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IF YOU do not find these books exactly as represented (see Pages following Pages 18 and 114) or if for any reason whatever you do not wish to keep them after having had the Free Use of them for 5 days, I personally Guarantee to take them back, paying all carrying charges, and to refund your deposit. I furthermore guarantee to include with Every Set of these Books the Special Premiums and Privileges given in connection with this Great Offer.

Ira A Radford

EDITOR-IN-CHIEF.

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It is the Atkins "Four Hundred" and the King of the Saw World. It is unquestionably the finest finished Hand Saw that has ever been made. The Blade is of Silver Steel, it is Taper Ground, extra thin and mirror finish. The Handle is of solid Rosewood, Perfection Pattern and fitted with Silver Plated Screws. It comes in an individual box, enclosed in a flannel bag.

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Exclusive Atkins Features

Atkins Silver Steel Saws are preferred by the finest mechanics everywhere on account of their High Quality and scientific construction.

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Write us to-day (enclosing ten cents in stamps to cover postage) and we will send you free a good strong nail apron together with a great deal of useful information in regard to High Grade Saws, how to buy and use them to the best advantage. It will pay you to write us.

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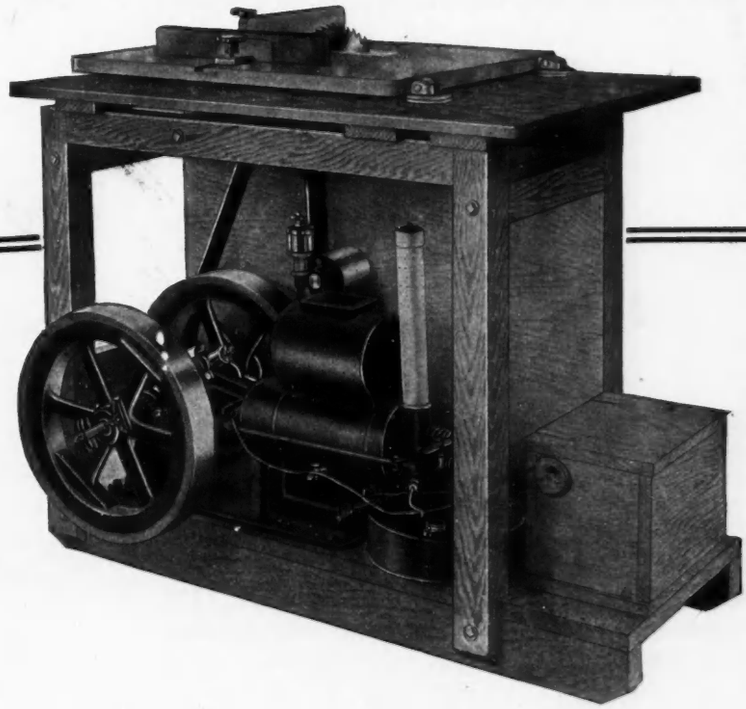

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Experience shows that the Weber sells itself on sight. One Weber in a town means that before long every contractor and floor layer in the neighborhood will throw away his old machine or quit doing hand-work and buy a Weber. This fact has been demonstrated time and time again.

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Gentlemen:—Received the scraper O. K. on the 7th. I used it 1½ hours and in that short time cleaned more floor with it than I could have done in a day by hand. The work was much better too.

I am thoroughly satisfied and believe the WEBER will do all you claim for it. When I hear of any contractor needing a floor scraper I'll tell him what the WEBER can do.

Sincerely yours,
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PAID FOR ITSELF ON FIRST JOB

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We do not know that other makes of scrapers are not all right, but *we do know* that the Weber Double Acting Floor Scraper *is* all right. Furthermore it has more than paid for itself by the saving of time and labor on the first job. It has given entire satisfaction in every way.

Yours very truly,
FRAZER BROS.

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Yours respectfully,
W. H. BRISTOL,
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FILL OUT THIS COUPON AND SEND IT TO ME NOW

Don't lose any time if you want to be the lucky man in your town to get the special introductory price. Act quick. Send me the coupon at right, before somebody else does. The first coupon received at this office gives the sender an option on the one Weber Scraper at the special discount price. This offer is open for a limited time only. Tomorrow may be too late. Send me the coupon today—NOW—get your letter in the next mail.

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Gentlemen:—I had under way the remodeling of a large two-story house, the second story to be used for a Private Hospital, and for that reason must have an even temperature. The local dealers, also one city party had quoted price on hot water. My attention was first attracted to you by an advertisement noticed in some magazine. I wrote asking about your estimate and then upon your request I sent you a rough plan of the house. I soon received a blue-print plan of house with location of radiators in each room, and also optional location, and lump price of all materials needed for the plant and setting up. This looked all right, but you were a new firm to me and I did not feel much confidence so went to see the only other plant of your make in the state, at Claremont.

After studying the matter some days I signed the contract. The locomotive boiler appealed to me as applying the heat to the best advantage, therefore was the one ordered. In a reasonable time the material came and I think I answered more questions for the villagers on the day we moved the boiler to the house than any other day since I passed my final examination in college.

We laid the pipe out each size by itself flat on concrete cellar floor, then slid the boiler down the rollway into the cellar on skids and soon had it in place. I had one man to help me and neither of us had had any previous experience in this kind of work. We followed the instructions carefully and once clear in mind there was no trouble.

Well, we got the plant ready to run in less than eight days, the whole fifteen radiators having 940 ft. of radiation.

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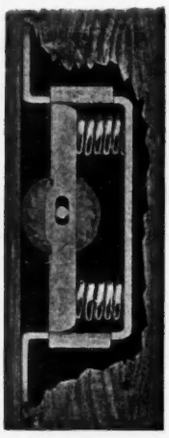

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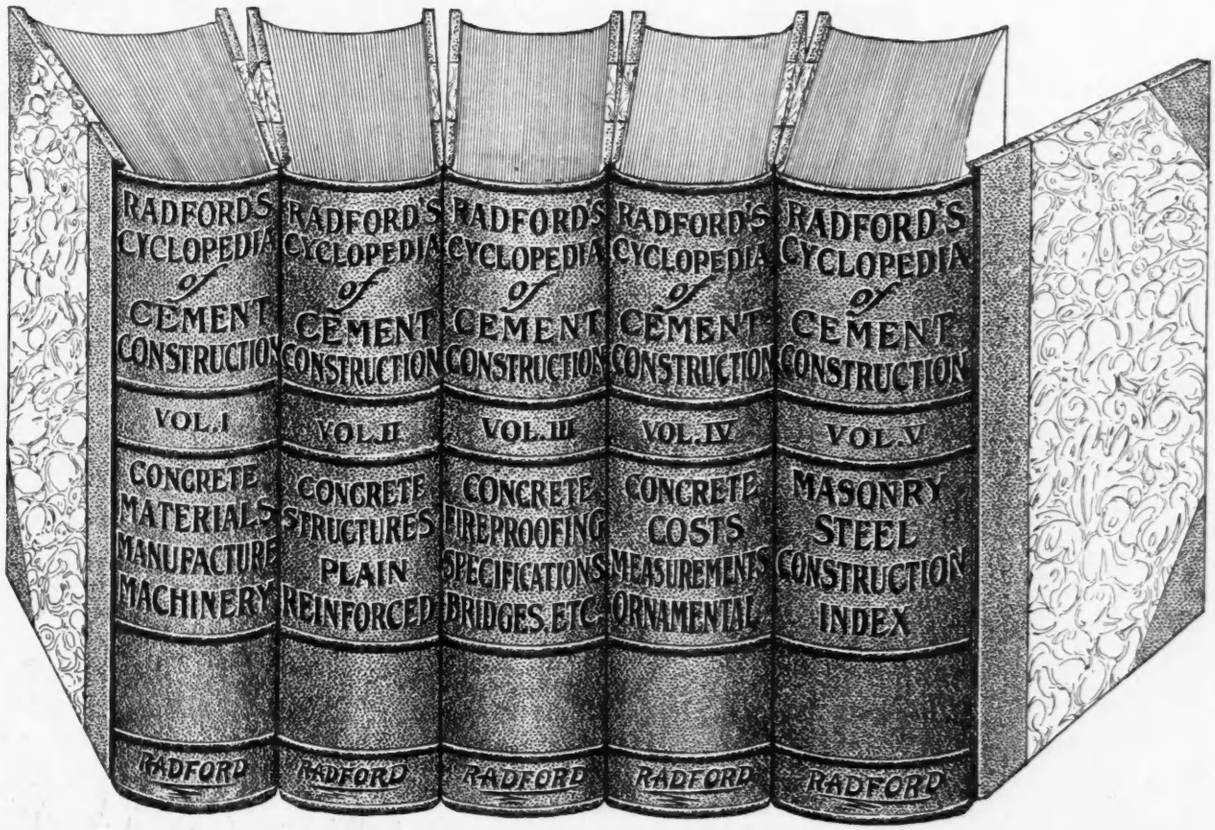

Radford's Cyclopedia of Cement Construction

A Practical Working Guide to the Intelligent Use of Cement, Concrete, and Structural Steel

(2,250 pages; 1,500 illustrations; completely indexed). As necessary to the Carpenter and Builder as to the Stone or Brick Mason or the Cement Man; to the Home Owner and Builder as to the Architect or Engineer; to the Farmer as to the City Craftsman of the Building Trades in general.

Concrete is now used everywhere, for all sorts of construction work—from large residences to small cottages or bungalows; from office buildings and factories to barns, silos, and water-tanks; from bridges and culverts to sidewalks and curbs and fence-posts; from breakwaters and dry-docks to hen's nests, feeding troughs, and garbage cans. It has triumphantly risen above prejudice and doubt to an assured place as one of the most important building factors of this great age of progress. Any failures in the past have always been due to ignorance or carelessness. Concrete is transforming the very face of things; it has already worked a revolution in building methods, and is

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As an ambitious craftsman or engineer, or even as a progressive citizen, you owe it to yourself to be posted on this great vital subject—the different kinds of cement and concreting materials, the proper methods of proportioning and mixing concrete, and the latest approved methods of using it in various forms of construction. You should be able to build a concrete foundation or wall, lay a concrete sidewalk, etc., and be able to tell good from bad in concrete work. These books dispel all mystery about it. Concrete **need be no longer a monopoly in the hands of a few well-posted men.** With the help of Radford's Cyclopedia of Cement Construction, you can do all the ordinary work of the Concrete Engineer or Cement Man, and without any deep mathematical calculations.

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Not a collection of pretty pictures or tales of fiction, but five great big volumes full of the soundest k instructio livest subject in the world today—**the uses of cement and the application of concrete to modern building construction.** a page is w theoretical discussion. The work is **practical** throughout. Only the best authorities on cement and the mos ert enginee concrete and structural work were asked to contribute to it. It thus represents the best fruits of the highest and embodie very cream of the world's latest information on this great subject. The work represents an investment o over $100,000 in money and several years of the most painstaking labor.

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Partial Table of Contents

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Origin of Portland Cement
Ancient and Modern Concrete
Advantages of Concrete
Development of Cement Industry
Dictionary of Terms

Materials and Manufacture of Concrete
Common and Hydraulic Lime
Cements (Portland, Natural, etc.)
Aggregates (Sand, Gravel, Crushed Stone, etc.)
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Mixing by Hand and Machine
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Cost of Concrete
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Expansion, Contraction, Hair Cracks, etc.

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Waterproof Paints

Concrete Blocks and Brick
Cement Mortar
Stucco and Plaster
Hollow Tile

Concreting Machinery and Tools
Crushers and Grinders
Separators and Screens

Concrete Mixers
Automatic Measuring
Hand Tools
Engines, Hoists, etc.

Concrete Block Machines
Kinds of Blocks (Hollow, Two-Piece, etc.)
Number of Blocks Required
Mixing, Moulding and Curing
Cost of Blocks
Brick Machines
Tile, Pipe and Shingle Machines

Plain Concrete Construction
Forms (Wood, Metal)
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Cement Houses
Poured, Block, Brick, etc.
The Edison Poured House
Plaster and Stucco
Foundations
Floors and Walls
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Roofs and Chimneys
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Sills and Lintels

Fireproof Construction
Hollow-Tile Walls
Metal Lath and Furring
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Insurance Rates

Concrete Sidewalks
Curbs and Gutters
Pavements and Driveways

Artistic and Ornamental Use of Concrete
Coloring Concrete
Surface Finishes
Art Tile and Mosaics
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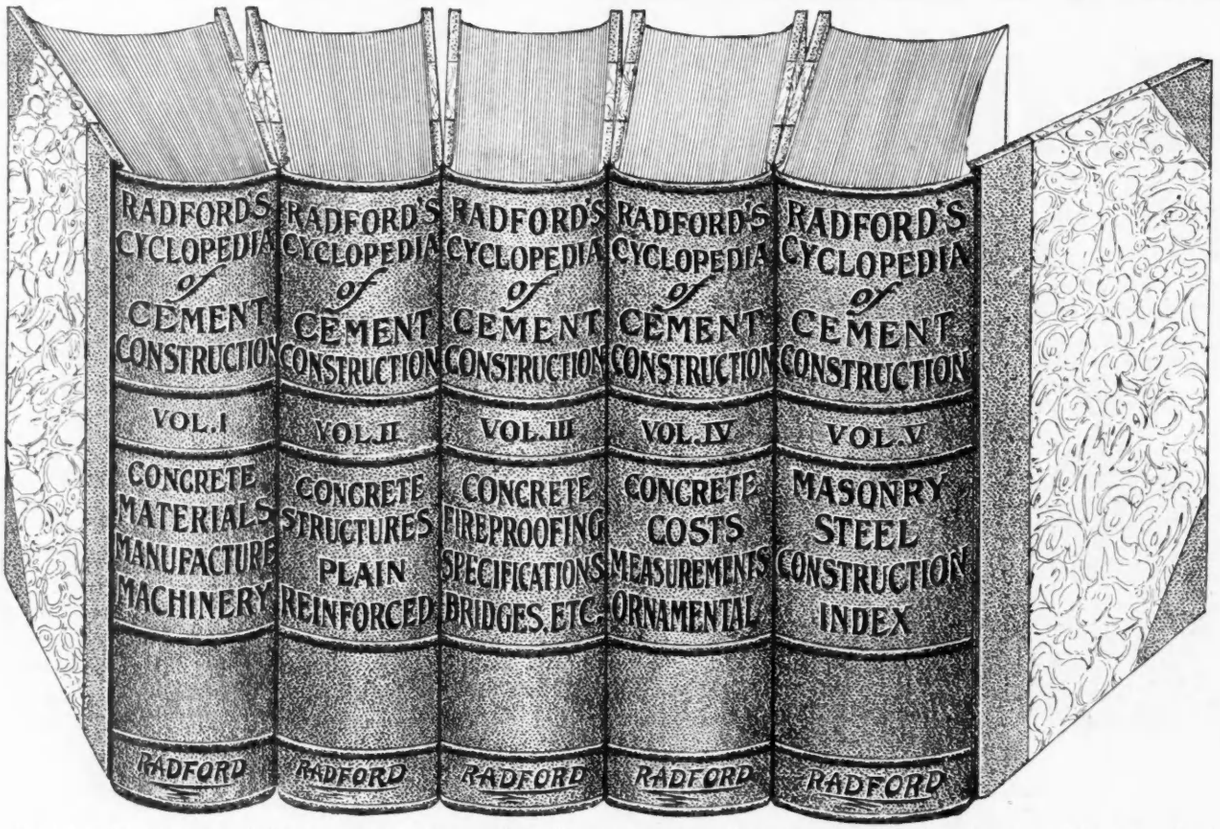

For Concrete Workers; Steel Workers; Carpenters and Builders; Contractors; Architects; Civil, Structural, and Sanitary Engineers; Draftsmen; Masons; Stonecutters; Plasterers; Sidewalk Men; Pavers; Roofers; Plumbers; Waterworks, Sewer, and Tunnel Constructors; Bridge Builders; Home Owners; and the Building Trades in General; also Schools, Colleges, and Universities.

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American Carpenter and Builder

Entered as second-class matter July 1, 1905, at the postoffice at Chicago, Ill. under the Act of Congress of March 3, 1879.

Published on the first day of each month by

AMERICAN CARPENTER AND BUILDER COMPANY

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NEW YORK OFFICE, 178 FULTON STREET

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VOL. X NOVEMBER 1910 NO. 2

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Better than to Cut Prices

"IT may be a good thing sometimes to take work in a slack season at reduced prices to hold good workmen or to keep the 'pot boiling,' as the saying is, but the principle seems to be wrong and will undoubtedly work evil in the end," said a contractor for interior decorating. "I find it a better and more profitable policy to work up trade for the quiet season amongst customers who want a good job and are willing to pay a fair price. I try to show them that they can get better and more satisfactory work when we can give time to it and besides we have naturally a better class of men available at that time than when we are rushed. A little extra attention in the way of protecting the floors and furniture appeals to the ordinary housekeeper and a little advertising of this kind will sound the praises of the decorator for a long distance. I am able to keep tolerably busy in the slack season, hold my men and make a fair profit."

✤

WE are publishing this month a second article on Varnish, by Mr. Charles H. Smith. This follows the exceedingly instructive and interesting article in the October number concerning the origin, history and processes of manufacture of varnish. In the present article the author discusses the properties and uses of varnish in modern work. Mr. Smith being connected with the Technical Department of Berry Brothers, Limited, is well qualified to write authoritatively on this subject. And it is by their courtesy that both of these valuable articles are published.

✤

Plumber's Interesting Discovery

PLUMBING involves the public health, and there seems to be no reason why the requirements with regard to it should not be enforced. The Plumber and Steamfitter cites an instance of a man who rented a house and store in New York not long ago. He happened to be a plumber, and on taking possession naturally took a look at the plumbing in his new home. Here is what he found: The hot water pipe from the top of the range boiler was left hanging in the partition, while the pipe from the hot water tap in the sink was connected to the cold water tap in the adjoining house. The cold water pipe connected with the tap in the sink was found with an open tee in the partition behind the baseboard. All bathroom fixtures leaked, owing to loose couplings. The gas pipe was not carried to the meter, being left hidden in the partition.

This man may consider himself lucky that his gas meter was not connected with the water pipes. He was fortunate in being a renter and not a buyer.

The rapid expansion and growth of our cities is a source of civic pride, but it brings with it the temptation to build hastily rather than well.

Remodeling Stores Into Small Theaters

VALUABLE IDEAS AS TO DESIGN, CONSTRUCTION AND BEST METHODS OF DOING THIS CLASS OF WORK WHICH IS VERY OFTEN REQUIRED OF BUILDERS

By Leonard Lytle

ALMOST all towns with a population of two or three thousand or more have, or soon will have, a moving picture theater. The majority of these places find quarters in store rooms; and builders are called upon to do the necessary remodeling.

Most of those who start these shows are inexperienced investors and are compelled to rely on the skill and genius of the builder whom they employ to remodel a dingy store room into an attractive place of amusement.

The room should be at least 18 or 20 feet wide and 60 feet long, the ideal size being 24 by 90. The ceiling height is important on account of ventilation and should be 14 feet, though 16 or 18 is better. The room should have side or rear exits, which, of course, must be marked and doors hung so as to *open out*.

The store front is always removed and the room closed in with a partition placed about 14 feet back from the front. This gives the wide vestibule which is so necessary in an attractive place besides furnishing a shelter for the patrons.

If the front of the building is supported on a beam so that no posts are required, so much the better, for one or two posts directly in front of a handsome entrance will counteract the effect of any amount of decoration. Frequenty the posts are spaced irregularly, which makes the trouble worse. This is something that should be looked into before the room is rented. If the beam over the store front is not self supporting, one should be put in its place if possible, so as to do away entirely with columns. Figure 1 shows how the writer got around the difficulty of changing a post by designing a front where the column is concealed in one of the pillars supporting the Moorish arch. On another job where it was impossible to remove a column the same method was used only that a different design was made. The front of a moving picture theater is without doubt the most important part of the "show shop," and it is here that the wise show man will be lavish with his money.

Fig. 1. Entrance Designed to Hide Center Supporting Post

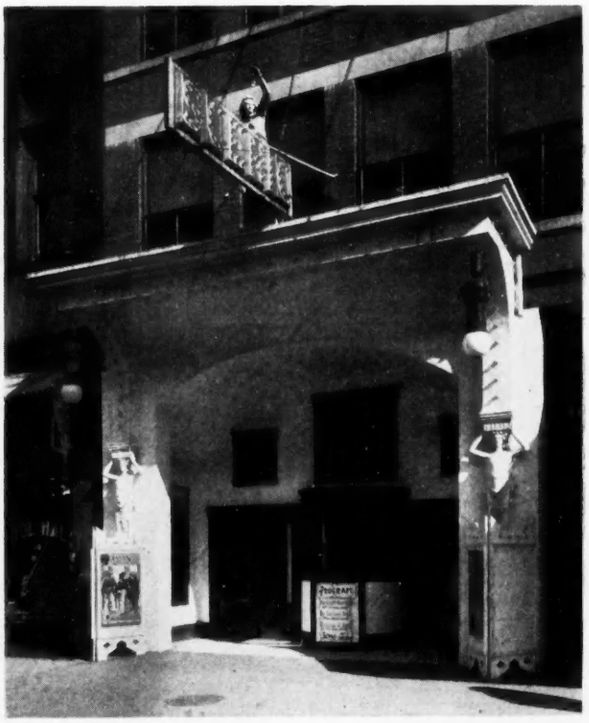


Fig. 2. An Unobstructed Entrance with Plaster Ornamentation

I have known many a man who started a show in a store room where the glass front was left in place and who gave good entertainments and kept an orderly house, but was forced to quit in six months through lack of patronage. It takes more than good films and good illustrated songs to get the dimes. An attractive front, plenty of light, good seats, and electric fans are the mainstays of a successful paying theatre. The front shown in Figure 1 is built of 2 by 8's so as to give the arches a good thickness. After covering the street side with sheathing, plaster board was nailed on; metal lath was used on the reveals of the arches. Before the back of the front was put on the electric wiring was done, holes being bored from the front side, thus placing the lights uniformly and at regular distances. Cement mortar was used for plastering and left with a sand finish, and the entire front and

lobby was given several coats of flat white paint. The bottoms of the pillars are made of wood.

It will be noticed from the picture that the floor is raised above the sidewalk. On account of the necessity of raising the seats at the rear end of the theater, any gain that can be made in the floor height at the entrance helps to make the seats in the back of the room more accessible. It is not practical, however, to gain more than 12 or 14 inches as any greater incline is undesirable. In this theater white marble slabs were laid in the entrance, the exposed edge at the walk being protected with an angle iron anchored into the concrete. The ticket office is in the center with double doors on each side, those on the right being the entrance doors, the others for the exit. Over the ticket office is an open balcony which holds the electric piano, thus keeping it out of the way and leaving

Fig. 3. Attractive Front of Galvanized Iron

the entrance clear. On the other side of the partition above the ticket office is another balcony which holds the iron house containing the picture machine. A narrow steep stair leads to this balcony.

The front is covered with electric lights of small candle power and in different colors so placed as to outline the arches. At night the effect of the lights against the rough flat white background is charming. Before this front was built, the place had been a losing proposition for several months. Good shows were given but people walked by the bare looking lobby. In order to gain height the owner had built a long incline raising about three feet to make it easier to get into the rear seats. The ticket office and partition was placed about 25 feet back of the front of the building. Then there was the iron column to one side of the center, making the whole thing look lopsided.

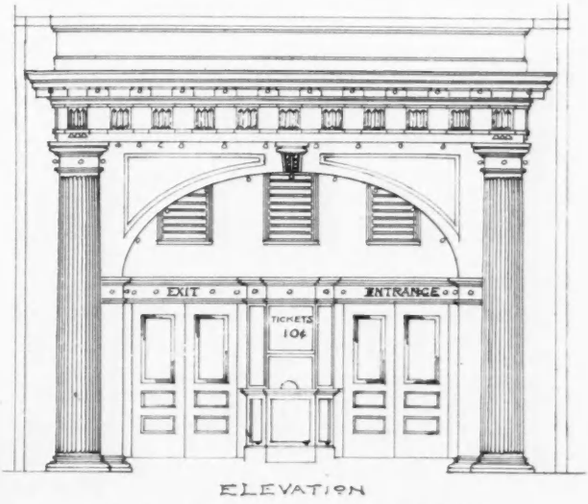


Fig. 4. Suggested Design for Simple Front

The place changed hands and was closed for one week during which time the new front, ticket office, balconies, etc., were installed. The improvement cost about $1,000.00, including painting, tile floor in lobby, bevel plate mirrors, etc., but not including wiring. This item alone cost $300.00, but covered the complete rewiring of the whole house. This place has been a little gold mine for the new owner who had the nerve to invest his money in a fine front.

If possible, the floor of the store room should be lowered to the proper slope, but this is expensive and often impossible on account of steampipes in the base-

Beautiful Little Theater with Plastic Figures and Ornaments

ment. The theater shown in Figure 2 has a floor built especially for the purpose. While the building was being erected, the showman leased this store room and had the floors built just as he wanted them. The lobby is of the same level as the walk and has only a slight slope. No posts were in the way here so the front was left wide open. The projecting part was made and wired at the shop and then erected and firmly anchored to the I beam in the front part of the building. The figures were purchased from the Decorator's Supply Co., of Chicago, and at a very slight cost.

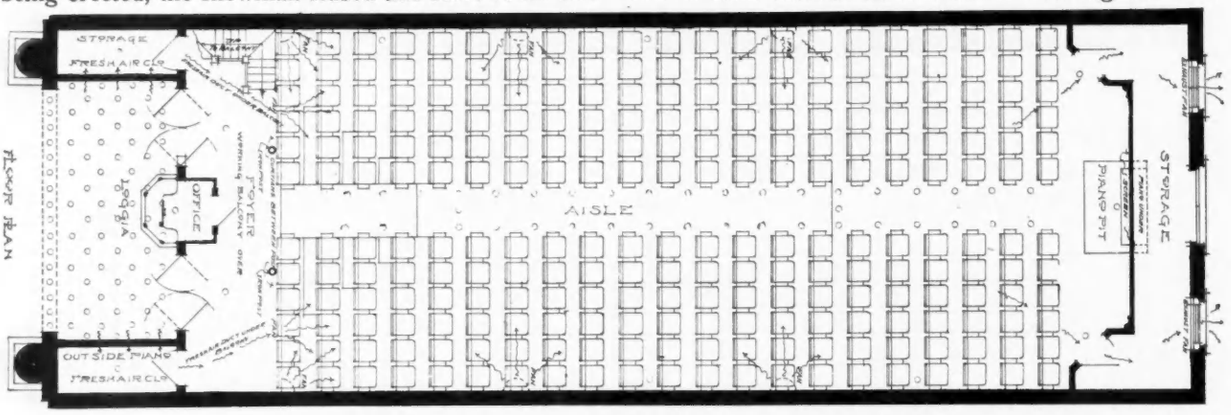


Fig. 5. Floor Plan showing Also Arrangement of Lights and of Ventilators

The plastering was done with Keene's cement over metal lath and plaster board, and the front is painted white. The water from the roof of the projecting part is carried down in conductors back of the figures. The ticket office is made round; and, there being no outside balcony, the electric piano is placed on the floor where it is somewhat in the way. The bulletin boards at the bottom of the figures were placed there afterwards when objection was made to placing them on the curb. These boards are made the right size to take the standard size posters furnished by the film manufacturers. The bottom part of the ticket office is used for the programs. This place has plate-glass doors, opening into a vestibule and solid doors opening from there into the theater. This prevents the loss of heat during cold weather.

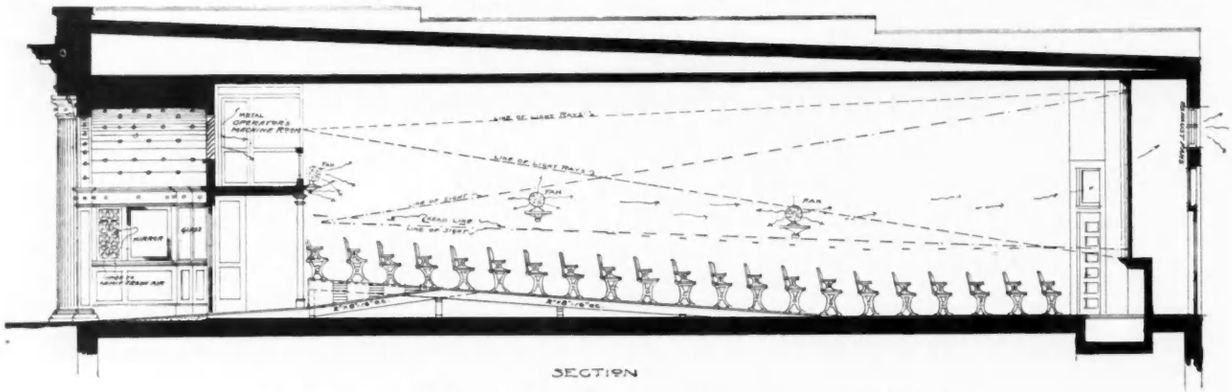


Fig. 6 Section Showing Sloping False Floor—Notice Picture and Sight Lines

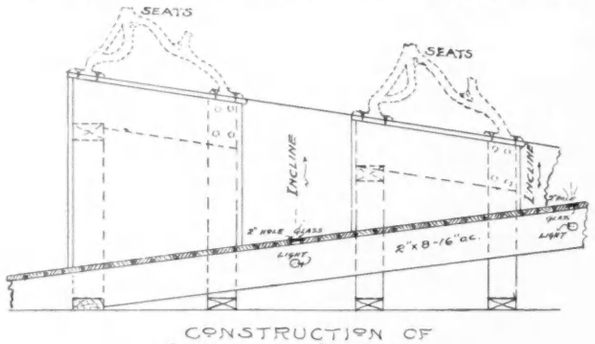


Fig. 7. Detail of Floor at the Rear Aisle]

The lighting of the inside is made more attractive than usual by means of fine Japanese lanterns hung over the incandescent lamps. Exhaust fans renew the air every few minutes. The screen on which the pictures are shown is built up of 2x4's and plastered with a troweled finish on one side. A canvas curtain moved more or less and a picture shown on it does not seem as steady as one on a solid plastered wall. The owner of this place has spent about $5,000.00 on improvements, which shows the large amount of money that can be invested in a moving picture business.

Figure 3 shows a front that is made of galvanized iron. This was made up at the cornice shop and, after being brought to the job, was installed in one day. The place opened for business six days after the plate glass was removed. Considerable night work was necessary, however, to do this. Galvanized

iron makes a very durable material for a front and is easily installed after being brought to the job.

Figure 4 is a suggestion for a theater front which can be built of galvanized iron or plaster.

Figure 5 shows the ideal floor plan and arrangement of an up-to-date moving picture house. Note that each aisle is marked by a small red light placed under glass in the floor. When a person first enters the dark room, these lights assist in finding the aisles. The piano pit is placed below the level of the floor to keep the player out of line of vision.

Figure 6 shows a section which gives a good idea of the raised floor, balcony and ticket office. It will be noticed that the three rows of seats at the rear are above the level of the main aisle. Steps are necessary to get into the seats, and as there have been many accidents, the showman puts red lights back of the risers which have holes bored in them. This construction is shown in Figure 7.

All moving picture films used to be very inflammable and could be ignited from the heat of the arc light if the operator stopped turning the reel. Many disastrous fires and panics resulted from such accidents. Some of the manufactures now claim to make a film that will not burn, but, even if these films are used, the large open arc light is a source of danger, and the underwriters require all moving picture machines to be operated only in small sheet-iron houses with automatic doors. All the small openings must be covered with hinged doors attached by ropes and pulleys to the main door. Whenever the film ignites, the operator merely steps out of the house and closes the main door, which automatically closes all other openings. The fire is entirely shut in where it can do no harm and does not cause a panic as the audience knows nothing about it. Any tin or cornice shop can make such a house and there are no special rules governing their construction. The underwriters merely require that they be built entirely of sheet iron, bottom, top and sides, and have automatic doors.

Elaborate Front for Large Theater

Architectural Terra Cotta

WHAT TERRA COTTA IS AND HOW MADE—THE MODELING OF ARCHITECTURAL TERRA COTTA—IT'S USE FOR THE DECORATION OF MODERN BUILDINGS

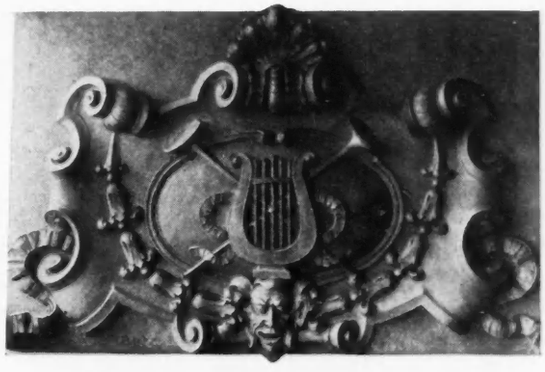
TERRA COTTA—which means literally *cooked earth*—is a burned clay product that has come into prominence in modern building construction for two reasons. In the first place it can be moulded into any form and given any color or surface finish desired. This has pushed its use for ornamental effects. And in the second place it is fireproof. This has brought it into high favor structurally, especially in connection with steel construction.

Architectural terra cotta is the name given to this material in its ornamental forms for use on the outside of buildings. This distinguishes it from terra cotta hollow tile, which is used structurally, within the building, for walls and floors and for the fireproofing of steel beams and iron columns.

In modern work builders are concerned with both these forms of terra cotta. The present article deals more particularly, however, with the architectural, the terra cotta ornaments used so effectively in connection with stone, brick or concrete construction and suited to both small and large work.

The clay used in the manufacture of terra cotta is a shale which has to be first placed in a "dry pan" and crushed. It is then carried to a sifter where all the coarse particles are removed. The pulverized clay is then carried to a "pug mill," where it is mixed with sufficient water and made plastic. It is then ready for the moulds, which have previously been prepared by expert workers in accordance with carefully designed working drawings. These drawings are all made with an allowance of three-fourths of an inch to the foot to provide for the shrinkage of the terra cotta in the operation of baking.

The moulds for special designs are always made in clay, as it works more easily, and permits of greater accuracy. The ordinary moulds are made of plaster of Paris. With the completion of the moulds they are



Terra Cotta Medallion Typifying Music

taken to the moulding room, where the soft ground shale is pressed into them and the designs are made ready for the coloring department. Modern methods have been installed here, and the coloring is applied with compressed air sprays. Where the terra cotta

"Granite" Terra Cotta Capital for Bank Building, Sterling, Ill., F. P. Drukelburg, Architect

is to be enameled the pulverized enameling material mixed with water is applied with the spray just as are the colors, and with no more difficulty.

The green terra cotta is then removed to the kiln rooms where it is permitted to dry out for twenty-four hours before being placed in the kilns to be baked. The kilns are of the up and down draught type, permitting only baking by radiation, as any direct contact with the fire would ruin the face of the terra cotta. The burning requires six days; and four days is allowed for cooling off. The terra cotta is placed on racks of fireclay, and the heat is driven all around it.

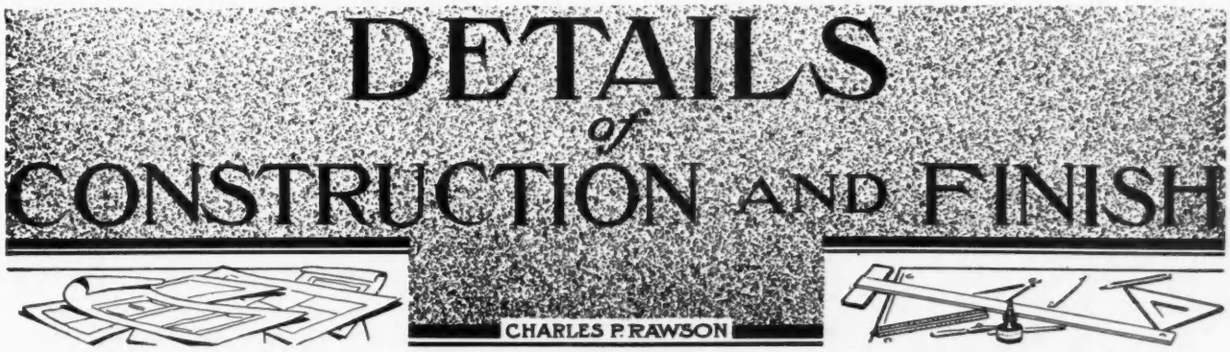
When the material has been removed from the kilns it is taken to the surfacing room, where all the rough and uneven edges are removed, and the parts made perfect so that there will be no bad or uneven joints when it is placed on the building. Guided by the blue prints, each section is marked and numbered just as it is to go in the wall of the structure, thus preventing possible errors. The entire operation is one of more than usual interest, and shows the progress made in this branch of building in the past few years. While it is true that architectural terra cotta has been in use over forty years, it is only in late years that it has reached its present perfection.

There has been an increasing demand recently for structural materials that combine durability, attractive-

Pilaster Cap of Light Cream Dull Enamel Terra Cotta for Bauer Building, Vancouver, B. C.

ness and fire-resisting qualities. Architectural terra cotta combines these essentials, and to some degree even others; so that there is reason for the notable increase in its use. Besides it is comparatively cheap. Fire-resisting materials are bound to find greater favor in the coming years, as this is one of the vital questions now being considered by every one interested in building.

Large Terra Cotta Ornament for the Douglas Park Auditorium, Photographed at the Works of the Northwestern Terra Cotta Co., Chicago



Details for Novel Door Hood and Window

WORKING DETAIL DRAWN TO LARGE SCALE FOR A LATTICE DOOR HOOD AND FOR A "SLIP-HEAD" WINDOW OF INTERESTING DESIGN

IT IS by no means easy to find many examples of thoroughly well designed and, at the same time, inexpensive small houses; but that their number is increasing there can be no doubt. The architectural education of the American people has made great strides in the last few years and the increase in good houses is due largely to the increasing number of people who are coming to know that the worst kind of economy which a housebuilder can practice is the attempt to save architect's fees. Money spent on a good architect brings more satisfactory returns than the same amount of money spent in any other way. The client, having selected the well-trained architect, should give him a chance to do his best work, trusting to the latter's judgment in all essential matters. By this method he always has a good chance of obtaining a dwelling of some character; he is sure, at least, of getting the best out of the architect he has selected.

Details for Lattice Door Hood

Occasionally one sees a charming bit of design such as the lattice porch or hood recently erected over the side door of a house at Concord, Massachusetts, a house representing the type built in many New England towns in the eighteenth century. Such a porch when painted green and resting against the white body of the house is unusually picturesque. Complete working details are given on the following page.

Details for "Sliphead Window"

We have had calls for details for a "Sliphead Window," the name by which they are known in the South, where they are largely used. We have selected for illustration a Colonial type in a brick wall with a small iron balcony before it. This type is capable of many variations in construction. They can be equally well used in a frame building, and in the South are largely used for entrance from the porches or "galleries" to the various rooms.

Complete working details, including internal and external elevations, plans, sections, with enlarged drawings of the different parts, are given herewith (on second page following). Attention is called to the hinged head which is lifted by the sash when raised and which falls again into position by its own weight as soon as the sash is lowered. In case there is sufficient room the framing can be so made that both sash will slide completely up out of sight.

✤

The Ten Best Buildings

Which are the ten most beautiful buildings in the United States? A recent voting contest in the East, of architects and architectural students gave this list: The Capitol and the Congressional Library in Washington; the Public Library and Trinity Church in Boston; Columbia Library, Trinity Church, St. Patrick's Cathedral, the City Hall and Madison Square Garden in New York and the Vanderbilt residence, Biltmore, in North Carolina.

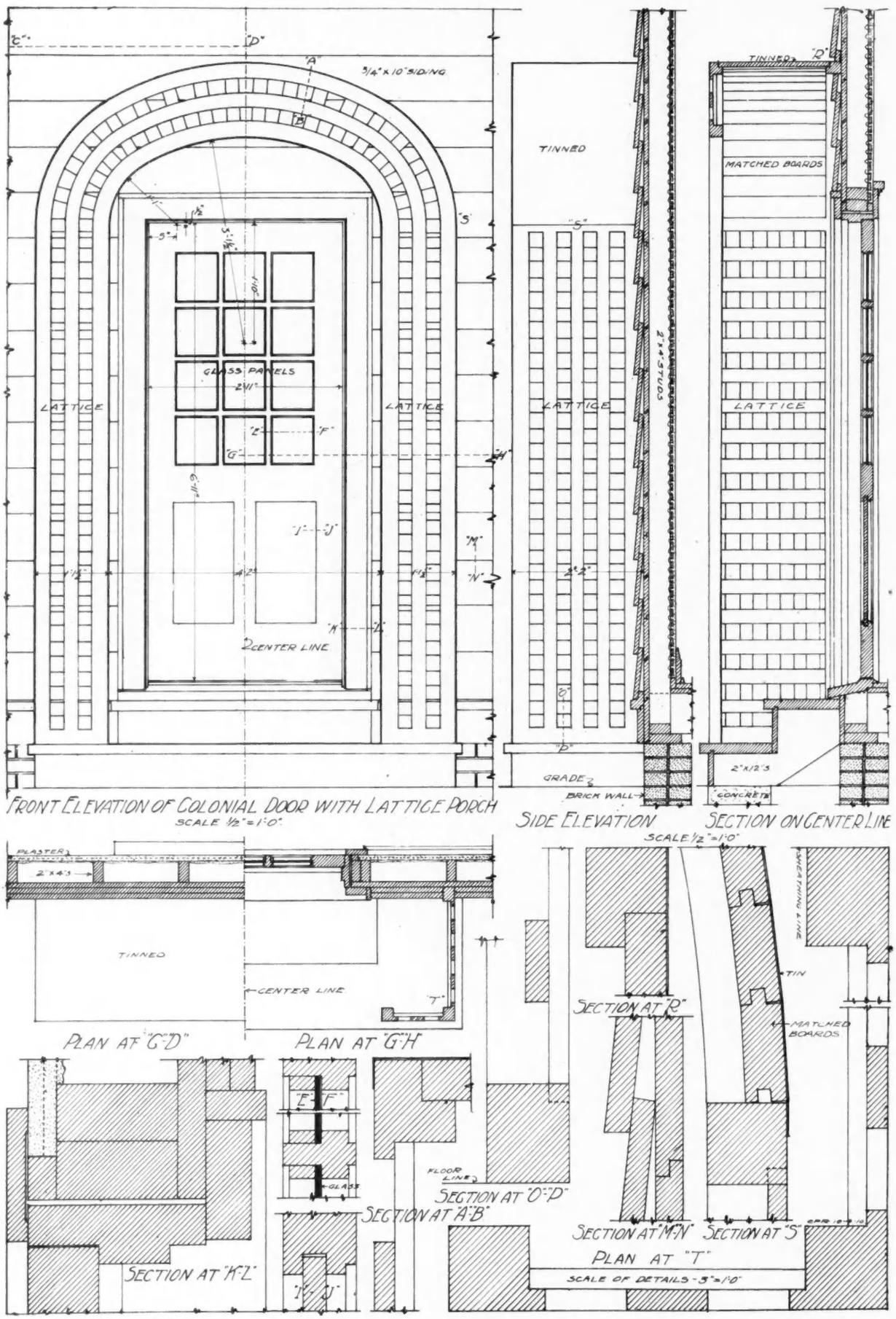
All of these buildings are in the East. Three of them are libraries and three are churches. One capitol, one city hall, one place of amusement and one residence complete the list. Not a single State capitol, or theatre or gallery of art, or monumental museum has a place.

It is hardly likely that the vote taken in the contest was fully representative of the country. It is an Eastern judgment expressed by architects and the favor appears to have run to grandiose rather than to beautiful buildings. A Western vote, or a vote of artists or of amateurs, would doubtless have given a different verdict in several cases.

✤

Concrete Coast Defenses

Recent tests at Sandy Hook of the resisting power of reinforced concrete as a defense against high-powered projectiles confirm the calculations of the penetrating power of the twelve-inch gun. A concrete well twenty feet thick, heavily reinforced with steel beams, was pierced by a twelve-inch projectile fired at high velocity. The blow delivered was sufficient to penetrate twenty-two inches of armor plate, and the reinforced concrete withstood the attacks so well that it will probably be used in the construction of the new coast defense fortifications in the Philippines. A similar attack is to be made with the fourteen-inch gun.



FRONT ELEVATION OF COLONIAL DOOR WITH LATTICE PORCH
SCALE ½"=1'0"

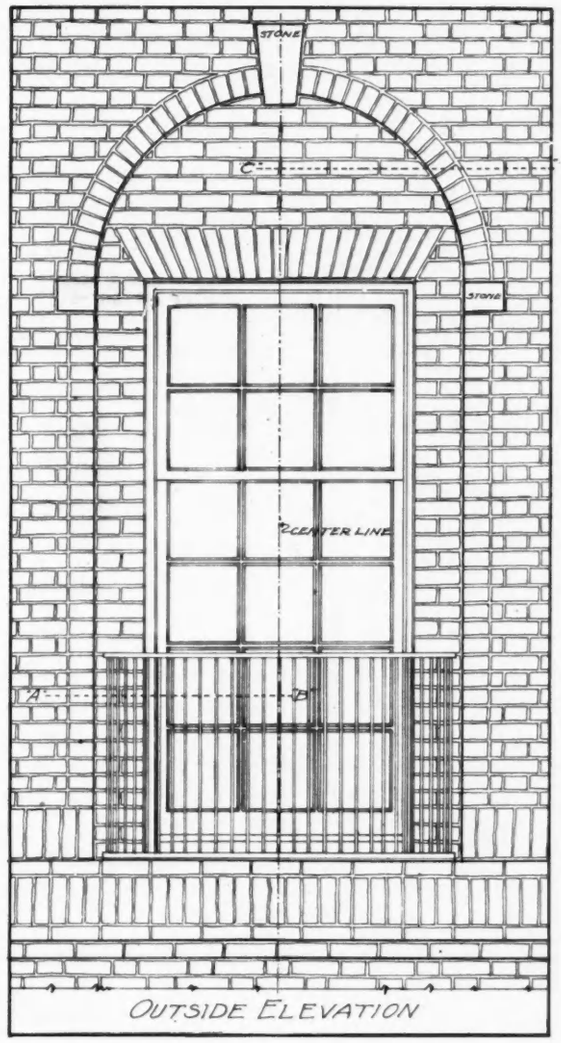
SIDE ELEVATION

SECTION ON CENTER LINE
SCALE ½"=1'0"

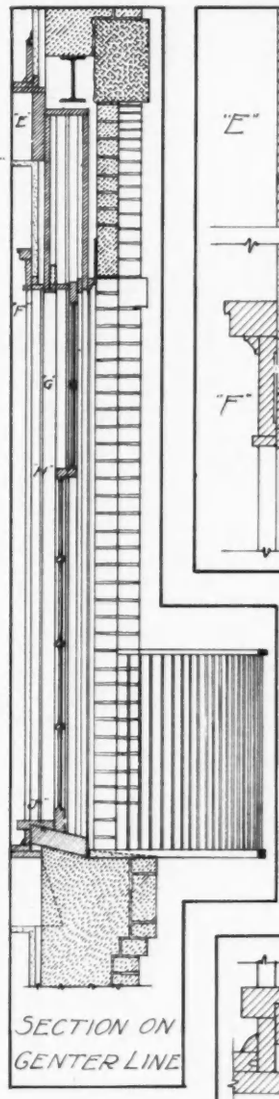
PLAN AT "C"D"

PLAN AT "G"H"

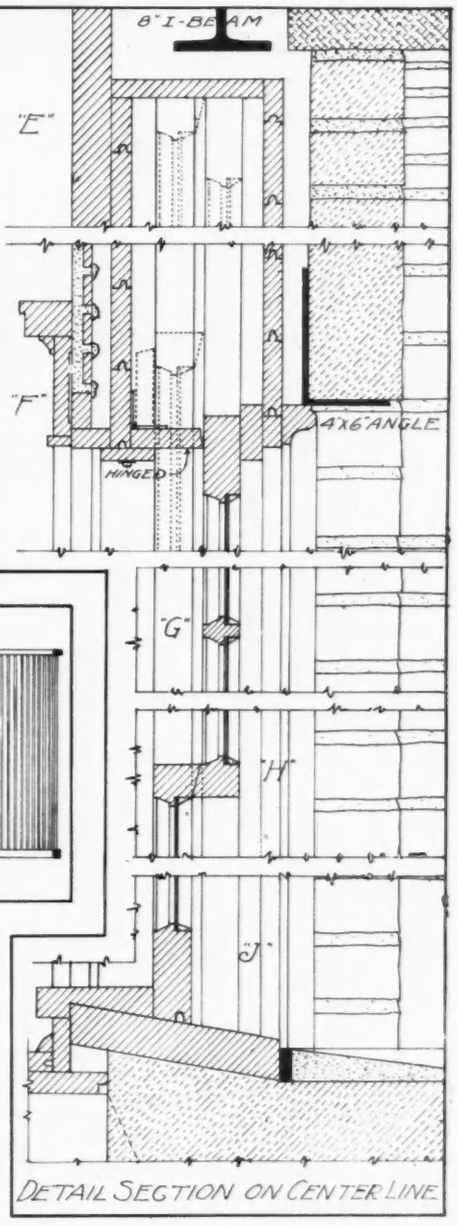
DETAILS OF COLONIAL DOOR WITH LATTICE HOOD



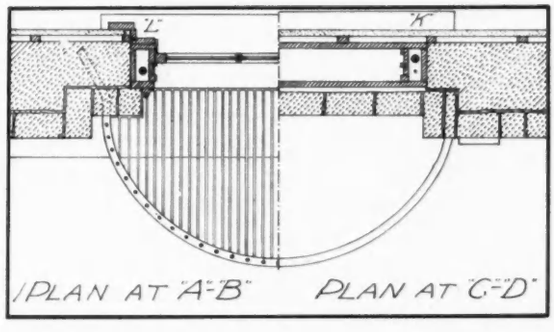
OUTSIDE ELEVATION



SECTION ON GENTER LINE

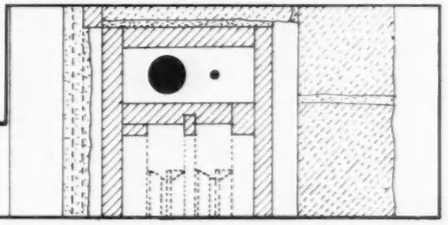


DETAIL SECTION ON CENTER LINE

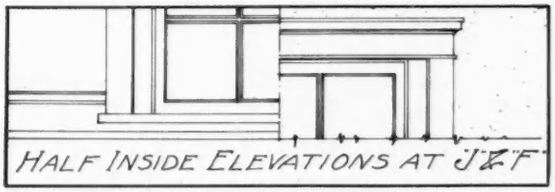


PLAN AT "A"-"B" PLAN AT "C"-"D"

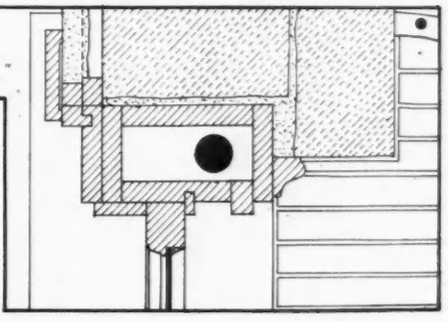
IRON
WOOD
BRICK
STONE
PLASTER
CEMENT



DETAIL PLAN AT "K"



HALF INSIDE ELEVATIONS AT "J" & "F"

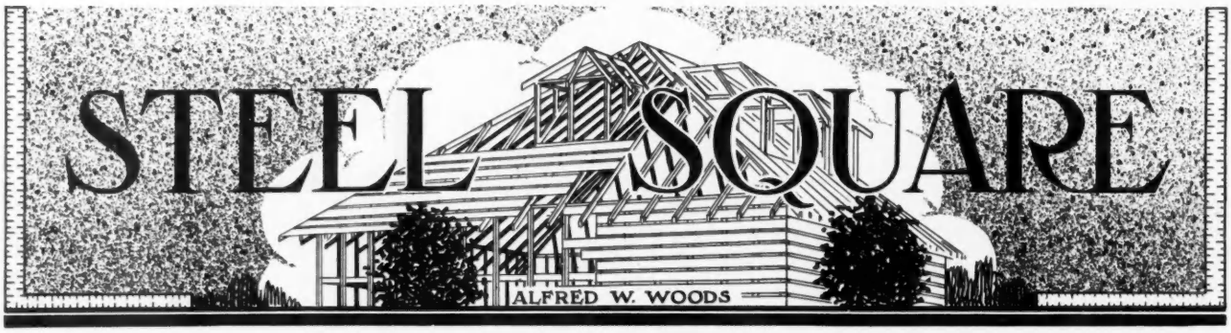


DETAIL PLAN AT "L"

DETAILS OF A SLIPHEAD WINDOW IN A BRICK WALL.

SCALES
ELEV. PLANS & SECT. - 3/8"=1'0"
DETAILS - 1 1/2"=1'0"

C.R.R. 10-18-10.



Problems of Roof Framing Solved

ELEVENTH ARTICLE—EXEMPLIFYING THE SIDE CUT OF THE JACK, AND THE HIP AND VALLEY RAFTERS BY TWO METHODS, BY ONE-TWELFTH SCALE AND BY FULL SCALE TO ONE FOOT

TAKING up the subject where we left off last month, we will proceed to illustrate the side cuts of the jack and hip or valley rafters by two methods in comparison, that is, by the one-twelfth scale (one inch to the foot) and the full scale (twelve inches to one foot) for the one-third pitch for a building fifteen feet 6 inches wide. In this the building is reckoned as being of the regular square cornered type so general in use. However, the reader should remember that the principles governing the parts to take on the steel square are general for any angle the building

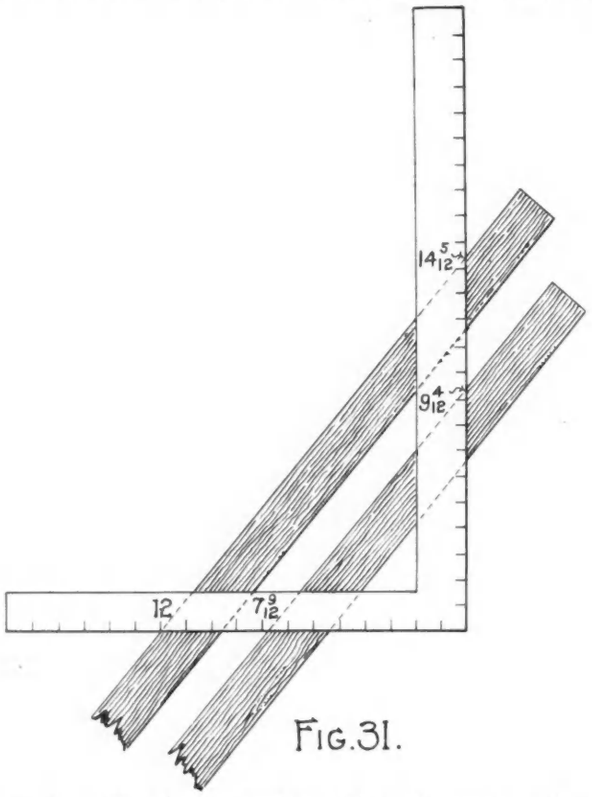


Fig. 31.

may have; but the changed condition of course requires different figures to use on the steel square to obtain the cuts.

Side Cut of the Jack

In Fig. 31, the two methods are shown in connection with the steel square; and it will be seen at a glance that the timbers are parallel and the results must necessarily be the same. Seven and nine-twelfths is used on the tongue because in the one-twelfth scale it represents the distance that the first common rafters must rest from the corner to intersect the same point that the hips intersect at the ridge. In other words, it is the length of the tangent line, as shown in Fig. 32. This length in the square cornered building is equal in length to the individual runs of the rafters. Nine and four-twelfths is taken on the blade because it represents the length of the common rafter for the building in question. The cut will be found along the edge of the blade.

By the second method it is 12 and 14 5/12 on the

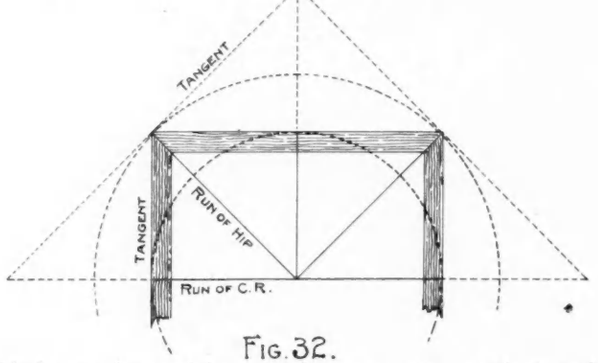


Fig. 32.

blade; 12 is used because it represents one foot and 14 5/12 because it represents the length of the common rafter for one foot run.

Side Cut of the Hip

The same relative parts are taken for the side cut of the hip or valley as for that given above for the jack rafters. There is, of course, a difference in the length of the run which necessarily must be longer than that of the common rafter; because, while it covers the relative space as to the width of the building, it is at an angle which in the case of a square cornered building is 45 degrees. The actual gain over the length of the common rafter is five-twelfths, and for that reason 10 11/12 and 17 on the tongue are used, as shown in Fig. 33, which like Fig. 31 also illustrates the two

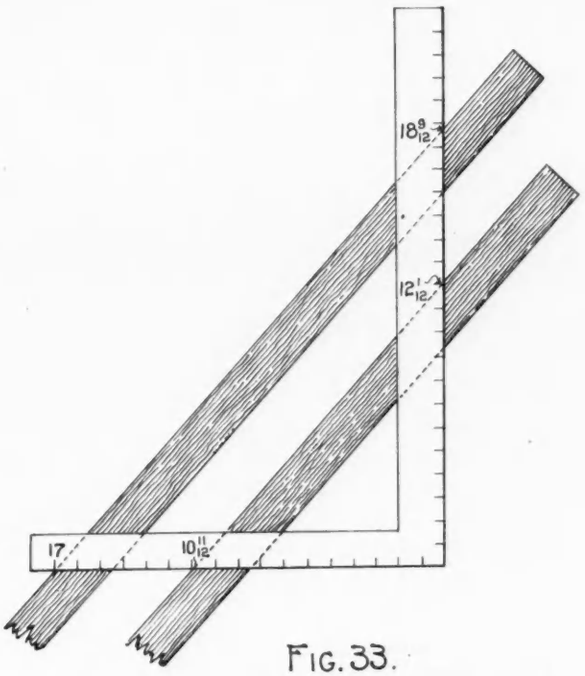


FIG. 33.

methods for obtaining the side cut. The figures shown on the blade in connection with this illustration represent the length of the hip for the respective runs.

Backing of the Hip

The backing of the hip is more often omitted than done. It should be just the reverse; more often done than omitted. There are a number of ways of arriving at this angle, and we have on numerous occasions in connection with our writing for this magazine exemplified them. In this we will simply carry out the two methods as applied to the example in question in connection with the steel square. In Fig. 34 are shown the two methods as follows: Take the rise on the tongue and the length of the hip on the blade and the tongue will give the proper angle for the backing so that its edges will be in the same plane as that of the back of the common rafter. This illustration simply shows the angle across the back from which the amount of wood from the sides to the center of the back should be removed to form the proper bevel. In connection with this it should be borne in mind that the reckoning line for the proper length of the hip or valley should be calculated along the center of its back.

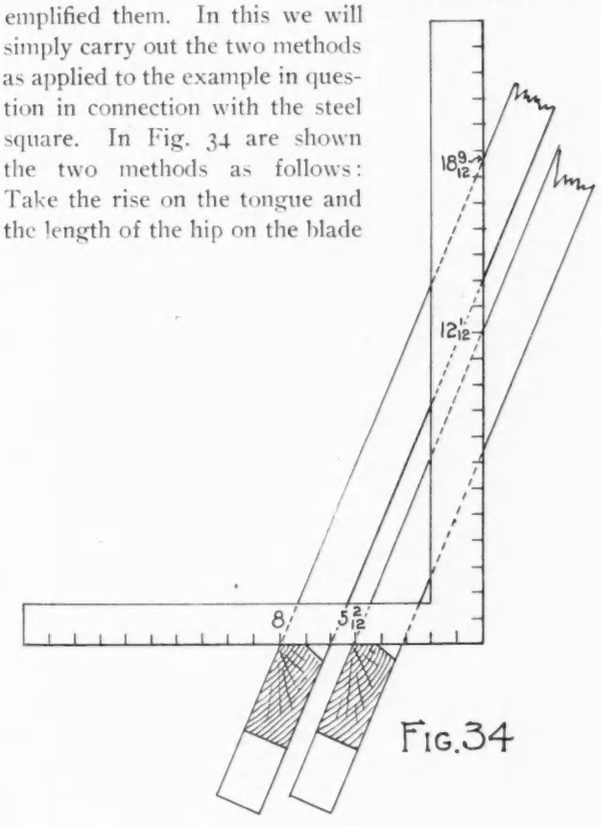


FIG. 34

In speaking of the tangent lines we wish to call attention to an error caused by oversight in Fig. 25 of the September number. As given, the tangent lines are all right for finding the side cut of the hip when the two join each other, the bisecting line being at the half way point between the two, but the illustration in question shows that they rest against a ridge board. This board then forms the bisecting line between the two hips and the cuts are obtained by taking the run say for the left hip and the length of the right hip, and the cut will be found on the side of the square on which the latter is taken, for the right hip and vice versa for the left hip. Thus it will be seen that the tangent for one hip is equal to the run of its mate.

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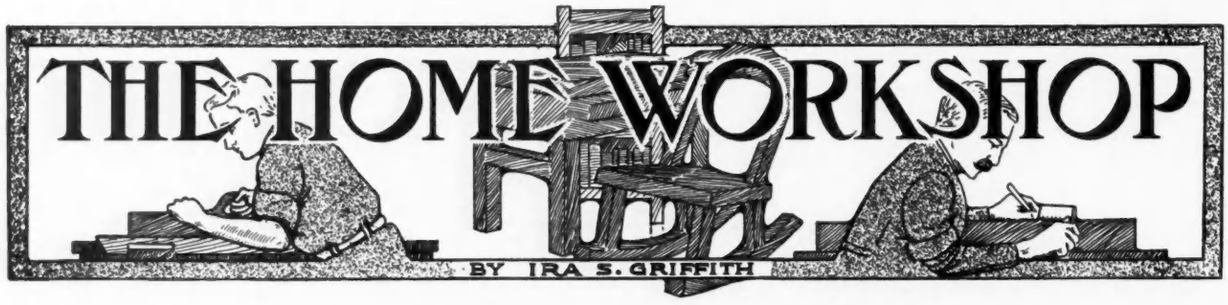
Durable Silo Construction

The silo is one of the things about a farm that should be built right. The common stave silo can hardly be considered durable enough to be a permanent investment. If you are where brick can be had conveniently and not too expensive, I would say build out of hard brick laid with cement, a practical farm silo builder advises. Then plaster it on inside with cement and you have a silo that will last to the end of time. If properly built you will never have to do any repairing, no matter how long you live. For the convenience of putting supports around it I would build it square and then round the corners on the inside, or put in octagon corners, because you can't pack ensilage in square corners sufficient to keep it from damaging. And to brace it, have some timber sawed about 4 by 4 and mortise them together, putting them around about 6 feet apart. However, I don't think they are needed much, except for the door, which I make to run from top to bottom. For the door I use good inch plank cut just to fit crosswise, leaving a groove on the inside. Make all the grooves when the silo is built and then the planks may be put in as the silo is being filled and taken out as it is emptied. When you build your silo you may dig down in the ground as deep as you like, but be sure to get down to good solid earth for a foundation. Some say it is unnecessary to put in a floor, but mine has a cement floor and is very satisfactory. I think that would not be necessary if I had a good clay foundation where the water would not rise. A silo built in this way will probably cost a little more than a wooden one, but then it is satisfactory, and in the end it is much cheaper.



Morris Chair and Foot Rest

COMPLETE DETAILED DIRECTIONS FOR MAKING A BIG, COMFORTABLE MORRIS CHAIR AND A COMPANION PIECE FOR IT, THE FOOT REST

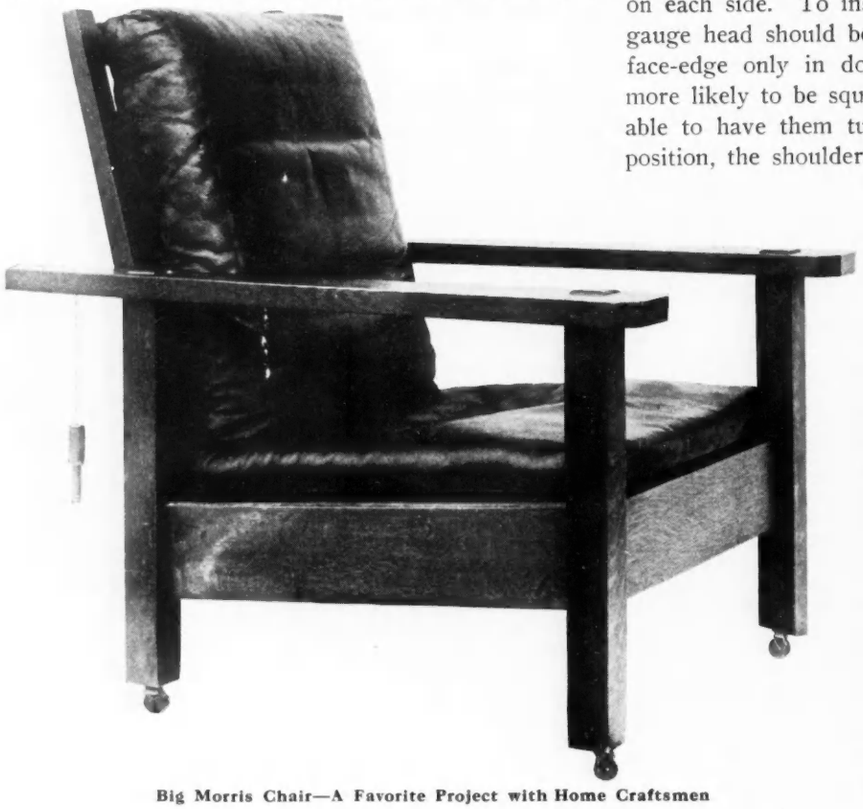
A MORRIS chair and a foot stool to accompany it will be described this month. These pieces will be found appropriate for this month, in view of the long winter evenings just ahead which must for the most part be spent at home by the fireside.

Stock Bill for Morris Chair.

The stock bill for the Morris Chair is as follows:

Posts, 4 pieces, 2¼ by 2¼ by 21½ inches, S-4-S.
Side rails, 2 pieces, ⅞ by 5 by 21 inches, S-4-S.
Front and back rails, 2 pieces, ⅞ by 5 by 26 inches, S-4-S.
Arms, 2 pieces, 1¼ by 5½ by 36½ inches, S-2-S.
Back horizontals, 2 pieces, ½ by 2½ by 19½ inches, S-4-S.
Back horizontals, 2 pieces, ¼ by 2½ by 19½ inches, S-4-S.
Cleats, 2 pieces, ⅞ by 2 by 24 inches, S-4-S.
Slats, 5 pieces, ⅜ by 3 by 20½ inches, S-4-S.
Pegs, 2 pieces, 1 inch dowel, 2½ inches long, each.
Pegs, 2 pieces ⅝ inch dowel, 2½ inches long, each.

The material used on this chair was quarter-sawed white oak. Of the readily accessible woods this is the best by far, cost considered. It is hard, beautiful in grain and takes a fine finish. Plain sawed red oak looks and wears well and is easily obtainable.



Big Morris Chair—A Favorite Project with Home Craftsmen

The posts are ordered mill-planed on four surfaces so that they need only to be scraped and sanded and the ends squared, giving the pieces the proper length, to prepare them for the joints. Work the four pieces together so as to insure their being all of the same length. That is, square the ends of each one then lay them all on the bench side by side making the squared ends even by means of the trysquare. While they are in this position measure the length on one of them and with a large trysquare or the steel square draw a line across all four of them to indicate the lengths.

The top ends of the posts are to be tenoned through the arms. The drawing shows mortises in the arms 1¾ inches square. The posts are 2½ inches square, necessitating a shouldering of these tenons of ¼ inch on each side. To insure tenons of uniform size the gauge head should be held against the face-side and face-edge only in doing this. Since the faces are more likely to be square with each other, it is advisable to have them turned in when the posts are in position, the shoulders of the tenons on the rails are more likely to fit properly.

In laying out the mortises in the posts it is a good plan to set the posts upright in their respective positions, faces turned in, and mark as with a penciled circle the approximate locations of the mortises. After this the posts may be laid on the bench and the mortises accurately laid out with but little danger of getting them on the wrong surfaces. It will be seen by the drawing that the mortises in the back posts are lower than those of the front posts.

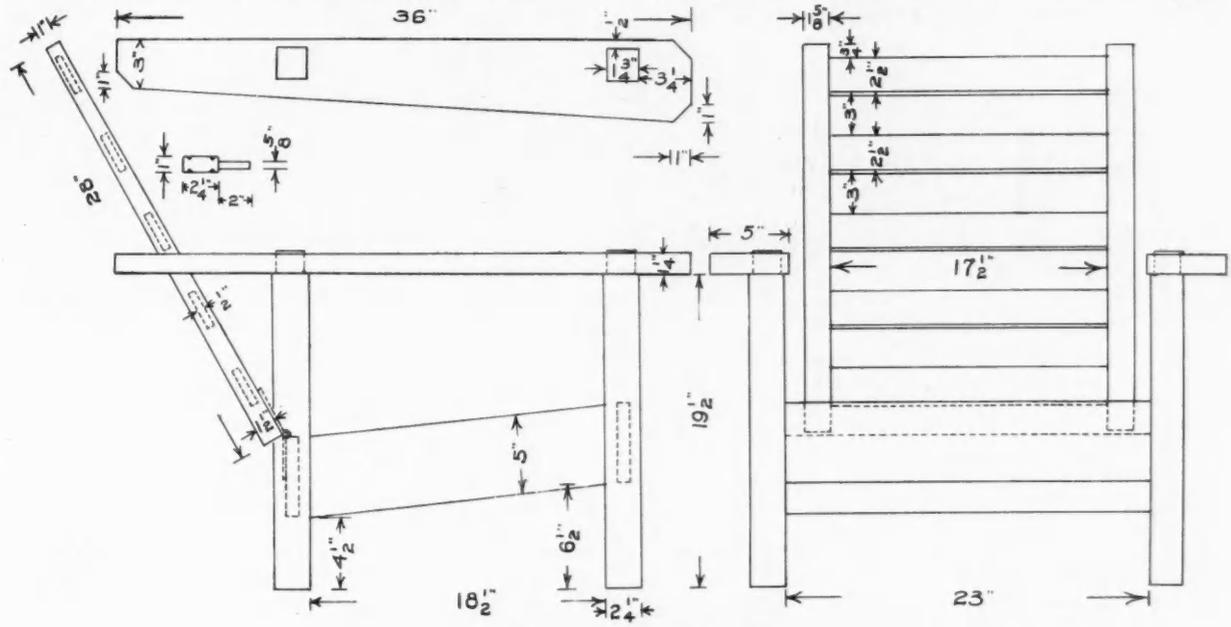
The rails may be prepared now. They, too, are ordered exact in thickness and width so that they require merely

smoothing. The front and back rails are the easiest made because of the square shoulders, and should be made first. The distance between shoulders is twenty-three inches. The tenons should be about one and one-half inches long and should be carefully made so that they may fit the mortises snugly. The T-bevel, or bevel square as it is commonly called, will be needed in laying off the shoulders of the side rails. The quickest way to find its setting is to make a fair-sized scale drawing of the side rail and posts and get the setting by placing the bevel on these lines.

The arms are to be shaped as shown in the drawing. Before cutting the mortises it may be well to put the posts and rails together, using good hot glue and cabinetmakers' bar clamps. Make certain that the rails are square with the posts, and the frame square. The trysquare will be used for the first test and a couple of sticks used to measure the two diagonals of the frame. If one diagonal is longer than the other, it will be necessary to put in a temporary brace until the glue has had time to harden. The location of the mortises in the arms may then be located by placing the arms upon the posts and scribing around, after which they may be more accurately marked with trysquare and gauge.

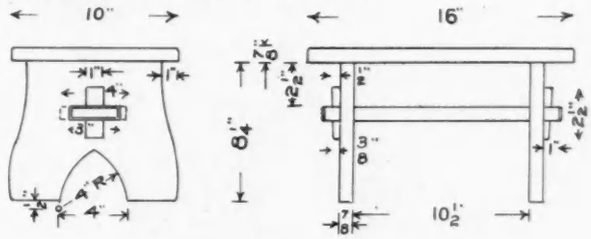
Foot Rest of White Oak

The verticals or stiles of the back are to be of the same width throughout, but their thickness tapers from 1½ inches at the lower end to 1 inch at the upper.



MORRIS CHAIR.

The horizontals or rails are to be tenoned into the stiles. The top and the bottom rails should be shouldered on at least two sides. The other intervening rails should not be shouldered at all but should have the entire ends let into the stiles.



FOOT STOOL.

The pegs which support the back are made by squaring up the end of the doweling, boring a hole in one end of the larger piece and inserting the smaller piece therein, glue being used to hold them together. The holes in the arms into which these pegs are to be inserted should be bored after the chair is assembled and the back in place. If an extremely low folding back is desired, the worker should order his arm stock longer than that specified.

See that the sharpness is removed from all arises where usage might cause splintering.

The cleats are to be fastened to the front and back rails and to these the slats. The cushions may be bought ready made in colors to match the wood finish or the material may be purchased and the cushions made at home.

Antique Finish

A good way to finish both the chair and stool is as follows: See that all the surfaces are sanded smooth

and clean, then apply a coat of antique water stain. Allow this to dry, then sandpaper it with number 00 paper until the "whiskers" raised by the stain have been laid. Upon this put another coat of the same stain diluted by the addition of an equal volume of water. Sand lightly when dry and apply a coat of very thin shellac. Sand this lightly when dry and follow with a coat of paste filler colored in the proportions following: Venetian red 12 ounces, Van Dyke brown 4 ounces, light paste filler 20 pounds. When the filler has hardened sand lightly and follow with a coat of orange shellac. Upon this put two or three coats of some good rubbing varnish. The first coats are to be rubbed with curled hair or hair cloth and the last with pulverized pumice stone and crude oil or raw linseed oil. This gives a finish known as Antique.

How to Make the Foot Stool

For the foot stool there will be needed stock as follows:

Top, 1 piece, ⅞ by 10 by 16½ inches, S-4-S.
Legs, 2 pieces, ⅞ by 10½ by 8½ inches, S-2-S.
Stretcher, 1 piece, ⅞ by 4 by 15 inches, S-4-S.
Keys, 2 pieces, 1 by ¾ by 3 inches, S-2-S.
Cleats, 2 pieces, ¾ by ¾ by 7 inches, S-4-S.

The construction of the stool is extremely simple. The top should be squared up first and the surfaces smoothed. There should be a slight rounding of the upper arises to prevent slivering and injury to the foot.

In making the legs prepare a joint-edge and from this square the two ends so as to give the legs the proper length. Make a paper templet or pattern out of cardboard, full size, and from this trace the shape on the wood. By drawing a line down the middle of the leg and reversing the templet it will be necessary to make a templet for but half of the leg. The mortises for the stretcher ends should be laid out before the joint-edges are cut off in the making of the curved edges.

The tenons of the stretcher are to be shouldered on but two sides each. The mortises for the keys should be laid out before these shoulders are cut. Their size is to be determined by that of the keys which should be first made.

The cleats are to be made short enough that they will not show from above. Screws put through these into the leg and top serve to stiffen and hold the parts together.

The two pieces shown were made by Robt. Hamilton of the Oak Park, Ill., Y. M. C. A.

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To Loosen Rusted Screws

Rusted or tight screws holding metal parts together can be loosened by holding a red-hot iron of the proper size on the head of the screw. After cooling, the screws can be turned out easily.

"My lord, the carriage waits without."

"Without what, base varlet, without what?"

"Without horses, my lord—it is the automobile."—*Brooklyn Life.*

New Version

Moving-picture shows remind us,
As they flash their scenes of crime,
That we'd hate to leave behind us
Imprints on the films of time.
—*Denver Republican.*

A Gradual Reduction

An old gentleman accustomed to walk around St. James's Park every day, was once asked by a friend if he still took his usual walk.

"No, sir," replied the old man, "I can not do as much now. I can not get around the park. I only go half way around and back again."—*Housekeeper.*

Fellow Feeling

Knicker—Does his auto smoke?"

Bocker—Yes; but he hates to make it stop till after he is married.—*Harper's Bazar.*

Not Invectives but Clam-Shells

The juryman with the long whiskers assumed a judicial air and butted in.

"You say he hurled invectives at you," he demanded.

"No, boss," answered the plaintiff, "to tell the hones' truf it was on'y clam-shells he threw at me but what I was kicking about is the way he cussed me every time I dodged 'em."

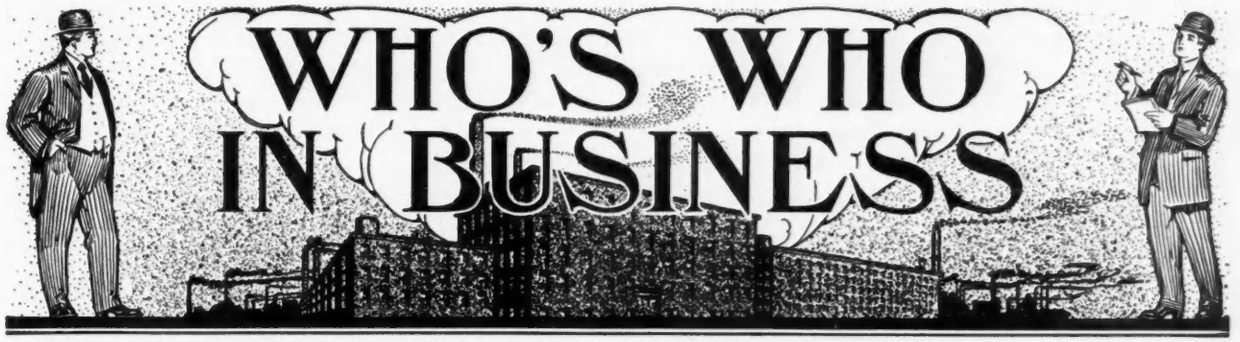
Captured

Sandy was having his first taste of life in the African forests. Borrowing a gun, he set off one day in search of game. A little later his companion spied in the distance Sandy running at full speed for home, with a huge lion behind him, gaining at every step. "Quick! Quick! Jock!" he cried. "Open the door. I'm bringing him home alive."—*Auckland Weekly News.*

A Mixed Advertisement

Here is an unique advertisement which the *Daily Eastern Argus*, of Portland, Maine, published just as it was submitted to the office:

"STOLE OR RUND AVAY.—Been loose him bout two tree weeks, hees almost black and white dog him tail cut off prety close to my body somebody find her keep it I belong to him.—*Joe Bordeau.*"



Franklin Murphy—President Murphy Varnish Co.

EX-GOVERNOR FRANKLIN MURPHY, President of Murphy Varnish Company, was the founder of the concern that bears his name.

Mr. Murphy comes of New England revolutionary stock, an ancestor, Robert Murphy, being a good fighter in the Connecticut militia.

Soon after the surrender of Yorktown the family moved to Newark, in the Jerseys, where the direct descendants have remained.

EX-GOVERNOR FRANKLIN MURPHY

Mr. Murphy was one of the boy soldiers in the Civil War. After three years of service he was mustered out at the close of the war, a lieutenant, still but nineteen years of age.

He immediately went into the varnish business, in a very small way. He went on the road—the only salesman—and sold his own goods.

In two years he had so far demonstrated his ability that his father, the late William Murphy, and Mr. James G. Barnett backed him with enough money to build a factory of respectable size. A company was formed; the Lieutenant was made President, and he has been the guiding genius of the concern ever since.

The business grew rapidly from the beginning, and still grows rapidly. The various factories for the making of varnishes, colors, enamels, stains and konkreto have a working floor space of about ten acres; and to represent the value of the annual output in dollars you must get up high in seven figures.

This gigantic success has been made by a constant application of the principle that a square deal, and a little better, is good business policy. Mr. Murphy puts this principle into many terse sayings, such as these:

"Give customers more than their money's worth and they will give you the best possible advertising."

"Make every customer your friend, and he will make his friends your customers."

"We can afford any expense to make the goods exactly right—the one thing we cannot afford is a dissatisfied customer."

In the treatment of employes this company is familiarly spoken of as "A Corporation with a soul."

Wages and hours are better than the unions ask.

Saturday half holiday is a real thing. The factories close at noon every Saturday in the year.

Profit sharing is a real thing. Every member of the force, from officers to draymen, gets a per cent check at the close of the year—and it is usually a good big check.

The pension system is a real thing. Not a penny is taken from wages or salaries for this fund for liability or old age, on which retired employes are now living in entire comfort.

Thanksgiving finds a Company turkey at every kitchen door; an "Outing Day" finds a Company train or boat at the disposal of employes and their families.

There has never been a "labor problem" even remotely connected with the Murphy institution, except the problem with every worker to see how well and how economically his work may be done. The spirit of the institution is the spirit of kindness and courtesy—all working together, in perfect loyalty, to produce the best possible products with the least possible wastage. That is what Mr. Murphy calls "Company Skill."

Of the office forces and the laboratory forces and the process forces and the sales forces, Mr. Murphy constantly says: "Pay them well; treat them well. Happy workmen are efficient and careful. They pay

it all back, and more, in the quality of the products and in preventing waste."

While conducting his many sided business, Mr. Murphy has found time to be a most useful citizen. As reform Alderman and State Assemblyman, as park Commissioner, as President of the National Soldiers' Home Association, as Trustee of the New Jersey Industrial School, as chairman of the State Asylum and Prison Commission, as Chairman of the State Republican Committee, as Governor of the state, he has given the public long and faithful service on many lines.

He was the first business man elected Governor of New Jersey, and his was a strictly business administration. He cut out graft, stopped the leaks, kept officials on the job, and his measures have saved the people millions of dollars in taxes.

Personally, he is a gentleman of the old-fashioned school of courtesy; a lover of music and pictures; he reads the best literature and a great deal of it. He makes a good speech and wields a trenchant pen. His brain works with lightning speed. His level judgment on social and financial and political problems is widely recognized. Nobody ever doubted his perfect honesty and candor in business or politics. Those who know him most intimately have the greatest admiration for him.

Growth and Development of Timber

WHAT EVERY CARPENTER SHOULD KNOW CONCERNING THE INNER STRUCTURE, GROWTH AND DEVELOPMENT OF DIFFERENT WOODS—SOME PRACTICAL SUGGESTIONS

By Will L. Hammons

THE man who works with wood should know it best; for best results in construction, house finishing or at the cabinet maker's bench, the woodworker must know his material. There is, of course, a certain familiarity that comes with simply handling the wood; but this practical knowledge is not enough; it does not go deep enough for best results.

A definite knowledge of the properties and kinds of timber, the laws of their development, the essential characteristics of good timber, its natural defects, its preparation for market, the process of drying, etc., is of value and interest. Such knowledge enables the

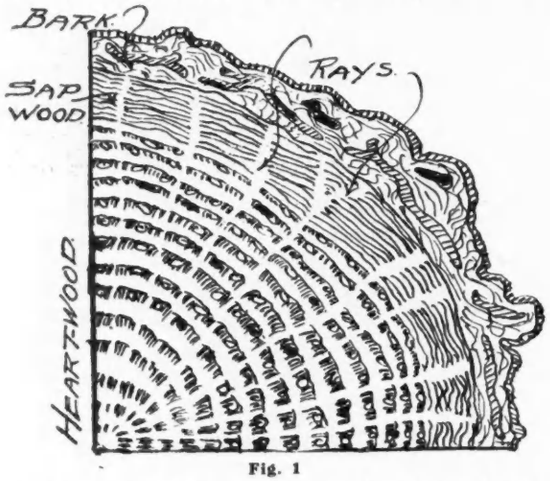


Fig. 1

workman to intelligently judge the value of timber which he uses, and to arrange it so as to secure the best and most permanent results.

Trees are divided into three distinct classes, according to their respective mode of growth: The *exogenous,* or outward growers; the *endogenous,* or inward growers; and the *acrogenous,* or summit growers. The oak, the palmetto and the fern are examples of these respective classes.

All timber used by the woodworker is of the exogenous method of development; this is the one that will be described in detail. The cellular growth of forest trees and plant life is a study in itself; but a few general remarks will give a clearer understanding of the subject. Plants are made up of a succession of long or short cells and tubes. When the plant is young these cells have soft walls and contain a substance which is almost fluid. As the plant grows older,

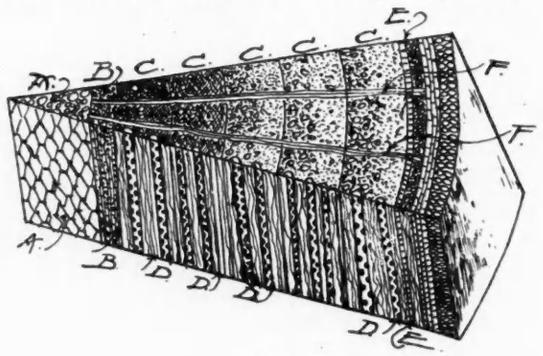


Fig. 2

the fluid contents of the cell becomes hard and fills the cell. After the plant is cut down and dried, these cells become harder, at the same time growing smaller. This fact accounts for the shrinkage of timber in drying. As the cells are crowded together, they become hardened in this way, forming a woody tissue, and the hardness and weight of timbers depend on the closeness with which the fibers are packed together after the hardening process has taken place. All woods used in woodworking are composed of these tissues and fibers.

From the core or heart of the tree a new layer of tissue is formed each year; so we can thus tell the age of a tree by counting the rings which appear on the cross section of the trunk. As the tree grows older, the woody tissue near the center becomes harder, and is called the heart wood. The outer layers, which are younger, are softer, and are called sap wood. This is better illustrated by Fig. 1.

In Fig. 2 is shown a microscopic enlargement of a section of an oak tree of five years' growth, showing the pith, the annual growth of woody layers, and the bark. At "A," the core or heart, is seen the medulla, or pith, composed of cellular tissue, a net-like fabric

of cells, resembling a honeycomb. At "B," the medullary sheath is shown, and is composed of spiral vessels and fiber ducts for the conveyance of the sap; this constitutes the inner layer of the first year's growth. At "C" are the wood cells, or fiber tubes, composing the annual layers which are formed in a series of concentric rings; each annual ring is called a circular belt or zone, as shown.

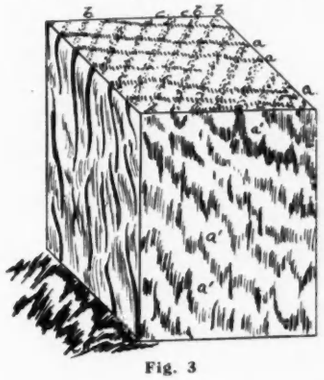


Fig. 3

It will be observed from Fig. 2 that there is a well defined line of separation between each pair of zones. About one-half of the width of the zone is occupied by bundles of fiber tubes containing large sap vessels, D, D, whose walls are fitted as shown, while the remainder of the zone is filled with fiber tubes of much closer texture. These vessels D, D, are easily observed in oak, ash and chestnut.

As compactness and firmness are the essential characteristics of the best lumber, both young and second growth timber are unfit for use where strength, durability and "staying" qualities are concerned. Soft woods generally possess wider zones than the hard timbers, and much difference exists between the width of the zones in the same tree. The wider zones denote the most vigorous growth of the tree, and in the oak, these are formed between the twentieth and thirtieth year.

At E, Fig. 2, is shown the cambium layer, which is composed of cellular tissue like the pith, and contains the rich life-giving secretion called protoplasm, without which the tree could not live.

At F, F, are shown the medullary rays, which radiate from the center of the tree, and when exposed in cut lumber, consist of a series of vertical plates or sheets. This is a most important factor in lumber for fine finishing purposes, and it is the presence of these medullary rays, or silver grain, that gives so much beauty to quarter-sawed oak. They are better shown in Fig. 3, in which a, a are the medullary rays, b, b the porous fibers of the zones, and c, c the close or denser ones. When cut nearly parallel to their direction the medullary rays have the appearance as shown at a'. These rays are more pronounced in oak, beech and sycamore, but are not well defined in maple, birch and chestnut.

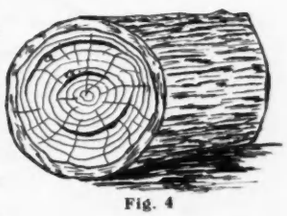


Fig. 4

When the tree has been felled, and timber cut from it immediately, it is found to be wet, or full of sap. But by exposure to the air the sap is evaporated and the tissues are packed more closely together. This is called seasoning the timber. Trees are generally felled in winter, when the sap runs less freely through them, and they are, therefore, in a condition to season more quickly than if cut in the summer, when they are full of sap.

There are many things that cause the tree to possess defects during its growth, and which result in the several different grades of lumber. There frequently occur in the body of sound, healthy trees circular seams, or cracks, where the layers have become separated from each other. These are generally caused by the action of violent wind storms upon the trunk of the tree, and are called cup shakes. This defect is more clearly shown in Fig. 4, at a, a,

For structural purposes, trees should not be felled until after the mature growth has been attained; nor should they be used after the tree shows signs of declining vitality. Most trees arrive at maturity between 50 and 100 years, and begin to decline after 150 to 200 years. After passing the period of mature growth, timber loses its firmness and elasticity and gradually becomes crisp and brittle.

Straight and tall trees are generally found in the heart of the forest, because their branches and leaves grow nearer the top of the tree, and not along the whole length of the trunk, as it is necessary for their leaves to receive air and sunlight for vitalizing the sap. But on the edges of the forests, where the whole tree is exposed to the air and sun, the branches grow lower, and for this reason the timber is knotty and cross-grained.

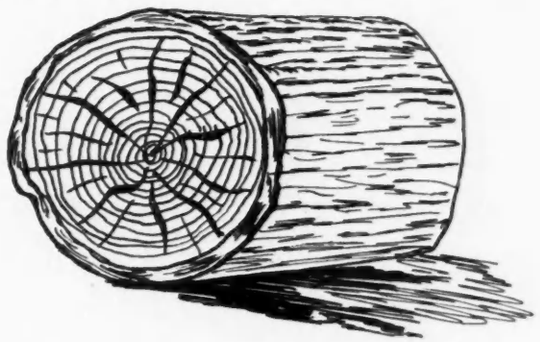


Fig. 5

The quality of the timber is also influenced by the soil in which it grows. Where the ground is damp and marshy, the fiber is of a spongy character, the excess of water preventing the healthy action of the sap in forming firm and compact wood. Basswood, willow and whitewood grow better in this marshy soil; the hard woods thrive better on dry, clayey soil, and those of the pine group are best adapted to the sandy soils.

The woodworker frequently finds a piece of timber in which the fibers run obliquely, and often in handling such a piece it will break from its own weight. This defect is usually caused by exposure of the tree in the forest to prevalent wind storms in one direction, which tend to produce a twisted, spiral mode of growth.

Timber is affected also by the action of insects, by water-rust, and by its own diseases. Rain water, obtaining access to the cambium layers of the tree through cracks in the bark, cause a brownish rust, which changes the character of the sap and reduces the wood to a powder. Bugs and insects, obtaining access through the bark, thrive upon the sap of the tree, and are one of the greatest enemies to the growth of the perfect tree. But where the trunk of the tree is evenly formed, and shows a perfect bark, free from cracks and excrescences, it may be assumed that it will produce a perfect timber.

Great care should be taken in properly piling the timber, to prevent the attack of parasitic plants, known as fungi. Timber piled in warm, damp places and excluded from the sunlight is subject to the growth of fungi, which soon decomposes the fiber, and results in what is known as dry-rot. No vegetation should be allowed to grow around the lumber pile, as it would create conditions favoring the germination of the fungi spores. It should be piled in dry and high locations

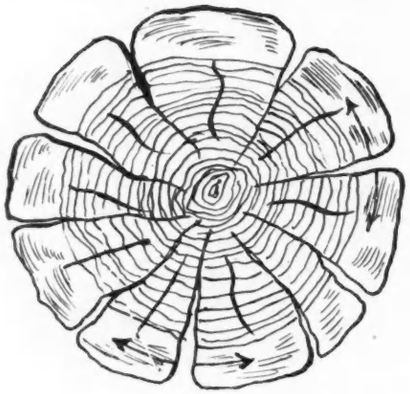


Fig. 6

only, and should be placed well up from the ground on staging and strips placed between the boards, so as to permit of a thorough circulation of air around all sides of the lumber.

Timber to be used for building purposes should be of straight grain, free from large or loose knots, wind and heart shakes, or the signs of any of the diseases or imperfections which often occur. When sawed, the surface should be clean and lustrous, giving a solid and bright appearance, and free from spongy fibers. The sawdust should be granular, crisp and free from stringy fibers. The heart wood should be mature and solid, and the layers next to the bark should be removed. The lumber should be uniform in texture and when cut should smell sweet, a disagreeable odor being a sign of decay. Good timber should be of uniform color; when blotchy or discolored, it denotes a diseased condition, caused either by defective growth or by piling the lumber in unfavorable locations. The black and blue streaks often seen in lumber are caused by close piling, which causes the sap to sour or ferment. When the wood is planed, it should have a silky, shining surface, the shavings should be like ribbons and stand twisting around the fingers. When the surface appears dull, and the shavings are short and easily broken, it is a sign that the material lacks its essential properties.

Nearly all classes of timber are subject to "heart shakes" or star shakes, which are the result of shrinkage of the layers, incidental to the loss of proper nourishment, usually caused after the tree has reached its mature growth and the more active layers absorb the sap juices from the heart wood. Heart shakes, which are only cracks radiating from the center of the tree, are shown in Fig. 5.

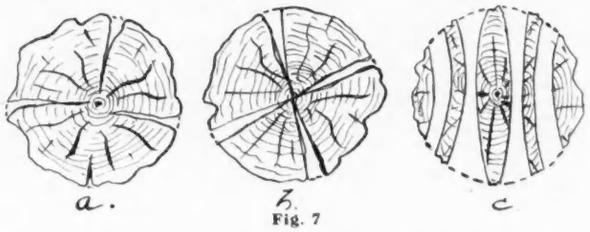


Fig. 7

One of the greatest drawbacks with which the carpenter and woodworker have to contend is the shrinking and warping of his lumber. It is almost essential that he understand as to why and how this takes place.

After cutting, the tree shrinks in all directions, caused by the drying of the sap, the shrinkage from without toward the center being more marked. As there is more moisture in the sap wood than in the heart wood, there is more shrinkage nearer the bark. The medullary rays, however, which radiate from the center of the tree outward, and are formed of hard plates, shrink very little. The shrinkage of these rays tends to draw the ends of the rays together, as in Fig. 6, and this causes cracks. As wood shows a tendency to split along these rays, logs are often halved or quartered soon after they are felled, to prevent cracking as far as possible. Fig. 7 shows, at "a," how a

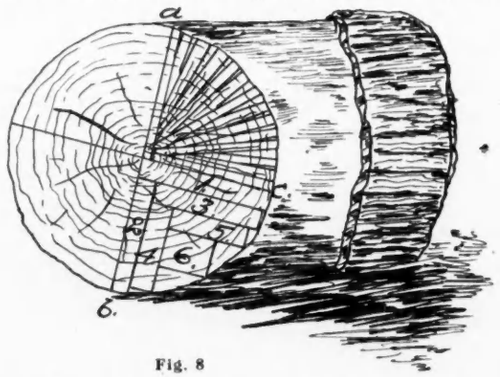
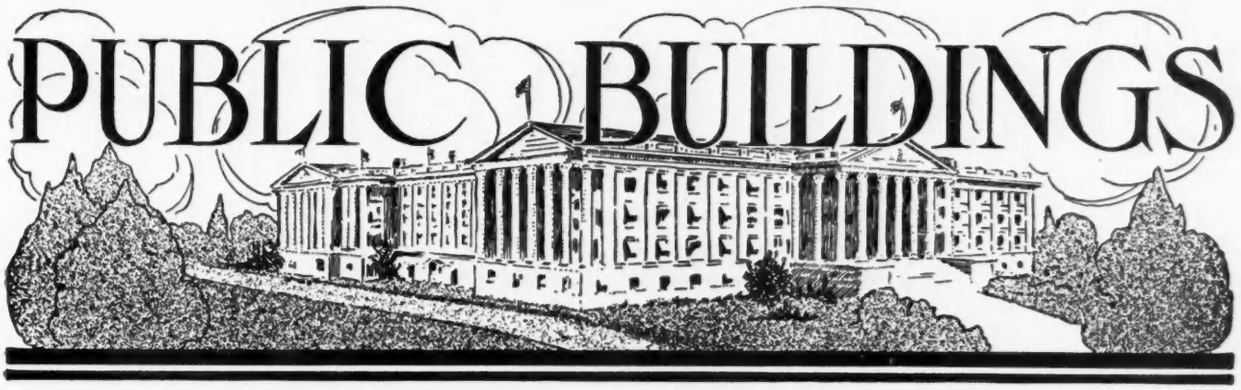


Fig. 8

log may be split along the medullary rays; at "b" the effect of shrinkage when it is quartered, and at "c" the effect when it is sawed into boards.

At Fig. 8, "a" to "c," is shown the method of sawing the log to obtain quarter-sawed timber. The annual rings cross the plank at nearly right angles to its face, and the medullary rays, being parallel to the cut, will exhibit the lines of the silver grain, so sought and admired in quartered oak.



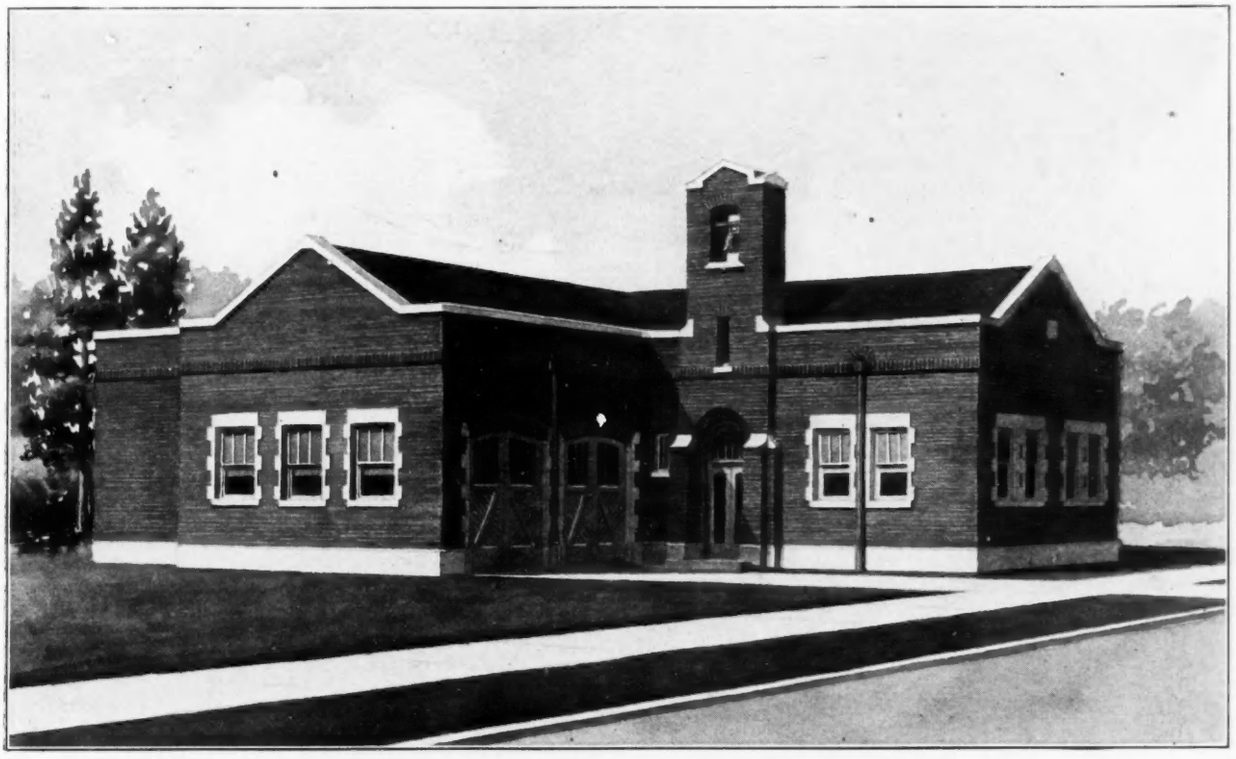
Design for Small Town Hall

SUBSTANTIAL BUILDING OF STRONG DESIGN FOR VILLAGE OR TOWN HALL—IDEAS FOR THE PLANNING OF SUCH A STRUCTURE

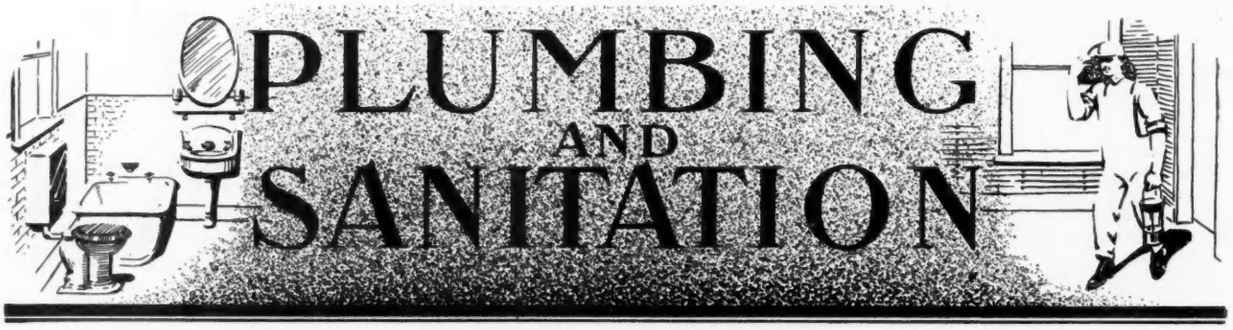
THE design shown herewith, by G. W. Ashby, Architect, of Chicago, is an example of what may be accomplished, by skillful planning, for even so unpromising a building as a small size village hall—which has to provide accommodations not only for the village officials and the court but also for the village fire department and the lock-up. Such a building is usually anything but an improvement to the looks of the street on which it stands, resembling more a livery stable or barracks than an important public building. The two widely separated requirements of a structure of this kind make it a hard problem of design, especially in view of the fact that the cost usually has to be kept very low.

In this design the architect has solved the problem very satisfactorily by placing the fire equipment room and the lock-up in the ell at the rear of the building; the offices are at the front, with the court room immediately back of them. The building as a whole presents a very dignified appearance. It is constructed of dark brown brick with Bedford stone trimmings.

FLOOR PLAN



Well Designed Building Containing Village Offices, Court Room, Lock-up and Fire Department



Septic Sewage Disposal

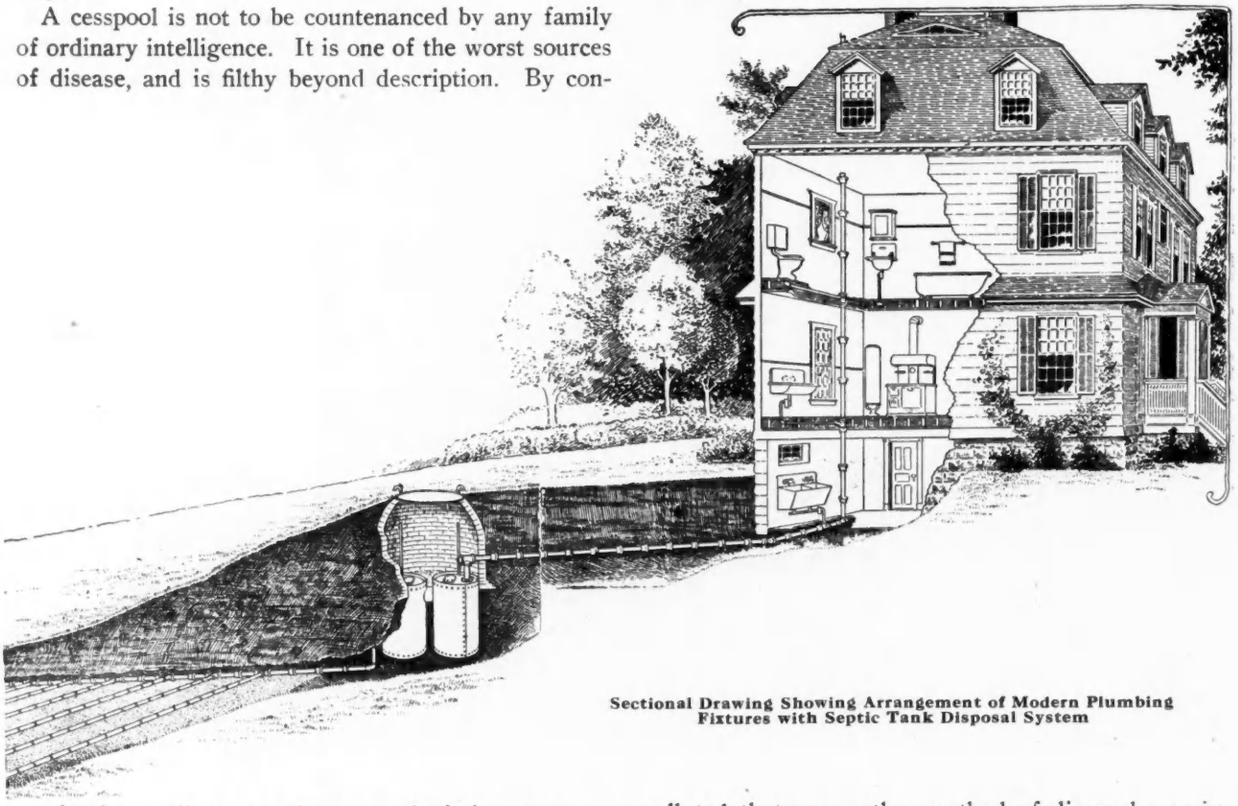
HOW TO CARE FOR THE WASTE FROM VILLAGE AND COUNTRY HOMES—MODERN PLUMBING CONVENIENCES WITH SAFETY AND WITHOUT BOTHER

THE main drawback to living in many of the suburbs of our larger cities as well as in the smaller towns and villages and out in the country, has been the lack of suitable plumbing and sanitary facilities.

The suburban electric railway, the automobile and the long distance telephone have made communication easy and simple. Hot water heating and water supply are as available there as anywhere else. But modern plumbing with all its convenience has not been available in many cases, owing to the lack of proper sewage disposal.

A cesspool is not to be countenanced by any family of ordinary intelligence. It is one of the worst sources of disease, and is filthy beyond description. By contaminating wells and springs near it, it is a common source of typhoid. Its principle is entirely wrong. Instead of tending to purify sewage or waste products, it causes them to decay and increases their offensiveness and power to do harm.

The problem of sewage disposal is one of the most important we have to consider. It is presenting itself before every city or community, and unless properly solved, becomes more and more serious as the population increases. It is not a satisfactory solution to allow fresh sewage to run into some river or stream. That is merely evading the matter. It is only a question of time when the increased amount of waste products, due to the rapidly growing population, will prohibit the use of rivers in this manner. This was the case with the city of London, which formerly emptied its sewage into the Thames, until that river was so polluted that some other method of disposal was imperative. The same problem has confronted other cities and towns and has been met in a similar way.



Sectional Drawing Showing Arrangement of Modern Plumbing Fixtures with Septic Tank Disposal System

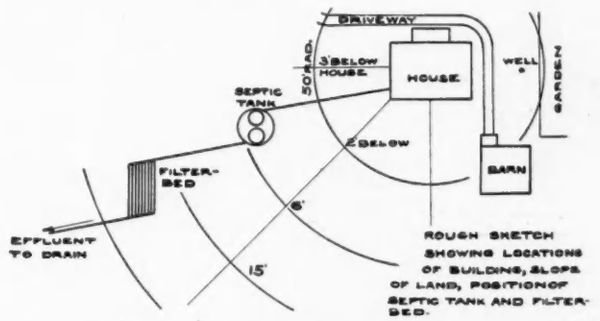
And on a smaller scale, though just as imperative, this question of sanitary sewage disposal confronts *in-*

dividually every resident of our small towns and country districts. If modern plumbing conveniences are to be enjoyed with any degree of safety, some sanitary automatic form of sewage disposal must be installed. As one authority, writing in Suburban Life has expressed it, "What is wanted is an automatic system of disposal that is fool-proof and everlasting, and will go on digesting the raw sewage poured in its receptacles, giving off, in its stead, a pure, sparkling water."

This the suburban and country dweller can now have at a cost of from one hundred and fifty dollars upward, according to the size and local requirements in each case and the cost of material and construction. One feature of sewage purification plants which will recommend it to most people of modest means is the simplicity of the plant, the cheapness of the materials required, and the fact that, once working drawings are obtained showing what to do. any handy man can do the work.

Simple sewage purification plants have been made possible by the invention of the septic tank; but a note of warning must be sounded against the too common belief that a septic tank in itself is a complete purification plant. In the process of sewage digestion, the septic tank is to the works what the stomach is to the human digestive apparatus—a place where the coarser solids are broken down, liquefied, and prepared for the real assimilation which is to follow.

A sewage-purification plant proper, then, consists of two or more parts—a septic tank or digestion chamber where the sewage is liquefied, and an aeration device to supply air or oxygen to the sewage after it leaves the septic tank; for at that stage of the proceeding the sewage is devoid of oxygen and, unless a sufficient



Typical Plan for Septic Tank Installation

amount is provided, rank putrefaction, instead of mild decomposition, will follow. After the sewage effluent is aerated, it must be applied to the soil, suddenly, in doses, with suitable periods between dosing, for the soil to drain off the liquid, and the voids again fill with air. Slow, continuous seepage would soon saturate the soil, which would become "sewage sick"; the purifying bacteria having disappeared.

Sewage from the septic tank, after being aerated, need not be applied to the surface of the ground, although from a merely purification standpoint that is the best possible method. It can be, and, on suburban lots, generally is applied to an underground filter of sand, or distributed in underground trenches through a system of underground drain tiles. Either method will prove perfectly satisfactory and give continuously good results if the system be properly designed and proportioned in advance, and not too large a dose be applied to the soil.

The arrangement of a typical septic sewage disposal system is shown in the accompanying illustration.

The sewage runs from the house drain into the septic tank where it is acted on by the anaerobes, bacteria that work without air, and from there at regular intervals, it is automatically syphoned into the filter bed where the aerobes, or the bacteria that work with air, finish it, leaving only a clear liquid which, if the process is properly carried out, is harmless. In the septic tank there will slowly be deposited a substance termed sludge. This is harmless and inoffensive and under right conditions there is so little formed as to require removing only once in two or three years, and sometimes not at all.

The arrangement of such a system depends on the location of the building, the kind of soil, the slope of the land, what the building is to be used for—as residence, factory or school, depth of frost line, etc. The design must take into account all these and a number of other conditions to produce satisfactory results.

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Offers Courses in Wood Technology

Courses in wood technology and the mechanical engineering of wood manufacturing plants have been added to the curriculum of the University of Wisconsin this year, the college of engineering co-operating with the new United States forest products laboratory in the instruction. The courses are primarily of a technical nature, arranged especially to meet the needs of students in the mechanical and chemical engineering courses who wish to prepare themselves for positions in the wood manufacturing industries.

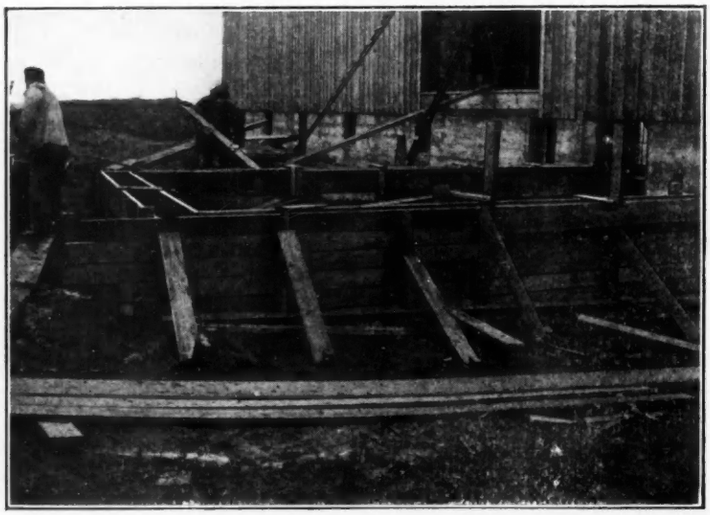
Three phases of the forest utilization problem are dealt with in these courses, including a study of the physical and chemical properties of wood, of the utilization of such wood products as are now wasted and the preservation of timber, and of engineering operations of manufacturing and preservative processes. Four courses in wood technology, including work in wood distillation, wood preservation, the chemical constituents of wood, and the physical properties of wood, are to be given by various members of the staff of twenty Government experts at the laboratory. In addition, there are lectures and demonstrations of the different operations in logging and wood manufacturing machinery, at the college of engineering.

CONCRETE CONSTRUCTION

Low Cost Forms

PRACTICAL CONSTRUCTION FOR WOODEN FORMS—SCHEMES FOR SAVING TIME, LABOR AND LUMBER —CONCRETE CONSTRUCTION ON THE FARM

SINCE freshly mixed concrete is a plastic material, forms of some kind are necessary to hold it in place and in shape until the cement sets up and the concrete becomes hard. Lumber, though expensive, is the material most commonly used. By exercising his natural ingenuity and customary care in the matter of construction of forms, the farmer has built so cheaply of concrete that his cost statements are frequently doubted by the builder in the city. The Association of American Portland Cement Manufacturers have been investigating these methods, and their secretary now makes report concerning them, together with other matters of interest to practical concrete workers.



Erecting Forms for Farm Foundation

Much of the work done on the farm requires almost no forms at all. In this class are walks, floors in buildings, and feeding floors.

The first requisite of good forms is that they should be tight so that the liquid cement may not run out between the cracks, cause pockets or hollows and thus ruin the looks of the work as well as decrease its strength. Consequently straight boards are most desirable unless one chooses to fill gaping cracks with stiff clay and tack strips over them. Dressed lumber is usually straightest and yields a neater finish to the concrete. But for ordinary purposes rough lumber is sufficiently good. Naturally the siding must be stiff enough not to bulge out of shape when the forms are first filled with concrete. This does not mean that very heavy siding is necessary. In fact one-inch boards are usually sufficiently strong. The bulging may be prevented by setting two by four-inch studding from 20 to 30 inches apart according to the thickness of siding boards or sheathing used.

The thoughtless cutting of boards into short lengths means a waste of lumber and a useless increase in the cost of concrete. Unnecessary nailing not only calls for more nails but adds to the difficulty of removing and the danger of splitting and ruining the boards. The reason that concrete is so unusually cheap for the farmer is that he plans his forms to spoil as little lumber as possible and he finds a use for all of the lumber after it has served to hold the concrete in place. In this way the material for forms cost practically nothing.

Little Saving Devices

Most concrete work on the farm is built in what is known as the *box form*, which, with variations, consists of one box within another between which the concrete walls are moulded. Such forms are used especially for walls of buildings, tanks and troughs. Ordinarily the studding need not be cut in lengths equal to the height of the wall; it may without inconvenience be allowed to project above the top of the siding. Nor does it need to be sharpened (and later battered up at the other end) for driving into the ground. There is a quicker, easier and cheaper way. Set the ends of the studding on the ground and hold them in their proper position by a timber, called a *liner*, lying on the ground against them; or "toe-nail" the ends of the studding to a plate which will serve the same purpose. Stakes driven into the ground and against the plates or liners will fix them firmly in place. The studding may be held plumb by bracing it with odds and ends running from the top to stakes driven into the ground a few feet away from the form. If the forms are so high and will be filled so rapidly as to render possible the springing of the studding, tie the

opposite pieces together by means of bailing or other pliable wire passed through the joints in the siding. Space the forms at the top by means of cross cleats.

For the outside wall of box forms boards of full length need not be cut at all. The extra length may be allowed to extend beyond the corners. This saving can not always be effected with the inner wall, yet odd pieces of boards may often be used in such a way as to prevent useless cutting. In nailing on the siding, arrange the boards so that ail end joints will not be made on the same upright. If the lumber is crooked, draw the boards together so as to prevent cracks. Since the siding is generally between the studding and the concrete, heavy nailing is not needed to hold it in place until the concrete comes against it. Often cleats, clamps, or screws are used to save the lumber and to render easier the removal of the forms. The forms should always be planned with this end in view. In placing the concrete avoid unnecessary lifting by leaving off a few of the boards at the top of the form until they are needed. However, if chips or blocks fall inside the forms, carefully remove them before proceeding with the work.

See that the forms are lined up properly before beginning to fill them as they *must not* be disturbed after the concrete is in place.

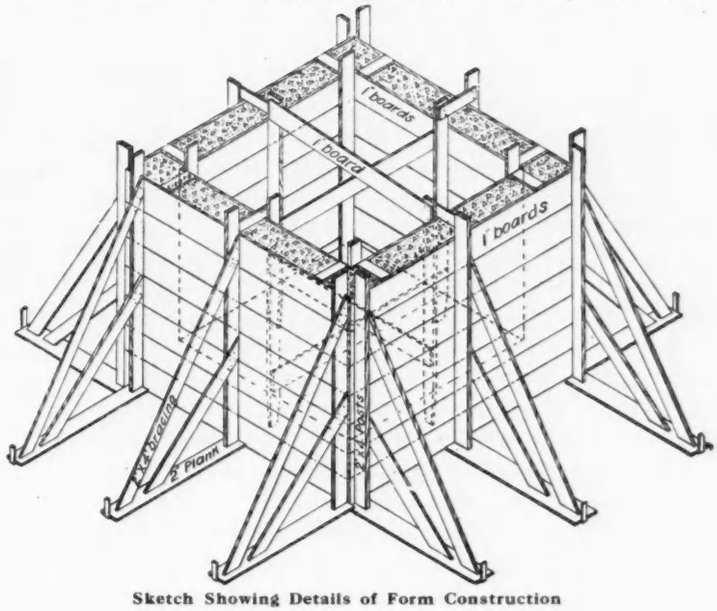
If new forms are wet, before the concrete is placed, and allowed to remain in position until it has thoroughly set, bits of concrete will seldom stick to them.

Forms for Concrete Silos

For very particular work, or where forms are to be used more than once, it is advisable to coat them, previous to erection, with soft soap or oil. Linseed, black or cylinder oil is suitable, but kerosene is not good. Upon taking down the forms immediately clean off all bits of concrete clinging to them. For this purpose a short-handled hoe is convenient, but it must be used with care so as not to gouge the wood.

The Placing and Protection of Concrete

All other things being equal, the strength of concrete is dependent upon its density or compactness. Where possible, the easiest way to render concrete dense is by mixing and placing it wet. For very wet concrete the forms must be tight so that the liquid cement cannot escape. To give a neat finish to the surfaces, which will later be exposed, force the larger stones back from the outside by running a straight spade or a wooden paddle down in the concrete next to the wall forms and working it back and forth.



Sketch Showing Details of Form Construction

It frequently happens that very wet concrete cannot be used. To make a drier mix dense and strong, tamp or ram it into place with a heavy wooden or iron tamper.

In a way, the successful making of hay and concrete are very much alike—both must be well cured. Exposed surfaces of freshly placed concrete should be shaded to protect them from rain, dust and the hot rays of the sun. Freezing injures freshly placed concrete. Hot water and salt are sometimes used to counteract the frost action; but, on the whole, it is better to attempt no outside work in winter. During the early months of spring and in the fall see that no frozen sand, gravel or rock is used in the work. *In summer* ordinary forms, for walls supporting no loads, may be removed after the concrete is 3 days old, but *in cooler weather* they should not be touched short of 5 days.

It is the attention to the details which makes farming or any business a success. The same principle holds true of concrete work.

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No man is indispensable, but it's a good idea to strive to be as nearly so as possible.

Varnish—Its Properties and Use

WHAT THE BUILDER SHOULD KNOW ABOUT THE USE OF VARNISH IN MODERN WORK—HOW SATISFACTION MAY BE HAD— VARNISH TROUBLES AND VARNISH HELPS

By Charles H. Smith
Technical Dept., Berry Brothers, Limited

IT is doubtful if even the architectural profession realize what an important factor varnish is in its relation to modern architecture. In its special office, varnish is as essential to a building as brick and building stone. It is true that in the former the genius of the architect finds visible expression, but it is also true that it is to varnish the chief beauties of the interior are due.

Natural woods may be said to resemble uncut gems that require the art of the lapidist before their colors and brilliancy become manifest. So the various woods while possessing a wealth of latent beauties require development at the hands of the wood finishers to bring out and preserve nature's wonderful handiwork of grain and color with the aid of varnish.

Nothing is so conducive to good work as a thorough knowledge of a subject, and it has sometimes occurred to us that the architectural profession, as a rule, is more familiar with many other building materials than with varnish, although we see no good reason why this should be so.

While fully recognizing the importance of external beauty and symmetry in a building both from ethical and aesthetic standpoints, it must be remembered there are two sides to a building, outside and inside, and it is with the latter that the owner is on the most intimate terms. Is it not then most essential that the interior of a building, especially a residence, should be attractive, restful to the eye and productive of a feeling of comfort and supreme content to the occupants?

Importance of Proper Varnishing

In most interiors of natural woods the general effect of the trim is either made or marred with some sort of varnish. In view of this absolute fact we submit that the varnish ought to be specified in definite terms. Is it not then most essential that the architect should take as much pains in the selection of varnish as in the matter of lumber, especially if he and the owner go to the trouble of selecting certain woods for the interior trim, and as is often done making a special point of selecting woods for beauty of grain.

A poorly finished interior is like a badly set gem, and there are instances of this all around us.

Not even the owner is more anxious than the architect for a perfect interior, but if varnish is to be used on the woodwork it should be written in the specifications in a manner to shut out the wrong goods, especial care being taken to prevent their spirit being violated by the contractor.

It is not necessary for an architect to be deeply versed in varnish in order to specify it correctly, although the more he knows of it the better.

Most responsible varnish manufacturers make special varnishes for architectural work, and it is always safer to specify these than to leave the matter open or sufficiently elastic to permit of too broad a construction being made by a contractor so that while the letter of the specifications may be complied with their spirit may be evaded.

It is to the architect that the building portions of the public naturally look for information on varnish and a working knowledge of the subject is surely greatly to be desired.

Varnish Troubles and Their Remedies

In the whole category of manufactured goods, it is doubtful if any one thing is so often unjustly blamed as varnish. In order to secure the best results from any varnish, certain conditions are necessary. For instance, varnish is very susceptible to weather influence and a temperature of about 70 degrees Fahrenheit should be maintained during the operation of varnishing. Cold weather retards the drying and hardening of varnish; humidity in the atmosphere will do the same, and a great excess of this may cause cheap varnishes to turn white also. Insufficient light and ventilation also cause varnishes to work badly.

During extremely hot weather varnish will remain soft longer than it otherwise would. To sum up, adverse atmospheric conditions conduce to an unsatisfactory finish, and the varnish is not necessarily to blame.

Hurried work is another fruitful cause of poor results. Every coat of varnish must be given sufficient time to harden before applying another and undue haste in pushing a job of finishing sometimes leads to deplorable results, the most common trouble from this cause being the effect known as "sweating," unsightly blotches appearing upon the surface caused by rubbing before the undercoat has hardened sufficiently, or cracking if the work is not rubbed.

Carelessness or improper methods on the part of the workman may also be responsible for a poor job. For instance, if varnish is applied too heavily the drying is unduly retarded and the finish is apt to present an appearance known as crimping, a sort of ridgy effect, very inartistic and undesirable.

Although most varnishes are sent out by the maker of the right consistency for use, the painter will sometimes reduce them with turpentine, and while this makes them work more easily under the brush, it injures the lustre and therefore mars the finish.

We might go on indefinitely telling about the woes of varnish, but will simply end by the broad statement that good varnish used intelligently under the right conditions can be depended upon to make good the

representations of the manufacturer; but adverse conditions and a disregard of the recognized rules for finishing will ordinarily end in disaster.

Use Proper Fillers

Making a finish on wood is much the same as putting up a building, the foundation must be right. In the case of open grained woods, the fibre or grain must be filled with a good paste filler rubbed well in across the grain of the wood, so as to fill up all interstices and level up the surface. This is a process that is often slighted, and when it is, the finish will show it by numerous tiny depressions where the filler did not penetrate. An imperfectly filled job will never make a perfect finish no matter how many coats of varnish may be given to cover up the defective filling.

The foundation is just as important on close grained woods, such as pine, maple, etc., although they do not need any paste filler. Such woods should receive a first coat of shellac, which need not be a heavy one, and is really economical because it stops suction and makes a hard nonporous foundation to finish on.

There is one close grained wood that is used quite a bit for interior trim and which deserves a passing mention by reason of its peculiar nature. We refer to cypress. This possesses a certain greasy quality that seems to permeate the wood and which requires sealing up before the wood can be varnished. The most effective way to do this is by giving two coats of shellac as a foundation for the finish, as the greasy sap with which the wood is filled will often come through a single coat of shellac and make unsightly blotches on the finish. This is worth making a note of as an otherwise handsome job of cypress trim might be ruined or at least greatly marred by neglecting this precaution.

The Best Varnish the Cheapest

Economy in the use of varnish does not necessarily mean that which costs least money, and in fact it usually means the reverse.

A poor or inappropriate varnish will soon outlive its usefulness and by fading, cracking or pealing off render the woodwork unsightly.

It should be remembered, moreover—and your special attention is called to this—that it costs as much to apply a poor varnish as a good one, so that there is nothing in favor of the low cost varnish but the insignificant amount saved on the price per gallon; and a very large proportion of houses only demand the use of from 5 to 20 gallons of varnish any way.

The finish woodwork done with the right varnish lasts indefinitely, whereas poor varnish produces a finish nearly as frail as the bloom on a plum, and the work has soon to be cleaned off and refinished, or look shabby and disreputable. It will thus be seen that even on a low cost building, if any varnishing is to be done, the best varnish is the cheapest.

With reference to the cost of natural wood finishing for interiors, it is generally conceded that the acme of perfection is a rubbed finish, and it is also known that the rubbing part of the finish is by far the largest part of the expense. It is not so generally understood among the laity, however, that it is not necessary to go to the expense of rubbing as soon as the varnishing is done, but that if the right varnish is used the rubbing may be deferred for a year or two, or indefinitely till the owner can afford it. We believe this piece of information would be very interesting to many builders of medium cost residences; we have found it so frequently when writing correspondents.

There is one question concerning varnish that no doubt often occurs to an architect and that is how long it will last. And while it is not always so easy to read the horoscope of varnish as it would be of a kitchen range for instance, the former will often outlast the latter, that is, of course, a high grade varnish, but the "ordinary" article will probably outlive its usefulness during its first year of service.

For front doors and store fronts on which the exposure is necessarily very severe, the use of only the very best exterior varnish should be permitted, and about once a year is not too often to refinish or at least to give another coat of varnish.

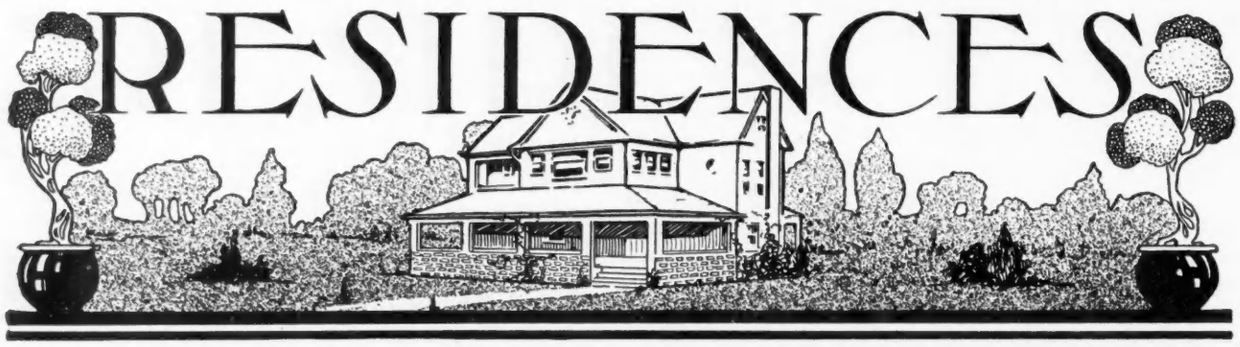
Varnish for Floors

There are two methods of treating natural wood floors, waxing and varnishing. Both require the same preliminary treatment. That is, open grained woods, such as oak, require filling with a good paste filler; and then, if the floor is to be waxed, a thin coat of shellac should be given, the wax being rubbed in to finish. This makes a handsome enough finish, but requires hard labor to keep it in first-class order.

The varnish floor does not need any shellac coat over filler, but two thin coats of floor varnish should be given, and the last coat may either be left as it is or given a slight rubbing to tone down the high gloss. Such a floor is at least equal in appearance to the waxed floor, and the finish, which has great durability, requires practically no labor to keep looking fresh and handsome. Worn spots are easily and quickly renovated with a thin coat of the varnish when they need it, and thus the acme of beauty and economy is attained.

It is proper to add that the ideal floor varnish is extremely tough and elastic, so much so that it will simply dent under a blow, without chipping or cracking, and any so-called floor varnish that will not stand this test should be rejected by the architect as unfit for the purpose intended.

In this little talk on varnish, which is necessarily brief and incomplete, it has been the writer's aim to show first the desirability of using good varnish and, secondly, the importance of specifying it carefully and arbitrarily; for, if as Ruskin says, "Architecture is frozen music," varnish is certainly an essential note in the harmony.



Plans for Artistic Story and a Half Cottage

COMPLETE SET OF ARCHITECT'S DRAWINGS FOR AN EIGHT ROOM COTTAGE OF VERY ATTRACTIVE AND STRIKING DESIGN

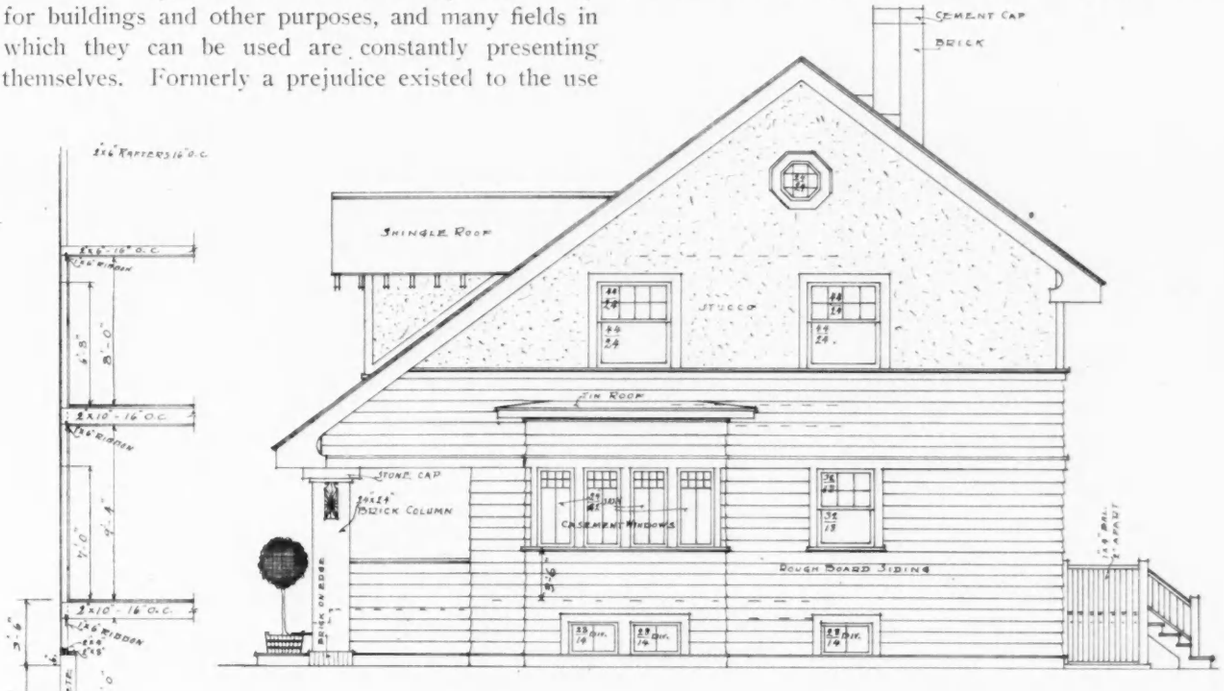
THE plans shown in connection with this are reduced about one-half from a set of architect's drawings of one-quarter inch to the foot. The three floor plans are all reduced in the same proportion, as are also the four elevations. This, in connection with the fact that the dimensions are given in most cases will make it very easy to make practical use of these plans, either for redrawing or for use direct.

This house will cost in most localities from $3,500 to $4,000. It is 39 feet 6 inches in width and is 32 feet in depth, excluding the porches. Eight very attractive, nicely arranged rooms are provided. The casement windows and the screened porches are special features. The first floor screened porch opening off the kitchen and dining-room will be used for an out-of-door dining-room in summer. The second floor porch will be used by the devotees of open-air sleeping the year round.

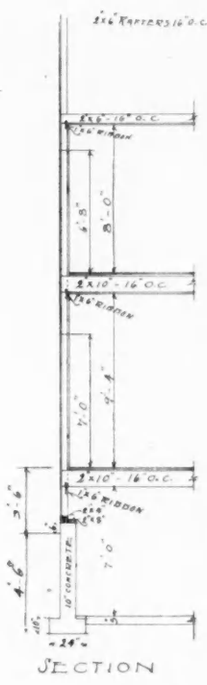
Eight Room Dwelling Sided with Rough Boards and Stucco

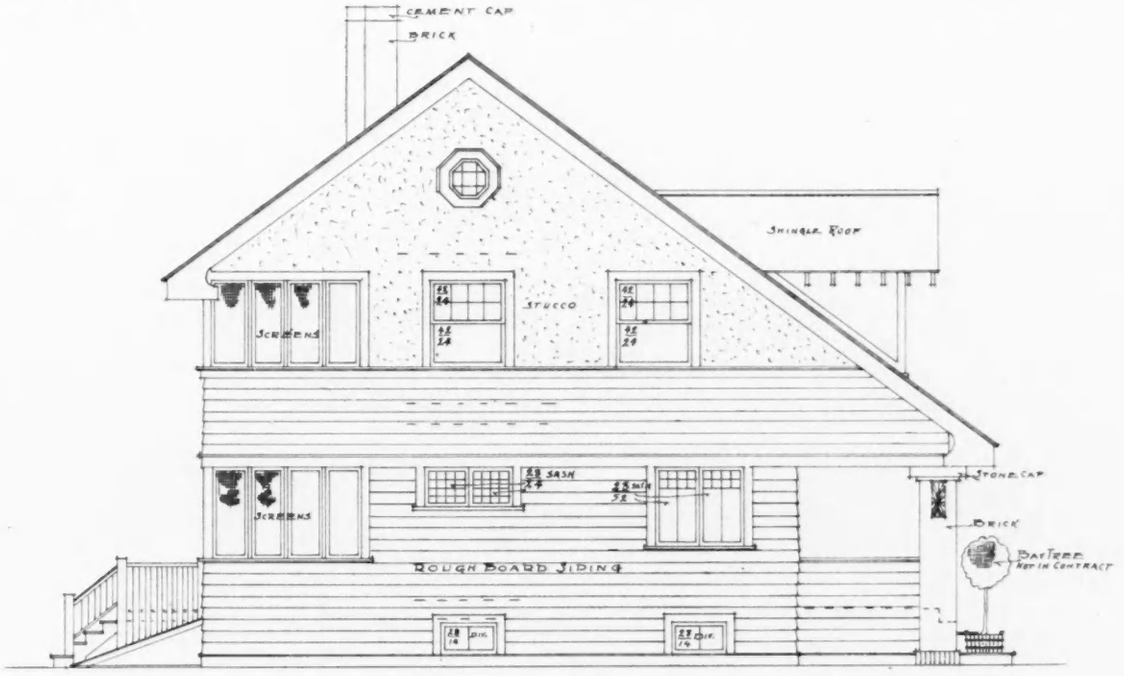
Enameled Brick

Enameled bricks are meeting with increased favor in this country, as a material of utility and beauty for buildings and other purposes, and many fields in which they can be used are constantly presenting themselves. Formerly a prejudice existed to the use of enameled brick, owing to the fact that they had to be imported from abroad. Of recent years several of the leading brick manufacturers have made enameled brick in this country. Some of them have been singularly successful. Enameled brick manufactured by one firm is similar to that made in England. They place the enamel on a fire-brick body and burn with one firing. Some manufacturers endeavor to produce enameled brick by using previously burned brick, dipping it in a glaze and again firing it. The effect is to produce an uneven finish. By the English process



RIGHT SIDE ELEVATION



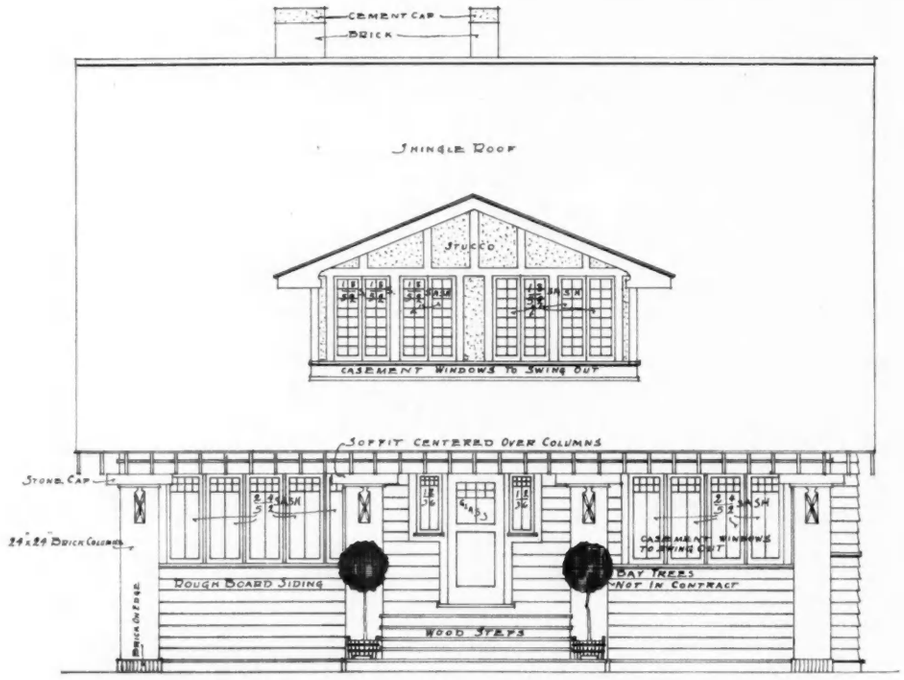


LEFT SIDE ELEVATION—HOUSE PAGE 48

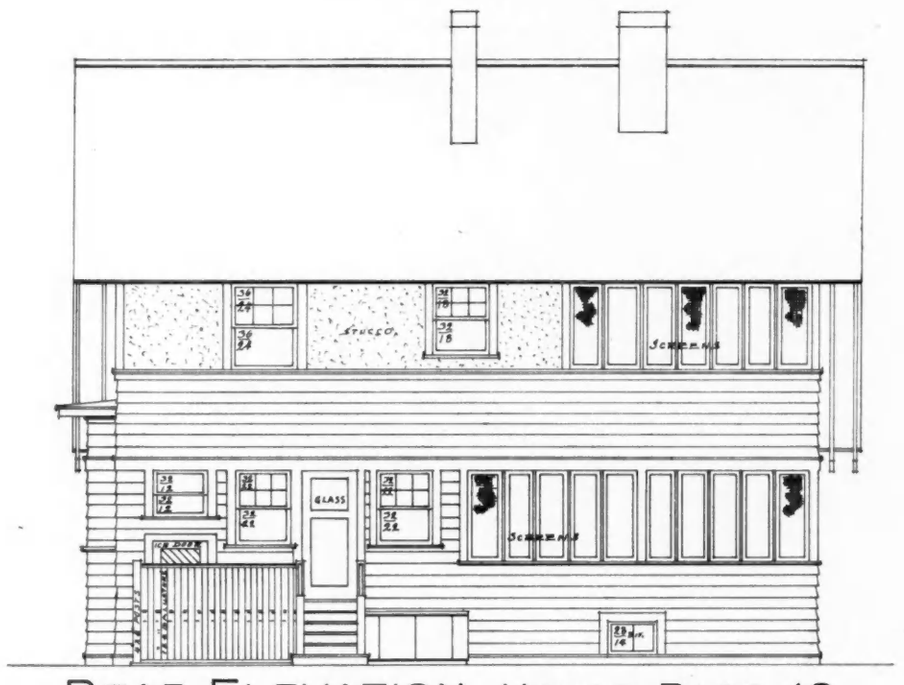
the enameled surface is perfect in every respect. Enameled brick have won such favor in England that the municipality of London requires that all courts and alleys be built of the material.

Making a Stave Silo

My experience with silos and the feeding of ensilage began eight years ago, a correspondent writes to the *Practical Farmer*, I being the first one in our vicinity



FRONT ELEVATION

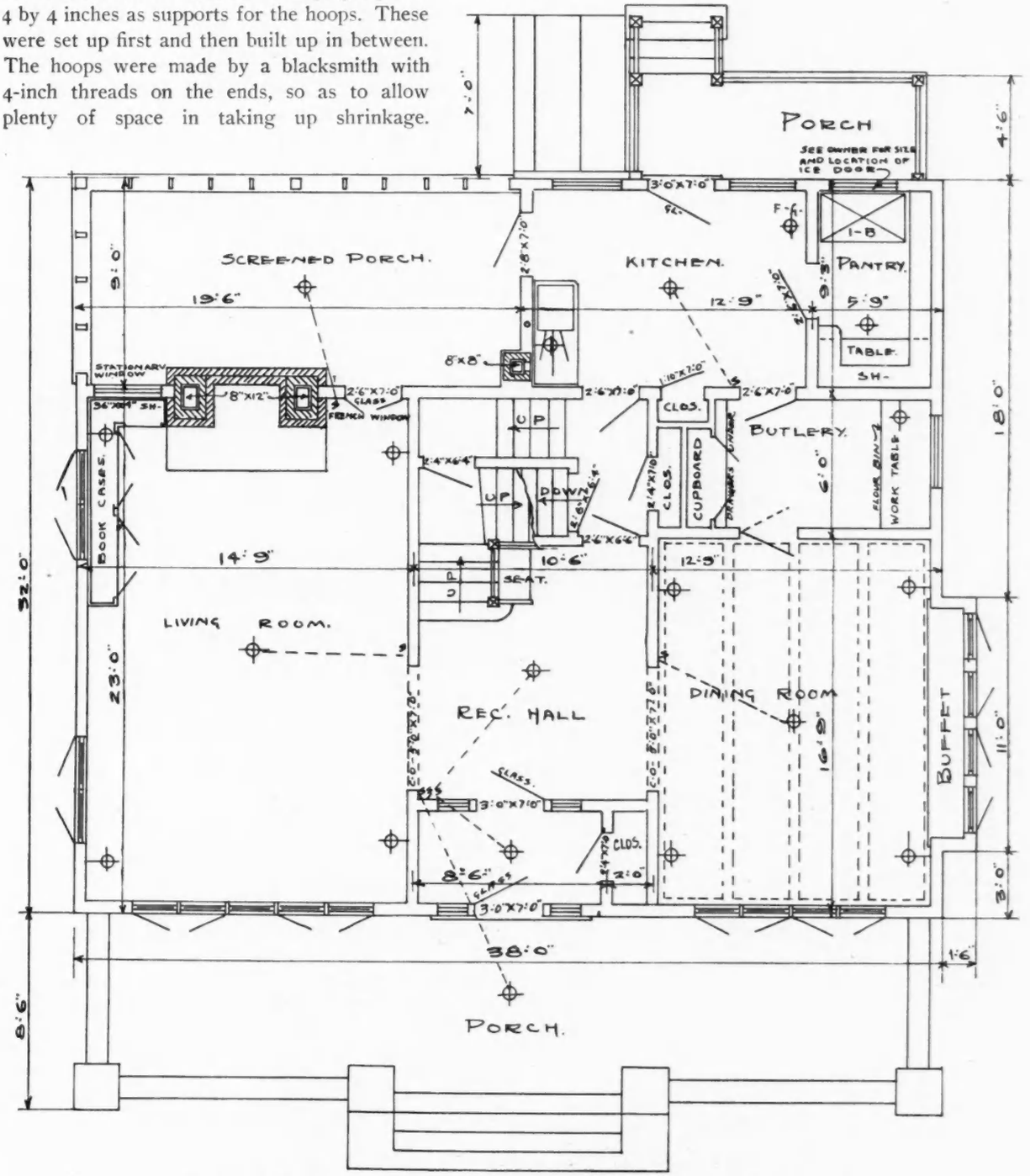


REAR ELEVATION—HOUSE PAGE 48

Enameled brick is largely used abroad, and foreigners express surprise that our architects do not utilize them more extensively, as they reflect light, are fireproof, and have no odor, prevent dampness and have a fine finished surface which is ornamental.

to erect one. Mine is a home-made one, and I think it is just as good as any $200 patent silo on the market. For building material I took the best white pine I could get, had it sawed 2 by 6, dressed and beveled ⅛ inch, and had it sawed in lengths of 8 and 16 feet.

They were grooved ½ inch, and separate tongues made to fit in; these were then spliced, attaching the 8 to the 16, making the silo 24 feet high. I made it 10 feet in diameter. I used four upright pieces 4 by 4 inches as supports for the hoops. These were set up first and then built up in between. The hoops were made by a blacksmith with 4-inch threads on the ends, so as to allow plenty of space in taking up shrinkage. two weeks. This silo is built in the barn, as I had plenty of room. The floor is a concave shape, being about 8 inches lower in the middle than at the sides.



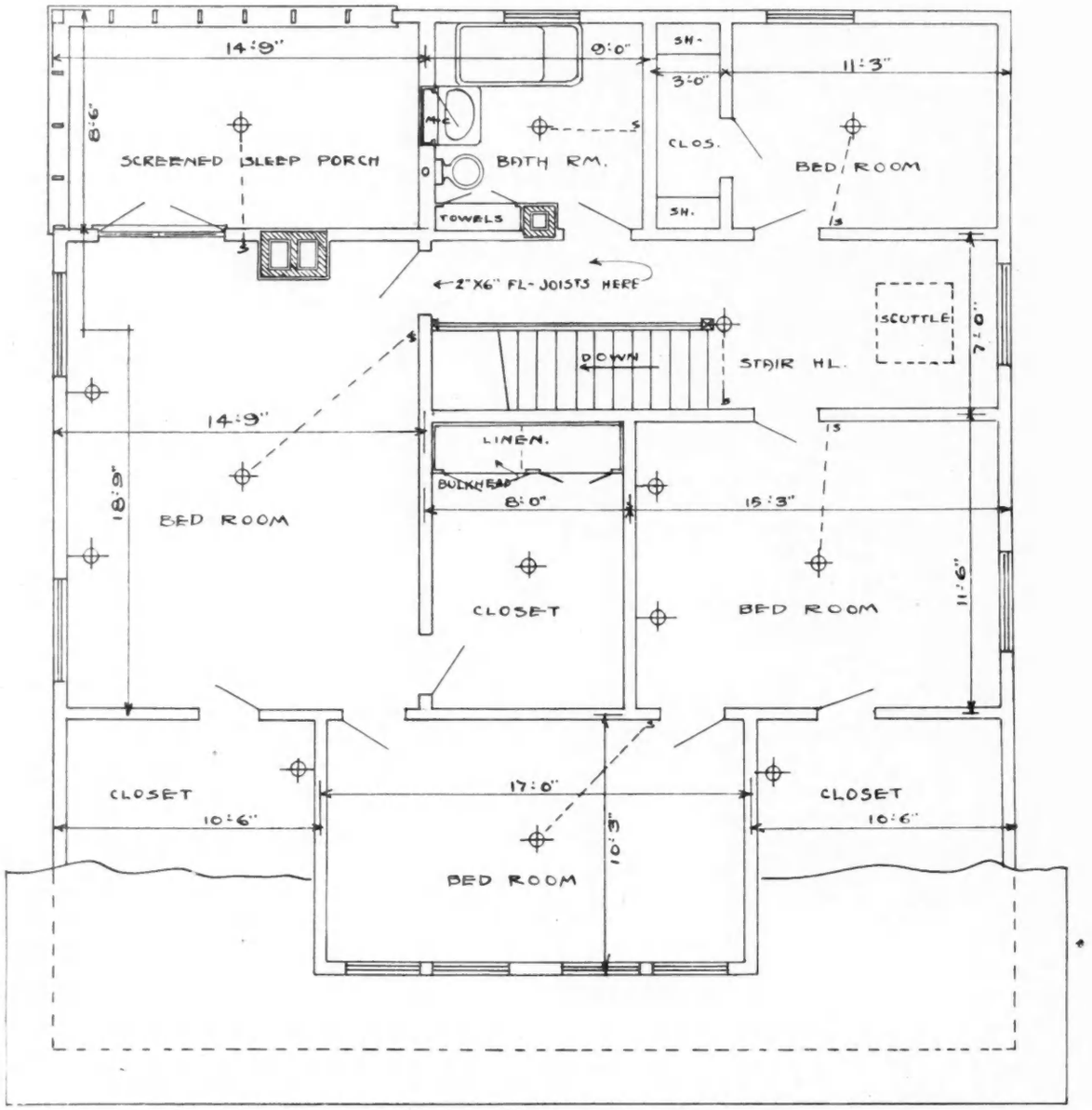
FIRST FLOOR PLAN—HOUSE PAGE 48

For a foundation I used rock and gravel with the best Portland cement. I put doors in 2 feet square, with 1-inch bevel; they are put in and drawn up airtight with a bolt and piece of wood 2 by 3, which extends across face of door 5 or 6 inches on either side. These doors are 5 feet apart. I gave the silo a coat of oil on the inside after it was finished, and let it stand The foundation is a rock wall 1 foot thick with a layer of brick cemented around the outside.

Growth of Aluminum Castings

Attention is directed to the rapid growth of the aluminum casting industry by the announcement of the consolidation of six of the largest aluminum foun-

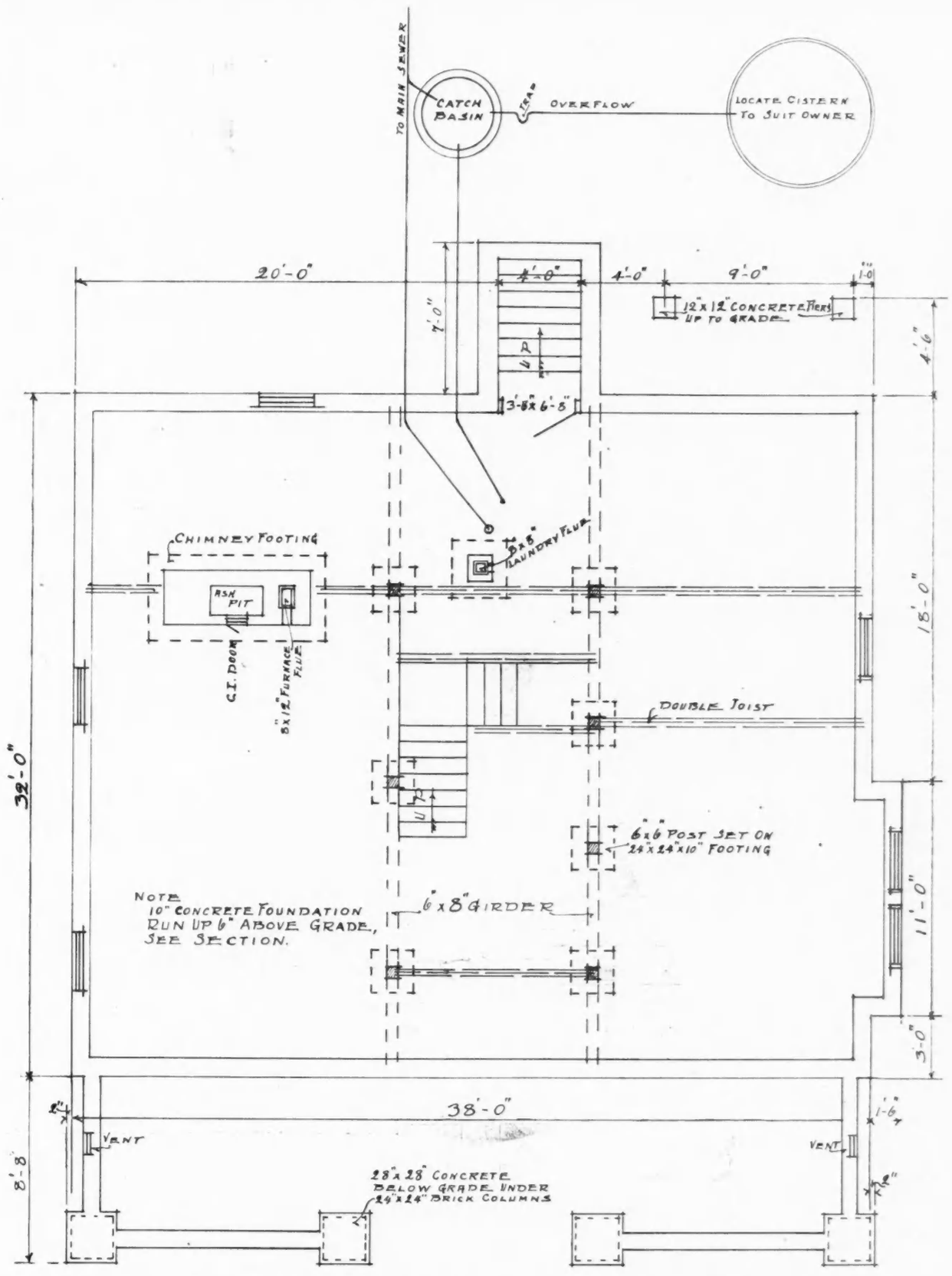
dries in the country, says the *Iron Trade Review*. Less than ten years ago, the casting of this metal was still in an experimental stage, and the knowledge of its behavior in sand moulds was an unknown quanity. Having a low melting point and being easily melted in a cast iron pot, if no crucibles were at hand, the production of castings from this metal proved exceedingly attractive to many foundry men. Furthermore, shops where a specialty was made of this line of work. Today, provided the metal is properly handled, not only in melting but in the moulds as well, little trouble is experienced from the difficulties encountered in early practice. Owing to its lightness, this metal has entered largely into automobile construction, and parts not subjected to severe strains are now made from it. Aluminum crank and gear cases of



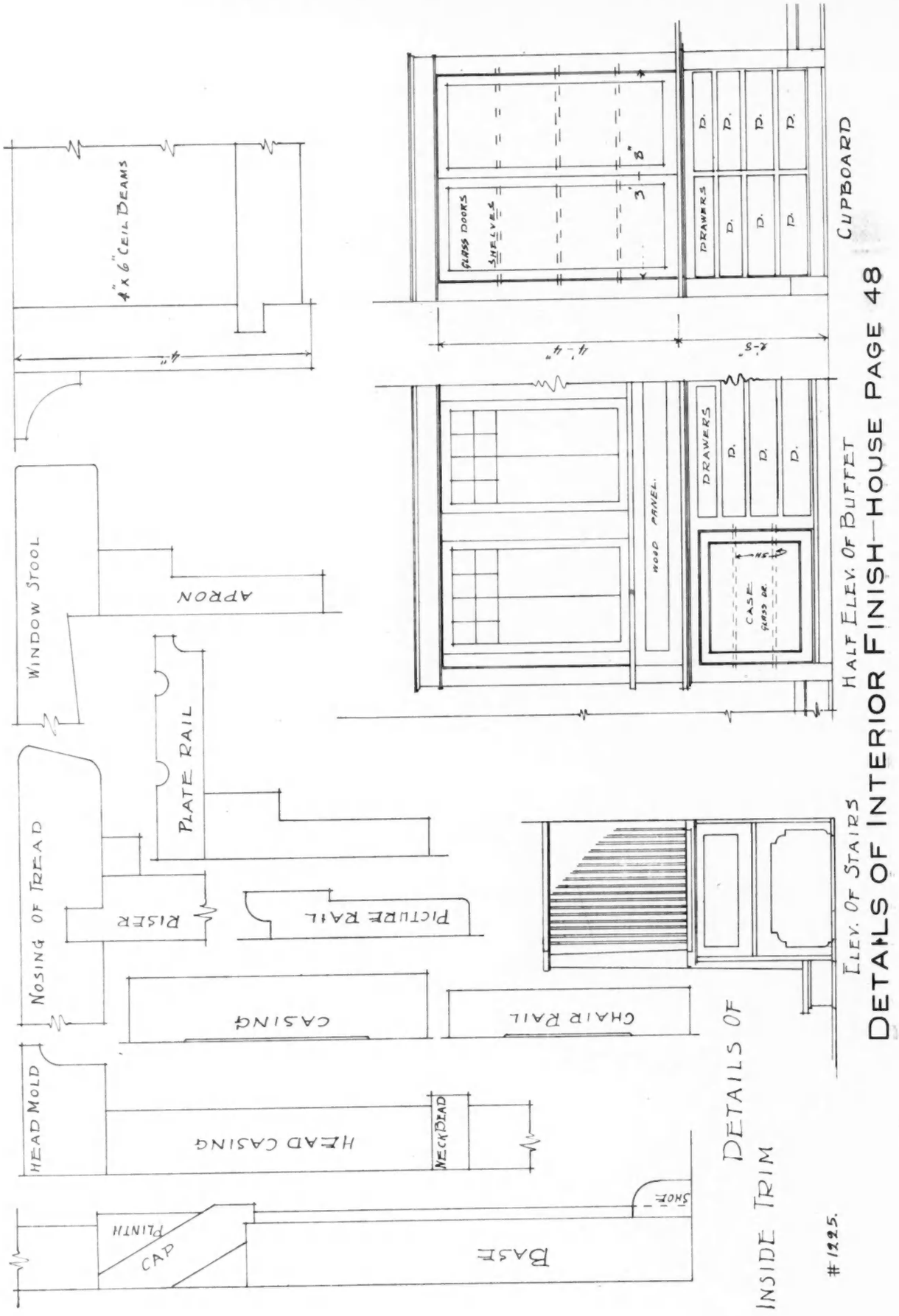
SECOND FLOOR PLAN—HOUSE PAGE 48

the exceedingly high prices that prevailed, ranging from eighty cents to $1.25 per pound, were the magnets that drew many founders into this line of work. At that time, however, it was not generally known that this metal was easily affected by the oxidizing influences of the melting flame, and the difficulties encountered after losses more or less heavy had been sustained resulted in centralizing this work in a few the most intricate design are successfully cast. The high shrinkage is overcome by the judicious use of risers, and many chills are also placed in the moulds.

The growth of this industry has been coincident with the expansion of the automobile trade, and it has been asserted that the six plants consolidated will consume approximately 8,000,000 pounds of aluminum per year.



FOUNDATION AND BASEMENT PLAN—HOUSE PAGE 48



Details of Interior Finish—House Page 48

Details of Inside Trim

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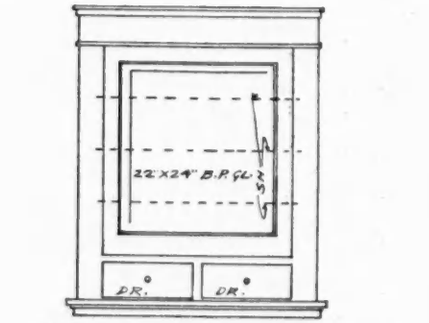
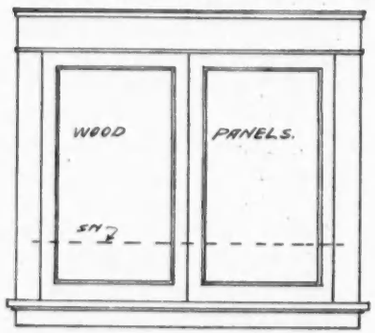


ELE. OF MED-CASE IN BATH RM.



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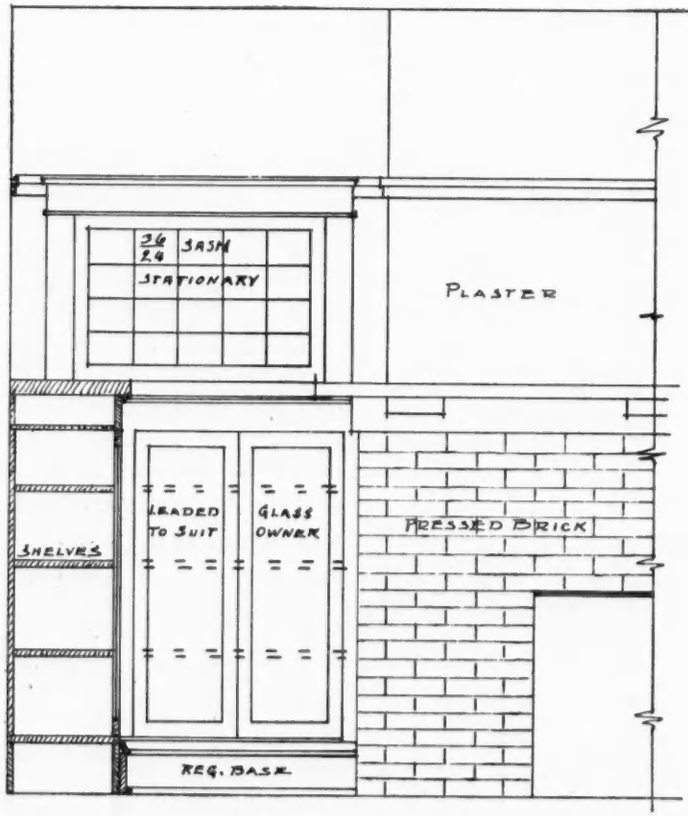
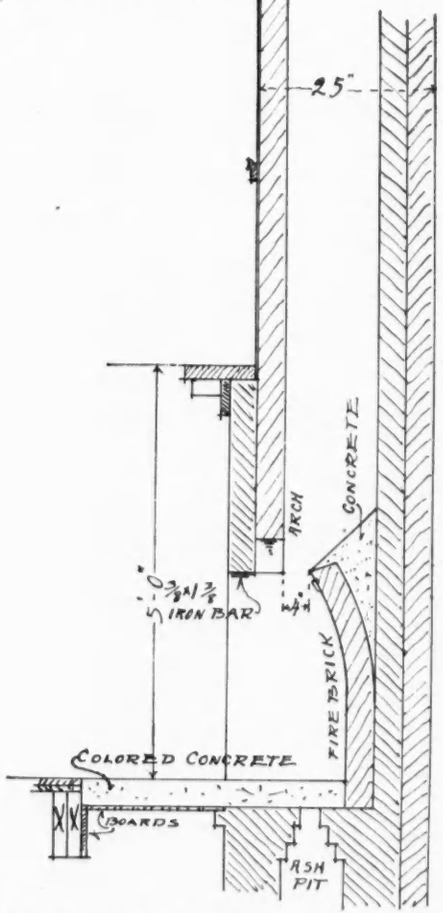




HALF ELEV. AND SECTION OF BRICK MANTEL AND BOOK CASE IN LIVING ROOM

DETAILS OF INTERIOR FINISH—HOUSE PAGE 48

MACHINE WOODWORKING

How to Care for the Band-Saw

A PRACTICAL AND THOROUGH TREATISE ON THE FITTING AND OPERATING OF BAND-SAWS—POINTERS VALUABLE ALIKE TO BEGINNERS AND TO EXPERIENCED FILERS

THIS treatise, prepared by the Berlin Machine Works, has been arranged especially for the benefit of beginners, but we believe it will also prove interesting to experienced filers and operators.

A bandsaw blade should under all conditions maintain a practically fixed position on the saw wheels. The teeth should project over the front edge of the wheel and the saw should maintain this position without any support whatever on the back edge of the blade. In other words, the saw blade should stay in place without a back-thrust wheel or any other mechanical device for holding it in position. This result may be attained entirely by means of "tension." Tension is obtained by means of the "tensioning roll" or "stretcher" or by the use of hammers. With these tools the blade should be so fitted that the extreme edges—that is, the portions just at the roots of the teeth and the back edge—are slightly shorter than the center portion of the blade. To illustrate: When a saw is properly fitted, if a narrow strip, say ¼-inch wide, were cut from the front edge at the roots of the teeth, another from the back edge, and a third strip from the center, and the three strips compared, it would be found that the strip taken from the center would be slightly longer than either of those cut from the edges. If the entire blade were cut into narrow strips and the lengths compared, it would be found that the strip taken from the center would be the longest and those at either side would gradually decrease in length toward the edges of the blade.

Each tooth of a band-saw acts like a small chisel, removing a certain portion of the lumber being sawed. That the tooth may do its work with the least possible strain on the blade, it should be of such form that it will cut freely and not tend to swerve sidewise and follow the grain. The teeth should be of even length, with the extreme cutting edge the widest point of the tooth and only wide enough to allow the saw blade to clear itself without friction. It is important that there should be sufficient space between the points of the teeth to chamber the dust properly and carry it out of the board.

Position on the Wheels

Various theories have been set forth as to why tension causes the saw to maintain the proper position on the wheels. The most plausible of these, we believe, is that because the extreme edges of the saw are shortest they get most of the strain. If the blade were absolutely flat so that all portions were the same length, the strain would be uniformly distributed, and it would be much easier to crowd the edges of the saw sidewise than it is when the strain is almost entirely upon the edges. It is practically impossible to force a saw to slip bodily backward on the wheels, as the friction between the blade and wheels is too great. The only way it can be crowded is to change the angle of approach to the wheel. In order to change the angle of approach it is necessary that the front or back edge of the blade be crowded sidewise. It is impossible to bend a saw edgewise in a straight line by any thrust applied during operation. Therefore, anything which will prevent the edges of the blade being moved sidewise will tend to prevent the saw from changing its position on the wheels. It requires a very slight change in the angle of approach to make the saw run ahead or back a great deal, because the wheels are traveling at such a high rate of speed. For proof of this statement, notice how a very slight crook edgewise in the saw will tend to make it vibrate back and forth on the wheels.

Tension

Tension is obtained by passing the saw between the tension rolls under pressure or by hammering. The term "tension" should not be confused with "strain." The word "tension" applies to that condition produced by expanding the center of the blade, leaving the edges slightly shorter. A short straight-edge may be used to determine when the saw is in this condition and light shows under it. If a "tension gauge" is used, the saw should fit the gauge evenly its whole length. The amount of tension required depends largely on the wood to be sawn, but no more tension should be carried than is actually needed, because excessive tension has a tendency to cause cracks in the saw.

Increasing the tension makes the saw "stand up" to a faster feed. Many cases can be cited of band resaws carrying blades 8 inches wide cutting soft woods 12 inches or less in width at the rate of 200 feet per minute. This shows it is possible to feed very fast if sufficient tension is used and it is perfectly even throughout the blade.

To tension properly, the center of the blade should first be passed through the rolls, with quite heavy pressure. The next time through, the rolls should be run a little to one side of the center of the blade and the pressure should be slightly less than the first time. The third time through, the rolls should be the same distance from the center on the opposite side, and with the same pressure as was used the second time. This operation should be repeated, each time approaching the edge of the blade and decreasing the pressure on the rolls. If this is carefully done, the tension will be practically uniform throughout the entire blade. It may be found, however, that there are spots where the tension is somewhat uneven. This can be remedied by passing the saw through the rolls where the spots show, and thus expanding the steel until the tension is uniform. When it is desired to stretch the back edge so that it will be slightly longer than the front, the blade should be rolled from near the center toward the back, using a slight and uniform pressure at all times. The last time through, the rolls should bear on the extreme back edge of the blade. On resaw blades it is better to tension from edge to edge of the blade, thus making the blade fit a tension gauge, which is the true segment of a circle.

Swage Setting

Another point which must be considered is the amount of swage. The purpose of swaging the tooth of a saw is, of course, to make the extreme cutting point wider than any other portion of the blade, so that the saw will pass through the stock without friction on its sides. Too much swage, however, is as bad as too little, for the more swage the greater the amount of sawdust and the harder the work on the blade. A saw having just enough swage to prevent friction will stand more feed than saws with too much swage. In addition to this, there is a material saving in lumber. The swage should be of such form that there is clearance in both directions—that is, the tooth should taper back to the body of the blade on both the upper and under sides. The extreme cutting point of a tooth should be perfectly square and the corners sharp, so that there will be no tendency to swerve sidewise or follow the grain of the wood. If the cutting point is not square and sharp, part of the work will be done by the side of the tooth just back of the point. This has a tendency to bend the tooth sidewise, which will cause the saw to run out of a straight line. Further than this, there will be friction on the side of the tooth, which is very objectionable, because it tends to heat the blade.

Leveling

A saw may appear to have uniform tension, but when placed on the leveling table and examined with a straight-edge, spots may be found where the straight-edge does not fit the blade perfectly. One side of the blade may be covered its entire length, commonly known as "dished." This may be caused by the rolls being worn out of true, or by hammering more on one side than on the other, or by slivers catching in the guides while running. These spots or "dish" should be located with the short straight-edge and removed by light blows with the cross-pene hammer, with the saw on leveling block. This is a point to which filers do not give enough attention. The blade should lie flat on the leveling block, then be gone over carefully and all lumps removed. As it is impossible to tension a blade perfectly, the leveling process is necessary to correct any slight imperfections that may exist.

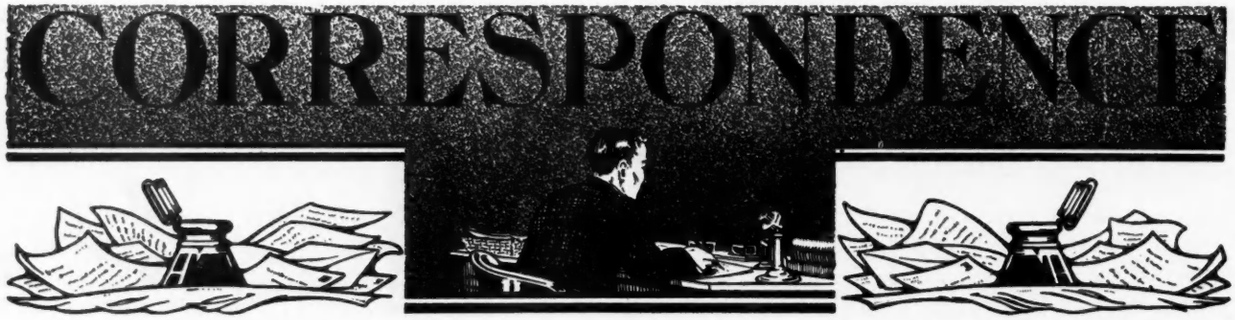
A saw may appear to be perfectly tensioned and level, yet may have what is commonly known as a "twist." To determine whether this condition exists the blade should be placed on the floor. If one end of the saw falls in one direction and the other end in the opposite direction, thus tending to form a figure 8, there is a twist somewhere in the blade.

If a blade having a "twist" is placed upon the leveling table and examined carefully with the straight-edge at right angles to the blade, the straight-edge may fit the blade perfectly. If, however, the straight-edge is applied at an angle of about 45 degrees with the length of the saw, a high spot or ridge may be found. When trying the straight-edge in this manner it should be applied angling in both directions across the blade. If it is a short twise these ridges will be pronounced and extend across the blade at rather sharp angles. On the other hand, if it is a "line-twist," the ridges will be found to extend at slight angles with the length of the blade and sometimes to extend almost the entire length of it. When the position and general direction of these ridges have been determined, the straight-edge need be applied only in the direction crossing the ridges. To remedy this condition, the saw should be placed on the anvil and the cross-pene hammer used, the long way of the face being parallel with the ridge. Only light blows should be struck, and the blade should be examined frequently, until it is found to be perfectly level when the straight edge is applied at all possible angles across the blade. When the saw is in this condition throughout its entire length, the twist will have disappeared.

In a future paper the best method of brazing broken band saws, together with the proper speeds for best results and other matters pertaining to the operation and care of band saws will be taken up.

✤

Doing the best we can, frequently means only the best we will.

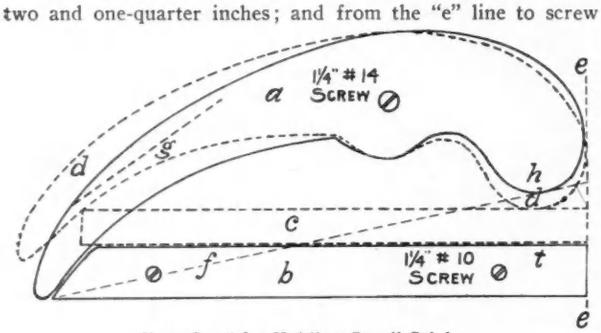


Convenient Bench Stop

To the Editor: Fossum, Minn.

The bench stops that we buy are good; but try this one. You will find that it holds short stuff better, because it does not let the piece back up with each stroke of the plane; neither do pieces held in this stop tip over so easily.

"A" is curved, made of elm or any hard wood that does not split very easy. It takes a piece five-eighths of an inch thick, three and one-half inches wide by eleven and one-half inches long. From dotted line "f" to center of screw is about two and one-quarter inches; and from the "e" line to screw



Very Good for Holding Small Sticks

about three and one-half inches. If curved piece is cross-grained, turn grain as per dotted line "g." "b" shows a straight piece; any hardwood is good; make it about one and one-half inches wide, ten and one-half inches long, by five-eighths thick. Screws should be countersunk quite deep so as not to injured plane irons. "c" shows piece held in stop; the harder you push the tighter the grip, because "a" acts as an automatic vise, oscillating as per lines "d d," adjusting itself to any thickness from one and one-eighth to about one-half inch. If thinner stuff is to be held, a short piece of wood is slipped in between heel "h" and the piece to be planed.

In setting the stop, fasten the straight piece "b" to bench—close to edge—use two screws one and one-quarter inch, about number ten. Square as per line "e e," so as to get "a" equal distance back; have front ends of stop close together, then about one and three-sixteenths between "h" and "t." Fasten "a" with a heavy screw, about number fourteen.

These stops are simple and don't cost much. Have used one since ten years ago. Make one. They are alright.

A. O. Stien.

How to Get Satisfaction out of a Hot Air Furnace

To the Editor: Brigham City, Utah.

I have noticed a number of articles lately about the hot-air furnaces and I would like to say a few words in favor of them.

The one great drawback to that system of heating is that people never give it proper conditions to work satisfactorily.

Most people who put in a heating plant of any kind have a house that is built reasonably tight. They expect a furnace to pour in a steady stream of fresh hot air in a room or building that is already full of air and has no outlet. It is impossible to heat a room properly in that manner.

Some will say that the windows and doors are loose and ought to let out the surplus air. But when there is a wind blowing outside against those windows at the rate of eight or ten miles an hour the outside pressure is greater than your furnace heat. Consequently your house does not warm up very fast.

My way is to build a flue from the floor at the opposite side of the room from register if convenient. Build it in with the chimney or between the walls of the house so that it will lead out through the roof, the same as a chimney.

Then as the hot air from the furnace rises to the ceiling and begins to press the cold air down, it (the cold or foul air in the room) will pass up this flue, thus giving a constant circulation of fresh warm air in the room all the time .

One flue can be built so as to take the cold air away from two or three rooms and be controled by small registers. An open fire-place will answer the same purpose, or an old chimney can be utilized in the same way.

If furnace dealers would insist on having such flues from the floors of the main rooms to be heated their troubles as well as those of their patrons would practically cease.

If these flues are put in when building a house the cost of the furnace would still be far below the steam or hot water systems, and the unsightly radiators done away with.

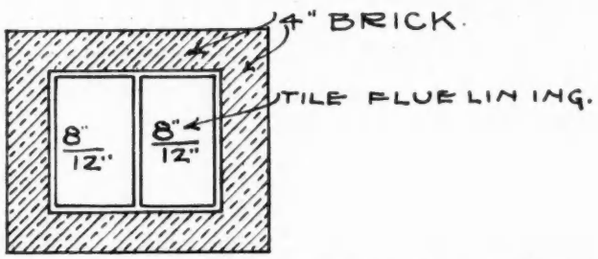
A. J. Miller.

Double Flue Best

To the Editor: Newton, Ill.

Enclosed please find check for $2.00 for which please push up due date on my subscription to American Carpenter and Builder.

I am wanting to build in my home an open grate, or as you say now days, an open fireplace; and, on account of its being necessary that I economize on space, I will have to



use the flue for grate and kitchen range. In your judgment, is a grate flue with an opening on rear side for range flue a success and can they be built so that the grate will not smoke?

Have you any working plans with detail instruction for building an open fireplace so that the flue can be used for grate on one side of the wall and kitchen range on the other?

I want good big flue for my grate so that it will be successful, giving plenty of draft and be a success. A. F. CALVIN.

Answer: Replying to that portion of your letter relative to flue construction for a fireplace and kitchen range combined, we take pleasure in enclosing to you herewith some details that should be of help to you. The design from page 655 of the February number, while it shows a case differing from yours, nevertheless gives good details for smoke arch and other parts that are common to all fireplaces; and so may be of assistance. The accompanying sketch shows our best suggestion for the arrangement of your flue.

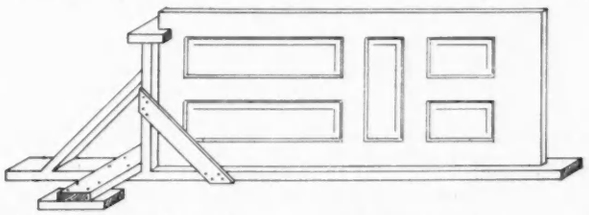
All authorities on fireplace construction agree that each fireplace should have a separate flue, and in no case should they ever be used for a stove flue. We suggest that in order to save room, you use from the point where the kitchen flue starts a double flue lining enclosed within a single brick flue as shown in the sketch. We could not advise the use of but one flue for both the fireplace and the kitchen range.

EDITOR.

Two Useful Devices

To the Editor: Everett, Wash.

I have in mind a few things that have been a great help to me in my work as a carpenter and thinking that they



might be of benefit to others, I herewith submit them.

My first is what I call a door jack. It is for holding a door for dressing the edges while being hung, putting on the butts, etc. It keeps the door clear of the floor, thus keeping the edges free from sand and other particles so injurious to the plane. It is made of dressed 2 by 4's 7 or 8 feet long with an upright a little shorter than the width of the door and braced as shown in illustration. It can easily be moved from room to room and is always ready for business.

My second is a device for cutting base against base blocks, or rather for scribing the base to the block. It is made of wood about 3 inches wide and 12 to 14 inches long. Bore a ⅞-inch hole and cut out, as shown in the drawing. Now place the base that is to be fitted against the base block and set the base scriber astride of the base-board and tight against the base block and mark with a sharp pencil, or better still with a knife and cut to the line. It is seldom that I make a misfit. FRANK C. TUBBS.

We Stand Corrected

To the Editor: Malvern, Pa.

In answer to a reader who has soil pipe to paint white, the pipe being coated with gas tar, you advise him to remove the tar with the gasoline torch or by scraping. It is impossible to remove the tar completely in this way, as the pores of the iron will be full of it, and hence any white paint applied will certainly turn brown almost as badly as if the tar had not been touched.

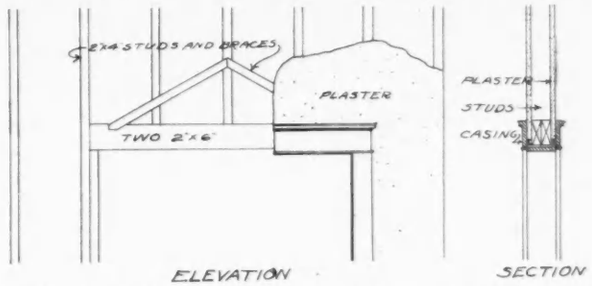
A better way, if you will permit me, would be to coat the pipe with a thin brown shellac varnish, which will prevent the tar from coming through and browning the white paint. This is a quicker and much easier method than burning off, and is the method followed by painters whenever they are up against a gas tar job. I have also coated tarred pipes in building when they were to be water colored, using shellac, and it is the only thing I could have used successfully.

A. ASHMUN KELLY.

Framing for Cased Opening

To the Editor: Mansfield, Mo.

Can some reader of the AMERICAN CARPENTER AND BUILDER show me the proper method, with sketch, for framing a cased



opening for inside work? I am building my first house and would like to hear from some of the older brothers.

JOHN A. DUNN.

Answer: The accompanying sketch will show you how such a job is done—at least it shows one way. Two 2 by 6's braced above as shown will be amply strong for cased openings of ordinary width. In some of the extreme "modern" houses openings of extreme width are encountered. For such some form of special trussing is necessary. EDITOR.

Stained Plaster

To the Editor: Browns Valley, Minn.

I am going to trouble you for a little information which I think will be of value.

I have done some plastering on brick and lath that were stained or colored. The first coat was put on and dried before the second coat was applied, but the coloring came through and shows. Can you tell me of any remedy for this?

GEORGE NOVOTNY.

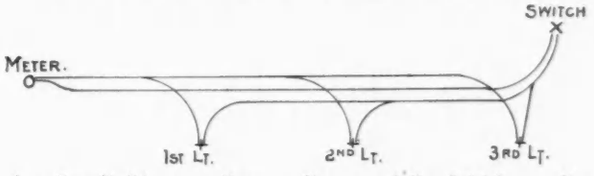
Roughing in for Electric Lights

To the Editor: Jerome, Idaho.

Below is a diagram of a system of roughing in for electric lights, which may help brother Emery J. Eastman out of a kink.

This is a simple system that was put in for me in a small church last winter. Other systems may be used but I think the diagram is plain and will need no further explanation.

I would like to ask if any of the brother chips have noticed



what I call "dog ears" on nails, especially finishing nails; incomplete cutting at the nail points. It is somewhat annoying to use these nails especially in good work where the nails should be perfect, in order to drive them straight. Is there any remedy?

I enjoy the AMERICAN CARPENTER AND BUILDER and have at hand every number since I began taking it.

M. L. PARSONS.

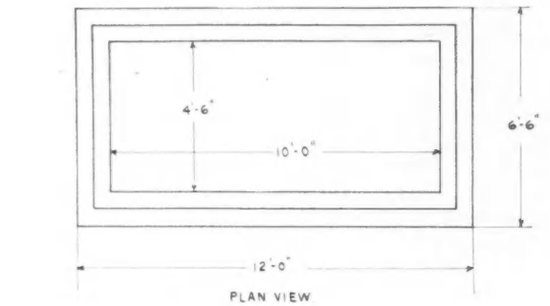
How to Make Concrete Water Trough

To the Editor: Steelton, Pa.

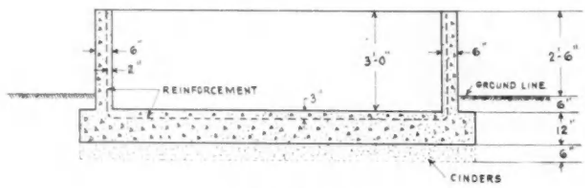
Concrete is an ideal construction material about the farm, as it is pleasing in appearance, and it can be constructed cheaply and well with local material and labor. Its adaptability for construction around the farm is universal, as it can be used for fence posts, watering troughs, rain leaders, retaining walls, barns, sidewalks, wells, silos, tanks, cisterns, ice houses, root cellars, chicken houses and greenhouses. One of the first essentials on a farm is the watering trough, and when made of concrete it is practically indestructible besides being of excellent appearance. If an inlet pipe with float valve connection is provided it needs absolutely no attention.

The trough can be made watertight by using a rich mixture of concrete, putting in enough water to give a concrete that will flow readily and placing the concrete at one continuous operation, so that no surface is allowed to harden. The best mixture of concrete to use is one part cement to one and one-half parts of clean, coarse sand to three parts of screened gravel or broken stone.

A satisfactory outside surface can be obtained if as soon as the forms are removed, the surface be thoroughly moistened



PLAN VIEW



SECTIONAL ELEVATION

with a whitewash brush, using plenty of water and rubbing the surface down with a board or a brick.

The trough shown in the illustration is 10 feet long by 4 feet 6 inches wide by 3 feet deep (inside dimensions), the walls being 6 inches in thickness, reinforced with woven fence wire or some other metal fabric. To construct this trough excavate an area 12 feet long by 6 feet 6 inches wide and 2 feet deep. Fill this area to a depth of six inchs with cinders; tamp this thoroughly and then fill in with a 6-inch layer of concrete, the mix of this concrete containing only one-half the proportion of cement to sand and stone required for the other parts of the trough.

The next thing to do is to place the outer forms in position, having them well braced and oiled or greased. Then place a three-inch layer of concrete in the form, and before the concrete has set, place sheets of the reinforcement (as described above) over the concrete, bending it up so that it will come within an inch or so of the top of the forms at the side and ends and 4 inches away from the inside edge of the outer froms, so that in a 6-inch wall the reinforcement will be 2 inches from the inside face of the trough walls. Then place another 3-inch layer of concrete on the bottom over the reinforcement, ram lightly and smooth the surface off evenly. Before the base has begun to stiffen, place the inside form in position, care being taken to see that it is at equal distances from the sides of the outer form, and then fill in concrete between the outer and inner forms.

If the trough is provided with inlet and outlet pipes, these pipes should be placed in the forms before placing the concrete, and if the pipes are not on hand at the time, suitable openings can be provided for them by placing greased wooden plugs in the forms, the plugs being easily removable after the concrete has stiffened. In a trough of this kind, the forms can be removed in about two days in warm weather and about four days in cold weather.

The trough should not be filled with water until about a week after the removal of the forms, and in that week's time the trough should be protected from the sun by keeping the surfaces wet. When the forms are removed it is best to thoroughly wet the inside of the trough and paint the inside surfaces with a first-class Portland cement, mixed to a creamy consistency. A trough of this size would require about 5 cubic yards of concrete. PAUL T. LESHER.

"Wall Boards"

To the Editor: Missoula, Mont.

It is only a few days since the writer heard a lady make serious plaint because some newly plastered walls were not pure white; yet she had had no thought of occupying the rooms till they were papered. She wanted the walls white, though, because she had been accustomed to seeing new walls white; and felt that her's were different—therefore wrong. For so many years have we been accustomed to seeing walls made from some white plastic material, put on with a trowel, that most of us are ready to condemn, without hearing, a wall of any other sort. Such is conservatism.

While the writer must admit feeling the usual prejudice in favor of plastered walls, under average conditions; he has often been struck by the special fitness of the so-called "wall boards" for some jobs. These "boards" though becoming more and more common, are yet so rare as to merit a word of comment. Were it not for the fact that whitewashed inside walls are even more a thing of the past than are white painted outside ones, plaster would hold a practically impregnable position; but, as most walls are now papered or otherwise covered, "wall boards" have a fighting chance all along the line—and they are in the ring.

If memory serves it was something like twenty years ago that the writer, his curiosity aroused by the white smeared overalls of a friend, learned that the first "wall board" was being born. This was made of slender laths, four feet long, covered on both sides with heavy straw board. The whole was fastened together with some sort of white cement, probably caseine and lime. The straw board, as at first used, was found quite susceptable to moisture, and the product has since been considerably improved; with results which seem quite satisfactory to the manufacturers, and, so far as is known to the writer, to their customers.

Within a few years several other wall boards, of slightly different construction, but of practically the same application, have been put on the market. As to what merit one may have over another—ask the manufacturers.

The principal objections to these wall materials—aside from prejudice—seem to be that they have to be covered with paper or other material in order to get a continuous finished surface; and that, being only about half as thick as lath and plaster, standard frames have to be cut down in order to come flush with them. In this locality the cost does not appear to be materially different from that of lath and plaster.

The manufacturers make the points that they may be applied at any time of year—freezing weather not effecting them—and that they void the necessity of slop and damp-

ness about the house. The latter point would seem to be a specially strong one in case of alterations and repairs.

It is also claimed, and seems plausible, that they are less liable to damage from blows, settling foundations; or any other of the many causes which lead to cracks in plaster.

That the writer once lived for a year in a house, before he accidentally discovered that the walls were of one of these boards, is sufficient proof to him that they are not markedly inferior to plaster. There are certainly cases where the application of wall board is expedient, cases where it is economical, and cases where it is better than plaster—possibly cases where it would "win out" on all three counts.

W. D. GRAVES.

Fireproof Paints

To the Editor: Hart, Tex.

I have a book on painting which gives one recipe for fireproof paint; but it takes too long to make it. I will send the recipe:

Slake stone lime by putting it into a tub to be covered to keep in steam. When slaked, pass the powder through a fine sieve and to each 6 quarts of it, add one quart rock salt and water one gallon. Then boil and skim clean. To each 5 gallons of this, add pulverized copperas ½ pound. Then slowly add powdered potash ¾ lb. Then add hardwood ashes sifted, 4 pounds. Now add any color and apply with a brush.

Now is that complete? I have tried it and it peals off right away. If you have a different recipe that you will stand behind I would like to hear from you. W. H. JOHNS.

Answer: We have been very much interested in comparing the ingredients which you named with those given in recipes for other so-called fireproof paints. We were at a loss to understand the significance of adding both powdered potash and hard wood ashes, since we would consider that the addition of the ashes would simply mean an increase in the amount of potash used. There is a possibility that the ashes are to be added in order to give the paint sufficient body.

In regard to the peeling off of the paint immediately after drying, we are not surprised, since it contained no glue or any substance of a like nature, to give it holding qualities.

We do not believe that there is such a thing as a fireproof paint taken in the strictest sense of the name. There are paints or coatings which may be applied to wood which will for a time prevent combustion. It is the general opinion though that paints of this nature are not durable, and require frequent renewing. Another complaint has been that these so-called fireproof paints, when subjected to the action of fire for any considerable time, burn and, flaking off, expose the wood beneath to the action of the fire. Many of these paints depend upon some soluble material for their fireproof qualities. You can readily see what action of repeated rains would be upon such a paint.

We have been informed by one of the engineers connected with one of the largest underwriters companies in the United States, that they do not consider that there is such a thing as an absolutely fireproof paint. This same engineer has told us that he considers the whitewash which is recommended by the Light House Board, United States Treasury Department, to be as good as the ordinary fireproof cold-water paint for inside use. We give the recipe for this particular form of whitewash: Slake ½ bushel unslaked lime with boiling water, keeping it covered during slaking. Strain it and add one peck of salt, the salt being dissolved in warm water. Three pounds of ground rice worked up to a thin paste in boiling water. One-half pound powdered Spanish whiting. One pound clear glue. These two dissolved in hot water. Mix all together and let stand for several days. Use hot with a brush.

We have heard paint experts say that any good paint may be made more resistant to fire (not absolutely fireproof) by adding one pound of boracic acid to each gallon of paint. This acid comes in the form of a powder or flaky material, and, when subjected to heat, fuses and prevents air from getting at the wood by forming a sort of glassy coating over the wood. You can readily see that this prevents the necessary oxygen from being supplied in order to carry out the combustion or burning of the wood. One objection to this method of fireproofing is the point already mentioned above in connection with solubility of the fireproof agent in water. The boracic acid is soluble in water and after a time is washed away by rain in spite of the protection offered by the varnish and oil in the paint. On account of this feature, surfaces protected by a paint of this nature should receive frequent attention. EDITOR.

Barn Framers

To the Editor: Stewartsville, Ind.

I am sending you a kodak picture of myself and men who are now at work on a large self-supporting barn near this place. All of us read the AMERICAN CARPENTER AND BUILDER

except the little one on the end—and he will too, in time. My picture is marked with an x on the shirt sleeve, and the one on my right is the man we are building the barn for.

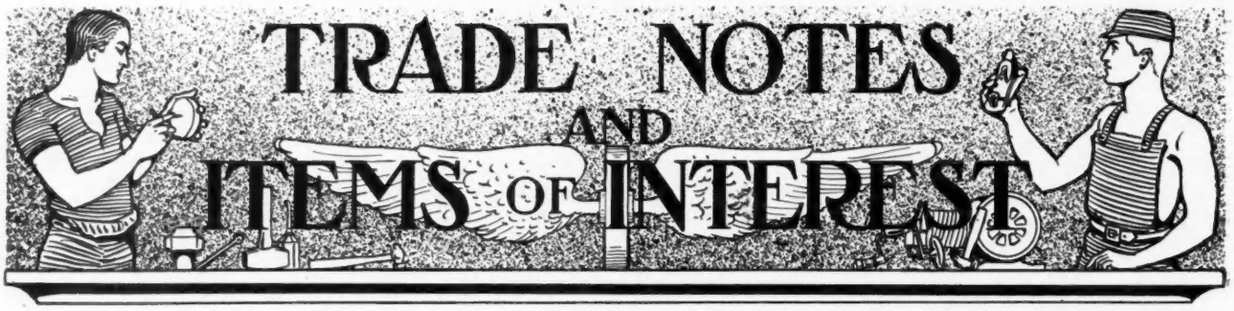
CHAS. N. AMICK.

To Build Stave Silo

To the Editor: New Dundee, Ont.

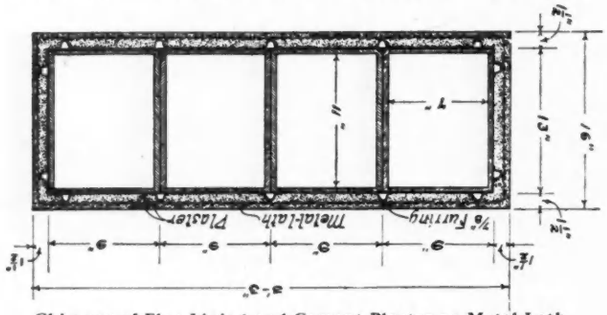
I noticed in your September issue that Mr. John T. Kramer wants some information about setting up stave silos. I have set up quite a few, and the way I go to work is this way: First, I set up and plumb one plank or else the piece where the iron hoops go through. After this is stayed both ways, we set up the second plank opposite the first one, stay same temporarily and then fasten two hoops to same by means of iron staples—the bottom hoop and the center one. When this is done, I start setting up my plank, at first plank erected, one man at bottom and another man on top of planks. The planks are all toed together at top with 3 inch nails at the same time fastening them to the two hoops by means of staples.

The staples should not be driven in so tight but that the hoop can slide in the staple when the silo is drawn together. When I have all the plank in I start to put in the rest of the hoops, drawing them tight together. This way two men can set up a silo 30 feet high in one day, providing the plank are in one length. If two lengths have to be used another man is handy to cut the ends of the planks square where the splice is made. The joints should be broken about 4 feet or not less than 2 feet, planks being all one width and slightly beveled, which can be done in the mills. The openings may be made by cutting two planks. An opening every 5 feet should be sufficient. The plank should be cut bevel towards the inside of silo. The same pieces can be used again to close the opening when silo is filled. CHAS. H. BECKMAN.



New Idea for Concrete Chimney

Builders are continually asking for some good way to build concrete chimneys. Here is a method extremely simple —that does not have the fault of letting the flue gases come into contact with the cement. The chimneys are constructed of terra cotta flue lining and may be of any size or dimensions required for satisfactory draft. Flue lining is laid in neat cement mortar and then covered with metal lath furred out with metal furring. This furring is held in place by means of wires wrapped around the terra cotta flue lining. To the lath is applied a heavy coat of cement mortar made in pro-

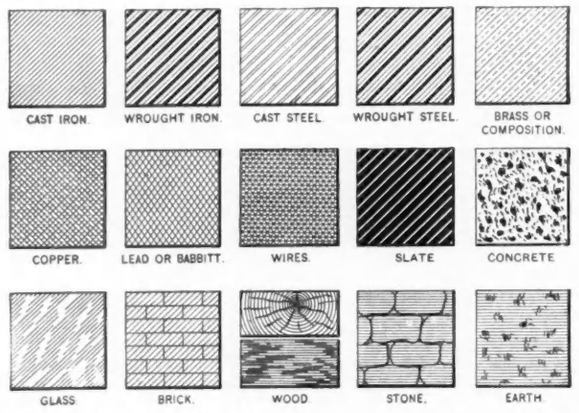


Chimney of Flue Lining and Cement Plaster on Metal Lath

portion of one part cement, one-half lime and five parts sand. This is shoved well through the lath and made to fill up the space between flue lining and lath, giving two or three coats, depending on the thickness of chimney wall desired. A very satisfactory and economical thickness from inside of terra cotta to outside of cement is 2½ inches.

Symbols Used in Drafting

The mechanical draftsman has certain ways of inking in his drawings in black and white so that, to the initiated, the different materials to be used in the construction are as



plainly indicated as though their names were lettered in on the drawing wherever they appear. The more common of these symbols, as used in mechanical work, are shown herewith. In architectural drafting a much simplier system is used.

Instead of cross-hatching or section lining the sections, they are sometimes colored with colored ink, certain colors representing a certain material, so that the sectional view not only shows the form, but also the material of which it is constructed.

The colors chiefly used to represent the various materials are:

Earth	Burnt Umber
Concrete	Sepia, with black dots
Stone	Pale Sepia
Brick	Light Burnt Sienna
Wood	Raw Sienna
Cast Iron	Neutral tint with Prussian Blue
Wrought Iron	Indigo
Steel	Prussian Blue
Lead	Neutral tint tinged with Indigo
Brass	Chrome Yellow
Copper	Chrome Yellow tinged with Burnt Sienna
Slate	Indigo tinged with Lake
Plaster	Pale neutral tint
Glass	Light Green

Blue prints are, however, used to such an extent that colored sections are but seldom used outside of exhibition drawings. We would strongly advise the student to color some sections as practice. When neatly done they show up very well and you will be proud of a good job, so try your hand at it. Practice makes perfect.

To Test "All-Wool" Cloth

Here is a simple method of finding out if the cloth the tailor offers you is really all-wool, as claimed. Take home a sample of the piece and boil it up for a short time with a solution of caustic potash, (KOH). A small stick of this costs only a few cents at the drug store. The caustic will dissolve out all the wool; and if any part of the cloth remains you may be sure it is cotton. In this way the home chemist is safe from the tricky tailor.

New Marking Gauge With Sawtooth Wheel

The Nicholls Manufacturing Company, Ottumwa, Iowa, are placing on the market a new improved roller marking and mortise gauge called the "Nicholls No. 17 Sawtooth."

This gauge is made entirely of metal, polished steel or nickel plated, double-faced head and has a sawtooth wheel at end of both bars in place of a pin or straight roll. This makes a gauge which will not run out with the grain of wood. The tracing wheel runs true with edge of board, regardless of knots or cross-grain wood.

This is claimed to be the only gauge on the market which will mark true at all times.

Another feature is, the line made by a pin is very hard to see on some kinds of wood, but with this true gauge the marks made are like punch marks, and reflect the light from all sides.

It is also made so that one rod slips inside of a hollow tube, making the same appearance as a single gauge; and, by slipping the inner rod out, you have a perfect single marking

gauge. Both rods are graduated. Very near the end of the outside rod they have placed a steel point pin to admit of being used close up into a rabbet or corner.

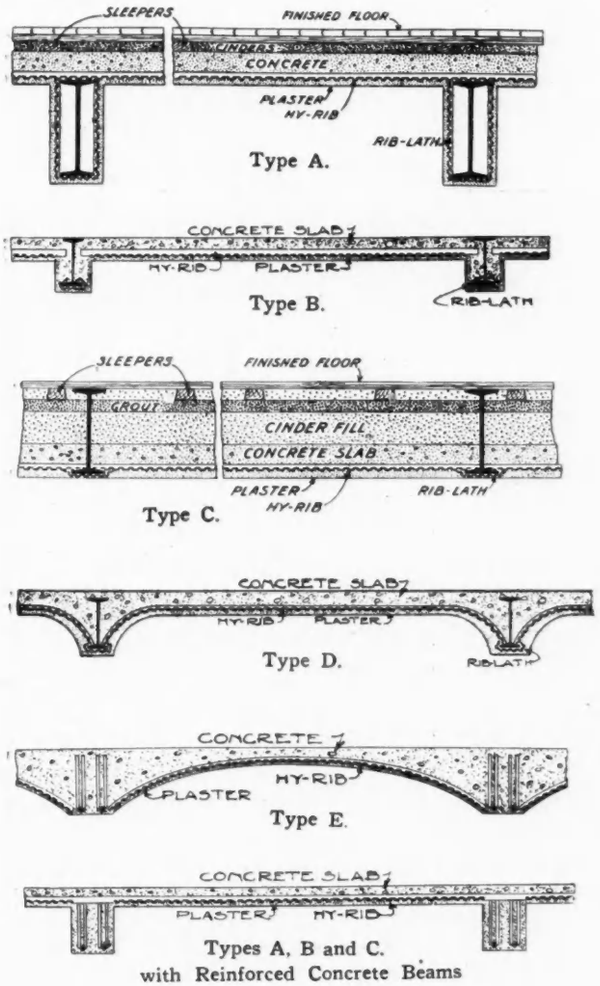
This gauge will last a life-time and every carpenter should have one.

Six Concrete Floors–No Centering

Practical builders know that the centering is the expensive and troublesome part of ordinary concrete floor construction, whether straight or curved. The drawings herewith show six types of concrete floors that require no centering. The concrete mixture is deposited on "Hy-Rib," the steel lath surface of the Trussed Concrete Steel Co. (Detroit), which is stiffened with rigid high ribs, making the single sheet of steel a complete unit of lath and supporting studs.

In type "A" the 'Hy-Rib" sheets are laid on top of steel beam, the concrete poured in, and under surface plastered—no centering is used. Solid concret or hollow tile may be substituted for fireproofing of steel beam. In the next, type "B," the finished concrete slab is flush with top of steel beam, giving greater head room below beams. The sheets are supported on the sides of beam boxes used as centering for the steel beam fireproofing, no other centering being necessary.

A flat ceiling is secured by constructing the "Hy-Rib" slab on the lower flange of steel I-beam. A light cinder fill over



Types A, B and C. with Reinforced Concrete Beams

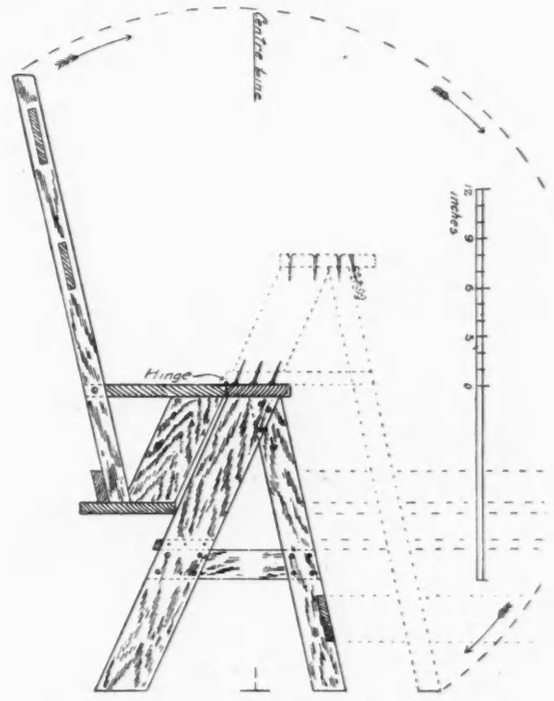
the slab brings the finished floor flush with top of steel beam as shown in figure, type "C."

In type "D" the ends of the sheets are curved (bending done at the factory) and rest on lower flange of beams. This provides the fireproofing of steel beams without the use of any centering. With reinforced concrete beams the sides of the beam boxes are done away with as the ends of the "Hy-Rib" rest on the bottom board as in type "E." Concrete is poured in above and plaster applied to the lower surface. No centering is necessary.

With reinforced concrete beams for types "A," "B" and "C" the "Hy-Rib" sheets are supported on the sides of the beam boxes used for centering the concrete beams, no other centering being necessary. If "Hy-Rib" extends over concrete beams, punch out the lathing between the ribs to permit filling of the beam.

How to Make Chair Steps

The chair steps here illustrated form a most useful article for any household, and have the additional advantage that they can be cheaply and easily constructed. The timber, which may be of good clean spruce, can be purchased for a small amount at any local timber yard.



Back of Chair "Flops Over" to Make Step Ladder

For the amateur worker we advise the making of the step portion first, and when this is completed he should mark out and make the seat portion; he will thus run little or no risk of going astray. The joints used are of the simplest character and include the mortise and tenon, the half lap and the housing joint, which are secured in their respective positions by the use of the screw. The illustration is shown with graphic scale, and the sizes may thus be easily obtained without a cutting list. For those who care to go to a little higher price, we suggest using clean, straight-grained birch for this piece. The sketches are self-explanatory, and detail directions are therefore unnecessary.

"The Mechanics' Handy List"

The Peck, Stow & Wilcox Company's Guaranteed Hand Tools for carpenters include a large number of guaranteed braces, chisels, drawing-knives, auger bits, hatchets, squares, callipers and many other items. All of their carpenters' tools are high-grade in material and workmanship. In addition to the carpenters' tools, they also make several other large lines of hand tools for machinists, electricians, tin-

smiths, etc. All these tools are thoroughly inspected and tested and guaranteed. Each one is branded with the registered hand-tool trade-mark of The Peck, Stow & Wilcox Company, as they are firm believers in standing back of their goods, in order that every man who buys one of their tools may know where it was made, and may see the mark of the maker on it.

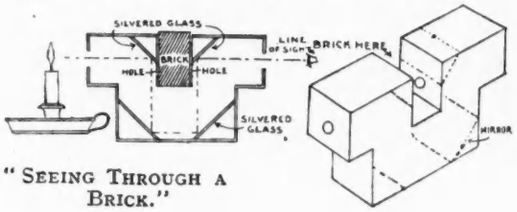
In addition to extensive advertising in trade journals, the Peck, Stow & Wilcox Company have made their tools known to many thousands of practical tool users, by the publication of an interesting little book, "The Mechanics' Handy List."

While this book is a very convenient and practical catalog, listing over 200 tools for carpenters, machinists, electricians, tinsmiths, etc., it also contains much valuable information for handy reference. At various points, paragraphs are introduced giving helpful suggestions as to the proper use and care of different types of tools, and the book also contains over 30 pages of handy reference tables, statistics and other matter of general information. The Handy List is a very convenient size, so that the user can slip it into his pocket, or find a convenient place for it in his tool chest. The Peck, Stow & Wilcox Company will be glad to send a copy of this book free to anyone interested.

"Seeing Through a Brick"

This is a very old trick device which seems to have a recurring interest. The trick is quite mystifying to those who are not "next"; and the box or apparatus for doing it is very simple.

It is known that the angle of incidence is equal to the angle of reflection, and it is upon this law that the puzzle is based. A box is made of thin pine. In the corners small pieces of looking glass are fixed exactly at 45 degrees to the sides. The trick worked in the following manner:—The brick is lifted out of the recess and some one is asked to look through the holes first at one end of the box and then at the other, and they see the lighted candle through the holes. The brick is then placed in position, and it should fit as tightly as possible so as to prevent any light from getting



"SEEING THROUGH A BRICK."

SECTION OF BOX. PERSPECTIVE SKETCH.

in at the sides. The sides of the box may be lined with thick velvet, so that the pile on the velvet will fit snug up to the sides of the brick and exclude the light. The lighted candle is now placed at the end of the box; the person applies his eye to the hole at the end and he will see the lighted candle at the other end. What really happens is that he sees round the brick. The inside of the box should be dead black so as not to reflect the light.

Importance of Surfaced Floors

The importance of nicely surfaced floors and their general effect upon the finest buildings has been largely underestimated by many contractors in the past, owing to the fact that they were not acquainted with the latest and most economical method for obtaining these results for finishing, but relied upon hand labor for scraping the floors which was tedious and an expensive process. (*Continued on page* 68.)

He Saved $800.00 On This Bungalow!

Dr. Whitehurst, of Texas, Tells of Big Saving in Building Cost By Use of Gordon-Van Tine Materials and Service

Here's His Letter

Peniel, Texas, May 7, 1910.

Gordon-Van Tine Co., Davenport, Iowa.

Gents: Enclosed are photos of our new house, in which we used your millwork, including White Pine Siding, Maple Flooring and Bishopric Mastic Wall Board. It is almost a Gordon-Van Tine house.

I have the swellest bungalow I think I ever saw now and saved about $800.00 in the building of it.

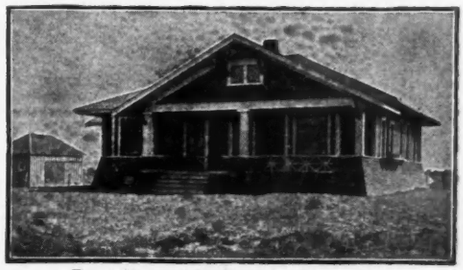
I received your check for $25.70 some time back, covering an overcharge in freight.

Please accept my thanks for your honest treatment.

These hardwood veneered doors, thick maple floors and Queen Anne windows are the talk of the town.

Respectfully,

D. Whitehurst M.D.



Front View of Dr. Whitehurst's Bungalow

Isn't This Good Evidence of Dr. Whitehurst's Satisfaction?

Interior View of Dining Room

We Protect Our Customers' Interests in Every Possible Way

Side View of Bungalow

Further Evidence of Intense Satisfaction

Over Half a Million Customers and Every One SATISFIED!

Over half a million home builders are buying their materials at **bargain prices,** direct from our great Millwork and Lumber Plant.

We carry a tremendous stock of building material—everything needed to build complete and beautiful homes of the most modern types, even to mantels and hardware. We guarantee quick shipment, no matter how large the order.

Quality, Safe Delivery and Satisfaction Guaranteed or Money Refunded.

Have You Written for Our Latest HOME-BUILDERS' CATALOG?

Solely through this wonderful Catalog of 5,000 Bargains in highest grade Millwork and Lumber we have built up a patronage extending from ocean to ocean. Everything offered at **dealers' prices.** Every item we sell is guaranteed up to the official grades of the Sash & Door Manufacturers' Associations.

ESTIMATES FREE!

Send on your list of materials. We will be glad to furnish complete estimates. You incur no obligation by availing yourself of this service.

At Last—A Plan Book That Keeps Cost Within Estimates!

The Gordon-Van Tine Plan Book shows over 50 designs of Houses, Cottages, Bungalows, etc., costing from $600 to $6,000, **that have actually been built at the exact cost specified.**

Doubtless you have sent for many of the Plan Books advertised for sale. **Have you ever tried to put up a house at the prices stated in these books?** The Gordon-Van Tine Plan Book wins out **because it safeguards the builder!** For a limited time we will send this splendid volume **free** on receipt of 10c to cover handling and postage.

Get Our FREE BOOKS and Save Big Money!

Our Grand Free Millwork and Lumber Catalogs will save an average of 50% on material, and our Plan Book will enable you to build with the positive assurance that the cost will not exceed the original estimate.

We offer to the Home-Builder a service that no other concern in America can duplicate. In justice to yourself, investigate the big advantages which we place at your disposal.

All correspondence receives prompt, courteous and careful attention. Write us. (74)

GORDON-VAN TINE CO., 546 **Federal St., DAVENPORT, IOWA**

The Making of Disston Files

Thoroughly Well-Made Service-Giving FILES

In the **DISSTON WORKS,** from the making of the Crucible Steel itself to the finished file, every operation is carefully performed and rigidly inspected.

We use 30,000 dozen **DISSTON FILES** annually in our Saw, Handle and Machine Shops. As a result of using them we know what a good file should do, and make the **DISSTON FILES** so they will **DO IT.**

HENRY DISSTON & SONS

Incorporated

Keystone Saw, Tool, Steel and File Works

PHILADELPHIA, PA.

Branches: Chicago, Cincinnati, Boston, New Orleans, Memphis

Branches: San Francisco, Seattle, Portland, Spokane, Vancouver, Toronto

In nearly all the principal towns and cities throughout the country, this work has been done for years by machinery designed and built by the American Floor Surfacing Machine Co., Toledo, Ohio, who are not only the pioneers in this field, but whose machines, so it is claimed, have never been approached either in efficiency or quality of work turned out by any other method.

The inventor of the machine was originally a contractor, and being a mechanic, knew the need of a machine that would produce work in paying quantities by lessening the cost of the operation. He also saw the need of a machine that would be adapted for use on all kinds of new wood floors but would also be able to save the cost of new ffoors by re-surfacing old ones, making them as bright, level and smooth and sanitary as a new floor.

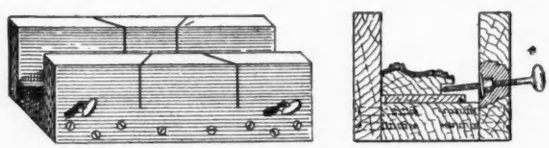
The American Floor Surfacing Machine Co. build their machines entirely in their own factory and not only sell the machines strictly on their merits, but fully guarantee the quality of work that the machine turns out.

Every contractor should communicate with the American Floor Surfacing Machine Company for their free booklet. "Surfacing Floors as a Business."

Holding Screws for Wood Miter Box

The patent miter boxes have various holding devices to gauge and steady the work, that are found very useful, especially for fine work, such as picture framing. Here is such an arrangement for the ordinary wood miter box:

The thumb-screws are fitted to the box as shown in the illustration, and are a great help, as they hold the moulding securely while sawing, thus relieving the hand entirely. If a piece of parallel soft wood, about ½ in. thick, is placed



Thumb Screws Hold Moulding

under the moulding, as shown, it prevents the bottom of the box from being marked with the saw; and if the long thumb-screws are put in at a slight angle, as shown, they will tend to press the moulding down securely and flat.

Reduction in Price of Woodworkers

An important step towards getting universal woodworkers into more general use among carpenters, builders and small contractors has been taken by the Sidney Tool Co., of Sidney, Ohio, who are offering for 60 days a complete universal woodworker at a 50 per cent reduction from the regular price. This is done for the purpose of familiarizing the trade with the advantages which such a machine offers.

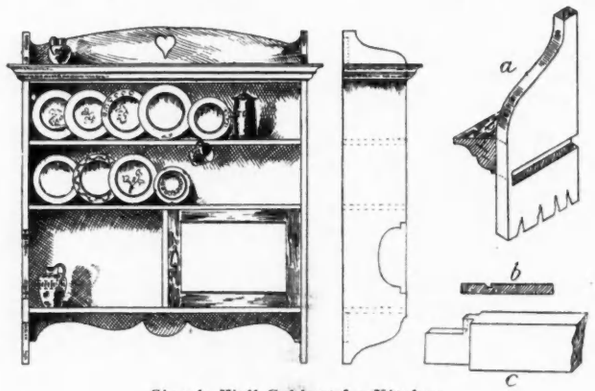
Carpenters, practically without exception, are fully alive to the economy of doing their own machine work as the planing mill bills are the bugbear of their existence. But the cost of woodworking machines has been prohibitive as, notwithstanding the bare cost of machines there has been the cost of installation, the cost of shafting or motors, and the large amount of floor space required. And as only one machine could be operated at one time, unless the carpenter had enough business to keep several machinists employed, it seemed too big an investment for a small contractor to make.

With the "Famous" Junior all this is changed. For the small price is obtained eight machines, all combined on one base, requiring just one motor or pulley, and the minimum of floor space. The machine can be changed to do either one of the eight different kinds of work at will, and is so simple in construction that any machinist can operate it. The cost of the complete woodworker can be saved in a short time while the saving in time and the added convenience are important items to be considered.

The low price is only for sixty days longer so our readers are invited to read the advertisement in this issue and to send to the manufacturers for full particulars.

Kitchen Cabinet Easily Made

The illustration shows a hanging rack or set of shelves with cabinet compartment, all very easily made, yet a great convenience in the kitchen. It should be made of clean white or yellow pine, and finished by painting or enamel. The ends and shelves should be 7/8 inch thick and the shaping at the top and bottom should be 7/8 inch thick. These shapings are fitted tightly between the ends and secured in their position by nailing. The left hand end of the rack is shaped out as shown in the end view; this gives it a lighter and more graceful effect. A construction sketch shows the method of trenching the ends, so as to receive the shelves. We also show the way to miter the cornice moulding around the top; this may be glued and screwed in position. The other sketch shows a haunched mortise, and the door frame for



Simple Wall Cabinet for Kitchen

the closed compartment is made by using this joint. The rails for the door framing should be 2¼ inches wide and 7/8 inch thick, and the panel may be of thin wood. For the average requirements we should suggest a width of 4 feet. The height will be in proportion to the plates, etc., which it will have to hold. Grooves should be worked in each shelf about 3 inches from the back edge so as to engage the edge of the plates and prevent their slipping.

Book Review

A new book of notable interest to those concerned with manual training work and of much value to beginners in

You Can Now Verify This Touring Car Value With Your Own Eyes

The contractor has never been able to buy, before, a four cylinder, four passenger touring car with 110-inch wheel base for $900.

Up to the present time there's been no such car in the market. But you can buy one now.

The contractor has never been able to buy before a 20 horse power touring car good for 40 miles an hour with sliding gear transmission for $900. But you can buy one now.

The contractor has never been able to buy a car, at any price before, which the maker would guarantee beyond a year. But you can buy one now.

The contractor has never been able to buy a car in which the maker would make good any defect two, three, four, five or six years, after you got it. But you can buy one now.

The contractor has never been able to buy a car like this which would cost you only 20c to 25c a day to keep. But you can buy one now.

The Car

A 110-inch wheelbase, four cylinder, four passenger Touring Car, with 30x3 inch front tires and 31x3½ inch rear tires and a speed capacity of 40 to 45 miles an hour; 20 h. p.; sliding gear transmission; multiple disc clutch; Bosch magneto; offset crank shaft. Upholstered in No. 1 machine buffed leather, tufted.

Deliveries of this $900 Hupmobile Touring Car are being made, as this advertisement appears, to all parts of America.

When you go to your own dealer in your own town, you will find yourself in immediate and enthusiastic agreement with the claim we made in our initial announcement: — "Never before such a car at such a price; with such a guarantee."

THE GUARANTEE This guarantee is explicit, unqualified and binding. It covers the entire life of the car, no matter how many different people may own the car. It means that during the life of the car, the Hupp Motor Car Company guarantees the car, in all its parts, and the accessories against defect of material or workmanship. The guarantee reads:

The Hupp Motor Car Company guarantees the Hupmobile from defects in material or workmanship, *during the life of the car,* and will replace, free of charge, any such defective material when returned to its factory for inspection, transportation prepaid. This guarantee does not cover tires.

Hupp Motor Car Company

R. D. Hupp

General Manager.

The Price

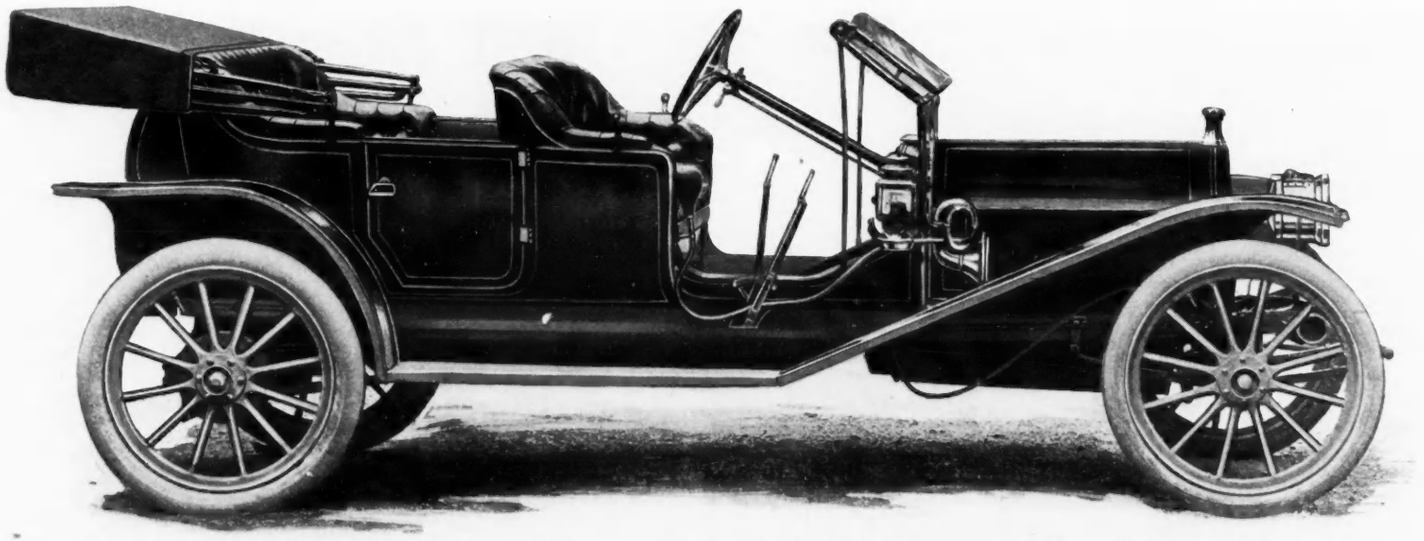
$900

F. O. B. Detroit with three oil lamps, two gas lamps, piping and gas generators, shock absorbers on front springs, horn and tools.

Hupmobile

GUARANTEED FOR LIFE

GUARANTEED FOR LIFE



The new $900, 4 passenger, 4 cylinder, 20 H. P. Hupmobile Touring Car

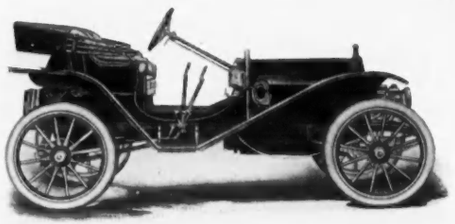
Back of this New Hupmobile Thousands of other Hupmobiles; and not a Second-Hand Hupp in all America

This Hupmobile Touring Car, with 110 inch wheelbase, is the result of the success of the thousands of Hupmobile Runabouts running in every State and Territory in the Union.

The new "square-deal," life-long guarantee is the outgrowth of the experience which the Hupp Company has had with these owners.

The Hupmobiles, in material and construction, are $5,000 cars on a smaller scale. They have gone everywhere and done everything. They have crossed the deserts of Arizona. They have traveled from Detroit to New York in last winter's snow storms that stalled the railroads. They have traversed roads that no automobile ever traveled before. They have climbed mountains that no automobile ever climbed before.

The new $900 Hupmobile Touring Car is bigger, and, if such a thing is possible, even stouter, stauncher and stronger than the Hupmobile Runabout. That explains the "square deal" guarantee. The Hupp Motor Car Company is willing to stand back of the car because it knows it is right.



Hupmobile Runabout $750 F. O. B. Detroit, including 3 oil lamps, tools and horn. Top, gas lamps, tank or generator, trunk rack and speedometer extra.

If you want any further assurance of the value of this wonderful new Hupmobile than is given by the sweeping guarantee, which covers its entire lifetime, a word or two about the Hupmobile Runabout will not be out of place.

The other day a Hupmobile in California fell over a cliff 500 feet high. It cost the owner just $45 to put it back in perfect condition.

There is not a crippled Hupmobile in America, unless it has been crushed in some accident.

There is not even a second-hand Hupmobile. Year old Hupmobiles command pretty nearly full list price. Every "Hupp" that started going three seasons ago is still going.

Hupmobiles, because of their readiness, are probably kept more continuously in commission than any other make of car—yet their repair expense is ridiculously low and a discontented Hupmobile owner is as rare as a white blackbird.

The average cost of upkeep to the Hupmobile owner who keeps his car at home is 20 to 25 cents a day.

Now, recapitulate all the advantages offered above, and see if you don't agree with us that there was "never before such a car at such a price; with such a guarantee."

Then confirm this conviction with a personal examination of the car by a visit to your dealer.

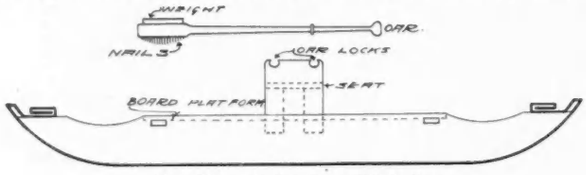
Licensed under Selden patent.

Hupp Motor Car Company, Desk 32, DETROIT, MICH.

cabinet making, has just been issued by the Manual Arts Press, Peoria, Ill. It is entitled "Handwork in Wood," and is by Wm. Noyes, M. A., of the Department of Industrial Arts, Columbia University. It is intended primarily as a handbook for teachers and a text-book for manual training students. It is a comprehensive and scholarly treatise, covering logging, saw-milling, seasoning and measuring, hand tools, wood fastenings, equipment and care of the shop, the common joints, type of wood structures, principles of joinery and wood finishing. 304 illustrations—excellent pen drawings by Anna Gausmann Noyes, and many photographs.

Ice Rowing Boat

Among the many curious ice craft designed last winter the most curious was probably an ice rowboat, the invention of a Detroit man. It rides upon one long runner of graceful design, and is propelled over the ice at a rapid speed by means of a pair of oar-like sweeps, the ends of which are provided

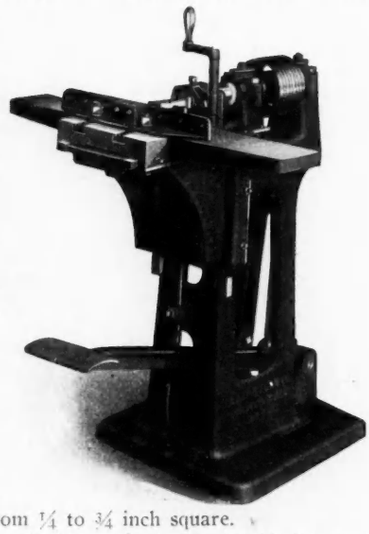


Side View of Ice Boat With Oar

with sharp steel points that engage with the ice. The bottom of the runner is shod with steel. On the center rests an oblong platform and above each end of this a seat is provided. Very little energy is required to send the craft forward or backward at a great speed. When starting back over the course the rower changes his seat and faces the other way.

Horizontal Hollow Chisel Mortiser

The J. A. Fay and Egan Company are offering a valuable and useful machine for light woodworking shops, their No. 270 Horizontal Hollow Chisel Mortiser. This is designed for a light and medium variety of mortising in sash, door and blind plants, cabinet factories, etc. It will be found a very useful and handy addition to any factory and a splendid tool for the purpose.



As to capacity, it works material 6 by 6 feet. Its greatest depth of mortise is 3 inches and by reversing stock, 6 inches can be mortised. Chisels may be used from ¼ to ¾ inch square.

The frame is a very rigid casting, being moulded in one piece and having broad floor base.

The table is 6 inches wide and 36 inches long, and is moved by foot treadle. It is raised and lowered by crank. It is provided with an adjustable fence.

The chisel mandrel is made of crucible steel and runs in long, self-oiling bearings.

The countershaft has tight and loose pulleys, 10 by 4½ inches, and should make 900 revolution per minute. The

loose pulley is their self-oiling bronze bearing type.

The machines as shipped are furnished with one chisel each, ¼ inch and ½ inch, and augers to suit.

The floor space required is 3 feet by 3 feet 2 inches. The power required is 3 H. P.

For further information about this machine you are requested by the manufacturers to write to them for large illustrated catalog. Their address is 545-565 W. Front St., Cincinnati, Ohio.

Flag Staff Ball Should not be Round

The ball to go on a high place like a flagstaff should not be a ball but a prolate spheroid with the long axis vertical, or else it will have the appearance of being flat.

Coloring an Electric Globe

Take a little white shellac varnish and thin it down with alcohol; dip in the bulb in this to produce a frosted effect. Use the shellac very thin, in order that it may run smooth. Color if desired with aniline dye, dissolve in a little alcohol and add to the shellac.

An Improved Swing-Saw

The accompanying illustration shows the Pryibil No. 5 improved swing-saw machine, manufactured by P. Pryibil, 512 West 41st street, New York. The former style parallel swing-saw, made by this firm, is undoubtedly well known to many woodworkers, carpenters and builders, and for that reason the improved and newly designed machine offers many points of interest.

As can be seen from the illustration, this machine is self-contained on one post, with one connection, and is guaranteed to remain absolutely in alignment. After the post is up, a few hours only are required for the erection of the machine.

The Pryibil swing-saw, No. 5, cuts in a straight, horizontal line, instead of a curved line, as with any ordinary swing-saw. This enables a comparatively small saw to be used for wide and thick lumber, and allows the use of a dado head for grooving, gaining, rabbeting, tenoning, moulding, etc.

In gaining and rabbeting, the work can be depended upon to go together properly, as the thickness of the parts left standing is sure to be the same. A finished cut can also be produced. The height of the saw arbor above the table is adjustable by means of a hand wheel to regulate the depth of the cut, and to adjust to the size of the saw or cutterhead used. The weight of the moving parts is balanced, so that they will remain in any position in which they are left. The machine is self-oiling.

Some interesting literature has been prepared, showing different views of this machine. This literature is well worth having and can be obtained by addressing P. Pryibil, 520 West 41st street, New York.

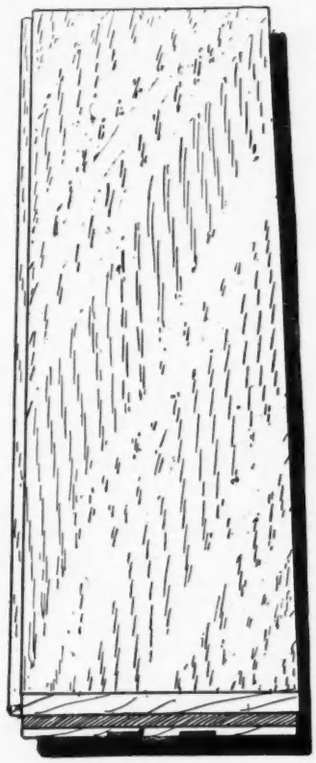
Solution for Cleaning Marble

A simple and effective means of cleaning marble is the use of a solution made by dissolving eight ounces of carbonate of soda in one gallon of water. Scour with a stiff paint brush, rinsing all the while with cold, clean water.

Send for Our Free Booklet

entitled "Profitable Opportunities to Carpenters" telling all about our wonderful **thin hardwood flooring,** and showing you how to take the place of the flooring specialist, and nice big profits for yourself.

It took us twenty years to bring hardwood flooring up to a state of perfection so that any one could lay it, and make a more perfect, sanitary, beautiful, attractive, profitable hardwood floor than has been possible heretofore.



CINCINNATI

Buy Our Thin Hardwood Flooring

Our strips are grooved and tongued the entire length of the stick **and at both ends,** and thus make a better floor.

Because: The nails are secret driven
It lays easier and cheaper since there is no hard labor connected with its laying.

Our flooring, made with **extra thickness** at the **surface** where it is **needed,** is absolutely uniform, and makes a better floor.

Because: It wears twice as well.
It needs practically no scraping—usually just a little sandpapering.
It saves buying expensive scraping tools.

Our wood is perfectly seasoned by a special and most thorough process, so makes a better floor.

Because: It is unaffected by furnace heat.
It won't warp or twist.
It is dry and has not lain exposed in a lumber yard.

Our Booklet

Tells it all. It gives instructions for laying, polishing, caring, preparing, and many other points about flooring. Send for it today because it means more profits to you, besides giving useful tables on estimating surface, and telling you how we prepare our stock so that it is the only perfect hardwood flooring that has ever been made. It will interest **you**

Tear It Off

You should have it because it opens up a new and profitable field to you. You can always count on our co-operation in every detail with you, because we are glad to help you with suggestions and ideas any time.

Write and have us explain it all to you in detail.

Remember the name,

Cincinnati Floor Company

Cincinnati Floor Co.
228 W. 4th St., Cincinnati

Send me a copy of "Profitable Opportunities to Carpenters," with no obligation to me whatever.

Name .....

Address.....

Free

WE WANT you to test Johnson's Wood Dye and Under-Lac at our expense. A single trial will convince you of their merits.

Johnson's Wood Dye

is not a mere Stain — it is a real deep-seated Dye that penetrates the wood, giving a rich and permanent color. It will not raise the grain in the slightest.

Johnson's Wood Dye is made in fourteen standard shades, as follows:

No. 126 Light Oak	*No. 130 Weathered Oak*
No. 123 Dark Oak	*No. 131 Brown Weathered Oak*
No. 125 Mission Oak	*No. 132 Green Weathered Oak*
No. 140 Manila Oak	*No. 121 Moss Green*
No. 110 Bog Oak	*No. 122 Forest Green*
No. 128 Light Mahogany	*No. 172 Flemish Oak*
No. 129 Dark Mahogany	*No. 178 Brown Flemish Oak*

Half Gallons, $1.50 each

Use the Coupon on Opposite Page for Free Samples and Book.

Any other shade may be easily produced, as all shades of Johnson's Wood Dye may be lightened by adding alcohol and darkened by adding No. 172 Flemish Oak Dye.

Mail The Coupon Now

Use the coupon on next page for free samples of Johnson's Wood Dye and Under-Lac. Be careful to state number of shade of Dye wanted. We will also send you a copy of our booklet—"The Proper Treatment for Floors, Woodwork and Furniture," showing all shades of Dye. See free offer on next page of Johnson's Wood Panels, as illustrated here.

S. C. Johnson & Son

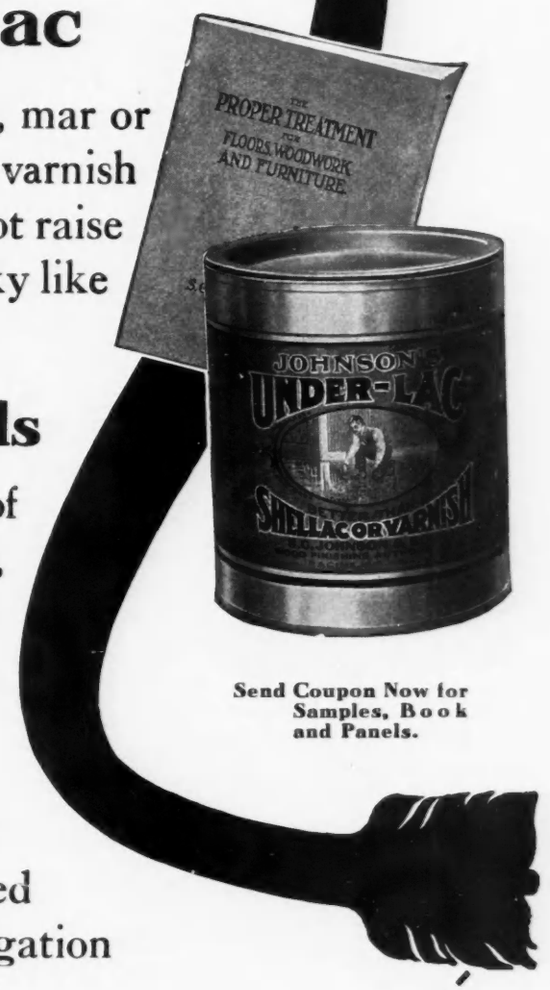
"The Wood Finishing Authorities"

Racine. Wis., U. S. A.

Free

Johnson's Under-Lac

is a spirit varnish which will not chip, mar or scratch. It is better than shellac or varnish as it can be easily applied and does not raise the grain. Neither is it thick and sticky like varnish—it dries in half an hour.



Send Coupon Now for Samples, Book and Panels.

Johnson's Wood Panels

In addition to sending free samples of Johnson's Wood Dye and Under-Lac, we are glad to supply painters and contractors with panels of various woods finished with Johnson's Wood Dye, Under-Lac and Prepared Wax.

If you care for a set of these panels drop us a line—and we shall be pleased to send them to you without any obligation whatever on your part.

You will find the panels very convenient to show prospective customers and they will assist you in procuring contracts at *Good Prices.* Mail the coupon now for samples, panels and book, "The Proper Treatment for Floors, Woodwork and Furniture."

Please send FREE samples of Johnson's Under-Lac and Wood Dye No. .... Also Booklet, "The Proper Treatment for Floors, Woodwork and Furniture." I agree to test the samples, and if they are satisfactory, will use and recommend them in my work

Name. .....

Address .....

.....

A.C.B.-11 .....

S. C. Johnson & Son

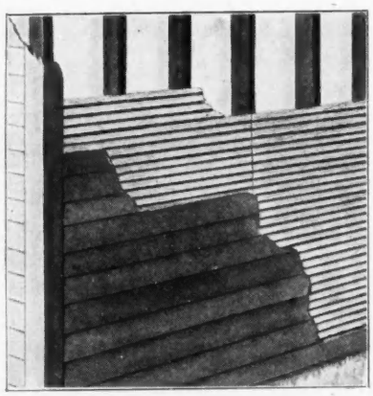
"The Wood Finishing Authorities"

Racine, Wis., U. S. A.

Bishopric Sheathing

A great many readers of the AMERICAN CARPENTER AND BUILDER have, during the past year, become acquainted with the merits of Bishopric wall-board and have tested it out on important work of various kinds.

These will scarcely need any introduction to its sister product, Bishopric sheathing. It is interesting to know that during the past 12 months the sales for these two materials aggregate 12,685,450 square feet—rendering valuable service in every State in the Union.



Sheathing Nailed to Outside of Studs

Bishopric sheathing is made of same materials as the wall board, being of kiln-dried, dressed laths, imbedded in hot asphalt mastic, under pressure of 500 pounds to the square inch, and surfaced with sized cardboard, all cut at the factory into sheets of uniform size (4x4 ft.). The finish, however, is not necessarily so fine. The sheathing is of uniform thickness, insuring a perfectly even surface when applied. For practical service—protection against heat, cold, dampness, etc.—Bishopric sheathing is the equal of wall board and is 20 per cent cheaper It is used as a substitute for lath and plaster where a particularly smooth job is not required.

Bishopric sheathing is nailed to the weather side of studs, with lath and asphalt side exposed. Over the laths, weather boards are nailed or cement is applied. Compared with low grade wood, Bishopric sheathing is preferred for the following ten reasons:

1. Bishopric sheathing makes a more solid and substantial wall than lumber; therefore, develops greater wind strength. There are no gaping joints; no widening cracks due to shrinkake; no knot holes. It's like a solid board.

2. The asphalt mastic in bishopric sheathing is a non-conductor; is proof against heat and cold, keeps the building cooler in summer and warmer in winter.

3. The body of Bishopric sheathing being asphalt mastic, moisture cannot penetrate it. The wall, therefore, is proof against dampness.

House With Clapboards Over Bishopric Sheathing

4. Bishopric sheathing is proof against vermin, weevils, etc. The pests cannot bore through the tough gummy asphalt mastic.

5. In applying weather boards over the laths, dead air space

The Work that Counts

There is no wasted energy, no lost motion in the work of the 'Varsity Crew. Perfect team work, co-operative effort and uniform action are strikingly exemplified.

The same principle of intelligent co-operation exists in telephone communication in its broadest application.

In handling the talk of the nation the Bell operators respond to millions of different calls from millions of different people, twenty million communications being made every day.

Ten million miles of wire, five million telephones and thousands of switchboards are used to handle this vast traffic.

More than a hundred thousand employees, pulling together, keep the entire system attuned. Unity is the keynote. Without this harmony of co-operation such service as is demanded would be impossible.

One policy, broad and general, in which uniformity of method and co-operation are the underlying principles, results in universal service for nearly a hundred million people.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

"One Policy, One System, Universal Service"

is left between the laths, forming splendid insulation.

6. One wagon load of Bishopric sheathing covers an area from six to ten times as great as one load of lumber—a tremendous saving in hauling. Ten thousand feet can be hauled in an ordinary wagon.

7. The cost of applying ordinary wood sheathing is from $5 to $10 per 1,000 feet, whereas the cost of applying Bishopric sheathing is but $2.50 per 1,000 feet—a saving of about 75 per cent. Furthermore, 1,000 square feet of wood sheathing covers but 750 feet of surface, 20 per cent less being due to tongue and groove. In Bishopric sheathing 1,000 square feet covers 1,000 feet of space.

8. Bishopric sheathing does away with the expense of building paper and cost of its application.

9. In applying ordinary lumber, heavier scaffolding, more tools and greater scaffold floor space are required. In applying Bishopric sheathing one man drives a few nails in each sheet; a common laborer or boy can finish the nailing.

10. Bishopric sheathing insures comfort during the construction of the building. As soon as the building is closed in with Bishopric sheathing, the men may work in comfort on the inside during bad weather, finishing the outside on suitable days.

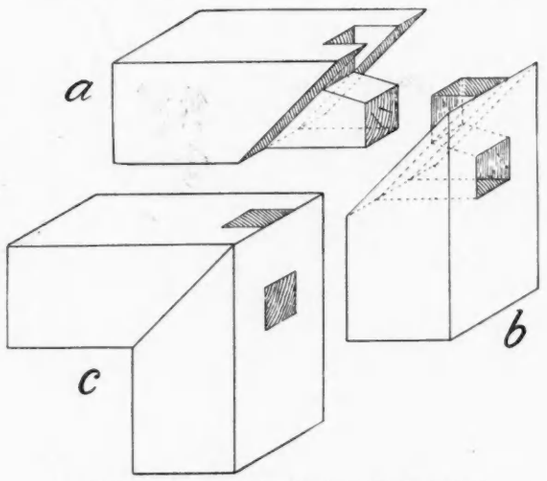
Bishopric sheathing is used with equally splendid results under flooring and roofing boards. Used under floors, it serves as a sound deadener and keeps out dampness; used under the shingles, it keeps out summer heat.

For cement or stucco work Bishopric sheathing is said to be the ideal material. Cement firmly adheres to the laths and asphalt mastic makes a solid, smooth exterior. For factory or residence this form of concrete or stucco construction is the cheapest and best known.

Every progressive builder should investigate this material for himself. Address the Mastic Wall Board & Roofing Mfg. Co., 24 E. Third St., Cincinnati, Ohio.

Miter Joint for Fine Work

Here is a jointed corner that is much used by English cabinet makers for fine work, and is very highly recommended. For painstaking, careful work such as we like to give the



A and B the Two Parts; C the Finished Joint

"Home Workshop" projects, this joint will be very desirable. The two parts are laid out and cut carefully with saw and chisel, as shown at "a" and "b." Glue only is needed to make this joint strong and rigid, no nailing being required.

New Hendrick's Directory for Buyers and Sellers

The 19th annual Revised Edition of Hendrick's Commercial Register of the United States for Buyers and Sellers has just been issued. It is by far the most complete edition of

this work so far published. The 18th edition required eighty-seven pages to index its contents, while the 19th edition requires just one hundred pages, or thirteen additional pages. As there are upwards of four-hundred classifications on each page, the thirteen additional pages represent the manufacturers of over five thousand articles, none of which have appeared in any previous edition. The total number of classifications in this book is 35,481, each representing some machine, tool, specialty or material required in the architectural, engineering, mechanical, electrical, railroad, mine and kindred industries. The 18th edition numbered 1,220 pages, while the 19th edition numbers 1,344 or 124 additional pages. One hundred and fourteen pages of matter are omitted from the new edition that appeared in the 18th edition. This makes a total of two hundred and thirty-eight pages of new matter. The whole representing upward of 350,000 names and addresses.

An important feature of Hendrick's Commercial Register is the simplicity of its classifications. They are so arranged that the book can be used for either purchasing or mailing purposes. As an illustration—all manufacturers of a particular trade are first classified under a general heading for mailing purposes, then each firm or corporation is subdivided under as many classifications as every variety of their products call for. By this system of compiling, the book is made of equal value for either the purchasing or sales departments. No other publication embodies these features.

Again, the value of the Commercial Register for Purchasing Purposes is not confined to its complete classifications alone, it also gives much information following the names of thousands of firms that is of great assistance to the buyer, and saves the expense of writing to a number of firms for the particular article required. This latter information is also not found in any other similar publication. The trade names of all articles classified in the book are also included as far as they can be secured. These trade names appear in parenthesis between the names and addresses under the classifications where they appear. The book is revised, improved and issued annually and has been since 1891. For further information address the publishers, S. E. Hendricks Co., 74 Lafayette Street, New York.

Stay-Put Door-Button

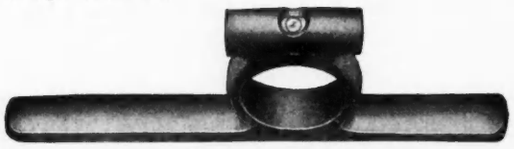
This button is recommended by a farmer as a handy home made device to fasten the doors of hen houses, gates, closets in the house, etc. Make it out of inch board the shape shown and of suitable size for the given door or gate. Put it on a round-head screw or a flat-head screw with a washer under head.

Before attaching to the door-jamb, a hole is bored edgewise through the wider part of button at the angle shown, to receive an iron bolt or heavy screw which ballasts the button so that it always comes into place and stays there.

"Finger Ring" Level

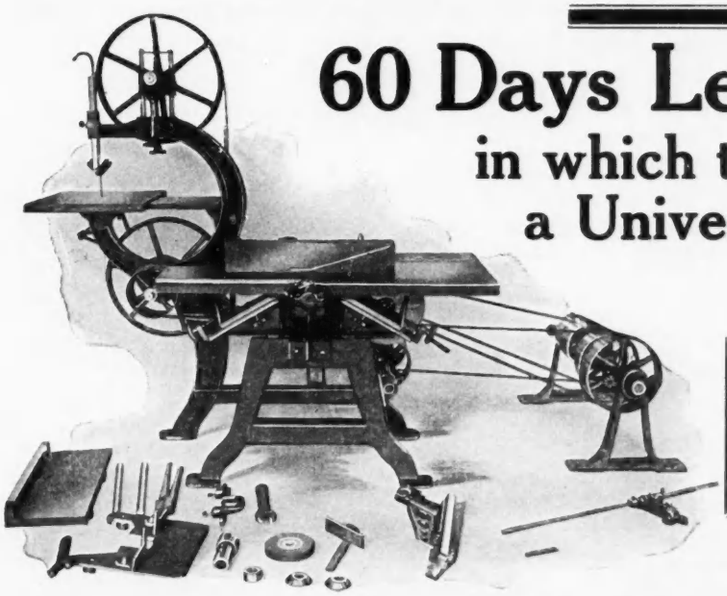
The "Finger Ring" level as illustrated herewith is proving its merits and utility wherever used.

While it has been on the market but a comparatively short time, it is now being used very extensively in both this and foreign countries.



Very Handy Level—Accurate Too

The fact that this level is absolutely accurate and small enough to be carried in the vest pocket, insuring the user



60 Days Left

FAMOUS

in which to get a Universal Woodworker at half-price

Ask for particulars of the Famous Junior

8 Machines in 1

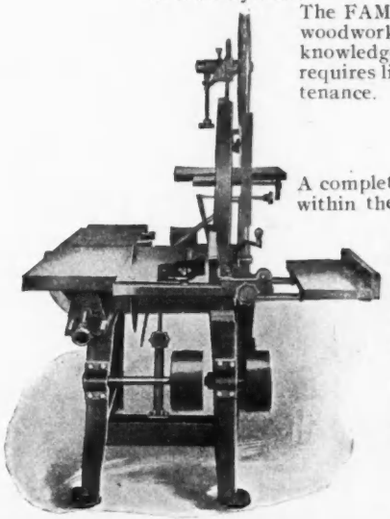
The chance of a lifetime for small carpenters, builders and contractors. Read this:

The first and only successful woodworker sold at a low price is now being offered. The FAMOUS Junior is the universal woodworker built particularly for carpenters, builders and contractors who want to put planing mill profits in their own pockets yet who cannot afford a high priced machine. It costs more than inferior woodworkers to ***build*** yet, for the next two months, is the lowest priced woodworker on the market.

We are selling the FAMOUS Junior practically at cost price for two reasons: first, to meet the competition of inferior machines; secondly, to familiarize carpenters and builders to the economy which such a machine effects in time, labor and money. The great experience and facilities of one of the most prominent woodworking machinery manufacturers are behind the FAMOUS Universal woodworker and no expense has been spared to make it the ***best*** machine irrespective of price.

PRICE, ABSOLUTELY COMPLETE, $150.00

The following eight machines comprise the FAMOUS Junior Universal woodworker: 20″ Band-Saw, 8″ Jointer, Felloe Rounder, Emory Grinder, Saw Table (with raised or lowered arbor), Boring Machine, Dadoeing Machine. For these "8 machines in One" we are making the competitive price of $150 during the next two months. There are positively no extras to pay. The first cost is the only cost.

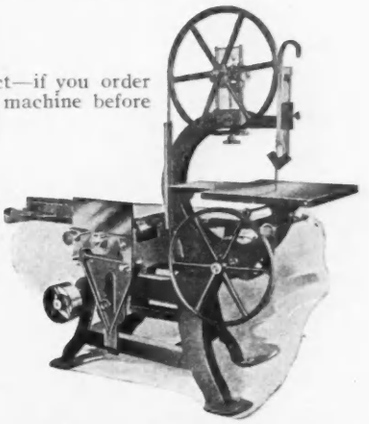


The FAMOUS Junior is the most durable, the most simple and the most reliable woodworker ever offered. There are no delicate parts and nothing beyond the knowledge of any machinist. It can be operated as either of the above machines, requires little floor space, is easily installed and requires almost nothing for maintenance.

Sent on Free Trial

A complete machine shop for $150 is an established fact—if you order within the next sixty days. If you would rather try the machine before you buy we will arrange for thirty days trial in your own shop. We simply want to "show" you.

Remember, no other woodworker is such good value—not even if the FAMOUS cost double the present price. You know our reasons for cutting the price—now it's up to you to get down to business and ask about our free trial offer. Complete literature sent upon request.



The Sidney Tool Co.

SIDNEY, OHIO

of always having a level in easy reach that can be depended upon, is well worth the small purchase price.

The Kokomo Level Company is now sending out a beautifully illustrated booklet which will be mailed free postpaid to any address for the asking. It will direct the attention of interested parties to a device that is worthy of recommendation because of its reliability and efficiency, its time and labor saving features, and the accuracy of its work.

This level is manufactured by the Kokomo Level Company of Kokomo, Ind., who will be pleased to give any information at any time regarding their levels. Their European agents are Lindenthal & Company, Berlin, Germany.

To Make a Hook-Bolt Stronger

In making hook-bolts or rods—that is, a bolt with a hook on one end, the common practice is merely to make a simple bend or turn in the round rod; but if a blow or two sufficient to flaten it be given to the broad side of the hook

THE USUAL WAY. A BETTER WAY.

while the iron is hot, thus making the rod thinner but wider where the bend is, the hook will hold two or three times as much more than the simple bend in the round rod would hold, and thus insure against the straightening out of the hook under a heavy strain. The rod generally has to be heated anyway in making the hook, and an extra blow or two will not cost much more. This will make the hook somewhat similar to a chain hook and will be narrow one way and wide the other, for the same reason.

This is upon the same principal that a joist or beam will hold more edgewise than flatwise.

Bargain Bathroom Outfits

Would you like a splendid new bathroom outfit complete? Then it would be well for you to turn to the advertisement of M. J. Gibbons, Dayton, Ohio, and consider the proposition he has to offer. Mr. Gibbons assures the AMERICAN CARPENTER AND BUILDER that the offer is bona fide and a very unusual one. He is only able to make it because of his exceptional buying connections and the fact that he buys in tremendous quantities. He guarantees satisfaction in every respect. This same outfit purchased of a local plumber would, he says, cost you much more than this special introductory price which he is making.

In addition to his bathroom outfits, Mr. Gibbons issues a fine catalog, packed full of plumbing supply bargains, and will be glad to send it to anyone on request.

Draw Good Plans and Draw Good Money

There are hundreds of good things which would bring profit and pleasures to us if we only knew how to get them.

The carpenter and builder looks with envy at the draftsman and architect who is able to earn thousands a year instead of hundreds.

Perhaps you are a steady hard working fellow with good brain matter and ambition to be above the average—and if a person is not ambitious nowadays in many ways, there are others who will be, and this kind will get the best jobs sooner or later. However, one can become absolutely perfect in this line of trade or business within a very short time. There are quick ways of getting such a fine start in a short time

HESS MEDICINE SANITARY CABINET LOCKER

the only

Sanitary Steel Medicine Cabinet

Solid steel enameled throughout with ever lasting snow white baked enamel; germ and dustproof; easily cleaned. Nickel plated brass hinges and turn catch. Fine imported plate glass beveled edge mirror in door. Enameled steel adjustable shelves, or polished plate glass shelves if preferred.

[Handsomer Than Wood—Costs Less

Should be in every bath room. We guarantee complete satisfaction and will permit the return of any locker if not satisfactory, we paying freight charges both ways and refunding all money paid.

We guarantee also, safe arrival, without damage, and will make good without expense to the purchaser, any damage received in transportation.

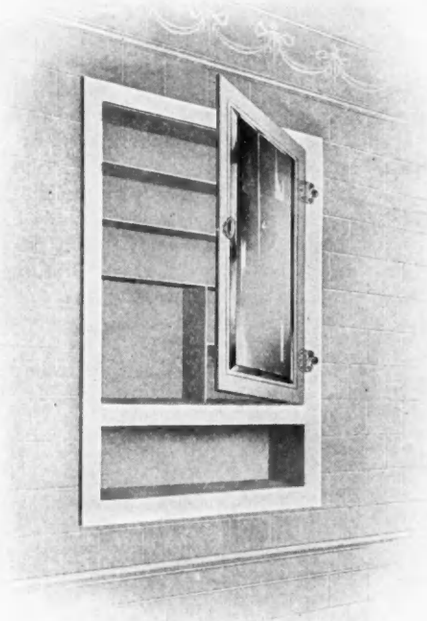
PRICES (F. O. B. CHICAGO) AND SIZES

No.	Extreme Outside dimensions Inches	Size of Mirror Inches	Inside dimensions Inches	Size of Open Shelf Inches	Framed Opening Required 4¼ in. deep	Price with Enameled Shelves	With Polished plate glass Shelves add	Plain door with't Mirror deduct	Shipping weight lbs.
STYLE E: To recess in wall, with open shelf below									
20	21½x33½	14x18	18¾x21	5¾ deepx17½	19x30	$10.00	$2.50	$2.00	68
21	23½x35½	16x20	20¾x23	5¾ deepx19½	21x32	12 00	2.75	2.50	77
22	25½x37½	18x22	22¾x25	5¾ deepx21½	23x34	16.00	3.00	3.00	85
23	27½x39½	20x24	24¾x27	5¾ deepx23½	25x36	18.00	3.50	3.50	100
STYLE F: To recess without open shelf below									
30	21½x25½	14x18	18¾x21		19x22	$ 8.00	$2.50	$2.00	59
31	23½x27½	16x20	20¾x23		21x24	10.00	2.75	2.50	68
32	25½x29½	18x22	22¾x25		23x26	14.00	3.00	3.00	75
33	27½x31½	20x24	24¾x27		25x28	16.00	3.50	3.50	90
STYLE G: To screw to face of wall, with open shelf below									
40	21½x32	14x18	20½x23	5½ deepx20½		$ 8.50	$2.75	$2.00	70
41	23½x34	16x20	22½x25	5½ deepx22½		10.50	3.00	2.50	79
STYLE H: To screw to face of wall, without open shelf below									
50	21½x24½	14x18	20½x23			$ 7.00	$2.75	$2.00	62
51	23½x26½	16x20	22½x25			9.00	3.00	2.50	71

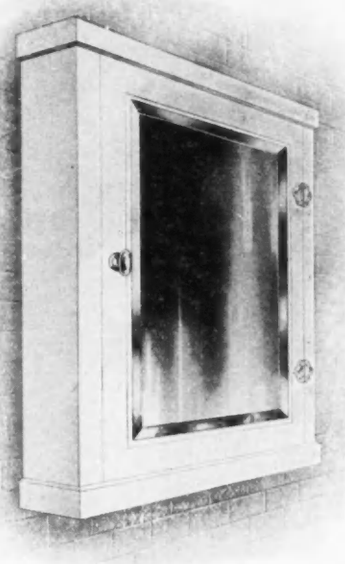
All Lockers listed are right hand. Left hand Lockers, or Cabinets with lock and key will be supplied at a slight additional charge.

HESS WARMING & VENTILATING COMPANY

920 B. Tacoma Building, CHICAGO



Yes! We make the Hess Steel Furnaces



Style E. Style F is similar, with open shelf below

Style H Cabinet not recessed. Style G is similar, with open shelf below

which will insure unusual success for those who will devote themselves to bettering their condition.

Opportunities offered today for ambitious, wide-awake progressive men capable of making from $24 to $75 per wek as architectural draftsmen, for instance, or for carpenters, contractors, or builders with draftsman's knowledge and training, are better than ever. The enormous amount of building which is going on and the increasing demand for better and more up-to-date structures gives the man with actual drafting-room experience splendid opportunities for steady income at high prices—besides a chance for advancement.

Mr. F. V. Dobe

There is no class of men who make better architectural draftsmen than carpenters and contractors. The experience gained by actual work on all kinds of building makes it much easier in studying and also in obtaining responsible good-paying contracts or position afterwards. No employer cares for diplomas—neither does he care to pay big wages to just a mere copying man. What the people or your employer wants today is originality, and practical ability, and this requires practal training. The quickest and best way to know how to do practical drafting-room work—and to get the required practical experience, is to receive personal and individual instructions from a high-grade practical man at the trade. This man, or instructor, must have a reputation as the most experienced in training men to become competent and successful draftsmen. An ordinary draftsmen, even the best draftsman, can't teach this trade unless he has had a good many years' experience as an instructor, and has the ability to impart knowledge so that it will be understood and will stick forever.

Mr. F. V. Dobe, Chief Draftsman of the Engineers' Equipment Company, Chicago, with twenty years' experience in training and handling men has for a good many years given personal draftsmanship instructions by mail. That his individual methods are deserving of the success which they have merited is proven by the increasing number of successful men who today lay their start in life to Mr. Dobe's individual draftsmanship instructions on practical work.

The "knowing how" to be a first-class draftsman and the ability to secure a good position can be had by applying one's self to Mr. Dobe's instructions. These instructions consist of actual drafting room work. He teaches each student according to the student's ability and with his individual and personal methods does away with unnecessary study of work on subjects which the student may already be well versed in.

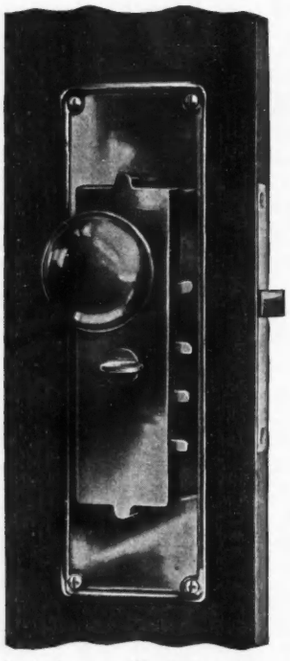
Mr. Dobe issues a prospectus on Successful Draftsmanship. His advertisement appears on another page of this paper. Those interested can get full particulars by writing to him.

Fruit Picker's Ladder

A reader of *Farm and Fireside* submits a good idea for a ladder on wheels for picking fruit. The hind wheels (AA) are old wagon wheels. The ladder (BB) is 10 feet high, made of pine 2 by 4's. The upright braces (CC) are maple boards 6 inches wide. The small wheels (DD) are 15-inch iron drag wheels. The platform at the top holds the basket. The ladder is 2 feet wide at the bottom and 1½ feet at the top.

Agents Wanted for Keyless Locks

The Dayton Keyless Lock Co., Dayton, Ohio, have perfected a door lock which, it is predicted, will put an end forever to the "Great Key Nuisance."



The Dayton Keyless Door Locks are the equal of the best key locks in appearance, material and mechanism, and give you double the protection, and their superior convenience make them worth many times more, though they sell for the same prices.

It will be asked, "What advantages have the Dayton Keyless Locks over key locks?"

With them you have far more protection. No keys with which to bother, to carry about, to lose, to hunt, to buy, to mislay or forget, to send for or go after, to take from your pocket, to select from your other keys, to turn right side up, for which to find the keyhole. No need of removing gloves or having light. You never hurry home because some one is locked out. Each member of your home goes in and out, day or night, at will, as if the house was not locked. No climbing in at the window because you have no key. You are never locked out.

When a servant or any one you distrust leaves your home, you do not buy a new lock and keys to keep them out, but you change your combination in five minutes and you are protected. Your home is never robbed because your servant gave the key to her pal before leaving, so he might get one like it, and also showed him where to find your valuables. Thousands of the best homes have been robbed in this way.

"But how is all this done? How does one operate the Dayton Keyless Locks?" Pull the sentinels (by the side of the lockcase) the right number of times and your lock is open. A child who cannot unlock your door with a key can unlock this with ease. You can unlock it with gloves and in the dark before you can say "Jack Robinson!"

The door always opens by the inside knob, whether locked on the outside or not.

If you choose you can have it open by the knob alone from both sides. You can have it as a night lock to lock itself, or as a day lock to remain open, as you like; but only the one who knows your combination can make these changes. You can change the combination in a few minutes to any of the many hundreds of combinations that you wish.

It is confidently expected that the Dayton Keyless Door Locks will soon be used on old and new doors of all homes, shops, stores and offices. With old locks, just lay aside the spindle, and the outside escutcheon and place the keyless attachment on the outside.

It is much easier put on than a mortice lock, and cannot be removed from the outside.

This company is offering a high-grade, special chance to local agents with exclusive territory. A few places are also open to first-class men as state managers. All readers of the AMERICAN CARPENTER AND BUILDER ought to know what this new keyless lock is. Write today for complete information.

President Huber has Many Gavels

President W. D. Huber of the United Brotherhood of Carpenters and Joiners has been presented with nearly one

hundred gavels during his administration. Every kind of a mallet that could be made has been given to President Huber with which to officiate at the metings over which he has presided.

At Milwaukee, where one of the stormiest sessions in the history of the carpenters' union was held four years ago, he was presented with a huge gavel weighing five pounds. So strenuous were the meetings at that day that he broke a solid oak table top in four places before he restored order. The gavels he has received are in most cases made of valuable woods inlaid and beautifully turned.

Will Turn Over all Business to Local Agents

The Edwards Manufacturing Company, of Cincinnati, Ohio, "The Sheet Metal Folks," have just adopted a new method of selling their goods. Hereafter all their business will be handled through local agents in every community. Their enormous business, built up through a long course of vigorous national advertising in which every result-bringing American trade paper and magazine has been used, will now be turned over to local agents, whom they are now appointing.

Here is a grand opportunity for one carpenter, contractor, builder or architect in every community to unite forces with the world's largest manufacturers of metal roofing and steel shingles—to his profit. The progressive men who read the AMERICAN CARPENTER AND BUILDER are especially fitted for these positions. By making prompt application to the Edwards Manufacturing Company you will put yourself in line to be selected as their district representative to handle this business in your locality.

The Edwards Metal Spanish Tile Roof

They state that the man selected will be given every dollar's worth of business that they now do and are continually doing in his territory. His share of the millions of dollars' worth of business corralled by means of their gigantic advertising and sales campaign will be turned over to him just as fast as it comes in—which, incidentally, is at a terrific pace right now!

The reasons for swerving this immense business into new channels, as explained by the general manager of the Edwards Manufacturing Company, is that the business has assumed such tremendous proportions that it is no longer possible to handled it direct—from factory to home—with fullest satisfaction. Their output is now so tremendous that even at the wholesale prices at which these goods are offered—which make a big inducement to individual buyers—it is now possible to allow a magnificent margin of profit to the local representatives.

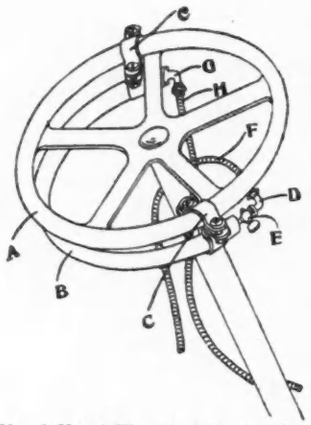
Every reader of the AMERICAN CARPENTER AND BUILDER knows what the Edwards Metal Roof is. The illustration shows one style, their metal Spanish tile, which has been termed the "most beautiful roof in the world." They have

many other styles also—something to suit every requirement.

This marvelous opportunity will knock at your door but once in a lifetime. Prompt action will put you in line for it. Act to-day. Write the Edwards Mfg. Co., 401-417 Eggleston Ave., Cincinnati, Ohio.

Hand Warmer for Automobile Steering Wheels

A patent has recently been granted in Great Britain on a novel but important contribution to the automobilist's comfort in cold weather, which is designated in the *Cycle and Motor Trader* (London) as a "hand warmer."



Novel Hand Warming Device for Automobile Drivers, Utilizing Heat From the Exhaust

"The patent relates to a hand warmer for the steering wheels of automobiles, aeroplanes and motor boats, in which internal combustion engines are used, and consists in utilizing and conveying to the steering wheels part of the hot exhaust fumes to circulate through a suitable tubular hand rest. The hand rest *B* shown in the accompanying illustration, is clamped below the rim of the steering wheel *A* by two-part clamps *C C*, parts of the latter serving to keep the rest and rim separated. The ends of the hand rest *B* are fitted with horizontal elbow connections *D G*, to direct the flexible pipes *F H*, respectively, inwards towards the steering column. That end of the rest receiving the hot fumes from the exhaust pipe is fitted with a tap *E* for regulating the supply of heated fumes to the rest, the tap being fitted to the elbow *D*. From the elbow *G* a flexible pipe *H* conducts the portion of the exhaust diverted for the warming of the hands to a position where it may escape into the atmosphere without annoyance. The flexible pipe *F* communicating through the elbow *D*, with the other end of the hand rest has its remote end connected up with the exhaust pipe from the engines."

Indestructible Roofs of Beauty and Utility

The National Sheet Metal Roofing Company of Jersey City, N. J., was the pioneer in the manufacture of metal shingle roofing material. Wise and practical men in 1882 saw the demand for a good article and formed this company. They saw that the day of the wooden roof was over, for the increasing scarcity of proper wood even then was manifest. The making of wooden shingles of a character to withstand the elements was impossible then and more so today. Sappy, cross-grained and poor wood was all that remained for use and a few seasons of storm and cold destroyed the shingles' usefulness.

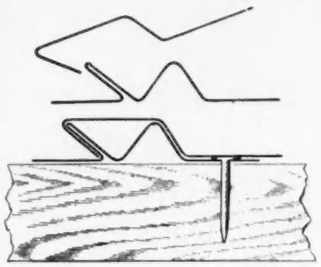
Therefore, some other material had to be found. Naturally metal roofing was the solution. Slate was thought to be heavy, costly, and frequently required repairs. Tar and gravel was "messy" and impractical for slanting roofs. Some form of metal roofing was consequently and manifestly the best. Large sheets of tin rattled and cracked and constantly leaked at seams and joints.

So the present well-known Walter's "metal shingle" was invented. This roof cannot rattle, is easily applied and is self-locking. It is inexpensive and beautiful, for the metal can be formed into any desired shape and cheaply. Their duplication of the wonderfully attractive Spanish tiling is an example. When necessary, they create special designs and

ornaments for use in particular work.

The vital point of any metal shingles is the lock by which they fasten together. This is the part of the shingle where moisture is most likely to enter. The good or defective features of any metal shingle depend to a great extent upon the lock.

The accompanying sketch is a profile of the Walter's patent expansion lock. This lock is of simple construction and represents what is claimed to be the easiest and most secure manner of locking metal shingles and tiles together.

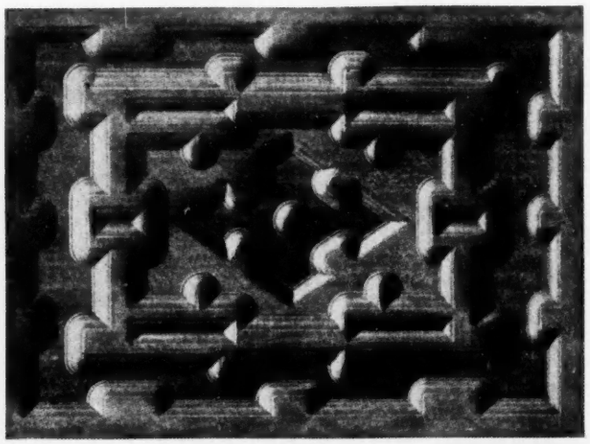


This lock is termed a covered or protected lock. The construction of the Walter's lock requires more material than used in any other lock, as every safeguard is used in the construction.

These and many other interesting and instructive points are covered in the new catalogue of the National Sheet Metal Roofing Company, Jersey City, N. J., which has just been received. This book is entitled "Shingles that Last." Everyone engaged in building should write for a copy.

Versatile Woodworking Machine

A machine has recently been invented in England intended for general use in the pattern-shop as well as the general woodworking shop which is capable of many adjustments



Panel Cut From a Single Piece of Stock With One Cutter

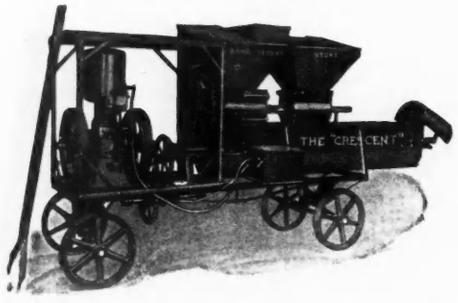
so that it can turn out a large variety of work. Some of the work done on this machine is illustrated showing a panel cut out with the use of a single tool.

Concrete Mixing Troubles Solved

Mixing concrete by hand on the board certainly should be relegated to the dark ages in this era of cement construction. Every up-to-date contractor and cement worker should have an efficient mixer; not alone for better work but also for more work, bigger profits, and general versatility to take advantage of every job of concrete construction that might come up.

The Crescent mixer, made by Raber and Lang Manufacturing Company, 810 Mill street, Kendallville, Ind., is said to be a veritable marvel of efficiency. It is conceded by professional and practical men to be a machine of greatest utility and worth. The manufacturers have proven beyond the slightest doubt in all sections of the country that this machine has absolutely no superior in construction, principle, and last, but not least, fairness in price. The fact that "Crescent" mixers are sold to parties who already have had

one of the machines in operation and who have seen others in operation, is certainly a recommendation of the wonderful merits of this machine worth mentioning.



The "Crescent" proportions automatically and positively, does it more accurately even than the man with the shovel. Any proportion you want can be had. The proportion can be set and changed at a moment's notice, without stopping work, while the machine is running, if you wish. The mix is perfect, and the labor required to operate is reduced to the minimum.

Every machine is built very strong and durable, to endure the rough treatment to which such machines are subjected. You will find it very useful whether you are making concrete products, lying sidewalks, putting in walls, or building bridges.

All interested should write at once for catalogue and prices.

Lubricant for Wood

The friction between two wooden surfaces is often very great, so great that it seriously diminishes the mechanical effect of screws, wedges, etc. Hence the importance of a good lubricant in such cases. Undoubtedly the best article to use is plumbago. It may be mixed with hard soap and applied in this way, and it has been known to double the effect of a wooden screw working in a nut of the same material. The great objection to it is its dirty character; it soils and blackens everything that it touches. Another article which is free from this defect, though it is not so efficient as plumbago, is talc or powdered soapstone. Mixed with soap, tallow or heavy lubricating oil, it diminishes the friction very much.

Good Work of Gravel Roofers Association

The National Association of Master Gravel & Slag Roofers of America are entitled to much credit for their efforts to standardize roofing practice. Having in their membership most of the responsible roofing contractors in the larger as well as the smaller cities of the country, the Association clearly realizes the damaging effect that a poor tar and gravel roof has on their business. That there are such roofs, they do not attempt to deny, and it is the causes that make them possible that they are fighting to remove.

As pointed out in a recent article in these columns (page 35, Aug. number), by their Secretary, L. P. Sibley, one of their first points of attack was the "indefinite specification." The Association contends that the use of such specifications, calling for, say "(4 or 5) ply gravel roof laid in the most approved manner," provides an excellent opportunity for "most anything" to be used in the shape of pitch and felt surfaced with gravel or slag. To condemn a practice and not provide the cure would have been useless, and a Committee on Standard Specification was appointed. This committee carefully inspected many large roofs in various sections of the country, and their report was, therefore, based on actual results obtained—roofs in service 15 and 20 years, and in some cases even 30 years, "without repair cost." The report recommending a standard specification was adopted at the 1909 annual meeting.

A definite specification, however, would be of little benefit

without a practical way of insuring a faithful compliance with it, and at the same meeting resolutions were adopted, which have resulted in standardizing roofing inspection.

By cutting into a roof the number of plies of felt can be easily counted, and what is of even more importance, one can see that the moppings of pitch are complete as specified. If there is difference of opinion regarding what inspection shows, and a section 6 inches wide by 2 feet long taken from the roof at right angles to the way the felt is laid is sent to the secretary's office, together with specification under which the roof is laid, he will promptly make a detailed report on what the inspection shows. The association, through its members, and other sources, is in touch with most of the large work, and upon receipt of information to the effect that the specification is not being complied with, the matter is immediately taken up with either the owner or architect.

The Association is also actively trying to bring about a better understanding of the value of "guarantees," which have become more of a factor in roofing than in any other work.

That guarantees have actually lowered the quality of roofing is hardly disputed, for the indefinite specification, careless application, poor workmanship, lack of inspection, and a general "skinning the roof" all pass unheeded if there is only a guarantee. The Association believes that primarily one should "buy a roof—not a guarantee," and a proper specification faithfully complied with does not require a guarantee. The calling for a long-time guarantee is evidence of the lack of knowledge on the part of the one who requires it.

Incline of the roof deck is another and very important factor. The Association is trying to have used on the proper inclines the kind of roofing most suitable. The slope or incline of the roof has much to do with determining what kind of roofing should be used in order that maximum results may be obtained.

Such an Association certainly deserves to be encouraged and supported. Their co-operation with the architect and property owner has already been productive of good results, and as the advocates of good gravel and slag roofing they merit the confidence of everyone; in fact, the Association serves its members best by assisting property owners to obtain maximum value in roof coverings, and their opinion is frequently sought. They have the experience of 50 years of roofing practice behind them and "roofing is their specialty."

To the responsible roofing contractor this Association is a necessity. It gives him additional fighting force and protection, and if he is doing an active business, he should not be without their co-operation and assistance. As indicating the value they are to the responsible roofer, their recent large growth is very strong evidence, for in a little over two years about 140 new members have joined this Association.

The headquarters of The National Association of Master Gravel and Slag Roofers are Whitehall Building, New York City.

To Make Waterproof Glue

Waterproof glue is manufactured of gum shellac three parts and India rubber one part by weight, these constituents being dissolved in separate vessels in ether, free from alcohol, subject to a gentle heat. When thoroughly dissolved the two solutions are mixed and kept for some time in a vessel tightly sealed.

This glue resists the action of water, both hot and cold, as well as most acids and alkalies. If the glue is thinned by the admixture of ether and applied as a varnish to leather along the seams where this has been sewn together, it renders the joint or seam water-tight and almost impossible to separate.

Art Glass Service

The work of the Clinton Glass Company, of Chicago is doubtless already well known to many of the readers of the AMERICAN CARPENTER AND BUILDER. For more than ten years they have been proving to builders and dealers the advantages gained by the use and sale of Clinton Art glass products.

It is stated that this company does a quality business; they believe in quality, talk quality and deliver quality in every panel of ornamental glass shipped.

Although their assortment of stock designs is always complete, they make to order special designs in art glass of every description — fine church windows and beautiful landscape panels without any painted work whatsoever.

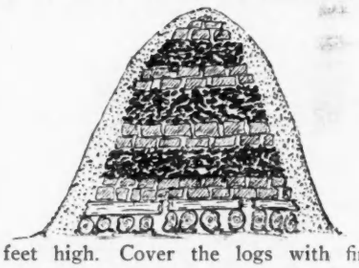
Their record for careful packing and safe shipment is nearly as perfect as possible — losses less than one out of 1,000 shipments—think of it, less than one-tenth of one per cent. It is stated that you'll find their prices lower for the same class of goods than those quoted by others—and you don't need to be an art glass critic to see the superior finish and artistic design of the goods.

Consult their catalog—or write about any special design you want. They state that they can make any design shown in any art glass catalog published and save you money, time and trouble on the job.

If you haven't a copy of their new enlarged catalogue be sure to ask for one. The Clinton Glass Company, Chicago, will mail it free and it will be a big help to you in getting business.

Home-Made Lime Kiln

For those who have easy access to lime-stone deposits, is in many country districts, the method of making lime in a home-made kiln will be useful. The illustration shows a cross-section of a kiln built on a timber base. Arrange the base of small logs, placed side by side and close together. Make this base the size desired for the kiln, 10 by 14 or 12 by 16 feet, etc. Leave three open places between the logs to serve as flues, and in the center build a box of old boards to serve as a center flue. Make the box about six feet high. Cover the logs with fine, dry wood, and put a good supply of wood in the bottom of the central box. It is usually well to make this kindling with crude oil, to insure a good fire.



Over the kindling spread a layer of coal about four inches thick. Next put on an eigth-inch layer of the limestone, broken fine. Over the limestone spread another layer of coal slack, then another layer of stone, and so build up

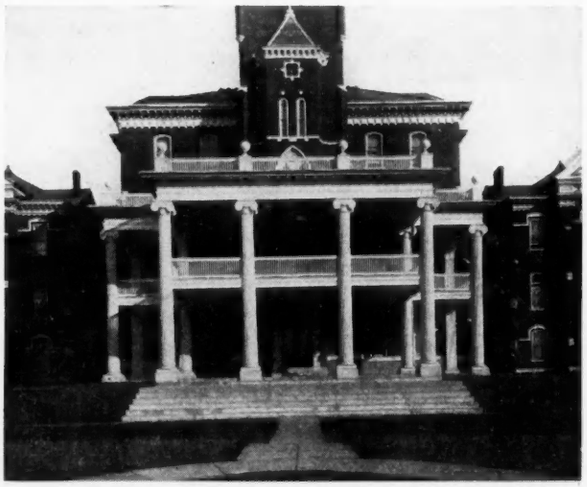
the kiln to the desired height, alternating the layers of slack and limestone. Draw the layers in as you build them up to make the finished kiln cone-shaped. Put an extra layer of coal on the top and cover with clay, leaving the cross-flues open. Start the fire at the bottom of the central box. If a good fire is not started, fire at the cross-flues also. When the fire is well started, close the flues with clay and allow the fire to burn itself out. This will require from six to ten days, depending upon the size of the kiln. In building, use about one-fifth as much coal as stone.

"Union" Metal Columns

Columns of proper proportions and style are of prime importance in the adornment of an edifice, and to be really valuable, their lines of beauty and symmetry must be permanent and durable. Another essential of a good column is strength.

"Union" metal columns fulfill all of these requirements and besides have many other superior qualities. They are made by the Union Metal Manufacturing Company of Canton, Ohio, and in their production the manufacturers have certainly overcome many of the serious and annoying defects common to wood columns, such as splitting, warping, opening up of glued up joints, rotting, etc.

The manufacturers have proven and are proving every day the truth of their many claims of superiority of Union metal columns by the receipt of many unsolicited letters from their patrons in nearly every state and many foreign countries expressing the most perfect satisfaction and unqualified endorsement of Union metal columns. The illustration shown on this page is of the Missouri State School for the Deaf,



Classic Portico of "Union" Metal Columns

located at Fulton, Mo., whose elegant and massive portico is equipped with Union metal columns, 26 inches diameter at base of shaft and 24 feet long. Hon. M. Fred Bell, official architect for the State of Missouri, created this beautiful portico and specified the Union metal columns and pilasters used thereon, and while the job is admired by many, and highly prized by the manuafcturers of Union metal columns as being one of their most elegant installations, yet they advise that they have many such installations throughout the country.

The manufacturers also advise that Union metal columns are rapidly coming into general use in many different parts of the country, for porch work on houses and cottages of moderate or even low cost and also for ordinary pergolas or arbors.

Union metal columns are made in various designs following as nearly as practical the classical order of architecture, and ranging in size from the smallest up to 40 inches in diameter

at base of shaft, and 35 feet long. The bases of all designs are made of high-grade cast iron, the shafts of special quality sheet steel fluted; and in the larger diameters two ply of same is used, being rolled and fluted together. The capitals vary according to design made of pressed zinc or copper, cast iron or compositon cement plaster. The shafts of all designs and sizes can be made of heavy sheet copper and reinforced with sheet steel when desired at a very reasonable cost.

It can be seen by this brief description that Union metal columns are very strong comparatively and that their strength is durable. The secret of their extraordinary strength lies in the fact that the shaft is correctly tapered and fluted the full length, thereby making it capable of withstanding a remarkable crushing strain.

These columns are broadly protected by U. S. patents as are also the machines used in their production which accounts for the fact that the columns are made exclusively by the Union Metal Manufacturing Company, of Canton, Ohio, who will gladly respond to all requests for further information, and will send catalogue and prices to all applicants.

Properties of the Circle

A few of the most important properties of a circle are as follows:

The diameter cuts the circle and its circumference into two equal parts. Equal arcs of a circle are subtended by equal chords.

The circumference of a circle is 3.14159265 plus times the diameter. In ordinary practice we get the length of the circumference with sufficient accuracy by multiplying the diameter by 3.1416. From the foregoing it is seen that the circumference of two given circles are to each other as their diameters. That is to say, if the diameter of one circle is twice as long as the diameter of another circle, the circumference of the first will be twice as long as that of the second; or if the diameter of one circle is three times as long as the diameter of another circle, the circumference of the first will be three times as long as that of the other.

The area of a circle is equal to the product obtained by multiplying 3.1416 by the square of the radius, or by multiplying .7854 by the square of the diameter. From this we conclude that the areas of any two circles are to each other as the squares of their radii, or as the square of the diameter or the square of the radius of a circle is twice as great as the square of the diameter or the square of the radius of another circle, the area of the first will be twice as great as the area of the second circle.

The area of a circle is greater than that of any plane figure which has a bounding line of the same length as the length of the circumference of the circle.

"The Proper Treatment for Floors Woodwork and Furniture"

We borrow our title for this article from a book issued by "The Wood Finishing Authorities"—a book which fully justifies its title, by the way, and one which we will comment on later.

It is gratifying to note that this subject of artistic wood finishing is more and more becoming a matter of popular interest, popular in the sense that the public in general has awakened to the importance of this part of home development.

The past few years have brought about a remarkable rise in the standard of wood finishing. In the homes of people of modest means a degree of artistic harmony is often found in floors, woodwork and furniture, which rivals the most pretentious establishment.

In this national movement toward "The home beautiful" is seen the readiness of Americans to respond to every reasonable suggestion in the direction of a higher plane of living.

Certainly there has been no lack of suggestions of recent years tending to spur people on to higher ideals of wood finishing.

A great number of magazines devoted entirely to home beautifying are full of educational articles on wood finishing and much space is given to the subject in periodicals of general circulation among all classes.

It is not in the editorial pages of these magazines, however, that we find the most potent, the most effective influence in the beautiful home movement.

Turn to the advertising pages. There you will find the big force at work—the true note struck—to which our public is responding.

The advertisers not only offer the suggestion, implant the desire, for the home beautiful—they crystalize that desire into immediate action.

For instance, no matter how rapidly a man or woman is turning through certain prominent magazines, this appeal in large type cannot be missed:

"Let us send you free sample to prove that you can artistically color and finish the floors, woodwork and furniture in your home."

That strikes the responsive cord. It stimulates ambition into action—and accomplishment follows. We borrow that, too, from "The Wood Finishing Authorities." We could not hit upon any advertisement or upon any particular advertiser that would illustrate our point more aptly.

In fact any comprehensive review of the development of artistic wood finishing in this country would show S. C. Johnson and Son of Racine, Wisconsin, as leading factors for over a quarter of a century.

Let us not lose sight of the fact that the decorating craft owes this firm a heavy debt for the discovery and perfection of Johnson's Wood Dye.

Johnson's Wood Dye was developed on the sound principle that the natural beauty of woods has more artistic value than any colored coating that remains on the surface, thereby detracting from the beautiful tones and grainings of the wood itself.

This firm put years of costly experimenting into the perfecting of this material that sinks deep into the wood, fixing the color desired. The dye leaves the wood perfectly natural except that the beauty and contrast of the grain are even more marked and new artistic effects of tone and texture brought out.

Johnson's Wood Dye is made in fourteen standard shades and any other shade may be easily produced, as all colors may be lightened by adding alcohol and darkened by adding their Flemish Oak Dye.

Over the dye either a dull wax or a glossy finish may be developed with the very best results. The surface of the wood has not been impaired as in the case of an unnatural extraneous coloring material.

Johnson's Prepared Wax applied over the Dye also becomes an integral part of the wood, working into the pores. It forms a protecting coat and produces the beautiful dull-lustre finish now so popular, without interfering with the artistic value of the naturally colored wood. Both the dye and the wax are very easily and quickly applied.

Where a higher gloss than the wax finish is desired, Johnson's Under-Lac is being used over the dye.

Under-Lac is another Johnson product of distinctive character. It is used instead of varnish. It is a light, thin, elastic spirit varnish which produces the "hand-rubbed" effect admirably. Aside from the superior finish it insures, it is constantly growing in popularity among decorators because it is so easily applied. It does not "crawl" or "lap" and it dries hard in half an hour.

These and numerous other products of "The Wood Finishing Authorities" are taken up in a most interesting and in-

structive way in the book we mentioned—"The Proper Treatment For Floors, Woodwork and Furniture."

Through their splendid and extensive advertising, S. C. Johnson & Son are placing this book with their free samples in thousands of homes every month. Such work as this means not only more decorating contracts for local men but a higher order of work. And it means surer results for the decorators with less time and effort because the Johnson products are absolutely *right*—each for its special class of work.

These materials are easily used with complete success even by the least experienced workmen. The Johnson book, which will be gladly and freely furnished to any of our readers requesting it, is a thorough lesson in the use of all Johnson finishes. Any of our readers who have not read this book will do well to send for a copy. Free samples of Johnson's Wood Finishes are also available to our readers.

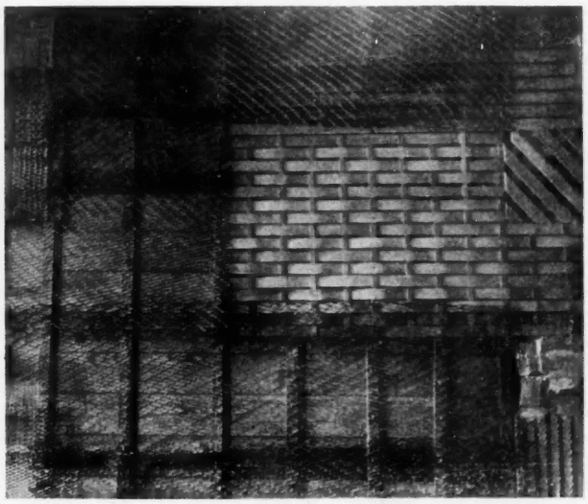
Address S. C. Johnson & Son, Racine, Wisconsin. This firm co-operates with the trades in the most broad, liberal and progressive way. They work "hand in glove" with the painter, decorator and contractor, spending large sums of money in the magazines to create demand, then directing that demand to the local men who can take care of it. Large and attractive display cards for window and store are given to the men who use the Johnson materials and a beautiful set of wood panels are furnished them, showing the results obtained with Wood Dye of all shades on different woods.

These are a few of the things that one manufacturer is doing toward the home beautiful movement. No wonder we, as a nation, are progressing some along that line.

Exhibit of Plastering Surfaces

The accompanying photograph is interesting as showing a large number of the cement plastering surfaces now in use. Ten different forms of metal lath are illustrated, three forms of wood lath, besides brick, concrete blocks and hollow terra cotta tile. All of these are in use by builders for modern stucco work.

It seems that there can be no excuse now for anything



Come on with the Stucco!

but the very best of cement plastering, when builders have such a selection of materials as this to draw upon—and with every manufacturer ready, even anxious, to send complete information as to the proper way to do the work.

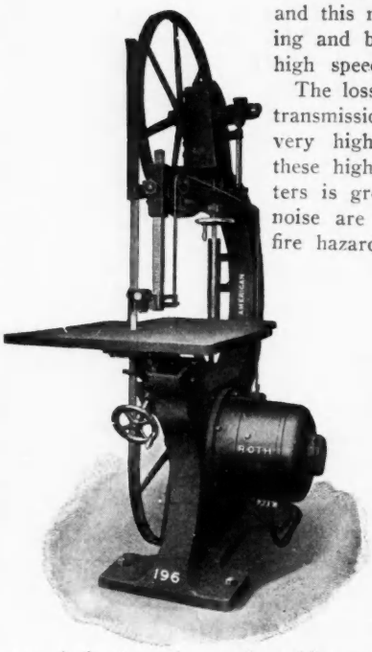
The Largest Map

It is doubtful if there ever has been produced a single map which equals in size and in the detail of its information the great map which has recently been prepared in New York

for the use of the directors of the Missouri Pacific Railroad. The map, which is 35 feet wide by 45 feet high, includes, on a scale of eight miles to the inch, the North American continent from the Canadian border to Panama. Its special purpose is to show, in their positions and relations, the railroads of the country.

Electric Motors for Woodworking Shops

The use of electric motors for driving wood-working machinery has increased very much in the past few years Most wood-working machinery operates at comparatively high speed, and this necessitates much shafting and belting, running also at high speeds.



The losses in shafting and belt transmission have been proved very high; the danger due to these high-speed power transmitters is great; the dust, dirt and noise are objectionable, and the fire hazard is also an important factor—these combined have been enough to make the benefits of electric motor drive easily apparent

The band saw is one of the wood-working machines which can be very efficiently operated by individual motor. This machine is used in a large variety of works. In many cases it is the only wood-working machine in the establishment.

At this point the individual motor drive suggests itself and in the cases where it has been adopted, has proved entirely satisfactory. Various ways of driving are in use: the earlier applications have been by simply belting from the motor pulley to the band-saw pulley,—then the motor has been set on the floor and connected to the band-saw shaft by means of gearing. Later the motor has been set on the floor or on an extended part of the frame and the motor shaft coupled to the band-saw shaft.

The Roth way, as exemplified by wood-working machinery of Roth Bros. & Co., Chicago, Ill., is the latest type of modern up-to-date direct-drive. The motor is of a special design, having a supporting ring at one end which is bolted against the band-saw frame. A special long bearing is used at the band wheel end, which extends through the band-saw frame, and the band wheel fits on the motor shaft close up to this bearing.

This motor runs at a slow speed so as to adapt it to directly driving the band-saw wheel. There are only two bearings, no pulley or belts; consequently the maximum efficiency of operation is obtained. The motor is fuly enclosed and protected against dust and mechanical injury. The general construction and materials entering into the manufacture of these Roth band-saw motors is up to the usual high standard of Roth apparatus. Steady power is obtained by this construction because there are no belts to slip, and this, with the elimination of vibration insures better work.

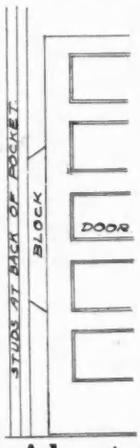
The floor space occupied is reduced to the minimum, and as the motor is up, out of the dirt, it will have a long life.

Cleaning and sweeping around the machine is easy, and all parts of the machine are easily accessible. Being a self-contained and complete machine it can be set in any part of the shop, independent of line shaft, belts, etc., and having in view only the best location for efficient operation.

All information concerning this or other electrically driven machinery will be promptly supplied by Roth Bros. & Co., 1422 West Adams street, Chicago.

Bumper for Sliding Door

There are things about the sliding door that should not be overlooked. The bumper, for instance, is sometimes forgotten to be put in the back end of the pocket before the ceiling of same, or the plastering is done. Then again if the bumper is provided for, more than likely it is simply a block, a piece of two-by-four nailed on the floor, so that when the door is run back the momentum of same causes the top to move on beyond the proper stopping place, then there is a sudden rebound and an unnecessary jar that is anything but helpful to the door, and the adjustment of the hanger. The accompanying drawing shows the proper way to put in a bumper for sliding doors, it being arranged to strike the middle of the door.



Advantages of Montross Metal Shingles

There are many reasons why Montross Metal Shingles should be specified, among which are their permanent durability and their attractiveness as a roofing for any class of building. For over twenty-one years they have been a leader among metal shingles.

They are fire, lightning and storm proof, three very important advantages. A telescopic side lock allows for the necessary contraction and expansion of the metal, overcoming the objection made to plain tin roofing. They are embossed in practical designs and then galvanized or painted, leaving no unprotected crevices to rust out.

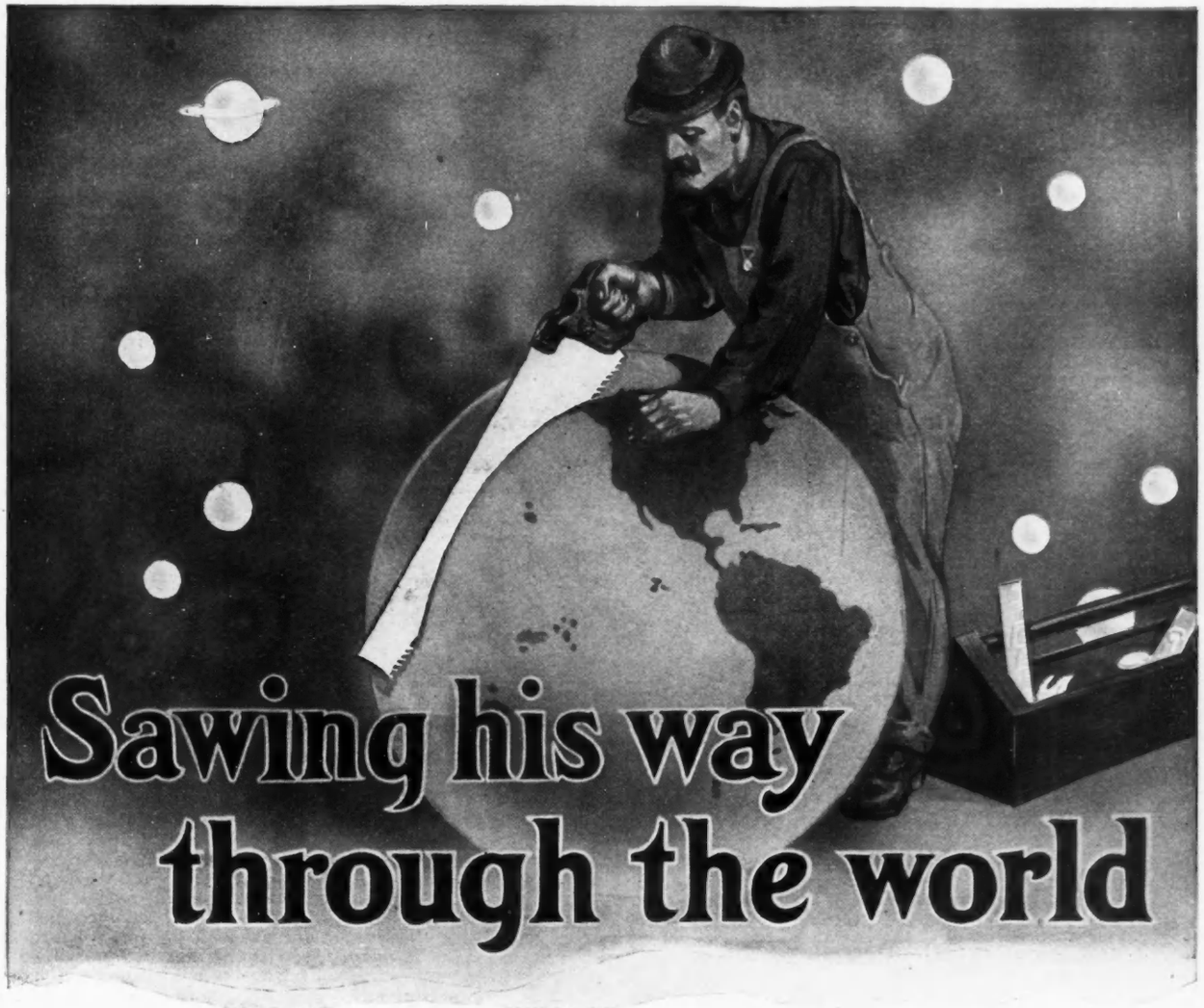
Being lighter than slate or tile, a heavy frame work is not needed to carry them. They are easily and quickly applied with hammer and nails, requiring no solder. They will not rattle or blow off, nor crack or break. They are claimed to be superior to wood shingles, composition and other roofings.

Montross Metal Shingles have the endorsement of all who have used them, and are recommended by many architects, contractors, builders, carpenters and metal workers. They will last the life of the building, if given ordinary care, and greatly reduce maintenance charges. All of these advantages should be carefully considered; they stand for high efficiency in metal shingles.

Write the manufacturers for a copy of their catalogue, price list and special folders, containing detailed information of much value. Address Montross Metal Shingle Co., Camden, N. J., and your request will be given careful, prompt and courteous attention.

A Kalsomining Trick

The addition of two teaspoonfuls of turpentine to the pail of kalsomine will make the latter work better, and enable one man to successfully do a ceiling that usually two men do. When the first coat of kalsomine is likely to rub up, add a little raw linseed oil to the stuff used for second coating.



That's just what the **Dollar-and-a-half-a-day** man is doing.

His whole life is just like his daily work. He sticks as closely to the mark from day to day, year in and year out, as when he is ripping a plank on the job. The same old **PUSH** and **PULL** and when he strikes the knotty part—the rainy days in life's journey—**THEN** is when he realizes how very little he is really doing for himself and for those near and dear to him.

HE IS SAWING HIS WAY THROUGH THE WORLD

In the building business it isn't the man who can saw accurately to a knife-line; who can mortise to a nicety; who can plane to a dead level; who can drive the nails with trip-hammer speed; it isn't this kind of a man who makes the money. Any *carpenter* is supposed to be able to do that much. *That* kind of ability is only **ORDINARY.** It is the man who can *plan* the jobs; who can lay out the work true and accurately; who can draw up the Plans and Specifications and read the Blue Prints; who can estimate close enough to get business without risk of loss to himself; and finally, who knows building work so thoroughly, from A to Z, forwards and backwards, that the people in his community realize it and look up to him as **"IT"** in his work; *this,* then, is the man who gets the big pay jobs, the important work; and who piles up the fat bank roll.

HE IS NOT SAWING HIS WAY THROUGH THE WORLD

If you have ever had any inclination to try to *get ahead,* to earn more money, to branch out for yourself, to make life pleasanter and easier for yourself and those dependent upon you, *all we ask* is to read this announcement through, word for word, and then **ACT** as your best judgment dictates.

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The books are indexed so thoroughly that you can find any subject in a second or two.

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Tracing and Blue Printing
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Floor Beams
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Time and Cost Keeping
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Laying off Mitered or Equal Joints
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Rafter Cutting
Miter Cutting
Hip Roof Framing
THE SQUARE IN STAIRBUILDING
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Pin a dollar bill to the Special Order Blank, fill in your name and address and mail it before the time limit. If you keep the books all you pay is $2.00 a month, or about **six cents a day.** That gives you a full year's time. At this rate any man in the building trades can afford the "Cyclopedia." We return the dollar if you don't keep the books.

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This offer is not made to everyone, but only to a selected list of men who have been recommended to us from different sources. We are willing to make these **extra special terms to you** simply because of your standing in the building trade. We believe that a set of these books in your hands will be the means of selling many more in your town—that's why we make such a low-priced offer and give all the valuable extra inducements. This offer is simple, straightforward; there is no catch in it anywhere. We mean just what we say and we sincerely hope you will take advantage of it, at once. One dollar less without magazine.

NO RISK TO YOU
No Expense
NO OBLIGATION

Brief Table of Contents

The books are indexed so thoroughly that you can find any subject in a second or two.

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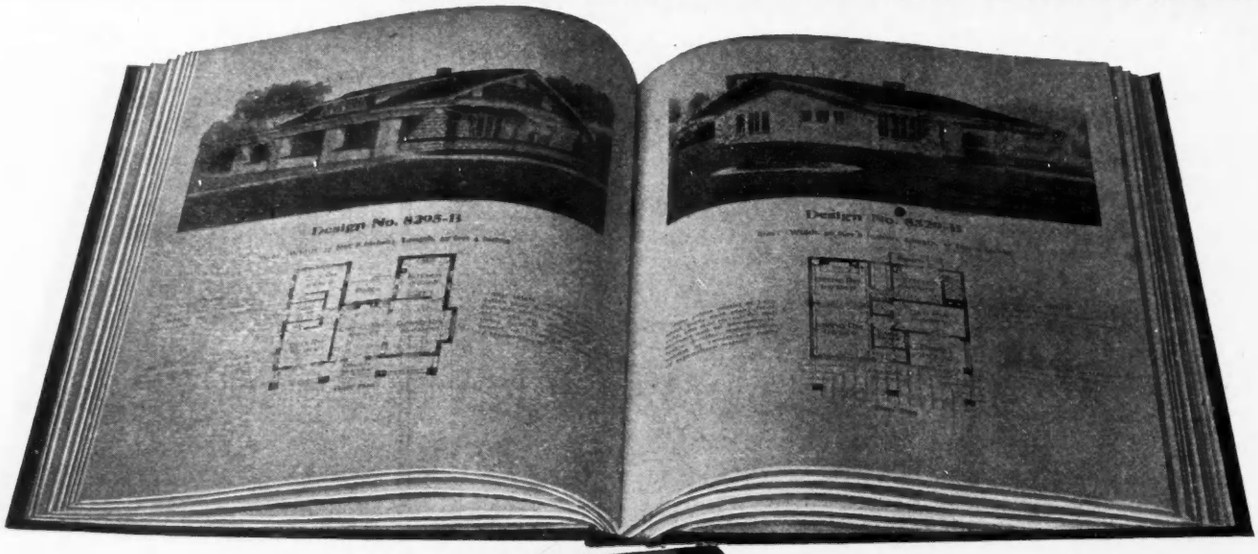

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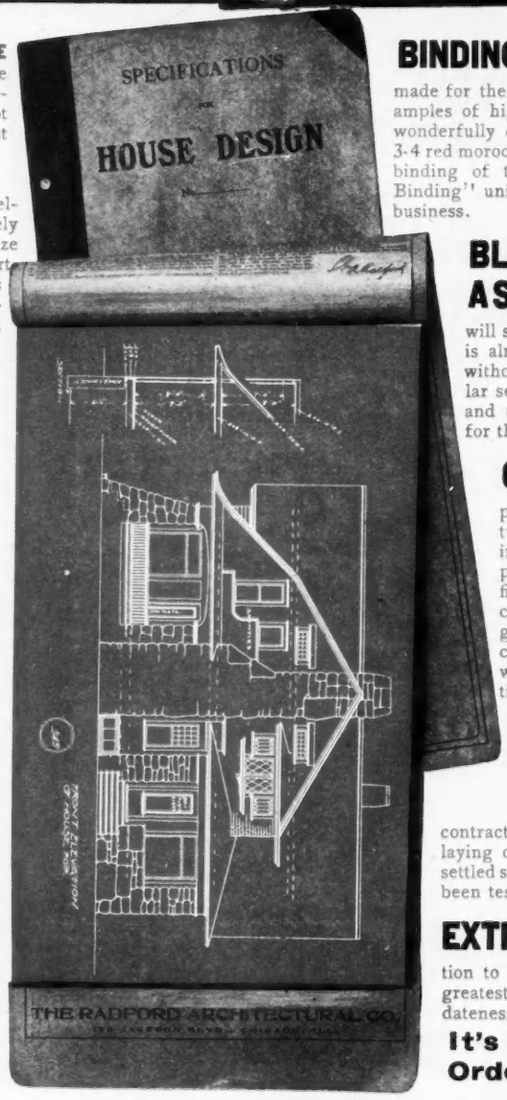
RADFORD'S $30,000 PORTFOLIO of PLANS This is the celebrated widely advertised Prize Winning Portfolio of Building Plans. It contains over 300 designs of all kinds of buildings—houses, cottages, bungalows, stores, flats, bank buildings, garages, churches, etc., each design a gem of the architect's skill, each one a prize winner and selected for its excellence of design, economy in arrangement of space, and for its popularity with prospective builders. It cost over $30,000 to prepare it. You can get it **FREE.** It would cost you at least $75.00 to $100.00 to get the Blue Prints for any design in this Portfolio, elsewhere. **On this Special Offer** you get your choice of any set for any house design in the Portfolio **Absolutely FREE.**



BINDING Radford's Portfolio of Plans is printed on a superior grade of enamel (glazed) paper, especially made for the purpose. The perspective views are unusual examples of high class half tone engraving. The floor plans are wonderfully clear, distinct and easy to read. The binding is in 3-4 red morocco leather, 14 karat gold leaf title. It matches the binding of the Cyclopedia, which is the celebrated "Brock Binding" universally conceded the highest standard in the book business.

BLUE PRINTS AS GOOD AS MONEY TO YOU If you are a contractor, carpenter or builder and will show the Portfolio to people who intend to build, it is almost certain that one of the 300 designs will suit without any change. You may then order that particular set of Blue Prints from us **Under this Special Offer** and **get it FREE.** Whatever you charge the customer for the Blue Prints will be **clear profit to you.**

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GENTLEMEN:

Please send set of your 12-volume Cyclopedia of Construction to me for five days' free examination, express prepaid, under the terms of your Advance Offer. I enclose $1.00 deposit which you agree to return if I decide not to buy the books after examination. If I keep the books I will pay $2.00 a month until the special price $23.80 is paid (including year's subscription to American Carpenter and Builder); otherwise I will notify you within five days after receipt of them. You also agree to furnish set of blue prints, if ordered within 2 months after acceptance of books.

NAME _____

ADDRESS _____

Pin a DOLLAR BILL to this COUPON and MAIL TODAY

Radford Architectural Co.

ENTIRE 11th FLOOR
Medinah Building
CHICAGO

A Pocket Miter Box

Yes, the old World does move!

Now it is a miter box so small and light that it can be carried in the pocket and used whenever or wherever needed—upon a scaffold or ladder; it can go wherever the workman can go; yet at the same time it is strong, accurate and dependable, an exceptionally useful tool.

Mr. Carpenter, are you still using that old-fashioned, clumsy miter box? If you are, just look at these illustrations of this tool, the Milks Pocket Miter Box in use, and see what a time-saver and convenient tool it is. There is no need of a dray to take it to your work, as it weighs but 8 ounces while others weigh from 8 to 18 pounds. It can be carried in the pocket or apron and you always have it with you when needed. The old saying that "A man wants what he wants when he wants it," is very true in case of any tool, but especially so with a Miter Box.

This useful and ingenious tool is made by the Parsons Mfg. Co., Parsons, Kas., who make the following claims for it:

The Milks Pocket Miter Box will cut the principal angles on moulding or strips of any kind. It can be carried in the

pocket as it weighs less than a pound. It is placed on the moulding instead of having to turn a long piece to get it in position to cut as in the ordinary miter box. It is never in the way on a scaffold. It can be used on a ladder. It saves lots of time in many places, as the workman can make cuts where it would be impossible to use an ordinary box. It is within the reach of every carpenter as the price is very low.

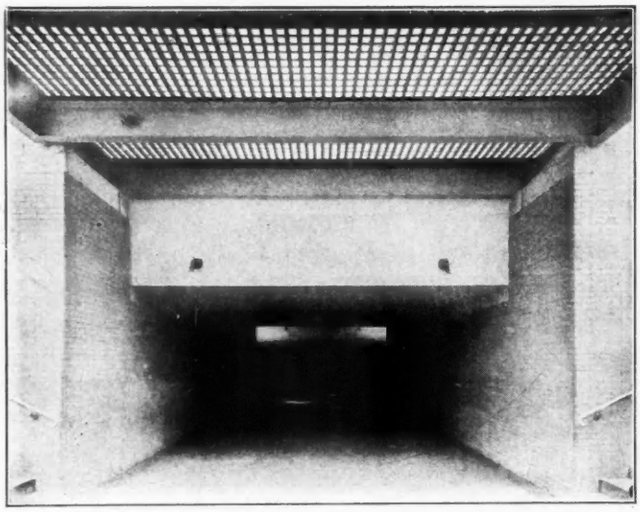
To use the Milks Pocket Miter Box, place the bar on the moulding, holding it in position with the left hand. This enables you to use it in a great many places and positions in which it would be impossible to use the ordinary box.

You will see by the illustrations that it can be used as a bevel square and also as a try square. This does away with carrying the try and bevel square on the scaffold with you. You will also see by the illustrations that it can be easily used on a ladder and carried in your apron or pocket without any inconvenience, owing to its light weight and compact form, it being constructed of aluminum, the durability and wearing qualities of which are unsurpassed.

The Milks Pocket Miter Box is manufactured by the Parsons Manufacturing Co., 1800 Washington Ave., Parsons, Kan. The illustration here and in the company's advertisement explains matters pretty fully, but circulars can be had on request.

Practical Floor Lights

The country-wide popularity of Berger's "Raydiant" system of sidewalk lights is the result of their original and effective type of construction. Being thoroughly characteristic of the American principles of value and economy, the lights are in use wherever concrete is used in building construction—for sidewalks, skylights, vaults, areaways, floors, roofs, etc.



Under Sidewalk Space Lighted by "Radiant" System

The construction of the Berger floor lights consists of a series of permanent forms of heavy galvanized steel, combined with glass, scientifically designed and made of especially prepared material, steel reinforcing rods, and concrete.

The heavy steel forms, four inches on center, interlock one with the other, forming a rigid base for receiving the glass and concrete, and not only serve the purpose of centering, but at the same time brace.

In addition to their strength, the steel forms make a neat, attractive surface underneath which may be decorated without danger of becoming discolered by the action of the concrete, and the small ribs, four inches on centers on the underside of the construction, break up the surface just enough to make a strong effect pleasing to the eye. These small ribs or beams, while adding to the attractiveness of the construction, do not in any way interfere with the diffusion or refraction of the light.

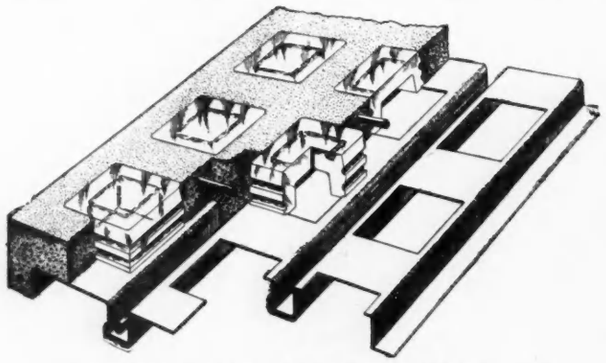
The forms are made from special analysis open hearth steel, heavily galvanized, and of full number eighteen gauge stock. They are of four inches effective covering width and are furnished in depths of one, one and one-half, and two inches, according to the span and the load to be carried.

The lower part of the glass fits down into the openings in the forms and has a supporting shoulder which rests on top of the form and extends entirely around the bottom of the glass; hence each glass has bearing on all sides, thus equalizing and distributing the strain and preventing their being cracked and broken on account of unequal bearing. The vertical leg or part of the glass which fits down into the form, prevents the glass from slipping and shifting out of its place, and also engages with the form when under strains in a distinctly characteristic manner, quite similar to mechanical bond of deformed bars in concrete.

The glass is made with grooves or recesses on all sides, which engage firmly and securely with the concrete, and are in effect, waterbreaks which prevent water from running down between glass and concrete and producing leakage.

Each form containing a single row of glass, may be shifted or moved at any time before the concrete is placed. Due to this fact it is possible to complete the job with all glass laid true and straight both ways.

After the bearings are in place any mason or concrete finisher can lay the forms, drop in the glass, and put in the concrete and reinforcing rods. The construction is very simple and the installation can be made easily and in much less time than that required for systems using false or wooden centering.



Detail of Berger's "Radiant" Side Walk Lights

As for reinforcing, it is possible to use any design or rods, the main point being that the construction should not be burdened with an excess of steel, which is not only entirely unnecessary but has a tendency to break up the construction and thereby weaken it. Rigorous tests indicate that ¼-inch rods are amply sufficient. The concrete entering into this construction should be made of the very best Portland cement and clean, sharp sand.

Lead Piping Harmed by Oak

Plumbers should be careful not to use lead in contact with oak, unless the latter is perfectly dry and free from sap, otherwise the gallic or acetic acid in the wood will turn the lead into acetate of lead or ceruse.

Progress at Panama

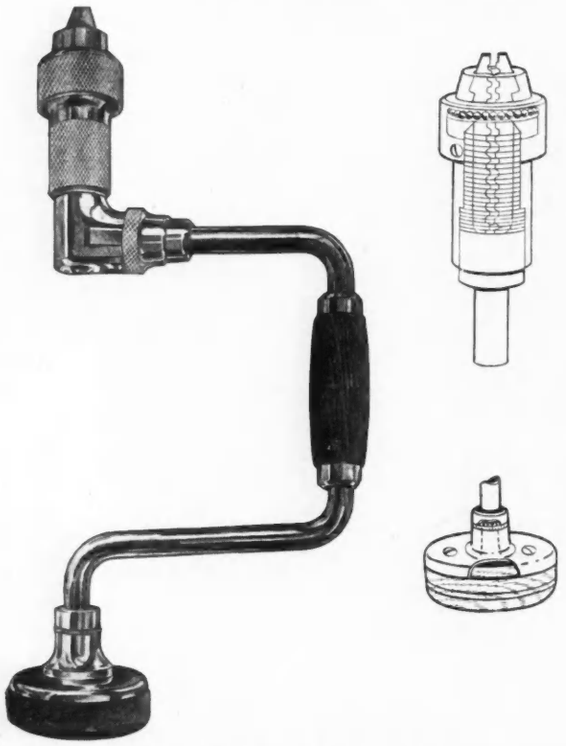
The completion of the first year of concreting work on the Gatun locks show that 655,083 cubic yards have been placed, and that about 1,440,000 cubic yards remain to be done, says the *Scientific American*. The greater part of the work has been built in the upper or lake-level locks, and preparations are now being made to move the huge forms, with their supporting towers each of which complete weighs about 2,200 tons, to the next level below, the transit being made over timber inclines. In this connection, it is gratifying to learn that the hydraulic fill at the Gatun dam is about one-third completed, 4,115,214 yards having been pumped into place by the hyraulic dregdes. On August 1st, the dry fill, consisting of excavated material brought in on trains and dumped along each toe of the dam, amounted to 5,900,569 cubic yards.

For Those Who Talk too Long

In the Japanese parliament the members all talk from a specified spot. A Japanese engineer proposes to make this spot a trap door. From beneath the spot little tubes will run to each member's chair and each member will have a little lead ball. When the man who is talking begins to slop-over the rest of the members can quietly deposit their lead balls in the little tubes, and if more than half the members do so, the weight of the balls causes the trap door to begin a calm and dignified descent into the basement, carrying the garrulous member with it!

The "Big Chuck Brace"

The Peck, Stow & Wilcox Company, manufacturers of large lines of mechanics' hand tools and machines, are the makers of a remarkable brace with a ball-bearing chuck. The name of this tool is the Samson Brace, but it is becoming widely known to carpenters and mechanics generally as the "Big-Chuck Brace," its chief feature being a large-sized highly improved ball-bearing chuck.



Brace with Ball Bearing Chuck

The advantages of thus introducing the ball-bearing feature and increasing the size are numerous. In the first place, it makes the brace much easier to tighten or release. With the ordinary brace, the workman is often forced to make use of a vise, in order to get a sufficiently tight grip on a round or small drill-shank. With the Samson, he can get as secure a grip as needed on any size or shape of drill shank with the bare hand only.

In fact the grip is so strong that ten-penny nails held in this chuck have been bored through solid oak, and steel rods 3-16 of an inch in diameter, with one end held in a vise, have been twisted to the breaking-point.

At the same time, the chuck can be released instantly, and with slight effort. The makers believe that this feature will prove a boon to any mechanic with a weak wrist, as he will experience no difficulty in handling any type of bit or drill-shank and in securing good results. They also state that mechanics generally, who have become acquainted with the brace, find the increased size of the chuck a convenience in handling the tool.

The strong grip is very much assisted by use of an alligator jaw which parallels itself to fit the shape of any drill-shank that may be inserted in it.

In addition to the chuck, the Samson brace has other very desirable features. The head is steel-clad, and has dust-proof ball-bearings. It revolves easily; will not work loose or pull off; the bearings cannot become clogged or jammed; and the head is securely protected against splitting.

This protection to the head is not cast iron; nor is it a flat plate. It is a steel-clad quill, which is fastened with three screws to the lignum-vitae head. This quill comes up around

the head to the height of 5-16 of an inch, making it a far greater safeguard against splitting than the ordinary flat-plate construction. There is also a hardened, knurled washer between the quill and the ball-bearing cup, which relieves all friction when in action. The Peck, Stow & Wilcox Co., however, do not rely solely upon this protection to the head of their brace, but use lignum-vitae in order that they may have the hardest and toughest possible materials. The center, however, is made of coco-bolo because lignum-vitae is too hard a wood through which to bore a hole of the length required for the rod. The general quality, efficiency and construction of this brace needs no further elaboration than the fact that it is one of the Peck, Stow & Wilcox Company's guaranteed hand tools.

Electrification of Hoosac Tunnel

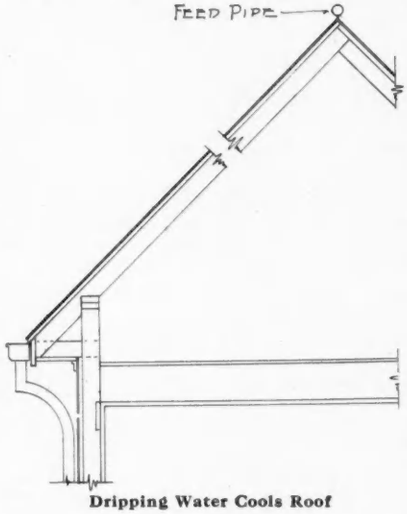
The report that the famous Hoosac Tunnel is to be changed from steam to electric operation is confirmed by the officials of the Boston and Maine Railroad. It is stated that the preliminary estimate of the cost of the change, including the cost of the electric locomotives, will be one million dollars. Passenger and freight trains will be taken through the Hoosac Mountain by electric locomotives between Tunnel Station on the east and North Island on the west.

Can Save Money by Using Concrete Fence Posts

The United States Department of Agriculture estimates that the farmers of a single state, Iowa, use every year $1,400,000 worth of fence posts, which cost an equivalent of $600,000 to set in the ground. Acording to these estimates about 10,000,000 posts are used. The average life of a wooden post is stated to be fourteen years and the average cost 13.7. Here is a problem of wastefulness, easily solved in the use of concrete. A wooden fence post must be replaced every fourteen years. A concrete post, properly made, is everlasting.

Scheme for Cooling the House

Every suburbanite will admit that the rooms of a wooden country house have an oven-like temperature during a sunny day, and that this heat is retained for the greater part of the night. The roof, of course, is responsible for this heating. One obvious way of reducing the temperature is to cool the roof by means of water, and a patent has actually been granted to a Baltimore inventor for such a device, says the *Scientific American*. The water is pumped through a standpipe to the roof and the drippings are led through the usual drain pipes, not, however, to be lost, as may be supposed, but to pass through a hose to a lawn sprinkler. The inventor claims that not only does he use his water twice, but that after having passed over the hot roof the water is supplied to the sprinkler at a somewhat higher temperature, with the result that his lawn will profit by it. The final touch is contained in the statements that if a hot-water heating plant is available in the house, the water can be drawn through it before passing to the roof, so as reduce the temperature of the lower rooms.



Dripping Water Cools Roof

Smithing or Truing Hand Saws

How many carpenters are familiar with the process of truing hand saws, so that they will run straight and cut on a line?

Unfortunately, there is no way of telling whether a hand saw has been properly hammered, other than through an actual test in a cut, for if the saw has been correctly finished, all hammer marks are removed by subsequent grinding.

The tempering process leaves the saw blade somewhat out of true. There will be an uneveness of temper, or tight and loose spots that tend to draw the teeth edge off the line.

This may be illustrated by standing a piece of sheet iron on edge and pushing it laterly and noting how it snaps or pops into place. This indicates that the outer rim is tighter than the center, which, when properly hammered, is stretched to an equal degree with the center and the entire sheet becomes in actual line.

As this process is invisible, it is frequently omitted by some saw makers and as a result, the saw is practically worthless until properly treated.

The smithing process is done on an anvil under a hammer by the most skilled workmen only, as it requires years of practical experience in order to master the art.

An awkward thrust of the hand saw sometimes throws it out of true, but this is not likely to happen with a saw which has been properly made in the first place.

Sometimes the uneven spots occur in the outer edge of the blade, sometimes in the center, and it requires most expert knowledge in order to properly locate and remove all uneveness.

These apparently little things, most of which are invisible to the eye, all enter into the construction of a perfect saw and are given the most minute attention.

There are many others, of which we shall take occasion to write later on. E. C. Atkins & Co., Inc.

Starrett Co. Moves Chicago Store

The L. S. Starrett Company, Athol, Mass., U. S. A., announces that its Chicago store is now permanently located in new and larger quarters, at No. 17 North Jefferson Street. You are cordially invited to call and inspect its complete stock of fine mechanical tools and better facilities for favoring the trade with prompt and efficient service. Al. T. Fletcher is the manager of the Chicago store.

New Jahant Furnace Catalog

We have just received our copy of the new catalog of the Jahant Down Draft furnace. It is very attractively gotten up with a beautifully embossed cover in three colors, is finely printed and is well illustrated. But more important still, it contains all the information a man requires and wants to have in order to intelligently figure on installing one of these furnaces. Moreover, everything is arranged so simply and in such a logical order that it is a pleasure to look the book over. The catalog is of convenient reference size.

Copies will be mailed to all interested parties on request by the Jahant Heating Co., 200 Howard St., Akron, Ohio.

For More Practical Education

The co-operative plan of engineering education, which has been successfully introduced at the University of Cincinnati, is being adopted, with some modifications, at the University of Pittsburg. A bulletin issued by the University describes the system. It says:

"The faculty of the School of Engineering have matured a co-operative plan whereby the student, while spending in school the amount of time usually devoted to instruction in our best engineering institutions, will work four terms of three months each in the engineering industries of the Pittsburg district * * * the school work being arranged so that successive groups of students will furnish continuous service to the employer."

CONTENTS FOR NOVEMBER, 1910

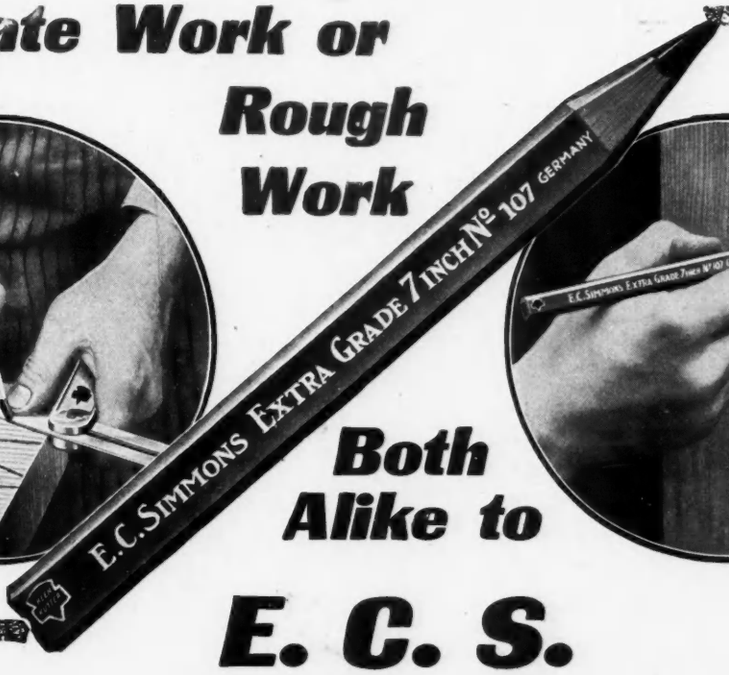
INDEX TO ADVERTISEMENTS, NOVEMBER, 1910

NOTICE TO ADVERTISERS

Forms for the December number of the American Carpenter and Builder will close promptly on November 20. New Copy, changes and orders for omissions of advertisements must reach our business office, 185 Jackson Boulevard, Chicago, not later than the above date to insure attention.

AMERICAN CARPENTER & BUILDER Co.

Accurate Work or Rough Work



Both Alike to

E. C. S. Carpenter Pencils

THESE pencils are soft enough to make clean cut, legible marks for accurate work and yet hard enough to hold that fine point without breaking or wearing away too quickly. In making offhand strokes on the roughest lumber you can be just as sure of good results. The lead won't snap or the pencil break in two.

We couldn't make such good pencils if we didn't use cedar of straightest grain—if we didn't process the lead to make it tough. In one test a sharpened pencil was actually driven clean through one-half inch soft timber without breaking. That's proof it will stand hard work.

You can get one of these pencils absolutely free by filling out the attached coupon. Mail it to-day while you think of it.

"The Recollection of Quality Remains Long After the Price is Forgotten."

Trade Mark Registered. —E. C. SIMMONS.

E. C. SIMMONS KEEN KUTTER TRADE ST LOUIS MARK U.S.A.

If not at your dealer's, write us.

SIMMONS HARDWARE COMPANY (Inc.)

St. Louis and New York U. S. A.

(Coupon)

SIMMONS HDW. CO. (Div. A. C.) St. Louis, Mo.

Dear Sirs:

Please send me FREE, Charges Prepaid—1 E. C. Simmons Carpenter Pencil, as per your offer, with the understanding that I am under no obligation to buy.

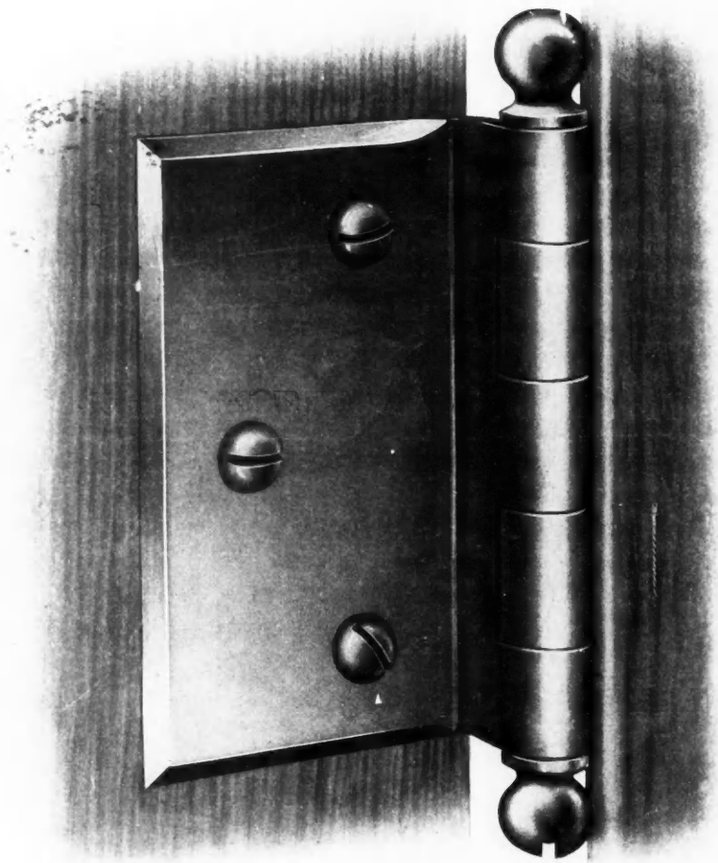
NAME . . . . . .

ADDRESS . . . . . .

. . . . . .

WE INITIATE — NEVER IMITATE

A REVOLUTION



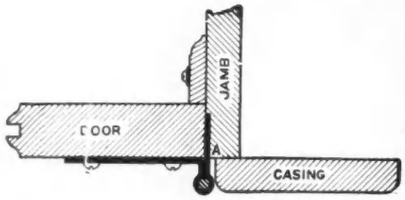
No. 450B

In building methods "NATIONAL" Ornamental or Half Surface Butts have made it possible for the contractor and carpenter to cut in half the labor of hanging doors. There is but one side to mortise, the ornamental leaf being screwed to the surface of the door.

The lower tip is threaded and screws into the butt. It is also slotted for a screw driver, making it easy to remove the tip and affords ready access to the pin.

Style No. 450B

here illustrated is a very popular design and can be furnished in all sizes from 1½" to 4" inclusive. These Butts are highly polished, have beveled edges and are double plated. They match the escutcheon plates with beveled edges.

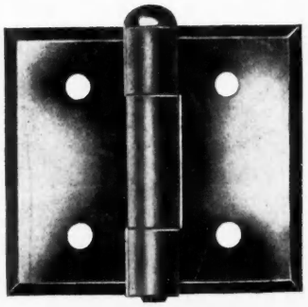


Ask for Booklet, "Ornamental Ideas," and give us your dealer's name.

Directions—Attach butt part "A" to jamb first, then set and wedge door into position and attach Ornamental Leaf to surface of the door. Simple, isn't it?

Trade Mark

Be sure to look for the flag—it's stamped on all "National" Butts—It stands for quality.



Surface Hinge

National Manufacturing Co., STERLING, ILLINOIS