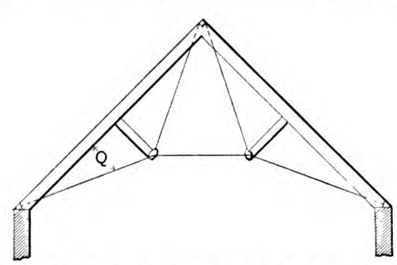


Fig. 9.—Truss in which the Ties may be of Rope or Wire.

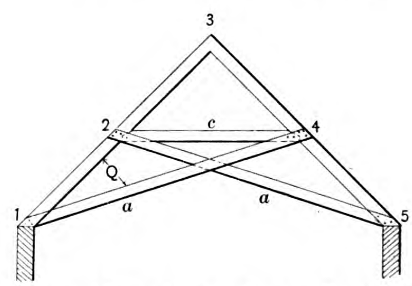


Fig 10.—Form of Truss Adapted for Spans not Exceeding 32 Feet.

Designs of Scissors Trusses.

Weather Stains in Milwaukee Brick.

In reply to a correspondent who asked in a recent issue regarding the best thing to take weather stains out of Milwaukee bricks, muriatic acid or oxalic acid failing to serve the purpose, the *Painters' Magazine* says: "Make a strong solution of rock potash in boiling water and apply to the stains with a sponge. In case this does not remove the stains, there is no remedy except to heat the bricks with a gasoline burner, and then coat them with paraffin, a rather costly undertaking, and by no means a certain remedy. If the treatment with muriatic acid solution did no good, the trouble is evidently in the composition of the bricks."

THE fire loss of the United States and Canada in September, as recorded by the New York *Journal of Commerce*, shows a total of $9,110,300, as compared with $10,298,250 in the previous month, $12,778,800 in September, 1899, and $14,203,650 in September, 1898. The total fire loss for the first nine months of the current year, however, is still far above that of former years, being $136,316,550, as compared with $99,608,650 in the corresponding period of 1899, and $89,164,000 in the first nine months of 1898.

Turning Mammoth Granite Columns.

Some time since we briefly referred to the mammoth granite columns which are to be used in connection with the Cathedral of St. John the Divine, now in process of erection on Cathedral Heights, New York City, and to the fact that a special lathe had been designed for turning up and polishing them. These columns will be 32 in number, each 54 feet long by 6 feet in diameter, and will weigh, when completed, about 160 tons each. Innumerable columns of somewhat smaller dimensions are also to be used in the construction of the cathedral, and for the turning of them the lathe in question will be employed.

The piece of granite from which a column is to be turned is cut square from the quarry, a view of one of the blocks being presented in Fig. 1 of the accompanying illustrations. This block is 67 feet long, 8½ x 7 feet in cross section, and weighs 310 tons. After dressing off the corners, which is roughly done by hand, the stone is placed in the lathe, shown in Fig. 2 of the engravings, a period of about six weeks being required to dress and polish the column.

The lathe for doing the work is 86 feet in length and weighs complete 135 tons. It swings 6 feet 6 inches by 60 feet long, and has eight cutters, each tool taking a cut 3 inches in depth. The entire eight reduce the column 24 inches in diameter at one passage over the length of the stone. The lathe was designed by E. R. Cheney and H. A. Spiller of Boston, Mass., and is said to be the only one of its size adapted for turning granite in practical use. The lathe was built by the Philadelphia Roll & Machine Company, Philadelphia, Pa., for use in the quarries of the Bodwell Granite Company of Vinalhaven, Maine.

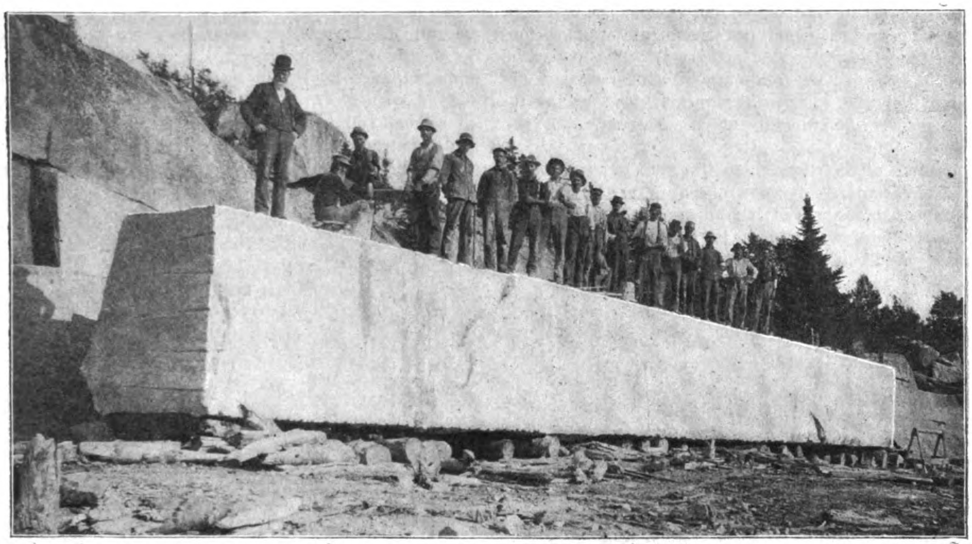


Fig. 1.—Block of Granite in the Quarry.

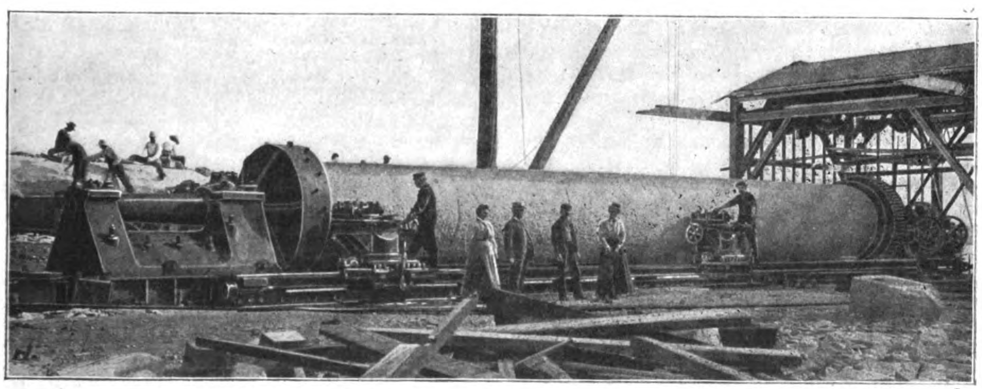


Fig. 2 —General View of Lathe

Turning Mammoth Granite Columns.

WHEN completed, in the course of a few months, the 20-story structure, known as the North American Building, will rank as the tallest structure in the city of Philadelphia. It is located at the corner of Broad and Samson streets, and is of the modern steel skeleton frame construction. An interesting feature of the work of erection, and one to which reference has been made in connection with some of the towering office buildings in New York, Chicago and Pittsburgh, is the carrying forward of the masonry at the upper stories before completing it at the lower portion of the building. In this case the exterior stone work was commenced at the tenth floor and carried upward, while the lower stories were still uninclosed. The appearance of the structure while this work was in progress was the source of much curiosity on the part of those who had never before seen a modern sky scraper constructed.

THE ART OF WOOD TURNING.—XI.

(SECOND SERIES.)

By Fred. T. Hodgson.

THERE are a number of devices for forming spirals by aid of the lathe other than those which I have presented, some of which I may describe and illustrate later on. Of the various kinds of ornamental turning, there is not one that lends itself so readily to the embellishment of small articles as "rose engine" work, and accordingly it has, since the invention of the device, been regularly employed in the ornamentation of small articles, and as often applied to the production of ground tints, borders and ornaments on wood, copper and steel rollers for printing and embossing cottons, leather and paper, and many other sorts of ornamental work. Considering the great variety of articles to which it can be applied, it is a wonder that more workmen are not acquainted with the working of the machine, for the invention is very old, though known, apparently, to very few people.

The origin of the rose engine, like that of many other machines, is entirely unknown. The French, who are quite expert in the use of it, and applied it to the arts at an early date, lay claim to its invention, but similar machines were known in England and Germany as early as in France, and it is on record that Sir Isaac Newton made use of one in some of his experiments.

A lathe that is unsteady in the head stock, or the tail stock, from the bearers up, when the rest is solid and remains firmly in its place, must convey to the work irregularities in proportion to the shake or unsteadiness of the center of rotation. Thus, if a piece of stuff in the lathe has, besides the rotary motion, a rocking motion, and the cutting tool remains stationary, the material being operated upon will show the wavy lines caused by the rocking motion, besides the shape given to it by the regular rotary motion of the lathe. It is on this principle that the rose engine, so called, is built. The name, perhaps, is misleading, as it defines rather the character of some of the work the machine executes than the machine itself. In order to get a better idea of the machine, it may not be out of place to quote the definition as given in Knight's Mechanical Dictionary, which is as follows: "Rose engine lathe.—A lathe in which the rotary motion of the lathe and the radial motion of the tool combine to produce a variety of curved lines. The machine consists of plates or cams set on the axis of the lathe, or suitably rotated and formed with wavy edges or grooves, which govern the motion of the cutting point toward or from the center.

"In another form, the combined radial and rotary motion is inherent in the work, the tool being stationary. In this case, the center of the circle in which the work revolves is not a fixed point, but is made to oscillate with a slight motion, while the work revolves upon it.

"The mandrel upon whose end the work is chucked does not rotate in stationary standards, like those of a common lathe, but the standards form part of a frame which oscillates upon a horizontal axis below the bed and parallel to the mandrel axis.

"The work is fixed in a chuck at the extremity of the mandrel, and the tool is held by a slide rest, and adjusts it to the radius to the rose, or figure intended to be cut. The oscillating motion is given to the mandrel by means of metallic rosettes or wheels fixed upon the mandrel, each having its edge or periphery indented or curved with a wavy line. The rosettes are acted upon by a small roller at the end of a bar supported from the bed. As the mandrel revolves, the wavy periphery of the rosette is applied to the roller, which moves on a stationary axis, and causes a vibratory motion of the mandrel as its frame moves to and fro on its axis.

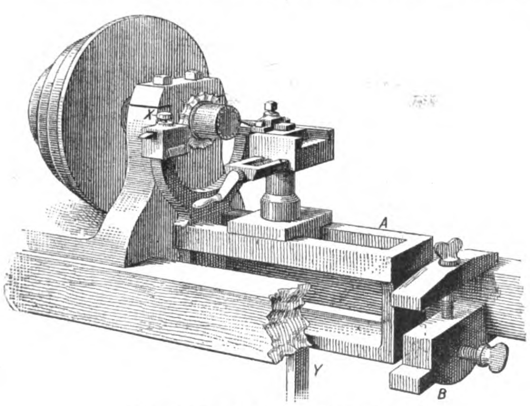


Fig. 79.—View of Rose Engine on Lathe.

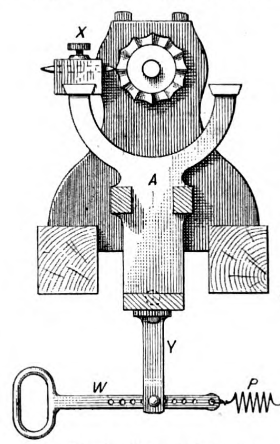


Fig. 80.—Oscillator and Rosette.

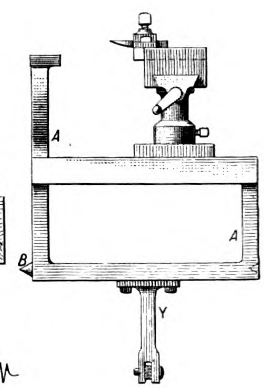


Fig. 81.—View of Oscillating Frame.

The Art of Wood Turning.

"The mandrel contains a number of rosettes of different patterns, and the governing roller is slipped in its axis, so as to act in conjunction with any one of the rosettes, according to the pattern required."

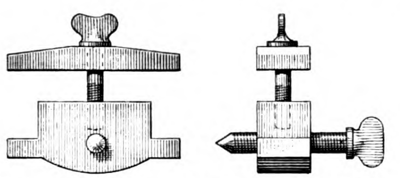
Rose engines and geometric lathes vary somewhat in their details, but agree in the general features, that the work is performed by a combined rotary and radial motion. If the center of the rosette and the axis of rotation coincide, and the tool receives an oscillation radial as to the said center, a wavy circle is produced. If the chuck and its mandrel, while rotating, are oscillating back and forth on a parallel axis, as previously stated, while the tool is stationary, the same effect—a wavy circle—is produced, the change merely being to move one part or the other relatively to its fellow, in the same degree and proportion. If the center of the pattern does not coincide with the axis of the mandrel, the effort will be an eccentric figure. If the radial oscillation be given to tool or chuck, in addition to the former conditions, a wavy concentric figure will be produced. If an oval or ellipse be required, it may be obtained by means of an eccentric guide or ring of brass fastened to the head stock of the lathe close up to the collar in which the neck of the mandrel runs. If the governing eccentric be wavy, the effect will be a wavy ellipse. By governing squares or other geometric figures, patterns of the required conformation are obtained. By a suitable disposition of the parts involved in the circular and radial motions, the tool is caused to make the peculiar line required within the limits of the said figure. By means of a straight line chuck, the patterns of a rose engine are made to follow in a straight, instead of a circular, direction.

Notable instances of the uses of this class of tools are to be found in the machines for engine turning watches, and those for making complicated figures, termed lathe work, which abound on the obverse and reverse faces of greenbacks and other bank notes.

From the foregoing, it will be seen that there are two kinds of rose cutting machines; one in which the head and tail stocks are fixtures, and another in which the tool is made to oscillate. In both cases the mandrel is so arranged that it has a forward and backward movement in the direction of its length, in order to enable the cutter to work on the face of the rosette, as well as on the edge. I will describe first the one in which the head and tail stocks are fixtures, because it is capable of being applied to an ordinary lathe for surface work, and if the lathe has a traversing mandrel it can be completely fitted for rose work.

The illustrations and descriptions given herewith are, with few unimportant alterations and omissions, taken from the " Manuel du Tourneur," of M. Bergeron, and, as the machine has had no improvements of any consequence to this day, the reader will be perfectly safe and up to date by following closely the following: In Figs. 79, 80 and 81, A A A is a strong iron frame made with one of the ends carried up and branched so as to embrace the mandrel and rosette, which latter is attached to the back of the chuck which carries the work. The top of this frame is double, so as to form of itself a lathe bed of small dimensions, upon which an ordinary slide rest can be fitted. The slide rest must, however, be used with a short socket, or it will be too high, as the top of the frame alluded to stands slightly above the level of the bearers. At B, in the side view of the frame, Fig. 81, is shown a point of hardened steel which fits into a conical hole in the bottom of the head block; or, if this is not long enough to reach a good way down between the bearers, into a piece of iron arranged for the purpose, similar to that used at the opposite end of the frame, as seen at B in Fig. 79, now to be described, and which is again shown in Figs. 82 and 83, but having a conical hole instead of the center screw. This is a kind of poppet head in a reversed position, the clamping nut and screw being above the bed, and the head with center screw below. The frame lies, therefore, between the mandrel head and this reversed poppet, or between two of the lathes, and oscillates upon the centers, whenever the projections or depressions of the rosette compel it to assume such motion.

In Fig. 84, an enlarged section of the chuck is shown which carries the rosette, the latter being shown in position A, in the body of the chuck B, the inside screw to fit the mandrel. On the outside of this part are a few turns of a somewhat finer thread, beyond which a plain part is left next to the flange C, and on this the rosette is placed, and is clamped by a nut, cut outside into beads, or milled, or left plain and drilled for the insertion of a lever pin. This nut is marked D in the figure. It will be seen to lie within a recess formed in the back of the rosette E. The latter is shown in Fig. 85. The dotted line A shows the recess just alluded to; B and C, the pattern on the face and edge; D, the large hole in its center, allowing it to be slipped on the back of the chuck. It is prevented from turning on the lathe by a pin which fits into the small hole F. From the front face of the chuck rises a conical pin, similar to that on the eccentric chuck, over which fits the circular division plate J, with its projecting screw H, to hold the ordinary chucks. This plate is recessed at the back, leaving a mere ring of metal, *e e*, which fits a corresponding circular groove and secures the steady movement of the plate, which is fixed by a conical washer and screw. This division plate is formed with indents or teeth, into which a stop dog falls, as described in the March issue, but the divisions are differently arranged in the figuring, the divisions being laid off into sets of eight or ten teeth. Let the whole circumference be divided off into six equal parts, and, commensing with the first division, mark off six or eight teeth, as if the whole circle were to be divided into 60. Pass on to the second portion and cut eight teeth, as if the circle were to be divided into 72. Let the third carry eight teeth, with a pitch of 80 to the circle; the fourth a similar number, with a pitch of 84; the fifth, 96; the sixth, 100 to the circle. These must be cut with the same cutter, so that the spring click, or dog, may fit any of the six sets of teeth. There will be several undivided spaces, which are to be left plain. The several sets are to be marked in numbers, so that the pitch may be discovered at a glance, and the teeth in each being so few will hardly require separate numbering.



Figs. 82 and 83.—Attachments for Head and Tail Blocks.

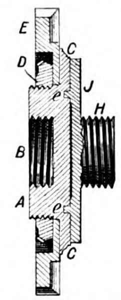


Fig. 84.—Section of Carrying Chuck.

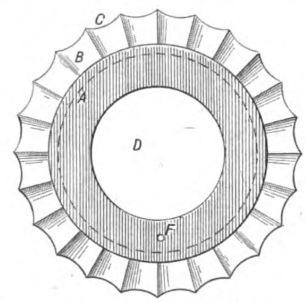


Fig. 85.—Face of Rosette.

The Art of Wood Turning.

The parts of the apparatus which carry the rubber—that is to say, the heads of the branched part of the swinging frame—are made flat on the top, which projects on three sides, forming small tables on which the actual holder or clamp can be fixed by a turn of the screw X. In Figs. 79 and 80 the rubbers are merely flat pieces of steel, with edges sufficiently sharp to penetrate to the lowest depths of the undulations and recesses on the rosettes, but rounded off and polished, so as not to cut and damage the softer metal against which they act. Other materials have been tried, as ivory, and the harder tusk of the hippopotamus, but hard steel is most generally preferred. It is, of course, necessary that the rubber press with some force against the rosette, which force should, moreover, admit of being regulated at pleasure. This is effected by a spring of steel under the lathe bed, to the end of which is fixed the arm W, Fig. 80, which has a ring handle as shown, nearest to the operator, and is perforated with a row of holes from end to end. This arm is flat, and falls into a fork at the end of the tail piece Y, where it is seen in Fig. 80 attached to the center of the lower bar of the rocking frame. A pin passes through holes in this fork, and through one of these in the arm. By this arrangement it is easy to regulate the force which the spring shall exercise, as this will be increased by moving the pin nearer to the spring, and diminished by placing it in a hole nearer to the ring handle.

SINKING FOUNDATIONS FOR LARGE BUILDINGS.

WHILE so much has been said of the construction of the high building above ground, comparatively little attention has been given outside of professional circles to the wonderful work that goes on underground. If anything to the layman, it is a matter of surprise that it takes the work so long, proportionately to the time taken to erect the superstructure, to appear above the sidewalk. This apparent anomaly, says the *Record and Guide*, is capable of easy explanation. Regarding the work below grade, that in every high building offers a separate problem. Not only is it that the great depth to which foundations have to be sunk must necessarily occupy a good deal of time, but incidental difficulties are encountered in the protection of neighboring buildings, in the character of the material to be handled, whether rock or sand, and particularly is water likely to become an obstacle to progress that requires the best engineering skill to overcome. An interesting story could be written of the foundation work of any of the great buildings erected since the high building came into favor, and each would reveal its own peculiar difficulties and special methods of dealing with them. In the protection of adjoining buildings the methods are various, almost as the buildings themselves, though they generally have one point of similarity or union in that the walls of the building to be protected are relied upon for assistance. It is in reaching these walls and putting in the necessary supports that the engineering difficulties are discovered.

Interesting Piece of Work.

One of the most interesting pieces of foundation work was that recently carried out at the southwest corner of Wall and William streets, for the new building of the Atlantic Mutual Insurance Company, of which Clinton & Russell were architects. The system employed was the wooden caisson with removable cover to the air chamber. In all 42 caissons were sunk. Work began on June 15, under the injunction that time was a prime necessity on this job, and was completed July 22, in just five weeks, or 24 days ahead of time, though at the time of commencement the walls of the old buildings were still only down to curb level and the shoring, sheet piling and excavating had to be carried on simultaneously with the caisson work. This expedition is made all the more remarkable by the fact that water was reached at about one foot from the cellar surface, and that the adjoining building, that of the United States Trust Company, rests on a lively quicksand and was left unshored, except for some pusher braces used to check any outward movement of the wall due to the eccentricity of its foundation, and the building was not in the least disturbed. To achieve this the westernmost row of caissons were sunk against the walls of the United States Trust Company's building, and to about 40 feet below the foundations. If the contractor had waited to shore the walls that work would have taken two months' time and have cost a good many thousands of dollars. The course pursued saved both time and money and left the building in a better shape than if it had been shored.

The caissons used in this foundation are constructed of wooden staves 3½ inches in finished thickness and about 9 inches wide, got out in 33-foot lengths and having ¾ x 1½ inch splines in each joint; they are cut to the radius of the cylinder joints and radial lines and furnished with a steel cutting edge. These wooden caissons can be put upon the site in two or three days from the receipt of the order for the foundations. They are delivered complete and sunk full length. Another advantage is that the roof of the air chamber is removable. It is made of steel plates in the form of a dome, divided into two parts. After the caisson is sunk to rock the air chamber is filled with concrete to within about 1 foot of roof, and the concrete is allowed to set in the compressed air until it becomes hard, which occurs in from three to six hours. The roof of the air chamber is then removed. This leaves an open well with wooden sides and a concrete bottom, both of which are water tight. This well is then filled with concrete from the top, and when set there is obtained a monolith rising from the rock to the surface. Other practice has been to put the roof of the caisson on in such a manner that it was irremovable, so that it was left in, and the concrete put on top of it, the concreting being done as the sinking proceeded. When solid rock was reached the air chamber was concreted in the usual manner. The concrete was in two parts, one above and one below the roof, and it was always a question whether the concreting had been done so as to properly pack underneath the roof without leaving any spaces between the concrete in the air chamber and that above it.

Shape of Caissons.

One of the interesting features of this work was the shape of the caissons sunk alongside the adjoining buildings. These were 8 feet 6 inches in diameter, and the cutting edge was made of a plate that was rolled up as a cylinder 8 feet 6 inches in outer diameter, from a plate 28 inches deep on one side and 14 inches on the other and adjusted to the end of the wooden cylinder, which was cut shear. The cutting edge was reinforced at the bottom by a steel angle ring placed ½ inch from the bottom of the cutting edge, upon the top of which the bottom of the staves rested. The caisson itself was carefully built, so that the 8 feet 6 inches diameter was almost absolute for every part of it. It was very smooth on the outside, all bolts and rivets being countersunk, and the friction was further reduced by a coating of ferry rack grease. When the caisson was set in place the deep side of the cutting edge was placed against the building. It is a principle that is well known that the compressed air from a caisson will escape at the highest point of the cutting edge in the same manner that water will overflow from a tank at the lowest side. The effect of using this oblique cutting edge was to confine the escape of the compressed air from the air chamber to the small space in front where the cutting edge stood highest and furthest away from the adjoining building. In sinking a caisson the escaping air disturbs the soil by agitating and churning the water through which it passes, and where this occurs under a building it also affects the bearing power of the soil. This is why heretofore all such buildings have been shored. The value of the oblique cutting edge will now be seen. By its use all the disturbance and softening of the soil was done on the side of the caisson furthest away from the building, leaving the soil under the building undisturbed and without any loss of its bearing power. The result was that the sinking of the caissons for the Atlantic Mutual Building was done without any disturbance whatever of the adjoining buildings. By the control of the escaping air the sinking of the caissons alongside the standing buildings was rendered as safe as if done in the middle of the lot. The obliquity of the cutting edge was originally a matter of accident, due to the position taken by the caisson in process of sinking.

An Asbestos House.

It is stated that Count von Waldersee, who has just arrived in China to assume command of the allied forces, will occupy a portable asbestos house, which is made in sections. Everything is so arranged that the building can, with the greatest ease and speed, be fixed up and taken down for erection elsewhere as required. The building contains seven large and comfortably furnished rooms for the use of the Count, his adjutant and servants. The material used is an invention of the Calmon Asbestos & Rubber Works, to which the name of asbestos slate has been given. It is absolutely fire and water proof, as hard as slate, and yet capable of being nailed or planed like wood shingles. It also possesses the advantage of extraordinary lightness, and, being an equally good insulating material against heat as well as against cold, constitutes an almost ideal material for light buildings.

CORRESPONDENCE.

The Diameter of an Octagon.

From E. R. P., *Canton, Ohio.*—Is there a rule by which the diameter of an octagon may be obtained when the length of one side is given ?

Answer.—Our correspondent, of course, desires to ascertain the diameter of either a circle circumscribing an octagon or a circle inscribing it. In the one case, the distance is obtained between two opposite angles of the octagon, while in the other it is obtained between two opposite sides. The method of procedure is to multiply the length of one side of the octagon by 1.3066, and the result is the radius of the circumscribed circle, which multiplied by 2 gives the diameter. Multiplying the length of one side by 1.2071 gives the radius of the inscribed circle, which multiplied by 2 gives that diameter.

Relative Strength of Brackets.

From Hee H. See, *Montreal, Canada.*—I inclose herewith sketches of two brackets, and desire to ascertain what is the relative strength; first, when the load is equally distributed; and, second, when the load is at the outer end ?

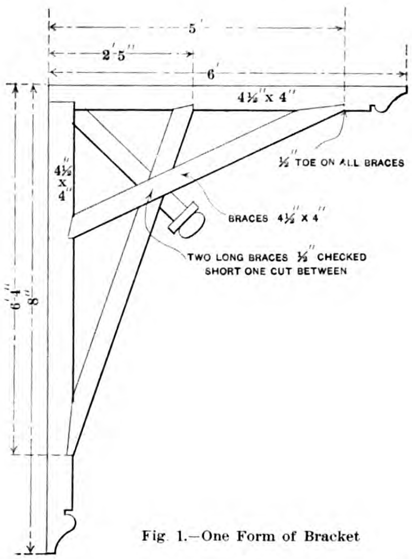


Fig. 1.—One Form of Bracket

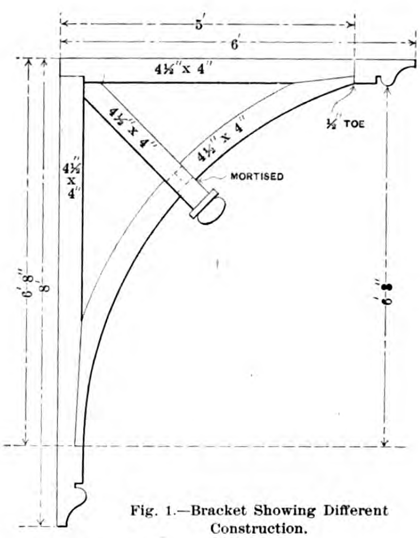


Fig. 1.—Bracket Showing Different Construction.

Relative Strength of Brackets.—Scale, ⅜ Inch to the Foot.

Answer.—We have reproduced from the sketches of our correspondent the two brackets in question, and present illustrations of them herewith. Under a distributed load the bracket shown in Fig. 1 would be about three times as strong as the bracket shown in Fig. 2. With the load applied at the outer end, the difference in strength would be measured by the relative strength of the straight and curved braces. The bracket in Fig. 2 would perhaps fail under a load about 20 per cent. less than would be required to break the bracket in Fig. 1, supposing that the upper end of the outer braces is well bolted to the beam. Without bolts there would be very little, if any, difference in the strength of the two brackets, as failure would probably occur by breaking off at the shoulders.

In order to develop the full strength of either bracket, it must be well supported at the bottom and tied at the top so that it cannot tip over.

The Practical Value of "Carpentry and Building."

From Frank J. Grodavent, *Fort D. A. Russell, Wyo.*—A few years ago you published the design of a residence, built for a gentleman in Denver, Col. Last spring he sold the house and went East to live, but later returned to Denver, and his wife liking the plan of their former house so well, he sent to me for the original drawings. I referred him to *Carpentry and Building*, and he then remembered my having given him a copy of the paper which he found, gave it to his builder, making a few changes, and erected the home. Thus the publication of the drawings in the paper were of value to him.

Making Perspective Drawings in Confined Space.

From Architect, *Portsmouth, Va.*—The September issue of your instructive paper has been received, and among the many interesting articles therein is one by Ray S. Blinn on "Perspective Drawing in Confined Space." I am very much interested in this subject and would gladly welcome any practical advice or method that would do away with the "10-footer" in the shape of a perspective drawing board. The object of this communication is to ask Mr. Blinn for a more comprehensive explanation in regard to the position and distances of the different curves he uses. I understand trigonometry, but cannot comprehend or locate the curves from the formulæ given. I would also like to know why the curves of a given radius cannot be used for any size scale drawing, so long as the angle of the plan with the horizon, 30 degrees or 45 degrees, as the case may be, remains the same. If Mr. Blinn will be more explicit and give figures instead of formulæ, he will doubtless confer a great favor on many others, who, like myself, do not quite understand the explanation given.

Answer.—We submitted the above to Mr. Blinn, who makes the following reply:

It may be that "Architect" mistakes the multiplication sign for an X in some of the formulas.

Referring to the article in September issue after substituting, should read:

$$OX' = 40 \times \cot 30 \text{ degrees} = 69.28$$
$$OX'' = 40 \times \tan 30 \text{ degrees} = 23.09$$

Now, by subtracting, the length of the radius of the curve is selected from the OX^1 or OX^2 values, the remainder will naturally be the distance the curves must be placed from O, that the radiating lines may all converge toward their respective vanishing points.

In theory one should measure from the chord of the arc instead of the arc, but this difference is slight, and will make no appreciable error.

A little ingenuity will enable one to locate these curves, and tack them on the board very quickly.

In reply to the second question: The limits of the board and the angle θ will determine to a large extent the proper arc to use. For example, if $\theta = o$, one point goes to infinity and the lines will run parallel. So that one should have on hand curves of different radius, if a draftsman cares to make varied drawings.

The scale, however, may be changed from 40 inches to 40 feet, if need be; the proportion will remain the same.

Miterl for Rake and Level Frieze.

From HEE H. SEE, *Montreal, Canada.*—Replying to the letter of "E. H. A.," Pulaski, N. Y., I would say that he will require both a square and a raking miter; a square miter on the level frieze, and a raking miter on the raking frieze. The cut is exactly the same as the side bevel for jack rafters. Suppose, for example, the roof is quarter pitch, it is necessary first to cut the level frieze as if it were going square across the end of the building; then take the raking frieze and lay the square

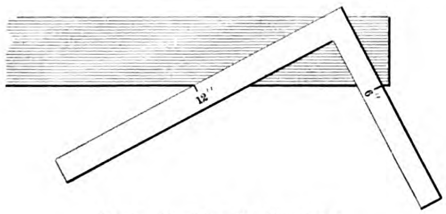


Fig. 1.—Obtaining the Plumb Cut.

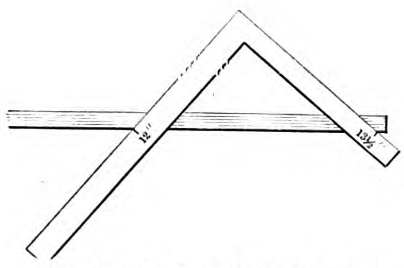


Fig. 2.—Figures on the Square Giving the Bevel.

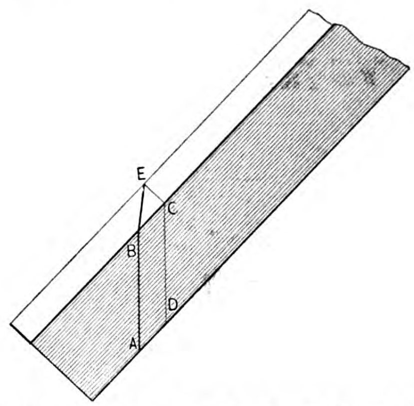


Fig. 3.—Method of Obtaining Plumb Cut Described by "J. M. D."

Miter for Rake and Level Frieze.

on the face of the board with the 6-inch mark on the tongue and the 12-inch mark on the blade, as shown in Fig. 1. Mark along the tongue to obtain the plumb cut. In order to obtain the miter, measure across the square from the 6-inch mark to the 12-inch mark, which gives us very nearly 13½ inches. Now, lay the square across the edge of the board as shown in Fig. 2, with the 13½-inch mark on the tongue and the 12-inch mark on the blade; the tongue will give the bevel.

The rule is to take the rise per foot on the tongue of the square and 12 inches on the blade and measure across these two marks, whatever the distance may be, using it with 12 inches to obtain the miter and mark by the long bevel.

From J. M. D., *Deep River, Conn.*—In answer to "E. H. A.," Pulaski, N. Y., page 248 of the September issue, I would say he requires practically a "square miter," as the angle formed by the corner of the house is 90 degrees, the miter of which is 45 degrees. Cut the level frieze 45 degrees or square miter; mark the plumb cut on the raking frieze where desired. In order to obtain the miter cut, use the figures on the blade of the square, which correspond with the length of the common rafter, and on the tongue those which represent the run of the rafter; cut by the blade. The same method is used for obtaining the top bevel of jack rafters, which information I obtained from Hicks' "Builders' Guide."

I have seen many carpenters mark the plumb cut A B, as shown in the sketch, Fig. 3, which I inclose, then draw the line C D parallel. The distance between the two lines is equal to the thickness of the frieze. Square across the edge C E and draw the line from the first plumb line to the square line on the other edge, as B E, which gives the cut, as shown.

Chimney Smokes and Makes Creosote.

From L. T. G., *St. Albans, Vt.*—As *Carpentry and Building* is the Meçca toward which the eyes of all those in trouble turn, I join my wail to that of the multitude and ask for information from some one who perhaps has had a similar experience to the one I describe. The case is one of a smoky chimney and also of much creosote. There is a wood furnace in the house, set about 18 years ago and still in good repair. It is connected to the chimney by a 7-inch pipe running about 22 feet horizontally in cellar and 10 feet up through dining room with elbow into chimney. It has always worked well until recently. For a while in the morning it blows smoke back around elbow where it enters the chimney in the dining room. The chimney was laid over new from the roof up last fall, but this was done to overcome a trouble the owner has had with creosote running down through roof into the attic on the outside of the chimney and not because of poor draft. I have examined and cleaned the furnace, pipe and chimney. After the early morning hours it draws well, and to test the virtue of the theory that a chimney always works better after it gets warmed up a hot fire was kept through two recent cold nights with the same result—smoke in the morning. There has been a covered cap put on chimney with no beneficial results. It extends up through the roof on the north side of main ridge and about 2 feet above it. I suggest to owner a galvanized cone top with a few feet of 10-inch pipe with hood. I also would like to know what can be done to stop the formation of creosote.

Filling in Between Studding.

From A. E. R., *Huntsville, Ont.*—Will some of the practical readers kindly inform me through the columns of the paper the proper way to build up the walls of a house between the studding, using stone and mortar? Will it do to put up the studding the same as for an ordinary frame house, then, nailing a board each side of the studding, fill in the space with small stone and mortar, and when it has set raise the boards a foot high and repeat the operation? Would it do to put in a little Portland cement so as to harden the walls? Would it answer to put a little coloring in the mortar so as to match the color of the brick, and then with a straight edge mark off in squares, the same as brick? Can the walls be made smooth this way, or would it be better to build with common mortar and then put colored mortar on the outside ?

Finding the Backing of Hip Rafters.

From W. S., *Paterson, N. J.*—I would like to thank "G. L. M." of Tacoma, Wash., for the further explanation of his method of getting the backing of hips, as I now understand the part which I previously failed to comprehend.

Lettering for Drawings.

From W. B. G., *Philadelphia, Pa.*—I have noticed in *Carpentry and Building* at different times requests for samples of printing or lettering suitable for use in con-

Samples of Lettering for Drawings, Contributed by "W. B. G."

nection with drawings, &c. The samples which I inclose represent a style which I have been using, and which may be of possible interest to readers of the paper.

Cypress for Outside and Inside Work.

From E. A., *Elmore, Ohio.*—Kindly allow me a little space in the Correspondence columns of your valuable paper to ask for a little information concerning cypress wood. I wish to know a little more about cypress, because we are having an awful time getting people accustomed to it, owing in some measure to the fact that it is a new wood in this part of the country, and people do not take to it as readily as to white pine. Some claim it will not stay to its place as well as other woods, while others claim it will not hold paint. I recently made of cypress 16 pairs of blinds for a man, and when they were finished he would not take them, because they were made of cypress, and, as he put it, "would not stay in place very long." He also claimed that they would not hold paint. However, he finally took them on the understanding that if they did not stay in place and hold the paint as well as if made of different material I would make him new ones, hang them for him and paint them.

This is one of a great many experiences we have had with the wood, and personally I believe cypress is all right. I would, however, like to hear from some of my brother carpenters in regard to cypress as a wood for building, and desire especially to know if it is satisfactory for corner boards, outside window casing, siding, shingles, sash, doors, blinds and inside finish. If some of those who have used it and seen it wear would give their views it would be a great favor to me, and would doubtless prove of interest to many others living in this section of the country.

Finding the Pitch of a Roof from a Circle.

From G. L. McM., *Tacoma, Wash.*—I take exception to "E. L. M.'s" article in regard to finding the pitch of a roof from a circle, as I do not think the method there described is correct. The terms one-fourth, one-third, one-half pitch, &c., are relics of the old "scribe rule" days when all framing was done by the scribe rule of "cut and try," instead of by the square, as we frame now. It grew out of the habit of taking one-fourth, one-third, or one-half the width of the building for the rise of the roof, which in case of a building 24 feet wide would give for one-fourth pitch a rise of one-fourth of 24, or 6 feet for the hight at the ridge above the plates. This would be a rise of 6 feet in 12, instead of 5 as "E. L. M." has it; one-third pitch would be 8 feet rise in 12 feet run; one-half pitch, 12 feet in 12, which he has correct; two-third pitch would be a rise of 16 feet in 12 run, and three-quarter pitch would be a rise of 18 feet in 12 run, instead of 21 and 30, as he has it. His error lies in taking the fractional part of the circle as the name of the pitch, instead of the proportion of the rise of the roof to the width of the building, which really gave the names of the pitches in the first place.

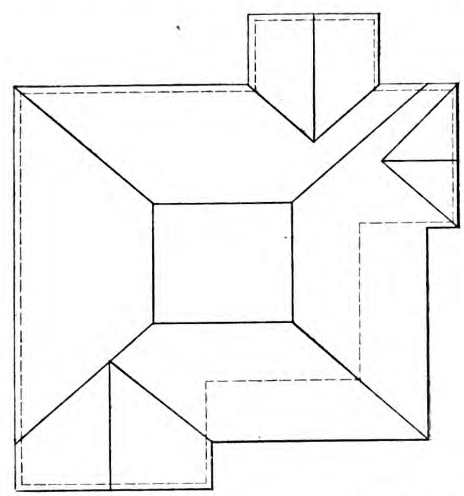
Raising Bents to a Building.

From F. P. M., *Florida, N. Y.*—Will some reader with experience give his plan for raising bents to a building, stating the size of rope, sizes of pulleys and the number of sheaves; and, if he uses a gin pole, how much longer must it be than the posts ? What are the number and sizes of the guy lines? State if the gin pole stands perpendicular or away from the bents to be raised. What are the size and style of the drum or winch, and where should it be placed ? What is the manner of holding the foot of the posts ? The building to be raised is 30 feet wide, with 16-foot posts of framed chestnut.

Roof Plan for Cottage.

From H. K. R., *Larned, Kan.*—Replying to "I. H. L." of Keene, Ohio, I inclose sketch of a roof, and would suggest that the correspondent use 6 x 6 turned columns at the corner of the porch, with about two intermediate posts of the same size, all to have good stone foundations. With regard to veneering, I would suggest that he use the common "English bond," using wire wall ties, similar, for example, to the New York wall tie recently illustrated in this journal, placed *en échelon*, about 4 feet apart. Personally, I prefer paper or sheathing quilt and redwood lap siding, giving 1¼-inch lap.

A building constructed in the shape "I. H. L." has



Roof Plan for Cottage Accompanying Letter of "H. K. R."

planned his house, gives chance for a large range of ornamentation in connection with the deck, gables and cornice, and I think shows off to much better advantage over frame work than over brick work; further, it gives a much better range to color combinations in painting.

Position of Fuel Room in Wood Working Shop.

From E. B. F., *Vermont.*—I have read with interest the article relative to "Position of Fuel Room in Wood Working Shops" on page 266 in the October issue, contributed to the *Wood Worker* by its correspondent, H. E. Kern. With the editor's kind permission I desire to offer a few remarks on the subject under discussion. While I never saw a wall next to a boiler get as hot as the correspondent states, I do not doubt he may be correct in his conclusions. In the first place, there should never be a single wall, as the heat will go through, even if it is 2 feet thick, just about as easy as it would if the wall were 1 foot thick, but at the same time the thick wall will not become as hot. I have seen boilers with 8 and 12 inch solid walls, exposed on all sides, but I never remember their becoming so hot that one could not hold his hands on them. If, however, they were banked up with fuel such as shavings and sawdust, I have no doubt the result would be very different, and I do not think in such a case it would be a safe arrangement. I think in the case of a boiler fired with coal the wall would become hotter than with lighter fuel, owing to the fact that the heat would be more steady.

It is better, in my opinion, if it can be so arranged, not to have the fuel room come in contact with the boiler, but if no other place was available I should build a 12-inch wall for small boilers and 16-inch wall for large ones, with air spaces. I should have a flue at the bottom of the air space, and have the top provided with openings for the purpose of circulation. With such construction I think there would be not the least danger. If much heat was developed the top could be closed and a pipe taken from it for heating purposes, on the principle of a hot air furnace. All doors of a boiler room shold be of iron or covered with sheet iron or tin, while the floor in front of the boiler should be swept clean and wet down at night.

I notice in the October issue the plan of A. L. Shaw of Whitecastle, La., which has about the same arrangement of fuel and boiler rooms, but I like his idea better, as he has the boiler nearer the engine. It will be noticed on the plans which drew the first prize in the competition in "Small Wood Working Shops" that the boiler wall constitutes the wall for the building. Now, in cold weather the frost will have a tendency to cool off the boiler on that side, but either plan with a double wall would, I think, be perfectly safe.

From F. TERRY, *Findlay, Ohio.*—I note the criticism of the correspondent of the *Wood Worker*, which appeared in the September issue of *Carpentry and Building*, relative to the position of fuel room in a small wood working shop, the drawings of which you published the early part of the year. The claim is made that the arrangement is dangerous from fire, the correspondent setting forth the example of a water works plant where coal took fire when piled against a boiler wall 2 feet thick. It occurs to me that the writer in question has failed to give all the conditions of the case, as to my best judgment and that of some of the most competent engineers in this city, a fire under a boiler sufficient to heat a side wall 2 feet thick red hot, clear through, would melt the whole inside of the furnace, and I am, therefore, led to suppose that the fire must have been due to some other cause. I call to mind an interior wood working shop, where a carload of coal was dumped against the boiler wall on the outside of the building, and subjected to all the rain and wet weather during the month of November, rendering it most susceptible to taking fire in the manner described. I was employed in this shop at the time, but never heard of any fire there. I believe, however, if the wall was thin enough and the fuel—coal, shavings or sawdust—was wet and reposed against the boiler wall any great length of time, it might take fire. With a 12-inch wall, however, properly built and a lining of fire brick, as any boiler furnace should have, thus making the total wall more than 17 inches thick I would have no fear of fire. However, I am one to stay within the lines of safety, and shall read with interest what others may have to say on this point.

Points on Chimneys.

From J. L. Bixby, Jr.—For the benefit of those who may be interested, I would state that for furnace work the area of the chimney should equal about one-fifth the area of the grate. Least width of flue should not be less than one-fifth the hight (in feet; answer to be called in inches) for chimneys of ordinary hight. In no case should the least width of flue be less than 8 inches, and for best results the length of the flue should not exceed twice its width. Square tile flues are measured and listed by outside and round ones by inside measurement. A tile flue whose outside dimension equals that of a brick flue has about the same capacity, and if the chimney is a high one the tile flue will exceed in capacity the brick one about 1 per cent. for each foot in hight above 50 feet. In other words, a 100-foot tile lined chimney will have 50 per cent. more capacity than a brick one of same hight, as ordinarily built; but as the smoothness of the brick flue increases the advantage of tile flue will decrease. The only objection to plastering a chimney on the inside is the fact that it is practically impossible to keep the plaster in place. The result is the sides of the flue soon become ragged, and the flue is less efficient than if it had been well laid up and joints smoothed.

In my opinion it is poor judgment to use less than an 8 x 12 inch flue for any kind of a heater, or for a flue where more than one stove is to enter. Put a clean out door at the base of the heater flue and make sure it closes tight. In building chimneys we are limited to standard tile flue linings, and to lengths and widths varying by 4 inches, or the width of a brick. If, in estimating the size of a flue, it comes to a question of which size to use, the smaller one can often be taken with safety if the chimney is comparatively high; but the larger size should be selected if the chimney is low, judgment being governed by the fact that the least side should never be less than one-fifth of the hight. That is, a flue of 40 feet or less should not be narrower than 8 inches.

The following table shows the area of chimney flues for furnace work. They are smaller than for steam or hot water boilers, as the temperature of the flue gases is much higher from a furnace than from any boiler. It is for this reason that a furnace is not as economical:

Size of Chimney Flues for Furnaces.

Diameter of furnace grate.	Hight of chimney from inlet in feet.					
Inches.	15	30	45	60	75	90
18	8 x 12	8 x 12	8 x 12	8 x 12	8 x 12	12 x 12
21	8 x 12	8 x 12	8 x 12	8 x 12	12 x 12	12 x 12
24	12 x 12	12 x 12	12 x 12	12 x 12	12 x 12	16 x 16
28	12 x 16	12 x 16	12 x 12	12 x 12	16 x 16	16 x 16
32	16 x 16	12 x 16	12 x 16	12 x 16	16 x 16	16 x 20
36	16 x 20	16 x 16	12 x 16	16 x 16	16 x 20	16 x 20

While the above sizes do not conform exactly to the rules given, they are the practical sizes that generally give the best results. Chimneys varying in hight from 40 to 60 feet are the most satisfactory. As the flues become higher the gases get cooled down, and owing to small volume, when furnace is not worked hard it has been found that it is policy to increase the size with the hight. It is also absolutely necessary to increase the size as the hight is decreased, the area increasing almost inversely as the hight. That is, a 20-foot chimney requires about twice the area of a 40-foot one, other conditions being equal. While this last statement is not strictly true, it applies with sufficient accuracy to furnace chimneys ordinarily found in houses.

I would not advise putting two 22-inch furnaces on an 8 x 8 flue, unless the owner wants to get the experience. I think it is not safe to risk them on less than a 12 x 12 flue. Even on this, under favorable weather conditions, if he starts up both fires at the same time there is liable to be trouble with smoke, but the trouble will diminish as the chimney becomes warmed up. If he decides to use a single flue for the two furnaces, I would advise him to make inlets to the chimney at different hights and at right angles to each other. Two 8 x 12 flue inlets will give best results, for the reason that the draft of one furnace will not be affected even if the doors and dampers on the other furnace are wide open and no fire in it. Two, or even three, ranges can be put into an 8 x 12 flue if the inlets are not opposite and of same hight. It is not safe to risk an 8 x 8 flue to care for more than one range. It may handle two or even three of them, but if fire is started in each at about the same time there will be trouble, unless the weather conditions are extremely favorable. It is a risk that I wouldn't care to take.

I know of no book treating on the subject of chimneys, except for power plants. My data have been gathered from masons, chimney sweepers, men with chimney caps for sale, from careful observation and tests, and from information gathered from furnace, stove and heating men throughout New England.

Who Puts on the Iron Roof?

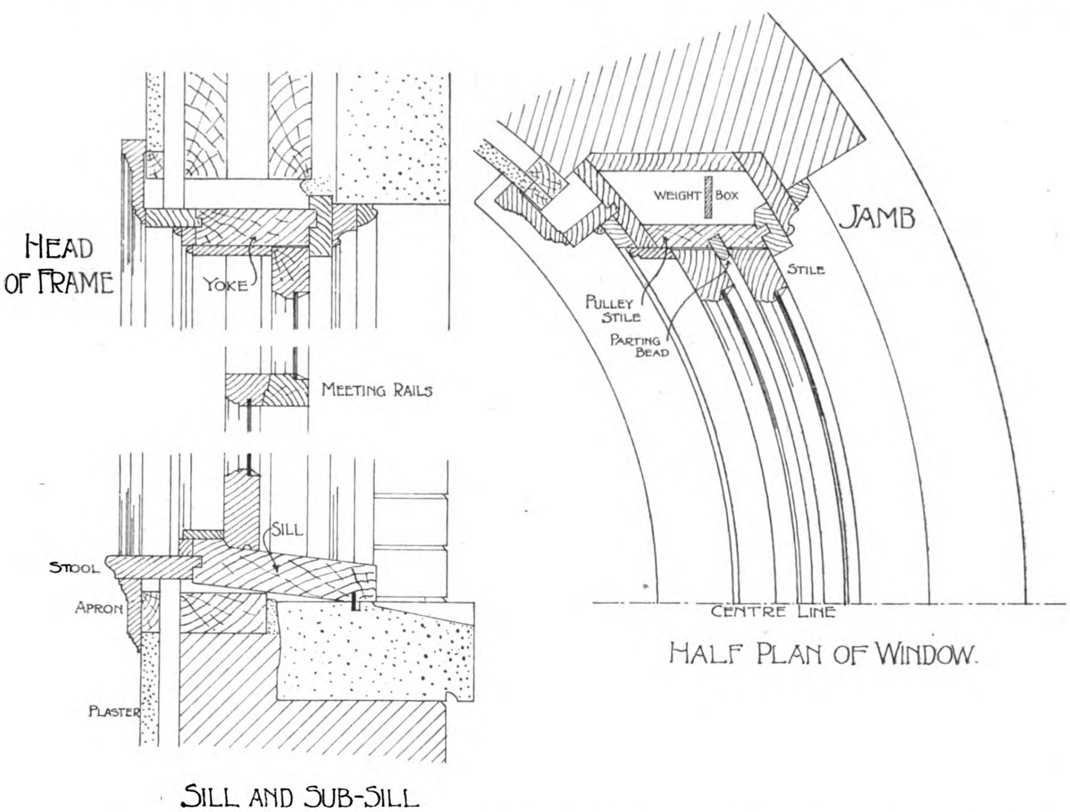
From W. J. M., *Reedsburg, Wis.*—I have a little dispute as to whether or not it is the carpenter's work to put on an iron roof. In my contract there is not a word said about the roof, although it states that it is to be understood that the parties called "builders" are to do nothing but the carpentry work.

Note.—From the terms of the contract as given by our correspondent the duty of the carpenter would seem quite clear, but we lay the question before our readers in order that all who desire may express an opinion. It is possible the same question has arisen in the practice of some of our readers and we shall be glad to hear how they solved the problem.

Constructing a Window Frame for a Circular Wall.

From Jack Plane.—My method of constructing a window frame for a circular wall may possibly be of interest to the readers, and I inclose herewith drawings and brief descriptive text. The detail shows a frame for a brick wall with a cut stone sub-sill and stone lintel over the frame. It is intended that the frame shall be made of clear, white pine for all exposed portions, except the pulley stile and parting bead or strip which will be of hard wood—oak preferred. The sash may be either white pine or oak, and the bottom rail will be plowed out at the bottom to prevent water following in by suction. The sash are to be hung with braided cotton sash cord. A good quality of cast iron axle pulley is to be provided in the pulley stiles for the sash and weights. A parting slip hung to the top of the frame should be inserted in the box, in order to keep the weights from clashing. The weights themselves may be of cast iron, and either round or square in shape. Suitable pockets are provided in the pulley stiles for inserting the weights.

In order to permit the sash being put into the frame from the inside of the house the stiles and boxes are made parallel to each other. By this means the sash can be removed for reglazing in case of breakage by simply removing the inside stops and parting bead. The inside stops are fastened with round headed screws, set in sunken, slotted metal stop adjusters.



Constructing a Window Frame for a Circular Wall.—Photo-reproduction of Drawings Submitted by "Jack Plane."—Scale, ⅜ Inch to the Foot.

Reference to the vertical section through the sill and sub-sill will show a galvanized iron water bar inserted in the bottom of the sill. This bar is ⅛ x 1 inch, and is leaded into the stone sill.

The inside trim, commencing at the box and including the inside stops, may be made of wood corresponding with the finish of the room. The frame is to be painted to match the other wood work of the house. The pulley stiles and parting strips should, however, be oiled and not painted, in order to allow the sash to slide with ease.

Hanging Glass Doors.

From G. L. McM., *Tacoma, Wash.*—I must differ with the editor in his remarks on hanging glass doors as presented in the note appended to the inquiry of "E. D. G.," in the September issue of the paper. I am employed in a door factory, the product of which is shipped all over the United States, as well as to Hawaii, China, Siberia and South Africa, and all our first-class doors are invariably fitted to hang with the putty side within, unless made on a special order, where the specifications distinctly say to the contrary. The reason for putting the putty side in is that if placed on the outside naturally the slamming of the door will throw the glass against the putty and in time tend to loosen it, allowing the glass to be thrown out and broken. On the contrary, if the glass is placed the other way, the weight of it is thrown against the solid wood and no bad results follow.

Note.—Custom regarding the hanging of sash doors seems to vary in different sections, and we trust readers will freely discuss the question in the light of their own experience.

A Cheap Storage Shed.

From E. S., *Ithaca, N. Y.*—I send herewith two sketches of a shed which I use in connection with my carpentry business, finding it very convenient for storing surplus material. The shed itself is 16 x 20 feet, with an overhang in front, making it 20 feet square. Fig. 1 represents a front elevation, showing the stalls, while Fig. 2 is a side view. For the sills I used one piece 8 x 8 x 20 and three pieces 8 x 8 x 12. These sills are at each end of the stalls. I spike on a 2 x 6 x 16 at the feet of the posts, which are 2 x 8, set with the edge toward the front. The sills form the bottom for the first set of stalls, and the upper tier is formed of 2 x 8 laid flat ways with angle braces under, spiking through the posts into the cross pieces and braces. The left hand end I leave open 8 feet for any wagon. I use a shingle roof and board the sides up and down .

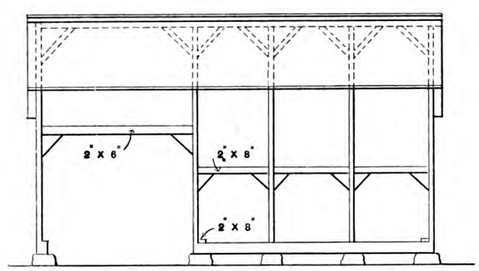


Fig. 1.—Front Elevation

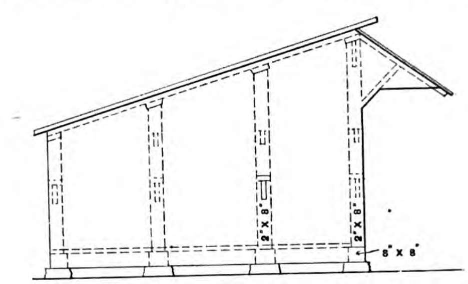


Fig. 2.—Side Elevation.

A Cheap Storage Shed.—Contributed by "E. S.," Ithaca, N. Y.—Scale, 1/8 Inch to the Foot.

Measuring a Slate Roof.

From R. J. H., *Du Bois, Pa.*—I would like to submit to the readers of the paper, who have had experience in slate roofing, a question which has been somewhat perplexing. I would like to know how to measure a slate roof. I gave a contract for "driving" a roof by the square and we cannot agree on the measurement. How much is it customary to allow over the exact measurement for hips and valleys ?

What is One-Quarter Pitch ?

From C. C. H., *Brookville, Pa.*—I have been reading *Carpentry and Building* for about four years, and think a great deal of it. I have learned much from the paper, and now I want to ask a question as to who is correct regarding the question of pitch of roofs. In a recent issue "F. F." of East Bloomfield, N. Y., states that in his section quarter pitch is 26½ degrees, while the illustration showing the method of finding the pitch of a roof from a circle, by "E. L. M.," Greenville, Iowa, shows quarter pitch at 22½ degrees slant. The latter seems to be correct according to the degrees; but here in our county quarter pitch is 6 inches rise to the foot run; one-third pitch is 8 inches rise to the foot run, but a quarter of 90 degrees is 22½, which surely is quarter pitch. This, however, makes only 5 inches rise to the foot run, and one-third pitch 7 inches rise to the foot run.

I would like very much to have F. E. Kidder, the consulting architect, explain this, for I feel certain he can do it to the entire satisfaction of all. I have followed carpentry for 14 years, and would be very glad to have some of the readers talk on the quarter-pitch question.

Note.—The question of pitch of roofs is one which has provoked a great deal of interesting discussion, and developed the fact that opinions differ concerning it. In this connection the letter of "G. L. McM." of Tacoma on page 307 is a timely contribution.

A Reader's Opinion of "Carpentry and Building."

From E. M. J., *Columbia, S. C.*—I am just in receipt of the August issue of *Carpentry and Building*, and must say that of four building papers which I take, this one overtops them all, particularly in the matter of details of construction. I find there are many workmen who can plan a fairly gool looking and comfortable dwelling, but when it comes to the details of putting the building together they are woefully deficient. Many buildings are spoiled by patchy construction, and pocket books are emptied by cutting and trying, putting up and tearing down, to produce some effect which the workman did not understand before he began operations. It seems to me that every wood worker should have this paper in his hands, and keep himself posted on all methods extant of producing well built structures in the best, which is the cheapest, manner.

Copper on Iron Framing.

From G. E. W.—I have a contract for covering the steeple of a church with 16-ounce copper. The frame is iron and the committee does not want any sheathing put on, but wishes the copper fastened direct to the frame, so as to make the building as nearly fire proof as possible. The question has arisen of the possibility of the contact of the copper resulting in the corrosion of the iron. I should be very glad to know if this is likely to occur, and if it is safe to place the copper in direct contact with the iron, and if not what would be the best plan of doing the work?

Answer.—That the contact between copper and iron causes corrosion of the iron is true, but the action is so faint that it would take quite a long while before any defects in the iron would be noticed. However, to be on the safe side, cover the iron frame work with a layer of two-ply asphalt paper, and over this paper lay on the copper, which will avoid any corrosion that might occur. We presume that the framing is filled with fire proof blocks to which the copper can be fastened.

BUILDING statistics just issued by the Secretary of State of Ohio show a large increase both in the number and cost of new structures for the last year over that of the previous year. The number of new structures for the past year was 26,949, at a cost of $18,528,376, while for the previous year the total number of structures was 21,152, and the cost was $14,645,944.

WHAT BUILDERS ARE DOING.

REPORTS which reach us from Boston, Mass., show that building operations in the city during the month of September were not as satisfactory as could be wished, for, while the number of permits granted for the construction of brick buildings were exactly the same as for the month of August, there was a gain of but seven in the number granted for the construction of wooden buildings. In September of last year there was a gain of 20 per cent. in brick construction over September, 1898, while this year there is no change, although there is a gain in frame construction for the corresponding period. In assigning a cause for this condition of affairs three reasons are given: The unsettled condition of business occasioned by the approaching Presidential election, the overconstruction in the city for some time past, and the high cost of material. The figures show that in September of the present year permits were granted for 44 brick structures, as compared with 55 a year ago, and for 81 frame buildings, as against 61 in the same month last year. Taking the figures for the first nine months of the present year, it is seen that the total of brick and frame constructions has decreased materially as compared with last year and the year before, the report showing 869 buildings for which permits were issued up to October 1, 1900, as against 1442 for the same period in 1899, and 1418 for the first nine months of 1898.

The report of Building Commissioner Damrell for the year ending February 1, 1900, has just been issued, and shows that during the 12 months there were 471 brick and 1240 frame buildings completed. Besides giving much information of interest and value to underwriters, builders, &c., the report of the commissioner presents a list of all registered plumbers and gas fitters in the city.

Buffalo, N. Y.

Labor conditions continue to be somewhat unsettled in Buffalo. The demand for workmen at the Pan-American Exposition Company makes the labor leaders rather autocratic. A few weeks ago the plasterers in the exposition building were being paid $3.50 per day for eight hours' work, but they decided the amount was not compensation enough for a hard day's work, and consequently they struck for $4 for an eight-hour day.

The structural iron men at the exposition struck for and obtained a raise of wages until they are now paid $3.50 a day. It is rumored that on November 1 the carpenters will demand 40 cents an hour. They are now paid 30 cents. Metz & Meyers' mill has been closed and their work on the Ethnology Building stopped simply because they had a few men in their employ who refused to join the union, and whom Metz & Meyers refused to discharge. It is stated that these same men had been discharged from the union because they had failed to pay their dues, and this method was taken by the union to collect same.

The following contracts have been obtained the past month by members of the Builders' Exchange:

Pergola Building, Pan-American Exposition Company, John Feist	$35,553
Woman's Building, Pan-American Exposition Company, J. H. Jaeckle	4,470
Stadium Building, Pan-American Exposition Company, J. H. Jaeckle	78,590
Shelter House, No. 1, Park Board, G. E. Frank	3,734
Shelter House, No. 2, Park Board, Wm. Henrich's Sons	3,652
County Hospital, Mosier & Summers	107,000
Steward Building, Flierl & Reimann	82,976

The exchange members have again formed a bowling club, and around 'Change is heard wagers of 10-cent cigars as to who is the best bowler.

Chicago, Ill.

Now that there seems to be some prospect of an early termination of the labor troubles which have existed in the city for nearly a year past, architects, contractors and builders are feeling much encouraged and are looking for increased activity in the spring. There is no doubt that the prolonged labor troubles have reacted seriously upon the building situation in Chicago and vicinity, but it is to be hoped that the struggle will not have been in vain. On our editorial page this month we discuss the situation at some length.

A matter which has attracted the attention of the trade in other cities is the step which has been taken by the Chicago Masons' and Builders' Association and the United Order of American Brick Layers and Stone Masons' Union, relative to the question of apprentices. According to the new agreement and working rules adopted by these two organizations, and which are said to be binding until April 1, 1903, apprentices are to have the opportunity of attending both public and technical schools. In fact, they are so required to do, in order to remain apprentices in good standing. According to the agreement, they are under the jurisdiction of the joint arbitration board. The applicant for apprenticeship must be under 18 years of age, and the contractor taking an apprentice shall agree to keep him at work for nine successive months in each year, and make it a point that during the three remaining months of the year the apprentice shall attend school. It is said that the rate paid the apprentice by his employer for the first year is $260; for the second year, $300, and for the third year $350. In case, however, the apprentice does not attain proper proficiency during three years, he may be required to work a year longer, for which he is to receive $400.

At the annual meeting of the Chicago Architects' Business Association, held on October 8, the following officers were elected for the ensuing year.

George Beaumont, president; E. Stanford Hall, first vice-president; E. M. Newman, second vice-president; S. A. Treat, treasurer; C. R. Adams, secretary.

Directors: C. W. Nothnagel, G. L. Pfeiffer, W. C. Zimmerman, A. F. Woltersdorf, Sidney Smith, F. W. Hessenmueller.

Board of Arbitrators: George Beaumont, S. A. Treat, W. C. Zimmerman, N. S. Patton, F. Baumann, C. R. Adams.

Cleveland, Ohio.

The amount of building in the city during the month of September was hardly up to the corresponding period of a year ago, although in the aggregate the amount was considerable. Cleveland, however, is no exception in this respect, for it is well known that building operations have been on a comparatively small scale all over the country. In spite of the decrease in the building in Cleveland, the men connected with the building trades have been fairly well engaged. A movement is in progress which is intended to compel all contractors for school buildings to finish their work by the time specified in the contract, as the penalty clause is to be rigidly enforced. Director Bell is pushing the matter, and it is said will enforce the penalty of $25 a day for all the time consumed in the construction of a building in excess of that fixed for the completion of the work in the contract.

Some of the Cleveland contractors came out ahead in the competition attending bids for work on the Ohio Building at the Pan-American Exposition. We understand that all the important contracts were captured by them, as there were but two which went to contractors in other cities.

At a meeting of the Board of Directors of the Builders' Exchange, held early in October, one of the matters for consideration was an invitation to send representatives to Youngstown to assist in stirring up the exchange idea in that place.

Columbus, Ohio.

The table of building statistics which has been issued by Secretary of State Kinney shows the total number of new structures for the past year, the figures indicating a large increase as compared with the previous 12 months. During the year under review the number of new structures erected was 26,949, casting $18,528,376, as compared with 21,152 buildings, costing $14,645,944 for the previous 12 months. The largest increase was in dwellings, the cost of which for the past year was $11,173,305, as against $9,570,965. The items for the past year are as follows: County buildings, 8, cost, $89,450; churches, 63, cost, $301,400; school houses, 68, cost, $331,790; stores and warehouses, 1616, cost $2,290,075; dwellings, 18,237, cost, $11,173,305; stables and barns, 4539, cost $1,106,685; manufacturing establishments, 592, cost, $2,379,344; all other buildings, 1826, cost, $856,337; making the total number of new structures as given above of 26,949, at a cost of $18,528,376.

Denver, Col.

A strike of the wood workers, which at one time threatened to tie up all the mills in the city, has been settled, and on October 10 the closed mills resumed work. The trouble grew out of the employment of non-union men at some of the mills and a demand for a recognition of the union.

Detroit, Mich.

An ordinance was recently introduced in the common council of the city, which is aimed to regulate the construction and arrangement of theatres, but which will carry with it, according to the plan of the builder at whose request the matter was presented, another ordinance to abolish the present board of building inspectors and replace them with a single superintendent of buildings, who shall be a practical builder and mechanic. For the purposes of the ordinance, buildings given up entirely to theater purposes and buildings containing entertainment and public halls, are divided into different classes. The ordinance provides specifically the minimum thickness of the walls of every theater building according to their hight, the manner of supporting the roof, number of exits, proscenium wall, fire proof curtains and construction, and places all the safeguards around such buildings which are required.

Kansas City, Mo.

According to builders and real estate men, there is a considerable amount of work in progress in the city, some going so far as to claim that the aggregate amount of building under way is greater than at any time during the past ten years. There are comparatively few empty houses for rent, and it is said that there are more than 200 new houses now in course of construction. Most of the building is being done in the southeastern part of the city, and while there is nothing in the nature of a boom, the volume is considerable in the aggregate. A member of a prominent firm of builders states that the building is simply to meet the demands of the increased population. The demand for houses is good; prices rule moderate, and the people are willing and able to buy. As a consequence nearly everybody who can build is doing so. The labor market is referred to as being pretty evenly balanced and everybody busy.

Los Angeles, Cal.

The outlook at Los Angeles, Cal., for fall and winter building shows an unprecedented number of small buildings, residences, &c., in sight, but very little to be hoped for in the way of big buildings. In Los Angeles, as well as in the neighboring towns, such as Pasadena, there is a great deal of inquiry for residences of the better class. Architects report that prospective builders seem to have plenty of money and are asking for a good class of dwellings. So far Los Angeles is free from labor troubles affecting building, but there are indications that the union carpenters will soon make trouble. The fight will be against piece work, which is quite common here.

Lowell, Mass.

The building business in the vicinity of Lowell, Mass., has been unusually dull for some time past, although the prospect for the future is much brighter. The big mill corporations are enlarging somewhat and some of them have plans for considerable work, which, without doubt, will materialize after the election is out of the way. The Lowell Textile School contemplates erecting a number of buildings which will call for the expenditure of something like $400,000, and it is expected that bids for a portion of the work, at least, will soon be invited. The American Woolen Company have been enlarging considerably, and the Yorick Club have purchased a valuable property near the City Hall, with a view to remodeling it into an elaborate up to date club house.

A committee has been appointed by the Builders' Exchange to consider the proposed building ordinance which is being fathered by F. E. Bean. The many friends of Contractor P. B. Quinn will regret to learn of his severe illness. He has always been a valuable member of the Builders' Exchange, and in the past a regular attendant at all the conventions of the National Association of Builders.

The labor unions have been very alert lately, but owing to the depression in business, nothing more than a small strike of the bricklayers and hod carriers has occurred to mar the harmony which has existed between employers and employed.

Memphis, Tenn.

The amount of building thus far in the year shows a very gratifying increase as compared with a year ago. The money value has already reached a total of $1,274,382, as compared with $1,076,250 for the entire 12 months of 1899; while the total for 1898 was only $544,689, and for 1897 was a trifle less than $500,000. Contractors, architects and real estate men seem to agree in the expectation that the aggregate of building operations for the year will fall not far short of $2,000,000. One of the largest of the permits recently granted was that for the Gayoso Hotel, which is estimated to cost in the neighborhood of $300,000, and which will be of steel frame construction.

Pittsburgh, Pa.

During the month of September there was a noticeable improvement in the building situation in and about Pittsburgh. Quite a number of buildings which have been in the hands of the architects for some time are now being pushed to completion. The contract has been awarded to William Miller & Sons for what will probably be one of the finest residences ever built in the city. It will occupy a site 100 x 150 feet on Fifth avenue, near Amberson avenue. We understand that the building will cost about $150,000, and that probably as much more will be spent before it is ready for occupancy. The plans for the house, which were drawn by J. Edward Keirn, call for a stone structure containing 30 rooms, exclusive of bathrooms and reception hall. The large reception hall will be fitted up magnificently and will be, it is said, the handsomest apartment of the kind in any Pittsburgh residence. Every bedroom in the house will have a bathroom opening from it.

What is said to be the largest building permit ever issued in Pittsburgh was that granted on October 11 to William Miller & Sons, who have the contract for the new Union Depot, and who are also putting up the 12-story steel frame building of the Pittsburgh Bank for Savings, referred to in these columns last month. The specified amount in the permit was $1,500,000. This, with the permits previously issued, made the amount the largest ever granted in one month. Some idea of the magnitude of the work in connection with the new depot may be gathered from the fact that the working plans of the architects, D. H. Burnham & Co. of Chicago, weighed 350 pounds.

Portland, Maine.

Latest advices from Portland are to the effect that building operations are decidedly active and that a great many business blocks and dwelling houses will probably be erected in the near future. One of the enterprises now nearing completion is the big block of the Union Mutual Insurance Company on Exchange street, which structure will be a fine addition to the city's architecture. Some of the enterprises in prospect which are mentioned include a Masonic Temple, a new United States Court House, a large hotel on the eastern promenade, a new railroad station, together with improvements on the Cape shore.

Portland, Oregon.

In Portland, Ore., there is rather more than the ordinary activity in building, although things have eased up a little recently. Footings for the first nine months of the year show a large increase over the same months in previous years. There is a good demand for residences and residence property, and just at present for modern flats, which are rather scarce in Portland. There is a rumor current that the old Market Block, belonging to the city, will be sold and that flats will be erected on it.

San Francisco, Cal

Advices under date of October 6, 1900, are that as far as new work is concerned, the past month has been about the dullest of the year, and this, too, at a time when under ordinary conditions building operations should be at their busiest. This state of things is due chiefly to the continuance of the millmen's strike, although it may be partly in consequence of the nearness of the Presidential election. The fact, however, that architects claim to be fairly busy with plans for the future would seem to indicate that the election is only a small factor. The strike itself has apparently not changed. The mill owners have now refused to figure on any new work or to sell to any one employing union labor. This still further complicates matters and makes building operations still more difficult. It is now claimed by the men that the lockout will be over in a week, but apparently the owners are as firm as ever.

In the meantime country building is in good shape. The harvest, which was a fairly good one, is now over, farmers are receiving money for their crops, and there is a general stimulation of country enterprise. A number of new buildings of some size are now either being erected or about to be erected in various parts of the State. Among the most important of these may be mentioned the new library building at San Jose, St. Matthew's School building at San Mateo, the new courthouse at Madera, a post office building at Oakland, and a post office building at Stockton. The contract for the construction of the latter has been awarded to McPhee & Co. of this city for $95,500.

Seattle, Wash.

This is just now the most active building center of the Pacific Coast. September showed by far the greatest building record in the history of the city. During that month building permits aggregating $469,078 were issued, being an increase of 40 per cent. over August, the largest previous month. On October 1 there were upward of 75 new buildings in process of construction. Some of these buildings were large, modern store and office buildings, but the greater number were residences ranging in cost from $1500 to $7000. At present everything is favorable for the building of this class of houses.

The labor situation is satisfactory, and though artisans are not plentiful there has so far been no great inconvenience on that account. The new Madison Park addition of the city has been opened. The grading of streets and laying of sidewalks and water mains is progressing and builders are already at work on the property.

Worcester, Mass.

There is a fair amount of building in progress in and about the city, and the leading architects have plans on their boards for enterprises which it is expected the spring months will fully develop.

The Builders' Exchange is showing increasing activity, and it is expected that the membership will largely increase in numbers as soon as the winter opens. The directors have been planning to make more desk room for the accommodation of tenants, this being a subject which has been agitated for some time back. We understand that there are a number of applications for admission to membership, and also for desk room in the exchange.

Notes.

Building operations in Hartford, Conn., are quite active just at present, and permits have been taken out for a number of improvements. While the season lasts work will be rushed so as to get the new buildings in shape so that operations can be carried on during the winter months.

It is stated that a larger amount of building for this time of year is being carried on in Waterbury, Conn., than is usual, and present indications are for a great deal of activity in the near future.

What is said to be a radical departure in connection with building operations has been made in Brooklyn, N. Y., in remodeling old style houses, whereby their rent producing qualities are largely increased. This is the introduction of the American basement style of architecture, and some of the first of these improvements are now in progress.

A meeting was recently held in Oakland, Cal., for the purpose of forming an association of building contractors, the leading spirit in the movement being A. W. Pattiani, who acted as chairman.

ACCORDING to the reports of the English Paliamentary Committee on Bankruptcy, the most unsuccessful business men in England during the past year were the builders, although no reason has been discovered why they should have suffered more than any other class. The builders were not only the most numerous class, but their liabilities were the largest.

WHAT is said to be the largest perfect plank ever turned out by a saw mill was manufactured by a California redwood mill not long ago. The plank is 2 inches thick, 6 feet wide and 17 feet long. It was cut by a band saw, and is perfect and without a flaw. Much larger pieces of redwood in the form of planks have been produced, but they were not perfect specimens.

HEATING AND VENTILATING A CLUB HOUSE.

FULLY realizing the advantage, and, in fact, the necessity, of having a well lighted and also comfortably heated and well ventilated assembly room, the members of the Whist Club of New York City instructed their secretary, C. A. Henriques, to secure the services of an engineer for consultation in making changes in the lighting, heating and ventilation, which had been decided upon in their new club house at 13 West Thirty-sixth street, New York City, erected from plans by Stein, Cohen & Roth, 41 Union square. For this work the services of James G. Dudley, 16 Broad street, New York, were retained, and the work was completed during the early spring, while yet there was an opportunity to thoroughly test it when the club took possession of their quarters after the changes had been made. The principal field for the engineering work was found in the main card room on the first floor, the plan of which is given in Fig. 2. In the evening it is not an uncommon thing to find the entire card room occupied with tables, around each of which four whist players are gathered, most of whom are smoking. The problem of heating under these conditions was not so difficult as the problem of lighting the room so that all parts were free from strong light or shadows, and providing for the removal of the smoke and otherwise vitiated air.

The lighting is done by means of electricity, the electricity being furnished by one of the electric companies having wires going through the street, and while the system laid out by Mr. Dudley lighted the entire building, the principal feature of it was lighting the main card room on the first floor. On the plan, Fig. 2, is shown the arrangement of the lights which are placed on the ceiling, with small lights down each side of the long room and around the square card room in the rear. In the center of the square card room there is a large light, and large lights are also used down the center of the long card room. The lights are arranged on several circuits, so that all the different combinations could be used to have the whole room fully illuminated, or only those required for lighting different parts of the room. The different circuits of lights are arranged in geometrical figures so that the room is not only well lighted, but also with a pleasing effect from the disposition of the lights. All of the lights are arranged on the ceiling, the fixtures having been specially designed by Mr. Dudley to harmonize with the ornamentation of the room and furniture. In order to spread the light evenly, and effect a soft, yet full illumination, Holophane glass, furnished by the Holophane Glass Company of this city, is used. When occupying the room, the members have found that all parts of the room are equally well lighted, so that there is said to be absolutely no choice in the location of seats at the card tables.

The building is heated by means of hot air furnaces whereby a current of pure air from out of doors flows into the house continuously, pleasantly warmed by the

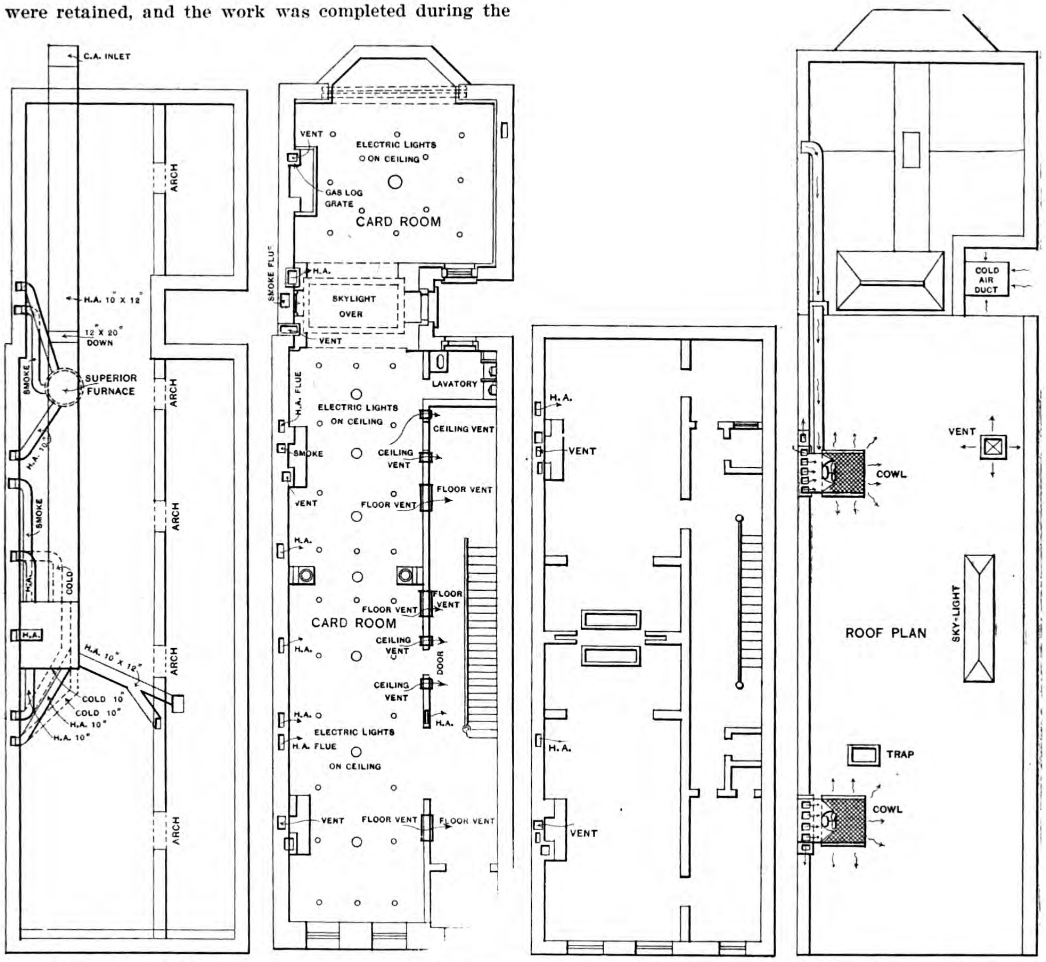


Fig 1.—Plan of Cellar. Fig. 2.—Plan of First Floor. Fig 3.—Plan of Upper Floors. Fig 4.—Plan of Roof, Showing Location of Exhaust Fan Ventilators.

Heating and Ventilating a Club House.

furnaces, to replace the air removed by the ventilating system. When this part of the work was taken up by Mr. Dudley, he found in the front part of the cellar, shown in Fig. 1, a furnace constructed by James McGregor and of the pattern of 1862, it having been in the building many years. It was expected that this furnace would have to be removed and replaced by an entirely new one, but upon examination it was found to be in excellent order, and, after its already long service, it is still a part of the new heating and ventilating system.

The square card room at the rear of the building on the first floor is an addition to the building, however, and in order to insure its being thoroughly heated a No. 38 Superior hot air furnace of the portable type, made by the Utica Heater Company of Utica, N. Y., was installed to aid the old brick set furnace and to heat the card room extension. In addition to heating the card room on the first floor, the second, third and fourth floors of the building are also heated by the old furnace, the rooms being arranged as shown by Fig. 3, which is a plan of the second floor. These upper floors, as well as the first floor, are all provided with open fire places, to assist the furnaces in case of necessity. The upper rooms are heated by means of registers placed in hot air flues, which are a continuation of the flues which are used to supply the registers in the main card room on the first floor. It is not expected that the upper floors will be heated when the card room is heated and in use, the upper floors being arranged as chambers for the use of club members, with the exception of the front room on the second floor, which is also arranged as a card room.

The furnaces are both equipped with Æolipyle combustion governors, made by the Æolipyle Company, 117 Beekman street, New York, and attached by W. B. Wilkinson, 284 Pearl street. The sheet metal work was all done by Herman & Grace, Brooklyn, N. Y. The furnaces are supplied with cold air from out of doors by means of a galvanized iron duct leading from the north end of the building. As the rear portion of the basement is not excavated, the cold air duct runs along the top of the ground until it reaches the cellar proper, where it runs along the ceiling. The arrangement of the outer end of the cold air duct is shown in Fig. 5. The cold air duct is 24 x 34 inches inside, and on the outer end has a curved top which is 34 x 48 inches in size. This is to provide for a woven wire screen to prevent the entrance of leaves, small animals or other objectionable things.

The top is hinged at the front so that it may be thrown over and expose the top of the cold air duct and allow for the removal of a filter frame made of oak strips 1 inch square. This frame is made 34 inches wide and 5 feet long, and is covered with cheese cloth, so as to arrest dust and dirt that would otherwise be carried into the furnace and distributed through the building. The hinged top allows this frame to be removed so that the cheese cloth can be dusted, brushed and renewed, and prevents the openings in the cloth being so stopped with dirt as to interfere with the cold air supply to the furnaces. This cold air duct passes along the ceiling in the cellar until a 12 x 20 inch branch is carried down to the bottom of the Superior furnace, after which it continues on full size to the brick set McGregor furnace near the front of the building.

Two hot air pipes are taken from the Superior furnace and carried to the flues at the rear of the building. There are five hot air pipes from the larger furnace at the front, one pipe running over to the hall, where it supplies a register in the basement hall, and a branch being taken to a flue in the partition running to a register in the first-floor hall, the purpose of this arrangment being an intentional throttling of the hall supply for increasing the card room supply. The hot air pipe running to the extreme front of the building connects with the hot air flue which heats the card room on the second floor and the chambers above it. The other three hot air pipes are used for heating the card room on the first floor, while one continues up for heating the chambers above.

In addition to the hot air pipes for heating the card room on the first floor there are also cold air pipes leading from the cold air duct to the heating flues, connected as shown in Fig. 6, so that by means of the mixing damper, also shown, the temperature of the air furnished these rooms may be tempered, and in case of the rooms becoming overheated from a large number of persons, or lights, cool air can be brought into the rooms and the hot air shut off. The damper is of the sliding character, rising and falling. When it raises, the cold air is shut off and the hot air is allowed to flow freely into the flue.

When the damper is partially closed by means of a regulating device, the cold and hot air is mixed. The regulating device is so arranged that the exact position of the damper can be told in the card room, where a

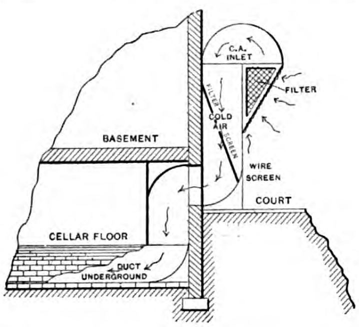


Fig. 5.—Cold Air Duct Entrance and Filter.

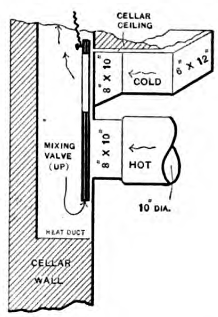


Fig. 6.—Hot and Cold Air Pipes and Mixing Damper.

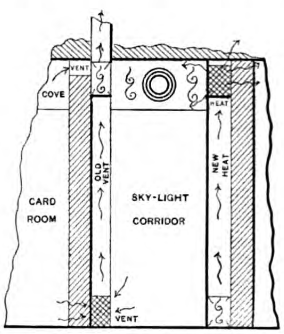


Fig. 7.—Showing Location of Heating and Ventilating Registers.

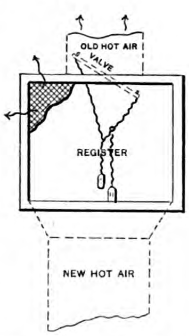


Fig. 8.—First-Floor Register and Damper in Flue to Upper Floors.

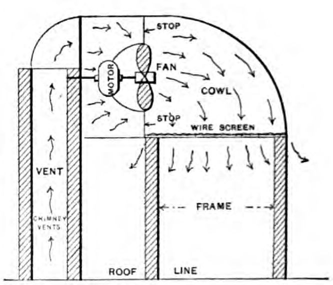


Fig. 9.—Section Showing Fan, Motor and Method of Discharge.

Heating and Ventilating a Club House

chain for operating it conveniently is placed. All of the hot air registers in the main card room are placed near the ceiling, as shown in Fig. 7, which is an elevation at the point under the skylight in Fig. 2. It will be noticed that the hot air enters the room at one side near the ceiling, and all the other hot air registers are arranged along the west wall and are all placed at about the same hight, or 8 feet above the floor, this being the flue location when the building was erected. The damper placed in the one flue which heats the upper floors is arranged, as shown in Fig. 8, to be operated by means of a chain, and is placed just above the heating registers, the new flues for heating the card room being enlarged to that point.

The Ventilating System.

In addition to the hot air furnaces for heating the building, there are also a number of open fire places, which are so arranged that they can be used with fire to aid in heating, and all of these being connected into two exhaust ventilating chambers placed on the roof, as shown in Fig. 4, which is a plan of the roof. A sectional elevation is presented in Fig. 9, showing the arrangement of the exhaust fans. In order to protect the exhaust fan, it is placed under a galvanized iron hood, as shown, and it is arranged to discharge down, to obviate any back pressure from high winds, a wire screen being arranged at the outlet to prevent the entrance of birds and other foreign matter.

At the rear of the building is a 24-inch Seymour fan, and at the front of the building is an 18-inch fan. These fans are operated by a ¼ horse-power directly attached electric motor. The switches for operating the motors, regulating their speed, are located convenient to the main card room. By means of flues from the open fire places and the special ventilating flues connecting with the exhaust fan chambers, the entire air volume of the main or first floor can be changed from four to six times per hour, thus providing from 1500 to 2000 cubic feet of fresh warmed air per hour per occupant, as it drops to the floor and passes off through the open fire places, or through the special ventilating registers in the base boards and in the partitions on the hall side of the main card room, near the ceiling, and over the doors leading to the main hall and stair well.

Round registers 8 inches in diameter are placed on each side of the partitions, connected by means of a sheet metal cylinder, so that the exhaust fans, in addition to drawing the air through the fire places in the various rooms on the first and upper floors, remove the lighter strata of vitiated air in the main card room. Arrangement is made for the removal of a portion of the air volume through 6 x 36 inch register faces in the base board, both in the hall and in the card room, which are connected by means of sheet metal thimbles. There are three of these ventilators along the floor in the hall partition, the exhaust fans drawing part of the air from the main card room through them, whence it passes to the upper portions of the building, thereby equalizing the ventilation of the main card room (which is, in effect, the "club" itself), and at the same time warming the other parts of the building.

As has been previously stated, this system has been under actual test with the card room fully occupied, and both the heating and ventilation, as well as lighting, have met the approval of the members. While the description has not dwelt upon the proportions of the different parts, the special size of the furnace, hot air pipes, flues, or the speed of the ventilating fans, it presents an idea of what can be done along these lines, which will no doubt be of special interest to many who have similar problems to solve, it being borne in mind that the system and methods employed were necessarily limited by the conditions confronted in remodeling an old building designed many years ago. An important factor in the success of the work is the positive movement and removal of the air in the building through the use of the fans.

CONCRETE FLOORS IN ENGLAND.

IN a recent issue of the *Journal* of the Royal Institute of British Architects appeared a paper by Frank Caws on the subject of concrete floors, which contains much that is of interest. The paper deals for the most part with concrete floors of the slab principle and in which the author uses as little iron as possible, to avoid the weakening of the concrete by the unequal expansion of the metal in the event of great heat, and also for the purpose of decreasing the expense. The following extracts may be suggestive:

In making fire proof floors for cottages I consider if proper care be taken in the centering, and the joints therein covered with narrow strips of lining paper (to prevent the cement grout from descending into the chinks) that it would be better to do without plaster ceilings altogether, and be content with the natural impression of the wood upon the cement, whitewashed. By such means, and also by avoiding needlessly thick slabs, the expense of cement concrete floors can be brought within such limits as to render the fire proof dwelling of a workingman cheap enough to be a good commercial investment.

Although a fire proof dwelling must cost more than a nonfire proof one, it will pay best in the end, because it does not decay or fall into disrepair, but, where ordinary care is used, is practically everlasting. Moreover, it is vermin proof, and cleaner and more sanitary than buildings containing many hidden chambers and cells of decaying timber, and ever gathering dust.

Size of Slabs.

The limitations as to the size of cement concrete floor slabs are largely determined by the quantity which a gang of men can cast in one day. If the slabs are made unduly large it is highly probable that some of them may be left by the workmen half finished over night, the other half being added next day, consequently leaving a joint right across the slab, which, though by no means fatal to its strength, is extremely undesirable.

In designing a large expanse of flooring it is necessary, therefore, to subdivide the area into squares of reasonable extent, and I may say that, in my own practice, I consider a square of about 150 superficial feet a reasonable size to arrange for, although in some cases I have found it necessary to make them much larger.

The steel girders which form the divisions between the slabs should be made strong enough to carry the weight of the slabs themselves and of their greatest proposed loads; but it must not be supposed that, when the slabs are set hard, these steel girders will necessarily be called upon to wholly sustain these weights.

I say necessarily, for much depends upon the manner in which the girders are placed. For example, if the girders are placed entirely or mainly beneath the concrete, so that the full thickness of the slab, or a considerable thickness of it, passes above the top of the girder, and if in such a case the casting of the slab be performed in one heat, or as nearly in one heat as possible—which can be done by organizing a sufficient number of working gangs—the whole floor, consisting of numerous squares, may be regarded as one homogeneous slab, which is therefore so largely self sustaining that, when once it is set, it brings but very little of its weight to bear upon these girders, which apparently support it.

But if, as an example of another method, the girders be placed so that their tops are bare or else covered by a thin surface of concrete, the girders in this case practically cut the various squares asunder, so that each square naturally must bear wholly upon the girder.

It will be obvious from these two examples that the former method, upon the score of strength, is distinctly preferable, though sometimes circumstances compel the use of the latter method; and whichever method is employed, it is always wise to make the girders strong enough to bear the entire weight.

Some people think that cement floors are too cold, and accordingly cover them with wood, which, of course, involves a very great addition to the cost, having nothing but the sense of comfort to recommend it. For my own part, I think that a cement floor covered by a good cork carpet is far preferable and quite comfortable. However well seasoned wood flooring may be, the boards will shrink, and when the floor is washed the moisture between the chinks cannot get away or be evaporated without, in time, tending to produce an undesirable state of mildew or decay. I am not arguing against parquetry floors laid upon a special glue, but I am dealing with floors of a more economical character suitable for ordinary dwellings.

Every one recognizes the danger attached to the premature removal of centering from concrete floors, of which we have had in the building world not a few lamentable examples; but there is another danger, not so generally recognized, which I should like to point out, namely, that of a too sudden removal of centering. Although the concrete may have had plenty of time to set, we must remember that its weight is resting upon the center, and that when the centering is removed the slab must bend, however inappreciably, before it can become self sustaining. The same thing is true of a wide span masonry arch of any bridge, so that no contractor or engineer would ever dream of permitting the centering of such a bridge to be suddenly removed without first easing the wedges which sustain it.

Although the vertical movement of the mass of a slab in settling is generally too small to be measured, yet this slight movement involves the momentum of that great mass, which momentum may be sufficiently serious to damage, if not to wreck, the slab. It is, therefore, absolutely imperative that the wedges sustaining the centering of concrete floors should be carefully eased, and the centering allowed to stand a day or two afterward, and the wedges should then be examined, and not till they are proved to be quite loose should the centering be taken down.

Seeing that the stress of slabs under uniformly distributed loads is proportional to the cube of their span, it will be obvious that great reduction of stress is obtainable by forming the slabs with covered edges. Suppose, for example, we are dealing with slabs about 12 feet square, and we reduce the flat part to 10 feet square by means of our cove, the greatest stress is reduced accordingly as from the cube of 12 to the cube of 10—that is, about 24 per cent., and at the same time these coves serve to inclose the steel supporting girders, thus protecting them from fire.

General Rules.

Below are some of the general rules, which 20 years of special experience has led me to make in regard to the construction of concrete slab floors:

1. To take pains to obtain old cement. 2. To use good broken brick aggregate, and not sand, in the proportion of four of brick to one of cement for the body of the slab, and fine crushed granite without sand for the surface coating, having about three of granite to one of cement. (I may say I have found that when the surface coat is gauged two of granite to one of cement it sets too soon, while the continued expansion of the body beneath is still going on, and thus causes minute cracks, tending to deface and spoil the surface). 3. To adopt, as precautionary provision, sheep wire netting as the base, and steel angle or tee bars weighing not more than 1½ pounds per lineal foot, spaced about 3 feet apart on the netting. 4. To consider a slab 10 feet square by 4 inches thick as capable of sustaining a load of 9 hundredweight per foot, including its own weight, and to reckon that every slab will bear per square foot more or less than 9 hundredweight directly in proportion to the square of its thickness, and inversely in proportion to the cube of its span. When the slab is rectangular the minimum span has to be considered the span. 5. To avoid casting slabs in frosty weather. 6. To insist upon organizing the gangs of workmen so as to cast as large an area of slabs as possible in one heat, and never to allow a slab to be left over night with its area only partially cast. 7. To insist upon strong centering, and to keep it all standing not less than five weeks after the last slab of the series of one flat is cast, and absolutely to forbid and prevent the sudden and careless removal of the centering.

Reality in Architecture.

The singular and characteristic helplessness of the modern architect when brought face to face with the realities of time, place and people must, some day, make the educator pause, and must likewise some day excite the curiosity and the wonder of the general public, says Louis H. Sullivan, the well-known Chicago architect. It certainly is curious enough to be worthy of comment and critical analysis that whereas the architect, to all intents and purposes, stands aloof from his people and his time, American inventiveness, ingenuity, adaptability and versatility are proverbial in so many pursuits.

But current architectural practice may not be called a pursuit; on the contrary, it is a running away, an evasion of plain duty, a dodging of the manifest issue.

This issue is not to be obscured by a mist of conventional and shop worn phrases, for it is as plain as the daylight to any unbiased mind that, when an architecture gives a reflection of the true life of the people it is a natural, a real art; that, when it fails so to reflect that life, it is artificial, unreal, and therefore not only negatively useless but positively pernicious.

Closeted for generations in the musty school, this art which needs as nurture the fresh air and the sunshine of green fields and limpid waters, the rejuvenance of springtime, has languished and faded in the poverty of neglect.

The remedy is self-evident—a return to natural, simple, wholesome, and sympathetic ways of thinking; a liberation of the creative impulse; an *entente cordiale* between architect and people—that he, as an artist, may interpret their true feelings in the natural language of his art, and express them with the eloquence and ardor of a poet—not, as now, to misrepresent them in the expressly cultivated cynicism of irrelevant mental attitude.

That there is need of such a change, and that the change is imminent, is keenly felt to-day by the younger generation of architects. The convention of the Architectural League of America, held in this city early in June, represented a movement in architectural thought so significant that it may easily be held the most important avowal of principles in the architectural history of the country. These principles, briefly stated, stand for " the encouragement of an indigenous and inventive architecture for America," as opposed to the imported fashion plates representing the art and the lives of nations centuries ago. In other words, an art for us, by us; not an art for us, by others.

The demand, then, is for architects of such breadth of culture and delicacy of perception, such art of expression, that from their hands may come a new phase, a new expression of the eternally youthful art of architecture that shall in turn be unique in the history of the fine arts.

It will be an art filled with optimism and humanity, in contrast with the pessimism of the past.

A 12-STORY brick, terra cotta and granite mercantile building, to cost $350,000, has been planned by John T. Williams of Stamford, Conn., to be erected at 114 to 118 Liberty street and 119 to 121 Cedar street, New York City. The structure will have a frontage of 70.6 feet in Liberty street and 45.2 feet in Cedar street.

Hollow Blocks in Building Construction.

For some little time past the attention of the trade has been directed to the merits of hollow blocks for use in building construction, and in these columns more or less has been given on the subject of hollow block *vs.* frame houses. The discussion seems to have excited a great deal of interest on the part of architects and builders, and as showing the effects produced by the use of these blocks we present herewith a picture of a dwelling built of hollow blocks, together with details showing the method of corner construction in using this material; also the manner in which floor joist are arranged in connection with it. These hollow terra cotta blocks, as made by Martin W. Lauer of 138 Washington street, Chicago, Ill., to whom we are indebted for the accompanying illustrations, are designed for use in the entire construction of buildings, as here shown, as well as for veneering of brick buildings or for basement foundations of frame structures. They are especially adapted for residences, cold storage work, warehouses, dry kilns, stables and other buildings for which absolute protection is desired against frost in winter and heat in summer. The blocks are made from a high grade of clay, such as is used in the manufacture of architectural terra cotta, which is burned to a degree of hardness which makes it impervious to moisture. All blocks used below grade are glazed, so as to prevent dampness entering the building.

It is well known that solid building materials are good conductors of heat and cold, and unless vitrified they will further absorb large quantities of water during rains, which in winter will be frozen in the walls, this being especially true of common brick. The hollow building blocks are closed at all corners and jambs, making each course a system of dead or non-circulating air spaces, the whole wall thus being a series of dead air chambers standing as a barrier against the heat of summer and the frost of winter. The hollow bricks being impervious to moisture, secure dry walls.

The blocks are made in various sizes and lengths, so as to be able to meet all requirements. Standard shapes are made for window sills, water tables and other places requiring bricks varying from the square or rectangular. The shape of the regular sizes enables them to be readily used for such purposes as porch piers. The manufacturer recommends mortar for use in connection with these bricks to be composed of 1 part Portland cement, 3 parts lime and 16 parts of fine, clean, sharp sand.

Perspective View of Dwelling Constructed of Hollow Blocks.

Hollow Blocks in Building Construction.

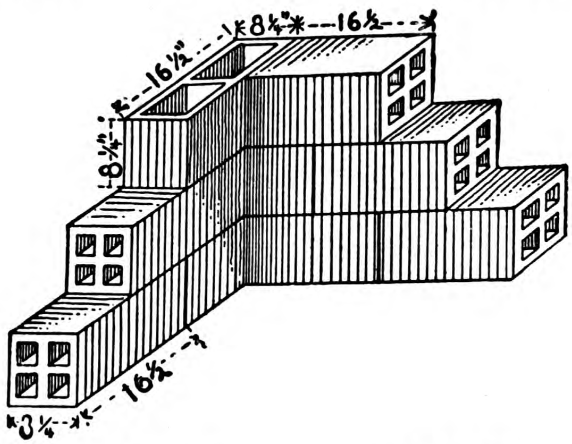
What is a Dome?

The word "dome," like the German term *dom*, is derived from the Greek *domos*, through the Latin *domus*, like the Italian *duomo*, which means house, whether *domus Dei* or *domus episcopi*. This word English writers almost invariably mix up and confuse with the term "cupola." This confusion does not, however, exist in other languages. According to the best French lexicographers, *coupole* is of internal application; *dôme* is of external. In Spanish the internal curved ceiling is a *cúpula*, but the external curved roof is a *media-naranja* (a half orange), which is alike a forcible and a homely definition. Dallaway says: "The term 'dome' is improperly used for 'cupola.' It applies merely to a cathedral church, and is not synonymous with a hemispherical roof, as at the Pantheon, unless the whole be elevated, as at St. Peter's." Viollet-le-Duc has the following remarks also upon the word "dome:" "It is employed (improperly) for cupola. *Duomo*, in Italian, signifies the cathedral or episcopal church, and as most of the cathedral churches of Italy are surmounted by one or more cupolas, a part has been taken for the whole. We say, the dome of the Invalides, the dome of the Pantheon; but it ought to be the 'cupola' of the Invalides or of the Pantheon. The dome of Paris in Italian ears would mean the cathedral of Notre Dame de Paris, which, as is well known, is not surmounted by a dome at all."

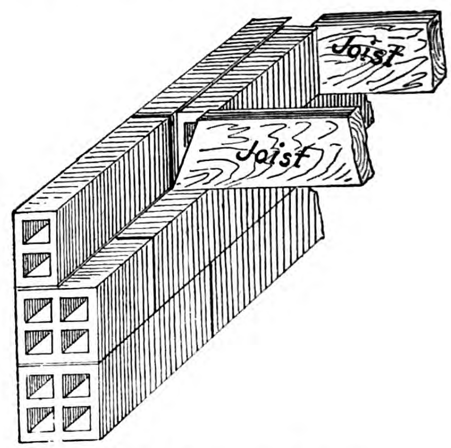
Perhaps it may be concluded, in accordance with the views hitherto held on the subject, that a dome may be defined properly to be a spherical or spheroidal vault, that generally rests on a circular wall, which, if raised upon another construction, is called the "drum;" but a dome, as well as its drum, may stand over a polygonal or rectangular area, in which case the base of the drum or of the dome is connected with the lines of the main wall by pendentives. On plan domes are sometimes circular, as that of St. Peter's; sometimes polygonal, as at Santa Maria del Fiore; sometimes oval, as at the cathedral of Pisa. A dome is also sometimes constructed as a single vault of equal thickness throughout the whole section, but more frequently thicker at the base; and sometimes (where a weight, as a lantern, is to be carried) with ribs having the surface between them merely filled in; sometimes there are two thicknesses of this filling, as at St. Peter's and Santa Maria. Like every other construction of genuine architecture, a dome ought to stand by itself—*i. e.*, the materials ought to keep their places by their own gravity and without the extraneous assistance of cement or chains.

The origin of the dome is to some degree involved in a cloud of doubt. Many of the huts of savage tribes are more or less domical in form, and the conical shape so generally adopted in order to resist tempestuous or rainy weather does not require very much modification to become a dome. In the peninsula of Hindustan the upper portions of the roofs of dagobas and tobas are, as a general rule, domical in form. The earliest specimens of domes among the ancient European nations are those of the early Greeks and the Etruscans of Italy. The so called "treasuries" discovered at Mycenæ by Dr. Schliemann are the earliest Greek specimens known. Of these that of Atreus is the largest and most imposing. This is thus described in the words of the explorer: "The great chamber, which resembles a dome or vast beehive, is 50 feet high and 50 feet in diameter. It is built of well wrought blocks of hard breccia, placed in regular layers, and joined with the greatest precision without any building material. The stones, which on the inside are smooth and well fitted, are on the outside very irregular, and, contrary to the general belief, they are not immediately covered with earth, but with enormous masses of stone, which by their ponderous weight keep all the stones of the circular layers of masonry in their position.

"Thus, the principle of this construction is that of an arch shaped wall resisting a great superincumbent weight and deriving its strength and coherence from the weight itself. The same idea which suggested the circular shape to the Cyclopean architect induced him also to curve the sides vertically, as they derived from that form an additional power of resistance to the lateral pressure." It may be remarked that the above described structure had been completely covered with earth, so as to become subterranean.



Detail Showing a Right Angle Corner in an 8¼-Inch Wall



Detail of Wall Showing Joist Construction.

Hollow Blocks in Building Construction.

The Xylosote Process of Preserving Wood.

Some interesting experiments were recently made in England showing the method of impregnating wood by what is known as the Xylosote process. This process aims at preserving wood from decay, and in that sense is comparable with creosoting. The method may be briefly described as follows: A number of pieces of timber (railway sleepers were used in the experiments alluded to), being placed on trolleys, are run into a large cylinder, the lid of which is then shut down and securely bolted. The cylinder is carefully made so as to be air tight. All air is then exhausted from the cylinder as far as possible; heat is then introduced, and this brings the sap out of the wood; the wood is then subjected to a highly heated solution of metallic and mineral salts under limited pressure. It is stated that the impregnating liquid consists of a solution of the sulphates of copper and iron, crystals of which are first made in the proportion of 20 per cent. of copper to 80 per cent. of iron, also alumina (condition not stated), and "Kanit," a salt mined at Stassfurt, in Germany, which consists chiefly of sulphate of potash and magnesia, and the chloride of magnesia. The sap brought out of the wood is, to a large extent, dissolved and carried off in the liquid, the copper arrests any tendency of the wood to decay from organic causes, while the iron is said to form a chemical combination with the woody fiber, the iron then becoming insoluble in water. After being subjected to this solution for three and a half to four hours, the solution is drawn off, and the wood is almost immediately taken out in a heated condition. The experiments indicated that the quantity of sap removed occupied more space when in the wood than did the chemicals introduced into the wood during the process. The wood consequently shrank to some extent, and it became harder and more difficult to work than before. It possessed certain fire proofing qualities, as was demonstrated by shavings which could not be completely burned up.

The report of the New York State Bureau of Labor for the second quarter of this year shows an addition of 151 unions and a gain in union membership of 15,069 in the labor organizations of the State during the three months ended June 30, 1900. On that date there were 1603 labor unions, with an aggregate membership of 247,602, reported.

Production of Grindstones and Oilstones.

Some very interesting information concerning the production of grindstones, oilstones, whetstones, &c., is to be found in the annual report of the Geological Survey in the United States, compiled by E. W. Parker, We make the following extracts:

Grindstones of domestic manufacture are obtained from the sandstone deposits which extend along the shores of Lake Erie for some distance east and west of Cleveland, Ohio, and as far inland as Marietta, and on Lake Huron above Detroit, Mich. In Mineral Resources for 1896 the methods of manufacture and use are given in detail, together with a tabular statement of the several varieties, foreign or domestic, that occur, with their special uses. Five varieties are produced in the United States—four in Ohio and one in Michigan. The four in Ohio are: 1, Berea, fine sharp grit, used especially for sharpening edge tools; 2, Amherst, soft loose grit, for edge tools and saws; 3, Independence, coarse sharp grit, for grinding springs and files and for dry grinding of castings; 4, Massillon, also coarse sharp grit, for large edge tools, springs, files and dry castings. The Huron (Michigan) stone has a fine sharp grit, and is used for sharpening edge tools when a very fine edge is required.

With the exception of 1882 the value of the grindstones produced in 1899 was the largest in the history of the grindstone industry. The statement of production in 1882 was based on "estimates" furnished by correspondents familiar with the industry. It is probable that such estimates were exaggerated, and that the record for maximum production belongs to 1899. There is no way of correcting the estimates for the earlier years, however, and last year must stand as second to 1882.

Compared with 1898 the value of the grindstones produced in 1899 exhibits an increase of $185,817, or 38 per cent.

Oilstones, Whetstones, &c.

The rough material from which our oilstones, &c., are made is obtained from various localities in the United States. The finer grades of oilstones are made from two grades of novaculite quarried in the vicinity of Hot Springs, Ark., and known, respectively, as "Arkansas" and "Washita" stone. Fine grained sandstone, called "Hindostan" or "Orange" stone, from Orange County, Ind.; Lake Superior stone, quarried in Cuyahoga County, Ohio, and a similar material, known as Labrador stone, from Cortland County, N. Y., and chocolate stone, from Lisbon, N. H., are used for whetstones. Scythestones and rubstones are made from Indian Pond and Lamoille stone, quarried in Grafton County, N. H., and Orleans County, Vt.; from Berea, Ohio, grit (which also furnishes grindstones), and from some of the Indiana sandstone.

The value of the oilstones and whetstones made in the United States was the maximum in our history. As compared with 1898, there was an accentuated value of $27,797, or 15 per cent.

Stone Covered Roofs.

Roofs to serve as floors are not especially common in this country, but a recent interesting example is found in connection with the new Immigrant Station on Ellis Island, New York Harbor, where stone roofs serve as balcony floors. These are of thick slate slabs, supported on steel beams. The slabs were selected sound and uniform in color, 1½ inches thick, and dressed smooth on both sides. On each beam galvanized iron double gutters are fixed along each side of the top flange, to catch any leakage at the joints, which are filled with slaters' cement. The slabs are clamped to the top flanges of the beams by steel clips, having bolts set with plaster of paris in holes drilled in the slate. These metal clips are 1½ inches by 3-16 inch, and are 18 inches apart. The roof is pitched to the front edge, where it drains into a copper gutter on wrought iron brackets, with one side flashed up over the blocks which raise the slabs from top of the beams to clear the joint gutters.

Builders' Wages Two Centuries Ago.

A writer in one of the London trade journals contributes to a recent issue some interesting figures showing the course of builders' wages in England during the last two centuries. He states that old builders' price books now treasured away in the British Museum library are funds of really important imformation on this subject of the gradual alteration of wages for the better, as also are the unpublished continuations of Thorold Rogers' "History of Agriculture and Prices in England," quoted by Arthur Bowley in his splendid book on wages, published this year.

Among the earliest facts which can be accurately gauged is one which tells us that about 1703-12 the daily wages of a carpenter and joiner in Westminster, then a city post outside London, and now a part of the very heart of the metropolis, was 2 shillings 6 pence. A plumber of the time got 3 shillings a day and a bricklayer's money commenced in 1703 at 4 shillings and worked down gradually to the same as a carpenter's in 1711. According to the Greenwich records (Greenwich now being a suburb of the metropolis) the weekly wages of carpenters and all other artisans in the locality were 15 shillings 6 pence to 16 shillings from 1710 to 1780.

In 1778 a London carpenter's wages had increased to 3 shillings and 4 pence per day and hour respectively. The same wages were paid to plasterers, slaters, and pavers, while bricklayers got in summer 6 pence a day more. Then a curious thing seems to have happened, for which (says Thomas Reece) I am not at present able to give any definite explanation. According to preserved copies of a famous old builder's price book, London carpenters' daily wages were between 1786 and 1806 as high as 6 shillings 9 pence. The chances are that the day's work was extremely long, as the hourly rate was 5 pence. This daily rate is far and beyond that of all other mechanics of the time, the next best (the bricklayers' summer wages) only being a very little over 4 shillings a day.

In 1809 the London hourly rate for carpenters was 6 pence and the number of hours per day apparently 11. Two years later the hourly rate had risen to 7½ pence, only to fall back in 1817 to 7 pence. Bricklayers' wages were equal to these and followed similar fluctuations. The 7 pence per hour rate for carpenters seems to have persisted at least until 1854, according to Crosby's price book. But from other sources we get information set out differently. From a report on artisans and machinery, published in 1824, we learn that in 1810 the weekly wages of a London carpenter were close upon 28 shillings. A strike then raised them to 30 shillings, but in 1816 wages had fallen back to the 1810 level. Gradually rates rose so that in 1824 the earnings of a carpenter were again 30 shillings per week.

Apparently there was then a further relapse, as according to the "British Almanac and Companion," published in 1860, the following list for London carpenters is given: 1839, 30 shillings; 1849, 30 shillings, and 1859, 32 shillings. To explain some apparent divergences it shows some of the builders' price book figures seem to refer to wages charged to customers for carpenters' services by the employer of the carpenter. A dispute is mentioned in 1810 where the carpenters were paid 5 shillings per day for their services, while the masters charged their customers 1 shilling a day more.

There took place in 1859 a great building trade strike to secure the Saturday half holiday without any reduction of wages—the result being that the system of payment by the hour became the established custom of the trade. The rate was made 7 pence per hour, and two hours were taken off Saturday—56½ hours being made the London week. In 1865 wages went up ½ penny per hour. Then came the great building trades strike and lockout of 1872. Its result was that wages were raised for London to 9 pence per hour, when the hours were reduced to 52½ in summer and 48 in winter.

New Publication.

CHURCHES AND CHAPELS. By F. E. Kidder, Ph.D., architect. Size 7 x 10½ inches; 213 pages, including 54 plates and 200 illustrations. Bound in cloth. Published by William T. Comstock. Price, $3, postpaid.

This is a new and enlarged edition of an interesting work by a well-known author, and treats in a practical way of the arrangement, construction and equipment of churches, Sunday school buildings, synagogues, &c. The text is comprised in eight chapters, giving a great deal of practical information relative to planning and seating, details of construction, roofing, ventilation, acoustics, &c. The plates show plans, elevations and perspective views of modern churches which have been erected by the author and other prominent church architects. The first chapter of the work takes up the preliminary steps to building, and will be found of special interest and value to those who wish to become intelligent on the subject preparatory to consulting an architect, or advising what to do regarding the building of a church. In the second chapter the author deals with design and general requirements, presenting in connection therewith illustrations of interiors and fittings, such as pulpits, pews, &c. In the third chapter Sunday school arrangements are considered, numerous plans being presented, both for independent buildings and for rooms in connection with church edifices. The fourth chapter deals with the seating equipment of a church, embracing furniture, organs, stained glass, &c. Chapter five is given up to details of construction and covers foundations, walls, floors, galleries, roofs, spires, windows, doors, &c. Many carefully drawn details are shown, including those of open timber work and half-tone engravings of interiors. In the sixth chapter of the work under review the general principles of acoustics are laid down, accompanied by diagrams of audience rooms. Comments are to be found relative to the proper shape of the room and the effect of introducing galleries, coved angles and domes, as well as the effect of air currents. Chapter seven treats of heating, ventilating and lighting, while chapter eight is devoted to church bells and tower clocks. The work is published in the form of an oblong octavo, printed on good paper, with well executed engravings, and is bound in such form as to make it an attractive and valuable addition to current architectural literature.

Finishing Cypress.

The method of finishing wood varies greatly, according to the physical characteristics of the material under treatment, and much of the satisfaction, or otherwise, regarding any given wood arises from the methods used in finishing it. Among the absorbent woods is cypress, which does not give good results when handled the same as non-porous varieties.

We here give the directions laid down by one who knows how to finish this Southern wood, says the *Lumber Trade Journal*. There is but one successful process of treatment, and that is to use what may be called a "sealer," not a "filler." This is a mixture of spirits of turpentine and boiled linseed oil, in equal parts. This, used as a first coat, will fill the pores of the wood and furnish a permanant surface for the varnish. Two coats of varnish on this sealer make the best finish.

Then the process of finishing is about as follows: After the sealer is thoroughly dry, sand paper again; then another coat of varnish, rubbed down with powdered pumice and water, after which it may be lightly rubbed over with an oily cloth. Should a finer and more durable finish be desired, add another coat of varnish after sandpapering between the three coats, the last coat being rubbed with pumice stone. To obtain the very best results, two or three days should intervene between each coat of varnish, while the last coat should stand from seven to ten days before being polished; but for cheap work the sealer, with two coats of good varnish, will give excellent results.

Cypress, like every other wood, has its peculiar characteristics, which must be studied if the best results are to be obtained. As the colors are varied in even a small lot of cypress lumber, the effect in the way of interior decoration can be greatly improved by assorting the different colors into harmonizing shades.

The New Boston Trade School.

Instead of opening on the first Monday in October, the new trade school of the Massachusetts Charitable Mechanic Association, in Boston, will begin its sessions on Monday, October 29. The six months' course will not, however, be shortened, for the school will run on a month longer than planned in the spring. The postponement has been caused by delay in fitting up the rooms. The equipment is very thorough for each trade. The committee, for example, when first planning the school, appropriated $500 for fitting up the rooms. The plumbing tools alone cost $500. The whole expense of getting the rooms ready will probably amount to more than $2000. In each of the three trades—plumbing, bricklaying and carpentry—an experienced, practical workman, as well as a man with knowledge of principles, have been appointed by the committee as instructors. The classes will meet at 7.30 every Monday, Wednesday and Friday night for two hours' work.

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Progressive Carpentry

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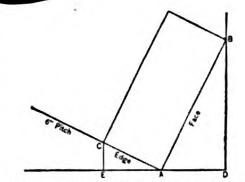


Fig. 66.—Mitering Fascia Set With Pitch of Roof.

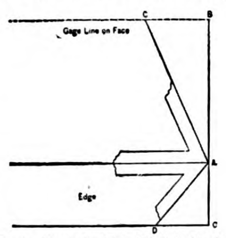


Fig. 67.—Mitering Fascia Set With Pitch of Roof.

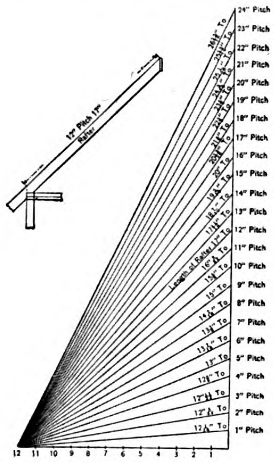


Fig. 51.—Pitch and Length of Rafters.

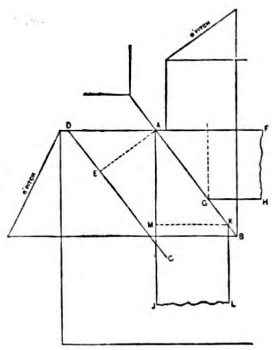
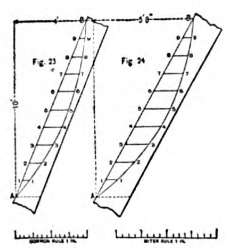


Fig. 13.—Laying Out Side Bevels for Two Pitches.



Figs. 23 and 24.—Laying Out Curved Rafter.

REDUCED SIZE ILLUSTRATIONS FROM PROGRESSIVE CARPENTRY.

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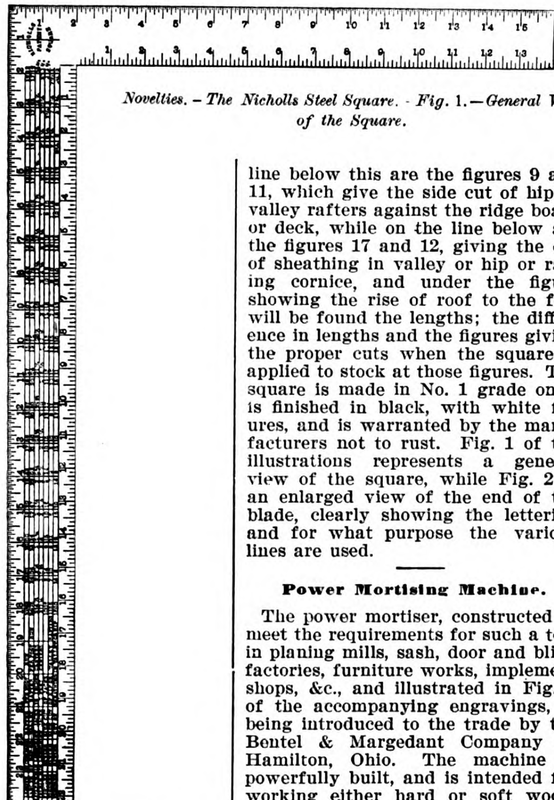
Novelties.

The Nicholls Steel Square.

A tool concerning which the carpenters of the country are likely to be interested is the Nicholls steel square, which is illustrated herewith and which is being placed upon the market by Nicholls & Wheeler of Ottumwa, Iowa. The illustrations so clearly show the general appearance of the tool, together with the markings, that comparatively little description would seem to be necessary. The manufacturers direct special attention to the fact that the board measure has been replaced by a simple rule for framing, and that there is to be found the lengths and figures giving the cuts for the entire roof, also the cuts for the cornice. The tongue on the square is 1¾ inches, thus making it convenient for spacing, as much of the dimension lumber is 1¾ inches thick. If, for example, in using the square, the roof rises 12 inches to the foot, or half-pitch, it is only necessary to look under the figure 12 in order to find the length of the common rafter for 1 foot run; on the next line under 12 is found the length of the hip or valley rafter per foot run; on the next line below is found the difference in length of jacks, spaced 16 inches on centers, which is 22⅝ inches; on the line below this is the difference in length of jacks spaced 2 feet on centers, which is 2 feet 10 inches; on the line below are the figures 12 and 17, and by placing the square on the stock to be cut at these figures, gives the side cut of jacks. On the next line below this are the figures 9 and 11, which give the side cut of hip or valley rafters against the ridge board or deck, while on the line below are the figures 17 and 12, giving the cut of sheathing in valley or hip or raking cornice, and under the figure showing the rise of roof to the foot will be found the lengths; the difference in lengths and the figures giving the proper cuts when the square is applied to stock at those figures. The square is made in No. 1 grade only; is finished in black, with white figures, and is warranted by the manufacturers not to rust. Fig. 1 of the illustrations represents a general view of the square, while Fig. 2 is an enlarged view of the end of the blade, clearly showing the lettering and for what purpose the various lines are used.



Novelties. – The Nicholls Steel Square. - Fig. 1.—General View of the Square.

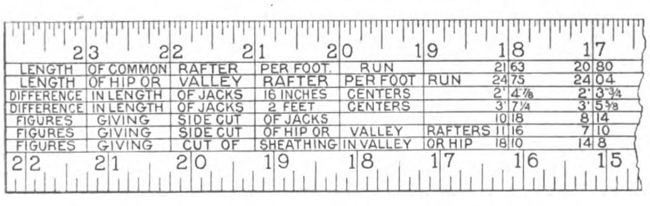


Fig. 2.—Enlarged View of End of Square, Showing Lettering.

Power Mortising Machine.

The power mortiser, constructed to meet the requirements for such a tool in planing mills, sash, door and blind factories, furniture works, implement shops, &c., and illustrated in Fig. 3 of the accompanying engravings, is being introduced to the trade by the Bentel & Margedant Company of Hamilton, Ohio. The machine is powerfully built, and is intended for working either hard or soft wood. The frame is cast in one piece, forming a straight and plain four sided column, the latter spreading out into a heavy, wide base, thus rendering the machine rigid upon the floor. The manufacturers lay special stress upon the ease of running and accuracy of the working parts, and point out that each machine is tested without bolting to the floor. It is arranged with a strong, extra outside journal bearing of brass, for supporting the steel crank shaft on the outside of the crank, thus affording it three firm supporting bearings of brass. The crank shaft, pitman and chisel bar operate and reciprocate between bearing boxes, and do not, as is usually the case, overhang and operate on the outside without support. This arrangement, it is claimed, insures light and easy running and a higher speed of from 150 to 200 strokes per minute than other mortising machines; also freedom from jarring, and preserving the true, horizontal position of the crank shaft, together with accurate vertical working lines of the chisel at all times. The chisel bar and pitman are made of fine cast steel, the latter being provided with gun metal strap boxes for taking up the wear. The chisel bar is self centering, and is held by long, vertical bearings of brass. The point is made that the automatic reverse of the chisel bar is quick, positive and unfailing. The chisel bar has a stroke of 5 inches and will mortise up to 1 inch and to a depth of 4½ inches, and still larger if used in connection with the boring attachment. The table rests on a heavy swivel bracket, which can be set to any angle up to 15 degrees and which rests on a strong, vertical, adjustable slide. With the hand table material up to 12 inches thick can be worked, and with the power clamp table material up to 10 inches thick and 6 inches wide can be used. Both tables are adjustable back and forth on the bracket for different widths of material and position of the mortises. The boring attachment is complete in itself, having a frame which is bolted to the side of the column and which carries the driving pulleys, the miter gears and boring bar, and a lever with segment for operating the bar. The boring bar is set in exact line with the chisel bar, so that most of the material may be bored out, and only the finishing up be left for the chisel, thus being especially useful in hard wood.

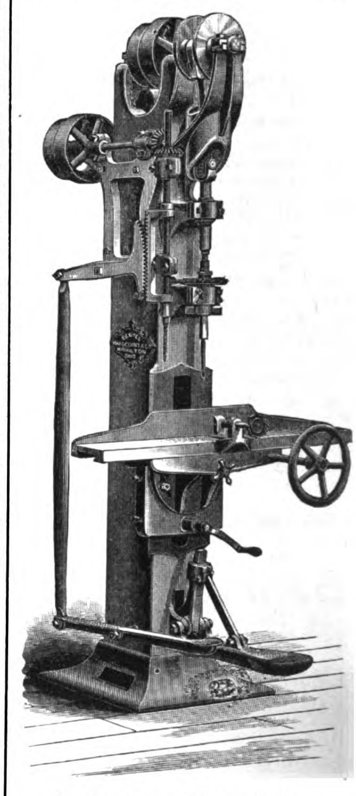
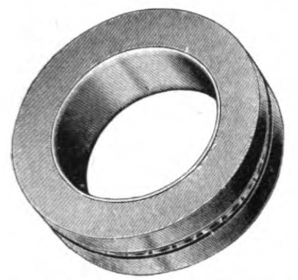


Fig 3.—Power Mortising Machine

The Allen & Winn Equalizer.

The device illustrated in Fig. 4 has been designed for the purpose of equalizing the strain on both a vise and its operator. It is manufactured by the Allen & Winn Mfg. Company, 85 Fifth avenue, Chicago. It consists of an annular steel box with movable ends capable of revolving on ball bearings. The device is applied by moving the screw rod of the vise, on which it is slipped, thus taking the place of the face washer. A vise



Novelties —Fig. 4 —The Allen & Winn Equalizer.

thus equipped requires the least amount of power in gripping its work for the greatest results. No matter how great the tension required to hold the work may be, the tendency to bind on releasing the vise is completely overcome by the action of this equalizer. It is essentially an anti-friction device, reducing the friction to a minimum. By equalizing the strain, increasing the leverage and distributing the pressure, it prevents sudden strains from breaking the vise, while the slightest pressure on the lever will release the vise. Thorough tests have shown that the greatest jar on the work will not affect the appliance, and it is claimed not only to lengthen the life of a vise but to increase its capacity. The standard sizes carried in stock are ⅞ inch, 1 inch and 1 3-16 inches in inside diameter. Other sizes can be made if ordered.

Novelty Never Break Steel Register.

In Fig. 5 of the illustrations we show a register put on the market by the Novelty Mfg. Company of Jackson, Mich. The goods are made entirely of sheet steel and steel plate, to render them indestructible. They

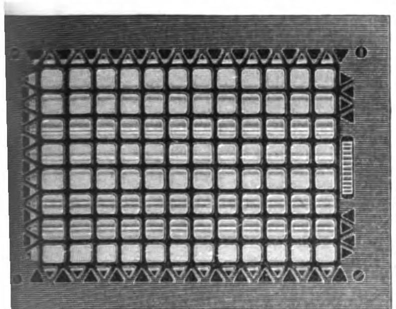


Fig. 5.—The Novelty Never Break Steel Register

are made in all standard sizes and finished in any style desired. The valves are of aluminum bronze, because, it is remarked, it retains its color and it can be readily determined whether the valves are open or not.

The Bournonville Acetylene Gas Generator.

The increasing use of acetylene for lighting purposes, especially in places where gas is not conveniently available, lends additional interest to a form of acetylene gas machine which drops the carbide into the water in the generating chamber and which the General Acetylene Company, 56 University place, New York, are putting on the market. It is known as the Bournonville gas generator and is made under patents granted to Eugene Bournonville. A sectional view of the generator is presented in Fig. 6, from which it will be seen that a quantity of carbide is stored in the chamber A, near the top, and the feed is controlled by the swinging door B. The bottom of the chamber A is formed by a feed drum that is revolved as the result of the rising and falling of the gasometer, which

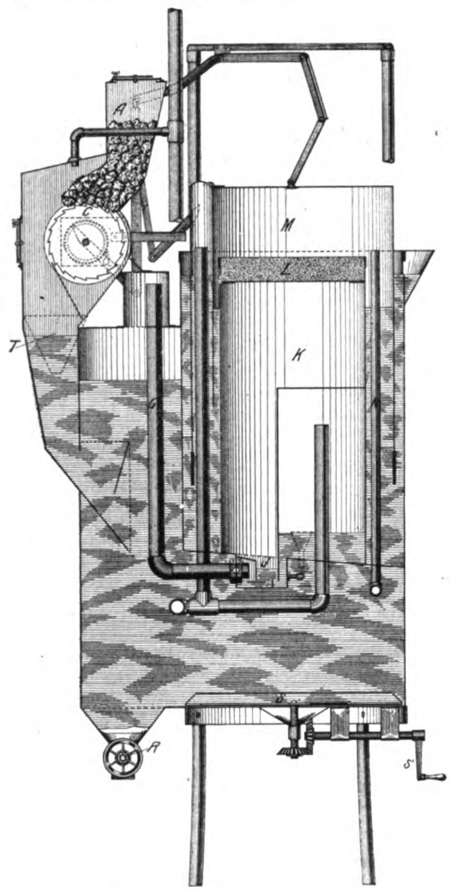


Fig. 6 —The Bournonville Acetylene Gas Generator.

is connected with a ratchet wheel on the drum by means of levers. By this means a small quantity of carbide is fed at a time to the chute, which carries it to the center of the body of water in the generating chamber. Being completely submerged, the entire surface of the carbide is in contact with the water, and the generation of gas is assisted. A shield or deflector, H, is provided to prevent the gas generated from passing up the feed chute, and a large and deep body of water is provided in the generating chamber in order to cool the gas before it rises to the top, where it passes down through the pipe G into the condensing chamber. At the point of connection there is a small compartment, filled with water, which prevents any back flow of gas from this chamber to the generator. From this chamber it passes through the dry filter L to the gasometer, and from it to the pipe which supplies the illuminating fixtures.

In the condensing chamber there is a small pressure relief chamber through which any excess of gas can pass off through the pipe P, this pipe being covered by a sheath, which becomes uncovered when the gasometer is filled and the generation of the gas still continues. It is claimed that by this method the gas is not only kept cool, but purified and dried, so that it reaches the service pipe free from impurities. It is also pointed out that by lifting the cover of the carbide hopper the quantity of carbide can readily be seen, and by operating the crank connected with the grating S in the bottom of the generator the residue or slacked carbide can be stirred up, so that any unslacked carbide can be utilized for generating gas and the refuse drawn off through the outlet valve R. A complete inspection of the essential parts of the machine can be made without the escape of gas or the admission of air. It is further stated that all the materials used in the apparatus are selected for their adaptability for the purpose, so that the machines may remain in operation for several years without annoyance to the owner. The machines are made in two styles and several different sizes. It is pointed out that from their automatic feeding from a large supply of carbide, the machines can remain in operation for several days before attention is needed, giving the machines a large illuminating capacity. It is also stated that the offensive odor from the refuse is avoided by the system of agitating the carbide in the machine.

Ornamental Wall Radiators.

The Fowler & Wolfe Mfg. Company, Bourse Building, Philadelphia, Pa., have recently issued to the trade a 56-page catalogue devoted to their ornamental wall radiators. The introduction states that in presenting their fourth catalogue, the company's claim of having a popular radiator is substantiated by the increased number of orders which they are receiving, and also by the superiority and efficiency which their radiator has demonstrated in use. It also calls attention to several new forms in which the radiator is made. The first 24 pages are devoted to cuts showing the radiator adapted for various uses, for direct, semi-direct and indirect work. The sections are made in four sizes, exposing 5, 6, 7 and 9 square feet of surface. The radiators are made both plain and ornamental. In the last part of the catalogue is presented a list of educational institutions, hospitals, public buildings, steamships, churches, business buildings, hotels and residences in which the radiators are being used. More than a dozen fine half-tone engravings show their adaptability for use in bay windows, parlors, under skylights in business buildings, in front of counters in stores, in schools and in churches. These illustrations furnish valuable assistance to the heating contractor by giving prospective customers a good idea of the appearance produced by the use of these goods.

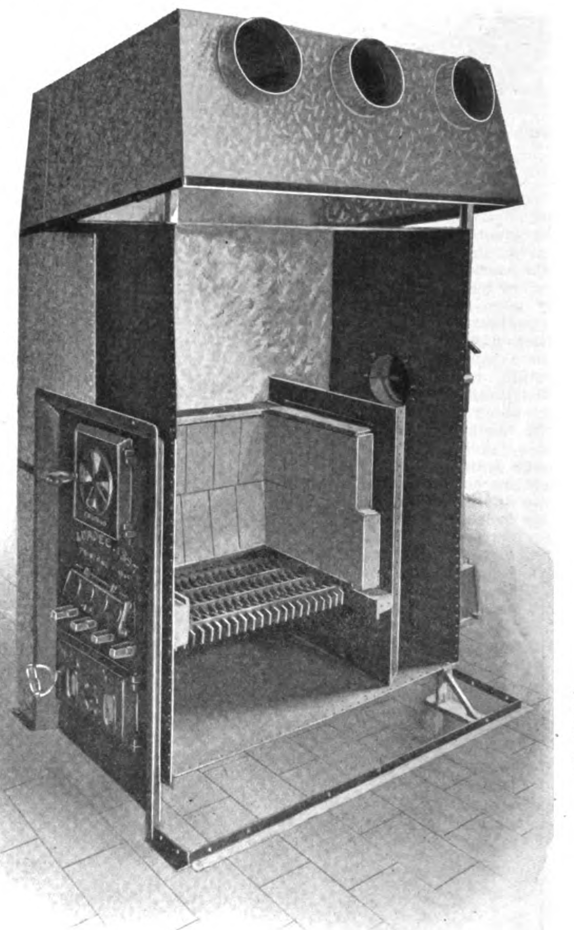
The Leader Steel Plate Furnace.

The Hess Warming & Ventilating Company, 708 Tacoma Building, 135 La Salle street, Chicago, have long had a high standing in the furnace trade as manufacturers of satisfactory heating apparatus. They are now making a special offer of their Leader steel furnace, which calls for more than passing notice. Their purpose is to reach the contractor and builder, without making use of any intermediary, and, by selling direct, secure the same price that a dealer would pay, while saving to the purchaser the dealer's profits.

For the building trade the company make a specialty of shipping complete outfits with pipes, registers, &c., all made to measure, with plan and full instructions, so that a carpenter or any handy man can put up the equipment without the aid of a furnaceman.

An illustration of the Leader furnace is given in Fig. 7, a portion of the casing and a side plate of the radiator being removed to show the construction. The furnace is adapted to the use of any fuel. It consists of an inner heater or radiator made up of steel plates closely riveted throughout, openings being made only for smoke outlets. Within this radiator is placed a fire box composed of ordinary square fire brick, such as may easily be obtained in any part of the country. These bricks rest upon separate steel flanges or brackets, and are held in position by cast iron angle pieces bolted to the steel radiator. Rocking grate bars are used, each supported at the rear and projecting through the front of the furnace, terminating in a square end, to which the shaker is applied, each bar being agitated separately. The furnace has two outlets for smoke, one at the bottom of the radiator and the other higher up, thus making a direct and indirect draft as desired. The front of this furnace is of cast iron, all in one piece, to which are hinged the fire door, the ash door and the lifting damper door. The damper door can have a chain attached for regulating the draft from an upper floor. The ash pit is unusually large. The joints of this furnace, being closely riveted, will not open, and therefore it is impossible for gas, dust or ashes to escape through the radiator into the rooms heated. Further, the furnace has no parts to crack, as no cast iron is used in the parts exposed to heat. It will be observed from these details that the construction of the furnace is exceedingly simple, and thus its low cost is explained. It is also a furnace which can be operated at very low cost for repairs, as the fire box is constructed of ordinary fire brick, and if the grate bars are injured through carelessness the damaged bar possibly can be replaced without purchasing a whole grate.

The company have issued a handsome illustrated catalogue describing this furnace, entering fully into details of construction and points of comparison with furnaces of other kinds. An interesting account is given in this catalogue of the way in which a block of houses was fitted with furnaces of this type last November in the town of Pullman, a suburb of Chicago, Ill. The company fitted in all 43 houses in Pullman under one contract. It was probably the largest and most difficult contract for furnace heating ever let in Chicago. The houses had previously been heated by steam and the owners of the houses, the Pullman Palace Car Company, decided to change the heating system from steam heating from a central plant to independent heating in each house. The work was entirely successful.



Novelties.—Fig. 7.—View Showing Interior Arrangement of the Leader Steel Plate Furnace, One Side Plate of the Radiator and One-Half the Galvanized Casing Being Removed.

Interior Decorations in Sheet Metal.

A 48-page illustrated catalogue, 12 x 9 inches in size and bound in green covers with old gold lettering, is issued by the Kinnear & Gager Company, Columbus, Ohio. The catalogue covers the products of the concern in the line of stamped steel ceilings, side walls, wainscoting, &c. In an introductory note particular attention is called to a number of new designs shown in the book, producing results which, the manufacturers claim, have never before been effected in sheet metal. Among the goods shown are handsome designs of ceilings in Rococo, Empire and Renaissance styles, with cornice molds and center pieces to match, suitable for high class interior finish of private houses, halls, public buildings, churches, business offices, hotels and all classes of structures. The plates are made with Kinnear's interlocking slip joint, which enables them to be put together with ease and gives a smooth finish to the ceiling. Diagrams show the method of erecting these constructions. In addition to the ceilings a large number of attractive designs in side walls and wainscoting are shown, together with embossed center pieces, ventilating and solid, panels, cornices, angles, molds, miter blocks, borders, beam covers, friezes, rosettes, coves, &c. Attention is also called to Kinnear's patent metal doors, shutters and partitions.

A Mechanics' Handbook of Tools.

We are indebted to the Stanley Rule & Level Company of 107 Chambers street, New York City, for a copy of an 80-page publication which they have just issued, known as "Catalogue No. 26." It is in effect a mechanics' pocket book of United States standard rules, plumbs and levels, iron and wooden planes, try-squares and bevels, together with miscellaneous improved wood workers' tools. In publishing it the company state it has been their purpose to embody in convenient form specifications of and information regarding certain of their tools most generally used. No prices are given in the catalogue, as the mechanic is referred to his regular hardware dealer for them. The company state that they have been engaged in the designing and manufacturing of carpenters' tools since 1857 under the present name, and for several years previous to that time business was carried on under other names. They are thus enabled to manufacture and offer tools which embody the study of half a century devoted to their design, both as regards the results which may be obtained with them and for the best methods of manufacture. The company are free to state that the design of many of the special tools which they show originated in the suggestions of customers, from whom they are always glad to receive hints. Many tools which in the past have been too expensive to find their way into every "tool-kit" are now being turned out by such improved methods and in such quantity that it is possible for the company to sell them at a price that makes them available to all. The company state that all their tools are guaranteed, and that if any Stanley tool which has passed the rigid inspection given it at their factory before shipment should show any defect due to the fault of the manufacturer such tool, if brought to their notice, will be replaced without cost to the owner. The company point out that in ordering parts for planes the number of the plane should always be given. The 80 pages of letterpress are profusely illustrated with an extensive variety of wood workers' tools, while the descriptive particulars are sufficient to render their merits readily understood. Among the closing pages of the catalogue are given many tables embracing weights and measures, the metric system, circumferences, areas, cubes, squares, square and cube roots, &c.; the properties of timber, approximate weight and strength of cordage, length and number of cut nails to a pound, table of relative weights of various roofing coverings, weights of skylight glass, with number and weight of pine shingles necessary to cover one square of roof, and, finally, a table of contents. The little catalogue is evidently gotten up with a great deal of care and a thorough understanding of the requirements of the building mechanic.

TRADE NOTES.

FREDERIC N. STANLEY, president of the Stanley Rule & Level Company of New Britain, Conn., died at his home on September 27, after an operation for appendicitis. Mr. Stanley was born in New Britain March 17, 1844, and was personally connected with the founding of a number of New Britain's great manufactories. He was identified with the Stanley Rule & Level Company practically all his business life, and at the time of his death was also a director of the Russell & Erwin Mfg. Company, the Stanley Works, the Union Mfg. Company, the New Britain Gas Company, the National Spring Bed Company and the Mechanics' National Bank. At his funeral on Sunday, September 30, the honorary pall bearers were officials of some of the many concerns with which Mr. Stanley was identified, while the active bearers were workmen of the Stanley Rule & Level Company, each representing a department in the factory.

J. C. BARTER, architect, of St. Johns, Newfoundland, is desirous of obtaining copies of catalogues of manufacturers of goods in which architects are likely to be interested.

THE prospectus for 1900-1901 of the Academy of Architecture and Industrial Science, 1742 Chouteau avenue, St. Louis, Mo., presents a great deal of valuable information concerning the courses of instruction at this institution, together with the fees of tuition. There are day and evening classes, a full course, consisting of eight terms of three months each, commencing on the first of September, December, March and June. A foreman's course has six terms, a journeyman's course four terms and a junior's course two terms. Although the institute intends to teach only those branches which are necessary to plumbers, draftsmen, foremen, &c., the course of study comprises so many topics that it is necessary for the student to diligently apply himself in order to complete the respective courses in the time specified. The school was founded in 1885 by its present principal, Henry Maack, and its design is to offer young men in the various trades an opportunity to acquire the theoretical knowledge needed in their vocation. Those who are unable to attend the classes at the institute can obtain instruction by mail. Among the subjects taught are architecture, carpentry, stone cutting, stair building, sheet metal work, plumbing and gas fitting, pattern making, carving, decorating, designing, cabinet making, &c.

WE have previously called attention in these columns to some of the little folders which have been distributed by the Cortright Metal Roofing Company of Philadelphia, Pa., and relating to their roofing specialties. One of the latest of these folders, entitled "It's the Quality," states that it is this feature which makes all users so well satisfied with the Cortright roofing. Every little detail in its construction is given direct attention, and the manufacturers intimate that their ideal is "not how cheap, but how good." The little folder in question presents illustrations of the Victoria shingles, which are referred to as being storm proof, fire proof, durable and easily and rapidly laid.

THE JOSEPH DIXON CRUCIBLE COMPANY of Jersey City, N. J., are distributing a folder calling attention to the merits of Dixon's Silica-Graphite paint as a protection against corrosion. The folder shows the Park Street Bridge in Cincinnati, the girders of which were painted with Dixon's Silica-Graphite paint, and which successfully resisted the action of engine fumes for over five years. A better idea, perhaps, of the merits of the paint can be gathered from the statement that an average of 500 engines pass under this bridge daily.

THE LUDLOW-SAYLOR WIRE COMPANY of St. Louis, Mo., have issued a dainty little folder calling attention to the fact that with largely increased facilities they are in the market offering painted fly screen cloth of their own manufacture. The little folder carries upon the first page a representation of screen cloth, the matter being printed in colors in order to show its actual appearance. The company have in hand some artistic work in their art metal department, embracing brass and bronze railings of original design, which are being made for a bank in Mexico and the First National Bank of Dubuque, Iowa, and a pair of bronze gates for a mausoleum in Rochester, N. Y. Some heavy weight iron work is also under way for a Government building in Dubuque. This company have lately increased their wire weaving capacity very materially by the construction of a new factory building and the installment of additional machinery.

THE HESS WARMING & VENTILATING COMPANY of 708 Tacoma Building, Chicago, Ill., present in their advertising card this month an announcement which cannot fail to command the attention of contractors, builders, house owners, and, in fact, all interested in the heating problem. It relates to the company's No. 45 solid steel furnace, which, it is claimed, is sufficient for heating six to nine rooms, and which is offered at an attractive price. The company state that they make a specialty of complete heating outfits made to measure, marked and sent with a plan so that any handy man can put up the work.

THE OGDEN MFG. COMPANY of Newark, N. J., manufacturers of the Ogden automatically regulated door check, and for whom W. H. Quinn & Co., 103 Chambers street, New York City, are the general agents, advise us that their checks are being used by many large contractors in office buildings in this city as well as in other large cities. Among the buildings in which they are already in use may be mentioned the Broadway Chambers, corner of Broadway and Chambers street, New York, and the Prudential Life Building, Newark, N. J. This check is specified by the Building Department of the Board of Education for use in New York public schools, they also being exclusively used in the public schools of Newark. The check has also been recently accepted by the United States Government, and 100 have been ordered for the new Immigrant Building approaching completion on Ellis Island, in New York harbor.

WE have received from Hammacher, Schlemmer & Co., 209 Bowery, New York City, a copy of an 18-page pamphlet which they have issued, relating to various lines of tools for wood workers, pattern makers, machinists and metal workers, which they are prepared to furnish on short notice. The little pamphlet is known as "Catalogue No. 26," and gives in connection with the various illustrations sizes and prices of the goods shown. The company named carry in stock a large assortment of tools, including cabinet, builders' and piano hardware. Accompanying the catalogue is a discount sheet which applies to various lines of vises.

H. B. IVES & Co. of New Haven, Conn., call attention in another part of this issue to the Ives patent window stop adjuster, a sample of which they will send to any one sufficiently interested to make application. The manufacturers have issued a 30-page catalogue of window hardware specialties, a copy of which they will also mail on application.

THE TABOR SASH COMPANY of 66-68 Jackson street, Newark, N. J., have issued some interesting circulars calling attention to the merits of Tabor's improved sash, for which strong claims are made. The device is referred to as being simple, durable and economical, and as being so constructed that the window may be revolved and easily removed. The claim is made that the strips upon the sides of the sash are hung to the jambs by an ingenious and simple device, which insures absolute freedom from friction at every point. No cords or chains are used, neither weights nor balances, and therefore no pulleys. Each sash is made to operate independently of the other, and may be turned to any angle or entirely over for the purpose of cleaning.

WE are informed that the 6 horse-power Mietz & Weiss gas engine and 4 horse-power direct connecting kerosene engine and electric generator, made by August Mietz of 128-132 Mott street, New York, were awarded a silver medal at the Paris Exposition.

WE have received from the National Pancoast Ventilator Company of Philadelphia, Pa., a copy of their annual catalogue for 1900, illustrating and describing an extensive line of Pancoast ventilators, especially adapted for the ventilation of all kinds of buildings. The catalogue consists of 32 pages, oblong in shape, and is bound in deep green paper covers, with an embossed side title embodying a *fac-simile* of the Pancoast ventilator. The illustrations consist for the most part of direct reproductions from photographs of buildings in connection with which the company's ventilators have been employed. There are also numerous testimonial letters from those who have used these ventilators with very satisfactory results. The last page is devoted to a standard price-list of galvanized iron and conner ventilators, and on the third page of the catalogue is a panel giving more or less useful information likely to be of service to those engaged in lines of business requiring the use of buildings fitted with ventilators. Accompanying the catalogue is a report of tests of two forms of ventilators, made by Professor Carpenter of Sibley College, Cornell University.

— MRS. SKOWLER: "You will have to go, Mary; I can't put up with your impertinence any longer. I'm sorry I can't give you a recommendation."

Mary: "It's all right, mem; my leaving alive will be all the recommend I need."—*Boston Transcript.*

— SATISFIED.—"There's no short cut to happiness!" urged the Ascetic.

"But there's fine cut!" retorted the Sybarite, and filled his pipe.

Carpentry and Building

WITH WHICH IS INCORPORATED

The Builders' Exchange

VOL. XXII. NO. 12. NEW YORK, DECEMBER, 1900. Ten Cents a Copy. One Dollar a Year.

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Philadelphia & Boston Face Brick Co.

Mantels, Wood
Foster-Munger Co.
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Masons' Stoves
Drouve, G Co,

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Thomson Bros. & Co

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Fox Machine Co.

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Mayhew, H. H. Co.
Millers Falls Co.
North Bros. Mfg. Co.
Sawyer Tool Co.
Smith, Otis A.
Stanley Rule & Level Co.
Starrett, L. S. Co.
Strelinger, C. A. Co.
Waltr's Sons, Wm. P.

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Grand Rapids Carved Moulding Co.
Mertz's, Geo. Sons.
Standard Wood Turning Co.
Waddell Mfg. Co.

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Church, E. I. & Co.
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Mott, J. L. Iron Works.

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Wood Scraper
Britt & Page.

Wood Working Machinery
American Machinery Co.
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Ball Bearing Machinery Co.
Barnes, W. F. & John.
Barnes Tool Co.
Bentel & Margedant Co.
Cordesman, Meyer & Co.
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Fay, J. A. & Egan Co.
Fox Machine Co.
Marston, J. M. & Co.
Seneca Falls Mfg. Co.
Seymour & Whitlock.
Yerkes & Finan Wood Working Mch. Co.

Work Holder
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Alphabetical Index to Advertisers.

RESIDENCE OF MR. WILLIAM F. ROCKWELL, AT BROAD AND ATKINS STREETS, MERIDEN, CONN.

DAVID BLOOMFIELD, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, DECEMBER, 1900.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS
232-238 WILLIAM STREET, NEW YORK.

DECEMBER, 1900

Licenses for Architects.

It seems probable at this writing that a bill for the licensing of architects will be introduced in the coming session of the Legislature of New York State. The matter is being fostered by the Architectural League of this city, which has recently appointed 15 of its members to arrange for and urge the passage of such a bill. This committee includes C. F. McKim, J. Harder, Woodruff Leeming, W. E. Stone, J. B. Baker, R. W. Gibson, Thomas Hastings, W. B. Tubby, C. W. Romeyn, L. D. Berg, George B. Post, William H. Russell, C. C. Haight, Bruce Price and W. A. Boring. The committee will submit its report at the next monthly meeting of the league in December, and no efforts will be spared to push the matter to a successful issue. It will be recalled that a bill having in view a similar object passed both houses of the Legislature several years ago, but was vetoed by Roswell P. Flower, who was then Governor of the State. Many architects are strong advocates of the proposed statute, although there seems to be some difference of opinion as to the details of the bill. They are agreed, however, that the passage of a bill of this character will cause public recognition of architects as professional men, and at the same time tend to protect the public from imposition. New York State is not alone in the desire for the licensing of architects, as a similar law is now in effect in Illinois, and we understand that New Jersey, Missouri, California, Texas and Michigan are also agitating the question.

Arbitration and the Industrial Commission.

The Federal Industrial Commission at Washington is now giving a series of hearings which are devoted to securing information on the subject of the desirability of arbitration, either compulsory or optional, as a method of settling labor disputes. So far, the evidence secured by the commission has thrown considerable light on the growing tendency in large industrial enterprises for employers and employees to sign agreements, usually covering annual periods and embracing not only wage scales, but stipulations designed to avoid strikes and settle all disputes by reference to joint committees or otherwise. Testimony now in the possession of the commission shows that a considerable number of firms representing many important industries have secured understandings with their employees, and that these agreements have been fairly effective in preventing trouble, although few of them have been in force long enough to present conclusive results. This phase of the labor question is now occupying the attention of the commission almost exclusively, and in its desire to obtain the greatest amount of information available on all sides of the question it has summoned a large number of witnesses who are familiar with the subject, including employers and employees, officials of employers' associations and of trade unions, students of industrial economy, members of State arbitration boards and other experts, from whom a large amount of interesting and valuable evidence is expected to be secured. The idea of the commission is to gather all the material and data possible to enable them to frame recommendations for uniform legislation on the subject of arbitration by the several States and by Congress, so as to bring about a satisfactory and permanent settlement of labor questions and secure the avoidance of strikes. Should it succeed in this endeavor the commission will most fully justify its creation and existence.

The New York Explosion.

The explosion on October 29, which destroyed an acre of buildings in one of the most frequented centers of the downtown business district of New York, involving a property loss of over a million dollars and causing the death of several persons and more or less serious injury to a great many others, was one of the most serious disasters in the history of the city. The cause of the tremendous explosion following a fire in a big drug warehouse has not so far been ascertained. Various theories are put forward, but nothing tangible has yet been developed, and the complete destruction of the building and the practical demolition of those immediately surrounding it makes it doubtful whether any definite information on this head will be forthcoming unless it be extracted from those who were best acquainted with the conditions inside the structure where the explosion occurred. The municipal regulations regarding the storage of explosives within the city limits are said to be very stringent, but they must either be inadequate or else the regulations were violated in this case. A statement made by the Chief of the city Fire Department to the effect that there are a dozen or more buildings in New York where a similar catastrophe may be looked for under the same conditions is not calculated to make for the comfort or peace of mind of the citizens. It is probable that a thorough investigation will reveal enough to justify stricter measures being initiated to obviate the recurrence of such a disaster in the future. The accident will not be without compensation if it leads to the restriction of dangerous trades in the city. Every establishment which is proved to be a menace to the safety of its neighbors should be banished to some isolated spot just as dynamite or gunpowder factories are now isolated by law.

Call for Industrial Education

Southern trade papers, as well as the daily press of that section, are insisting strongly upon the necessity of providing proper technical education for the young men of the South. It is pointed out that mills and factories are being erected in large numbers, and that the proprietors, instead of giving the responsible positions in these establishments to Southerners, are compelled to send to other parts of the country, and even abroad, for qualified and competent superintendents, overseers, &c., because none are to be found at home. Trade schools are also being called for in the Southern States, as the dearth of skilled mechanics is seriously crippling industrial progress. And this condition is not confined to the South, but exists to an appreciable extent all over the United States. The increasing frequency with which this subject is being canvassed by the trade and daily press throughout the country affords hope that the matter may be taken up in earnest by the local authorities, manufacturers and business men of the United States, with the result that trade and technical education will in time be provided for the American boy in every center of population. It is becoming more clearly recognized that industrial education is the foundation of industrial greatness, and that if the country is to rise to the great opportunities for the extension of trade now opening out on all sides all of her youth must be given the chance of securing the best industrial training possible. This fact was recognized long ago in Germany. That country to-day is full of technical and trade schools, through which medium young Germans are found everywhere well equipped for the tackling of any industrial problems that present themselves. It is these schools that have enabled Germany in the past decade to reach the important place she has made for herself in the industrial world. Aided by the State, by municipalities and by private munificence, it is no stretching of facts to say that the German trade schools are to-day doing more for the benefit of the Fatherland than any other agency.

Removal of a Large Hotel Abandoned.

A short time ago we referred in these columns to the contemplated removal of Hotel Wollaston, in Boston, Mass., a distance of some 130 feet, in order to obtain a more firm foundation. The undertaking, however, proved to be too great and the plan, we understand, has now been abandoned. The alternative decided upon is to reconstruct the hotel on its present site and a firm foundation is expected to be secured by the aid of a number of additional piles. The work of lifting the structure is already under way, and it will be pushed forward as rapidly as possible. A close row of 40-foot spruce piles will be driven around the building as near to the exterior wall as possible, and jointed piles of heavy hard pine about 50 feet long will be driven within the walls, holes being made in the lower floor to admit them. These will be driven by a Warrington hammer, which works in the same way as a steam drill. A cylinder connected with a heavy iron ram is placed about the pile and with heavy, short strokes it drives it rapidly home. The hammer moves through a space of 30 inches and strikes 60 or more blows per minute. When the piles are in place they will be capped by iron beams and concrete, and cross capped under the walls by heavy iron beams. When these beams are placed the building will be temporarily supported upon the new foundations until the old are built up to the required level. It is expected that this work will be completed January 1, and that the building may be ready for occupancy about February 1.

A Cement Roof.

One of the latest uses to which cement has been put is in making a roof for an office building in a Northwestern city. The roof is flat and was originally covered with sheet iron of ordinary thickness. This sheet iron was constantly rusting and numerous leaks were caused, which necessitated frequent repairing. In order to save the expense of these repairs, the owner of the building decided to experiment with cement. It was concluded to put down a layer of concrete and on top of that a thin layer of cement mortar, giving the roof the appearance of an ordinary sidewalk. This will certainly make a roof of more than ordinary weight, but as the building is a steel beam structure throughout, it should be able to bear the weight.

WHAT might be called a freak house was recently put up for sale at auction in Philadelphia, Pa., the building being 4 feet 10 inches wide and having a depth of 141 feet. There are six different firms that carry on business on the ground floor, the three upper stories being devoted to lodging rooms, of which there are seven on each floor. Entrance is gained from the side street by means of three winding stairways of tiny proportions. Each of these rooms is 14 feet long. An ordinary bed takes up the whole width of the apartment, and the occupants are therefore compelled to crawl in over the footboard. Not infrequently one of these rooms is occupied by a man and his wife, and constitutes their entire place of abode. According to tradition, where American street now is there was once a narrow alley, just wide enough for a person to walk through, and when it was broadened, many years ago, the building on the corner had to be reduced to its present dimensions.

Meeting of Master House Painters and Decorators.

According to announcement recently made by Joel Kennedy, seeretary-treasurer, the seventeenth annual convention of the National Association of Master House Painters and Decorators of the United States will be held in Buffalo, N. Y., February 19 to 21, inclusive. In addition to the regular routine business a number of interesting papers will be presented by leading members of the trade. The sessions of the convention will be held on the first floor of the City Convention Hall, where there will also be displayed exhibits of interest to architects, builders, &c.

An Experiment in Lighting.

As an experiment in trying to obtain a uniformly distributed light throughout the rooms of the new engineering building of the University of Wisconsin, the auditorium and drawing rooms will be lighted by electricity with the lamps so placed as to be invisible to persons in the rooms. They will be arranged around the sides of the rooms with opaque reflectors to project the light evenly over dead white ceilings. These ceilings will reflect the light throughout the rooms, thus furnishing a reflected light of uniform intensity everywhere in the rooms.

A FEW weeks ago a Chicago court decided that the owners of a building having a smoky chimney are liable for damages to persons whose property is injured by the smoke and soot. The award for damages was $1500. The suit was brought by occupants of an office in an adjoining building, who presented conclusive evidence to sustain it. The amount awarded is so large that the case will doubtless be appealed, as other suits would follow from numerous sufferers. The defendants are owners of a large office building, who have less excuse for maintaining a "smoke nuisance" than if they were manufacturers. The case is attracting widespread interest, as it has an important bearing on the hastening of the day when smoke preventing or smoke consuming devices will be in general use wherever bituminous coal is burned.

THE Scholarship Committee of the Chicago Architectural Club, which has established an annual scholarship prize of $250, the fund so provided being to assist the winner in defraying the expenses of a European trip devoted to architectural study, announce in a syllabus just issued the programme for the current club year. The subject of the competition is to be the residence of an American Minister in an important foreign city, and the problem will be divided into five parts or stages, each constituting a monthly problem in the design. The syllabus gives the officers and committees of the club for 1900-1901, also the calendar for the same period, together with the subjects and dates of the various parts of the scholarship competition.

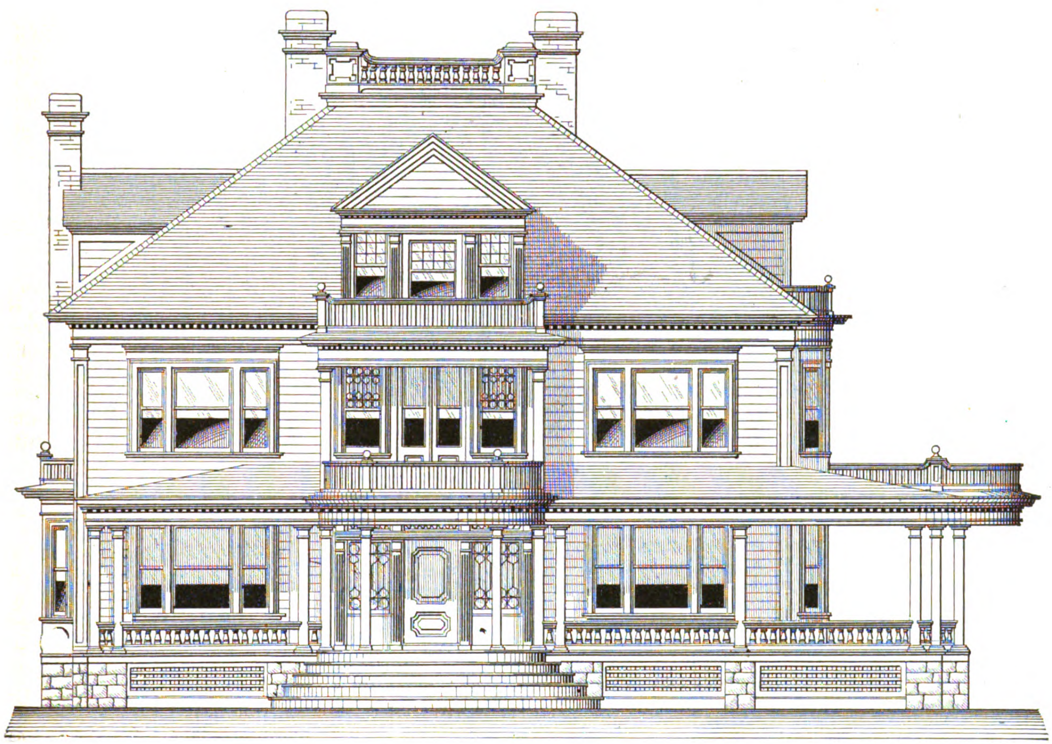
THE fifteenth annual convention of the National Brick Manufacturers' Association is to be held early in February, 1901, at Old Point Comfort, Va.

COLONIAL RESIDENCE AT MERIDEN, CONN.

WE have taken as the basis of our half-tone supplemental plate this month one of the finest residences in Meriden, Conn., being that lately erected for William H. Rockwell, president of the Miller Brothers Cutlery Company. The house occupies a commanding site at the corner of Broad and Atkins streets, and faces directly west, affording a fine view of the beautiful country which surrounds it. Our half-tone engraving gives an excellent idea of the building, being made directly from a photograph taken especially for the purpose. The design of the structure is Colonial in its treatment, and while rather more elaborate than the majority of those presented to our readers, embodies features of arrangement which cannot fail to interest a large class. A feature which will strongly appeal to many is found in the wide veranda which extends across the front and around one side of the house, together with the semicircular projecting roof at the side, forming a *porte-cochere*. Within the house, the rooms are spacious and arranged upon both sides of a hall which runs the entire depth of the main portion of the building. The broad stairs rise from practically the center of the house, giving a landing on the second floor, from which all rooms are readily accessible. The plans presented herewith so clearly show the disposition of the interior space that little comment regarding this feature would seem to be necessary.

According to the specifications of the architect, David Bloomfield of 129 State street, Meriden, Conn., the building is of frame construction, the timber being of sound spruce. The first, second and third floor joist are 2 x 10 inches; the third story ceiling joist 2 x 6 inches; the studding 2 x 4 inches, the window studs being doubled. All studding and joist are placed 16 inches on centers. The sills are 4 x 8 inches, the girders 8 x 10 inches, the beams and girts 4 x 6 inches, the plates 2 x 4 inches doubled, the posts 4 x 6 inches, and the rafters 2 x 7 inches, placed 24 inches on centers. The cellar is 9 feet 2 inches in the clear, the first story 9 feet 9 inches, the second story 9 feet 2 inches and the third story 8 feet 3 inches. The outside of the frame is sheathed with No. 2 matched spruce covered with water proof building paper, which in turn is covered with white pine clapboards. The roofs are covered with white cedar shingles 18 inches long. The balcony floors are covered with roofing duck.

The cellar is cemented and fitted with a servant's bathroom, laundry and vegetable cellar. The first and second floors are double, the upper ones consisting of parquetry flooring. The third floor is also double, with the top one of 4-inch matched white pine. The finish in the dining room is mahogany; in the kitchen and butler's pantry brown ash, in the kitchen pantry and ice room white pine, and in the bathrooms on the second floor quartered oak natural finish. The balance of the house is in ivory enamel finish. The stair rails are mahogany, and the treads and risers quartered white oak. The mantels are made to suit the finish of the various rooms, the hearths and facings of the fire places being red pressed brick. The ornamental glass throughout the house is bevel plate with metallic setting. All parquetry floors are treated in wax, while the side walls of all rooms are painted in colors and the ceilings frescoed. The plumbing is of the open type, nickel plated, one bathroom being fitted with shower bath or ring. The house is heated by a Richardson & Boynton hot air furnace, installed by the Griswold, Richmond & Glock Company of Meriden, and who state that it was one of the largest



Front or West Elevation.—Scale, 3-32 Inch to the Foot.

Colonial Residence at Meriden, Conn.—David Bloomfield, Architect.

furnaces they ever put into a dwelling. The lighting is by electricity, the fixtures being of the combination order.

The builder having the contract for the carpentry work was Carl Wagemann; the mason work was done by James Kane & Son; the interior cabinet work by Dewey, Carrier & Co., and the plumbing was executed by James T. Kay, all of Meriden, Conn.

Mahogany in Mexico.

In describing the way in which mahogany is secured in Mexico, a writer in the *Mexican Herald* says:

The mahogany hunter is the most important and best paid laborer in the service. The trees do not grow in clusters, but are scattered promiscuously through the forest and hidden in a dense growth of underbrush, vines and creepers, and it often requires a skillful and experienced woodsman to find them. No progress can be made in tropical forests without the aid of a machete, for the way must be cut step by step.

The mahogany is one of the largest and tallest of trees, and the hunter, seeking the highest ground, climbs to the top of the tallest tree and surveys the surrounding country. His practiced eye soon detects the mahogany by its peculiar foliage, and he counts the trees within the scope of his vision, notes the direction and distances, and then, descending, cuts a narrow trail to each tree, which he carefully blazes and marks, especially if there is a rival hunter in the vicinity.

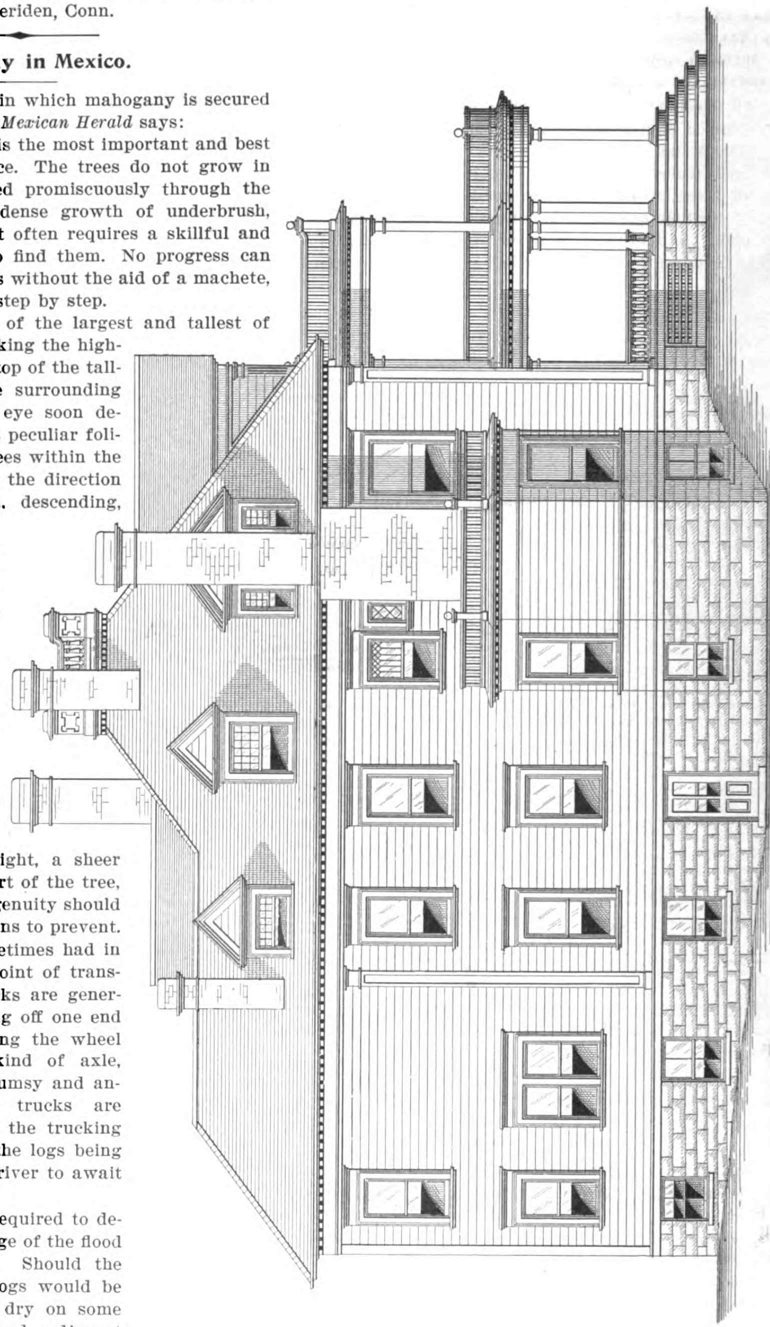
To fell a large mahogany tree is one day's task for two men. On account of the wide spurs which project from the trunk at the base, scaffolds are often erected and the tree cut off above the spurs, which leaves a stump from 10 to 15 feet in hight, a sheer waste of the very best part of the tree, and one which modern ingenuity should certainly devise some means to prevent.

Great difficulty is sometimes had in getting the trunks to a point of transportation, and crude trucks are generally used, made by sawing off one end of a tree trunk and fitting the wheel thus acquired with a kind of axle, which at the best is a clumsy and antiquated affair. These trucks are hauled by oxen, and all the trucking done in the dry season, the logs being placed on the bank of a river to await the time of the floods.

No little judgment is required to determine at what exact stage of the flood to turn the logs adrift. Should the water be too high, the logs would be apt to be left high and dry on some of the low lying ground adjacent to the river, and probably covered up by sand and rubbish.

Mahogany trees give from two to five logs each, measuring from 10 to 18 feet in length and from 20 to 40 inches in diameter after being hewed.

The manufacturing process consists in sawing off the ends that have been bruised and splintered in transit down the river and in relining and rehewing the logs by skillful workmen, who give them a smooth and even surface. The logs are then measured, rolled back into the water at the mouth of the river, and then made into rafts to be taken to the vessels anchored outside the bar.



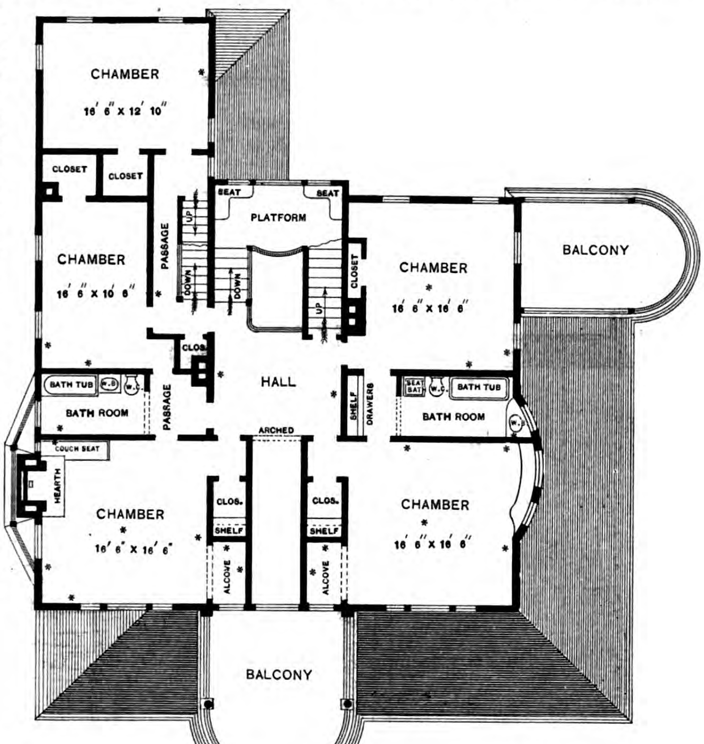
Colonial Residence at Meriden, Conn.—North Side (Left) Elevation.—Scale, 3-32 Inch to the Foot.

Paint for Rough Cast Surfaces.

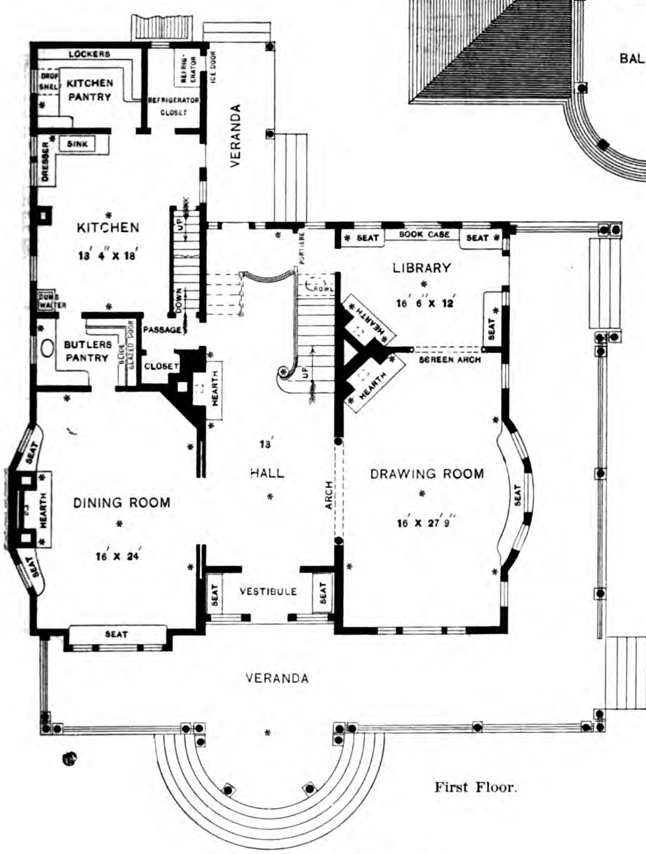
In making answer to a correspondent who asked with regard to painting rough cast surfaces, the *Painters' Magazine* presents some suggestions which may prove of interest to our readers. It says:

If the walls have stood for some time, say at least one year, and first cost is no obstacle to its use, we would recommend a pure lead and linseed oil paint, white or tinted to suit, the first coat to be quite thin and oily, the second coat as stout as it is used for a finish on wood work. Should this be too expensive to suit your patron you might use either of the following Take fine sand that has been washed and dried and mix the same with a similar quantity of Portland cement (best grade) in water to a fairly thick consistency, then add for a red tint enough Venetian red, for a yellow tint pale French ocher, for a greenish tint terra verte, for a gray tint lamp black, for a bluish tint ultramarine blue, and strain through an ordinary sieve to break up any lumps that may have been formed. Finally thin the mixture down with water to the consistency of a thin oil paint and apply cold with large wall brushes. The wash must be kept well stirred while being used. Should the color be too dark add some slaked lime or ordinary whiting, but be careful to use mineral colors only for tinting, because of the probable causticity of cement and lime.

If it is in any way convenient for you to apply a warm paint we would suggest the following wash, which has been tried by the writer with excellent results: Take a 50-gallon barrel and place therein ½ bushel of builders' lime, fresh burnt, over which pour hot water, say about 10 gallons, and cover lightly to keep in the steam while slaking. Let stand over night, then strain the liquid through a fine sieve into another barrel and add 7 pounds of common salt, previously dissolved in hot water.



Second Floor.



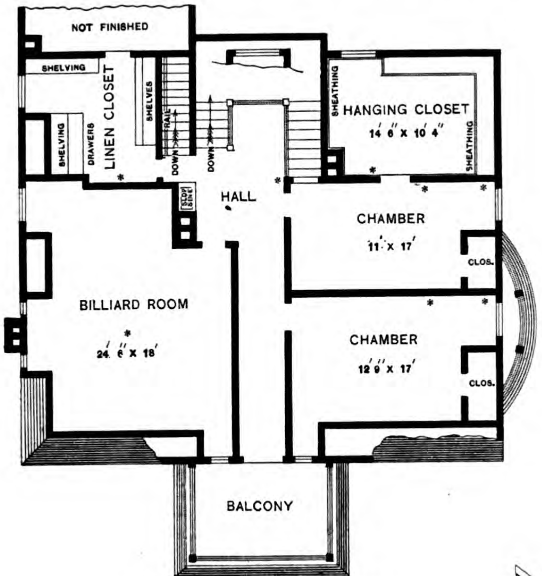
First Floor.

Scale, 1-16 Inch to the Foot.

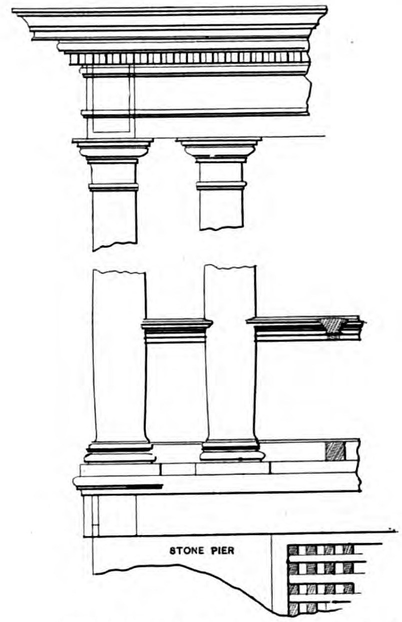
Colonial Residence at Meriden, Conn.

In the meantime cook 3 pounds of rice flour in hot water to a creamy paste and add this while hot, always stirring well. Five pounds of bolted whiting are also mixed with soft water to a thin paste and added to the liquid. Finally 1 pound of pale glue that has been soaked in water over night is boiled as usual in a water bath and thinned with boiling hot water to make 5 gallons of liquid glue, which is put in with the other. Stir well, and if the total does not amount to 30 gallons add enough hot water to make that quantity. Let the barrel stand covered for several days more, when the wash is ready for use. The wash must be applied fairly warm, therefore it is necessary to have the pots from which the paint is used standing in hot water during the operation. Two coats in this wash will stand out white on any surface and it may be tinted with mineral colors, as in the case of the cement wash. It is the most durable and economical coating for brick or rough cast walls that we know of and has been in use for 100 years or more on lighthouses and other buildings in the United States.

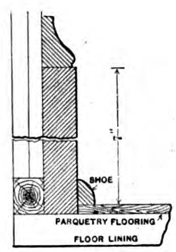
SOMETHING novel in the way of church architecture is the edifice now in process of erection for the Manhattan Congregational Church on Broadway, New York City. In this building the auditorium is in the rear, while the front is devoted to the church parlors, prayer meeting room, Sunday school room, library, offices, &c. The auditorium is a one-story structure with an entrance on the side street, while the Sunday school room is on the second floor of the front building. The auditorium will have a seating capacity for 800 people and have a gallery around three sides.



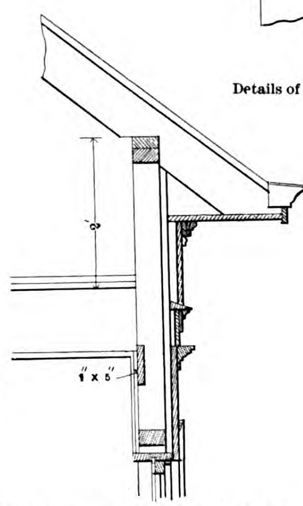
Attic.—Scale, 1-16 Inch to the Foot.



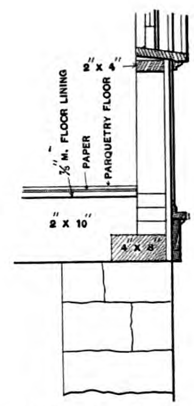
Details of Veranda.—Scale, ½ Inch to the Foot.



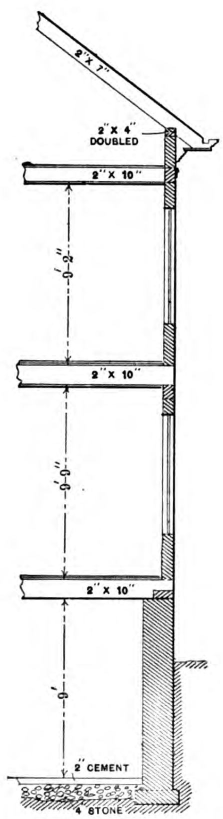
Section of Base, Showing Construction at Floor Level.—Scale, 3 Inches to the Foot.



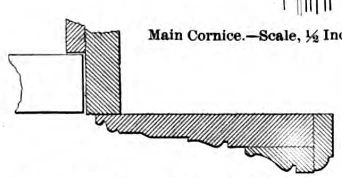
Main Cornice.—Scale, ½ Inch to the Foot.



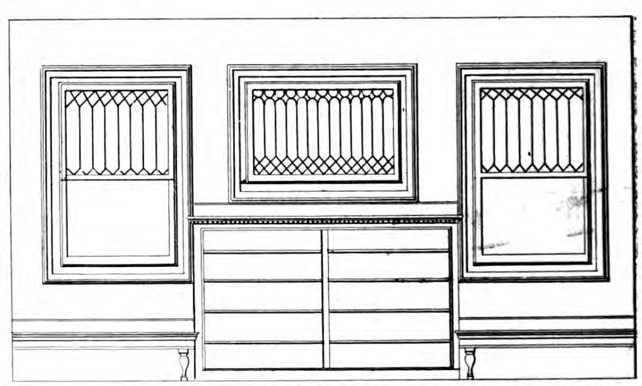
Details of Water Table.—Scale, ½ Inch to the Foot.



Section Showing Hights of Stories.—Scale, ⅛ Inch to the Foot.



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

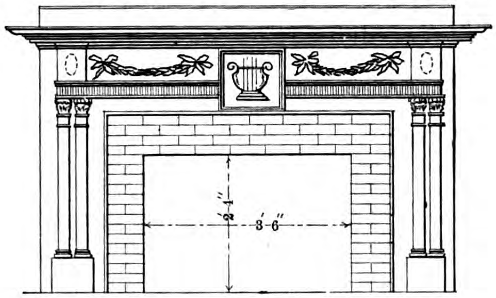


Elevation of Book Case in Library, the Front being Fitted with Sliding Sash Glazed with Metallic Setting.—Scale, ¼ Inch to the Foot.

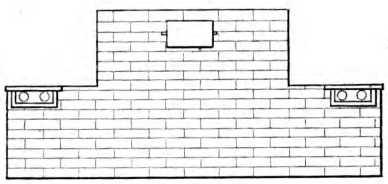
Miscellaneous Constructive Details of Colonial Residence at Meriden, Conn.

A Large Cedar Tree.

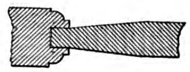
According to a Seattle paper a cedar tree was recently found near the road from South Bend to the Palix River which measured 56 feet in circumference, or about 18 feet in diameter. It was over 75 feet from the ground to the first limb. The most famous and heretofore largest cedar known in the State of Washington, says the same authority, is near Sedro-Woolley, the stump of which measures 14 feet in diameter. The top of it was smoothed off and used as a dancing platform. Photographs of it, crowded with people craning their necks to get their faces taken, have been scattered widely. This stump really consisted of two trees grown together, but the tree just discovered is a single one, nor is it swell butted.



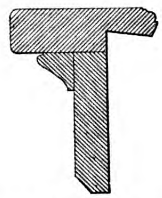
Elevation.



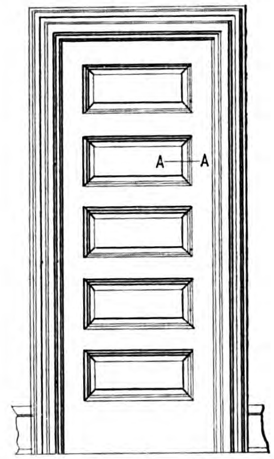
Plan at Hearth of Drawing Room Mantel.—Scale, 3/8 Inch to the Foot.



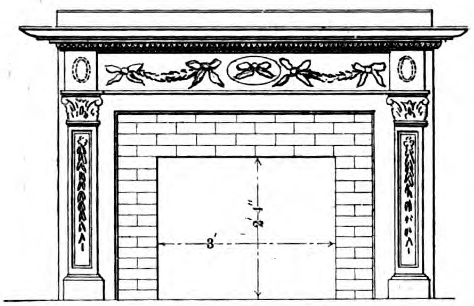
Section through Door at A A.—Scale, 3 Inches to the Foot.



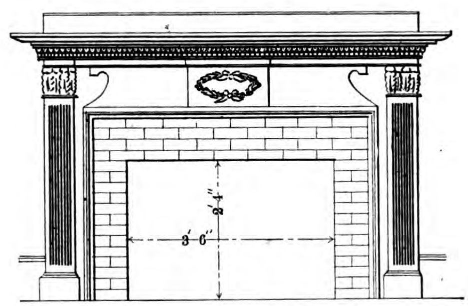
Section of Stool Cap.—Scale, 3 Inches to the Foot.



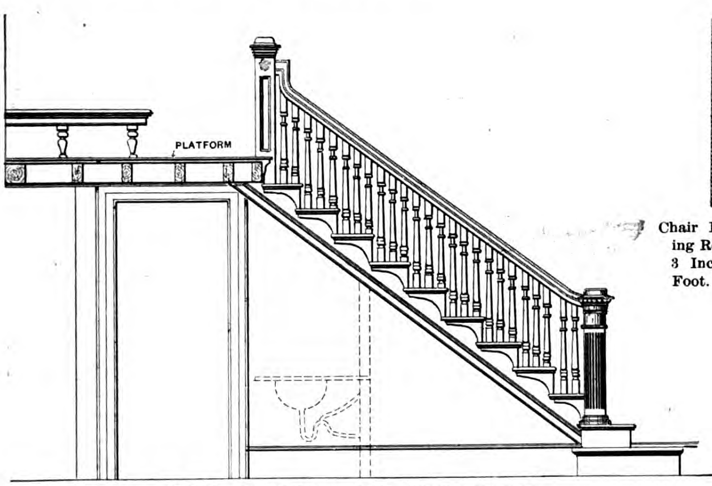
Elevation Showing Style of Doors.—Scale, 3/8 Inch to the Foot.



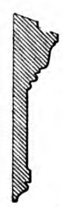
Elevation of Library Mantel —Scale, 3/8 Inch to the Foot.



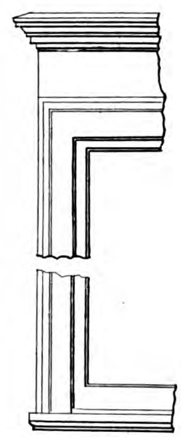
Hall Mantel.—Scale, 3/8 Inch to the Foot.



Side Elevation of Stairs —Scale, 1/4 Inch to the Foot.



Chair Rail in Dining Room.—Scale, 3 Inches to the Foot.



Trim of First-Story Windows.—Scale, 1/2 Inch to the Foot.

Miscellaneous Constructive Details of Colonial Residence at Meriden, Conn.

LEADED GLASS WORK.

BY PAUL D. OTTER.

MANY home decorators might feel that working in glass was something beyond their ability, as it is probably looked upon in about the same way as a bit of permanent treatment of the edifice—the work of skilled hands embellishing the design of the builder. This should not cause the adept enthusiast to hesitate, as the work to be treated will be within the scope of the ordinary artificer.

It is not the purpose to elaborate on the construction of stained glass work and its varied color blendings and intricate interlacing patterns. This work is within the province of those who are a little skilled in carving, modeling, wire work, and like attainments, to replace a plain window light with the same surface made up in some simple geometrical figure of leads and plain white glass filling, and it will be surprising both from within and without how the commonplace gives way to a greater value and distinct appearance.

A window or two of the regular shape treated in this way makes a pleasing contrast to the conventional window opening. There have been such vagaries executed in many colors—if one is careful in noting in passing from house to house in our cities—that the colorless leaded glass is a great relief to the multicolored atrocities that stare one in the face when house hunting.

Those who have built or bought a home may select a window opening for their initial piece, and with an object in view, should their efforts prove successful, they can by having conformed to the exact size simply replace the plain sheet of glass with the built-up figure.

As a beginning, we will say the oblong window by the door, or lighting the stairway, has been selected. Its shape is similar to Fig. 1, and the present "glass size" as it sets in the frame measures, say, 14 x 20 inches; this is the size to be strictly adhered to.

Upon a flat board surface, or table somewhat larger than intended for window light, lay out on stiff paper the pattern shown in Fig. 1, to be contained within the size of 14 x 20 inches, of which lines are drawn square to each other, forming the oblong. Within this enlarge the design herewith shown. This may be readily done by blocking off by intersecting lines across the figure, and then by the same number of lines drawn lightly crossing each other in the size of 14 x 20 on the stiff paper. In this way you can by easy stages note what is contained within corner square in design and reproduce it in the corresponding enlarged square in the full size.

This accomplished, the next operation is to secure a copy of this drawing by means of carbon paper and a tracing point, or hard pencil, carefully imprinting the design on a like piece of paper. You have now the pattern, which is to be cut up into its separate parts; before so doing, number these parts from 1 up alike on each drawing. The next operation is to sever the various parts of the copied drawing. Do this by cutting with scissors the outer margin first and from this margin trim off ⅛-inch. Then cut up the design into its various parts, and from each trim 1-16-inch off entire edge. The dissected pattern is now in readiness to use the edge of each part as a guide to run your diamond or glass cutter, and the thickness of the leaden walls between each bit of glass has been allowed for in the operation of trimming off the narrow strip from the small patterns. When the glass and leads are all assembled in their place, forming the oblong, it will be found to be within the size of original drawing. Tack the full drawing on a smooth surface, a large board or table top, and along the left hand edge and top line tack, or secure firmly, two straight edged thin strips; lathing strips are good for the purpose.

This corner will be the starting point to assemble the work, building directly over the numbered drawing. In this way you will be able to very easily work out your puzzle intelligently, and retrim any glass that may overlap the line.

Plain window glass, what is called "double thick," is the next thing to secure; glazier's scraps, or a few sheets of 10 x 12 inch size, will be found easy to handle for a beginner. As to means of cutting the glass, it depends whether you wish to go into the work extensively in making up several windows. If so, a glazier's diamond is, of course, most preferable. In using this tool care should be taken to always use it in the same position and not run off the edges of glass with a bump. The steel wheel glass cutter commonly sold at hardware stores for a few cents is a very good tool for beginners, and on plain glass lasts quite a while, with care. Whatever cutter you use, practice cutting straight lines on scraps, this to familiarize yourself with the instrument and also in the use of the two or three different sized slots found on the side, which are intended to engage various thicknesses of glass, and by gently using the tool as a lever, start the line to parting; these slots, however, are intended more for severing narrow strips, and also enabling one to nibble off any unevenness, or create a small incut. The parting of two pieces of glass is best accomplished after using the diamond by holding it between fingers and thumbs, with the line between the two hands and thumbs on upper face of glass, hold firmly and press upward with fingers. By a little practice in feeling the line part, you will have confidence in beginning to cut out the various pieces from the paper pattern.

With this preliminary practice we may now start with the first piece; firmly holding it over a small piece of glass and running the cutter from one edge of glass to the other, cutting a line close up to edge of paper; sever the parts and proceed to trim exactly the remainder of outline of paper pattern. Set aside those cut with their patterns underneath, numbered side to view, and when all are cut you can readily see through glass and pick up right number and place it in its right position on full chart. Where you have a number of pieces about the same size, it is best to cut several strips that will cut a number of smaller ones to advantage, rather than attempt to get a small piece from a large sheet each time. If a slight misscut is made by which the glass is a little larger than the pattern it can often be "gnawed" down to size by using the notch in tool that best fits size of glass; do this in a gentle way, rather nibbling at the edge than taking a decided hold. If the fullness is much over ⅛-inch, a line should be cut and pried off with the notch.

Remember that cutting in glass cannot be done in the same manner as you would describe a given outline with a pencil; it is accomplished by cutting one line at a time, from edge to edge, and in cutting quick, curved lines, until one is a little practiced. It is easier done by cutting the line and then cutting a few tangent lines, removing part not wanted by degrees. All this with the natural fear of breaking in the wrong place, will soon be overcome and it will surprise you what can be done.

With the experimental subject to deal with it will be found a very simple task, as the lines to be cut are all straight, and having cut and placed them in an orderly manner near at hand, the next thing is to equip yourself with necessary articles to carry the work to completion. What you need to secure at a glaziers' supply house is about 25 feet of lead grooving. This should be of small size, one that will fit easily over thickness of glass used, also about a pound of soft solder, used for soldering joints. The other articles for beginner's purpose need not necessarily conform to those regularly used, and other tools employed to accomplish the same result may be brought into requisition. The knife generally used for cutting the leads has a crescent shaped edge, and is used in somewhat of a rocking position to sever the leads; an ordinary potato knife will answer. For the purpose of placing the leads into position provide yourself with a hard, smooth ended stick, or, better still, a tooth brush handle thin enough to fit the groove of lead. A tallow candle will be required to rub over the joints; this enables the heated solder to adhere to leads.

The soldering iron is the tinner's pattern of soldering copper; a smaller size is often sold at large hardware stores for household use; this will do. As to means of heating the copper, a coal or gas stove flame answers all purposes.

While securing material get a couple of pounds of putty and have your paint dealer reduce it in a can to the consistency of thick paint; this you will use to fill joints and crevices after the work is soldered.

Everything important to the work has now been provided for and with the original plan firmly held in place by the two strips, operations will develop from this corner. Take up the grooved lead as you would a piece of twine, and lay over the side line, mark the exact length and with the potato knife or one similar to it, cut off the piece at the mark, pressing the knife into the soft lead against the table or piece of board. Proceed to cut another length equal to top line along the straight edge; these will now have to be mitered at each end in the same manner as picture frame molding, &c. This can be

Proceed to cut leads to cover these lines and fit ends so that they will miter with top and left hand border leads; now tack a lath firmly against side and cut another one to fit under bottom line. This securely locks in the work as in a frame.

Soldering the leads is the next operation. This is first accomplished by rubbing every joint and corner on the upturned side with the tallow candle. In heating the soldering copper, it is not necessary to heat it to a red heat. This is likely to occur when thrust into a redhot coal fire; a gas or gasoline flame for this reason would heat it better and is cleaner. It is well to have a bit of rough board handy and if the copper comes from the fire with soot or grit on it, push the point over the board several times to brighten it. Take up your roll of soft solder in your left hand and with the end projecting several inches from your fingers, to avoid feeling the heat, take up the heated soldering copper and with the soldering strip resting over corner joint, touch the tool against it until the soft metal runs off, following and dropping from point held immediately over joint you wish to

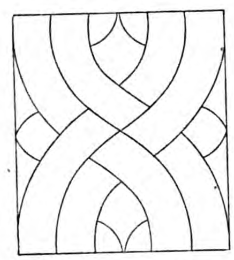


Fig. 3.—An Interlacing Pattern.

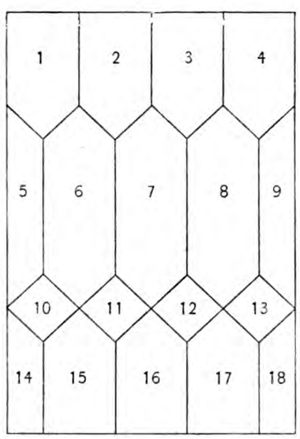


Fig. 1.—Design Suitable for Side Light to a Door or for Lighting a Stairway.

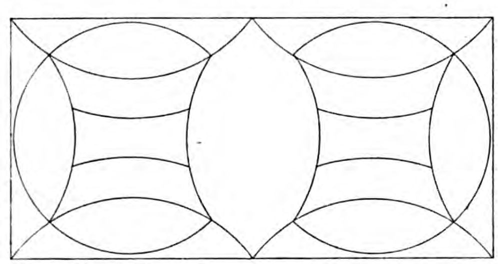


Fig. 2.—Design Having Curved Lines.

Leaded Glass Work.

readily done by first placing pieces in position and noting just about the angle needed to effect a joint. While it is not essential that there should be an absolute fit, nicety is always to be sought after. Use the stick or tooth brush handle wherever the flanges are pressed out of shape, run the stick along the groove and smooth out into place any other dents.

Place the two pieces of leads in their proper place and straighten any inequalities with the stick, pressing it against the straight edge. Now take up glass No. 1 and slip it into the groove so that it lays over its own shape on the chart, then place a large sharp tack against the lower edge simply to temporarily hold it in place. Now cut another lead, square on one end, and cut off both sides at other end in conformity to angle shown; this for lead between 1 and 2; then bring glass No. 2 into place over No. 2 on drawing, remove first tack and use it to engage No. 2, then cut leads between 3 and 4, continuing with 5 and 6, and so on to the last glass, No. 18.

During this work it may be found necessary to make use of several tacks to keep all in their places, but as the lead is very tractable to deal with very little trouble will be met with if each piece of glass has been cut exactly to size of the patterns, and when they are all assembled they should constitute an oblong exactly inside the right hand and lower lines.

solder. Do not allow your soldering tool to rest on the leads, simply let it "hover" over the work, applying the strip to the heat and allowing it to drop melted on the seam. This requires, of course, a little practice and steadiness at the start, but it is far better to be careful even in you get an extra amount to be afterward scraped or cut away, rather than attempt without skill to smooth off the leads with direct heat, melting and distorting them in so doing. The practice obtained on this side will put you in condition to do the opposite side more skillfully.

Remove side and bottom laths and carefully turn the work face down, and again confine within the laths and proceed to solder in a like manner all joints and openings. The work is now thoroughly locked within the leaden walls. The next operation is to make it as one sheet, air tight and water proof. Take a coarse paint brush, one that is half worn out is much better, dip it in the semiliquid putty and proceed to work it along the edges of the lead; this will have to be done quite vigorously, using due care not to press heavily on the glass. After you are sure you have crowded in all you can, turn the work over and treat it in a similar way, until on reversing the sheet you will find the putty has come together in the joints from each side, and begins to ooze out, which indicates that the glass is thoroughly surrounded by putty. This operation will, of course, leave the work in a very greasy condition, which is effectually removed by sprinkling with a quart or more of fine sawdust, such as an ordinary hand saw produces. This, rubbed over the face of the work and crowded against the edges of the leads, absorbs and unites with the putty, and also cleanses and brightens the leads and glass to a high luster. This operation is to be carried out to a finish on both sides, and then the work allowed to lay flat over night, and longer if possible to permit the putty drying, when it is ready to place in window frame, and by brads and putty secured as an ordinary sheet of glass.

The foregoing operation may appear to the beginner difficult, but as you follow it along, starting out with the dissected pattern, as directed, you will find the work very fascinating and not as hard to do as at first imagined.

The example figure given is advised, as it deals entirely with straight lines; after this has been successfully worked out a pattern such as shown in Fig. 2 might be executed, embodying simple bow lines. This will be as a gradual practice to shapes having other than straight and curved lines. As the interest develops a suitable combination of colors in Venetian and cathedral glass could be introduced with pleasing effect.

ARCHITECTURAL ART.

WHAT is known as the Trowbridge course of lectures at Yale College was recently opened by Professor Hamlin of Columbia University, who spoke on the subject of "Architectural Art," the lecture being illustrated by means of lantern slides, showing various types of Gothic architecture as exhibited in the famous churches and cathedrals of the Old World. Among other things the speaker said:

The fine arts owe to religion their highest inspirations and their most impressive achievements. The instinct of worship has given rise to the sublimest efforts and noblest achievements of the architect, so that in almost every land and age, it is the temple, the mosque or the church that in beauty, size or splendor outranks every other manifestation of skill and enthusiasm in building. Not merely to the architectural student, but to the unprofessional tourist, also, who visits the historic cities of the Old World, the abbey, the church or the cathedral is the first and central object of interest. In nine out of every ten cases, not merely the first, but the one which excites the profoundest admiration and leaves the most lasting impression on his mind.

For not only are these venerable piles saturated and redolent with the aroma of history and romance, every stone associated with some secret in the strange and wonderful development of the world in the Middle Ages, but they represent a unique chapter in the history of art, and possess an extraordinary beauty which appeals to every consciousness. The style in which most of them are built, known as the Gothic, which originated, matured, culminated and declined between the eleventh and sixteenth centuries, was developed almost entirly in the building of cathedral churches, though its beginning was chiefly concerned with monastic architecture. The 110 years from 1160 to 1270 in France where the style made its most rapid advances, and a little later in England, is perhaps the most extraordinary period in the annals of the builder's art. The number, size and splendor of the great churches whose erection it witnessed in these two countries alone passes comprehension.

In the midst of tumult and disorder, of unsettled social, ecclesiastical and political conditions; with king and pope, barons and bishops and abbots, striving each for supremacy in authority, territory or wealth; the people ground between cogs of this disordered machinery and crushed with burdens from which they could not escape, there were yet hands and brains, treasure and resources to spare for the building of these mighty churches, and never before had the world seen so extraordinary an activity in building accompanied by such splendid results. The cathedral thus stands for something more than the ordinary product of the religious impulse under normal conditions. It is a part of the social and political history of the age that brought it forth, the stupendous resultant of great forces meeting and combining with each other.

As a work of art the Gothic cathedral is the supreme product of the union of reason and taste, of intellect and emotion, working in harmony toward a result at once beautiful and scientifically correct. Never before and never since the thirteenth century have the art of building and the sciences of engineering construction joined hands in such perfect unity of purposes to realize such triumphant results. The Gothic architecture is the one form of the builders' art purely and wholly conceived and worked out in stone, borrowing nothing from traditions of wooden, brick or mud structure. It depends for the decorative effect of all its masses and controlling features upon forms primarily dictated by the structural necessities of this material, every part of the whole mighty being worked out by a severe logic, but finally molded into forms of the highest beauty.

In its treatment of decorative sculpture, of the profiling of moldings, of stained glass, of scale and proportion, in it use both of length and of loftiness to produce effects of sublimity, in its masterly balance between the repose of its greater masses and the animation of its details, in the perfect harmony of style and expression between the interior and exterior, both designed in and for stone and demanding no visture of applied decoration of painting and mosaic, the Gothic cathedral stands in unquestioned supremacy among the world's temples. It is a creation of art full of suggestion, instruction and inspiration for any one who takes the pains to open his eyes and his mind to its lessons.

The English cathedrals share in these elements of artistic and scientific interest with those of Continental Europe. But their charm is of a different flavor, corresponding with the fundamental differences of principle and taste which controlled their design and execution and with the different environment in which they stand. Less loftly, less awe inspiring, less bold in conception and execution, they possess a poetry and a picturesqueness not to be found elsewhere. Their massive central towers or slender spires, rising from the dense foliage of the cathedral close and bishop's palace grounds, their quiet cloisters and noble chapter houses, appeal in the highest degree to the imagination. The cathedrals of England are neither as numerous nor as near together as the French. This is due to the scanty population of the island in the days when the sites were parceled out and also to the fact that as the population increased the regular or monastic clergy were the coadjutors of the bishop in the cure of souls, not his opponents, so that it was possible for a single bishop to administer a large diocese.

IT is said that the addition of even so small a proportion as one-tenth of as much brick dust as of sand to ordinary mortars is preventive of the disintegration so often characterizing mortars used in the masonry of public works. The use of such dust mixed with lime and sand is said to be generally and successfully practiced in the Spanish dominions, and is stated to be, in all essential points, superior to some of the best imported hydraulic cements for the construction of culverts, drains, tanks or cisterns, and even for roofs, whether for setting flat tiles or for making the usual flat tropical roof.

HEAVY TIMBER FRAMING.

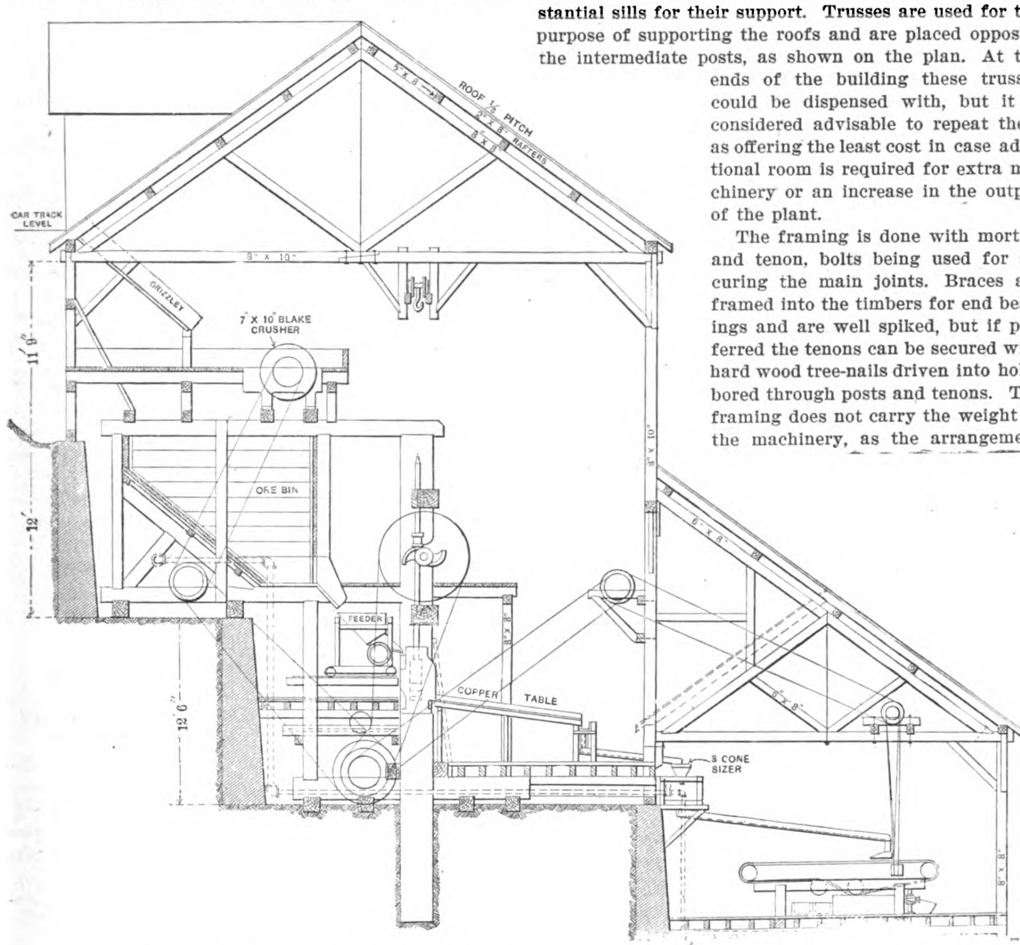
THERE are many readers of this journal who are doubtless interested in the subject of heavy timber framing, such as would be used in connection with mill and factory construction, and also well adapted to the requirements of buildings in the mining regions of the country, where carpenters are called upon to erect concentrating and stamp mills which are a prime requisite in the reduction of mineral ores. Buildings of this kind are naturally constructed of heavy timber in order to withstand the unusual strain which is brought to bear upon them by reason of the machinery with which the works are equipped, and no little care must be exercised in putting the work together in a substantial manner. With a view to affording some practical suggestions regarding this kind of work we present herewith illustrations showing an example of heavy framing, selecting for our purpose a ten-stamp gold mill such as would be erected in the mining districts. Like most mills of this kind, the building site is upon a hillside, as such locations offer better advantages than the level ground. The ore is delivered at the greatest hight, where in dumping the smaller pieces fall direct to the ore bin, by passing through what is known as the "grizzley," whereas the larger portions fall to the platform, thence passing through the crusher to the ore bin, and then on to the feeder, the stamps, the tables, cone sizers, &c., all as indicated on the plan and transverse section.

In the framing it will be observed that the timbers are of good dimension, sized for regular widths and thicknesses at bearings, mortised and tenoned, braced and bolted. No details or elevations are shown locating doors or windows, neither the material covering walls nor roofs as locality and conditions govern these items. Stone walls are constructed as foundations for the timbering at the banks, and at the same time serve as retaining walls against the earth above.

An idea of this construction may be gained from an inspection of the framing section presented herewith. As the bins, crushers and stamps require great strength, the timbers for these are extra heavy, having substantial sills for their support. Trusses are used for the purpose of supporting the roofs and are placed opposite the intermediate posts, as shown on the plan. At the ends of the building these trusses could be dispensed with, but it is considered advisable to repeat them as offering the least cost in case additional room is required for extra machinery or an increase in the output of the plant.

The framing is done with mortise and tenon, bolts being used for securing the main joints. Braces are framed into the timbers for end bearings and are well spiked, but if preferred the tenons can be secured with hard wood tree-nails driven into holes bored through posts and tenons. The framing does not carry the weight of the machinery, as the arrangement has been made with a view to placing such machinery directly upon the ground, resting upon heavy wooden sills, and thus avoiding expensive construction as well as vibration. The details which are presented in connection with the descriptive text show the construction at some of the joints and are practically self-explanatory.

While this article is primarily intended to show the method of framing for a ten-stamp gold mill it is of interest in a general way as indicating the location of the machinery in the working plant. A careful inspection of the plan and sections will show the application of the power from the engine to the several pieces of machinery, likewise the movement of the ore through its course from the "grizzley" to its final disposition. For the general arrangement of the machinery, &c., we are indebted to Frazer & Chalmers of Chicago, Ill., who make a specialty of mining machinery.



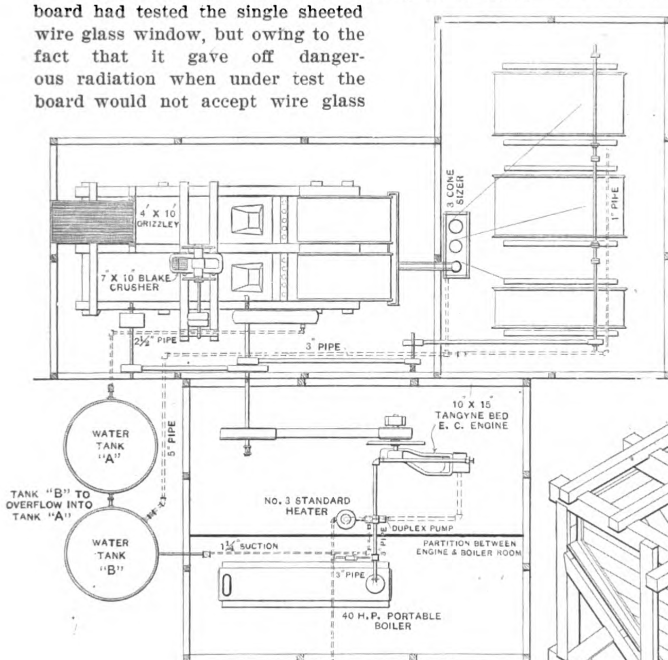
Transverse Section through Stamp Mill, Showing Location of Machinery.—Scale, 3-32 Inch to the Foot.

Heavy Timber Framing.

Fire Shutters of Wire Glass.

At the annual meeting of the National Fire Protection Association, held in New York City, some very interesting data were presented by H. C. Henley, chief inspector of the St. Louis Board of Fire Underwriters, relative to his experience with the double sheeted wire glass window as a positive fire stop under most severe conditions.

He stated that a committee appointed by the St. Louis board had tested the single sheeted wire glass window, but owing to the fact that it gave off dangerous radiation when under test the board would not accept wire glass



Plan of Mill with Engine and Boiler House.—Scale, 1-16 Inch to the Foot.

windows in place of fire shutters, as combustible material stored in close proximity would be endangered. The demonstration that made the board change its views of wire glass as a fire retardant, and make rulings accepting wire glass windows as a substitute for fire shutters in exposed positions, says the *Insurance Press*, was so unique, severe and satisfactory that there has not been a question raised since as to the correctness of the decisions arrived at and the good that must come therefrom.

A metal covered wood frame was glazed with two parallel sheets of ¼-inch wire glass, about 18 x 36 inches, having a free air space of about ¾ inch between them, being open top and bottom to allow of the free entrance and exit of the air when heat was applied.

The window was placed at the open porthole of a furnace, within 18 inches of a known temperature of over 2500 degrees F., and although it was kept in position for a half hour, the rapid circulation of air between the sheets carried off the radiating heat that came through the sheet exposed nearest the heat, and thus protected the sheet furthest from the heat, so that there was not enough heat passed through to endanger the common cotton batting that hung 7 inches from the glass, or even to singe it when it was rubbed on the surface of the window.

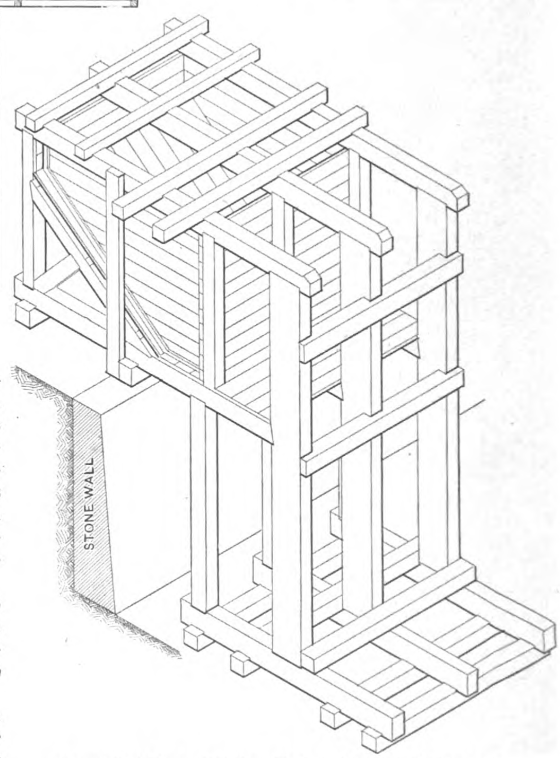
It should be noted that when the air ducts were closed the panes of glass immediately heated and gave off dangerous radiation, igniting the cotton. The test was so convincing of the virtues of the double sheeted wire glass window as a positive fire stop that the committee recommended and the board adopted the following ruling:

"For the protection of openings in walls not less than 13 inches thick, in approved frames, where exposure is over 15 feet distant, a single thickness of wire glass is deemed sufficient. Where exposure is less than 15 feet, and for the protection of roof exposures, double thicknesses of wire glass with ¾-inch free air space are required."

A Model City School House.

What is known as the Phillips Brooks School House, recently completed at the corner of Quincy and Perth streets, Dorchester, Mass., embodies many interesting features as regards its heating, lighting and ventilation.

The style of architecture adopted by the architect, A. Warren Gould of Dorchester Center, Boston, Mass., is Spanish Renaissance. The materials employed in the exterior walls are common red brick with limestone and terra cotta trimmings. The cornices are of copper and the roof is covered with green slate. The façade on Perth street has in the center a highly ornamented doorway with a carved granite buttress on each side. Over the door and surrounded by richly carved ornamentation is placed a tablet on which



Isometrical View of Timber Work at Ore Bins, Stamps, etc.

Heavy Timber Framing.

is inscribed in raised letters cut into the stone the name Phillips Brooks. Over this entrance, and forming a central feature, beginning at a line with the top of the second story windows, is a projecting order of richly ornamented, engaged columns, which extend up to and are capped by the main cornice, over which is placed a copper cresting. This central feature, combined with the effect obtained by the grouping of the school windows with their ornamented mullions, and entablatures, presents a façade which is very beautiful, and one which is said to possess a distinction from all other buildings of this character in the city.

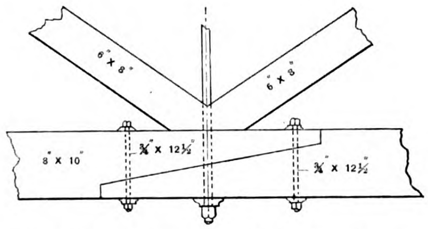
The structure is three stories in hight, contains 17 school rooms, an assembly hall, teachers' rooms, store-room for books, &c., and will accommodate 840 pupils. On the first floor are five school rooms, the second floor six rooms, and the third floor four rooms and the assembly hall. The latter is lighted front and rear and through a large centrally located skylight in the roof, and is provided with a stage of ample size for a full graduating class. The basement contains two large school rooms, one for cooking and the other for manual training, boiler room, fuel room, boys' and girls' separate bicycle rooms, and lavatories and janitor's room. There are five separate and distinct means of ingress and egress to the basement, four of which open onto the school yard.

The heating and ventilating of the building is planned on scientific principles; the heating is indirect steam, with fresh air induction provided by the blower system.

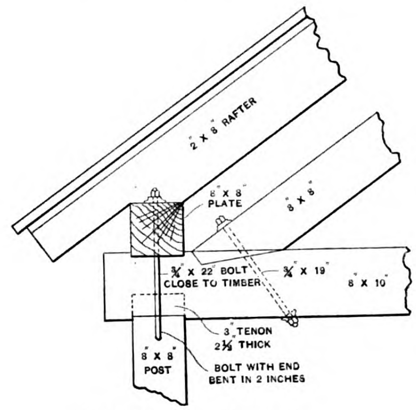
Extra provision has been made for the proper ventilation of the wardrobes, by building into the masonry walls Eureka ventilators placed directly back of the radiators, thus providing fresh air induction at all times where it is most needed.

All the school rooms are lighted from one side only, which insures the very best results to both pupils and teachers. The side of the room through which light is admitted is provided with five large windows to each room, extending from a hight of 2 feet 8 inches from the floor to the ceiling, the hight of which is 13 feet 6 inches, thus providing a glass surface equal to the average school room having three windows on each of the two sides, and avoiding any cross lights, which are so injurious to the eyes.

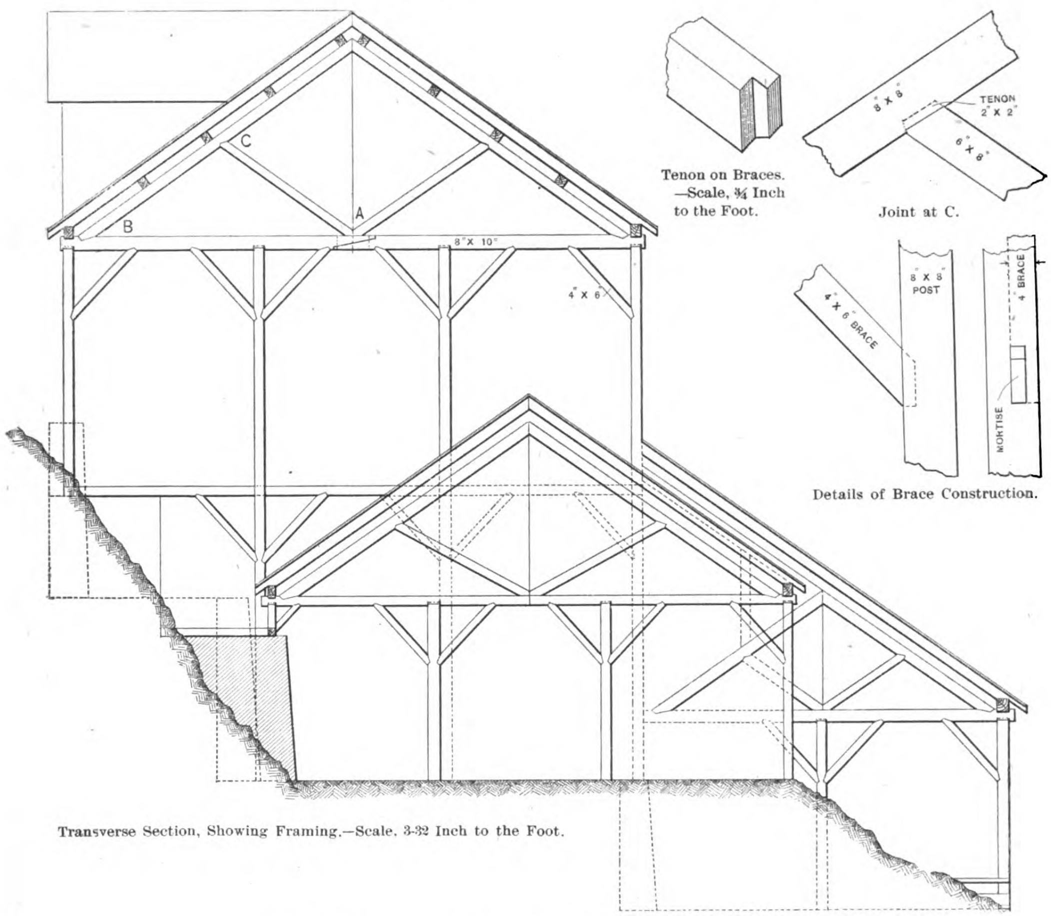
The general contractor was James Fagan, and the carpenter contractor R. B. Plummer.



Detail of Splice in Truss at A of the Framing Section



Details of Construction at B.



Tenon on Braces. —Scale, ¾ Inch to the Foot.

Joint at C.

Details of Brace Construction.

Transverse Section, Showing Framing.—Scale, 3-32 Inch to the Foot.

Heavy Timber Framing.—Details.—Scale, ½ Inch to the Foot.

CAISSONS FOR FOUNDATIONS OF BUILDINGS.

SO much has been said relative to the sinking of the foundations which are required for the towering office buildings and business structures to be found at the present day in our larger cities that it may not be without interest to many readers of this journal, especially to those living away from the great centers of activity, to describe how the caissons for the foundations are carried down to bed rock. It may be stated in this connection that the same method of building foundations is not employed in all cases, as the nature of the soil is an important factor in determining this matter, but where compressed air is used the operation of sinking the caissons is practically the same in every instance. Just how the work is done is told by a representative of the New York *Times*, who went down into one of the many caissons sunk for the foundations of the mammoth 20-story office building now well under way at the corner of Broad street and Exchange place, in this city, and known as the "Broad and Exchange." What he had to say concerning his experience is of such general interest that we devote space to the following extracts from his published story:

The Caisson.

Aside from the part played by compressed air in caisson construction, the working principle is very simple, and were it not for the compressed air a descent into a caisson would not be a much more novel or interesting experience than going down into the cellar. The caisson, or working chamber, as it is sometimes called, is nothing more than a huge steel box, without any bottom, and having the same area as the foundation pillar or column that is to be carried down to bed rock. The caisson at the beginning of the work rests on the surface of the ground. Men inside of it begin excavating, and at the same time another gang of men begins to build up the masonry or concrete on top of it, the added weight causing it to settle as rapidly as the materials are removed from underneath it, and the men at the surface building up the masonry as rapidly as the settling takes place.

Of course some means of entering and leaving the working chamber must be maintained, and this is done by a shaft about three feet in diameter leading upward from a hole of the same diameter in the roof of the caisson. This shaft is built up of sections of steel cylinder, so that as the caisson sinks the top of the shaft may always be kept above the surface. Where the foundation column is to be built of concrete instead of masonry there must also be an outer cylinder of steel of the same area as the roof of the caisson. This outer shell, however, simply acts as a mold to confine the concrete, and plays no essential part in the general principle of caisson construction.

Work of Compressed Air.

If rock could be reached 10 or 15 feet below the surface, the process as already outlined might be all satisfactory. But where 40 or 50 feet or even a greater depth of soil, mud, water and nobody knows what must be penetrated, the problem presents new difficulties. A stratum of quicksand might be encountered, the caisson or working chamber would fill in a few minutes, and probably nobody in it would live to tell what happened. Moreover, the pressure at a depth of 40 or 50 feet is so great that even where the material encountered is of a firmer character it would work up underneath the edges of the caisson and would have a tendency to crush in its walls, while its roof might also collapse under the great weight of masonry resting upon it.

To counteract this the caisson itself and the inner cylinder or shaft leading to it are constantly kept filled with compressed air, supplied by a large steam pump. The pressure is raised as the caisson reaches lower depths, beginning with perhaps only 3 or 4 pounds to the square inch, just below the surface, and increasing to 20 or 25 pounds at a depth of 50 feet. To maintain this uniform pressure in the working chamber and the shaft and still allow the latter to be opened as frequently as may be desired, so that men and materials may pass up and down, is a problem which the caisson workers have solved by a very ingenious and at the same time simple device.

To the top of the inner cylinder or shaft there is always attached an affair that looks much like the ordinary boiler found in the kitchen of every residence, although somewhat larger, it being perhaps 4 feet in diameter and 6 feet high. This is known as the lock. It has a door or flap in its top, opening downward, and a similar door at the bottom, which also opens downward into the shaft. Now suppose a man wants to go down to the working chamber. The door in the top of the lock is open and the air inside is at the normal pressure of the outside atmosphere. The lower door, however, is closed, and below it in the shaft there is a pressure of, say, 25 pounds to the square inch. The man climbs into the lock and the upper door is pushed up—a rubber rim making it absolutely airtight. Then a valve connecting the lock with the shaft is opened, allowing a rapid influx of the compressed air from the shaft below into the lock, and equalizing the pressure in both. The lower door of the lock may then be opened, and the descent made to the caisson itself.

Descent Into the Caisson.

The reporter, arrayed in a suit of oil skin and being taken in charge by Mr. Cahill, the superintendent of the caisson work, describes his experience as follows:

"You are here at a very favorable time," said Mr. Cahill. "We have just reached the rock in one of the 5 x 14 caissons."

It took but a minute to scramble up the short ladder to the top of the lock, and to get down into it.

"Now," said Mr. Cahill, as he closed the upper door, and making the lock as dark as a pocket, "being as you're new at this game, I'm going to let the pressure in here gradually. As I do so, keep your mouth closed tight, hold your nose, and breathe out as hard as you can."

The reason for this is to prevent injury to the ear drums. The great increase in pressure from without is liable to cause serious trouble in the ears unless by blowing, with the mouth and nose closed, the air is forced up through the Eustachian tubes to the inner chamber of the ear, thus in a manner equalizing and counteracting the pressure from without.

There was a hiss, as of escaping steam, which developed almost to a roar as the valve was opened and the compressed air rushed in from the lower shaft sufficiently to fill the lock. With all his blowing there was a sensation in the novice's ears that was anything but agreeable; but it was all over in a few seconds, and down went the little door in the bottom of the lock, showing a few dim candle lights far below, and with a little rope ladder the only means of getting down to them.

"You are now in an air having a pressure of 20 pounds to the square inch," said Mr. Cahill. The novice was gratified by this bit of information, because if he had been asked to guess on the subject he would have estimated the pressure at about seven tons—three on his right ear and four on his left.

The strange feeling wore off very rapidly, however, and the oppressive sensation was replaced by one of exhilaration, owing, doubtless, to the greater density of the air and the correspondingly increased amount of oxygen taken into the lungs. The descent of the rope ladder in almost total darkness required a sure foot, but once at the bottom the 5 x 14 chamber afforded plenty of room to move around.

"You are now on bed rock, 46 feet below the curb," said Mr. Cahill. "Try it," he added, handing a pick to the reporter. Sparks flew when the pick came down, leaving no doubt that the edges of the caisson at last rested at the sought-for rock floor.

By the light of half a dozen candles, four men stripped to the waist were at work cleaning off the last of the hard pan that is immediately above the rock at this point. This particular day was one of those in the last hot spell in August, and while up on Broad street people were looking at thermometers that registered about 90, down in the caisson there was a delightful temperature that must have been 20 degrees lower.

"You understand," said Mr. Cahill, "that when this rock has been thoroughly cleaned off this chamber will be packed full of concrete, as will also the inner shaft through which we have just come down, making a solid column right up to the surface."

The climb up the rope ladder into the lock took but a few moments, and the process of getting from the compressed air into the outer atmosphere began. To do this the several steps of the going in operation are just reversed. The lower door of the lock is drawn up tight and a valve opening into the outer air is released, relieving the pressure of the air in the lock and allowing the upper door to open. The sensation caused by coming into the outer air after having been under pressure in the caisson is almost as trying to a beginner as that experienced upon going into the "heavy air."

Preparing Plaster of Paris Ornaments.

In answer to a correspondent who asks the best way to harden and toughen plaster of Paris with a view to using it for making ornaments in molds, and being unable to get the ornaments out of the molds without breaking, although greasing the molds well with lard, the *Painters' Magazine* says: If the molds are made of wood or plaster, they should be coated with shellac varnish first, so as to prevent all suction, but this coating must be thin and evenly applied, so as not to fill up fine lines in the model. Next a coat of a mixture of oil and soft soap is given, which will allow the cast to come out of the mold readily. Plaster molds that are not to be oiled may be made non-porous with one or more applications of a strong size of soap. Molds or models of metal that have a smooth surface require no coating, while models, such as unique marble ornaments, that must not be oiled in order to prevent spotting, may be covered with very thin tin foil before taking a cast.

To be successful in making plaster ornaments the following points must be observed carefully: The mold must be so constructed that the cast can be removed without breaking any of its fine lines; that molds of wood or plaster must be shellacked to prevent suction, and greased with a mixture of non-drying oil and soap; that the plaster must be carefully selected, and its quality ascertained by making a test in a small way. When mixing the material for a cast, the water must not be poured on to the plaster, but the plaster must be slowly stirred into the water until the proper consistency is obtained, which method prevents lumping. To slow up the hardening of the plaster cast a saturated solution of borax is employed in place of clear water.

One part of solution to 20 parts water retards hardening ten minutes, 1 part of solution to 10 parts water retards hardening for 40 minutes, while equal parts solution and water will retard the hardening for at least eight hours. A saturated solution of borax is prepared by dissolving borax in boiling water, and after allowing the solution to cool, pouring off the clear liquid from the crystalline sediment, this liquid constituting a saturated solution of borax in ordinary temperature.

Borax retards the rapid hardening of plaster, but the addition of marsh mallow root not only retards quick hardening, but toughens the mass in a remarkable degree. Two or four per cent. by weight of finely pulverized marsh mallow root added to 96 or 98 per cent. of plaster of paris and worked into a paste with 40 per cent. water will not allow the mass to harden for one hour, and makes it so tough that when finally hardened it may be cut, turned, filed or drilled. A larger percentage of marsh mallow root will retard drying and hardening still more and impart still greater toughness to the mass, so that it may be rolled into thin sheets on glass plates with an ordinary rolling pin, that will not crack on drying and may be rubbed to a polish. After drying this mass may be colored with water colors, varnished, rubbed and polished, and by such process made water proof.

Heating and Ventilating Portable School Houses.

A short time ago we called attention to the fact that Boston was making use of a number of portable school houses in order to relieve the congested districts by increasing the school accommodations. An interesting feature in connection with these portable houses is the method of heating and ventilating. The system is laid out with a view to meeting modern standards and the State requirements, which demand 30 cubic feet of fresh air for each occupant. This result is effected by a special type of furnace and galvanized iron ventilating ducts. Forcing out the vitiated air is accelerated by introducing into the vent duct, the smoke pipe of the furnace, the latter being located in the rear of the room with the pipe running up through the roof. In order to keep the floors warm, a matter which in other portable structures seems to have been a source of complaint from the children, on account of cold feet, the entire space around the building between the sill and the ground has been double sheathed with several thicknesses of building paper. The floors consist of 3-inch matched plank, upon which is laid in the opposite direction a ⅞-inch matched hard pine floor. Special precautions have also been taken to prevent the entrance of dampness and moisture by utilizing extra heavy sheathing quilt.

The exterior of the school house is covered with matched boards on which is laid ⅞-inch cypress shiplap, with building paper between. The inside walls are covered with ⅞-inch matched North Carolina pine finished in the natural wood. The roofs are covered with ⅞-inch matched boards on which is laid an extra heavy quality of canvas duck painted with three coats of oil paint.

Each portable house is 25 x 35 feet in size; is well lighted, and the entrance is gained through a door at the left of the front end. This door is approached by a short flight of steps and opens into a small vestibule.

The buildings are located in school house yards and are consequently without sanitary appliances, the conveniences of the school buildings proper affording ample accommodations. We understand that the cost of each of these school buildings was $1250, the heating and ventilating apparatus involving an additional cost of $150, making the total price $1400. Each school house has a capacity of 60 pupils.

ONE of the curiosities of architecture in England is said to be the house erected about 300 years ago at Rushton, in Northamptonshire, by Sir Thomas Tresham, who wished by his design to typify the Trinity. It is all three; has three sides, three stories, and three windows on each flat, each of them in the shape of the trefoil—the three leaved shamrock. Where the roofs meet rises a three sided pyramid, terminating in a large trefoil. The smoke escapes from this chimney by three round holes on each of the three sides. The building is almost covered with mottoes and carvings, three Latin inscriptions, one on each of the three sides, having 33 letters in each. Three angels on each side bear shields. Over the door is the text from the Vulgate, "There are three that bear record." Inside the house each corner is cut off from each of the three main rooms, so that on every floor there are three three-sided apartments. It is hardly necessary to add that the house has ceased to be inhabited.

THE ART OF WOOD TURNING.—XII.

(SECOND SERIES.)

BY FRED. T. HODGSON.

IN forming rosettes, great care should be exercised to make the corresponding parts agree. The depths of similar hollows must be precisely equal, and elevated portions intended to match must do so with great accuracy. Supposing, for instance, a rosette to be made with 10 elevations and 10 recesses, all of equal curves. If these are accidentally unequal and it is desired to arrange a set of these waved rings within the other, so that the depressions of the one shall be opposite to the elevations of the other, or so that this effect shall take place gradually, if the curves of the pattern are unequally cut the several portions of the device will not tally, and an irregularity will be produced of disagreeable appearance, an inspection showing at once that such irregularity is not part of the device, but unintentional and erroneous. This leads to a consideration of the division plate of this rose engine, and an explanation of the object of its peculiar construction.

The pattern of the rosette, is, as it were, in sections; either similar elevations and recesses are alternately repeated, or there may be a variety of such, extending over a part of the circumference and forming a certain complete device, which may then give place to a second pattern, extending a similar distance, and these two may alternate regularly round the circumference. Each of these sections must be of precisely similar length, and the repetition of the pattern must also be precisely similar, for the reason stated above.

It is possible that all possible alternations of the device, or set of devices may be obtained by means of six or eight notches of the division plate, for, by moving it forward to that extent, the whole pattern may be compassed. In treating of the second form of rose engine, and of the method of using it, this will be adverted to and illustrated later on.

Hitherto I have spoken only of the use of the pattern on the edge of the rosette, but, as already stated, it is frequently repeated on the face, and by this means it becomes easier to work upon the outside of a cylindrical piece, as well as on two ends. Patterns thus cut on the face of a rosette tend, of course, to move the mandrel to and fro in its collars, which is only possible when the lathe is made on the plan of a screw cutting or traversing mandrel lathe. The spring which keeps the rubber in contact with the face of the rosette is shown at L L, Fig. 86.

The head on the top of the arm, which forms the clamp of the rubber, must be turned round to face the rosette, or a separate rubber must be used, which passes through the clamp at right angles to that used in surface work, and the frame must be prevented from oscillating by a stop which fits between the bearers of the lathe and embraces the upright side of the frame. The top of the slide rest must be turned round, or a side tool used. In this case the rest and frame with its rubber become fixtures, as in ordinary turning, the mandrel and work being alone moved in correspondence with the pattern on the face of the rosette. It would indeed be much better to do away with the frame altogether, fixing the rubber to an upright pedestal mounted on the lathe bed, and using the slide rest in the usual way, were it not that in general the work is constantly being varied, the slide and face being worked in turn, and the apparatus is rather cumbrous to remove and remount often. It is, nevertheless, easy to finish the ornamentation of plain surfaces first, and then to remove the frame altogether and substitute a fixed rubber, as stated.

The rose engine as now described has certain evident advantages over the rose cutter frame, and is capable of working the most exquisite designs. It may be, perhaps, a mere question of taste, whether rose engine work finely executed is not in point of beauty superior to anything that can be performed by geometric chucks, however elaborate. That it is so is admitted by many experts, especially when this apparatus is used in combination with the elliptical chuck. Moreover, there is nothing in the form of the rose engine described to make it a very expensive article, or beyond the skill of the average workman, and with a set of only three rosette patterns the design may be varied continually and multiplied, if not *ad infinitum*, yet quite sufficiently for the display of skill and taste of the operator.

In using the rose engine, it is necessary to carry the driving cord to the pulley from a very small wheel on the axle. Sometimes the lowest speed pulley of the fly wheel may answer, but if the recesses of the rosette are deep

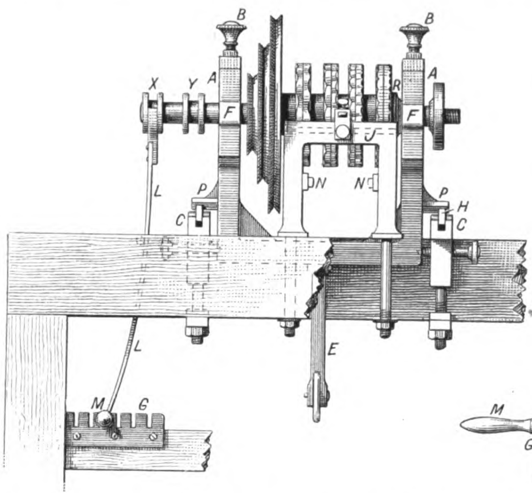


Fig. 86.—Side View of Rose Engine with Rosettes on Mandrel.

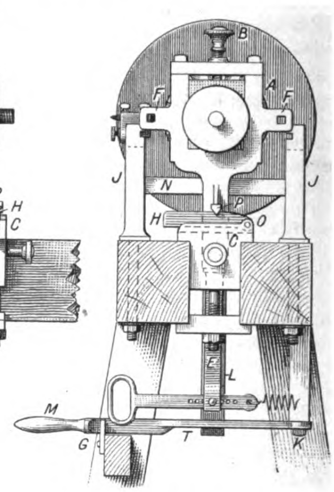


Fig 87.—Front View of Rose Engine

The Art of Wood Turning.

Carpentry and Building for 1901.

FOR many years it has been our practice to send out with the December issue what may be termed a skeleton outline of some of the features which will characterize the paper for the ensuing year, and we take this occasion to call attention to several important announcements, which are found below, pertaining to the Twenty-third volume of *Carpentry and Building*. Ever since the publication of the paper in 1879 it has been the aim of the management to make it of the greatest possible service to those engaged in a practical way in the various branches of the building trades, and in carrying out the programme which we have arranged for 1901 no efforts will be spared to keep the paper fully up to the standard of excellence already established. We shall from time to time lay before our readers special articles on various mechanical and architectural subjects, prepared by writers who, by reason of their long practical experience, are well qualified to deal with the matters in hand. The numerous illustrations, which have come to be an important feature of the paper, will be of a character well suited to the purpose and will include, among others, elevations, floor plans and constructive details of dwellings, school houses, churches, small wood working establishments, &c., and relating so far as possible to work already completed or about to be erected.

Moderate cost houses have long been of interest to a large class of the readers of *Carpentry and Building*, and we feel sure that the announcement which we present on another page of this prospectus will prove timely and meet with a hearty response. The subject of the competition is one which offers an excellent field for those desiring to participate, and we shall be glad to have every one of our readers bring the matter to the attention of some other architect, designer or builder, so that the list of contestants may be large, representing all sections of the country.

Stresses in Roof Trusses.

During the year which this volume brings to a close there were presented several articles on the subject of "Trusses for Wooden Roofs," in the course of which it was shown how wooden trusses should be designed, the accurate arrangement of the pieces for the common types of truss, together with details of the joints and connections. These articles were presented through a special arrangement with Frank E. Kidder, the well-known structural engineer and consulting architect, who will continue the series in the new volume. Thus far the correct scientific principles of the truss have been considered in a simple and practical manner, and the author now takes up the method of determining the stresses in a truss; for it is a well-known fact that the essential feature in designing a roof truss is to ascertain the stresses in the pieces forming it, as well as to compute the sizes of its various parts. This, it may be stated, is not a particularly difficult task, but it is a phase of the subject which calls for earnest study as well as very close attention on the part of the reader. Mr. Kidder handles the subject in his usual masterly style, and what he has to say should prove highly valuable and instructive to those among our readers who are desirous of thoroughly understanding the roof truss question.

Supplemental Plates.

One of the important features of the paper which has proven very popular with the readers is the half-tone supplemental plate which for the past ten years has accompanied each issue of *Carpentry and Building*. These plates consist of direct reproductions of photographs of buildings taken especially for our purpose, and afford an excellent idea of the appearance of the structures as they actually exist. The half-tone plates will continue to be a feature of the new volume, and the subjects which we contemplate illustrating will embrace dwellings erected in various parts of the country, involving a wide range of architectural treatment, together with churches, stables, school houses, &c. The designs vary to such an extent as to adapt them for erection in the smaller cities and towns, as well as upon suburban sites.

In connection with the plates there will be presented in the reading columns, elevations, plans and an assortment of constructive details, all carefully drawn to convenient scale and accompanied by brief descriptive particulars, thus rendering each study, so far as possible, complete in itself and making it the basis from which the practical builder may readily execute the work.

Right here we wish to emphasize the fact that we shall be very glad to have architects and builders all over the country forward for publication drawings and photographs of attractive structures which they may have erected, to the end that as many localities as possible may be represented in our columns, and at the same time enable members of the profession in one section to study types of buildings constructed in another. We would state by way of explanation that we can use tracings, blue prints or originals, as may be most convenient, and that after publication they will be returned to the authors free of charge.

Reading Architects' Drawings.

It is generally conceded that one of the best methods of learning how to read architects' drawings is to thoroughly understand how to make them, but it is also true that much important knowledge in this respect may be gained from a careful and conscientious study of the plans, elevations and details of construction which are to be found in the columns of *Carpentery and Building* during the course of a year. These drawings are published to convenient scale and the various parts of the work so clearly indicated as to render their purpose obvious almost at a glance.

In order, however, to still further assist those among our readers who find difficulty in understanding architects' drawings, we shall present in the Twenty-third Volume of the paper a special series of articles showing details of modern building construction which cannot fail to also interest young architects, draftsmen, carpenters, cabinet makers and others connected with the building trades. The subjects which it is our present intention to consider in this series embrace,

Double Hung Sash in Frame Walls,
Kitchen and Pantry Dressers,
Construction of Box Cornices,
Pivoted Casements and Eyebrow Dormers, and
Bay Windows with Counterbalanced Sash.

These details, accompanied by descriptive text, are made as definite as possible, so that the drawings can be easily read by a mechanic, even though he may not be familiar with ordinary detail drawings. A little careful study, however, on his part should so familiarize him with details that he will be able to understand those he may receive in practice, notwithstanding the fact that they may be very indefinite, as compared with the ones from which he studied.

Dovetail Work.

Another feature of the new volume which we feel sure will prove of more than ordinary interest will be an article on "Dovetailing"—a phase of construction which enters largely into the work of the carpenter, the cabinet maker and the joiner. Experience has shown that there are comparatively few carpenters among the younger class who thoroughly understand this kind of work in all its details, and it is with a view to affording them valuable suggestions that we have arranged for a careful consideration of the subject for the coming year. The matter is from the pen of Frederick Reissmann, foreman of the Quartermaster's Shops, United States Military Academy, at West Point, where he has had a long and varied experience in every kind of work pertaining to the subject of carpentry.

The author will show by description, as well as by illustration, what he considers the best methods of doing first-class dovetailing. He takes, for example, an ordinary tool chest of prescribed dimensions, and explains step by step how the lumber should be joined and glued together, also how it should be marked in order to prevent confusion in laying out the work. He shows what is essential in order to make a first-class glue joint and at the same time the right and wrong way of laying out the dovetails. He points out the most rapid way of doing the work, as well as the manner of making the strongest and best lid for a chest or other box, so it will neither warp nor break. There are also other things considered which are likely to interest the young carpenter and possibly not a few of the older members of the craft. Regarded from a practical point of view, the matter is of more than usual importance, and should prove a most instructive contribution to the literature of dovetail work.

Correspondence.

Our efforts will be to make this department in the future as in the past the principal medium for the interchange of practical ideas between mechanics in all branches of the building business. Communications will receive careful editorial attention, and no trouble or expense will be spared to prepare the necessary engravings from the sketches which may accompany the letters of our correspondents. In this connection it may be stated by way of explanation that it is not essential we have finished pen and ink drawings in order to make our engravings, as pencil sketches will serve our purpose, so long as the lines are sharp and clear. The Correspondence department is one of the most valuable features of the paper, and in it every reader, in whatever branch of the building business engaged, should take an active interest by contributing monthly to its columns.

He can do this either by asking questions, answering the inquiries of those who are seeking information, discussing topics of trade interest, describing jobs of peculiar work which he may have executed or with which he is familiar, or in some other way adding to the value of the paper. It is well known that methods of doing work are not the same the world over, and the Correspondence department is intended to afford opportunity for the building mechanic to discuss those methods which obtain in his locality, as well as comment upon the way in which that particular kind of work is executed in some other section of the country. The department is open to all alike, and it is obvious that the more diversified the subjects considered the greater will be the resulting benefits.

Stair Building.

The art of stair building is of ever present interest to carpenters and joiners, as well as to those regularly following the trade. Our preparations for the new volume of *Carpentry and Building* include a serial on the subject of "Hand Railing," by Charles H. Fox, an author of wide experience and one well qualified to discuss the topic under review. The matter has been prepared more especially for the younger element in the trade who desire to obtain a practical knowledge of the art of hand railing. The explanations refer chiefly to the construction of cardboard representations of the solid of the given problems. The models show the actual inclination and position of the face section and two joint surfaces, together with the development of the sections in their own planes projected in the same manner and standing perpendicular over the plan in the same way as the actual solid of the rail would in practice at the stair. The matter will be illustrated by numerous diagrams, which will be presented in such a way as to avoid, so far as possible, a confusion of lines.

Preventing Dampness in Buildings.

A problem which the builder is very often called upon to solve is to prevent dampness penetrating to the interior of buildings, for it is well known that it has not only an important bearing upon the durability of the structure, but in the case of dwellings it may have a very serious effect upon the health of those living therein. There are various methods of keeping out dampness which may be adopted while the structure is in process of erection, and even after it has been completed, and while the principles involved are very simple the necessary precautions are through ignorance or neglect ofttimes omitted.

In the belief that brief reference to a few of the many ways of preventing dampness in a dwelling may prove of interest to the readers of this journal, we take pleasure in announcing that in the volume for the new year we shall present an illustrated article dealing with various phases of the subject in question. It will, among other things, enumerate the sources from which dampness in a building may arise, and describe the necessary precautions to be taken by the builder in order to make his house dry and healthful, whether the walls be hollow or made solid. The writer of the article also tells how to treat the walls of old buildings which have become damp through prevailing storms, in order to remedy the trouble. The illustrations are of a nature to clearly show the construction employed and the position of the damp proof course in all cases.

What Builders Are Doing.

We shall continue through the coming year the monthly bird's-eye view of building operations in various sections of the country. This presentation of what architects, contractors and builders are doing is based upon reports of secretaries and members of local building exchanges, as well as upon information gathered from other sources, and is of such a nature as to show the reader almost at a glance the general condition of affairs in the building trades as it exists from time to time in the leading centers of the country. We invite architects, builders and contractors everywhere to keep us advised of all local happenings likely to interest members of the trade, and at the same time we shall be glad to hear from every Builders' Exchange in the country as to the progress it is making and the building measures with which it may be connected.

Wood Turning.

The second series of articles on the "Art of Wood Turning," which were inaugurated early in the present year, will be continued in the volume for 1901, along the general lines indicated in our announcement last December. The dearth of American literature bearing upon the subject of "Wood Turning," and adapted to the requirements of the average mechanic, has rendered the articles published in *Carpentry and Building* of peculiar interest and value. The author, Fred. T. Hodgson, will discuss in some of the issues of the coming volume chucks and devices for turning curtain rings; various kinds of lathes for turning irregular forms; methods of square and octagonal turning; devices for turning fancy work, together with such other phases of the subject as the interests of the readers of *Carpentry and Building* would seem to demand. The articles thus far presented have attracted widespread attention, and the installments which will appear in the paper for the coming year are of such a nature that they cannot fail to prove valuable and instructive.

Miscellaneous.

During the coming year we shall present in addition to the above a large amount of miscellaneous matter covering a wide range of topics. Attention will be given to details of modern building construction as furnished by architects, builders and mechanics in different sections of the country, also to improvements in heating methods and apparatus, ventilation, roofing, plumbing, lighting, tools and appliances for builders' and wood workers' use, together with other matters likely to interest the readers. The serial on "Making Wood Patterns" will be brought to a conclusion during the year, and an article on stone work will be given dealing with "A Raking Circular Ceiling." This will tell how to lay out the work, make the patterns and cut the various stones for the curved and twisted surfaces. Another article will describe how the roof of a large cathedral was successfully restored, showing by means of illustrations how the roof appeared before and after the work of reparation was done. Various designs of small wood working establishments will be included among the many other things we have prepared for the benefit of our readers, and no efforts or expense will be spared to make *Carpentry and Building* steadily more valuable and instructive.

Prize Competition for 1901.

Moderate cost houses have always been a subject of deep interest to readers of *Carpentry and Building*, and we take pleasure in announcing a competition in frame dwellings of this class, which will be managed upon the same general plan as has characterized our work along similar lines in the past. The attention of all our readers is invited to the following particulars, with the suggestion that they bring the contest to the notice of their friends, to the end that the number of those participating may be as large as possible. The publication of drawings winning the several prizes will constitute an interesting feature of the paper for the coming year.

$200 in Cash Prizes.

Competition No. XXXII—$2000 Frame Houses.

The subject of the Thirty-second Competition is a frame dwelling, the cost of erecting which is not to exceed $2000 in the part of the country from which the drawings are sent. The house is to have a cellar under at least a portion of it, and is to be upon a foundation adapted to resist the weather. The cost is to include an appropriate finish inside which shall be in keeping with the general character of the structure, and shall also include a serviceable roof and painting throughout. What is wanted in this contest are houses suitable for erection in the smaller cities and towns and upon suburban sites, and which when fairly completed shall be worth the amount above named in the communities in which they are designed. Any house which is made to figure $2000 or less by manifest deficiencies in construction or finish or omissions of important parts will be rejected.

Drawings.

Contestants are at liberty to send original drawings or to forward those from which buildings have already been erected, and when the latter is the case the fact should be so stated. Each contestant may send as many studies or plans as he may wish, all to be subject to the general conditions explained further on, and which are applicable to all the competitions conducted by *Carpentry and Building*.

Requirements.

Each set of drawings must include a front elevation, one side elevation, foundation or cellar plan, first and second floor plans and a selection of details including both exterior and interior finish. The elevations and plans may be drawn to any convenient scale, preferably ¼ inch to the foot, and the details may be drawn to any desired scale from 1½ inches to the foot up to 3 inches to the foot. The drawings may be in pencil or in ink upon any good quality of material. Tracings on cloth will be accepted, as will also blue prints. Each study must be accompanied by a brief specification outlining the construction of the building, with indications of the materials to be employed. There must also be an estimate under the heads of "Excavation," "Mason Work," "Carpenter Work" (to include the roof), "Plastering," "Painting" and "Tinners' Work" (to include plumbing if any), showing the cost in detail of each of these portions of the structure, and the aggregate cost. Each estimate is to be accompanied by a certificate from some responsible builder to the effect that he would be willing to erect the house indicated by the drawings and specifications at the price named in the estimate.

Time.

This competition will be open until the close of business on Monday, February 11, 1901.

Prizes.

In this competition three cash prizes are offered, to be awarded to the best three studies submitted, in the order of their merit:

First Prize	$100
Second Prize	60
Third Prize	40

Committee of Award.

The decision in this competition will be made by a competent committee embracing in its composition both architects and builders. It is hoped that the work of this committee can be completed in season to admit of the publication of the first-prize design in the issue of *Carpentry and Building* for April, 1901.

General Conditions.

This competition is open to the world, subject only to the conditions and limitations set forth. All studies and designs submitted in this contest are to be carefully packed for transportation by mail or express, *without folding* or *rolling*, and are to be sent prepaid, addressed as follows:

Editor Carpentry and Building,
232-238 William Street,
Entry in Competition No. XXXII. NEW YORK CITY.

The drawings or designs must reach their destination not later than 5 o'clock of the date of expiration given in the announcement. Studies coming to hand later than the stipulated hour may receive notice, but will not be considered in the award of prizes.

Names and Addresses.

Each sheet of every study and each sheet of every set of plans and each specification and estimate submitted in this contest must bear upon its face a *nom de plume*, motto or device by which it can be identified, and the same designating motto or *nom de plume* must be placed upon a sealed envelope containing the real name and address of the competitor. Several designs or studies may be submitted by one contestant, but in that case each must be designated by a separate *nom de plume*, motto or device. Each design or study must be complete in itself and bear no reference to any other whatsoever.

Stipulations and Reservations.

The right to return to competitors all the studies submitted in the competition above described without an award of prizes, in case none of the drawings sent in are deemed sufficiently meritorious for publication in the columns of *Carpentry and Building*, is expressly reserved; and, in the event of prizes being awarded, the right to publish any or all of the designs submitted in the competition is stipulated. The right to readvertise this contest or postpone the date of it, in case it should be found necessary so to do, is also reserved. Contestants are referred to the particulars given in this announcement as being sufficient for all purposes. Since it will manifestly be unfair to give one contestant more information than another, all letters of inquiry will be answered by reference to this paragraph.

and sharp, or only slightly rounded, it may become necessary to mount a still smaller wheel on purpose, else the rubber will jump over and mix parts of the design, thereby spoiling the work. Indeed, in many instances, a small pulley is attached to the lathe bed and turned by hand, the fly wheel and treadle being dispensed with, when the work is fine or complicated.

The rose engine described is of the simplest kind, yet is capable, in good hands, of executing most elaborate work. Watch case turners and artificers who make dies for bank notes or intricate patterns for figures on cotton prints and wall papers use more elaborate machines, which are more perfect in detail and which have more contrivances attached, but these are necessarily more costly and cannot be said to be so well adapted for working in wood, except in a limited degree.

The rose engine proper is arranged with an oscillating head stock or poppet, carrying the mandrel and its rosettes, the cutting tool being stationary. Following Bergeron as near as may be in English, both as to text and drawings, we get the following: In Fig. 86 is given a longitudinal view, and in Fig. 87 a transverse view of the working part of the lathe.

The modern rose engine is not provided with the projecting lugs F F, shown as intended for the application of the guide ring in elliptical turning, as this guide is now made to fit a poppet head of ordinary form. The pulley and the division plate, as shown, are of the obsolete form, though answering fairly well.

In the illustrations, Figs. 86 and 87, A A are the poppets, which are in one casting, with a connecting piece below, shown by the dotted lines, which latter has a tail piece, E, firmly attached to its center, to which a spring is affixed, as in the lathe previously described. In the drawing the cylindrical collars carrying the mandrel are split, so that in case of wear they can be tightened in the usual manner by the screws at the top of the poppet, marked B. The lugs F F, with square holes, are for the application of the guide for elliptical turning, the latter being originally a ring with slotted arms on either side. The points of oscillation are precisely similar to those of the rose engine first described, two short poppets, C. Figs. 86 and 87, having center screws, whose points fall into conical holes made in opposite faces of the upper or large poppet, a little below the level of the lathe bed. These poppets are formed with a slit to receive the stop H, which is hinged at the point O, and which, when raised by a wedge, catches upon a small projection, P, thereby fixing the poppet bearing the mandrel in a perpendicular position and preventing its oscillation. The rose engine can then be used as an ordinary lathe, to finish the preparation of the work to be operated on, which should, if possible, be commenced and mainly formed when things are arranged as a common lathe, which is an easy matter. The tail piece E does not require a separate description, being precisely similar to that already described.

The to and fro movement of the mandrel, caused by the action of the rubbers on the face of rosette, is also arranged in a manner similar to the last. At L L the spring is shown, swung the middle of its length on a pin in a piece of iron fixed on the bed, so that if both ends were free it could swing backward and forward between the bearers of the lathe on this pin as a center. The upper end of this spring is branched in a semicircular form, to embrace the mandrel, this fork fitting in a groove formed to receive it. It can thus be brought to bear against either of the shoulders visible at this part. The lower end of the spring fits into a notch, or rather a slot, in the arm T, Fig. 87, the handle of this arm being shown at M. This piece is pivoted at K, and at its other end falls into one of the notches in the retaining plate G, Fig. 86.

By this plan the tension of the spring can be brought against the mandrel in either direction at pleasure, for if the lever is placed in one of the left hand notches, the tendency of the spring will be to move the mandrel toward the right, and *vice versa*. The tension of the spring can also be regulated by the use of the groover X and Y, at pleasure. All the above parts are commonly of iron, the following are in brass or gun metal.

On the bed and parallel to it two pieces of brass, or standards, rise, similar to J, Fig. 86, the two being opposite to each other, one on each side of the mandrel, as shown in Fig. 87. Both of these are firmly secured to the bed by long bolts and nuts, it being of the utmost importance that they should not move or vibrate in the least. They are in addition united to each other by two horizontal braces, one of which is seen at N in Fig. 87. There are two rectangular notches made in the upper part of the head piece J, and which traverse its whole length. These notches receive the crooked part A of the rubber holder, Fig. 89, so that the latter can be slid along this bar and brought opposite to any one of the rosettes, after which it can be screwed in any position by the screw B, Fig. 89.

The mandrel is thus arranged: It is cylindrical, with a shoulder against which the chuck can rest as in an ordinary traversing mandrel, and a similar but reversed shoulder at R, Fig. 86. Against the latter abuts the end of an accurately turned sleeve of brass, which fits over the mandrel with slight friction, so as to have no shake or play upon it. Upon this sleeve the rosettes are placed. They fit accurately over it, and are prevented from turning round upon it by a feather extending the length of the sleeve, which fits into a corresponding notch

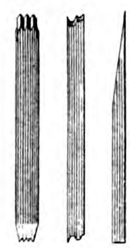


Fig. 88.—Cutters.

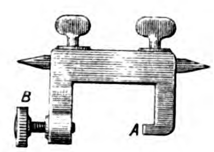


Fig 89 —Rubber Holder.

The Art of Wood Turning.

cut on the inside of the rosettes. These are arranged in pairs, back to back, and each couple is separated from the next by a short sleeve or ferrule, which the author recommends to be made of wood, as tending to hold the rosettes more securely than metal when pressed together by the nut at the end of the set. The fibers of the wood should be placed parallel with the mandrel, because then there would be no shrinkage as regards its length.

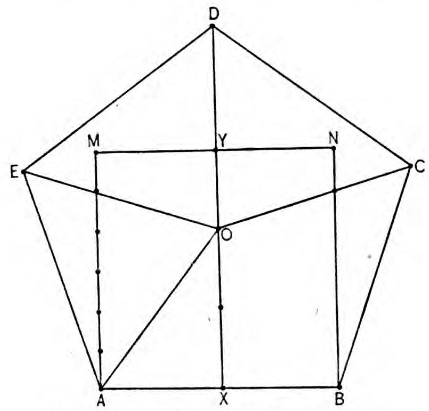
The pulley is fixed beyond the rosettes on a part of the mandrel filed into six faces for that purpose. The nut which secures all the parts to their several positions does not so jam them together but that the mandrel can be turned within the sleeve when the positions of the rosettes are to be changed, in the course of working a pattern.

The division plate is not attached to the pulley, though lying close upon its surface. It slips on the sleeve on which the rosettes fit, and its spring catches only on the face of the pulley. Thus the latter is held to the sleeve and its fittings when the catch or dog is down, so that all turn together; but when the catch is raised the division plate, carrying with it the rosettes, can be turned round upon the mandrel as may be required. It is not necessary to repeat what has been said respecting the manner of graduating the division plate, as that used in the lathe already described is in that respect a counterpart of what is used in the rose engine now under discussion. Indeed, these division plates may readily be adjusted to suit almost any pattern within the range of the machine, after a little practice by the operator.

CORRESPONDENCE.

Constructing a Pentagon Upon a Given Side.

From F. L. T., *Eureka, Cal.*—Some time ago I submitted a method for constructing pentagons which might answer very well when the problem is to inscribe one in a given circle. When it is required to construct a pentagon upon a given side this method, which I have found since, is much simpler. I have not demonstrated its accuracy, but believe it is correct. Referring to the diagram which I inclose, let A B represent the given side, upon which construct the square A M N B and sketch its vertical diameter X Y; trisect it at O. Divide



Constructing a Pentagon Upon a Given Side.

A M into six parts, draw O E through the last point of the division, making it in length equal to O A. Do the same thing in obtaining O C, extend X Y to D, and make O E, O D and O C all equal to O A. Then line in the pentagon.

Filling In Between Studding.

From F. L. B., *Royersford, Pa.*—In answer to "A. E. R.," Huntsville, Ontario, who asks with regard to filling in between studding, I would say that if he has reference to the outside studding and the frame is weather boarded, I will try and tell him how I helped to build a frame house some twenty years ago. The frame of the house was put up in the ordinary way and covered with weather boards or siding; after which local flat stones and good mortar were used to wall up between the studding 18 or 20 inches, keeping the wall level, or nearly so. A piece of lath or any offal board was cut to fit snugly between the studding and nailed to some of them. Sometimes the boards would be nailed 2 feet to 2½ feet apart, depending altogether on what kind of stones were used. The boards were nailed only to keep the wall firm; afterward they were lathed over and plastered, but never plastered without lath. I have done repairing on frame houses which had been built for 25 or 30 years which were found in good condition so far as the filling between the studding was concerned. This form of construction makes a light frame building solid and firm, and if properly put up is warm in winter and cool in summer.

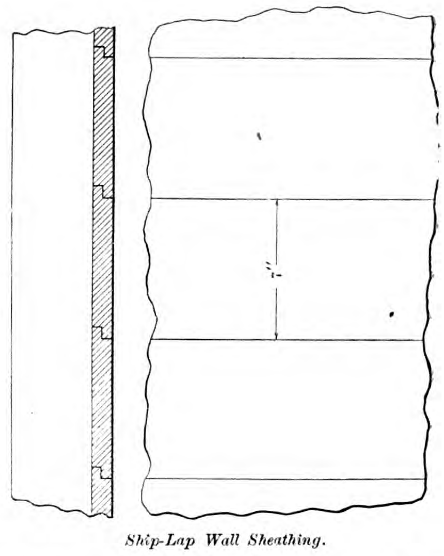
Setting Corrugated Skylight Glass.

From W. T. F., *Gloversville, N. Y.*—The question has arisen several times lately as to how corrugated skylight glass should be set, also common window glass. What I desire to know is which side of the corrugated skylight glass should go out to the weather? There are some in our gang, myself included, who claim that the smooth side should be out—that is, the putty side, and the corrugated side should be in, so as to carry the condensed vapor down and out at the bottom. The next question is, Which is the proper side to put out, or next to the putty, in common window glass, the convex or the concave side? Of course, I am speaking of glass that is slightly bent, as almost all glass, unless it be plate, is more or less crooked. Perhaps these questions will interest some of the readers, and I should like to have their views on the subject. At least, I should like to know which is right, for no one here seems to know for a certainty.

Ship-Lap Wall Sheathing.

From J. H. FUHR, *Macomb, Ill.*—As being of possible interest to some of the readers of the paper, I inclose a small diagram illustrating ship-lap sheathing, and by way of explanation I would say that this grade or style of sheathing is universally employed now all over the West. A few years ago we used common square edged boards of all widths, from 8 to 18 and 20 inches, and paid no attention to knot holes or open joints. It was put on regardless of its condition—green or wet, as it happened—consequently there was nothing gained in the warmth of the building, the only advantage being to strengthen it. Then the idea started of sheathing diagonally, which was a failure, as the shrinkage in the lumber destroyed the bearings on the edges of the boards, and the result was a loose, rickety building. Of late years, however, the structures are of a better class. My specifications invariably call for 8-inch No. 2 ship-lap, containing no loose knots or knot holes, with ½-inch lap joints and well seasoned. Of course, I always superintend my buildings and never allow the sheathing to be put on wet. This wall sheathing is covered with good building paper and weather boarded with 4-inch quarter round edge lap siding, laid 2¾ inches to the weather. This makes a warm house and resists the cold Western winds.

The advantage of the ship-lap joints over the tongue and groove grade of lumber will readily be seen. To tongue and groove lumber with a good many knots leaves bad edges, and is more liable to be mutilated on the edges in putting on than the ship-lap joint. Again, the ship-lap joint can be made perfect regardless of knots



Ship-Lap Wall Sheathing.

and produce a strong substantial job. It will be seen from an inspection of the sketch, which is drawn to a scale of 1½ inches to the foot, that the boards show 7 inches on the face. This allows 1 inch for joint and workage.

Designs for Fancy Gable or Porch.

From W. J. S., *Parker, S. D.*—I would like to see some one contribute a design for a fancy gable or porch. I would like to see a small prize offered for the best looking porch or gable ornament. I would suggest that the first prize be *Carpentry and Building* for two years and the second prize *Carpentry and Building* for one year. From the number contributed a few of the best ones might be selected for publication. Will some one second the motion ?

Roof Plans for Cottage.

From H. A. F., *Port Antonia, Jamaica, W. I.*—I send herewith sketch of roof plan, Fig. 1, for the benefit of "I. H. L." of Keene, Ohio. The plan represents a roof that I have already constructed and I found no difficulty

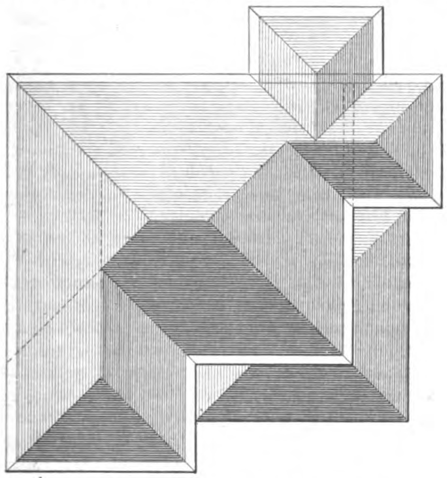
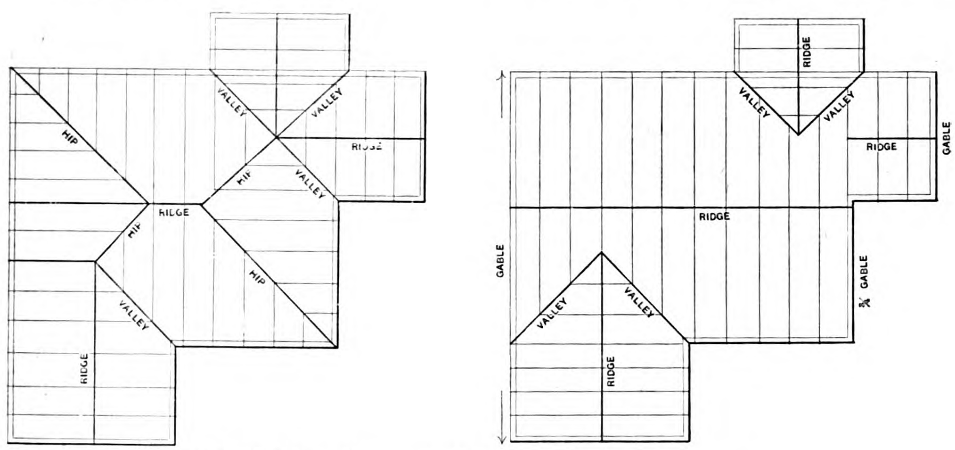


Fig. 1.—Plan Contributed by "H. A. F."



Figs. 2 and 3.—Plans Accompanying Letter from "C. C. H.," Brookville, Pa.

Roof Plans for Cottage.

in doing the work. All bevels for hips and valleys can be easily found on the steel square by using a fence in connection with it. The veranda roof can be put under the eaves of the main roof. If the design is not too plain for "I. H. L." he can use it without fear.

From C. C. H., *Brookville, Pa.*—I send diagrams, Figs. 2 and 3, of roof plan for cottage solicited by "I. H. L." of Keene, Ohio, and which I think any carpenter will readily understand. An inspection of the plans will show that I have marked all ridges, hips and valleys, and I would suggest to the correspondent that he give the roof 12 inches rise to 1 foot run, or what is known as half pitch. As to the porch, a hipped roof would be the proper thing, with possibly a center gable, if desired. The plans which I send show two methods of treating the problem.

Measuring a Slate Roof.

From AULD & CONGER, *Cleveland, Ohio.*—Noticing the inquiry in the November issue of the paper relative to the measurement of a slate roof, we beg to offer some information based on our experience of 30 years in the business. The rules which we offer are those generally recognized and followed by roofers, architects and engineers wherever slate roofing is employed, and we think will be found of assistance to the correspondent making the inquiry. For a plain roof measure the length of the roof and multiply by the length of the rafter. In the case of a roof with hips and valleys, gables, dormers, &c., measure each section through the center and multiply by the length of the rafter. In addition to the actual surface of the roof measure the length of all valleys and hips by 1 foot width, the extra measure of hips and valleys being for the purpose of compensating for the extra labor and loss of material in cutting and laying same. No deductions are made for dormer windows, skylights and chimneys, unless they measure more than 4 feet square. If more than 4 feet square and less than 8, deduct one-half the amount; if more than 8 feet square, deduct the whole amount.

Who Puts On the Iron Roof?

From A. & B., *New London, Conn.*—In answer to "W. J. M." of Reedsburg, Wis., it seems to us that if the specifications do not call for an iron roof or the plans show in any way that such a roof is to be put on, and more especially if no mention is made of it in the contract, we should not consider that it was the builder's place to do the work.

From B. S. R., *Ohio.*—There is an interesting query in the November number of the paper relative to whether or not it is the carpenter's work to put on an iron roof. Unless there is a prevailing custom in the locality in which the correspondent resides, or the fact was specifically mentioned in the contract that the carpenter was to put on the roof, he should not, in my estimation, be expected to do this work. It belongs to the sheet metal worker or to bridge builders, if it means structural work. The fact that sheet metal roofing can be done by a carpenter with a hammer and nails does not bind him to do that work.

Cypress for Outside and Inside Work.

From J. P. K., *Worcester, Mass.*—I have had some experience with the use of cypress in this city and in and about Boston, and during the last few years it has been employed to quite an extent for inside as well as for outside work, especially for gutters. I presume there is no wood that can be used for exterior finish, clapboards or shingles that will last as long as cypress, and we have always regarded it as one of the best woods to take paint and hold it. As I said, however, it is used largely for gutters and when it will hold paint there it will in any place. There is only one objection that I could ever find with it as regards paint—that is, that two coats in light colors do not cover up as well as on pine. I think that there is no occasion for "E. A.'s" man to worry over his blinds staying together or holding paint, if the work is well done and the wood dry when painted. The latter is the chief reason why any wood will not hold paint—it is not dry when painted. In this connection I would say that in priming a house I would not have it done until after the plastering and the wood work are thoroughly dried.

Concerning the use of cypress for inside finish, it is all right if properly dried, prepared and put in place, but dry it must be, and there will be no trouble with its staying in place or shrinking any more than any other kind of wood. I would remark right here, however, that cypress is an excedingly hard wood to thoroughly dry, but I think for a low cost material there is nothing to equal it in appearance. Get good even colored cypress, finish it well and some people could not tell it from red birch. If one cares to have it stained it takes first rate. In finishing up cypress, the painters' work is the most difficult, for if the proper materials are not put on the grain is very liable to raise, which will spoil the good effect and will show even after being rubbed down. I had a cypress mantel put in a house recently which was made to order, in Chicago, I think it was. It was finished up very fine and not a particle of the grain raised. I am told by one who has had experience in drying cypress that the proper way to do it is to stand it on end. The pioneers of cypress wood in these parts are the A. T. Stearns Lumber Company of Neponset and Boston, Mass. They use what they call "Gulf" cypress and they thoroughly understand how to prepare it. Their doors with dark panels and light frame work are very handsome.

From R. S. B., *Coshocton, Ohio.*—In regard to the inquiry of "E. A.," Elmore, Ohio, concerning the use of cypress as a finishing lumber, I would say that it is not used to any great extent in Ohio. Poplar takes precedence over it on account of its finer texture, and it is also a little cheaper. I think, however, that cypress deserves a better place than has been accorded to it. In my estimation it holds its place almost as well as white pine, and has good lasting qualities in damp places. In my experience as an architect and engineer I have never encountered the troubles mentioned by the correspondent above named.

From A. & B., *New London, Conn.*—With regard to the inquiry of the correspondent in the last issue relative to the use of cypress, we would state that we have had considerable experience with cypress in our practice of building, and with a few exceptions cannot recommend it for exterior use, on account of its tendency to curl and split. For veranda and porch floors, either matched or square edged, cypress has lasting qualities superior to white and yellow pine; in damp or wet places it can be used with success and it will take and hold paint as well as white pine.

For interior work it can be used for a number of purposes, although mitered joints will surely open no matter how well they may be made and nailed. We have tried painting the back and filling the wood as it came from the kiln, but to no purpose. Where corner blocks are used the joints will remain closed as well as with other woods.

For a house of moderate cost cypress makes a very neat inside finish. Handsome doors are made of this wood by using light cypress for the stiles and dark cypress for the panels. In making the doors care must be taken to select only straight and clear grained wood, as it will sometimes warp, especially in the case of sliding doors.

Finding Pitch of Roof from a Circle.

From H. K. R., *Larned, Kan.*—In the September issue of the paper "E. L. M." of Greenville, Iowa, gives a very interesting dissertation on "Finding the Pitch of a Roof from a Circle," but he makes a mistake when he figures that $22\frac{1}{2}$ will give one-quarter pitch, that 30 degrees will give one-third pitch, and 45 degrees will give half pitch. He certainly is mechanic enough to know that one-quarter pitch is one-quarter of the span, and that one-third pitch is one-third of the span, rise. He ought also to know that not one carpenter in a thousand carries a protractor with him for the purpose of framing roofs by its use. Taking the base of his circle as 24 inches and drawing from center A to 6 on the perpendicular line B E, which is one-quarter of 24, it would cross the arc at a fraction over 25 degrees; the one-third pitch line would cross near the 34-degree mark, &c.

Now, I take it that the correspondence pages of this paper are of the most interest to young men and apprentices, and I do not see what object "E. L. M." may have in trying to mislead practical mechanics or young men as to the meaning of the terms "one-quarter," "one-third" and "one-half pitch." It does not follow that because one-half pitch is one-half of a right angle, one-third pitch is one-third of a right angle, &c. What would "E. L. M." think of a master carpenter who would put a protractor into the hands of one of his men, telling him to go to Smith's and lay out the roof for his house? How many men are there in this world who would doubt that that master carpenter was crazy? If "E. L. M." will study his steel square as assiduously as he does his theory of roof pitches, I believe he may yet learn something from it. There is no tool in a carpenter's kit which is more worthy of study than the steel square, and I advise all young men to study it and not the protractor until they turn to the drawing board. It is a well-known fact that a circle can be easily drawn with a steel square, but I venture to say that "E. L. M." could not draw a right angle with a circle and not a square or compass. Do you catch the idea? Study the square and the circle will take care of itself.

Greenhouse Heating Below Zero.

From G. B. T., *Orange, N. J.*—I should like a little information through your valuable paper in reference to the heating of a greenhouse by hot water in a distant town where the thermometer often registers 25 to 30 degrees below zero. It is desired that the temperature of the house shall never drop below 50 degrees when these low temperatures prevail on the outside. Now what I wish to know is how to figure the radiation properly to heat the greenhouse? We have all the dimensions of the house and area of the glass surface, and intend using one of the cast iron boilers on the market in connection with wrought iron pipe coils.

Note.—Most of the engineers who design greenhouse heating plants figure on the outside temperature at zero and provide 1 square foot of heating surface to 2 square feet of glass surface when a temperature of 70 degrees is to be maintained in the greenhouse, and a proportion of 1 to 3 when 60 degrees is to be maintained, and 1 to 4 when 50 degrees is to be maintained. But the conditions to be met here will require a different proportion, and we give the following method of calculating the radiation required, taken from the book "Heating and Ventilating Buildings," by Prof. R. C. Carpenter.

The loss of heat from a greenhouse or a conservatory is due principally to the extent of glass surface; hence the amount of radiating surface is to be taken proportionate to the equivalent glass surface, which in every case is to be considered as plus one-quarter the exposed wall surface. From this surface one heat unit will be transmitted from each square foot for each degree difference of temperature between that inside and outside per hour—that is, if the difference of temperature is 70 degrees, 1 square foot of glass surface would transmit 70 heat units per hour. The radiating surface usually employed for this purpose is horizontal pipe, hence is of a most efficient kind. From a surface of this nature we can consider without sensible error that 2.2 heat units are given off from each square foot for each degree difference of temperature between the radiator and the air of the room, per hour.

With this information it will be a simple matter to calculate the amount of surface required for heating the greenhouse in question. As the amount of glass surface is not given, in order to give an example, it is assumed to be 1000 square feet. As the minimum temperature to be attained in the greenhouse is 50 degrees above zero, with an outside temperature of 30 degrees below zero, the difference in temperature will be 80 degrees, so that each square foot of surface will lose 80 heat units per hour, or a total of 80,000 heat units. If the heating surface maintains an average temperature of 150 degrees, the difference between this temperature and the 50 degree temperature to be maintained is 100 degrees, and as each square foot will give off 2.2 heat units for each degree difference in temperature, 1 square foot will give off 220 heat units. In order to find the amount of heating surface required it is only necessary to divide the 80,000 heat units by 220, and it will be found that 363 square feet of heating surface will be required to supply the heat lost through the glass. This amount, it is recommended, should be increased 10 or 20 per cent., according to the circumstances of the exposure and the quality of the building to be heated, as it does not take into consideration periods when the fire may be low and the temperature of the heating surface will drop below 150 degrees. It will probably be safer to allow at least 10 per cent. for slow firing, high winds, air leaks in the greenhouse and other emergencies that might arise. If it is desirable to have a higher temperature maintained under any circumstances, the method of calculation is given so that the amount of radiation for temperatures of 60, 70 or 80 degrees can be readily determined.

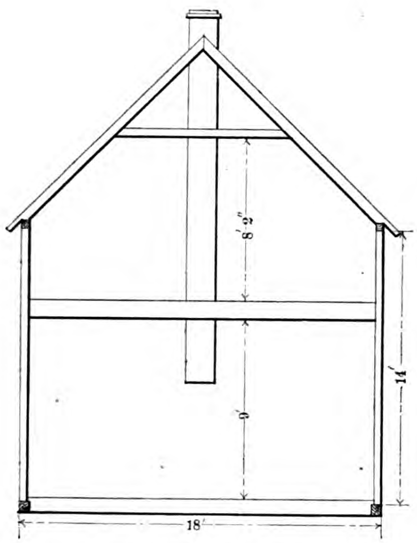
Some Questions in Barn Ventilation.

From R. E. S., *Morris, Manitoba.*—I would like to ask through the columns of the paper the best method of ventilating a stable, also a rule for obtaining the correct size of ventilator to correspond with the building. What pitch should be given to what is called a gambrel roof for a barn?

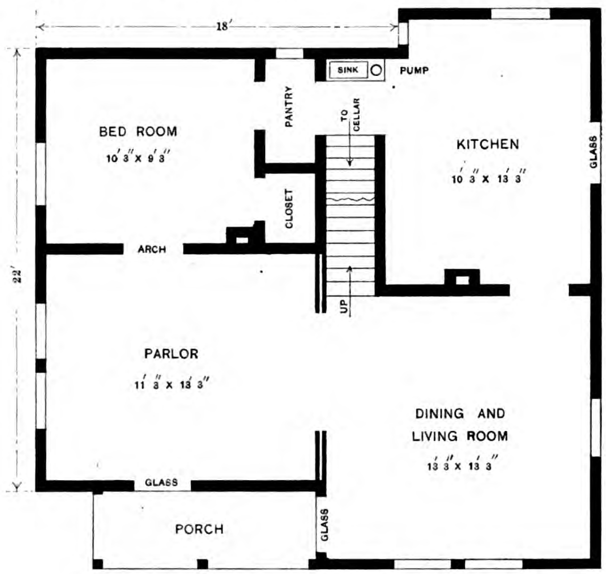
Note.—Some of these questions have recently been discussed in the columns of the paper, and for the proportions of a gambrel roof we would refer him to the letter of a correspondent which appears in the September number of the current volume. A commonly accepted rule covering the size of ventilators on farm barns is to make them one-tenth the length of the barn, the ventilator from base or cone of roof to the plate being a cube. On large or long barns ventilators are often built less than one-tenth. As to the best method of ventilating a stable, we should say that it would depend very largely upon local conditions, but the particulars given by our correspondent are so meager that the subject can be discussed only in a very general way. We present the inquiries to our readers and shall be glad to have them express their views on the various phases of the subject.

Plan Wanted for Second Floor.

From A. J. B., *Lafayette, Ind.*—I inclose pencil sketches showing floor plan and section of a house, and I wish some of the readers who like to try their hands at planning would design a second floor for the building. I want two rooms with a closet in each room, a stair hall well lighted and a dark closet in the hall. The house as it stands now is 18 x 22 feet, with sills 6 x 8 inches, and the first-floor joist 2 x 10 inches. It is lined with ⅞-inch surfaced hemlock. If some of the readers can help me in this matter they will confer a great favor.



Section through House.



Plan of First Floor.

Plan Wanted for Second Floor.—Sketches Accompanying Letter of "A. J. B."

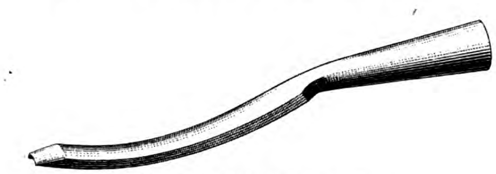
The Strength of Columns.

From T. B., *Ballston Spa, N. Y.*—Please tell us what is the relative strength of solid columns and pipe or hollow columns. We have had several disputes about this, and would like to have some reliable information.

Answer.—Our correspondent has asked a question the answer to which might be extended over many pages. The common saying is that the hollow column is stronger than the solid column. This means that for the same amount of metal the hollow form has the greater strength. In an upright column supporting a load the strength ought to depend upon the amount of metal in the section, irrespective of its shape, and this would be the case if the load pressed with absolute equality on all parts. An ordinary column, however, breaks by buckling, and does not break by crushing. The stiffness, therefore, is an important factor in its practical strength. In a solid column the metal in the inside core does not add materially to its stiffness, or rather, the same amount of metal spread out in a cylinder of much greater diameter would have proportionately greater stiffness, and would therefore be a stronger column for practical purposes. From Kent's "Engineer's Pocket Book" we take the following rule for the strength of hollow columns: The strength nearly equals the difference between that of two solid columns, the diameters of which are equal to the external and internal diameters of the hollow one.

Masons' Tool for Tuck Pointing.

From G. J. F., *Fort D. A. Russell, Wyo.*—Having lately learned of a new wrinkle in preparing a masons' tool for tuck pointing I give it for the benefit of the readers of



Masons' Tool for Tuck Pointing.

the paper. In preparing a round, raised bead, ¼, ⅜ or ½ inch, the pointing tool is made by first purchasing a carpenters' socket gouge of the proper size and having it bent by a blacksmith. The sketch which I inclose clearly illustrates the idea.

What Is One-Quarter Pitch?

From H. M. K., *Thomas, W. Va.*—I have been repairing and building houses, small and large, for more than 25 years, and wish to say a few words in the December issue in regard to "Roof Pitch" discussion. One-quarter pitch means that from the comb of the roof to the square of the building in a perpendicular line is one-quarter the width of the building in feet; and one-third pitch is one-third of the width. For instance, given a building 20 feet wide, quarter pitch will give the comb—that is, top of the rafter, 5 feet above the square, and the miter 6 and 12 will give the rafter cut. If all mechanics would depend more on the square and pencil and less on habit, we should hear no more of "what *we* call one-quarter pitch."

From J. P. K., *Worcester, Mass.*—I have seen quite a number of answers to the question as to which is the correct number of inches to the foot for a one-quarter, one-third or one-half pitch roof. Now, I was taught and always understood, until I saw the question brought up so many times, that quarter pitch meant, as "G. L. McM." says, a quarter the width of the building, or 6 inches to the foot; one-third pitch, a third the width, or 8 inches to the foot, and one-half pitch, half the width of the building, or 12 inches to the foot. This is the old method and I think correct.

Building a Barn with 30-Foot Posts.

From H. K. R., *Larned, Kan.*—With regard to the inquiry of the correspondent who asks about using 30-foot posts in the construction of a barn, I would state that I can see no valid reason for not building such a hight, provided the structure be thoroughly braced from bottom to top and that there is ample pitch to the roof. In the issue of *Carpentry and Building* for February, 1899, page 43, John L. Shawver of Bellefontaine, Ohio, voices my idea of barn framing, both for low and high posts, save that in the high posts I would interlace the posts with 2 x 4 or 2 x 6 between the 2 x 8 of the posts. In low frames I do not consider it is necessary. I would suggest that "A. McN.," who started the discussion, secure a copy of *Carpentry and Building* of the issue named and carefully study the article by Mr. Shawver.

Ingeniously Arranged Tool Chests.

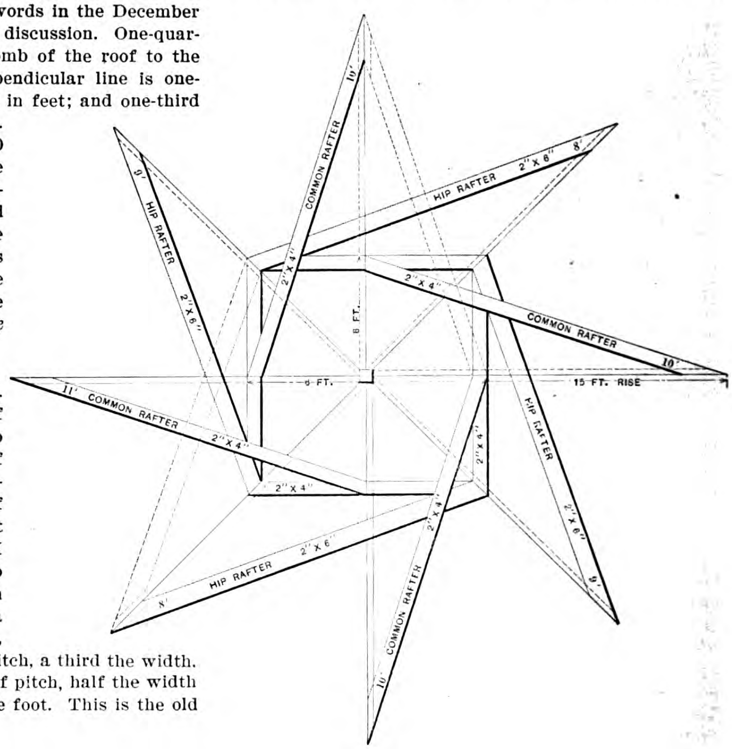
From C. C. S., *Kansas City, Mo.*—I wish some subscriber who has an ingeniously arranged tool chest would describe it in the columns of the paper. I do not want anything common, but some patented device, as I do not wish to occupy space in the paper for anything in the ordinary line. I want to build a chest, and wish to have the tills run crosswise instead of the length of the chest.

Framing a Square Tower.

From W. M. B., *Valparaiso, Ind.*—I send herewith a sketch showing how to lay out and frame the roof for a square tower. The plan will, however, work out on a tower of any number of sides. The sketch shows so clearly my idea that extended reference to it would seem to be unnecessary.

Tinning Battlement and Fire Walls.

From JAMES GRAY, *Rensselaer, N. Y.*—Having had 20 years' experience in the roofing and general business that I carry on, I have come in contact with a number of stubborn architects and builders. One particular trouble I have had is to get architects to sheathe up inside of high fire walls so that the metal can be properly nailed to the side to prevent the wind from causing it to rattle and the weather from causing it to buckle. It is impossible to sleep just under a tin roof that rattles, and roofs that are



Method of Framing a Square Tower Recommended by "W. M. B."

not well nailed are liable to be blown off. The same architect that will ask you to cover a fire wall 36 inches high, without any means of fastening it, will specify small tin to be used on the flat portion of the roof and to have five nails in each sheet. For the benefit of some architects who might see and profit by reading I would like to hear from some of the trade on this subject.

WHAT BUILDERS ARE DOING.

THE Rooms Committee of the Builders' Exchange, at Baltimore, Md., have been making some improvements in their quarters, which are intended to greatly facilitate the business of the exchange. The prospects for the Exchange Library are very encouraging, and the librarian, Addison H. Clarke, is classifying and cataloguing the books which are being received through the courtesy of the friends of the exchange. The management intend to make this library for technical literature an important feature of the exchange, and are desirous of receiving manufacturers' catalogues and other publications which may be of interest to architects, builders and others.

It is a source of some pride to the exchange that the marble selected for the Albright Art Gallery at the Pan-American Exposition is of Maryland production, and the work of construction will be done by members of the exchange. The bids for the new Fifth Regiment Armory, of which Wyatt & Nolting are the architects, were opened on November 14 by the commission appointed to erect the building. The same architects are in competition for the buildings of the Government Hospital for the Insane, District of Columbia. A number of good local contracts have been given out recently and others are in contemplation. This, with the prospect of new buildings to be erected in the near future by the city to the value of $400,000 or more, makes the outlook very encouraging.

A short time ago a number of the members felt that the methods of the "Board of Estimates" of the city were working hardships upon every one interested in improvements in process of construction, and tended to prevent or hinder the erection of many contemplated buildings. A special meeting of the Builders' Exchange was therefore called to consider the matter, those in attendance including architects, real estate owners and agents, general and subcontractors and members of the exchange representing the various building trades. The Building Inspector and City Engineer were also present, and explained at length the methods of their departments, answering many questions put to them by those present. The discussion of the matter proved to be very beneficial, for it was found that through ignorance of some of the facts charges had been made by the board for sanitary privileges where there should have been none, and the City Engineer stated that he would take steps to prevent delays in issuing permits in emergency cases of plumbing. Much helpful light having been thrown upon what before was obscure, and with the assurance that certain ills would be alleviated or removed, the exchange declined to pass resolutions of censure upon the "Board of Estimates." The meetings were presided over by J. J. Walsh, president of the Builders' Exchange, with John M. Hering as secretary.

Buffalo, N. Y.

The Architectural Club of Buffalo recently held its second annual election, resulting in the choice of F. A. Whalen as president, Frank Kidd as first vice-president, M. G. Holmes as second vice-president, W. W. Wade as secretary and Walter Taylor as treasurer. We understand that the club has organized classes for the year in design, water colors and construction. There will be monthly competitions in design during the winter, and prominent architects and others interested in the allied arts will give lectures from time to time.

The work on the buildings of the Pan-American Exposition, which is making good progress, calls for the employment of so many hands as to render carpenters somewhat scarce in South Buffalo, where more or less building is in progress.

The carpenters of the city recently met to consider propositions submitted by the contractors of Buffalo, intended to govern the wage rate for the ensuing 18 months. The contractors offered a minimum rate of 35 cents an hour on Pan-American work, and on outside jobs a minimum rate of 30 cents an hour. They agreed to hire none but union men, and to recognize the union. The carpenters voted to accept the terms as offered.

Boston, Mass.

There is a fair amount of building in progress in and about the city, the record for October, however, showing a slight falling off as compared with the same month a year ago. There seems to be a slow but sure increase in the use of the more durable materials in the construction of buildings, which it is thought must in due season relegate wood to a secondary position. The record for October shows that there were permits issued for 59 brick structures, as against 44 in September, and for 72 wooden buildings, as against 81 in September. For the ten months of this year permits were issued for 362 brick buildings, as against 629 last year, and for 636 wooden buildings against 1242 in the same ten months for 1899.

There is more or less building going on in the suburbs which aggregates a fairly large total. One of the interesting building operations in prospect is to be carried out in Dorchester, where the owner will construct 300 brick houses, designed after what he designates as the Philadelphia style. These are two stories in hight and of a character which, it is said, has not heretofore been adopted to any extent in Boston, although the plan has met with favor in other cities. The houses will have a frontage of 14 feet each and a depth of 40 feet, and will contain six rooms.

During September and October there was also considable building in Brookline, a goodly number of permits being granted for new buildings. The Committee of Twenty-five is expected to report soon on the matter of change in form of government, and the question of a change in the towns building laws regarding wooden buildings in crowded districts will also be considered.

Cleveland, Ohio.

The Builders' Exchange held its first election of officers under its new constitution on Monday, November 5. There were also chosen a Board of Directors, there being 20 candidates for which ballots were cost, the ten receiving the highest number of votes being the ones selected. The judges of the election were F. G. Hogan, F. H. Palmer, Jacob Schade, John A. Kling and John Leese. In the evening the annual meeting of the exchange was held, when the names of the new directors were announced. On election night the exchange kept open house, the returns being received by special wire. Refreshments were served, and the occasion was enjoyable in many respects.

The old Board of Directors of the exchange held its final meeting on the morning of Thursday, November 8, when it turned over its books to the incoming board, the members of which were duly sworn. The new Board of Directors elected its officers, resulting in the unanimous choice of William H. Hunt for president; William Downie was the unanimous choice for vice-president, and E. W. Palmer was re-elected treasurer. The popular secretary of the old board, Edward A. Roberts, was also re-elected, and C. M. Harris was chosen assistant secretary. The members of the new Board of Directors lunched together, and afterward an impromptu reception was extended President Hunt in the rooms of the exchange. The new president was called upon for a speech, which was favorably received by the large number of members present.

Denver, Col.

The report of the Building Inspector shows that for the month of October there was a very gratifying increase in building operations in the city, as compared with the corresponding period of last year. There were 122 permits issued for work calling for an estimated expenditure of $348,-750, the projected buildings including 75 residences, 37 additions and alterations, 14 barns and 8 business structures. The record for October is considerably in advance of that of September of this year. and also for August.

Detroit, Mich.

After a long struggle the union carpenters of the city have secured an eight-hour work day, which affects something like 1600 men. Heretofore, it is stated, the pay has run from 18 cents an hour upward, but under the new arrangement it is placed at a minimum of 25 cents an hour. The first big carpenter's strike in Detroit for a short work day is stated to have been in 1886, but was without avail. The next strike was in 1890, this being a prolonged one, and although the men obtained concessions in some instances the strike was generally regarded as a failure. Last spring the question was again taken up with the result above noted. The present agreement holds until April 1, 1901, but negotiations have already been begun for making arrangements for the year following.

Joplin, Mo.

The outlook for building in the early spring is regarded as very good in and about the city, the high price of zinc and lead ores stimulating business to a very considerable extent. There are a number of buildings under way and in prospect, including a Presbyterian church, to cost $27,000; the Young Men's Christian Association Building, which is estimated to cost $29,000, and a new Christian church, which is expected to involve an outlay of $20,000.

Milwaukee, Wis.

The outlook in the building line in Milwaukee is of a rather encouraging nature, following upon a quiet season, although the members of the Builders' Exchange have been busy looking after smaller work. There has been some scarcity of large work, but there has been enough of smaller jobs to give almost every one employment. Common labor has recently been rather scarce and has commanded good wages. Several large factory buildings are in course of construction, and work will be carried on during the winter as much as possible.

The Builders' Exchange is in a flourishing condition and the attendance very fair. During the past few months the exchange has lost three of its members: William Miller, one of the oldest mill men in the city; John Pritzlaff, head of the J. Pritzlaff Hardware Company, and Frank Mildebrath, a plastering contractor. Suitable resolutions were passed by the board and committees appointed to attend the obsequies. For the coming season the Enteraimment Committee of the exchange has arranged for a series of card parties for the entertainment of members and their friends. Those which were given last year proved very enjoyable and were well attended.

A new architectural club has been formed in the city, and has the use of the exchange room for its meetings.

New Orleans, La.

Late advices from New Orleans are to the effect that the demand for small two-story houses and single cottages is greater than ever before in the history of the city. This demand is regarded as one of the most significant and encouraging of the many signs of prosperity in the city, indicating the presence of a large class of industrious wage earners who are in want of comfortable homes and are in a position to pay for them. Architects are busy and report a demand for moderate sized dwellings. During last year the major portion of the buildings erected were business houses, but those now going up and already completed are for the most part cottages adapted to the requirements of people in moderate circumstances.

San Francisco, Cal.

Advices under date of November 5 are to the following effect: There is no great change in the building trades, but there is a steady general movement, and neither contractors nor workingmen are idle to any great extent. Nevertheless the total of new building contracts is remarkably small, and there is no doubt that operations are greatly checked by the mill strike. The fact that there are few idle men is probably due to the activity in suburban building, where operations are naturally smaller and owners do not seem to be afraid of the strike. Buildings are very scarce in San Francisco, the agencies reporting that there are now fewer vacant residences than for many years previous. Contractors are confident that a season of great activity will follow a settlement of the labor trouble.

In the meantime the strike situation is unchanged, except that the men have secured an apparent advantage in the reopening of the P. A. Buell Mill, at Stockton, which employs about 100 men, as an eight-hour mill. The union men are preparing to open two mills in this city, for one of which a permit has been obtained to operate a 70 horse-power engine and a 100 horse-power boiler. On October 16 the contractors and mill owners formed an association, known as the Master Builders' Protective Association, for mutual protection against the demands of workmen.

A number of plans for large buildings in this city and vicinity have been completed, and work on them will shortly begin. Among these are the new building of the German Hospital, to cost between $200,000 and $250,000, for which an architectural competition, with prizes aggregating $4000, has been arranged; the new High School Building, at Berkeley, Cal., to cost $55,000; the seven new buildings of the Stanford University, at Palo Alto, Cal., to cost about $1,500,000; the new Post Office Building, at Oakland, Cal., which will cost $250,000, and the new power house of the San Francisco & San Mateo Electric Railroad.

Honolulu, H. I.

A correspondent, writing under recent date, says: The building situation at Honolulu is unusually active. The increasing trade and business prosperity of the city since the annexation of the islands to the United States is now having its effect on the city's growth. So, too, the destruction of some of the cheaper and poorer districts at the time of the plague visitation has had a stimulating effect on building operations. The labor situation is, in general, quite satisfactory, although there is a scarcity in some special lines of skilled workmen, due to the fact that the building of large modern structures is a new feature in the city. Beginning with November 1 members of the Carpenters' Union will work only eight hours per day. Heretofore Honolulu carpenters have worked nine hours per day.

Among the finer buildings now under construction are the Stangenwald Building, the Boston Block, the E. O. Hall Building and the Alexander Young Block. For finishing some of these special artisans will be imported from San Francisco. The bids for the alteration and modernizing of the Campbell Block, at the corner of Fort and Merchant streets, were opened in the early part of October. They were as follows: Lucas Bros., $7545; Fred. Harrison, $8795; H. F. Bertleman, $9485; Arthur Harrison, $11,999.

Tacoma, Wash.

Reports from Tacoma show that so far this has been the most prosperous year, from a building point of view, that the city has experienced in a long time. The figures for the first ten months show that during that period the amount of building contracted for was more than double that of the same period of last year. It is noticeable that the character of work is of a better class than that of former times.

Seattle, Wash.

This place has just escaped a serious attack of the strike epidemic. On October 7 about 1200 workmen quit work in order to compel the contractors to sign an agreement to pay the union scale of wages for a year. The Builders' Exchange of Seattle, which comprises practically all the contractors, refused to accede. Work was stopped on over 30 residence buildings and six large brick blocks. This condition of things continued for two or three days when the men agreed to eliminate the one-year contract clause. The contractors then accepted the rest of the stipulations of the union. Work was resumed on October 12. With the exception of this incident building at Seattle has been in the same healthy condition as during the preceding few months.

The Builders' Exchange of Seattle elected the following Board of Directors at its meeting, held on October 12: O. N. Soderquist, Matthew Dow, W. H. White, C. C. Cawsey, D. Rohlfs, H. S. Wold and C. H. Bacon.

Los Angeles, Cal.

The union carpenters of Los Angeles have notified the contractors of that city that hereafter the members of the union will work only eight hours per day at a wage of $3 per day. It is not believed that this will in any way interfere with building operations. So far 20 contractors have accepted the new situation, agreeing to pay $2.75 per day for old work and $3 per day for all new work. The general building situation in Los Angeles is good.

Notes.

A movement is said to be under consideration by the builders of Atlantic City, N. J., to establish an exchange for the exhibition of building material and appliances of all kinds, such as that established in Philadelphia some years ago.

Building operations in Hartford, Conn., continue in gratifying volume, and it is said that the amount of money likely to be expended on new buildings is unusually large for this season of the year.

Some of the local architects of Akron, Ohio, are authority for the statement that it has recently been difficult to obtain stone masons and bricklayers to build new jobs, the contracts for which were recently awarded. Notwithstanding the fact that the price of building materials has been high the season has been a busy one, and it is thought that the activity will continue.

A feature in connection with building operations which has been forcibly drawn to the attention of carpenters and masons in Worcester, Mass., is the increasing use of open fire places in private residences. These are used in rooms which are heated by furnace, steam or other means, the fire place being more in the nature of an ornament than as a dependence for warmth. It is said that more than two-thirds of the private residences built in Worcester the last two years are supplied with fire places.

For some time past there has been a demand in Lewes, Del., for summer cottages, and the expectation is that this demand will be met by the erection of a number of them in time for occupancy next summer.

Indications point to increased activity in the building line in and about Long Island City, N. Y., and in fact, throughout the Borough of Queens. Architects and builders expect something of a boom the coming spring, judging from the plans for new dwellings, stores and manufactories which are being prepared.

Recent reports from Syracuse, N. Y., are to the effect that architects, builders and real estate men generally feel confident that there will be increased activity in the building line the coming spring. Many people who have had plans prepared and had set them aside awaiting developments will call for bids and begin work early in the spring.

Liability for Injury To Workman.

During the construction of the building of the American Tract Society, on the corner of Nassau and Spruce streets, in New York City, a brick fell from the ninth story, injuring a truckman who was engaged in unloading pipe on Spruce street. The Court of Appeals has just decided that no one can be held responsible for this injury. The American Tract Society, as owner, is not liable, for it did none of the work itself, but employed 19 different contractors. The fall of the brick indicated that some one or more of these contractors must have been at fault, but the proof did not point to one more than to another. "Cases must occasionally happen," says Judge O'Brien, "where the person really responsible for a personal injury cannot be identified or pointed out by proof, as in this case, and then it is far better and more consistent with reason and law that the injury should go without redress than that innocent persons should be held responsible upon some strained construction of the law developed for the occasion." Judge Haight, however, in a dissenting opinion, agrees with the Appellate Division that there was evidence enough to charge two of the contractors with negligence, and declares that if the principle sanctioned by a majority of the court is to be sustained in its entirety, the public will have little protection from the dangers liable to occur from the construction of lofty buildings in large cities.

THE tower of the new building of Montgomery, Ward & Co. of Chicago, Ill., is surmounted with a finely executed figure in sheet metal representing "Progress Lighting the Way of Commerce." The statue represents a young woman with a distinctly forward movement holding a torch high above her head in her right hand, with the caduceus of Commerce in her left stretched out in the direction of the wind, the flame and smoke of the torch being blown backward and acting as a wind vane. The statue, which was made by W. H. Mullins of Salem, Ohio, stands on a 2-foot ball and measures 14 feet from the ball to the top of the head and 22 feet from the ball to the top of the torch. The statue, ball and torch are made of heavy sheet bronze on a skeleton built up of steel shafting, pipes and structural steel. The top of the torch is 394 feet from the sidewalk. The figure also serves as a weather vane, the revolving part weighing 2200 pounds. It is gilded, about $500 of 23-carat gold being required for the gilding. The statement is made that the gilding is guaranteed to remain for 20 years.

MAKING WOOD PATTERNS.—XVI.

BY CHARLES J. WOODSEND.

SEPARATE core boards will be required for each half of the cores to be made, making two boards of each kind shown. The reason for this is that when the cores are made they are put in a stove or oven and baked without being removed from the boards upon which they were made. When they are dry and will retain their shape the two halves are pasted together before being put into the mold.

The lumber for the boards may be of any thickness, so that it is stiff, and at the same time it should be free from knots and pitch. The boards should be planed straight and out of wind and have one edge jointed. Good battens should be placed on the under side, in order to prevent warping.

Referring to the accompanying illustrations, Fig. 110 is a plan view of the core board for the core of the long part of the branch, while Fig. 111 is a section of the same board. The blocks A A are sawn out of, say, 2-inch stuff. Fig. 112 is an elevation of these blocks, the from the large end toward the small end. The distance between the blocks measured upon the core board should be the same as from the top of the flange B, Figs. 106 and 107, to the upper part of the other core below.

In Fig. 118 is a plan of the core board for the small branches. This is shown double, and where the cores are short it may always be used. The only thing to observe is that the board be not too long to handle easily. Fig. 119 is a section of this board upon the line L M. The elevations of the blocks K and N are shown in Figs. 120 and 121. The curve upon the blocks K K, as shown in Fig. 119, is the same radius as that for the blocks B. As these cores have to butt against the core of the long part of the branch, therefore the ends must be the same radius.

The distance between the blocks K N measured upon the core board will be the same as from the end of the core print at the flange A in Fig. 107 of the core of the long part of the branch, taken upon the parting lines.

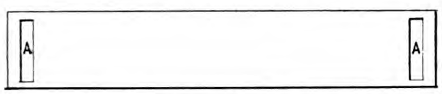


Fig. 110.—Plan of Core Board for Long Piece of Branch.

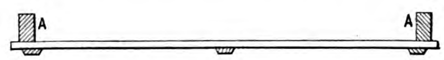


Fig. 111.—Section of Core Board Shown in Previous Figure.

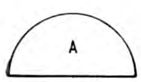


Fig. 112 —Elevation of Blocks A A.

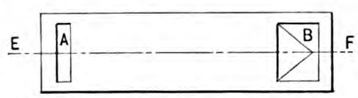


Fig 113.—Plan of Core Board for Short Section of Branch.

Fig. 114.—Section of Core Board shown in Previous Figure.

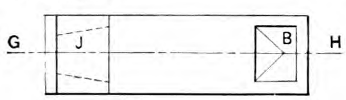


Fig. 115.—Plan of Core Board for Perpendicular Branch with Flange B of Figs. 105-107.

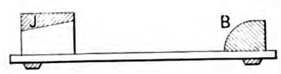


Fig. 116.—Section of Core Board Shown in Previous Figure.

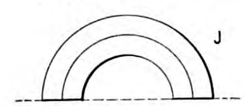


Fig. 117.—Elevation of Block J of Figs. 115 and 116, as Viewed from Large End.

Making Wood Patterns.

longest diameter being equal to the size of the core required, and the short diameter should equal half, so that when the two half cores are placed together they will be perfectly round. The distance between blocks A A of Figs. 110 and 111 should be the exact distance between the ends of the core prints at the flanges C C of the longest part of the branch, Figs. 105 and 106.

In Fig. 113 is shown a plan of the core board for the short branch at right angles to the long part, as seen in Fig. 107. In Fig. 114 is represented a section of this board upon the line E F. The block A on this board is exactly similar to those upon the other board. The block B is made the same size as block A, but is constructed from thicker stuff, so as to allow it to be worked, as shown in Fig. 114.

This curve is worked to a template, and is the same radius as that of block A. The distance upon the board between the blocks A and B of Fig. 114 should be the same as the distance between the end of the core print at the flange C of Fig. 107, and the core of the long part of the branch measured upon the parting lines. Fig. 115 is a plan view of the core board for the short, vertical branch having the taper (cone) core print, Figs. 105 to 109. In Fig. 116 is a section of this board upon the line G H, the block B being exactly the same as the block B of Figs. 113 and 114. The block J is tapered upon the inside, the same as the core print in Fig. 109. In Fig. 115 the dotted lines show the taper upon the boards. Fig. 117 is an elevation of this block, as seen looking

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By closely examining Fig. 107 it will be seen why the core prints in the small branches should be long enough to balance the cores. It will be noticed by reference to this figure that these branches are so small that where they butt against the other core there is little to support them, so that the balancing is necessary in order to keep them in place. The other cores, by reason of their being the same diameter as those they join, have support in themselves.

In Fig. 122 is represented a strike, and Fig. 123 is a section upon the line O P, looking from the handle. The inner circle is made the same radius as the core required. The shoulder seen toward the handle runs against the edge of the core board, and thus makes the cores straight.

Log Houses at Pan-American Exposition.

The village of the Six Nations Indians on the grounds of the Pan-American Exposition at Buffalo, N. Y., which is intended as an historical exhibit of the aboriginal people of the eastern part of the United States, will be surrounded by a stockade such as the Indians built in olden times to protect their villages from the unexpected attack of an enemy. Within this stockade these descendants of the Red Men who once held within their sway all that part of the country where the exposition is situated, will live just as their ancestors lived several hundred years ago. Their dwellings will be "long houses," built of poles and bark, and they will cook their meals and perform domestic duties as the Indians of the Iroquois League did in times long since gone by.

Just outside the stockade will be several log cabins which will have association with Indian life. One of these will be made to represent a cabin of the white pioneers, and another will be the identical log house in which Nancy Johnson, an aged Seneca squaw, has lived for the past century. This cabin was the oldest house on the Tonawanda Indian Reservation, which is situated near Buffalo and the grounds of the exposition. It was taken apart and transported to the site of the Six Nations village and set up just as it was before. It is in a clump of trees, where it looks as if it might have stood for 100 years. The rebuilding of the cabin has just been completed, the work having been done by Seneca Indians from the Tonawanda Reservation. The cabin is composed of logs of red beech which were hewn in the forest just after the close of the Revolutionary War. They are so well preserved that the cabin would doubtless stand for another half century.

Wages Now and Five Years Ago.

The last quarterly bulletin of the Bureau of Labor Statistics at Albany contains some very interesting figures relative to the rates of wages now as compared with five years ago. In the building trades in Manhattan, for example, electrical workers' wages rose from $3 to $4 daily for journeymen and from $2 to $2.50 for their helpers; sheet metal workers' wages advanced from $3 and 3.50 a day to $3.75; steam fitters, from $3.50 to $4, and their helpers from $2 to $2.30 in value. In Brooklyn the wages of carpenters and joiners advanced from $3.25 to $3.60, and in Bronx Borough from $2.25 and $3 to $3.50.

Chief McMakin has compiled a table of maximum and minimum wages, the figures for which are as reported by the unions. The compilation is made for March 31, 1895, and for the same day of the same month this year. The following is a showing of the Manhattan statistics of the lowest wages paid at the beginning of this five-year period:

	1895.	1900.
Limestone cutters	$4.00	$4.00
Freestone cutters	4.50	3.50
Granite cutters	4.00	4.00
Machine workers and hand rubbers	2.00	2.25
Marble cutters	3.50	4.00
Marble cutters' helpers	2.25	2.40
Marble polishers, &c	2.75	3.25
Stone setters	4.50	4.75
Bricklayers and masons	4.00	4.40
Carpenters and joiners	3.50	4.00
Derrickmen	2.90	3.00
Elevator constructors and millwrights	3.00	3.25
Framers	3.60	3.75
Gilders	3.15	3.15
Painters and decorators	3.50	2.50
Pavers and rammermen	4.50	4.50
Plasterers	4.00	4.50
Plumbers, gas and steam fitters	2.75	3.75
Roofers and sheet metal workers	3.50	3.50
Stair builders	3.50	3.84
Tile layers and marble mosaic workers	2.75	3.50
Tile layers' and marble mosaic workers' helpers	2.00	2.30
Varnishers	3.00	3.00

This table indicates that, out of 23 building trades in the Borough of Manhattan 15 are receiving higher wages and two are receiving lower wages. As a fair evidence of better conditions hardly any table of facts could be more significant.

Water for Cement Mortar.

One of the very common mistakes made in mixing a cement mortar is in the amount of water that is used, owing to the fact that no fixed rules can be laid down. Very generally too much water is added, which will make the cement porous when it has dried, for all the water that is in excess of the necessary amount will evaporate and leave air spaces, which weaken the holding power of the cement very materially. The following rules, says *Cement and Slate*, have been laid down as giving good results:

1. Fine sand mortar requires a little more water in making it up than coarse sand.

2. Sand composed of porous material requires more water than other sand.

3. As the proportion of sand to cement is increased, the proportion of water to cement should also be increased.

These three rules give a general idea as to the amount of water required, if remembered, that the consistency of the mortar should be such that when tamped down a perceptible film of water, possibly only a dampness, should be noticed on the surface. The idea of mixing water with cement is to bring the particles into closer contact and to supply the water by means of which hydration takes place. In adding too much water the cement is injured, both as to its setting powers and its ultimate strength. In making concrete it is often found very difficult to make the mixture homogeneous, for the reason that too much water has been added to the mortar. The latter becomes too liquid and settles down through the crushed stone, leaving them without any binding material.

The temperature of the water has a very important bearing on the amount that is used. It is well known that the higher the temperature of the water the more rapid the setting, consequently the cement seems to become plastic before sufficient water has been added. The kind of water also has some connection with the amount to be used, less saline water being required than ordinary water to produce the same consistency.

The amount of water required for any new or special work should always be determined by experiment, and then the mortar made up with measured quantities of water. After the eye becomes accustomed to the appearance of the mixture a hose can be used, but the amount of water must always be carefully watched.

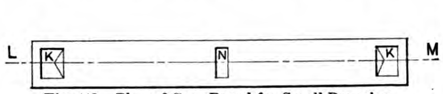

Fig. 118.—Plan of Core Board for Small Branches.

Fig. 119.—Section of Core Board Shown in Previous Figure.

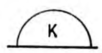

Fig. 120.—Elevation of Blocks K K.

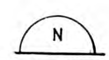

Fig. 121.—Elevation of Block N.

Fig. 123.—Section of "Strike" on Line O P of Fig. 122, Looking from the Handle.

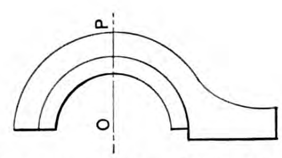

Fig 122.—Side View of "Strike" Enlarged.

Making Wood Patterns.

AT one of the meetings of the British Association the comparative values of Portland cement and hydraulic lime came up for discussion, in the course of which J. F. Deacon states that whereas Portland cement mortar, composed in the proportion of 2½ of sand and 1 of cement, might in common practice be expected to stand from 300 pounds to 400 pounds per square inch, there was plenty of hydraulic lime in England which, used in the same proportions, would stand from 400 pounds to 500 pounds. He had brought some from Italy which would stand over 600 pounds, and he had recently been testing a sample from Russia which stood 1260 pounds per square inch. Much depended upon the manipulation.

THE REDWOODS OF CALIFORNIA.

DOUBTLESS there are many people who confuse California redwood with the red cedar of Washington and Oregon, and who with others will be interested in the following information touching the first named wood, gleaned from an authoritative source:

"For finishing, casing, shelving, ceiling, wainscotting, and all interior finish and exterior work, redwood has many advantages over any other timber. Its lasting qualities and freedom from rot and decay under all conditions are well known. It is more easily worked and about the same weight as white pine; being free from pitch it paints well; finishes beautifully in natural color; or if desired can be polished equal to the finest hard woods. It is slow of burning and practically noncombustible. It is a wood that will take the place of much more expensive woods, such as quartered oak, walnut, cherry and mahogany. A trial only is needed to prove this timber the peer of all soft woods.

"California redwood forests are of enormous extent on account of being exempt from damage by fire. The wood contains no pitch, does not hold large quantities of water, and when green it is impossible to burn it. No fire can run in a redwood forest to its destruction, as it will in any other large body of trees.

Fire Resisting Qualities.

"Redwood certainly will burn, but the acid with which it is plentifully impregnated enables it to resist the action of fire with great stubbornness and success. Even after ignition a very little water is sufficient to extinguish the flames, and it is a remarkable fact that the city of Eureka, in the United States, built entirely of redwood, never in its history had a destructive fire. Many single buildings have been burnt, some when the wind was blowing at the rate of 40 miles an hour, and firebrands were carried several blocks, falling on other roofs, but in no instance did the fire get beyond control with very ordinary appliances.

"In numerous instances when the fires have occurred in buildings where fir or pine has been used for lath or studding, the fire followed down and destroyed the walls before breaking through the redwood roof or siding. The noted Baldwin Hotel at San Francisco, which was lately burned, was constructed of brick, and the studding and flooring of different kinds of timber, but the cornices and window finish and the enormous pillars were constructed of redwood. These parts stood practically untouched by the flames, while all other kinds of wood were totally consumed. The immense water tank over the theater was also constructed of redwood, and was but slightly damaged, showing conclusively the resistance of redwood against fire.

"For every building purpose where exposure to fire is probable, the non-combustible quality of redwood renders it peculiarly adapted.

"Redwood walls, compactly built, are almost as indestructible as if built of brick or iron. Fire makes little progress in a redwood forest. Such timber as spruce and pine a forest fire may, and in fact often does, destroy, but the redwood escapes uninjured.

"It is a beautiful timber, wide and clear. It has a quality as distinct as the territory in which it grows. The district bound by the fire limits of San Francisco, in California, is smaller than that of any other city of its size in the country, one reason being that the buildings are constructed largely of redwood and will not easily burn. If we may judge, this is a rare quality in any building wood, especially for residence purposes, yet so little is said about it that this information will undoubtedly be news to many.

"As California redwood lasts much longer than other woods for exterior work, in order to receive full benefit galvanized nails should be used for siding and clapboards.

"The fact that redwood swells, shrinks, or warps but slightly specially adapts it not only for shingles but for tanks, vats and patterns, while its rich color and susceptibility to high polish, especially of the curly grained varieties and huge bird's-eye burls, are bringing it into great demand for bank, store and office fixtures, cabinet work, and interior finish.

"The production of curly grained and burly redwood at the present time is limited, as the manufacturers have heretofore left that portion of the tree that was curly grained in the forest; but it is our purpose to promote the manufacture of curly grained redwood, as it is superior to rosewood or English walnut burl for fineness of figure, grain and color, and costs less. We can supply it at present in limited amounts only.

Color of the Wood.

"The color of California redwood is a rich reddish tinge. It varies, however, from that of the lightest beech to that of the darkest mahogany. Perhaps, of all woods, rosewood most nearly approaches it in beauty and richness of native coloring. It is darker and less easily stained than oak or chestnut, and lighter and more cheerful than black walnut or mahogany. A great many of the trees are curly grained, and most of the stumps have a curly 'mottled bird's-eye' or variegated grain, and these, with the burls, are highly prized for cabinet work and interior house finishing. The beautiful color and variegated grain of the wood makes it one of the most precious for interior decorations, especially when the surface is properly treated to bring out and preserve the natural tint. It takes a fine polish. Some of the finest offices and residences on the Pacific Coast are finished in redwood in its natural color.

"The endurance of redwood and resistance to decay are qualities which make it superior to other woods for various purposes. In the outskirts of Eureka stands old Fort Humboldt, where in 1853-1854 General Grant was stationed. The shingles were laid on the building in 1851, and yet to-day, after 48 years' exposure to the storms of the ocean and the land, they are still sound and useful. In such a condition are they, in fact, as to excite the wonder of all not familiar with the qualities of this timber. A more forcible illustration of the comparative indestructibility of the California wood could not easily be given.

Proof Against the Elements.

"It is little affected by time or by contact with earth or water. Especially is this true of the lower half of the redwood trunk, which appears to contain most of the sap. Its value for sills, ties, stakes, piles and foundation timbers could not therefore be readily exaggerated. The stumps of trees felled half a century ago are nearly as sound to-day as they ever were. Rarely does a redwood stump show signs of decay.

"One of the faults found with the building woods of the Eastern and New England States is their inability to 'hold paint.' That is, the wood refuses to absorb the paint properly, with the result that the paint peels or scales off after a time. Whenever it has been sought to introduce redwood into these States, one of the first questions asked has been, 'Will redwood hold paint?' And here, again, is called out one of the many good qualities of this matchless wood. Redwood will 'hold paint' better than any other building wood, a fact that is demonstrated beyond a doubt wherever it is in use, and this, together with its non-warping, non-shrinking, and non-swelling qualities, make it peculiarly adapted for siding and outside finishing of buildings.

"To those who stand in awe of the Climex lectularius, it may be reassuring to know that this pestilential little insect never invades a redwood house or redwood bed. The marine teredo, which destroys all wood alike, is the only insect that has ever been known to attack redwood timber. Because of its peculiar nature in this respect, the tropic countries of South and Central America, where insects eat away the wood of dwellings, have learned to value redwood doors, sashes and casings. In Central America it has been found that insects will not touch redwood, and quite a demand for doors and other specialties has been created as a result."

Model of the Cathedral of St. John the Divine.

We understand that arrangements have been made for a public exhibition this winter of a complete model of the Cathedral of St. John the Divine, now in progress of erection on Cathedral Heights, New York City. The model will be of plaster supported on wood and iron frame work, with sheets of matting for the purpose of keeping the walls firm. The model will be about 50 x 25 feet in plan and 35 feet high. It is said that there will be room for 100 or more people to walk about inside, and that the architects, Heins and Lafarge, have worked upon this model for nearly two years. The model will be exhibited on the site of the cathedral, and probably a small fee will be charged.

During the past summer the work carried on has involved the buttressing of the main arch and starting the walls for the August Belmont Chapel, which will be the first of the seven chapels to be completed. The Episcopal residence will be erected near the corner of Amsterdam avenue and 110th street, or Cathedral Parkway, as it is known, and directly opposite the new building of the National Academy of Design. Just north of the bishop's house and connected by cloisters with the cathedral will be the library and choir school.

Massachusetts Charitable Association Trade School.

The new trade school of the Massachusetts Charitable Association opened on October 29 at the new quarters in the Mechanics' Building, Boston, Mass., under the most favorable auspices. While the enrollment was excellent, it is thought that the postponement of the opening night from October 1 materially affected the attendance by an increase. The school is located in three of the basement rooms, is lighted with both gas and electricity, and, in fact, has every modern convenience. The largest room, which is directly under the office of the association, is fitted with carpenters' benches and has accommodations for 25 pupils. There are two lights to every bench and a complete set of tools that any ordinary wood worker would need. The department is under the supervision of the vice-president of the society, William N. Young, and E. Noyes Whitcomb; these two supervisors are called the Carpentering Committee. The instructor of this department is a practical and well-known contractor. His name is Albert Duncanson.

The next department is the bricklaying. While as yet there are not many students for this branch of the school, it is expected that within a short time the roll will be filled to the limit. Isaac F. Woodbury and Stephen H. Whidden are the committee for that department, and Frank Tift is the instructor.

At present the enrollment in the plumbing class is the highest. The plumbing class room has 25 benches, all of which are occupied, and has heaters at every bench. There is also a full set of tools for these benches as for the carpenters. The Plumbing Committee are William Mitchell and Isaac Riley, and Joseph P. Williams is the teacher.

The president of the association, Horace H. Watson, is the treasurer and chairman of the Executive Committee. The school is to be held every Monday, Wednesday and Friday until the latter part of April, when there will be an exhibition of the year's labors.

WORK on the buildings of the coming Pan-American Exposition at Buffalo, N. Y., is going on apace, recent photographs of the principal structures showing them to be in an advanced stage of progress. The electric tower, which is to form the grand centerpiece of the exposition, promises to be a unique and splendid object. Five thousand horse-power has been provided for the electric features of the exposition, part of which will be used to illuminate this structure. One of the great Swiss turbines at Niagara Falls has been set aside to supply this volume of energy. The tower is to be 375 feet in hight and will have a base 80 feet square, flanked on either side by semicircular colonnades 75 feet in hight, forming a clasp setting for the great basin of the electrical fountains. From the fountains to the Goddess of Light at the summit the tower will be a mass of fiery, sparkling grandeur by night. Abundant streams of pure water, transparent while the light of day lasts, will be transformed at the approach of darkness into all the colors of the rainbow, making a spectacle at once unique and beautiful.

Slate Making in France.

At the slate quarries of Angers, France, roofing slates have to be dressed on the spot before the slate has time to dry and lose its fissility. The block is first divided with a chisel into thick slabs, the size of a slate. Then the splitter, seated under a wind screen, places the piece of schist between his legs, and with a very thin chisel and mallet strikes on the edge to detach the plates. It now only remains to give the plate its form and dimensions, which is done by the aid of a very heavy iron knife, the end of which is run through a ring, and falls down on the edge of a block. A skilled workman can make 700 to 800 slates per day, but the more the dimensions of the slate are augmented to compete with machine made tiles the more delicate the work becomes, and is a source of frequent disputes between masters and men.

CONTENTS.

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PITTSBURGH—R. A. WALKER, Manager..............Hamilton Building, 335-337 Fifth Avenue.
CHICAGO—H. H. ROBERTS, Manager................Fisner Building, Dearborn and Van Buren Streets.
CINCINNATI—HENRY SMITH, Manager...............Pickering Building, Fifth and Main Streets.
ST. LOUIS—C. F. WIELAND, Manager..............Chemical Building, 721 Olive Street.
CLEVELAND—EZRA S. ADAMS, Manager..............The Cuyahoga, 311 Superior Street.
AUSTRALIAN OFFICES:........................{ MELBOURNE, 231 Elizabeth Street. { SYDNEY, Palings Buildings.

ENTERED AT THE POST OFFICE NEW YORK, AS SECOND-CLASS MATTER.

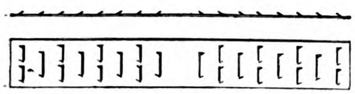
— AT THE TABLE.—The Lover: "Love makes the world go 'round."

The Landlady: "I wish love or something else would make this chicken go 'round."—*Life.*

NOVELTIES.

Sheet Metal Wall Ties and Sleeper Clips.

Some new candidates for popular favor in the way of wall ties and sleeper clips have just been put on the market by Hurd & Co., 570-576 West Broadway, New York. The wall ties, two views of which are shown in Fig. 1, are made of cold rolled steel, 8½ inches long and 1¼



Novelties.—Sheet Metal Wall Ties and Sleeper Clips.—Fig 1.—Plan and Side Views of Metal Wall Tie.

inches wide, but can be made any length desired. The smaller cut shows a side view of the tie and the larger one a top view. In the rougher and cheaper construction of brick walls, where wall ties have been used, it is explained that a growing need has developed for a tie which is readily bent in order to conform to the unevenness of brick walls. The top of one brick may set from ¼ to ½ inch below the adjoining brick to be bonded. The tie has been brought out to meet this condition. The strip of metal has been sheared and formed, it is remarked, so that the inward directing projections insure a perfect grip. The sleeper clip and its application is shown in Fig. 2, while in Fig. 3 is shown the old method of accomplishing the same results. The clip is made of 3-16 inch steel wire. It is pointed out that with the old method there was not only the labor of holding the large piece of sheet iron in place, but that there was additional labor in driving two nails. The clip illustrated in Fig. 2 is in one piece, the sheared point allowing it to be driven readily. The new clips are referred to as being much cheaper than the old style, and can be ordered any style or length. The firm signify their willingness to send samples and quotations of the tie and clip upon application.

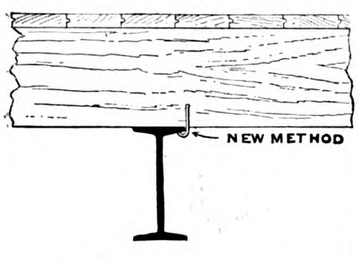


Fig 2.—The New York Sleeper Clip.

Wrought Steel Safety Hasp.

The Stanley Works of New Britain, Conn., and 79 Chambers street, New York, are manufacturing a wrought steel safety hasp, the feature of which is that the hasp when closed entirely covers all screw holes, while the staple is so made that there is provision for the sagging of a door or any shrinkage laterally without resetting the plate. It is made of cold rolled steel, in 3, 4½ and 6 inch lengths of strap. It can be furnished in plain steel, japanned, bronzed, brass plated and old copper plated finishes, the last three being packed complete with screws.

The Kelsey Warm Air Generator.

Some good reasons why the Kelsey warm air generator would heat your house properly and under the most approved sanitary conditions are embodied in a handsomely printed pamphlet of 48 pages, which is being distributed by the Kelsey Furnace Company, 335 to 341 West Fayette street, Syracuse, N. Y. The point is made that the Kelsey is entirely unlike any other apparatus and has many distinct and decided advantages which would well repay investigation. The manufacturers claim that by their system every part of the largest house is thoroughly heated with one fire without the use of radiators, steam pipes or coils. The pamphlet in question illustrates and describes at considerable length the Kelsey corrugated warm air generator, sectional views being presented in order to show the internal construction. A large portion of the text consists of testimonial letters, the matter being illustrated by means of well executed half-tone engravings of buildings in which the heater has been used. A number of pages are devoted to a list of names with addresses of persons who have practically demonstrated the merits of the heater.

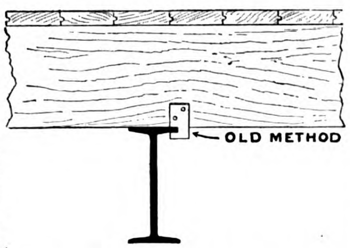


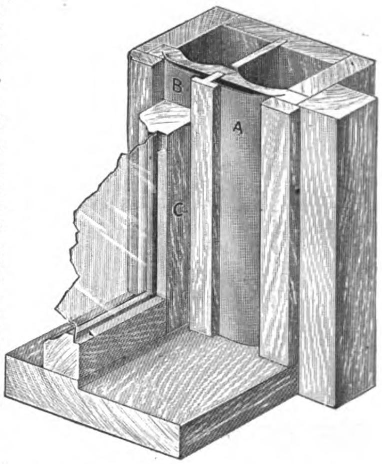
Fig. 3.—Former Style of Sleeper Clip.

Sheet Metal Window Frames.

The Smith-Warren Company have recently completed a new factory building on Potter street, East Cambridge, Mass., which was designed particularly for their requirements. The plant has been equipped with the latest improved machinery for sheet metal work, and the business is under the direct charge of H. Collier Smith. The company are manufacturing under Mr. Smith's patents sheet metal window frames and sash, some reference to which has previously been made in these columns. These windows are made of galvanized iron or sheet copper and are glazed with wire glass, and afford better protection against fire than the ordinary windows with tin shutters, and cost no more. The windows can be arranged so as to close automatically in case of fire, and no shutters are needed. These are used in connection with wire glass windows, which, it is claimed, make as impervious a fire wall as though it were built solid. The manufacturers refer to the fact that closed shutters are a great obstacle to the fire department when they want to gain admittance to a building on fire, while wire glass windows can readily be broken through by axes in the hands of the firemen. Wire glass windows cost no more than the ordinary common window frame, sash and fire shutters combined.

The Jones-Harig Window Frame.

A style of window frame involving a number of interesting features of construction, and illustrated herewith, is being manufactured by Harig & Brueggeman of 837-839 Livingston street, Cincinnati, Ohio. The construction of the frame is referred to as being simple and durable and its operation pratically noiseless. It is known as the Jones-Harig patent wind and dust proof window frame, the general construction being indicated in Figs. 4 and 5 of the engravings. Referring to Fig. 4, A and B represent spring brass runners, B showing the brass depressed by the sash C. Some of the advantages claimed for this frame are that the sash is absolutely tight and will not rattle; that air, dust and soot cannot enter; that the sash will work equally well in wet, dry, warm or cold weather; that the weights will not become fastened, as the whole front of the frame can be taken out and the weights hung before the box is closed, and that the pulley D, shown in Fig. 5, is anti-friction and entirely hidden from view, thus adding to the neatness in appearance of



The Jones-Harig Window Frame.—Fig. 4. —Section of Frame and Sash, Showing Construction.

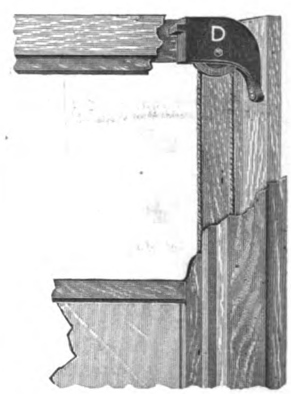


Fig. 5.—Broken Section of Frame, Showing Pulley.

the frame. The manufacturers also claim that the sash are more easily fitted and hung, and that the expense of lead weights is avoided owing to the fact that longer iron weights may be used than in the former old style frames. A four-page folder which the manufacturers have issued illustrates and describes this patent window frame, some of the illustrations serving as working drawings, clearly showing the construction and operation.

Novelties.— Yankee Screw Drivers Nos. 11 *and* 60 —*Fig.* 6.— *General View of Screw Driver.*

Yankee Screw Drivers Nos. 11 and 60.

The accompanying cuts represent two screw drivers offered by North Bros. Mfg. Company of Philadelphia, Pa. The screw driver shown in Fig. 6 is an improvement on the company's No. 10 ratchet screw driver, the adjustment being across instead of in line with the length of blade, thus obviating, it is explained, any possibility of changing the position of the shifter while in use. The ratchet mechanism has been modified to take less room, with consequent slight saving in the size and weight of the tool, and to work with less friction than the No. 10. The adjustment for right or left hand is made by pushing the shifter to left or right hand end of the slot. When the shifter is placed midway the blade is held rigid as in an ordinary screw driver. The manufacturers state that the materials and workmanship of the screw driver are of superior quality in every detail, and that the tool is strong, durable, well finished and thoroughly tested before leaving the factory. The screw drivers are made in eight sizes, from 2 to 12 inches inclusive. The pocket magazine screw driver shown in Fig. 7 is made of steel, polished and nickel plated, weighing 2 ounces. The tool is convenient to carry in the pocket, measuring when closed 3 inches in length and ⅝ inch in diameter. It is provided with four detachable blades of varying widths and thicknesses to suit different size screws. The blades are kept in the magazine formed by the handle.

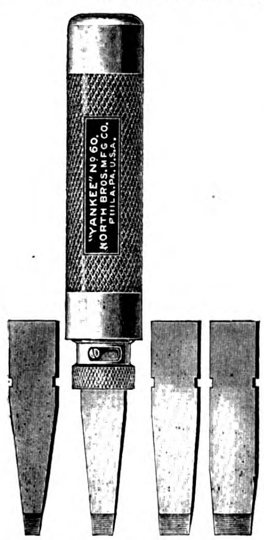


Fig. 7 —*Pocket Magazine Screw Driver.*

The Sturtevant Electrically Driven Ventilating Wheel.

A form of ventilating wheel, with a special eight-pole attached motor, has the fan arranged with a large inlet for admission of air through one side only, the fan having curved blades and a conoidal plate concentric with the inlet, which serves to gradually deflect the air from an axial to a radial movement. In the inlet of the fan is placed a continuous oiling journal box which supports the fan shaft upon that side. Immediately outside and at the back of the wheel is a flanged coupling which joins the fan shaft to the motor shaft. The motor is built within a wrought iron field ring. Attached to each side of this ring are tripod supports which carry the ring oiler bearings and absolutely center the armature within the field. The field cores are of wrought iron with a special type of cast iron pole shoe. The peculiar size and shape of this shoe makes possible extreme variation in load without sparking or adjustment of the brushes. The armature coils are built up of laminated slotted disks, which are solidly clamped between brass rings, having teeth to correspond with the core teeth which support both edges of the core. The commutator is built up of pure drop forged copper segments, and is of large diameter. Self adjusting and self feeding brush holders with carbon brushes are used. This type of electric fan, which is built by the B. F. Sturtevant Company of Boston, Mass., is employed without a casing, and usually arranged to draw the air through an opening in the wall and discharge it at comparatively low velocity into the space within which is located the fan and the motor.

Dry Kilns.

An extensive catalogue of the American Blower Company of Detroit, Mich., treats of their A. B. C. moist air and blower dry kilns. Their moist air dry kiln is of the simplest design, construction and operation, and is readily applicable to the varying conditions met with in every day work. The temperature is entirely within the control of the operator, and the kiln works as well in winter as in summer, as it is not affected by atmospheric conditions. This statement in regard to temperature is true in regard to the humidity of the air. It can be so saturated as to produce a fog, or the air in the kiln can be kept dry and clear. The circulation course can be varied to suit existing conditions and requirements. It is positive and strong, the air penetrating all the interstices between the boards, carrying off and depositing all moisture rapidly and perfectly. The highest temperature practicable is obtainable with the least expense for fuel. Another feature of particular merit in this kiln is that fine finishing woods, green from the tree, can be dried as rapidly as most of the ordinary kilns will dry air seasoned stock, yet preserving that which makes wood valuable for finishing purposes. The value of the kiln is not confined to the drying of hard woods. Its remarkable rapidity in drying soft woods, particularly Southern and sap pines, makes it valuable for this work. A two compartment kiln has dried out 36,000 feet per day of green sap pine, evaporating nearly 100,000 pounds of moisture from the same.

Union Tool Grinder.

A convenient and practical grinding machine intended to be operated by foot power is being introduced to the trade by the Union Mfg. Company of 20 Breckenridge street, Buffalo, N. Y., and is illustrated in general view in Fig. 8 of the engravings. The device is the Union tool grinder and will be found useful by carpenters for grinding chisels and other tools belonging to their kit. The machine is portable and easily adjusted to a post or wall by means of a few screw nails properly applied. The manufacturers point out that the emery wheel is of a fine grade and that by its use an edge can be put on a tool much more rapidly than would be possible in connection with a grindstone, while only one man is required to do the work. The driving gear being a special metal, the company claim that the running of

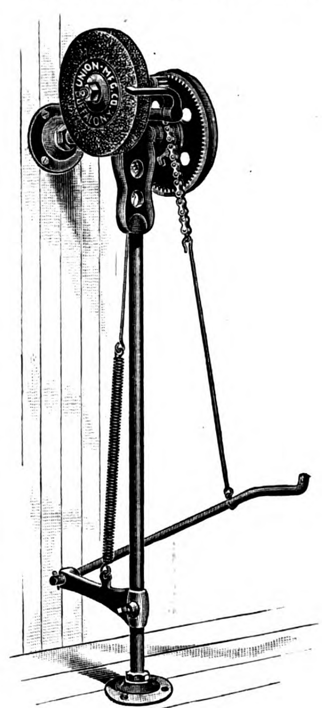
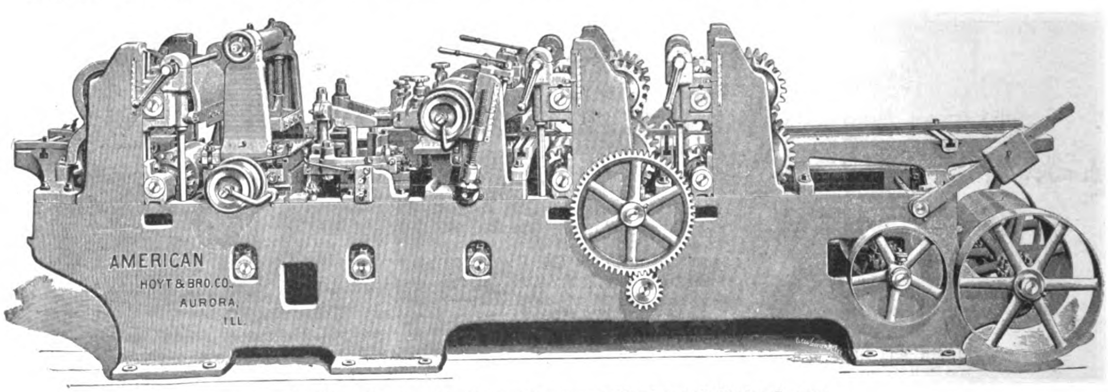


Fig 8.—*The Union Tool Grinder.*

the machine is smooth and easy; that the cone bearings are well fitted; that there are no bolts to slip, and that every machine is warranted. The grinder here shown stands 42 inches high; has a ⅝-inch steel shaft, furnished with a solid emery wheel 6 inches in diameter, and a ¾-inch face. It is also stated that buffing and polishing can be done, as a speed of 2000 revolutions and upward is attained. The company manufacture a full line of foot power grinding machinery, and will be pleased to send circulars or give information to those who may be interested, on application.

New Series Planer and Matcher and Timber Dresser.

A new series of planers and matchers and timber dressers, representing the results of years of careful study and practical experience, have just been brought out by the Hoyt & Brother Company branch of the American Wood Working Machine Company at Aurora, Ill. In Fig. 9 of the accompanying illustrations we show a side view of one of this series of machines, the frame being heavy and substantially braced, and all working parts of liberal proportions, with adjustments easy of access by the operator. The new series of machines are built in various sizes from 9 inches wide, working up to 8 inches thick, to 30 inches in width, working up to 12 inches thick. Some of the machines have solid rolls and some of them have divided rolls, with center guide. The upper and lower cutter heads are alike in detail, both having a cutting circle of 7½ inches and will carry a knife 4 inches wide. The end play on the cutter heads when working ceiling or other beaded work is cared for at the end of the journals, where hard wood plugs run against the centers. One feature to which the manufacturers call special attention is the device for lining up the cutter head. It is easy of access, not only for adjustment, but also in case of repairs being necessary. The upper head yoke is clamped by hand levers, thus keeping the yoke firmly in place without the use of a wrench. This clamping device, it is claimed, provides for a quick correction of lost motion. The upper cutter head has an independent leveling device whereby it can be quickly lined up to and with the bed of the machine. The top of the pressure bar is on a line with the center of the cutter head, thus giving ample room for sharpening or setting of knives. Special attention is also called to the gearing of the machine, all the gears being of one size, with the same size hole. This is a feature which the practical operator will appreciate, as heretofore he has been accustomed to the multiplicity of gears usually found in connection with planers and matchers. By the new system of having one of each of the gears on hand he is prepared for any emergency, as accidents will happen, no matter how much care and attention may be taken to avoid them. In the event of one of the large gears breaking it is only necessary to take one from the reserve stock and put it in place and the damage is at once repaired. In case no extra gear is kept in stock it is only necessary to take off one from the infeeding roll in case of breakage, thus simply throwing out the first pair of rolls and operating the machine with four rolls in the feed until the needed gear is received from the factory. The same applies to the expansion and intermediate gears. The matcher spindles are made from steel and have long journals of large diameter. The matcher stocks are readily adjusted independently and the clamping device is positive and easy of access. The chip breaker for the side head has a hardened point and is adjustable to any desired cut. The top chip breaker has an inserted steel point, which is easily replaced in case of necessity. On this machine there are no studs carrying loose gears or pinions, as all the gears and pinions are mounted on shafts which run in boxes. The American Wood Working Machine Company have salesrooms at 36 Liberty street, New York City, and 45 South Canal street, Chicago, Ill.



Novelties —Fig. 9.—New Series Planer and Matcher and Timber Dresser.

Niedermeyer's Fire Proof Window.

An improved form of fire proof window construction is being brought to the attention of the trade by Biersach & Niedermeyer of Milwaukee, Wis., some idea of the arrangement of parts being indicated in Fig. 10 of the engravings. The sides of the window frame are formed in a rectangular shape, of sheet metal, and having an outwardly projecting flange. Three of the vertical sides forming the rectangular shape are formed of a single sheet of metal, which is united at its outer edges with the fourth side or wall by folding joints. The object of the projecting flange referred to is to furnish a supporting bearing in the masonry of the wall, for holding the window frame in place. The bottom cross piece of the window frame is also formed of sheet metal. The central cross piece of the frame is provided with a recess for the reception of the upper edge of the glass, this recess being of such depth as to permit the glass to be raised therein until the lower edge of it is brought above a corresponding recess in the lower part of the frame, when the glass can be dropped into place. The sash for the lower glass is formed as a part of the window frame, while the upper glass is supported in a separate hollow movable sash, which is pivoted at the center of the frame, so as to swing outward at the top. The swinging sash is pivoted slightly

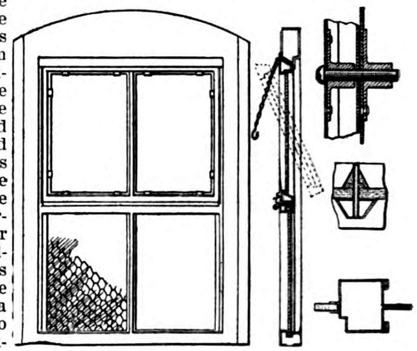


Fig. 10.—Niedermeyer's Fire Proof Window.

above its center of gravity, so that when not otherwise supported it will drop to a vertical position.

In order to provide for the windows automatically closing in case of fire, they are retained in an open position by a combustible or fusible connection, which connects between the upper end of the sash and the stationary connection, whereby, in case of fire, the fastening will be either burned or fused, and the window will drop of its own gravity to a closed position.

The Drake Acetylene Generator.

The Drake automatic acetylene gas generator, manufactured by the International Heater Company of Utica, N. Y., is described in a pamphlet just received. This generator is stated to be suitable for all places and purposes where light is wanted, from a small cottage, and which can require only a few lights, to a large factory requiring many hundreds of lights. The machine automatically drops measured quantities of lump carbide into a sufficient amount of water to absorb all heat. All the gas is purified through two separate bodies of water, and then through a combination purifier and dryer. The generator has been approved by the National Board of Fire Underwriters.

TRADE NOTES.

HAMMACHER, SCHLEMMER & Co., 209 Bowery, New York City, are distributing a neatly printed catalogue of 18 pages showing many varieties of vises which they are prepared to furnish. The goods include among others parallel, swivel and slide vises, wood workers' vises, clamp vises, saw vises, pipe vises, coach makers' vises and solid box vises. In connection with the numerous illustrations are to be found brief descriptive particulars calling attention to the important features, also dimensions and prices. Accompanying the catalogue, which is known as No. 96, is a discount sheet. The company are prepared to furnish tools for wood workers, pattern makers, machinists, metal workers, &c., as well as cabinet, builders' and piano hardware. We understand that the company have in preparation a new catalogue, which will contain something over 200 pages, and will be devoted to tools and supplies for metal workers.

JONES & DOMMERSNAS, 31 and 33 Indiana street, Chicago, Ill., show in their advertising card this month an illustration of Jones' patented coping saw, which is constructed with a tubular back through which runs a string or cable connecting both ends of the saw frame. This arrangement causes the blade to turn to any angle by simply turning the handle, but without removing it from the work. The manufacturers have issued a circular setting forth the merits of this saw, and we understand that a copy will be forwarded to any one who may be sufficiently interested to make application.

THE BURNAM GRATE COMPANY of Huntsville, Ala., have just arranged with the Lowe Cotton Mills of that city to equip their village of workmen's cottages with the Burnam grate, a duplex grate that heats two rooms with one fire.

THE JONES-HARIG WINDOW FRAME is the subject of an interesting announcement presented in another part of this issue by Harig & Brueggeman, 837-839 Livingston street, Cincinnati, Ohio. The frame is of such construction that it is claimed to be wind and dust proof, that the sash is absolutely tight and will not rattle, and that it works equally well in wet, dry, hot or cold weather. The pulley used is anti-friction, while the arrangement of the frame is such that it is entirely hidden from view. The stile or runner is of brass, presenting a very neat appearance, and at the same time the arrangement is such as to deaden all annoying external noises.

AT a special meeting of the Board of Directors of the Stanley Rule & Level Company, New Britain, Conn., held on October 8, the following officers were elected: C. E. Mitchell, president; C. B. Stanley, treasurer, and A. W. Stanley, secretary.

"WE are Always on Top—We Fix Roofs" is the legend under a general view of the housetops of the city of Philadelphia given on the outside of a neat folder distributed by Gara, McGinley & Co. of 23 South Seventeenth street, in that city. The text within calls attention to the fact that the company have been in the roofing business for 60 years and are prepared to undertake all kinds of work in that line.

THE second issue of *Berger's Hustler*, a paper "published now and then" by the Berger Mfg. Company of Canton, Ohio, is largely devoted to the exploitation of Berger's classic metal ceilings and side walls and Berger's metal tiles. Illustrations and descriptions of these goods are presented, together with brief, pithy remarks and striking sketches bearing on their merits.

JOHN H. FEUGILL, architect, of Methuen, Mass., is desirous of obtaining copies of catalogues of manufacturers of goods in which architects are likely to be interested.

THE CINCINNATI FOUNDRY, SCREEN & WIRE WORKS, J. H. Shrader, & Co., proprietors, Cincinnati, Ohio, have purchased the plant located at 1962-1966 Queen City avenue, formerly operated by Dohner Brothers, and are now engaged in making the necessary alterations and additions of new machinery for the production of wire and iron fencing, bank and office railings, elevator cabs and inclosures, flower stands, weather stripping, &c. A catalogue is now in course of preparation, which will be sent to the trade upon request.

THE CANTON STEEL ROOFING COMPANY, Canton, Ohio, have sent us a 26-page catalogue devoted to their extensive line of warm air registers and ventilators made from sheet steel. It is pointed out that these registers not only have sufficient strength to stand any of the strains that are put upon registers, but are not liable to break, consequently are not damaged in shipment. They are furnished in black or white japan and in different styles of plating and bronze. A border is made from stamped steel to use in connection with them. The registers are made in an extensive line of sizes from 4 x 6 inches to 36 x 36 inches. The company also manufacture elbows, steel ceilings, cornices, skylights, steel roofing and siding, conductor and eave trough, and a line of supplies for roofers.

WE have received from F. Reissmann, West Point, N. Y., circulars illustrating and describing the Perfection rule gauge, a device which answers for a tri-square as well as for a siding T-bevel, and will gauge to any width or thickness; also Reissmann's rafter and polygon gauge, with which any angle or cut required in the construction of buildings and roofs can be instantly obtained and with minute accuracy.

THE J. A. FAY & EGAN COMPANY, the well-known manufacturers of wood working machinery, 221-241 West Front street, Cincinnati, Ohio, have just issued a pamphlet giving instructions regarding the erection of band saw mills and the care of band saws of all kinds. The pamphlet is of such a character as to prove more than ordinarily useful to those using band saws, and we understand the company will forward a copy to any address on application.

SOMETHING of a departure in the way of trade catalogues is that which is being sent out by Eastman & Johnstone of 1811 Pine street, St. Louis, Mo. The pages are oblong in shape, and the body portion in each case and upon which the illustrations are presented appear to be made by the blue print process. In the make-up the illustrations appear upon the right hand pages, while those facing are blank. The binding is in light green paper covers of rough texture, tied at the back with a silken cord. Messrs. Eastman & Johnstone are wood carvers, and also give attention to plaster composition ornaments for interior and exterior decorations. In issuing the catalogue the firm state that they are prepared to furnish anything wanted in the line indicated, and that all ornaments shown in the catalogue can be made any size desired.

THE WILCOX MFG. COMPANY, Aurora, Ill., manufacturers of door hangers and other hardware specialties, have for some time contemplated the enlargement of their factory. The result of the election hastened their decision, and they have since then contracted for the erection of a two-story brick building, to cover a ground space of 40 x 60 feet. It is designed to enable the press department to be enlarged about 40 per cent. of its present capacity. This department has latterly been running night and day to keep up with the rest of the plant. The volume of the company's business this year has been fully up to that of last year. The orders of this year have been small and numerous, but they are expected to call for larger quantities from this time, as jobbers' stocks have been kept too low because of the political uncertainty. The company are adding to their line, having some new goods which will shortly be ready for the market.

LORD, WITTER & PARK of Worcester, Mass., direct attention in their advertising card this month to the Lord patent saw filer, especially intended for filing cross cut, rip and band saws. The manufacturers refer to this tool as the most economical on the market and that "a tough job can be made easy by using it." The filers are offered at 50 and 75 cents each and can be supplied through the hardware trade, or sent direct by the manufacturers.

POINTS ABOUT BOOKS

ARCHITECTURAL DRAWING. By C. F. Edminster.

In acquiring the correct principles of architectural drafting, the student will find no book more thorough and competent as an instructor and guide than this volume. It is a work of special value to the student, the mechanic and the man that is looking to better his position. It is practical and up-to date, treating the various subjects it covers in a simple, concise and comprehensive manner.

The book contains ninety-six full-page illustrations beautifully rendered, and one hundred pages of text. The drawings are made with the greatest degree of accuracy, and reproduced in line and half-tone.

The first chapter treats the drawing materials used by the draftsman and gives full directions for their use. The chapters that follow are devoted to Geometrical Problems, Simple Projections introducing the Principles of Working Drawings, Intersection of Solids, Development of Surfaces, Projection of Shadows, Instrumental Perspective, Orders of Architecture, Study of a Frame House and Studies in Masonry Construction. Size 7 x 9, oblong form, cloth binding **$2.00**

ARCHITECTURAL DRAWING FOR MECHANICS. By I. P. Hicks.

This is another elementary text book on drawing prepared by a practical writer. The subject is treated in the simplest manner to the exclusion of problems not comprehensible to building mechanics who have had no technical training. The examples which are given as lessons in drawing embrace a wide range of work, the aim of the author having been to select only such figures for practice as are likely to meet the wants of working mechanics. 94 pages. Illustrated. Oblong. Cloth..................**$1.00**

ESTIMATING FRAME AND BRICK HOUSES. By F. T. Hodgson.

This book tells how to estimate, step by step, the cost of labor and materials necessary in building frame and brick dwellings from the work of excavation for the foundations to the finishing of the building. It is the only book which may be said to give a careful analysis of each item of cost of construction, all being demonstrated in order and by means of figures and data. All these methods and rules of figuring costs are brought out in the clearest and simplest manner, and may obviously be applied in determining the cost of constructing any dwelling. 147 pages, cloth bound...**$1.00**

PROGRESSIVE CARPENTRY. By D. H. Meloy.

The simple and accurate methods of framing set forth in this book embody results of the author's life experience as an architect and builder, and will at once commend themselves to the practical mechanic.

A new Enlarged Edition, 89 pages, illustrated by full-page diagrams, cloth binding..................**$1.00**

POCKET STAIR BUILDER AND CARPENTERS' HAND-BOOK. By Wm. Peoples

This elaborate pocket companion is to the stair builder, carpenter and joiner what the pocket books of Haswell, Kent or Trautwine are to the engineer. It contains, besides 250 pages of text, 51 folding plates in which are presented over 500 figures. The text gives a full description of all these figures, which embrace Carpenters' and Stair Builders' Geometry, Problems, Conic Sections, Cylindric Sections, as applied in the construction of the Wreath part of Hand Rail. Rules for the Measurement of Surfaces. The Construction of Ladders, Box Stairs, Dog-legged, Open Newel. Cylinder, Circular and Elliptical Staircases. Roofing—Hip, Valley and Jack Rafters. Purlins, Splayed Work and Bevels for the same. Transverse Strength of Joist and Beams, and easy formulas for their safe load. Also Excavators', Stone and Brick Masons', Plasterers' and Carpenters' Memoranda; with a variety of miscellaneous information, useful in the practice of the Architect and Builder; together with a Glossary of Arichtectural terms, and General Index.

The author states that the apprentice who studies these plates one at a time, and draws each figure to a larger scale, either quarter, half or full size, applying leisure time in this way, will be assured of success. Strongly bound in leather, pocket size.....................**$2.50**

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These two volumes are specially complete and useful for carpenters and builders, giving a selection of tasteful designs of prevailing styles of suburban homes, together with their floor plans, elevations and constructive details, showing interior and exterior finish, and drawn to convenient scale.

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