AMERICAN CARPENTER AND BUILDER

SPECIAL CONCRETE NUMBER

Concrete Block House. See page 827

AMERICAN CARPENTER and BUILDER

The Largest, Best and Most Practical Trade Journal in the World for the Carpenter and Builder

American Carpenter and Builder

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Value of Conventions

NOW that some of the conventions are over and others are in progress it is a good idea to sum up the benefits and advantages derived from them. The primary object of having a convention is to get the members of any industry together and discuss subjects which are of common interest. Here the subjects are presented by men who are best qualified to do so and then followed by a general discussion which brings out many points which may have been overlooked. It broadens a man's mind to come in contact with men who although in the same business have altogether different ideas. The social feature of a convention is not to be disregarded. For some reason or other everybody at a convention gets more or less sociable and it gives you an opportunity of meeting and conversing with those of whom you have often heard but never seen. A convention is a place where business relations can be cemented more closely and gives you an opportunity of showing your associates in business that you are progressive and in the front rank. Everyone will find it to their interests, both from a business and personal standpoint, to attend the conventions, as it is here that he meets the most advanced men in his industry.

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Exchanging Information

INFORMATION, like currency, only obtains its full value through being put into circulation, but it differs from currency in that we can put it into circulation and still retain it. In other words, no man loses knowledge by giving information, and there is frequently a good chance to gain by a little exchange. This is especially applicable to carpenters and builders who in their line of work learn to do certain things in an original and time-saving way. It will not be a loss to you to let your fellow workers receive the benefit of your ingenuity and they in exchange will be pleased to give you the benefit of their knowledge along other lines. Our pages are open at all times to our readers to be used intelligently in the exchange of ideas. You have nothing to lose and everything to gain.

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Importance of Work

ONE of the most essential things on the road to success is work, and plenty of it. While it is a splendid and important thing for a man to have talent and training and good character, yet if he does not know how to work and have a love for work his talent, training and character will account for very litt'e. This applies very strongly to the carpenter and builder, for he may have the training and be skilled in his line, yet if he does not put that training to use and accomplish something it will be of little value to him. It is not what men can do or want to do, but what they accomplish.

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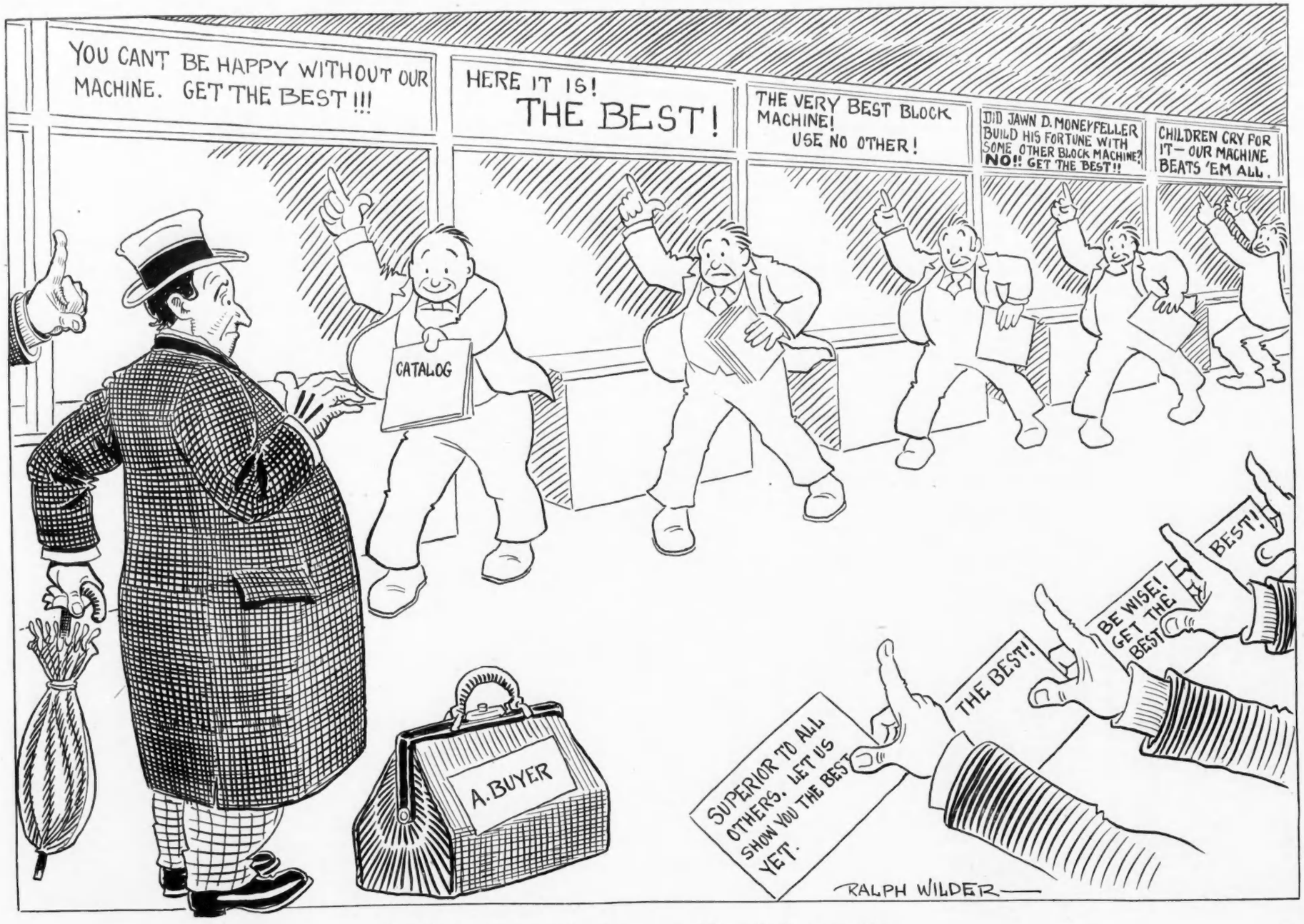
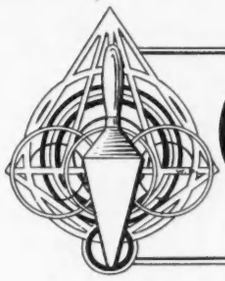
THERE is always one job that you should put off until to-morrow, and that is a job of spite work.



An Echo From the Cement Users' Convention



Cement Building Construction

FRED W. HAGLOCH

Monolithic Concrete Construction

WHAT IT REALLY IS AND HOW MADE—ADVANTAGES AND DISADVANTAGES OF MONOLITHIC WORK—WHERE USED WITH SATISFACTION

ALL concrete work constructed in one piece is known as monolithic, a wall built by planking up both sides and filling between same with concrete and when hard remove plank thus leaving entire wall a single block of concrete is the most common way of building monolithic work, but building floors, roofs and bridges are also monolithic construction.

The advantages of monolithic construction are the reinforcing or trussing with steel, and in ordinary work where no steel is used its advantages are practically limited to admitting the use of large stone as aggregates, thus in large work such as foundations, retaining walls, dams, etc., very large stone may be utilized.

In dwelling house construction it may be used for cellar walls, but in such instances its walls should be made hollow by means of cores. Several systems of building construction have made their appearance the past five years, some which have succeeded beyond the expectations of the architects and engineers.

The points of advantage in monolithic walls are that no expensive labor is employed and that concrete steel floors, beams, etc., may be united with it, but this is sometimes more detrimental than beneficial.

The disadvantages are the expanding of the planking or frame in tamping the concrete, causing an unsightly swell in the wall as well as a waste of material contained in the swell projecting beyond the true line of the wall.

The concrete filling the creases, knotholes and other deficiencies of the plank is another objection, but this can be overcome. The oldest concrete house built in the United States is of monolithic concrete. It was built on Staten Island, N. Y., in 1837, of natural cement concrete. Although badly weather worn and dilapidated, this house still stands and was inhabited by one or two families when the writer visited it in 1902. It must be remembered that this house was built of the imperfect natural cement made in those early years, and the aggregates used were not carefully selected, but portions were composed of brickbats, irregular and rather large sized broken stone, etc., therefore the dilapidation shown. In front of the house at the gateway lie two cast concrete lions, one badly cracked and crumbling, the other yet in fair condition after many decades of weathering.

A class of work where monolithic concrete proves the most satisfactory is basins, troughs and reservoirs, but much care is required, as such work must be made water and frost proof, for a cement may be frost proof and concrete made with it may not be, which is better understood by the following: Two years ago a basin sixteen feet in diameter, five feet deep, was made of concrete twelve inches thick at the top (rim) and eighteen inches thick at the bottom, the outside and the entire inside was coated with cement plaster. The following winter one entire side gave way, which was supposed to be caused by expansion of the main body of water by freezing, but as the concrete crumbled in thawing weather, the theory of expansion of the body of water would not solve the solution, and a close inspection revealed the fact that water slowly filtered through the plaster and was absorbed by the concrete, which was very porous for want of tamping, as openings of several cubic inches each were frequently found, which expanded in low temperature and broke the entire mass into small bits. This real illustration is given to enable the reader to realize the necessity of reducing the voids in concrete especially so in basins and reservoir work.

Voids may be reduced in various ways and in such work every method should be employed, namely, using various sized grains of sand and aggregates as explained in a former article, mixing the composition slightly damper than for dry tamped work and by persistent hard tamping after placing same in position and taking special care not to jar or disturb same when completed until thoroughly hardened.

The waterproofing for such work being given in our articles on that subject, need not be repeated here.

The plastering should be done before concrete has set, but should this be impossible, thoroughly moisten the surface before applying the plaster, which should be done with a plasterer's trowel and a float.

Should there be objections to the troweled surface, same should be covered with a composition of one part cement and three parts sand, mixed dry and dropped onto the plaster before it has set either by sifting through a screen or with a dry whisk broom. This will leave a sand surface, but much practice is required to make it uniform.

For a rough coat plaster surface, mix one part ce-

ment, two parts sand and four parts broken stone of one-half to one-inch mesh and add sufficient water to make thin mortar, and apply with a mason's trowel by taking a small amount at a time, which must be applied with a swinging force, never allowing the trowel to strike the surface.

This will produce the rustic appearance often desired on the rim of a lawn basin and around the fountain.

Preventing Injury by Freezing

To the Editor: Newark, N. J.

Will you kindly give me some hints on the manufacture of cement blocks; how to make it in freezing weather; what will keep it from freezing and how long it should be kept indoors? N. J. SURGES.

Answer: One pound table salt per five gallons of water will in a measure prevent injury to cement setting in low temperature. A small amount of potash will cause cement to set and harden in less than half the time usually required. Cement should not freeze for three to four days after setting, and if both potash and salt is used this time is reduced to twenty-four hours. Salt somewhat discolors concrete and potash will disintegrate the work if used to excess, and as I avoid it entirely I cannot give the exact proportion that could be used without danger. Different cements require different proportions of material. Hence to prevent injury from freezing is a problem largely to be learned by testing with the materials used.

Cement Brick for Chimneys

To the Editor: Sandstone, Minn.

Is cement brick as good as common brick for chimneys? T. R. MCCORMIC.

Answer: Concrete blocks and cement brick make very desirable chimneys, and carefully carrying out the following rules will result in giving entire satisfaction.

Concrete being fireproof to the extent of its raw material we find that sand usually endures more heat than cement, hence the cement is the lowest, therefore select a high-burned cement which is no less than 1,200 degrees, which will make a chimney safe at that point, but it may discolor at 800 degrees without injury.

For wood and soft coal fires any Portland cement is acceptable; for hard coal and coke select your cement and omit gravel, limestone or soft sandstone. Then plaster the inside of the chimney with a mortar made of one part cement to three parts sand mixed with strong salt water.

For natural gas fires concrete has proved a failure, but I have tests now which I believe will prove successful and hope to report same in February issue.

Metal Lath for Building

To the Editor: Vacaville, Cal.

What kind of metal lath is the best for the outside of a building? In plastering with cement mortar what proportions do you use and how put on? H. D. EDDY.

Answer: Concrete steel exterior walls built to wood or iron framing can be accomplished in various ways, viz.: Expanded metal of three-quarter inch mesh fastened to studding sixteen-inch centers is superior to any other, as this metal has sufficient openings to allow the cement mortar to pass through and cover the inside of the metal, thus protecting it. The usual sheet metal lath with protruding cups and opening cannot be covered on both sides by plastering on one side, hence are not recommended for outside walls, as dampness will soon rust the metal sheet. Another satisfactory method is to cover the outside of the building with sheathing and placing plaster lath vertically about one foot apart. On this fasten wire poultry netting of three-quarter-inch mesh made of No. 12 to No. 16 wire, and plaster with cement mortar. This will require less material than the method previously described. The composition of such work is governed largely by the finish desired. For smooth surface take one part Portland cement and three parts sand; and for a rough surface one part Portland cement, two parts sand and two parts fine gravel. The latter will prove the more durable of the two.

Building a Cement Cistern

To the Editor: Petaluma, Cal.

Will you kindly answer these questions for me? Would it be practical to cement the walls of a cistern without first lining them with brick? How much and what proportion of cement should be used for a cistern seven feet in diameter and eight feet in depth? R. FLUTH.

Answer: Where the soil contains sufficient clay or other solid matter to prevent caving in during excavating it is useless to wall up with brick. Make concrete of one part cement and three parts sharp sand, mix dry and add sufficient water to make a stiff mortar. Apply about one-half inch thick and follow immediately with a second coat one-fourth inch thick, then give a skim coat made of equal parts cement and sand. Keep moist for a week, but do not fill with water until ten or twelve days old. Cisterns built in this manner are usually made egg shaped, with the use of false work for crowning (drawing in) the top, in which case the skim coat cannot be added. The concrete in egg-shaped cisterns should be two inches thick in the bottom, three-quarters of an inch on the side and three inches thick at the crown, and if under driveway the crown should be reinforced with one-inch mesh wire poultry netting.

Hollow Brick for Interior Lining

To the Editor: Woodstock, Ill.

Will a four-inch hollow brick lining in a twelve-inch wall overcome the necessity of furring and insure a dry plaster wall in a room left without heat sometimes for days in the winter? F. H. OPFERGELT.

Answer: Hollow brick for interior lining for brick walls is extensively used, and in a measure prevents the penetration of both frost and moisture; but in rooms without heat they receive the severest test possible, and I give the following example: A seventeen-inch brick wall, including hollow brick interior lin-

ing, built in this city (Cleveland, Ohio,) has successfully resisted the outside elements except where the mortar joints were unusually thick. Here dampness and frost were noticeable, as dampness will penetrate two feet of mortar and frost follows dampness; hence severe dry winters are less injurious than mild damp winters. To insure dry plaster in brick buildings, whether heated or not, choose one of the following methods. Break your mortar joints from outside to inside, thus insuring a complete air space; or, waterproof the exterior surface of the wall; or, use furring, as you suggest.

Sand Lime Brick

To the Editor: Crestline, Ohio.

I wish to know how long lime mortar takes to set if used to lay common sand mold brick. This brick was laid in the fall during very wet weather. What is your opinion of brick made of lime and sand? WM. SCHAAF.

Answer: Mortar made of one part well burned and properly slacked lime to two parts sharp clean sand will harden in two to six days in dry weather and in ten to fourteen days in wet or damp places, which would be about the same conditions as you mention. A mortar made of one part Portland cement, one part lime paste and six parts sand will make a smooth working mortar that will set in one day and become more durable at less cost. Sand lime brick is meeting with splendid success in our southern states and some are becoming popular in the north. But like everything else used in building it must be well made of proper materials to become a staple building article, and whether this can be done with lime is a question we are unable to answer.

Cause of Hair Cracks in Concrete

To the Editor: Peotone, Ill.

Please let me know what is the cause of hair cracks forming on the face of concrete blocks that are made by the pouring process and molded in sand. Is there any way of preventing it? My proportions are one part cement and four parts crushed limestone. C. H. CARTER.

Answer: Limestone expands upon receiving moisture and contracts in drying, thus causing hair cracks, which in several years' exposure enlarge into large openings and the stone crumbles. The practical examples of this folly are numerous. Your limestone is unfit, and the following test will convince you: Tamp a quart jar full of finely crushed limestone in the dry state, then add water, and if the jar does not break by the expansion the crushed stone will rise above the top to the extent of the expansiveness of the stone, which will be from one-eighth to three-quarters of an inch. Substitute a light lamp chimney for the jar, and if the stone is finely ground and closely packed it will burst when about twenty per cent of water has been added.

Cost of Concrete Blocks and Brick

To the Editor: Southern Pines, N. C.

I wish to know the comparative cost of a building built of concrete blocks or monolithic concrete and one built of brick that cost sixteen dollars per thousand laid in the wall. Good Portland cement will cost about three dollars per barrel, sand about seventy-five cents per yard, and crushed stone will have to be shipped in. H. E. CARPENTER.

Answer: The comparative cost of a building built either of brick, concrete blocks or monolithic concrete (molded in forms) varies as to cost of material and labor as follows: Brick at sixteen dollars per thousand laid in the wall. Concrete blocks will cost thirteen dollars and eighty cents for same space, with cement at three dollars per barrel and mason wages same as bricklayers, while monolithic concrete would cost only eleven dollars to fill the same amount of space. But monolithic construction undertaken by a novice is likely to result in uneven and bulging walls, besides requiring a cement (stucco) plaster on the exterior for finishing, thus costing about the same as hollow concrete blocks. Should the monolithic finish be desired I recommend building with plain blocks and coating the exterior with cement plaster. This would be slightly cheaper than brick and make a most satisfactory wall. Should you build monolithic walls do not pour the concrete into the molds, but make it of the same dampness as you would for concrete blocks and tamp hard. This when kept moist for six or eight days will make stronger walls and can be finished at less expense.

Hollow Cement Block or Solid Concrete Wall

To the Editor: Paonia, Colo.

Which would you advise, as being best and cheapest, the hollow cement block or the solid concrete wall for a warehouse thirty by seventy feet, one story with basement? Basement seven feet and first story ten. As yet the cement block has not been used here, and as I have had no experience in cement work any information will be gladly received.

C. D. SMITH.

Answer: Buildings for storage purposes should be built of hollow walls, and the hollow concrete block is best. It will cost less and be more satisfactory. It is true that in concrete (monolithic) wall construction large gravel or stone can be used, but to no greater per cent than the air space of a hollow block wall. Besides the air space will retard dampness and frost.

Waterproofing Concrete

To the Editor: Cincinnati, Ohio.

I have been doing a little experimenting and have found that a solution of paraffin and naphtha turns the water, but I would like to know if such solution would in anyway injure the concrete and if it makes a permanent waterproofing? CHRISTIAN MILLER.

Answer: Paraffin and naptha is not injurious to concrete after same has hardened. It is a very good waterproofing, but is not permanent, as it remains so near the exposed surface that the weather will remove it in three to five years. In recent issues of the AMERICAN CARPENTER AND BUILDER we have given the soap and alum formula, which is cheaper and more durable than the above.

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Even the wise saws no longer seem to cut much ice.

Hollow Concrete Block Construction

CEMENT USED AGES AGO AS A BINDING ELEMENT—HOLLOW CONCRETE BLOCKS NOT RECOGNIZED UNTIL RECENTLY AS BUILDING MATERIAL—QUALITIES THAT BLOCKS SHOULD POSSESS

By Harmon S. Palmer

THERE is no subject more interesting to the creative mind, especially in the line of building construction, than that of cement. I think those who have been accustomed for years in working with the three principal materials which constitute nine-tenths of the building structures of the world, brick, stone and wood, will agree with me that the advent of Portland cement opened up one of the grandest fields for the progressive man within the history of the world. As he scanned the great blue arched dome of possibilities, his bosom swelled with that satisfaction which is known only to the true inventor; it seemed to him that truly the foundation of building construction had been discovered, on which the beauty, strength and durability of the country could rest; the only requisite being proper application of methods and tools and correct construction. To the ambitious and enthusiastic builder, there was never a brighter spot in his life than when he was absolutely convinced that stone could be made, which neither freezing and thawing, fire and water could destroy. These indispensable virtues were also equaled by one other, and that was in the manufacture of this stone; it could be moulded to any form in which stone could be cut and that shape for shape and volume for volume was much less in cost.

If in the life of a few generations these essential elements of cement stone had to be proven, no practical man would have ever been free from doubts and fears; but fortunately thousands of years ago many great works and costly structures were wrought with cement as the binding element which are standing today, and although crude as compared with our more modern construction, are positive proof of the durability of properly manufactured stone. Probably these ancient workmen never realized to what perfection their crude methods could be carried, and it is only of late years that science and invention, coupled with higher civilization of our race, have united their efforts to attain the highest standard in the production of manufactured stone, and they are justified in the expectation of increasing excellence. The history of its growth would be the history of its uses, but from the time it was used in such structures as the Pantheon of Rome to the time it was rediscovered by Joseph Aspden, an Englishman, about the year 1825, its history can be secured only by inspection of such works as remain to the present day and found in various locations and erected at various periods of time.

Taking these as evidence of the durability, modern builders begin with the above date and proceed with caution, precision and unbounded faith to plan and execute such structures as will be architectural monuments and the pride of future generations.

As stated above, the modern use of Portland cement begins with the accredited discovery by Joseph Aspden, a practical brick maker in England, whose accidental discovery would be very interesting reading, but space in this article forbids. A reference to many uses to which this cement can be applied in the arts could also be mentioned, but one of the most valuable is in the manufacture of the hollow building block, and to which this article is strictly confined. It is needless to elaborate on the advantages of these blocks or the superiority of buildings constructed with them, provided they are properly made; but the infinite variety of ways and methods which have appeared within the last three years by which they could be used and manufactured presents one of the most complicated problems which has ever occurred in the building world for the average man to solve.

In view of the fact that it would not be fair to take advantage of this opportunity to force my opinions and convictions upon the readers of your journal, I can only give such general ideas as are common to nearly all the different methods in use at the present time from which deductions can be made by each individual; although it is generally conceded that practically all of them are repetitions of the first fundamental principle, differing only in minor details.

The use of hollow block is possible by reason of the great strength of Portland cement, which does not require a stone made from it to be solid in any but certain portions of a building; these portions, of course, being under the bearings of floor joist, roof joist, and especially trussed roofs of large span, which in many cases require pilasters, depending upon the weight to be carried. These are also constructed of the hollow block, but where additional strength is desired they can be filled with concrete of such proportions as the work demands. The first patent on hollow blocks that ever attracted attention was in the year 1901; no mention can be found in print of any extended use of this form of construction prior to this date and any reference to this form of block only relates to isolated cases, in which some person had conceived the idea and failed to complete it. Even if a house had been made with them, its cost and construction was such that the builder did not care to repeat the experiment. Not only is this a fact in this country, but it is so in the old country. The writer spent four months traveling in England, France, Germany and Belgium, with the special view of ascertaining the fact as to hollow block construction and not one house was found of these blocks, and but very few people had ever heard of one, and although chimneys had been constructed of them, they were made in crude hand box molds. The old patents on

concrete blocks sometimes referred to are often on solid blocks or some impracticable Z shaped block with self-binding forms, but in whatever form, they were never introduced, although the incomplete idea may have been discovered more than fifty years ago and experimental buildings erected. The hollow concrete block was never recognized as a building material until after the year 1901 and no machine whatever of any value previous to the year 1899.

Here then is the dawn of the hollow block era, made practical by employing the material in a semi-plastic condition in which state a machine could not only turn them out in great quantities at low cost, but also with the desired cavities. During the ten years previous to 1901, the total number of hollow block houses erected in the United States was only seven and their combined value was less than twenty thousand dollars, and not more than one-half the hollow blocks of which they were constructed were machine-made blocks, the balance being required for closures and special places which the crude machine could not make. These were made with hand or box molds, the same as had been employed from time to time in previous experiments. The above statements are true and are the first authentic statements ever made regarding the launching of the industry. From the year 1901 its growth has been phenomenal almost beyond precedent and from one factory of hollow block using two machines at that time there has grown in the last four and one-half years 2,386 firms and individuals who are engaged more or less in the industry, with an estimated capital of more than ten millions of dollars. Could any industry that was new and untried attain such proportions without unbounded merit?

It is not to be wondered at that with the great rush to be first in the field many have made colossal failures, while others with no more favorable conditions have made money and in some cases fortunes simply by manufacturing blocks and contracting to erect buildings. It must be admitted that in these cases the individuals were adapted to the business by nature and experience. It is not the man who begins with the inquiry "what cement to use" or who gives only dessertations on the quality of artificial stone and its manufacture, or simply describes some machine for making blocks, that will very soon be in the class referred to. It is a long step from this stage of the game to a contractor who understands the co-operation of his machine and the building plans, or the architect who understands the possibilities of the machine which is to make the blocks for his plans and who realizes that each should co-operate with the other so that satisfaction can be given to the customer. This means building a house that will not crack, one of maximum strength with a minimum amount of cement, one that will hold its color, that will not absorb moisture, one that will be pleasing to the architect as well as the layman, one that is a credit to the industry and up to the possibilities of the system by following each successive step in an economical and practical manner. Even a man who can do all this has his troubles and many of them; but still men must be educated and learn what cement to use and how to use it, which will be taken up more in detail later on.

We might mention here that only Portland cement can make good and lasting blocks, and the manufacturer need have no fear of the cement found in the market with this brand. Too much stress is often put upon the technicalities of testing, and the block maker can safely rely on the cement makers in this respect. There is also much needless advice in regard to curing the blocks, especially such as refer to covering them with straw, hay, and refuse of yards and sprinkling them every two hours. Such methods, while it might add a trifle to the strength of the stone, no uniform color can be obtained which is of more importance than the strength, especially when the strength is sufficient. The proportion of water to secure the greatest strength is a very simple proposition; the semi-wet process is the only one which is adapted to hollow block construction and the machine which will mold them and allow them to be removed at once is the only one that is of any value. It is impossible to remove a block from the machine at once if there is too much water, because it will stick to the sides when the machine is opened; the suction of the sides will pull it out of shape and it will settle out of shape by standing; therefore, the criterion by which to be governed is to use all the water possible and allow the block to be removed without sticking or settling after removal. More water would be advisable, but color and removal are necessities, and if more strength is required more cement must be added.

In the foregoing remarks I have only referred to the beginning of the industry and the foundation on which it rests; I have shown that at least one method of manufacture and one principle of machine have become recognized as a revolution in building methods, but the variations from the original and basic principle I have not touched upon. Even in this there remains a vast sea which must be explored for the best general results, which can be divided into numerous sections, each of which has its divisions and subdivisions.

The question will arise, "Why was the hollow block not used long ago, if it was thought of"? "Why was it?" They had cement fifty years ago, both good and cheap; they realized the value of these houses, the very first conception was sufficient for an intelligent man; but one difficulty was to break away from long and constant practice and to surmount others which the builders encountered. It can be stated here that the average person who has saved enough money with which to build a home is not anxious to experiment with untried methods.

Residences

Well Planned Concrete Houses

PERSPECTIVE AND PLANS OF FOUR CONCRETE RESIDENCES, SHOWING THE POSSIBILITIES OF CONCRETE—DESIRABLE FEATURES AND ADVANTAGES OF EACH CAREFULLY EXPLAINED

ON PAGE 821 we illustrate a cottage designed for a small corner lot having a 50-foot frontage to the west and a 125-foot frontage to the south. The exterior treatment of this house is of the Spanish Mission style, which is now becoming very popular on account of its graceful outlines, simplicity and economical construction.

The basement walls are of concrete construction up to above the grade line where the frame walls start, constructed of 2 by 4 studding sheathed and papered

FRONT ELEVATION

on the outside, and then from the grade up to the first story window sills the exterior walls are finished with wide boards lapped one inch and stained with creosote stain. The walls above the window sill belt are rough cast cement on wood lath.

The first story consists of the hall, living room, dining room, kitchen and pantry. The hall contains the stairway which is of a plain and neat design of the Mission style and constructed out of weathered oak. There is a doorway from the hall to the kitchen and an archway to the living room, which is spacious and has large windows facing the west and south; the west window being shaded by the porch and the south being exposed to the sun. This makes this room very pleasant all seasons of the year. The dining room is entered from the sitting room through large sliding doors and this room also has a large window to the south, which is the preferable light for a dining room, and small leaded glass windows to the east. The side-

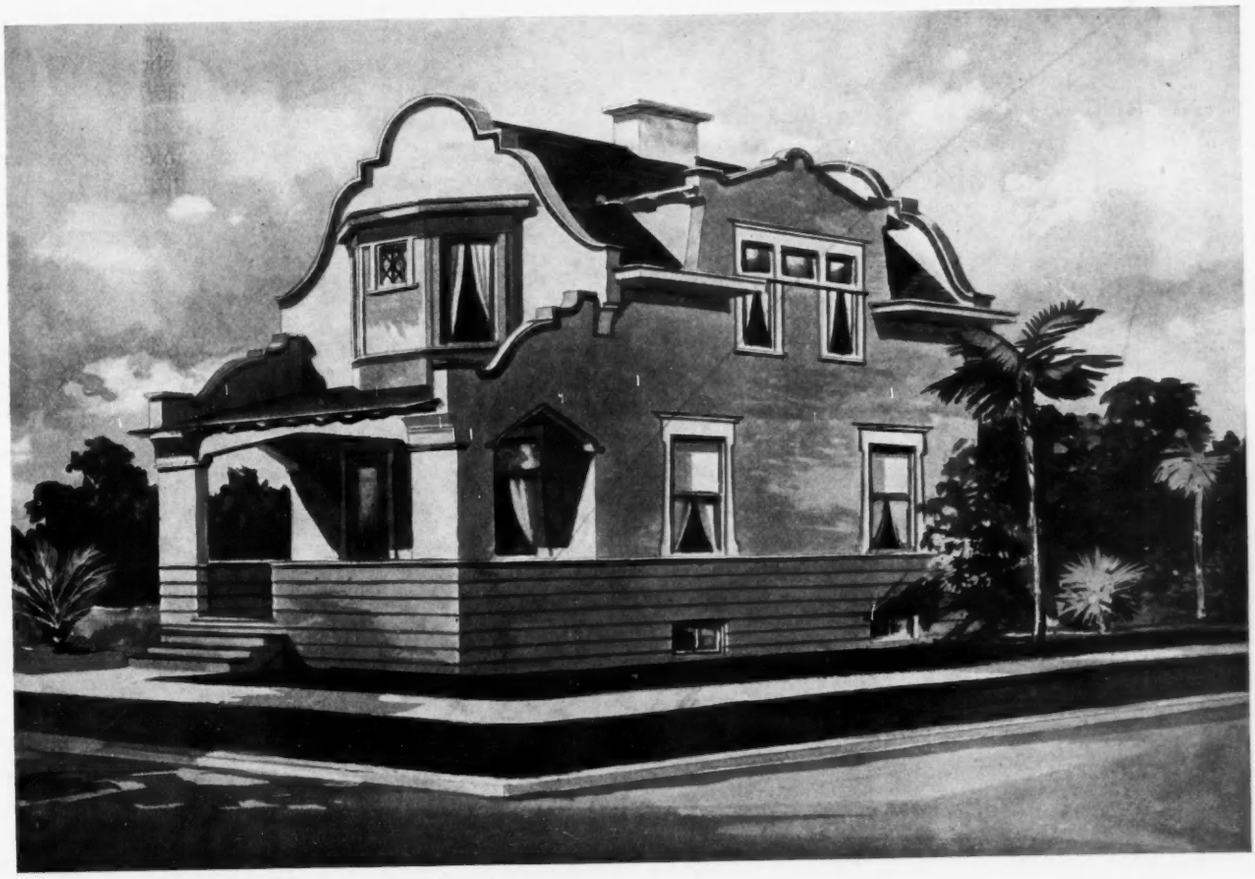
RIGHT SIDE ELEVATION

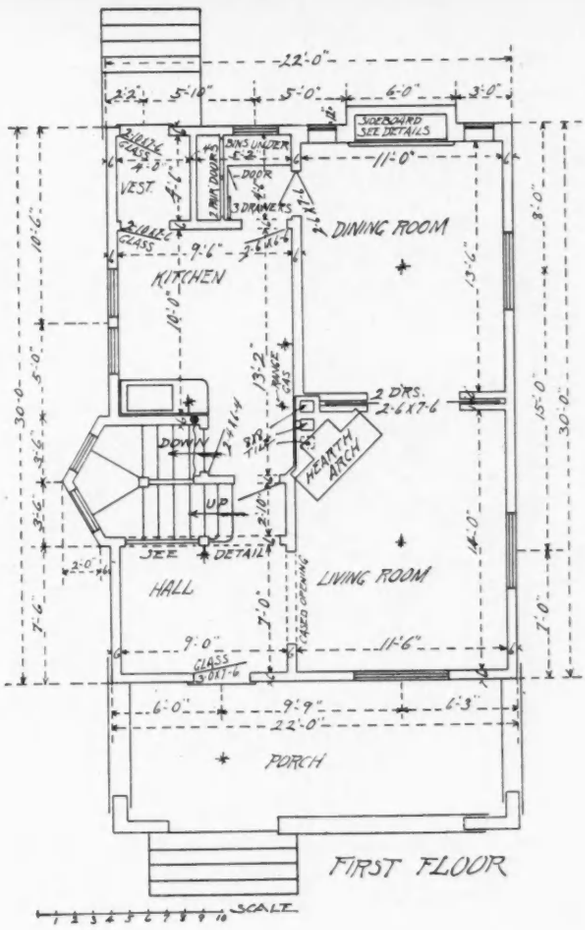
board is built into the east wall thus making the view from the living room into the dining room very pleasing and effective. The kitchen in this house has been very carefully studied for convenience, light and ventilation. The pantry contains bins, shelves, drawers and a cupboard with glass doors and adjustable shelves. The kitchen is entered from the outside through a vestibule which contains the refrigerator.

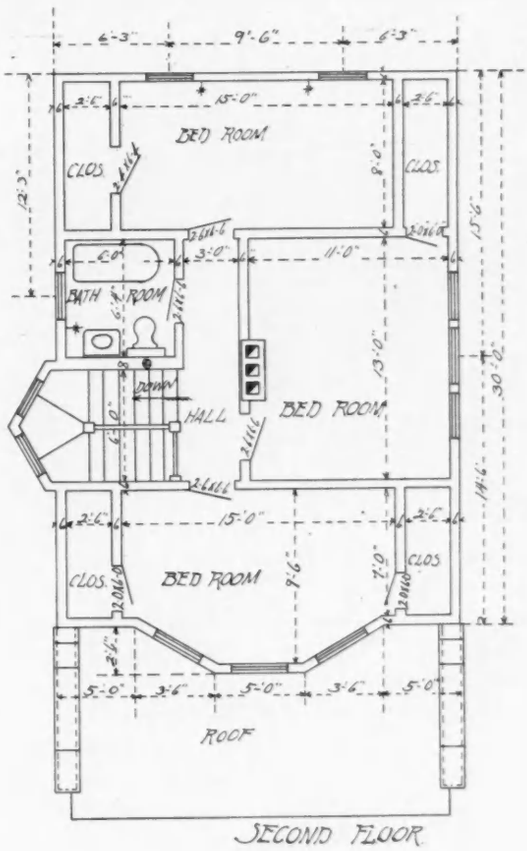
The second story consists of three bedrooms, bath

LEFT SIDE ELEVATION

room, hall and four large closets. The arrangement of this story is very good and not a square foot of room has been wasted. The doors and windows in all rooms have been located with reference to the best locations for furniture. The front porch is built




22'-0"
SIDEBOARD SEE DETAILS
11'-0"
DINING ROOM
KITCHEN
VEST.
DOOR
3 DRAWERS
2 DRS.
2'-6"X7'-6"
HEARTH
ARCH
DOWN
UP
SEE DETAIL
HALL
LIVING ROOM
PORCH
FIRST FLOOR
SCALE


9'-6"
BED ROOM
CLOS.
BATH ROOM
DOWN
HALL
BED ROOM
BED ROOM
CLOS.
ROOF
SECOND FLOOR

for service as well as looks, and the projecting cornice will give shelter against rain and the hot afternoon sun.

A Country Home

The house shown on page 823 is the country home of Captain A. Ackerman at Twin Lakes, Wisconsin, and was constructed of hollow concrete blocks. The view of the house here shown is from the lake and brings out its location and beautiful surroundings. The sand used for making the concrete blocks was taken from the basement of the house. The blocks are eight by eight by sixteen. The house is finished on the inside with Georgia pine and all the floors are of hardwood. There is a shingle roof on the house and the gables are of cement. There is a good arrangement of the rooms throughout the house, there being a living room, dining room, kitchen and den on the first floor, and four bedrooms and a bath room on the second. There are large fireplaces in both living and dining rooms, which add greatly to the appearance and comfort of the house.

From the porch which surrounds the front of the house a view of the entire lake can be had. The entire house is artistically built and shows the architectural possibilities of concrete blocks.

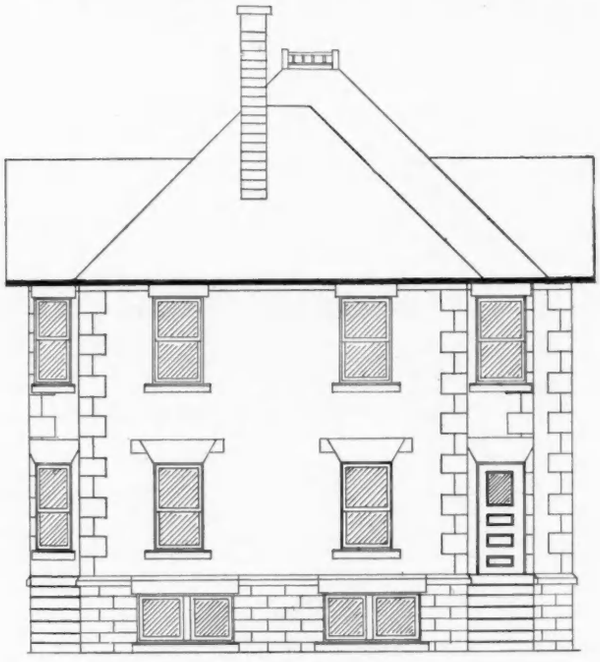
Concrete Dwelling House

Concrete block houses are acceptable in preference to brick or stone for comfort and durability but are often objected to for their appearance simply for the fact that all blocks are of one size and mold, which has been entirely overcome in the plan here illustrated.

This building was designed to comfortably house two families and is now being erected in the heart of the city of Cleveland, Ohio, by F. W. Hagloch, near the public square, and it is the first attempt of producing a broken ashler wall with hollow blocks. These blocks are made on any large block machine by the use of inserts and special face molds, or with two small machines which require less inserts and special patterns. Inserts are usually made of wood to fill

Country Home at Twin Lakes

Front Elevation



Rear Elevation


PORCH
VESTIB.
DINING ROOM
15-10 X 18-6
PANTRY
KITCHEN
12 X 16-3
DEN
10 X 10-6
LIVING ROOM
15 X 26
VESTIBULE
PORCH
BED ROOM
14-4 X 16-3
BATH RM
7 X 11-6
BED ROOM
12 X 16-3
CLOS.
CLOS.
CLOS.
CLOS.
HALL
BED ROOM
16 X 20
BED ROOM
11 X 12-6

surplus space of the mold in making blocks of less dimensions then the full sized block made on the machine. Some machines are adjustable but in broken ashler there are always some sizes required that cannot be met with the largest possible range of adjustments.

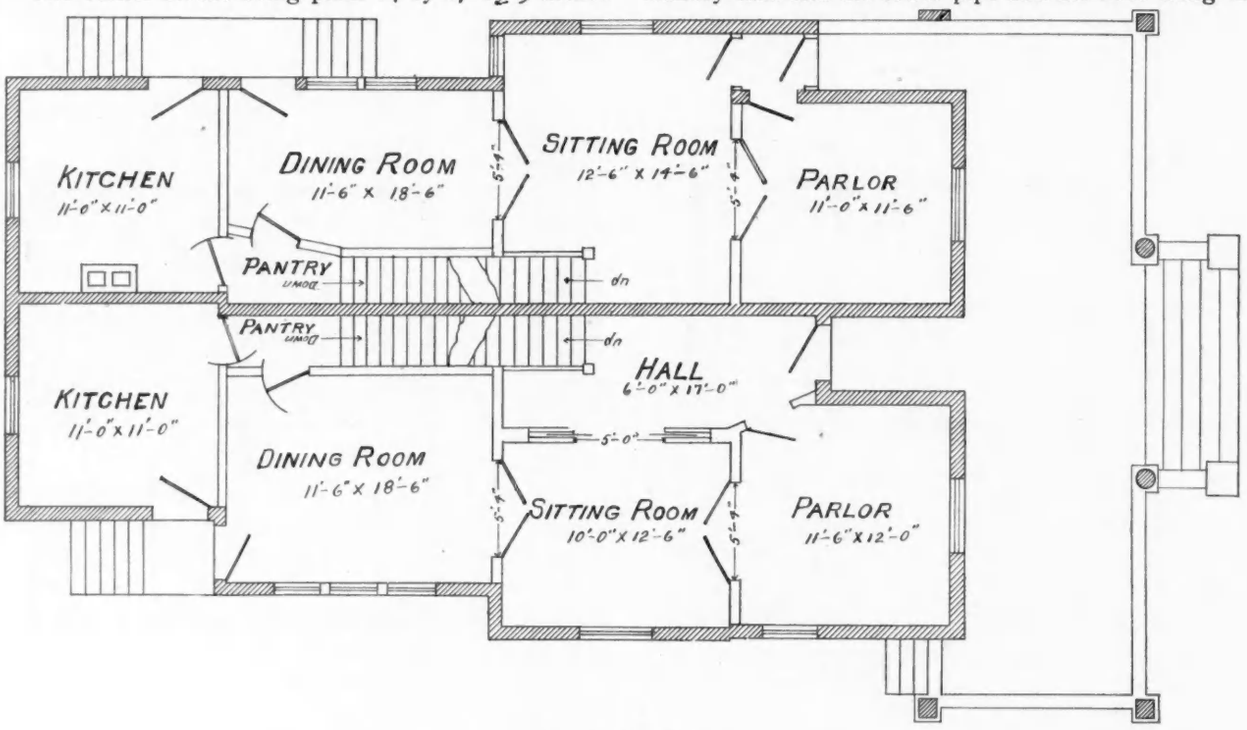
The corner blocks being plain 14 by 17 by 9 inches are made in wood molds as well as the lintels, sills, steps, water table and porch trimmings, except the spindles and carved work which is made in plaster molds.

The porch and balcony floors are concrete-steel and made in position, the round columns on either side of the front entrance are of polished artificial granite.

The roof is of reinforced concrete shingles, the laundry tubs and the sewer pipe and the floor tiling in the halls and bath rooms are of reinforced concrete.

The plaster is applied direct to the concrete blocks

Left Side Elevation

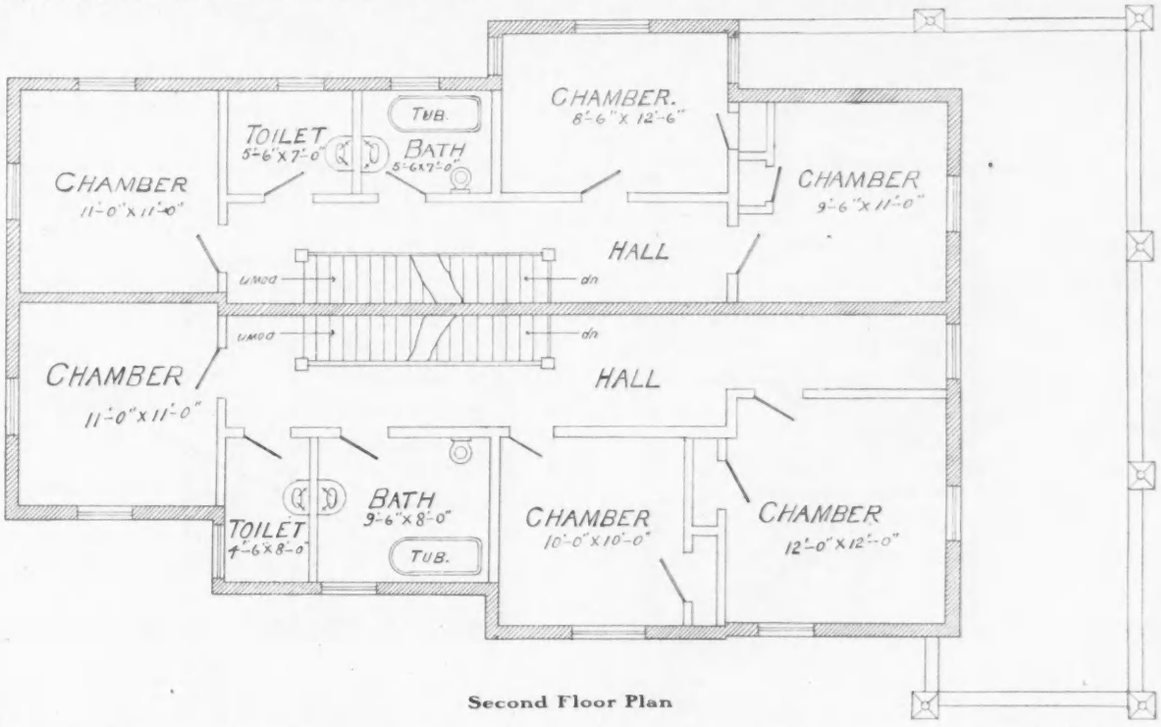


First Floor Plan

and the rock face exterior is waterproofed with a transparent filler, and the plain with an imitation of light clouded marble, thus making the entire exterior waterproof.

Right Side Elevation

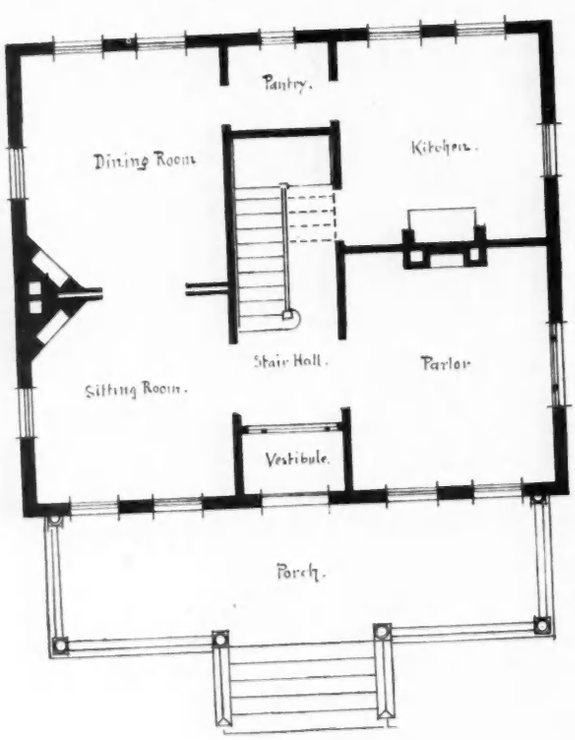
The total cost when completed will be about $7,000 while in natural materials it would be more than double that amount and would not equal it in durability and appearance.

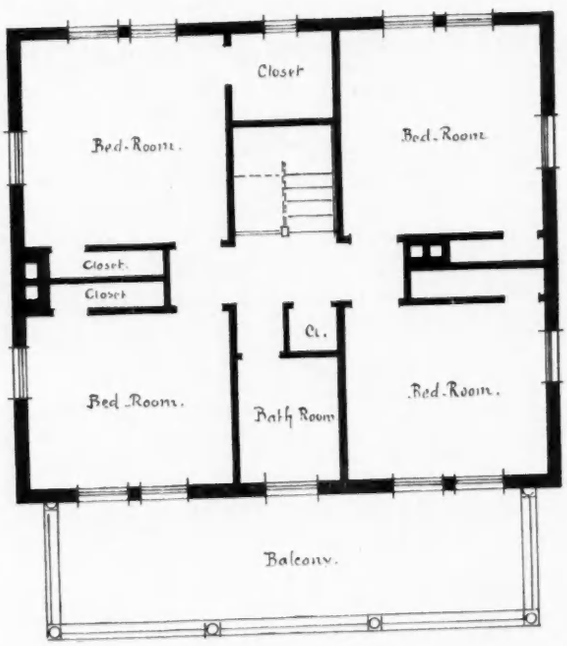


Second Floor Plan

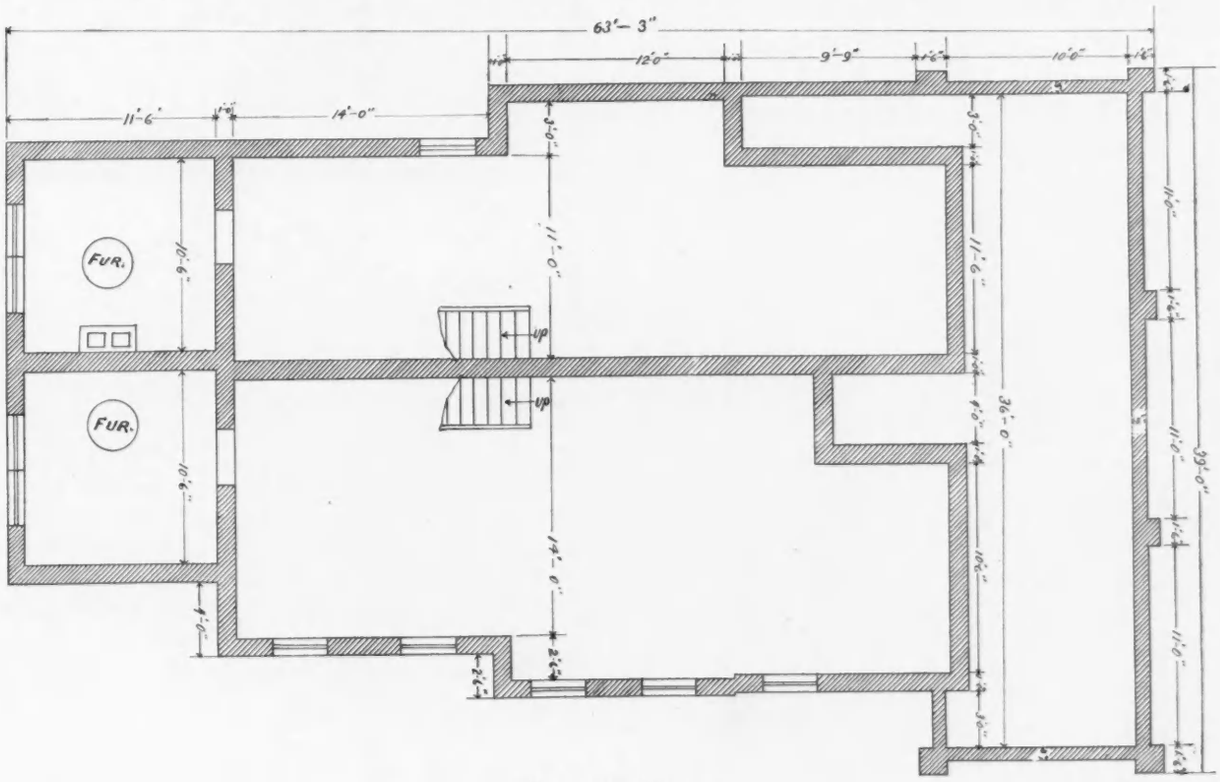
Reinforced Concrete Block House

The design of a hollow concrete block house shown on page 826 is a very substantial building and shows the possibilities to which concrete blocks can be put. The blocks with which it is constructed are reinforced with steel wire or rods. One feature to be considered with regard to these concrete houses is that they do not need to be plastered. All that is necessary is a thin white coat. They are warm in winter and cool in summer and sanitary in every respect. No expense is necessary for repairs and they will last for ages. These hollow blocks can also be used for foundations, basements and even first stories of frame buildings. The arrangement of the floors in this design is a very


Pantry.
Dining Room
Kitchen.
Stair Hall.
Parlor
Sitting Room.
Vestibule.
Porch.


Closet
Bed. Room.
Bed. Room
Closet.
Closet
Cl.
Bed. Room.
Bath Room
Bed. Room.
Balcony.

commendable feature as all the available space is used to the best advantage. The first floor is divided into the parlor, sitting room, dining room and kitchen. The sitting room and parlor are connected by the large stair hall making one large room if desired. Between the dining room and kitchen is the pantry, which is a very convenient location. The second floor is divided into four bedrooms and the bath room. The bedrooms all have large, commodious clothes closets and all



Basement Plan

open directly into the hallway. The design was kindly loaned us by the National Hollow Concrete Machine Company.

Concrete Block House

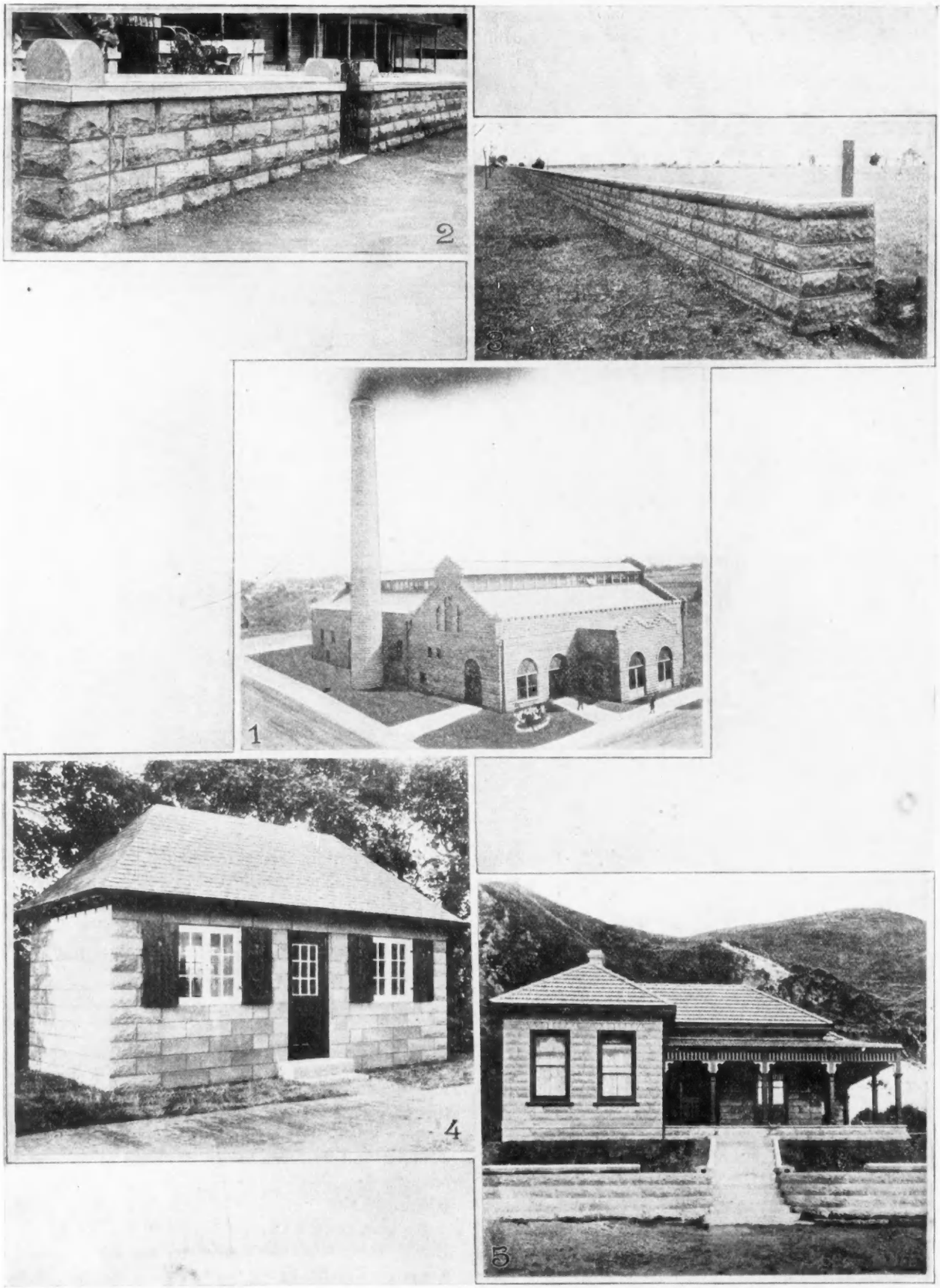
The residence shown on our cover page is a good example of what effect can be produced with concrete blocks. It was one of the neatest designs among the hundreds exhibited at the recent cement users convention. We expect to publish the complete plans of the same at some later date. This photograph was kindly loaned us by the Automatic Building Block Machine Co.

Sandstone Bricks

Probably the oldest artificial building material in the world, bricks, have never lost their value or importance and are still being improved. This applies not only to methods for producing them, but to distinct and sharp departures from the clay that was formerly exclusively employed. Quite recently there has been established in British Columbia a factory for the manufacture of artificial sandstone bricks for building purposes, after a German invention which is now being exploited. In this new process sand and quicklime are mixed together in certain proportions, the latter hydrated in a mold in which a vacuum is produced, and as there is no space for expansion of the lime of hydration, the compression of the material follows. After this preliminary process is completed the bricks are further compressed in high-pressure stamps and then passed into steam boilers, in which a constant current of steam is maintained for some ten hours. This causes a chemical combination of sand and lime and produces hydrosilicate of lime. The lime acts as a binding material or cement, uniting the particles of sand together and producing a brick of exceeding hardness and practically impervious to moisture.

Reinforced Concrete

A material much cheaper than brick and terra cotta and rapidly becoming as cheap as wood; a material that is absolutely fire and rain proof, yet that lends itself to artistic treatment as the clay in the hands of a sculptor, is bound to have its way, despite the disturbance it may occasion to some of the trades. The bricklayers will find it impossible to stay the course of what is far from being a "fad." They will have to learn the new trade. Construction in reinforced concrete is primarily a rather nice job for carpenters, than one for the architect-engineer, who adjust the iron skeleton, and last for the mason who fills the forms. As between carpenter and mason the carpenter has the more important work.



Interesting Concrete Block Construction

1. Water Works at Charlotte, N.C. Chimney 100 Feet High.
2. Retaining Wall.
3. Fence One Quarter Mile in Length at Wahoo, Neb.
4. First Concrete Block House in England.
5. First Concrete Block House In New Zealand.

Nos. 1, 2, 4 and 5 loaned by Harmon S. Palmer, Hollow Concrete Building Block Co., Washington, D. C., No. 3 by Cement Machinery Manufacturing Co., Burlington, Iowa.

Cement Users' Conventions

TWO GATHERINGS, ONE AT MILWAUKEE AND ONE AT MINNEAPOLIS, WHERE GREAT AND UNUSUAL INTEREST IS SHOWN—IMPORANT QUESTIONS ABLY DISCUSSED

TWO important conventions of cement users were held last month, each remarkable for the great interest shown in all branches of the industry. Both gatherings were strictly business from beginning to end, morning, afternoon and evening sessions being held, and every meeting fully attended. It was necessary to curtail rather than urge discussion, as everyone was either anxious to ask questions or tell the results of his experience.

At neither city was there sufficient room for exhibits of machinery pertaining to the industry. At Milwaukee three or more buildings were used and even the public streets had to be utilized. This is to be regretted, as the cement user was particularly anxious to learn the merits of the different machines on the market, and it was important that he should have had the opportunity.

The meetings demonstrated the rapid growth of the industry and its possibilities. One cement dealer estimated that the amount of Portland cement used in 1905 exceeded that used in 1904 by 50 per cent, and that the ratio of increase in 1906 over 1905 would be even greater.

Richard L. Humphrey
PRESIDENT NATIONAL ASSOCIATION OF CEMENT USERS

Milwaukee Convention

The second annual convention of the National Association of Cement Users met in Milwaukee, Wis., January 9, 10, 11, 12. Owing to the loss by fire of the Exposition building the convention was held in the West Side Turner Hall. This was found to be inadequate to hold all displays and some were transferred to the Frei Gemeinde Hall, one block away. Considering the difficulties which were encountered, everything went smoothly. The attendance was unusually large and all took an active interest in the proceedings.

The first paper of the convention, read by Sanford E. Thompson, was on "Concrete Aggregates." He said that, for the fine aggregates, sand, broken stone screenings, pulverized slag, or the fine material from cinders may be used, separately or in combination; while for the course aggregates, broken stone, gravel, screened gravel, slag, crushed lava, shells, broken brick, or a mixture of any of these may be employed. In the discussion which followed it was brought out that clay in quantities not exceeding 10 per cent was a desirable element in adding strength to the concrete.

George L. Stanley, in his paper on "The Use of Salt in Concrete Sidewalk Construction," drew the following conclusions from his tests. That 15 per cent of salt can be used in the mixing water without injurious effect on concrete three inches thick and placed on the ground: that salt will prevent injury to concrete by frost at temperatures about ten degrees above zero; that concrete without salt in the mixing water will be more or less injured by frost if laid in freezing weather; that if there is no frost in the material used, and if properly cared for, concrete walks can be laid in freezing weather and be strong and durable.

"The Development in the Uses of Cement" was very ably discussed by President Richard L. Humphrey. After giving the history of cement back to an early date he grouped the uses to which it can be put into three classes: First, in mortars, binding together large masses of stone or brick, etc., or for casting various forms, such as artificial stone, hollow blocks, brick, etc.; second, as concrete in mass or under conditions where it is only subjected to compressive stresses; and third, as reinforced concrete when it is subjected to both tensile and compressive stresses.

A. L. Johnson, in his paper on "Steel for Reinforcement," stated that in specifying bars for reinforcement, a few fundamental principles should be observed. In the matter of elastic limit the general proposition is that it should be as high as is consistent with the ductility required by the case in hand, up to about 60,000 pounds per square inch. Preference should be given to more bars of small section, as it is desirable to have the metal well distributed through the stretching concrete area. The bars should not be painted. A slight film of rust is no injury at all, and will totally disappear after embedment, but if the bars have been exposed long enough for scale to form,

this must be removed before use or the corroding will continue.

C. A. P. Turner gave a paper on "Cement and Building Construction," which was illustrated with stereopticon views. In speaking of reinforced concrete work in winter he stated that it gave him very little concern. The only inconvenience he had was to keep the snow and ice out of the forms until he could fill them with concrete. He had to heat the material used, and when this was properly done, freezing did not appear to damage the work as much as too rapid drying in the hot summer months.

R. W. Lesley, in his paper on the "Relation of the Cement Manufacturer to the Cement User," stated that it was the duty of one to co-operate with the other in the making of standards, and in the production of such regulations as will make the construction of a building of reinforced concrete, or of concrete blocks, as safe, as definite and as positive, from the smallest frame or brick building to the largest skyscraper, as that of any other material.

President Humphrey, in his paper on "Investigation of Cement Mortars and Concretes at St. Louis," gave an outline of the work being carried on. Some of the experiments being made are with reference to the various kinds of concrete, different mixtures, different methods of reinforcing and properties of hollow blocks as regards fire resisting properties. He urged every member to write to his congressman and urge him to use his influence to pass the bill, which will soon be introduced in Congress, appropriating $100,000 for this work.

In his paper on "Cement Block Architecture," Louis H. Gibson stated that if one wanted a clear, crisp, live colored block one must use clean, crisp, sharp, lively sand. The color and beauty of a concrete block depends upon its ingredients; if you put in muddy sand you will get a muddy colored stone. In speaking of the texture of the block he stated that in order to get a uniform texture the proportion of sand and cement had to be uniform. A block with good texture is one in which the surface is gritty and has somewhat of a sandpaper quality.

"The Use of Cement and Concrete for Farm Purposes" was the title of the paper read by S. M. Woodward. He brought out the facts that residences, barns, ice houses and silos may be advantageously built entirely of concrete blocks, or the cement may be used for cellar floors, barn floors, feeding troughs and mangers. It will also serve for pavements of yards, walks, hitching posts, fence posts and watering troughs. Watering tanks and troughs are rendered safer from injury if the interior surfaces are given a slant so that ice cannot exert a pressure perpendicular to the surface.

In his paper on "Hair Cracks, Crazing or Map Cracks on Concrete Surfaces," Albert Moyer stated that very wet concrete is more apt to craze and show undesirable hair cracks than dry concrete. A careful examination of these cracks lead to the conclusion that they are due entirely to a contraction of the surface, the same contraction not taking place in the body of the concrete. His conclusions were that in a rich mortar there is more neat Portland cement on the face; and, therefore, a greater percentage of contraction of the surface; and that if the concrete were kept wet and protected, hair cracks and crazing would be avoided.

Henry Longcope, in his paper on "The Manufacture and Use of Concrete Piles," stated that while a concrete pile cost one and one-half times as much as a wooden one, it was far superior as it was not subject to rot or to the ravages of worms, neither could it be destroyed by fire and no cost is attached for repairs.

In his paper on "Machinery for Cement Users," W. W. Benson said that no one should go into the block business exclusively without a sufficient number of machines to give an average minimum daily capacity of not less than 400 standard sized blocks. The supervision of the plant should by all means be in the hands of some one who has a thorough knowledge of cement and concrete, and who is capable of testing the cement used.

An interesting paper on "Waterproofing" was read by J. L. Mothershead, Jr., in which he stated that one of the essentials in making blocks waterproof was to first make them good, then to use a richer material as a facing for the blocks. He also found that salt added to the cement does not make them waterproof but shortens the time of setting. The use of lime in any form is very detrimental to the blocks, as it has the tendency to disintegrate the blocks.

"Air Tamping and Conveying Concrete Blocks," by J. P. Sherer, brought out the points that the decked car is the best and cheapest method of conveying blocks. By using portable tracks any part of the yard can be reached. With reference to tamping he stated that the pneumatic tamps, which they had placed in their plant, was the best investment they had made, as they made a denser product, making their blocks more solid and easier to handle.

In his paper on "Legislation on Concrete Building Blocks" Will J. Scoutt stated that the standard that must be adopted cannot be one that restricts the use of blocks of a certain age, nor of a certain proportion of aggregates, without reference to what the aggregates consist of, but it must relate to the quality of the product. In brick work, no attempt is made to say that a brick shall be made of one certain kind of clay and not of another. The brick requirement is one of strength and compactness; it should be so of concrete.

In a paper on "The Manufacture of Hollow Concrete Blocks," by S. B. Newberry, he advocated the use of from one quarter to one-third of hydrated lime in the concrete mixture, as it would materially add to the strength and waterproofing qualities of the concrete. Quicklime was also advocated. It had to be thoroughly slaked with water, and remain in the water

for a day or two so that all particles of the quicklime can be thoroughly slaked. It is then called milk of lime and after being poured through a fine screen can be readily used.

A paper on "The Causes of Failure in the Concrete Block Business" was given by O. U. Miracle. He stated that failures were caused by placing poor material on the market, cutting the prices of competitors and then turning out poor work, having insufficient capital to start with. To get good results the following vital points must be followed: First, proper selection and proportioning of material; second, careful mixing and complete incorporation of the ingredients; third, careful and thorough tamping; fourth, care in curing; fifth, care in laying.

"The Choice of Cement for Concrete Blocks" was ably discussed by Richard K. Meade. He summed up the requisite properties of the Portland cement which is to be used for the manufacture of concrete blocks so that they will have endurance, strength and color. He advocated the use of cement which was seasoned for at least six months, also the use of fine cement.

A paper on "Legislation Concerning the Use of Cement in New York City," by R. P. Miller, dwelt upon the building laws pertaining to cement and concrete in several of our large cities. He concluded by saying that it was decidedly to the interest of every cement user, that so valuable a structural material as cement should be applied honestly and intelligently, leaving no chance for its condemnation because of improper or irresponsible work.

J. C. McClenahan read a paper on "Manufactured Stone," in which he stated that the composition of a manufactured stone was finely crushed limestone, sandstone, trap rock, or granite, an aggregate that will pass through a 36-inch sieve, and not to contain over 15 per cent dust. This aggregate, clean and sharp and thoroughly mixed in a dry state, with cement in the proportion of one part of high grade, well-seasoned Portland cement to three parts of aggregate, and about 40 per cent good, pure water, will give the basis for a good manufactured stone.

Richard L. Humphrey was re-elected president, as were the other officers, excepting that O. U. Miracle succeeded to the office of third vice-president. The full set of officers follows:

President—Richard L. Humphrey.

First Vice-President—Merrill Watson.

Second Vice-President—J. H. Fellows.

Third Vice-President—O. U. Miracle.

Fourth Vice-President—A. Monsted.

Secretary—Charles Carroll Brown, Indianapolis, Ind.

There was lively competition for the next convention, Chicago, Columbus and Jackson, Mich., leading in popularity. The question was placed in the hands of the executive board who decided to hold the annual meeting in Chicago at a date to be named later.

Minneapolis Convention

The second annual convention of the Northwestern Cement Products Association was held in Minneapolis, Minn., January 17, 18 and 19. The convention hall was entirely separate from the hall where displays were made, and this was a very commendable feature, as each could do work without interrupting the other.

O. U. Miracle
PRESIDENT NORTHWESTERN CEMENT PRODUCTS ASSOCIATION

After the address of welcome by Mayor D. P. Jones a short address was delivered by Lee Stover on "How Conventions Can Help Us." He said that there should be more practical information given and less theory; also that many block machine men were hurting the industry by making exaggerated and misleading statements.

Arthur N. Pierson, in his talk on "Some of Our Troubles, and How They Came About," declared that the successful block man must have faith in his product as being superior to any other material. As to mixing concrete he favored using as much water as possible. He advocated wetting the blocks and keeping them in a damp atmosphere for a week.

President O. U. Miracle gave the annual address, giving the history of the association and the work being done by others throughout the country who were interested in the industry.

A set of specifications for the manufacture of concrete blocks and for concrete construction in general were submitted and, after consideration and revision by a committee, were adopted. These specifications include full details of proper aggregates, as well as definitions and instructions, and as they are the concensus of opinion of not only a committee but also of the full convention, they are given in full:

Sand.—Such material as will pass through a screen ¼-inch mesh and is retained in screen having No. 40 mesh. This applies to river sand, bank sand, or screenings from a stone crusher.

Gravel.—Such stone or rock, obtained either from a bank or river, of such size as is retained in a screen having ¼-inch mesh.

Crushed Stone.—Such stone from a crusher as is retained in a ¼-inch screen.

Bank gravel.—Such material as is obtained from a pit or river containing both sand and gravel.

Aggregate.—Any material, such as broken stone, gravel, or such fragments used with cement and sand mortar in making concrete for the purpose of reducing the cost and adding to the strength.

Voids.—The space existing between particles of sand, crushed stone, or materials of which an aggregate is composed.

Cement.—Any American or Portland cement which will pass the tests required by the American Society for Testing Materials.

Quality of sand.—Sand suitable for concrete work must not be finer than the above described; must be sharp and gritty; not soft or loamy; must be free from loam or other foreign material, and must not contain any perceptible amount of clay, or other soluble matter. Some authorities concede that clay to the extent of 10 per cent in sand or gravel is not harmful. That, this committee is of the opinion that any perceptible amount of clay is unsafe. Crushed stone must be reasonably free from dust and must be retained on the same size screen as bank sand, viz., ¼-inch. Gravel or crushed stone must be free from loam, dust, or other foreign material, and must contain no soft or rotten stone.

Determination of amount of cement to be used with aggregate.—A theoretically correct concrete should consist of sand and gravel, or crushed stone, or a combination of them, containing any amount of cement equal to the voids in such combination. In other words, interstices should be filled with cement.

To state this in another way, if the concrete is made up of sand and gravel, such proportion of cement should be used with the sand as is equal to the voids in the sand, and such quantity of this resulting mortar of sand and cement should be used with the crushed stone or gravel as will fill all voids in the crushed stone or gravel.

Restating this in a few words, the cement should fill the voids in the sand, and the resulting mortar should fill the voids in the aggregate.

Determination of voids.—To determine the voids in the sand, or the material to be used as an aggregate, what is known as the "water test" is employed. In preparing for this test the sand or gravel must be perfectly dry. Sand has greater volume when wet.

A receptacle holding a known amount, such as a quart jar, is filled with the material to be tested, sand for example, and into this receptacle is poured as much water as the sand, or other material, will absorb. The water should be measured. The amount of water absorbed indicates the voids, and also indicates the exact amount of cement which it is necessary to use in order to produce a solid concrete.

In making hollow blocks, if no gravel or other coarse aggregate is used, the result of this test should give the proportions of sand and cement to be used in block manufacture. Average sand will absorb 25 to 35 per cent of water, indicating from 25 to 35 per cent of voids; also indicating that the proportion to one part of cement to from three to five parts of sand are required to make a solid block.

The proper selection of sand and aggregate material is important. Care should be taken that the particles vary so in size as to produce the voids to the smallest amount possible. With this careful selection the amount of cement required to produce good work is greatly reduced.

Provided that the defining the proportions of cement we mean that a given measure of cement is one portion and that multiple of that measure of aggregates as properly combined, under the water test, shall determine the proportion. If found under the test that five parts crushed stone or gravel will take three portions of sand to fill the voids without increasing the bulk, and that one portion of cement shall fill the remaining voids, this proportion shall be a one to five mixture.

Mixing.—After the materials are selected they should be mixed together dry, until thoroughly incorporated, or in other words, until the mass is of an absolutely uniform color. Water should then be applied, and the thorough mixing repeated. The amount of water should be in all cases as great as possible, without causing the materials to stick to the molds when the stone is removed.

A little more care in the treatment of the face plates of any machine will enable the manufacturer to use a wetter concrete than is usually employed. Only such size batches should be mixed at one time as can be used up within thirty minutes from the time the water has been added.

Manufacturing.—The concrete should be placed in the mold in small quantities, and tamping should begin immediately upon the placing of the first shovelful, and continue until the mold is full. The material should be tamped with a tamper having a small face, and short, quick, sharp blows should be struck.

In faced blocks the face should be composed of two parts sand and one part of cement, the same being mixed in the manner described above.

Owing, however, to the excess of cement used in facing, and owing, further, to the fact that the cement is what makes concrete sticky, the facing cannot be used as wet as the balance of the block is made. Great care should be taken to tamp the concrete thoroughly into the facing, so as to unite the two into one solid stone.

In the wet process the amount of water used is such as will produce a plastic or flowing condition in the concrete, but not enough to wash the cement from the other material. When placing the material in the molds the entire mold is filled with one pouring.

No stone having transverse ties or webs cracked should be used, or even allowed to cure. Should a slight crack occur in moving the green stone, throw the material back and make it over. In no case use a cracked stone in a building.

Curing.—All stone made by the medium wet or medium dry process should be made under cover, and kept under cover for at least ten days, protected from the dry currents of air. If shed room is not available to store a ten days' output, the blocks should be carried out after the initial set has taken place, and covered with canvas, hay or other covering, which will retain moisture and at the same time keep the dry air from circulating around the block. Under no circumstances should blocks be made under the direct rays of the sun, nor should blocks made by this process be exposed to either sunshine or dry winds while curing.

The blocks should be gently sprinkled as soon as possible after making—that is, just as soon as the cement has set sufficiently that it will not wash. Blocks should be kept wet from ten days to two weeks, and should never be removed from the yard for the purpose of using in a building until they are from thirty to sixty days old. This is very important. A green block will surely crack in the building, on account of shrinkage.

Laying.—In laying cement stone a soft mortar composed of one-half cement mortar and one-half lime mortar should be used. This mortar should be made with fine sand free from stone, and should be buttered on the ends of the stone before laying. The stone should be laid in the mortar and worked down. Do not leave end joints open until after the building is completed, because when the end joints are filled at this time shrinkage in mortar is liable to loosen it, causing the mortar to fall out, leaving openings through the wall.

The spreading of mortar is very important, because if mortar is unevenly spread so that it is thicker under one portion of the stone than under the other, a leverage is created, which, under the weight of the wall, is liable to produce a crack in the stone.

Coloring.—In using coloring matter with concrete, the color should always be mixed with the cement dry, before any sand or water are added. This mixing should be thorough, so that the mixture is uniform in color. After this mixing the combination is treated in the same way as clear cement.

The following officers were elected: President, C. A. P. Turner; vice presidents, A. H. Laughlin, O. U. Miracle, Lee Stover, John Wunder, E. W. Dow; secretary, George A. Hughes; treasurer, John M. Hazen.

St. Paul was the city unanimously decided upon for holding the next annual convention.

Use and Manufacture of Concrete Blocks

ADVANTAGES OVER OTHER BUILDING MATERIAL—TIME REQUIRED TO HARDEN—WHAT MATERIALS TO USE—COST COMPARED WITH BRICK AND STONE

By George E. Walsh

THE rapidly extending employment of concrete compressed in the form of building blocks for houses, factories and public structures promises to make important changes in the general features of our country's architecture. More and more are we tending to substitute fireproof tiles, bricks and concrete blocks for wood in the building of both city and country homes, and the greater degree of safety from fires obtained thereby is an important gain. Whether the same degree of architectural beauty of line, proportions and ornamentation is perpetuated in the new fireproof houses is a question that depends upon the success or failure of architects to adapt the new materials to the needs of the day. While the danger is that fireproof building materials may produce too much of monotony in our homes, it is unquestionably true that they can be adapted to yield architectural effects of the greatest variety and beauty.

The danger of fire that is ever present in a frame building is practically eliminated when incombustible concrete blocks, burnt clay tiles, or hard-burned terra cotta bricks are used for the walls and partitions. Ordinary bricks which are not subjected to intense heat in the manufacture are not fireproof in the modern understanding of that word, nor can the same be claimed of granite, marble or stone. All of these materials, while not combustible like wood, will disintegrate and crumble when subjected to an intense heat, and especially if a stream of water from a fire engine is played on them. Consequently they fail to carry the loads for the upper stories of a building, and the walls collapse even after an ordinary fire. In the recent large fires, such as at Baltimore and other large cities, the common unburnt bricks, stone and marble proved almost as weak as wooden houses when surrounded by fire.

In a similar manner iron and steel are only semi-fireproof. When subjected to great temperatures, the steel framework of a modern building is warped and twisted so that the beams and girders fall and the superimposed loads collapse. In order to secure protection to the steel girders, columns and beams, it is necessary to build them up in partitions composed of fireproof material. Usually in the high-grade fireproof buildings the steel framework is protected by porous terra cotta tiles or bricks that have been subjected to a heat in the manufacture of at least 2,000 degrees Fahrenheit. As the fireproof material will not disintegrate, crumble or crack at such a high temperature it is not likely to be affected by any fire that breaks out in a city. The burned clay tiles, bricks and terra cotta are poor conductors of heat and cold, and as there are air spaces between them and the steel frames the heat naturally penetrates very slowly through the walls.

Concrete is one of the oldest and one of the newest of our building materials. It was used by the early Romans and Egyptians, but as employed by them it was far from the standard required to-day of fireproof material. Only comparatively recently has concrete been extensively manufactured in briquettes or blocks for general building purposes. In this convenient form concrete is one of the most recent of popular building materials.

There are great numbers of cements used in the different building and engineering trades, and each has its particular use. The hydraulic cements include natural cements, slag cements and a certain grade of Portland cements. Most of the hydraulic cements harden quickly, and they contain a much larger proportion of clay than the best Portland cements. Slag cement is made chiefly from refuse of blast furnaces and slaked lime.

Portland cement is made in many different states, and by a great number of companies. Some 20,000,000 barrels of true Portland cement are manufactured annually in this country. This cement consists of lime, silica and aluminia, with a few other ingredients. These materials are heated or calcined up to incipient fusion so that they readily mix. The mixing of the different proportions of the ingredients and the firing constitutes an important and delicate part of the process of cement making. If the mixture is underburnt it is weak and light in weight, and if over-burned it is inert and requires a long time to set or harden.

In the manufacture of modern concrete blocks of pure Portland cement and sand or gravel equally careful methods of mixing and curing must be observed. The cement should be carefully selected and only the fine, pulverized particles be used. The coarse, lumpy parts are inert and do not possess proper adhesive qualities. Usually the cement must pass through fine sieves with from 100 to 200 meshes to the linear inch. The quality and amount of sand or gravel to be mixed with the cement must receive equal careful attention as well as the water employed for softening the mixture. Sand that will pass through a sieve with 20 meshes to the linear inch is considered the best by the expert manufacturers and cement workers. To make the particles of sand uniform a second sieve with 30 meshes to the linear inch is suspended under the first. The sand that is to be used for the blocks must pass through the meshes of the first and be retained on the second. All that pass through the latter is too fine for the highest use, and all that is retained by the first sieve is too coarse to be used to any advantage.

Sufficient water is used to reduce the cement to a

consistent paste so that it will unite with the screened sand and form a stiff, homogeneous mold. The question of when the cement mixture is at the normal consistency is important. This is ascertained in concrete block factories by means of an apparatus which determines just when the paste is plastic enough to receive the sand. In all cases the exact proportions of cement, sand and water are ascertained in advance, and the same quantities used for making all the different bricks or blocks. Otherwise there will be a variation in the strength and standard durability of the walls. These formulas vary from 1 to 4 to 1 to 5 of cement and sand, but the greater the amount of Portland cement added the stronger will the blocks prove when cured.

The mixing and molding must be thorough and usually it can be done only by expert cement workers. No rules can be given which would help one to understand exactly when the ingredients are sufficiently mixed. The tendency of the cement to ball up is common, and this prevents mixing to a homogeneous mass. In mixing machines it is common to stop work to clean out the masses of cement that have not properly mixed with the water. This difficulty is not met with often when the cement is carefully screened and selected beforehand so that no hard particles find their way into the mass. The mixing must continue until there is a perfect uniformity of material and water is added until the mass is plastic enough to work easily in the molds.

The molding machinery is made of some non-corrodible material sufficiently strong to resist any pressure to which it may be subjected. The blocks or briquettes must be absolutely uniform in size, and any spreading of the mold boxes causes inequalities in the blocks. The molds are filled as soon as the concrete is mixed to the proper consistency. The mixture is pressed down firm in the molds with the hands and smoothed off at the ends with the trowel, and then the upper surface of the mold should be heaped up. They are then ready for the automatic pressure. It is commonly specified that any bricks or blocks that show a variation of 3 per cent in weight from the standard should be rejected. When pressed in shape, the blocks must be cured or dried, which is a process that can be left to nature. The curing room should be well ventilated, but the air should be dry and proper protection secured from rain or outside moisture. During the first day or two the blocks of concrete will harden a little on the outside, but the interior will be soft and moist. If natural cements are used the hardening process is greatly expedited; but natural cements are not proof against frost as Portland cement, and building blocks made of this material lacks the durable qualities required for modern fireproof buildings. There is always danger of collapse of walls when concrete blocks are used that are not proof against the action of frost.

The slow curing of concrete blocks has tempted many builders to resort to different methods of hastening the process, but when we consider that the value of the briquettes depend largely upon the time allotted to them in the drying room it is important that no haste should be made. Concrete continues to set and harden up to six months and a year. No artificial process has been discovered to hasten the curing any more than in seasoning wood. Until completely set the blocks must not be moved or even jarred, nor should they be used for any building purposes inside of a week.

Even at the end of seven days they are far from ideal for building purposes, for they have reached only about half their full strength. Blocks that have been allowed a full year to harden show remarkable strength, and their power of resistance to pressure and fire is great. The hardening process proceeds more rapidly during the first seven days than thereafter, but the slow and sure setting of the concrete up to the first few months is of the utmost importance. At 30 days the blocks have reached about 65 per cent of their full strength, and at six months nearly 96 per cent. At this latter age they are practically good for any kind of work for which they are intended.

As the strength of the blocks depends upon the time of curing it stands as a matter of course that once in the walls of the building they will continue to harden the longer they stand, but in large buildings where the pressure of the load on the upper floors come directly on the lower courses of blocks the concrete may sag and give before the material is thoroughly set. For this reason blocks that have not reached at least 60 per cent of their full strength should not be employed for the foundation courses of any building that is to run above three stories. This means that the blocks should have at least thirty days in which to dry. For very tall buildings for factories or storage houses where the load to be carried is heavy, the drying process should extend upward of three or four months. At four months the blocks reach over 90 per cent of their full strength, and they can be used for almost any ordinary purposes.

Concrete blocks and bricks come in a variety of sizes and shapes, but the most convenient and popular are the brick form and the hollow block or stone form. All the larger size blocks are made hollow, which saves in material and weight, and at the same time increases the fireproof and dampproof qualities of the walls by having an air space between. The ordinary block made to take the place of stone, granite or marble is made to occupy two cubic feet of space, but some are made five feet long and eighteen inches thick. The former size occupies the space that would require 42 common bricks to fill, and the time and labor saved in laying the courses are quite important factors. The cost of hollow blocks and setting them in the courses of a wall is not much different from that of brickwork at a cost of $12 per thousand in the wall. As the com-

mon unburnt bricks are not fireproof, nor so impervious to the action of heat, cold and moisture as the concrete blocks the gain in some instances is quite a determining factor in building.

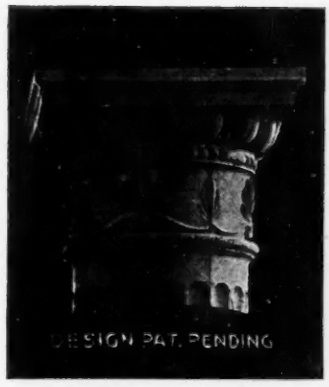
Molding Ornamental Stone

SEVERAL METHODS ON CASTING STONE—WHAT MAKERS OF CONCRETE STONE MACHINERY MUST DO IN GETTING OUT DESIGNS

By E. C. Harter,
Proprietor Cement Working Machinery Co., Detroit, Mich.

MANY methods have been devised for producing ornamental concrete stone. When made of the proper materials and thoroughly crystallized, artificial stone may be cut to any ornamental design by a stone carver or sculptor. On account of concrete being easily molded into any form desired this is the method generally employed for making ornamental work from it. The Germans have to considerable extent used both methods, and in forty years' time which they have devoted to the art have achieved a marked success. At Chicago World's Fair the German government built its exhibits and even the statuary entirely of Portland cement stone, and these exhibits illustrated both ways of making ornamental stone from concrete.

In the past several methods for molding ornamental stone have been attempted in our country. The first of them may be described as the gelatine or glue mold process, by which the sculptors' work of whatever detail, even the masterpieces of the ancients, are reproduced in plaster of Paris. While this process works admirably well with plaster on account of the slow chemical action or setting of the cement, it has so far been found worthless for making ornamental stone. The slow setting cement will disintegrate the molds before one cast can be made. The writer has experimented with all manner of coating to protect the molds, but was finally obliged to abandon the method.



Another method of casting stone is to use the patterns and after molding them in the sand the same as an iron molder would in forming cast iron into desired shapes, pour the concrete, which must be in a very wet state—in fact, at least 65 per cent of water is necessary—into the molds. This process is a very good one where the maker of concrete stone is sufficiently familiar with, and has the practical aid of one who has learned the molder's trade. Even "cut under" work may be made by this process by using cores or fillers, but difficulty in making stone by this method will be a drawback to its ever becoming generally used.

Another method by which the desired effects may be secured, which was adopted by the builders of the

power house of the Chicago Drainage Canal, is to use plaster of Paris molds and after the concrete is sufficiently hardened break or cut away the plaster. Of course this requires special molds to be cast for making each stone. The average builder does not wish to invest the amount of money necessary to secure this class of work. Therefore some other method for molding concrete into ornamental stone must be adopted that will meet with his requirements.

The illustration of a lion's head shows a sample of "cut under" work in concrete stone made in flexible molds of rubber, the flexible molds being held in position until the concrete is sufficiently hard to admit of removing by a perfectly fitting metal casing. This is a practical method for producing "cut under" work, and such molds will with constant use last for several years. They are quite expensive, but when the number of stone that may be produced in them is taken into consideration, the cost is not great enough to prevent their becoming generally used.

The writer has found that very fine effects may be produced by having an artistic modeler approach as nearly as possible the popular architectural designs that are in general use without adopting details that

are cut under. Metal patterns are made from these designs, and from them molds made of cast iron that are thoroughly sand-blasted, thus removing all the rough scale and sand, leaving them as smooth as stove plates. The accompanying illustrations, excepting the lion's head, show concrete stone made from such molds. This process is simple, in fact, is the popular one already in use by makers of building blocks. Except for the cost of the original patterns such molds are inexpensive. After a little practice with them one operator can get as good results as another.

The missionary work necessary for the adoption of concrete as the universal building material has already been pretty thoroughly done. When the most conservative corporations and builders, as railway companies, large packing houses, etc., adopt concrete as their material for constructing buildings, it is time for the general public to have confidence in the material. There remains no question as to concrete being the most durable of any of the building materials. The building public will now look to the makers of concrete stone machinery to get out such designs as will make the general appearance of the buildings throughout our country more beautiful than has been produced by brick and lumber, so largely used in the past. When this has been accomplished the much talked of "Concrete Age" will be a reality.

Forms of Modern Masonry

TAKEN FROM THE EARLY EGYPTIAN AND ITALIAN DESIGNS—HOW THE DIFFERENT EFFECTS ARE DEVELOPED—WHERE USED TO THE BEST ADVANTAGE

By Geo. H. Melrose

THE art of hewing stones and fitting them into regular masonry work with bricks, has developed wonderfully in recent years. The operations of the modern masonry, as demanded by some of the builders of ornamental construction work, call for practical dexterity, with knowledge of geometry and mechanics.

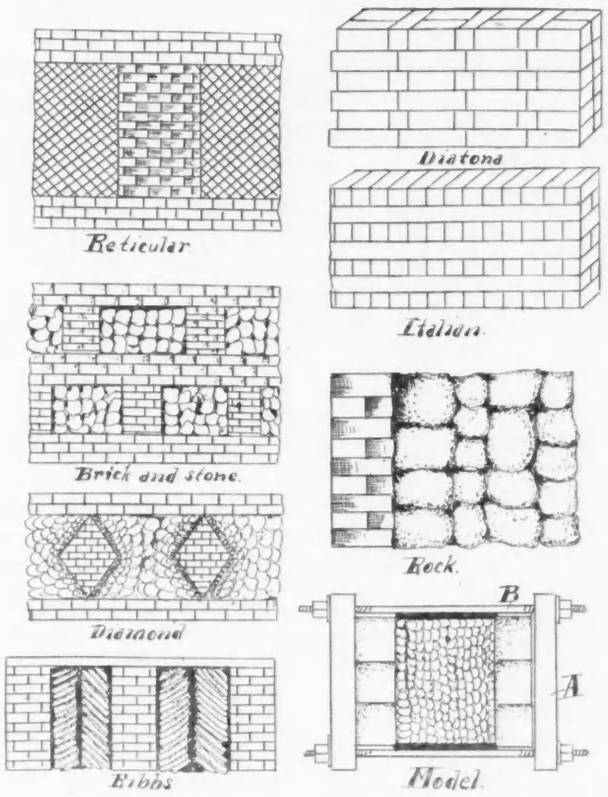
The demand in some lines of building construction is very kindred to the designs furnished in the masonry work of the early Egyptian bricklayers. We may find Cyclopaean masonry in service now in correct imitation of this class of brick and stone work of centuries ago. Tyrrhenian masonry and Eutruscan masonry are likewise utilized for certain descriptions of work. We get many suggestions from Italy. The Italian mason takes pleasure in uniting stones, brick and cement in such way that quite an elaborate figure work is produced in the body of his work in the walls, in the interior decoration, and in pillars. The Italian mason devotes a good portion of his time to sketching novel effects that he may develop in actual practice. In recent years the rubble or random walls have been introduced quite freely in the construction of American masonry. Stones of irregular form are specially selected and these are utilized in the describing of figures by an artistic arrangement of the same.

I have been traveling a great deal the past few years, and during these travels have come into contact with men who make a business of designing the odd forms of ancient masonry, and apply them to the needs of the present age and demand. The so-called Reticular design, shown in Fig. 1, is used to some extent. This is formed in a net-like way with bricks or specially shaped stones on the order shown. Quite a stanch combination results. Then again the brick and stone design presented in the next drawing is popular. I found this class of brick and stone work used for framing designs in common wall-work and for the erection of supports for weights. Quite substantial results are obtained, from the point of durability, as the combination can be planned to alternate stone and brick. The Greeks use a great deal of this line of stone and brick architecture. I also found evidences of this style of masonry in Japan and in the Philippine Islands. The American mason now erects considerable work of the diamond order as shown in the cut thus marked.

The diamond effects are developed by shaping the brick work in the four-cornered style, pointed to the right angle to get the diamond design. Rubble walls are getting into fashion for this description of work. The rubble is made from the selected stone. Some of the brick manufacturers now carry the necessary rubble stock as a side line.

The shaping of patterns of masonry into ribb work as illustrated in the pattern indicated "Ribbs" is an-

other feature of the masonry service that is attracting attention. I found a great many of these styles of designs in Japan. I traveled through the United States extensively during the past year, as well, and could not help comparing the advent of the ribbed work in this country with that of foreign countries. It would seem that the plan of introducing novelties in the way



of rubble and brick combination has developed alike in various parts of the world. In the construction of the ribb work, the stones must be carefully selected. In some of the yards boys are hired to get the proper stones and not only choose them out from among many, but with the necessary tools reduce high places, and make the stones suit the conditions needed to shape the required pattern. It is not only the ribb style, but there are herring-bone selections, diamond effects, line work and general artistic designs wrought out. There is a great chance for a man to display his originality in this service. Some of the patterns appeal to the people and are adopted. On the other hand, some of the designs are cumbersome, impracticable or unsuitable, because of the crudeness of the design. Some of the designs die in their infancy, while some live for years.

I likewise find that there is an inclination on the part of some masons to adopt the old style Diatonous system of brick laying.

We exhibit a diagram of this description of wall work in the cut marked "Diatona." This is a Greek pattern, in which the brick or stones of kindred dimensions, are placed one upon the other in courses, as shown. Sometimes the stones are arranged to have their length equal to double their width. One meets with several varieties of this line of masonry, both in stone, tile and brick. Instead of the same course being pursued, there is one header and one stretcher alternating in some of the walls, while in others, there is a course of headers and a course of stretchers, as the case demands. Sometimes the English bond in brickwork is followed out closely. Sometimes the headers pass through the wall entirely as in this illustration and a solid wall results for the width made. The common Italian system of wall work with bricks or with stones of equal sizes, is set forth in the next illustration and is signified "Italian." Here we have the courses or headers and stretchers arranged in regular form, without alternations, resulting in another form of powerful wall for the dimensions of the same. There is a great deal of stonewall work in progress in these days in which the foundations are erected with stone and brick. In the diagram marked "Rock" we exhibit one form of foundation used.

In the Roman system of foundation, a trench is dug and the bottom is covered with gravel and small stones.

Often dry and hard rubbish is put in on the gravel surface and then the stone and brick work is laid. Some very unique results are obtained when the wall work is made up with pillars of brick intersecting the stone. Sometimes satisfactory results are obtained through the employment of "long" and "short" work. The Norman style of cube work for masonry is used to some degree in this country and works to advantage in the erection of certain classes of architecture. Wall work which is completely filled in with some other kind of material is not at all uncommon nowadays. In the final cut of the illustrations we exhibit a plan of model employed in the shaping of some wall work constructed with courses of cubes with an interior filling of small stone. In examining some of this work, I found that pieces of broken brick, bits of lumber and all sorts of substances were often dumped into the space and packed securely with mortar. This plan is in vogue to an excessive degree in Japan and also in the buildings of the Philippine Islands and the Hawaiian Islands, all of which places were visited by the writer not long ago. In the construction of the wall shown in the last illustration, the jacks are made of two pieces of hardwood, *a*, secured on either side by bolts, *b*. After the completion of the wall, the jacks are removed.

Treatment of Floors

The floors of bath rooms, sculleries, water closets, larder, lavatories, greenhouses and sometimes of halls should be covered, whether with hydraulic pressed tiles, marble, mosaic or some substance of a non-absorptive character, so that they may be washed down frequently. In the case of lavatories, bathrooms and sculleries the floors are best laid sloping, so that when washed down the dirty water may be led, by means of a duct pipe, into a rain-water head to discharge over a gully trap.

Short Talks With Our Subscribers

WE BELIEVE we are justified in telling our subscribers something of the great success of the AMERICAN CARPENTER AND BUILDER. Every subscriber and reader of the magazine is entitled to consider himself really a part of the organization, and is interested in its success, and is entitled to know how his paper compares with others conducted along the same lines.

We started out with the ambition to build the largest carpenters' and builders' paper in the world. We have succeeded in the very short period of ten months in having accomplished our aim, and now lead all other publications by a very large margin. It will, no doubt, please you to know that, from all the information we are able to obtain, the AMERICAN CARPENTER AND BUILDER has as many paid-in-advance subscribers as its next two competitors combined. It also has more pages of paid advertising than its next two competitors combined.

When you take into consideration that we have accomplished in ten months what other papers have not been able to half accomplish in a quarter of a century, you will realize that we have been giving our readers the very best material that can be secured. We have not spared money nor energy in the accomplishment of this result, and it is with a great deal of satisfaction that we are able to tell our subscribers that they make up a part of the great family which has not been unsparing in its praise of our publication, and we wish to thank our readers for all the good words they have said in our behalf.

We are not selfish, but still we are not satisfied. We wish to increase the size of this great family of readers, and we believe that, with your assistance and the kind words you have said about us, we will be able, within a very short time, to double our circulation.

In order to accomplish this result, we are conducting a Prize Contest. This Prize Contest is confined to paid subscribers prior to January 1, 1906, and is not open to any other persons.

We believe that you have some friend or acquaintance whom you would like to see a regular subscriber to this paper, and we believe that you would like to see him one of the great family, so that when you meet him in your daily work, or, when you are at your leisure, and have time to talk of topics which relate to your trade, you will have some one with whom to discuss the subjects so ably handled in the AMERICAN CARPENTER AND BUILDER.

The very large subscription list we have is evidence of the exceptionally fine matter we offer our readers; the many pages of advertising is evidence of appreciation by advertisers who stand at the top in their particular lines. The advertising section of the AMERICAN CARPENTER AND BUILDER is becoming one of the best educators that can be placed in the hands of carpenters and builders to-day. It tells them of new devices, new machines and new methods; it puts them in touch with the very best and most responsible manufacturers and dealers who have goods to offer them, which will be of assistance to them in their business.

Remember, that the contest which we call attention to on the opposite page is only for members of our great family, and only for those who became members prior to January 1st. We pay you a liberal commission for new subscribers, and, at the same time, we give you an opportunity to secure one or more of our very valuable rewards for extra effort in endeavoring to increase the size of our great family.

We have accomplished so much within the past ten months that we feel we should tell you about it, and, we also believe that by your assistance, and by the extra effort which you will put forth, we can give you a magazine which will be worth in the future more than it has been in the past. We want you to feel that it is your paper as well as our paper; we want you to be constantly looking for the next issue.

Our "great family" of subscribers is now composed of 26,401 members, and new additions are being made daily.

Do you realize that there are members of this "great family" in every state in the Union, and in almost every town in the Union where there is a carpenter?

Not only this, but do you realize that there are nearly 1,000 members in Canada, and that there are others in Alaska, Cuba, the Philippine Islands, England, Australia and Scotland?

You may have a friend who is not a subscriber to the AMERICAN CARPENTER AND BUILDER. You will probably be interested in having him become one of the "great family."

Have you ever asked him to subscribe?

Tell him how thoroughly and practically we cover every subject in which the carpenter and builder is interested.

Tell him how nicely our magazine is printed and fully illustrated.

Call his attention particularly to this number, our "Special Cement Number." Show him how thoroughly all details of the subject are covered, and how full of practical information each article is. Tell him that no other magazine published covers the subject one-half as well.

He will be deeply interested in this rapidly developing form of construction, as you and every other wide-awake carpenter and builder is.

Read the very liberal offer we are making to our "great family" of subscribers—to those who subscribed before January 1.

As one of the "great family," show your interest and add at least one new name to the roll.

Great Prize Contest

Hundreds of Valuable Rewards

REMINGTON TYPEWRITER, COMPLETE CHEST OF TOOLS, ROLL-TOP OFFICE DESK, AND A HOST OF OTHER ARTICLES TO BE GIVEN ABSOLUTELY FREE TO SUBSCRIBERS

Limited to Those Who Subscribed Prior to Jan. 1.

WE BELIEVE that our "great family" of nearly 27,000 subscribers are most interested in our wonderful success, and will want to see this success continue. We want them to share in the success of the AMERICAN CARPENTER AND BUILDER, and will reward them liberally for adding new names to the "great family."

A brand new Remington Standard Typewriter will be given to the subscriber who secures the largest number of new readers before March 1, 1906, Chest of Tools to the one who secures the second largest, a Dearborn Roll-Top Office Desk for the third, a set of German Silver Drawing Instruments for the fourth, and twenty-two other valuable rewards to the twenty-two who secure the next largest numbers.

There are also twelve liberal cash "Territorial Prizes," amounting in value to $210.00.

In addition, there are many other special prizes for those who secure three or five subscriptions.

In fact, a liberal commission will be paid for every subscription secured.

If you were a subscriber previous to January 1, 1906, don't fail to take advantage of this liberal offer. Read the "Standing of Contestants" on page 843, and note what an excellent opportunity you have of securing one of the leading rewards.

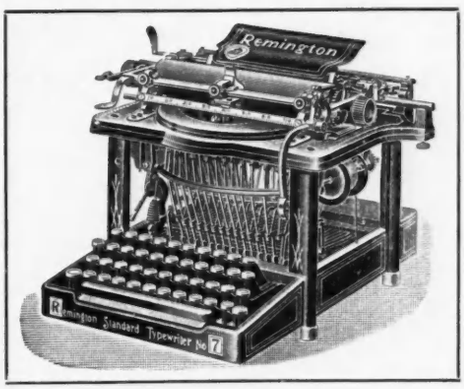
Address, Contest Editor,
AMERICAN CARPENTER AND BUILDER,
196 Fifth Avenue, Chicago.

Four Leading Prizes

In selecting Grand Rewards and Special Prizes to be given to its great family of subscribers, the AMERICAN CARPENTER AND BUILDER has endeavored to secure none but the very best.

REMINGTON STANDARD TYPEWRITER

The Remington Typewriter is so well known that our readers do not need to be told of its excellent points. We are so well convinced of its superiority that we have twenty-five of these machines in daily use in our correspondence department. The subscriber who secures this Grand Reward absolutely free will have not only one of the most useful articles ever produced, but will have something to be extremely proud of. It will be sent all express charges prepaid. Value $100.00.



COMPLETE CHEST OF TOOLS

Following the same idea regarding the best of everything, we have arranged with the Orr & Lockett Hardware Co. to furnish us with one of their Tool Chests of the largest size, to be packed full of every conceivable tool that the carpenter or builder could use, everything to be of the very best. This Chest is 32 inches long, 18 inches wide, 16 inches deep, and has sliding trays. It will contain the following:

Orr & Lockett Tool Chest.
Bedrock Smooth Plane, 2-inch Cutter.
14-inch Bedrock Jack Plane, 2-inch Cutter.
22-inch Bedrock Jointer Plane, 2⅜-inch Cutter.
Bailey Iron Block Plane.
Bailey Rabbet and Fillester Plane.
26-inch Bishop Cross Cut Saw.
26-inch Bishop Rip Saw.
12-inch Bishop Back Saw.
1 Set No. 12 Bishop's Nest of Saws.
Jones Cable Coping Saw.
3x6 Orr & Lockett Cabinet Scraper.
Morrill's Special Saw Set.
1 Set Buck Bros. Socket Chisels, Bevelled Edges, ¼-inch, ½-inch, ¾-inch, 1-inch, 1¼, 1½-inch
1½-inch Buck Bros. Tang Butt Chisel.
Straight Claw Hammer.
5½-inch Cut Barton Hand Axe.
Millers Falls Ratchet Brace, 10-inch Sweep
Yankee Automatic Drill, with 8 Drills.
1 Set Russell Jennings Auger Bits, in case, 32⅛ Quarters, ¼-inch to 1-inch—13 bits.
Large Steers Expansive Bit, to cut ⅞-in. to 3-in.
1 Set Syracuse Twist Bits for Wood, from 3-32-inch to 12-32-inch.
Clarks Countersink.
Yankee Automatic Screw Driver.
6-inch Champion Screw Driver.
Orr & Lockett Screw Driver Bit.
30-inch Stratton Brass Bound Mahogany Level.
4-foot White Enamel Zigzag Rule.
Eclipse Folding Square.
8-inch Stanley Try Square.
8-inch Eureka T-Bevel.
Stanley's Universal Spoke Shave.
Wilkinson Folding Handle Drawing Knife.
Pair 8-inch Single Leg Cook's Dividers.
Assortment Knurled Handle Nail Sets.
Mortise and Marking Gauge.
Stanley Butt Gauge.
Lignum Vitae Mallet.
Russwin Monkey Wrench.
Pair 7-inch Carpenter's Pinchers.
Walls Special Steel Oilers.
"Oils-Here" Oil Stone, with one 8-inch Combination India Oil Stone
1 Dozen Orr & Lockett Carpenter's Pencils.
1 Dozen 5-inch Black Diamond Saw Files.

This complete set consists of more than 100 pieces, and combined with the Tool Chest has an actual value of more than $65.00.

NOTE. — The carpenter securing this valuable reward may make any changes in the contents desired, providing the changes do not materially increase the cost.

DEARBORN ROLL-TOP OFFICE DESK

The beautiful desk shown in the illustration is made by the Dearborn Desk Co., who are constantly shipping desks in large

quantities all over the country. It is 54 inches wide, 33½ inches deep, 53½ inches high, and weighs 300 pounds. These dimensions alone show that it is an exceptionally fine and heavy piece of office furniture. It is made of beautifully figured oak, polish finish, three-ply writing bed and panels,

well grained oak front wood filing boxes, two upright spaces reserved for books, two extension slides, drawer in center, four right drawers and left which lock and unlock automatically by action of curtain; all drawers have carved handles and work easily. This desk is equipped with a patent smooth outer surface, dust-proof roll curtain, showing an unusually attractive grained effect, and also has heavy chilled-steel ball-bearing casters. Absolute satisfaction is guaranteed by the manufacturers. Value $50.00.

GERMAN SILVER DRAWING INSTRUMENTS

The set of Drawing Instruments offered as a fourth Grand Reward is one of the best and most complete made. They are of high grade, superior quality and the set includes 13 pieces: 5½-inch Compass, Attached Needle Point, with Pencil and Pen Points, Lengthening Bar, 5-inch Divider with Hair Line Spacing Attachment, 3½-inch Compass, Attached Needle Point with Pencil and Pen Points, Spring Bow Pen, Spring Bow Pencil, Spring Bow Divider, two Spring Back Ruling Pens, 4½ and 5 inches, Box of Leads and Key. Value $13.50.

Special Notice

The illustrations and descriptions above cover only four of 38 Grand Rewards and Territorial Prizes to be given absolutely free to subscribers, who were members of our great family previous to January 1, 1906.

Four Prizes for Every Contestant

The most energetic contestants will secure four separate and distinct prizes, and even more when ten or more subscriptions are obtained:

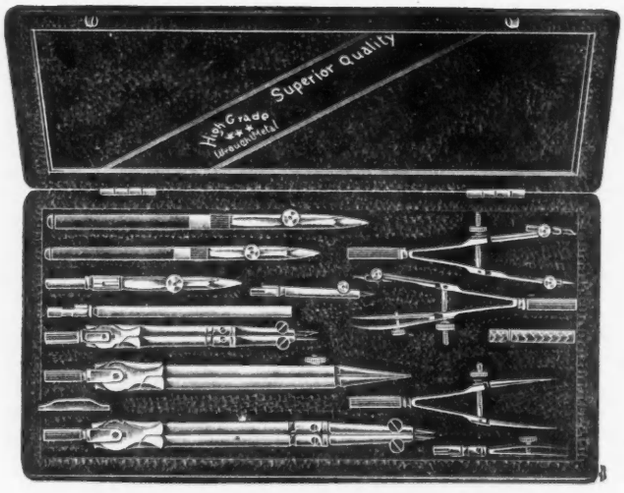
First—A cash commission of 50 cents on *every* subscription.

Second—A "Special Prize" when he secures either three or five or more subscriptions.

Third—A "Territorial Prize" if he secures the largest or second largest number of subscriptions in the group of states where he is located.

Fourth — One of the leading "Grand Rewards," if he finishes among the first twenty-six.

It should be remembered that the securing of one of these prizes does *not* prevent participation in the distribution of the other three. The contestant is paid



for *every* subscription secured, an additional payment for the securing of three or five, and also may secure two additional prizes through participating in the distribution of thirty-eight other rewards for special merit.

Special Prizes for Five Subscriptions

ONE OF THESE USEFUL AND VALUABLE PRIZES WILL BE GIVEN ABSOLUTELY FREE TO EACH CONTESTANT FOR EVERY FIVE SUBSCRIPTIONS SECURED—OTHER PRIZES FOR THREE SUBSCRIPTIONS.

IN ADDITION to participating in the distribution of the "Grand Rewards" and "Territorial Prizes," and also in addition to the liberal cash commission paid for each subscription, the contestant is entitled to select one of the following "Special Prizes" every time he secures five subscriptions:

1. "BED ROCK" SMOOTH PLANE, NO. 603

This plane is of a design which allows of the combination of the utmost solidity and rigidity, with a wider range of adjustments than heretofore placed on iron planes. The advantages of this design are made possible by the extreme nicety of their manufacture. Among the novel points in this plane are: A frog with a machined face; a frog so designed that the entire bottom of the frog rests solidly on a seat formed in the plane body a frog so designed that its sides conform to guides formed in the plane body, which guides lend accuracy of adjustment to the frog as well as prevent any possibility of its wobbling; a reliable adjustment for the width of throat opening. This plane is 8 inches in length, with 1¾-inch cutter.

2. "BED ROCK" JACK PLANE, NO. 605

All that has been said in describing the Smooth Plane applies also to the Jack Plane. It is 14 inches in length, with 2-inch cutter.

3. BISHOP'S RIP OR CROSS CUT SAW, NO. 90

These saws are highly polished and fully warranted in every respect. They are hand made from purest steel, perfect

in temper, full taper ground and highly finished blade, carved and polished applewood handle, improved nickel screws, full skew back, teeth hand filed to diamond point, set ready for use. Length, 26 inches.

4. DISSTON'S ACME RIP OR CROSS CUT SAW, NO. 120

This saw is made of extra London spring steel, warranted, carved and polished apple handle, skew back. A fast, smooth-cutting saw, particularly adapted for fine cabinet work, sawing mitres, and in all instances where rapid, smooth cutting is desired. Either a rip or cross cut saw will be furnished, 26 inches in length.

5. JENNINGS' CHISEL SET, NO. 702

This is a set of 6 No. 02 Beveled Edge Chisels in canvas chisel roll. There is one each ¼, ½, ¾, 1, 1¼ and 1½ inch, with Cocobolo handles. The blades average about 3½ inches long from shoulder, with sockets and handles in proportion.

6. BARBER IMPROVED RACHET BRACE, NO. 32

These braces possess the following points of superiority: The sweep is made from steel, the jaws are forged from steel, the wood handle has brass rings inserted in each end so it cannot split off, and the chuck has a hardened steel anti-friction washer between the two sockets, thus reducing the wear. The head has a bearing of steel balls, running on hardened steel plates, so no wear can take place, as the friction is reduced to the minimum. The brace is heavily nickel plated and warranted in every particular. No. 32 has a 10-inch sweep.

7. STRATTON BROS.' MAHOGANY LEVEL, NO. 2

This excellent mahogany level is adjustable level and plumb, has two ornamental brass side views, heavy circular end top plates, solid brass end plates, polished. Can be had in either of three lengths, 26, 28 and 30 inches.

8. "RIVAL" STEEL MEASURING TAPE, NO. 243

This steel tape line is enclosed in a nickel plated steel case with flush handle. It is a ⅜ inch tape, marked one side only in feet and twelfths (inches and eighths).

9. ECLIPSE ADJUSTABLE FOLDING SQUARE

This square is designed to meet the wants of those desiring a more convenient tool than the ordinary carpenter's square. It can be folded and packed in a small chest, and can be adjusted at right angles ready for instant use when required. It does away with cutting holes in the top or sides of small chests, can be shipped more readily on cars when traveling from place to place, and is protected from being bent and rusted when left standing or exposed to the weather.

10. NICHOLS FRAMING SQUARE, NO. 1

This square is made with the framing rule on the blade. It saves time, labor and money to the user. The No. 1 square has drafting scales 1-16, 1-12, ⅛ inches, with framing rule, brace measure octagon, and 1-100 scale.

11. CARPENTERS' SHOULDER TOOL CHEST, NO. 20

This is a portable tool chest and can be easily carried on the shoulder. It is made of chestnut with locked dovetailed corners; has lock, brass elbows to support lid when open, drop handles and rack for holding saws. No. 20 is the largest size. Its inside dimensions are 32 inches long, by 8 inches wide, by 8 inches deep. A smaller size, 25 inches long, may be had if preferred.

12. SET OF DRAWING INSTRUMENTS, NO. 2076

This is an excellent set of German silver instruments. It contains 8 pieces: 5½-inch compass, attached needle point, with pencil and pen points, lengthening bar, 5-inch divider, spring bow pen, 5-inch ruling pen, box of leads and key.

13. SET OF DRAWING INSTRUMENTS, NO. 2015

This is a set of nickel plated instruments, designed especially for the young carpenter. It contains 9 pieces: 4½-inch compass, pen and ruling points, lengthening bar, dividers, ruling pen, spring bow pen, box of leads and key.

14. IMPROVED TRANSPARENT T SQUARE, NO. 373

This transparent T square is ambro lined, has maple blade and black walnut head. It can be had in any length desired: 18, 24, 30, 36, 42 or 48 inches.

Special Prizes for Three Subscriptions

In order that every subscriber entering this contest shall be fully paid for the work accomplished, we have decided to offer a limited list of Special Prizes to those who may not be able to secure more than three subscriptions. These prizes will be given absolutely free and entirely additional to the cash commission of 50 cents on each subscription.

1. STANLEY STEEL JACK PLANE, NO. 105

This is an exceptionally fine plane and is one of the carpenter's most handy tools. It is adjusted by a lever and is especially adapted for working on soft woods. It is 14 inches in length and has a 2⅛-inch cutter. Smaller planes, 9 inches in length with 2⅛-inch cutter, or 8 inches in length with 1¾ inch cutter, may be had if desired.

2. HAMMOND'S MECHANIC'S PRIDE HAMMER, NO. 175

This is one of the most expensive hammers made. It is nickel plated, has hickory ebonized handle, and octagon neck. Its weight, exclusive of handle, is one pound. Any other make, size, or style of hammer may be had if preferred.

3. YANKEE AUTOMATIC DRILL, NO. 44

This drill has an adjustable tension. The cap on top has a screw attached to it, by revolving which the spring is made longer or shorter, thereby making it weaker or stronger. The tool is made of brass, nickel plated and finely finished, the material and workmanship throughout being of the best. Eight drills are furnished with each tool. The chuck is of new and approved design, and will hold drill points absolutely tight and rigid. The entire length of tool, inclusive of drill, is 10¾ inches.

4. SET SYRACUSE WOOD DRILLS, NO. 16

This set contains nine drills. It is put up in a neat, strong box, and contains one each of the following sizes: $\frac{3}{32}$, $\frac{4}{32}$, $\frac{5}{32}$, $\frac{6}{32}$, $\frac{7}{32}$, $\frac{8}{32}$, $\frac{9}{32}$, $\frac{10}{32}$, and $\frac{12}{32}$. An attractive prize.

5. GERMAN SILVER DIVIDERS, NO. 2231

These dividers are made of the best German silver and have steel points and high finish. They have pivot point, with set screws, straightening device, hair-line spacing attachment, 5 inch.

Special Notice

If the subscriber should fail to find in these lists articles that he desires, we will be glad to substitute any other tool or article of merchandise of equal cost. Write to the "Contest Editor," stating just what you would like to secure, and he will tell you just how many new subscriptions will be necessary to secure it free. There is no reason why any subscriber should not secure any article he desires.

Details of Rewards and Conditions

HOW THE VALUABLE REWARDS AND CASH PRIZES WILL BE DIVIDED AMONG AMERICAN CARPENTER AND BUILDER SUBSCRIBERS THROUGH ITS GREAT CONTEST

TO THOSE subscribers who were on our list prior to Jan. 1, 1906, securing the most yearly subscriptions before March 1, 1906, the following Grand Rewards will be given:

For the largest number, Remington Standard Typewriter, No. 7, value	$100.00
For the second largest number, Complete Chest of Carpenter's Tools, value	65.00
For the third largest number, Dearborn 54-inch Roll-Top Office Desk, value	50.00
For the fourth largest number, Complete Set of Drawing Instruments, value	13.50
For the fifth and sixth largest numbers, Cash, each, $10.00, total	20.00
For the next five largest numbers, Cash, each $5.00, total	25.00
For the next fifteen largest numbers, Cash, each, $1.00, total	15.00

There are twenty-six (26) prizes in this list, with a total value of $288.50.

TERRITORIAL PRIZES

In addition to participating in the above distribution of Grand Rewards, Territorial Prizes will be awarded as follows:

For the largest number of subscriptions from the North Atlantic States, First prize	$25.00
Second prize	10.00
For the largest number from the South Atlantic States, First prize	25.00
Second prize	10.00
For the largest number from the Northern Central States, First prize	25.00
Second prize	10.00
For the largest number from the Southern Central States, First prize	25.00
Second prize	10.00
For the largest number from the Western States, First prize	25.00
Second prize	10.00
For the largest number from Canada, etc., First prize	25.00
Second prize	10.00

This makes an additional twelve (12) prizes bringing the total value of these two lists up to almost an even $500.00.

SPECIAL PRIZE FOR FIVE SUBSCRIPTIONS

In addition to participating in both of the above, each contestant securing five subscriptions, and for every five subscriptions secured, will be entitled to a choice of the special prizes.

SPECIAL PRIZES FOR THREE SUBSCRIPTIONS

Where a contestant is unable to secure five subscriptions, but does secure three subscriptions, he will be entitled to a choice of special prizes.

CASH COMMISSIONS

In addition to participating in the Grand Rewards, Territorial Prizes and Special Prizes, each contestant is entitled to a liberal cash commission on every subscription secured.

Conditions

The full conditions of this extraordinary contest are as follows:

These offers are made to AMERICAN CARPENTER AND BUILDER subscribers only, and is limited to those who subscribed prior to January 1, 1906.

The prizes are divided into four classes: "Grand Rewards," "Territorial Prizes," "Special Prizes," and "Commissions."

In case of a tie for any prize, the prize will go to the one whose subscriptions were received first.

Each contestant sending three or more subscriptions will participate in all four of these classes.

For every subscriber secured the contestant must send us $1.50.

Send us your new subscriptions and the payment for each subscription as soon as you get it.

As soon as a subscriber has sent in five new subscriptions the "Special Prize" should be ordered.

The "Special Prize" for three new subscriptions is only intended for those who are unable to secure five or more subscriptions.

Any subscriber of the AMERICAN CARPENTER AND BUILDER who was on the list before January 1, 1906, may become a competitor for these valuable prizes and rewards.

TERRITORIAL PRIZES

These prizes are entirely additional to all other rewards and prizes. The list of states included in each division follows:

North Atlantic States—Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania.

South Atlantic States—Delaware, Maryland District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida.

Northern Central States—Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas.

Southern Central States—Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, Indian Territory, Texas.

Western States—Montana, Wyoming, Colorado, New Mexico, Idaho, Utah, Arizona, Washington, Oregon, Nevada, California.

Miscellaneous—Alaska, Cuba, Philippine Islands, Canada, and all Foreign Countries.

CASH COMMISSIONS

Every contestant will be well paid. In addition to participating in the "Grand Rewards," "Territorial Prizes" and "Special Prizes," a commission of 25 per cent(50 cents), will be paid on every subscription secured. In addition to this liberal commission, those who participate and are most successful will have a share in all three of the other classes of rewards for special merit.

HOW TO SEND MONEY

There are four ways in which money may be sent by mail at our risk—by Postoffice Money Order, Express Money Order, Bank Draft, or Registered Letter.

Stamps may be sent in payment for subscriptions, but one or two cent stamps must be used.

The expense of sending money must be borne by the person sending it.

Money must be sent with all subscriptions—we cannot open subscription accounts with any one.

We will be pleased to furnish sample copies and subscription blanks—as many as you can use—free.

Contest closes March 1, 1906.

Read the next page. Note how few subscribers are necessary to secure the leading rewards.

Standing of Contestants to January 20

North Atlantic States

MAINE

Camden	R. E. Richards	1

NEW HAMPSHIRE

Claremont	W. H. Story	4
Exeter	George W. Lane	1
Farmington	A. Davis	1
Franconia	William Wilkins	5

MASSACHUSETTS

Great Barrington	F. P. Spath	3
Hyannisport	O. W. Marchant	2
Norwood	F. L. Colton	1
Quincy	Herman G. Olsen	1
Uxbridge	W. E. Aldrich	3
Vineyard Haven	Thomas E. Mosher	1
Worcester	Wm. F. Hyde	1

CONNECTICUT

Bristol	George H. Saxton	2
Burnside	A. W. Hayes	1
Greenwich	Geo. R. Murray	7
Madison	Chas. A. Willard	5

NEW YORK

Akron	Goodlap Deinhart	1
Bayside	Joseph Reichel	1
Brooklyn	E. Nelson	1
Bushford	Frank M. Fuller	1
Dansville	E. J. Rauber	4
Despatch	H. R. Warden	1
Fairground	George W. Sweezey	2
Fredonia	Arthur P. Jeffery	2
Houghton	Wm. Francis	1
Jamaica	Henry W. S. Bangert	8
New York	C. S. Heney	1
Niagara Falls	John Lindeberg	2
Pottersville	Henry W. Smith	1
Prattsburg	J. W. Gelder	2
Rochester	H. C. Ball	5
Seneca Falls	E. R. Stevens	1
Tottenville	W. E. Joline	1
Watertown	George Smith	1
West Rush	Frank Stiggins	3

NEW JERSEY

Bayhead	Jos. F. Morton	2
Bernardsville	H. T. Conklin	2
Cranford	E. A. Thompson	1
Phillipsburg	G. L. Creveling	1

PENNSYLVANIA

Alba	Frank A. Kiff	1
Barnesboro	John F. Bee	1
Berwick	J. C. Smether	4
Butler	E. P. Peffer	2
Carnegie	Will Geyser	1
Center Valley	Frank A. Weaver	3
Claysville	S. A. Bane	1
Columbia	C. T. Emon	2
Dorranceton	H. L. Poust	1
Fairchance	E. T. Bailey	2
Harrisburg	J. R. Matter	1
Hollidaysburg	J. A. Martz	3
Kushequa	Harry Eshbaugh	1
Lilly	A. J. Yingling	5
McKeesport	M. E. Davis	1
Mechanicsburg	Andrew Stambaugh	1
Pottstown	Luther W. Turner	1
Rice's Landing	Walter B. Guesman	5
Rochester Mills	J. A. Brooks	1
St. Mary's	Jos. Kronenwetter	1
Sheffield	F. A. Stover	1
Shiremanstown	H. L. Huntsberger	5
Uniontown	John D. Cook	1
Wyalusing	V. H. Brown	1

South Atlantic States

MARYLAND

Baltimore	J. E. Kaiser, Jr.	1

Northern Central States

OHIO

Barberton	Wm. H. Snyder	1
Byesville	J. W. Dilley	2
Cleveland	E. Holder	1
	Alonzo Parks	1
Portsmouth	W. C. Bussa	13
	J. F. Wanless	1
Sidney	S. H. Love	5
Steubenville	A. A. Arnold	3
Wadsworth	Alfred K. Houseworth	2
Westerville	J. F. Bunn	1

INDIANA

Brook	D. C. Worrall	1
Hamilton	Levi B. Brown	1
Hammond	W. Baumgardt	2
	Jos. Tratebas	1
Indianapolis	Burnett & Lewis	1
Larwill	J. S. Noble	1
Ligouier	Z. T. Cook	1
Lowell	J. Claude Rumsey	2
Mentone	Max Dunlap	1
Oaktown	W. F. Snapp	1
Pimento	Newt. McKay	1
Sedalia	W. H. Cokayne	7
Webster	I. P. P. Steddon	3

ILLINOIS

Alton	Thomas Oddy	1
Anna	T. C. Lippard	7
Barrington	H. G. Aurand	3
	E. E. Ernst	5
Belleflower	W. G. Moreland	1
Carlinsville	Harvey Phelps	1
Carrollton	A. Postlewait	2
Centralia	A. C. Schnake	2
Chebanse	G. E. Scott	9
Chadwick	John W. Spinka	1
Chicago	John H. DeYoung	1
Dewey	J. W. Fink	1
Exeter	H. C. Ward	4
Grayville	A. E. Randle	5
Harvard	F. W. Moore	1
Hinckley	J. E. Powers	1
Holder	A. W. Anderson	1
Kewanee	A. Frank Ahleman	5
La Salle	Harry Heilstedt	1
Melvin	Jacob Gedelman	1
Mendota	G. L. Fleming	2
Oregon	E. F. Davis	1
Sterling	John D. Baker	2
Table Grove	I. N. Willis & Co.	4
Upper Alton	O. M. Elder	2
Westfield	C. E. Bigelow	7
White Hall	F. F. Worcester	7
Willmette	Geo. E. Bray	1
Zion City	C. F. Billings	1
	George West	3

MICHIGAN

Belleville	F. S. Pullen	2
Detroit	E. C. Harter	3
	Frank A. Lucas	1
	H. J. Screes	1
Hartford	D. C. Cameron	1
Holland	A. Potsma	1
Otter Lake	Leonard Schott	1
Sturgis	Lew A. Rippey	1

WISCONSIN

De Pere	G. W. Fisher	2
Galesville	George W. Smith	1
Iola	Chr. K. Berg	1
Knapp	A. C. Peters	1
Milwaukee	Jos. A. Amman	1
	Arthur L. Richards	1
North Freedom	W. N. Fisk	1
Oshkosh	Henry L. Lenz	1
Plymouth	J. A. Kuster	6
Sheboygan	A. Schneidewent	1
	C. Zelle & Son	2
Wauwatosa	T. H. Sporleder	1

MINNESOTA

Crookston	Chas. J. Johnson	1
Farmington	E. L. Brackett	2
Minneapolis	Olaf Eweroth	1

IOWA

Belford	E. Golding	1
Tiffin	Geo. Osborne	3

MISSOURI

Herculaneum	J. W. Dugan	9
Kahoka	L. W. Dumas	1
Monroe City	W. L. Bond	5
Philadelphia	B. F. Leake	4
St. Joseph	H. F. Rieper	1
St. Louis	H. W. Haddock	1
Santa Fe	E. F. Quisenberry	1

NORTH DAKOTA

Ellendale	John P. Greenawalt	1
New Rockford	Chas. F. Culp	2
Minot	A. Hangse	2
Munich	Chas. H. Bitterling	1
Valley City	Philip Schaefter	3
Wales	Chas. Richardson	1

SOUTH DAKOTA

Aberdeen	George B. Narregang	7
Mitchell	Austin C. Myers	1
Pierre	Henry F. Neuhauser	1
Rapid City	D. B. Murray	1

NEBRASKA

Bladen	J. W. Wrattan	2
Bloomfield	E. D. Hunt	1
Cook	J. G. Albers	3
Farwell	Alfred Lang	2
Geneva	W. A. Hosack	2
Humphrey	Wm. E. Schmid	1
Lexington	John Haworth	5
Litchfield	J. A. Swanson	1
University Place	A. H. Thompson	1
Waterloo	W. W. Ramsey	1

KANSAS

Argentine	George Paine	1
Ashland	Wm. Evans	1
Blue Rapids	Wm. S. Winne	1
Cunningham	J. B. Thompson	1
Ellsworth	J. O. Knowles	2
Greensburg	B. R. McBride	1
Highland	W. G. Bingman	5
Lewis	C. F. Randel	7
Maple Hill	W. H. Greaser	3
Marion	H. C. Kable	1
Newton	A. G. McQuiddy	2
Parsons	J. M. Franklin	1
	John P. Olsen	1
	Paul Sharp	1
Republic	E. Van Nortwick	1
Seward	D. B. Riegel	1
Wetmore	E. G. Larzelere	1
Wilson	C. M. Lingo	1

Southern Central States

KENTUCKY

Louisville	James H. Shaw	1
Paintsville	Larin Turner	16

TENNESSEE

Cleveland	S. F. Pierce	1
Dyersburg	D. A. Gardner	3
	E. C. Maynard	1

MISSISSIPPI

Greenwood	W. J. Lacouer	6
Jackson	C. J. Harper	1
Leakesville	C. A. Hillebrand	4
Sardis	J. M. Burns	2
Tupelo	H. A. Moreland	4

ARKANSAS

Conway	John A. Herbert	2
Eureka Springs	Ed. Cunningham	1
Harrison	B. N. Ritchey	2

LOUISIANA

Burnside	Tony A. Montecino	1
White Castle	J. T. Williams	11

OKLAHOMA

Stillwater	H. B. Bullen	2

TEXAS

Bang	L. A. Wooten	2
El Paso	E. J. Ogle	1
Irving	C. C. Derrick	1
Port Arthur	Wm. Wolverton	1
San Antonio	George Powell	1

Western States

WYOMING

Buffalo	J. H. Butler	1

COLORADO

Lamar	P. S. Lynch	6
Longmont	Fred H. Thompson	1
Loveland	G. E. Wright	1
Meeker	C. M. Thompson	1
Pryor	R. L. Davison	1

NEW MEXICO

Las Vegas	Griffith Hughes	9

IDAHO

Lewiston	C. A. Strong	2

UTAH

Ephraim	T. Breinholt	2
Park City	Eric Nielson	3

ARIZONA

St. Johns	H. C. Overson	2

WASHINGTON

Charleston	Alex Kellogg	1
Medical Lake	R. W. Carlisle	1
North Yakima	W. T. Stewart	1
Pomeroy	Wm. Waugh	1
Snokomish	L. Balliet	1

OREGON

Halsey	J. W. Rector	1
Newberg	Allen Smith	1
Phoenix	E. T. Shaffer	2
St. Johns	J. H. Crook	2

CALIFORNIA

Long Beach	J. A. Kirkpatrick	2
Oroville	H. E. Johnson	2
Redlands	B. F. Corwin	3
San Diego	Sydney H. Smith	1
San Francisco	J. E. Casey	1
	James Gilchrist	1
Santa Ana	Willett S. Decker	1
Sonoro	H. D. Grayson	3

Miscellaneous—Canada

CAPE BRETON

Sydney	Jos. C. Turner	15

MANITOBA

Elgin	J. A. Maguire	1

NOVA SCOTIA

Truro	D. Henderson	1

NEW BRUNSWICK

Campbellton	R. D. McNair	2

ONTARIO

Kingston	J. C. Davis	1
Port Arthur	A. F. Manchee	2
Stratford	David Jacobs	5

SASKACTHEWAN

Regina	Andrew Menzies	5

Building Construction

J. A. F. CARDIFF

Building a Home

A SERIES OF ILLUSTRATED ARTICLES COVERING CONSTRUCTION DETAILS IN THE ERECTION OF OUR AMERICAN HOMES —FROM THE LAYING OF THE FOUNDATION TO THE DELIVERY OF THE HOUSE TO THE PAINTER

PLATE XXI takes up the construction of a double-hung sash frame in a double-plastered wall, with mosquito screen and blinds outside of the sashes and ample space for window shades on the inside stop bead. Also, the inside finish is of a somewhat better character than in preceding examples.

In locations exposed to severe cold weather and penetrating winds the double-plastered wall is particularly desirable. The walls are constructed of the usual two by four-inch studs, with one four by four-inch or two two by four-inch studs at all openings. The outside of the wall is sheathed with matched boards, laid horizontally or diagonally, preferably the latter way, and the sheathing paper is then put on; being well lapped at all corners and around all openings. On top of this the shingles, clapboards or other covering material is placed.

The inside of the wall is lathed and plastered two coats—scratch coat and brown coat. One-inch by two-inch grounds are nailed to studs as indicated at "G." A one-inch air space is then formed by means of one-inch by two-inch furring strips, marked "F," and the wall is again lathed and plastered, this time with three coats of plaster. All spaces around head, sill and jambs of window frame should be well filled up with scratch mortar, so as to be absolutely windproof.

In Fig. 88, where marked "P," two pockets are formed in the lower part of the pulley stile, for access to the sash weights. When the strip of wood dividing weight box is omitted, one pocket, usually on the inner half of the pulley stile, is sufficient. The flashing shown at the outside architrave is used only in the best grade work.

The interior finish consists of a pedestal base or wainscoting, the top member of which forms the window stool; pilaster jambs and an entablature head. With a finish of this kind the stop bead, marked "S," should always be made thick enough to take up the projecting mouldings of the cap and base, which butt against it. The panel under the window should be constructed so that it can be readily removed in case it cracks or is damaged, by taking off the panel moulding. The frieze of the entablature should be on a line with the face of the pilaster, and the face of the wainscoting should be kept on a line with the plinth of the pilaster base. Cap and base are shown in Figs. 93 and 94.

Fig. 91 is an exterior elevation and Fig. 92 an interior elevation of the window.

Another method of constructing double-plastered walls and a window frame for same is shown in Fig. 90. In this case one-inch by two-inch furring strips, marked "A," are nailed to the studs as a bearing for the lath and are placed so as to allow a one-inch air space between the inside plastering and the back plastering. The frame could be improved by placing the outside casing outside of the sheathing boards, thereby giving enough width to the pulley stile to permit of both screen and blinds outside of sashes.

In Plate XXII. we illustrate a storm-resisting window, with a double set of sashes, in a double-plastered wall, for use in a location exposed to very severe weather throughout the entire or greater part of the year.

Three by six-inch studs are used for the outside walls and the window has a box frame with a separate weight box for each set of sashes. The sill should be gotten out of two-and-one-half-inch stuff.

Fig. 98 shows how storm sash may be substituted for blinds when cold weather sets in. The thickness of storm sash and outside architrave should be at least one and one-half inches, or better, one and three-quarter inches. The joint at the meeting stiles of storm sash is shown in Fig. 99. Sash are usually rebated one-half inch.

Fig. 100 shows a double-glazed sash for exposed locations. The principal objection to their use is that dust will sooner or later get between the sheets of glass, which, with the sweating in cold weather, will soil and streak the glass where it is inaccessible for cleaning.

Fig. 101 shows a window frame constructed for the use of heavy sashes. The use of four-inch by five-inch studs and the placing of the outside casing over the sheathing boards gives the required width to the pulley stile.

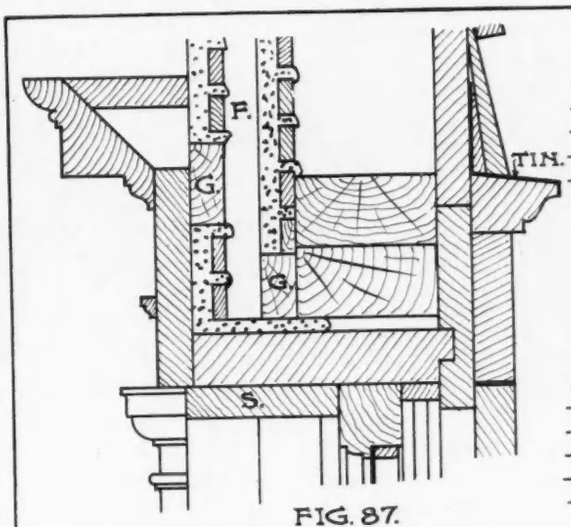


FIG. 87.

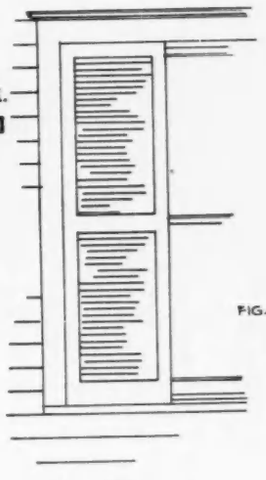


FIG. 91.

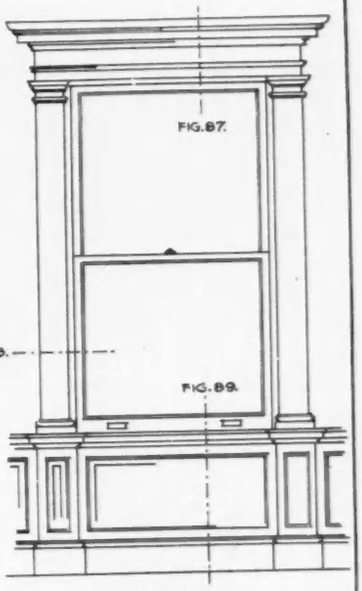


FIG. 92.

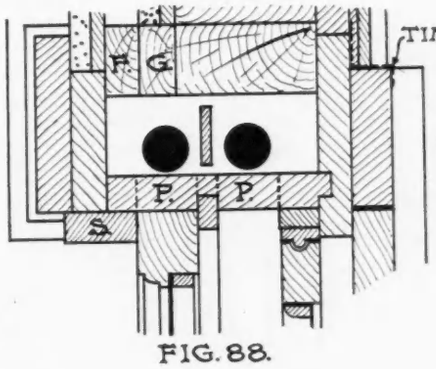


FIG. 88.

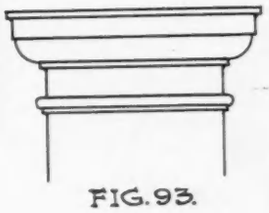
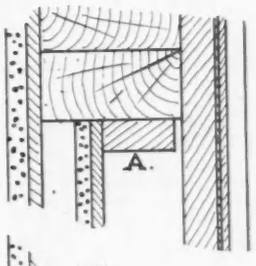


FIG. 93.



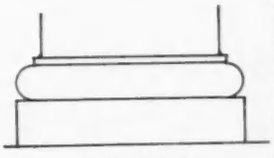


FIG. 94.

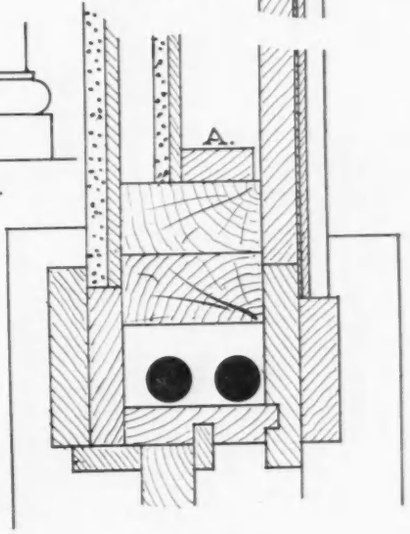


FIG. 90.

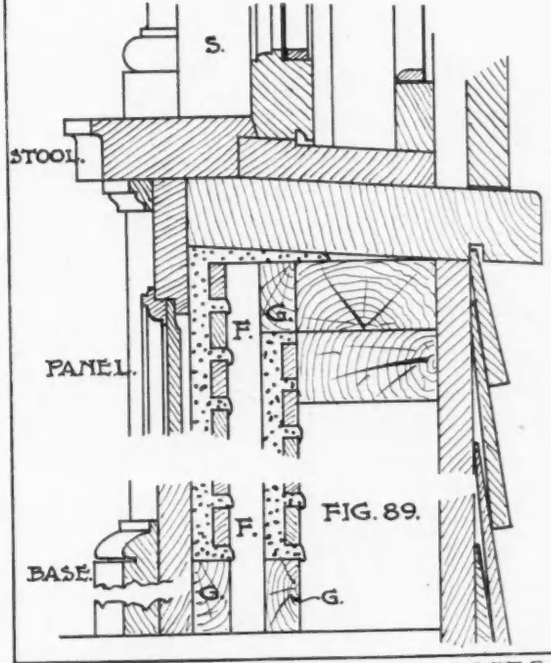


FIG. 89.

PLATE XXI.

WINDOWS.

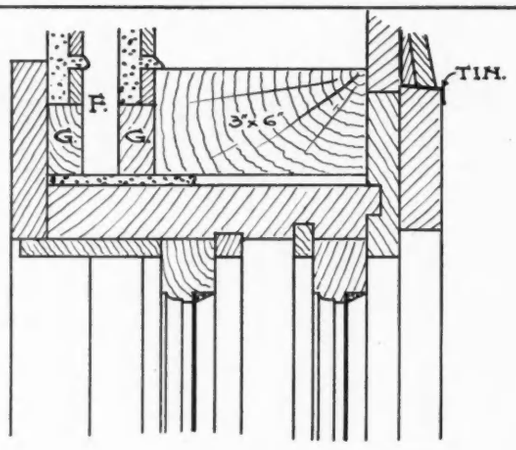


FIG. 95.

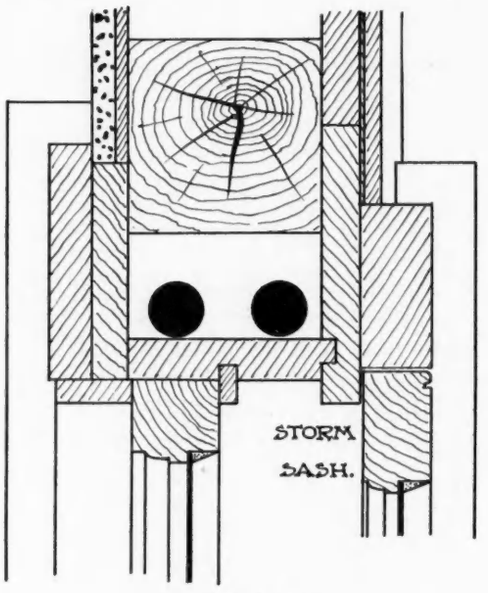


FIG. 98.

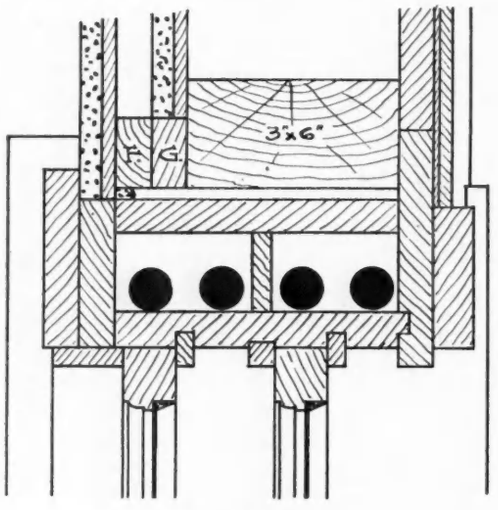


FIG. 96.

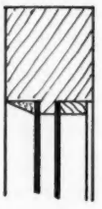


FIG. 100.

FIG. 99.

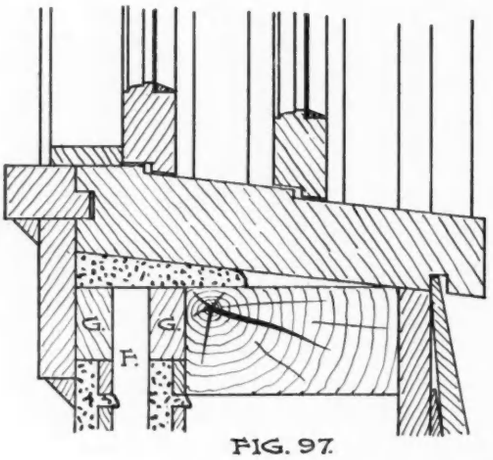


FIG. 97.

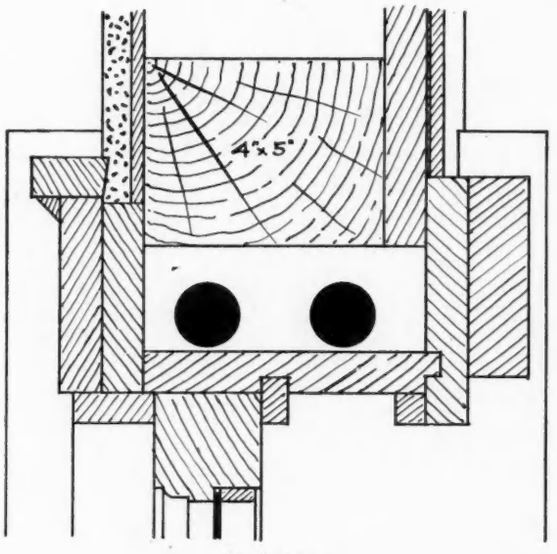


FIG. 101.

PLATE XXII.

WINDOWS.

Steel Square

ALFRED W. WOODS

How to Use the Steel Square

SHOWING THE RELATIVE DIFFERENCE OF PITCH WHEN RECKONED BY THE DEGREES OF INCLINE AND BY A RISE GIVEN IN PROPORTION TO THE SPAN—HOW TO RECKON PITCH IN CONNECTION WITH THE STEEL SQUARE

IN OUR last article we closed talking on the subject of pitches. In this the subject is continued, giving a comparison of pitches reckoned by degrees given the incline of the roof and by a rise given in proportion to the span. In engineering works, custom seems to have long since settled on the former method, while in carpenter work it seems to have as firmly settled on a rise given in proportion to the width of the gable, as one-fourth, one-third, one-half, etc. In this way of reckoning the degrees of pitch are practically lost sight of, with the exception of the one-half pitch, which remains the same in either case. Yet they are there playing their part just the same, and when rightfully understood the steel square becomes to them simply as a reading instrument, translating their parts to the standard lineal measurement.

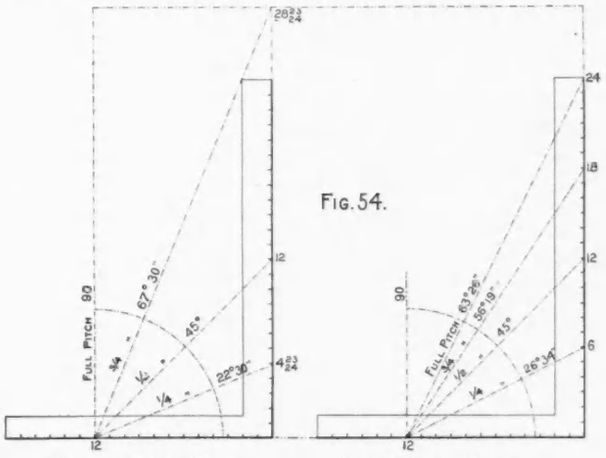


FIG. 54.

PITCH BY CIRCULAR MEASURE. PITCH BY LINEAL MEASURE.

Angles are formed by the divisions of the circle, called degrees, of which it contains 360, and these parts are again divided into 60 parts, called minutes, and these parts are again divided into 60 parts, called seconds. From this it will be seen that there are many fractional parts, and if used for the pitches would result in fractions in the lineal measurement of the rise given the roof, as will be seen by referring back to Fig. 4. Only the 45 degree is without a fraction on the blade of the square when using 12 on the tongue. Besides, there is no way of arriving at the measurement of same without a problem of no small means in trigonometry or the use of a protractor to arrive at the desired angle from which to take the measurements by scale.

In looking up the subject we fail to find pitch as applied to the roof defined in any of the encyclopedias other than by the degrees given the incline of the roof. Therefore, it is more than probable, to avoid these troublesome fractions, custom has settled on taking a proportion of the span for the rise. Thus, knowing the measurements of two of the factors (run and rise), the third (pitch) is easily arrived at by scale and from their measurements, the various angles for the cuts may be obtained with the steel square without the knowledge of the degrees entering into the problem.

The fact that the 45 degrees remains the same in either way of reckoning is no reason that 22½ degrees should equal the one-quarter, or that 67½ degrees should equal the three-quarter pitch in comparison to the pitches where reckoned by the proportion to the span.

Because, in degrees, the proportions are based on circular measurement, the 45-degree angle is at the half-way point between the horizontal and perpendicular, while in the proportion of the span, the measurements are based on lineal measurement and half of the span coincides with the tangent or rise of the 45-degree angle.

In Fig. 54 is shown a comparative illustration. Here are shown the one-quarter, one-half, three-quarter and full pitch by both methods. Note the difference in degrees: In the former they are 22 degrees and 30 minutes; 45 degrees; 67 degrees and 30 minutes, and 90 degrees respectively; while in the latter they are 26 degrees and 34 minutes; 45 degrees; 56 degrees and 19 minutes, and 63 degrees and 26 minutes.

The rise in inches of the former to one foot in run are 4 23-24; 12; 28 23-24 inches, and perpendicular; while in the latter they are 6; 12; 18, and 24 inches respectively.

By the former method, there could never be a full pitch because it would have to stand at 90 degrees, and in that case fails to cover space; in other words, it would never meet its mate. By the latter method the pitch becomes full when the rise equals the span, and consequently the roof can have any number of full pitches and fractions thereof. Yet, while they differ in the expression of pitch, they have their parts

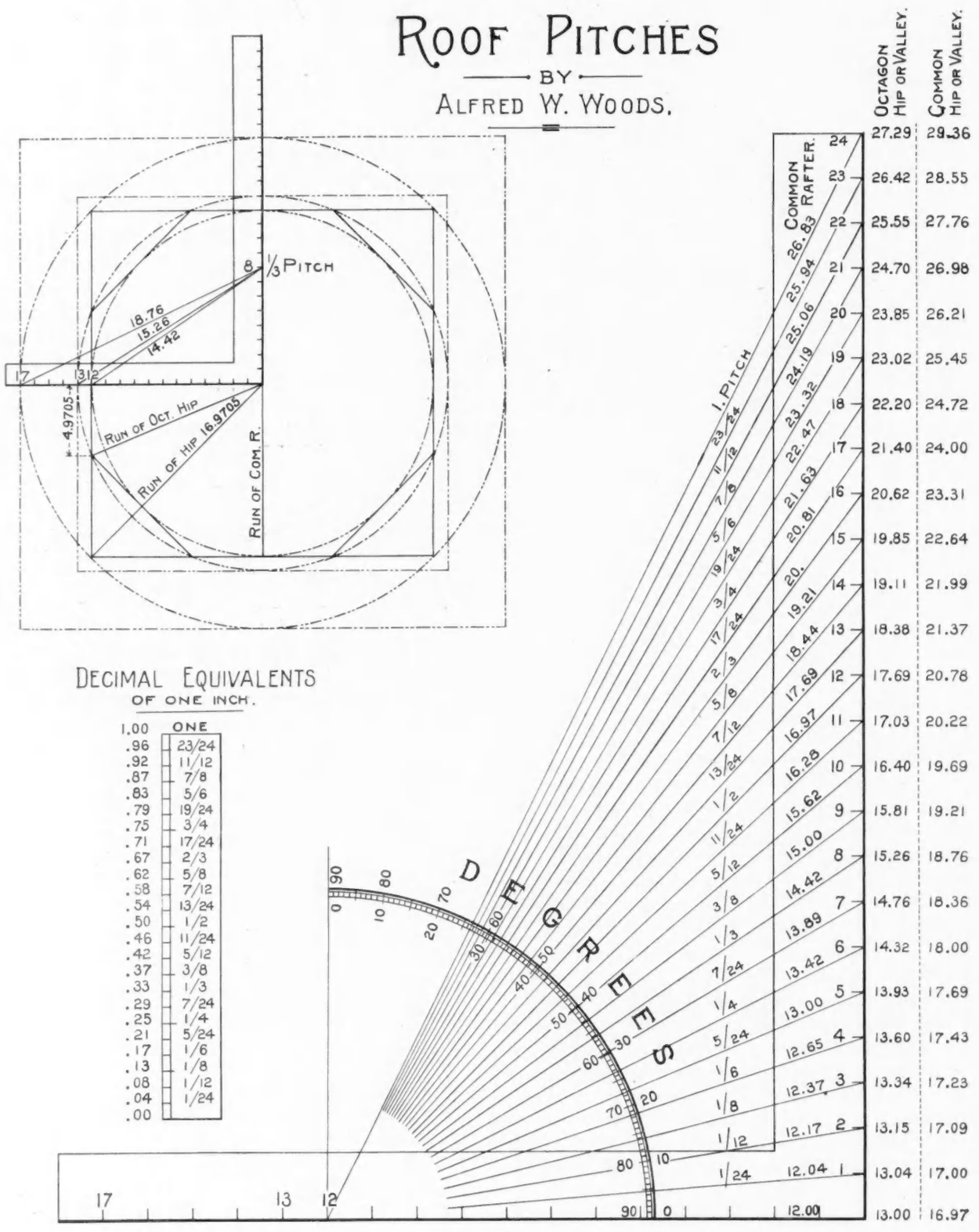

ROOF PITCHES
BY
ALFRED W. WOODS.
8 1/3 PITCH
18.76
15.26
14.42
17
13
12
4.9705
RUN OF OCT. HIP
RUN OF HIP 16.9705
RUN OF COM. R.
DECIMAL EQUIVALENTS
OF ONE INCH.
1.00 ONE
.96 23/24
.92 11/12
.87 7/8
.83 5/6
.79 19/24
.75 3/4
.71 17/24
.67 2/3
.62 5/8
.58 7/12
.54 13/24
.50 1/2
.46 11/24
.42 5/12
.37 3/8
.33 1/3
.29 7/24
.25 1/4
.21 5/24
.17 1/6
.13 1/8
.08 1/12
.04 1/24
.00
DEGREES
90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90
17 13 12
1. PITCH
23/24 11/12 7/8 5/6 19/24 3/4 17/24 2/3 5/8 7/12 13/24 1/2 11/24 5/12 3/8 1/3 7/24 1/4 5/24 1/6 1/8 1/12 1/24
COMMON RAFTER.
26.83 25.94 25.06 24.19 23.32 22.47 21.63 20.81 20. 19.21 18.44 17.69 16.97 16.28 15.62 15.00 14.42 13.89 13.42 13.00 12.65 12.37 12.17 12.04 12.00
24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
OCTAGON HIP OR VALLEY.
27.29 26.42 25.55 24.70 23.85 23.02 22.20 21.40 20.62 19.85 19.11 18.38 17.69 17.03 16.40 15.81 15.26 14.76 14.32 13.93 13.60 13.34 13.15 13.04 13.00
COMMON HIP OR VALLEY.
29.36 28.55 27.76 26.98 26.21 25.45 24.72 24.00 23.31 22.64 21.99 21.37 20.78 20.22 19.69 19.21 18.76 18.36 18.00 17.69 17.43 17.23 17.09 17.00 16.97

FIG. 55.

singly and jointly in the framing of all hip and valley roofs in determining the cuts, bevels and lengths of the rafter, which we will take up and explain later under their proper heads.

We will now drop the subject of pitch as expressed by the degrees for the time being and confine our remarks to the pitch as expressed by the proportion of the span in connection with the steel square, as shown in Fig. 55.

In this we show a line for every inch on the blade; or, in other words, for each inch in rise to one foot of run. Twelve on the tongue represents unity, because 12 inches is one foot; and since the run is 12 inches, the span must be double the run, or 24 inches, which is the length of the blade of the square. Then the first inch in rise on the blade must be that proportion to its own length, and produces one-twenty-fourth pitch, the second inch, one-twelfth pitch, the third one-eighth pitch, and continue to the twenty-fourth inch, when it becomes full. The twenty-fifth inch rise would therefore be one and one-twenty-fourth pitch, which is simply a repetition of the above pitches with a one prefixed till it gets up to 48 inches, when it takes on another pitch and represents two pitches, and continues on and on, getting fuller and fuller, but would never stand straight up because the run remains the same.

But let us get back to Fig. 55. This illustration contains a whole volume on roof framing and is to the roof as Fig. 4 (see May number) is to the polygonal miters. The fractional pitch lines for the common rafter are shown for each inch in rise up to the full pitch, and their lengths are expressed in decimal figures to the one-hundredth part of an inch, while to the right of the blade the same is expressed for the corresponding octagon and for the common hip or valley for a square-cornered building, which are reckoned from 13 and 17 on the tongue respectively. However, neither is absolutely correct, though near enough as far as the cuts are concerned. The greater deviation being in the hip for the square-cornered building. It lacks .0295 of being 17 inches and represents the run of the hip to a 12-inch run of the common rafter. Its true length being 16.9705 inches, this is the length from which we have reckoned for the lengths of the hips instead of 17, as is the usual custom. This may seem a trifling difference, and so it is in a short run and low pitches; but suppose it is for iron construction. To begin with, the shortage of each foot in run with the common rafter is .0295 of an inch; added to this the gain it would have in the pitch, which would be .015 of an inch by the time it got up to the full pitch for the common rafter; and this added to the .0295 to start with would be a difference of .0445 of an inch to the foot in run with the common rafter. Now suppose the run to be 18 feet; $18 \times .0445 = .8+$, or 19-24 of an inch difference; or, if no account was made of the gain in pitch, the .0295 of an inch in the run would amount to over half an inch in the length of the hip alone. This is a common error and while it is not much and probably would never be noticed in wood construction, it is well to know this discrepancy and guard against it when the occasion demands, and for that reason we give the correct amounts. The shortage in the octagon is not so pronounced. Instead of it being in the run, it is the tangent that is lacking the same amount, it being 4.9705 instead of 5 inches. This coming as it does cannot affect the length of the rafter nearly so much as in the above.

We explain this shortage better by referring to that part of the illustration in Fig. 55 showing the plan of a combination square and octagon frame with the heel of the steel square resting at the center. From this it will be seen that the two outer circles catch the corners of the frame and seemingly intersecting the tongue at 13 and 17 and represent the figures to use on that member for the seat cuts, but the true length of the run of the hip is 16.9705 and that for the tangent of the octagon is 4.9705.

In connection with this illustration we also give a table of decimal equivalents to the one-twenty-fourth part of an inch for convenience in finding their value in common fractions.

Concrete and the Bricklayers

Certain obvious advantages connected with the use of concrete instead of wood and brick for buildings of all kinds have persuaded a good many builders to employ it, with its modern improvements, for factories, apartment houses, stables, garages and cottages. So determined is the demand this year that those architects who have mastered the science of reinforcing concrete with iron and steel can scarcely accept all the commissions offered. Already the bricklayers and masons have taken alarm lest the new fashion in building materials should affect their labor market. Recently there was a call on their leaders to put a stop to a "fad" which might seriously interfere with their power over the building trade. And there is some reason for their anxiety.

The tendency of wood and brick to rise steadily in price and that of cement, the dearest ingredient of concrete, to fall, point to an economy in this material which builders cannot fail to see. Just now complaints are heard everywhere that men of moderate means cannot afford houses even in the country, owing to the extraordinary rise in cost of labor and materials.

A little systematic observation is of more value than a great deal of surface knowledge and enthusiasm.

Just because a rolling stone gathers no moss is no reason why a man should become a fossil.

It takes more than a derrick to raise hopes.

Farm Buildings

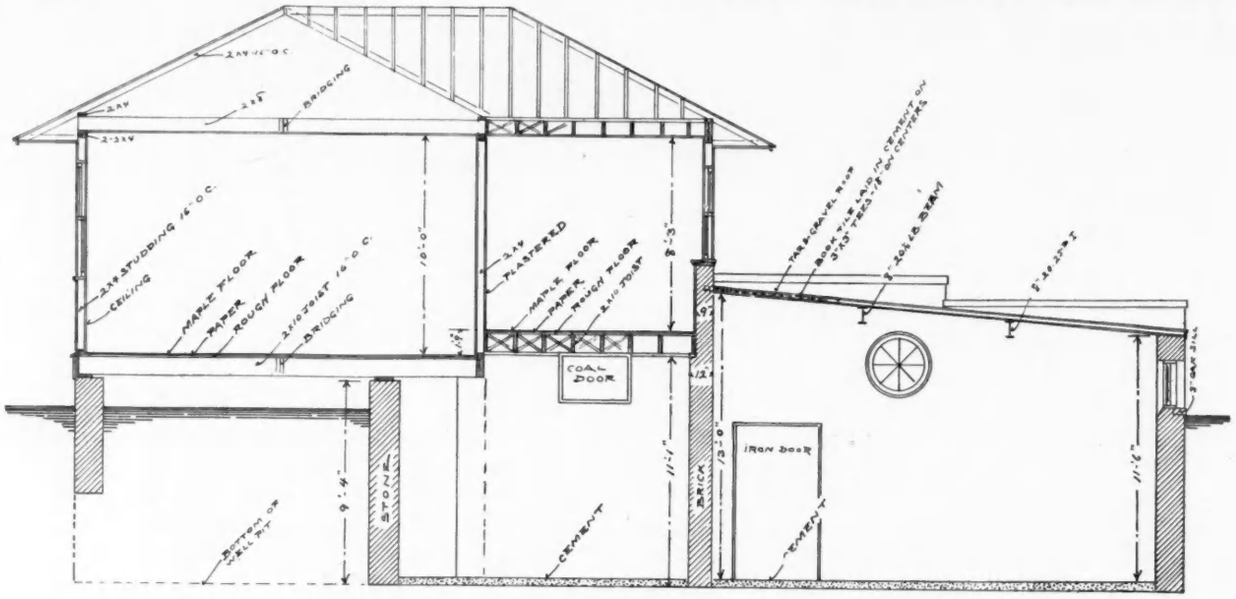
HENRY H. NIEMANN

Power House for a Farm

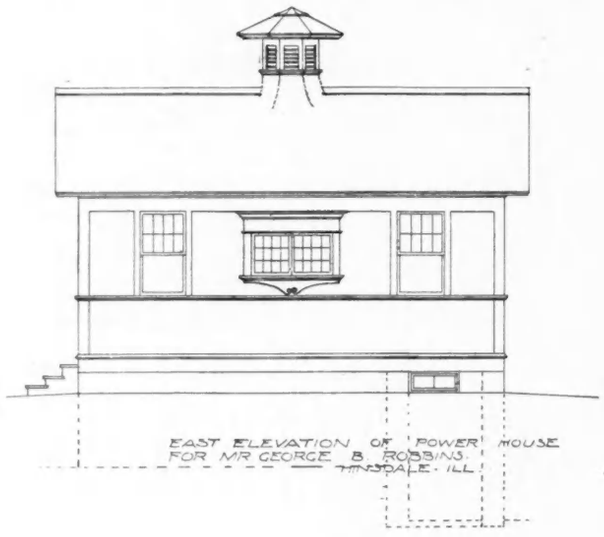
WELL EQUIPPED WITH ENGINE AND MOTORS TO HEAT AND LIGHT THE ENTIRE FARM—FURNISHES POWER TO RUN ALL NECESSARY MACHINERY—DRAWINGS SHOWING CONSTRUCTIONS

THE drawings and photograph here shown will give the reader a good conception of the power house of the George B. Robbins farm and will, no doubt, be interesting to the mechanics of rural buildings.

This building gives shelter to the various mechanism which furnishes the power, light, water and heat to the different buildings of the farm and thus becomes one of the most important buildings. Its engine room is equipped with a powerful Westinghouse,



SECTION SHOWING FRAMING OF POWER HOUSE

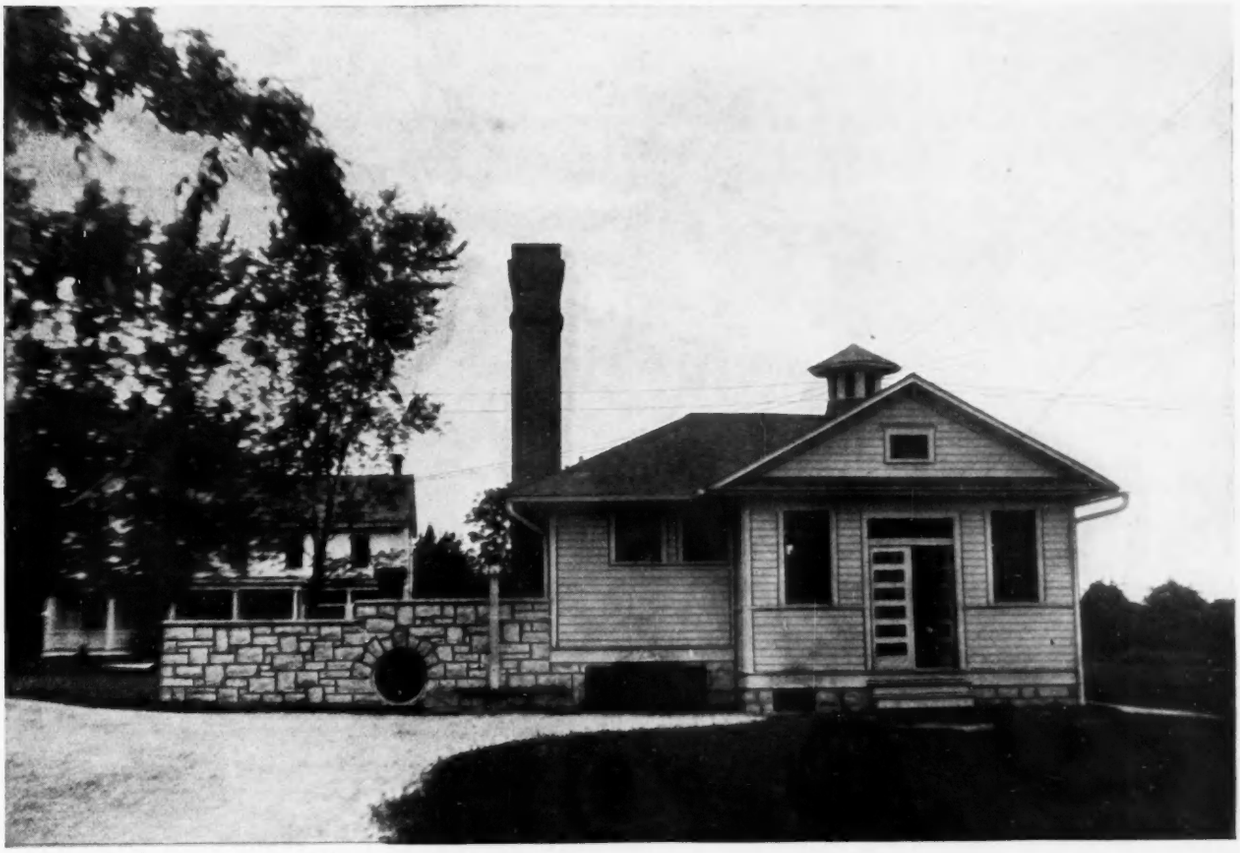


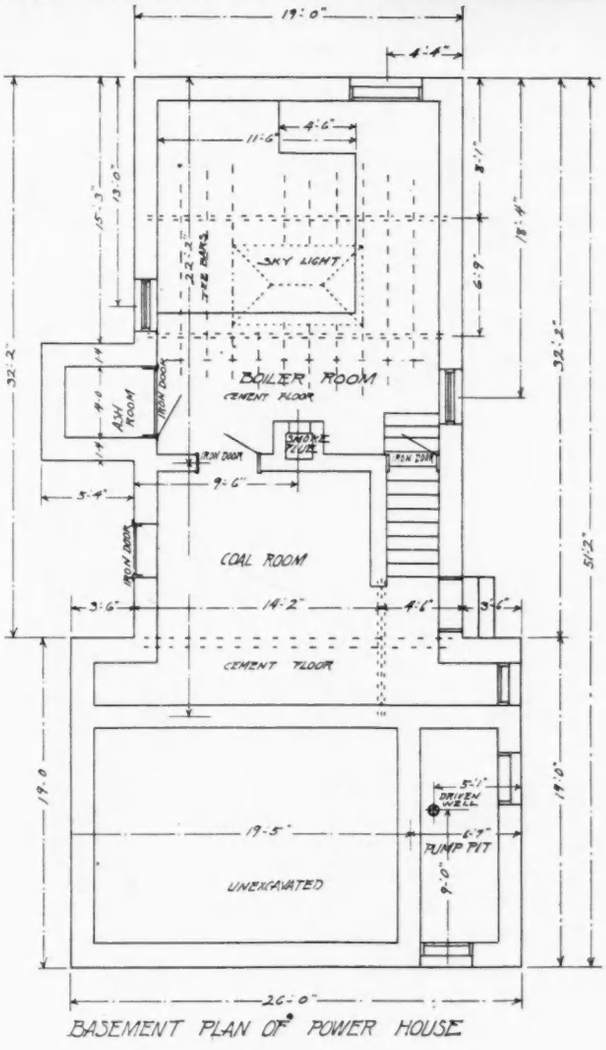
EAST ELEVATION OF POWER HOUSE FOR MR GEORGE B. ROBBINS HINSDALE, ILL.

three cylinder, gas engine which supplies power for pumping water and generating electricity for light and power for the various small machines such as cream separator, churn, ensilage cutter, grain elevator, ice hoist and for many other purposes about the farm.

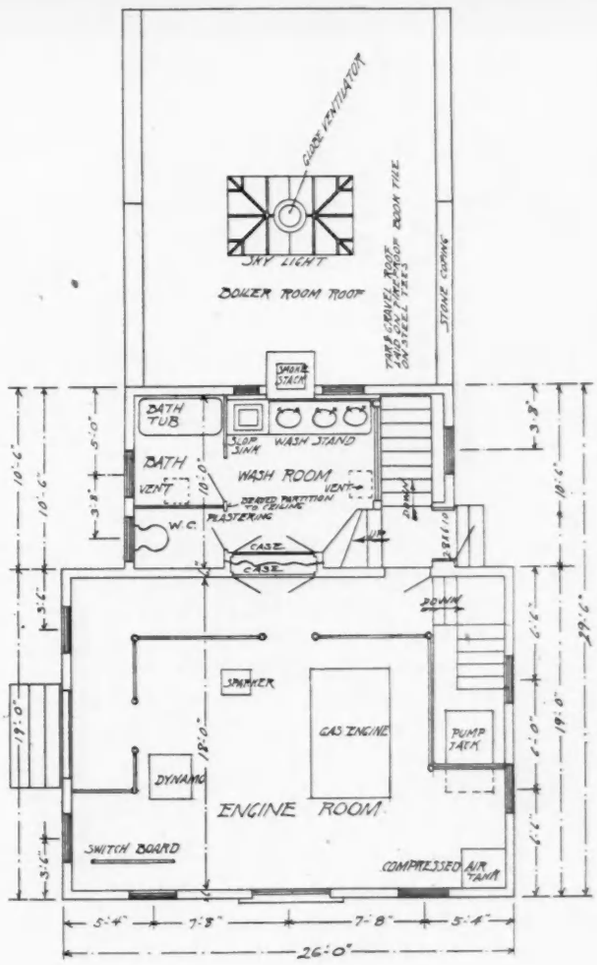
The various electric circuits are controlled by a modern marble switchboard, from which the wires run up to the ventilator on the roof of the building and from thence to the different buildings, supplying them with incandescent light and power.

The pumping apparatus supplies water from a deep driven well to two large pneumatic pressure storage tanks. The soft water supply is pumped from large cisterns with a total capacity of 700 barrels into another pneumatic storage tank; the three tanks supply the various buildings with cold, hard and soft water,





BASEMENT PLAN OF POWER HOUSE



FIRST FLOOR PLAN OF POWER HOUSE

having a pressure of about 80 pounds per square inch and a capacity of 27,000 gallons.

The boiler room is of fireproof construction, having stone walls and a ceiling of book tile laid on steel T bars, bedded in cement; this ceiling also forms the roof which is of asphalt and gravel. The boiler room is built partly below ground so that the steam return pipes from the various buildings will slope back to the boilers. Both boilers are of the high pressure, fire-box type; the larger is of sufficient capacity to heat all the buildings in the coldest weather and the smaller to furnish high pressure steam at all times for the sterilizing oven, creamery, laundry and other purposes.

This building is connected to the other buildings with a network of pipes run through underground conduits which contain hard and soft water, hot and cold water and steam supply and return pipes. Between the boiler room and engine room is the toilet and wash room for the employes of the farm. Under this wash room and under part of the engine room is a large basement for coal and fuel. The exterior of this building is very pretty and from an architectural point of view it is in harmony with the other buildings.

Public Library Building

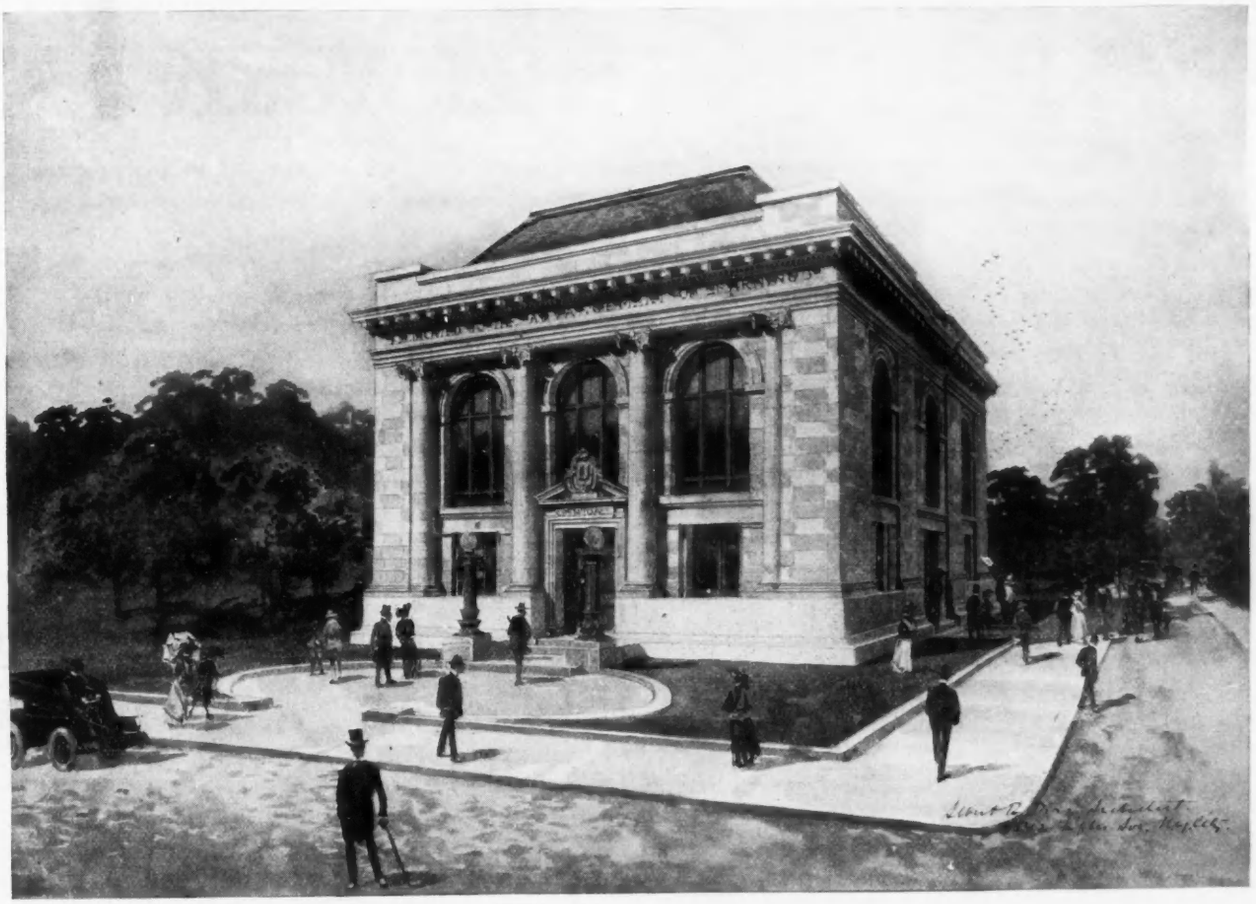
BUILT SO AS TO BE A CREDIT TO THE TOWN—ARRANGEMENT OF ROOMS AFFORDS GREAT CONVENIENCE IN DISTRIBUTING BOOKS

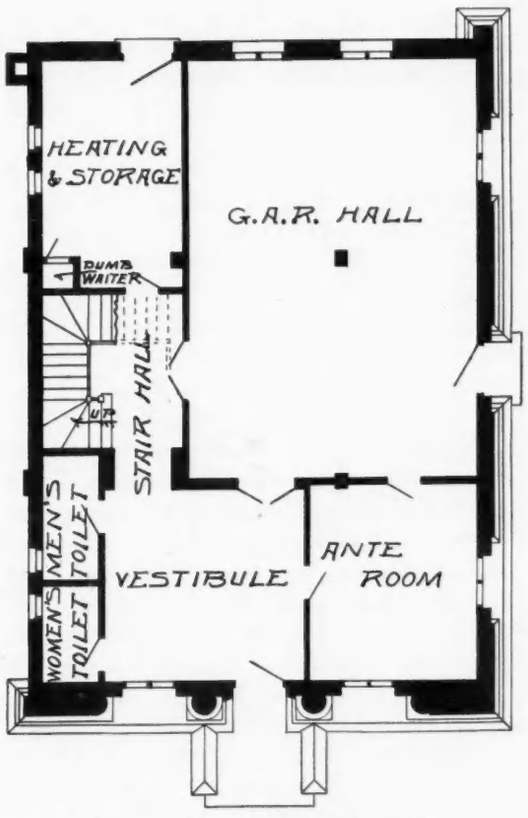
WE HEREWITH show the perspective and floor plans of a public library built in South Haven, Mich., during the past year. The architect for the same was Albert R. Ross and the contractor J. L. Simmons. The building is forty by fifty-four feet and is constructed of Bedford cut stone. This gives it a rich imposing appearance and makes it one of the finest buildings in the town. The roof is of slate. The floors in the vestibule and stair hall are in mosaic. The interior woodwork is finished in black and the walls are appropriately tinted. In the basement is a large hall which can be used for different meetings. The toilet rooms are also located here and the heating and storage plant. The building is heated with hot water. The first floor is divided into the stack room, main reading room, reference room and delivery hall. There is a large table at the entrance of the stack room, where the books are given out.

The total cost of the building is $12,500.

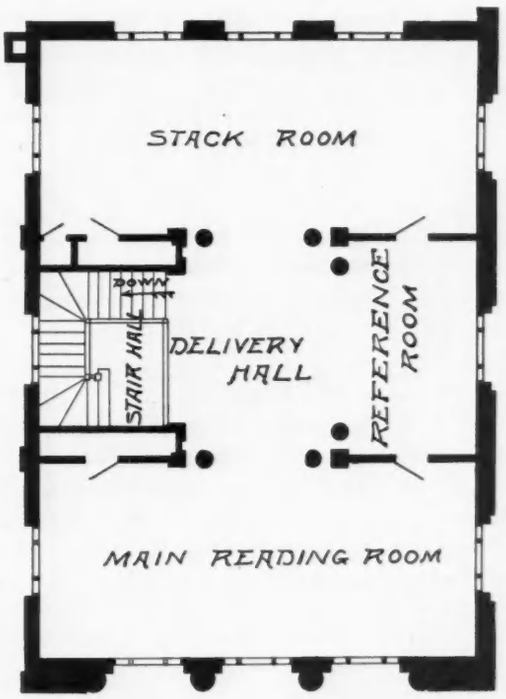
Brazilian Woods

A German consular officer, writing to his government, points out the enormous possibilities of Brazil's forests and calls attention to the fact that an American company, with $5,000,000, is beginning to exploit some of the best regions. He assigns as a reason for the backward state of the lumber trade the fact that communication with the woods was bad, freights and wages high. The new company hopes to overcome all these by the application of modern transportation and milling methods.





PLAN OF BASEMENT



PLAN OF FIRST FLOOR

PLANING MILL WORK

J. CROW TAYLOR

Care of Small Band Saws

IMPORTANCE OF SETTING AND FILING—AMOUNT OF STRAIN TO PUT ON A SAW OF ANY GIVEN WIDTH—CAUSE OF VIBRATION AND HOW TO REMEDY IT

IN THE care of small band saws, while the subject of brazing has been discussed first, it is in order to remark that skill in the art of preventing the necessity of brazing is just as important as to be able to do the brazing when it is needed. Saws will eventually give way and crack from continued use even with the best of attention, but there are many more brazes caused by lack of proper attention to the saw while in operation than from the metal just naturally giving out. The first item of consideration, of course, in the proper maintenance of the band saw is that of setting and filing, a matter which should not require any extensive treatment here, because the same theories and practices that obtain in fitting hand saws apply also to band saws. There is the one difference that the band saw is used indiscriminately as a rip saw and crosscut, but as most of the work is in the nature of ripping, it is generally treated as a rip saw and filed square, with spring set in the teeth, just as you put it in your hand rip saw. There is a difference of opinion as to the kind of set to use in this work, but if you have a Morrill set for your hand saw you can very easily adjust it and make it do good service in setting band saw blades. There are some instances where a heavy lot of crosscutting is to be done, where it might be advisable to file the teeth a little fleaming, just as you would your hand crosscut saw, but for general purposes file your band saw square. The saws should be jointed, of course, and preferably jointed while on the machine, which can be done while the saw is in motion with a piece of emery or grindstone. In the matter of the size of tooth, number of points to the lineal inch, it is a little difficult to give specific advice without knowing exactly the nature of the work in hand. But it is generally a good idea to have among your saws a variety in teeth sizes. For some work six or seven points to an inch are advisable, while in other classes of work three and four points are better, and on wider blades for resawing you may come down to two points. After using saws with one kind and then another kind of spacing for the teeth you will be able to determine for yourself which gives the most general satisfaction for the work you have, and that is about the only way to get at it right.

Tension of a Saw

When you put a saw on a machine you will find that the most difficult question to come to a definite conclusion about is tension. Training it on the wheels so that it will run straight and stay back against the guide without pressing too hard and straining is all very simple and a correct idea which should be very easy of attainment. But, when it comes to tension, there is nothing very positive to go on. Practically all band saw machines are provided with a hand wheel and screw for raising and lowering the top wheel to take in varying lengths of saw blade and enable one to tighten the saws up to whatever tension may be desired. The earlier types of machines had spring tension devices, but the later types have a weighting device for putting tension in the saw, the weight being made to slide in or out on a lever, and thus put more or less tension in the saw. While this is an improvement over the old designs, there is nothing in any of them to give one a clue to just how much strain to put on a saw of any given width. The only thing to do is to use your own judgment and work with this idea in view: You want to put just as little strain on the saw blade as is necessary to make it run steady and stand up to its work. In other words, you should guard against over-straining your saw, because it is not only hard on the saw, but makes the machine run heavy and sometimes causes heating in the journals. The saw, if run too slack, will show a decided tendency to shake and chatter in the guard block on the back side of the machine. The chattering tendency being governed somewhat by the general condition of the machine itself, but a little practice and a little experimenting will enable you to tell with a reasonable degree of certainty when you have got strain enough to make your saw run steady. When you get that it is generally enough.

Cause of Vibration

If you have trouble with vibration in your saws and in your machines, try to locate the cause and remove it, for this is one of the hardest things on both machines and the saws. See that the machine is setting steady and is free from vibration contributed by other parts of the factory. Then examine the wheels and see if they are true and round on the face. Sometimes when rubber bands are put on the wheels to act as cushions to the saw blades they are not evenly stretched, and as a result, the face of the wheel becomes lumpy. In the case of lumps on the wheels dress them off. This is easier said than done, but it can be done. Some people fasten a piece of sandpaper on a block and hold this against the wheel while it is in motion; others

take a file or rasp and get a rest for it so that they can bring its face or corner in contact with the surface of the rubber while it is running and smooth it off in this way. There is really no perfect way for doing the work, for rubber is one of the most difficult things to work with tools and cannot be easily turned off with a turnnig tool like one would turn wood. With the faces of the wheels trued up, if there is still vibration, the chances are that one of your wheels is out of balance and should be attended to. This contingency does not arise very often, however, for most wheels are put in balance in the factory before sending out, still it will be well to bear it in mind, for if they are out of balance they will never give satisfactory service till balanced up.

Some day, in the course of events, you will likely discover that there is something wrong with the top wheel. There will be a flapping and thumping that will finally resolve itself into the fact that the rubber band on the top wheel has come loose from a section of the wheel rim and is impelled by the centrifugal force of the wheel in motion to swing out when it is released from under the saw in front and flapping back again when it comes in contact with the back side of the saw again. Then you will begin to wonder about band saw wheels and rubbers. Big band saw machines for sawmills carry their saws right on the iron face of the wheel, but the saws are trained so that the teeth extend beyond the edge of the wheel, a thing which is not practical in the operation of a small band saw, so the small band saw rig is provided with a flat soft rubber tire on the wheel to form a cushion for the saw teeth so as to not take out the set and dull the teeth. It is a simple thing, but this little rubber band can cause you lots of trouble when it begins to come loose, and it is a strange fact that it is nearly always the top wheel that comes loose first. Just why this is has not been satisfactorily explained, but it is a pretty generally recognized fact just the same, and the chances are your top wheel will use nearly two rubbers to your lower wheel one.

Putting on Rubber

When your rubber comes loose strip the machine of its saw, take the wheel off and examine its condition. If the rubber is badly worn the best thing to do is to order a new one. If it is not worn badly, however, then there may be a chance to reset it and get good service. Sometimes you may take a piece of sandpaper and clean off the face of the wheel under the loose section of rubber, take some glue and glue it down again and it will stand. Oftener it becomes necessary to take the rubber all off the wheel, clean both the rubber and the wheel and then put it on again just as if you were putting on a new rubber. Now, a rubber band for a wheel, whether new or old, should have to stretch considerably in putting it on the wheel, otherwise it will be very difficult to hold. If it does not stretch tight on the wheel, if your old rubber seems in view of this to be a little too long, cut and lap the rubber, scarfing the ends back, say two or three inches. Cement the lap together with rubber cement and let it dry before putting on the wheel. To put a rubber on a wheel the most important thing is to get the face of the wheel thoroughly clean and absolutely free from all oily or greasy substances. Some resort to one thing and some to another for this purpose. Some use sandpaper and some use concentrated lye to cut off all grease, and then rub thoroughly dry with dry waste, and there are a number of other ways of doing the work, enough that you may choose your own method, bearing in mind the one fact that you want to get glue to adhere to the iron face. For holding the rubber on you can use any good glue, but the general shop practice is to use a good liquid glue. Cover the face of the wheel evenly and liberally with glue, then let two men get hold of the rubber band with all four hands, standing opposite each other, and stretch it on to the wheel, taking pains to get it stretched well and evenly all around. Sometimes it may become necessary to use some rods or sticks in the form of levers to assist in this work, but generally two men can stretch a band on a wheel. Go over the wheel carefully at once, before the glue sets, and adjust every part of the rubber so that it is on the wheel evenly, and press it against the face all around with the hands so as to get it settled down firmly all over. Then let it lay for twenty-four hours before putting it on the machine.

After you get through with putting the first rubber on you will wonder what it is that makes them come off, and be in a humor to take steps to guard against it, because new rubbers cost money, and it takes time and work to put them on. There are different causes for rubber coming loose, but probably the most general cause is from the use of coal oil on the saw, or from moisture, which may come from various sources, including sawing of green or wet material. Either of these will in time cause the loosening of glue joints, and while it is not possible to entirely prevent them one can guard against it to some extent. The use of coal oil on the saw is good for the saw, especially where one is cutting yellow pine, or any wood with resin in it, because it is one of the greatest cleaning agents we can get hold of, but it should be used judiciously and in as small quantities as possible, for while it is good for the saws, it is hard on the rubbers. In other words, don't be sloppy with it. Use it whenever you need it, but be nice about it.

✣

Applause for our efforts is the incentive that often helps us to the highway of accomplishment.

✣

We would never fully realize how great some people are if they didn't tell us.

✣

Don't try to be whole-souled in a half-hearted sort of way.

Painting the New House

WHAT WOOD FILLERS CONSIST OF—WHY BENEFICIAL TO INTERIOR FINISHING—HOW TO PREPARE AND APPLY—PREVENTING THE DARKENING OF THE WOOD

BEFORE considering the actual work of the preparation of the surface for finishing and of the actual application of the varnish or other finish which is to be used, we should take up briefly a class of materials upon which much of the beauty and durability of the subsequent varnish structure depends—the wood fillers, and the surfacers or first coaters.

For the preparation of all open grained woods, such as oak, chestnut, ash and the like, in all cases where a smooth surface is desired, it is necessary to fill up the open grain of the wood with a hard, transparent substance, which should not be acted upon by the tannin or tannic acid contained in wood of this character, and which should be chemically inert in regard to the varnish that is to be applied upon it.

If varnish is coated directly upon one of these open grained woods, it would sink down into the inequalities and would give a surface that was far from level, and even several subsequent coatings would still show traces of this irregularity. It is true that it might be possible to produce a perfect finish by means of varnish alone, provided much labor was used in rubbing down these inequalities with pumice, but it would be a tedious and expensive means of obtaining an end that is more directly reached by the use of a paste wood filler. This will give a smooth, hard and glassy surface, to which the subsequent coats of varnish will adhere firmly and upon which they can be made to lie in smooth, even films that will take but comparatively little labor to rub to a practically perfect surface, and upon which a high grade piece of polished work can be produced.

A paste wood filler might correctly be termed a paint, inasmuch as it is composed of a solid substance held in suspension by a liquid or vehicle. Paste fillers of all sorts have been put on the market, and many different materials have been used as the pigment base, from corn starch and potatoes to china clay, barytes or whiting, but the majority of these have little value. Vegetable substances will in time decay, while soft mineral bases, such as china clay or whiting are unfit for the purpose, being absorbent and taking up moisture from the wood and swelling. The best pigment base for a wood filler is very finely ground silex or quartz. When dry this is a white powder, but when mixed with a quick drying oil varnish, by some curious and not exactly understood law of optics, it becomes transparent and remains so even after the hardening of the varnish film. One test of a good filler is to spread a little of it upon a clear white board and rub it back and forth with the blade of a palette knife for a few minutes. The silex being very hard and having a slight grit, although it should be ground so fine that the grit cannot be detected by the fingers, will wear away the surface of the palette knife very slightly yet sufficiently to darken the board. A filler that is not made of silex will show no darkening.

Only enough varnish should be used in the preparation of a good filler to form a sort of paste, and the filler must be thinned down to working consistency with turpentine just before it is to be used. It is applied with a short, stiff brush and rubbed well into the pores of the wood across the grain. It is not sufficient to simply apply the filler like a paint as some wood finishers do who care more about saving themselves hard work than they do about the quality of the finish. The filler should be allowed sufficient time to set; that is, for part of the turpentine to evaporate—when it is to be well rubbed across the grain of the wood with coarse burlaps or bagging. Some finishers use excelsior or curled hair, but these are not so good, as they have a tendency to drag the filler out of the pores. The filler must not be allowed to become bone dry before rubbing—as specifications sometimes mistakenly call for—or it will be impossible to rub it at all, or even to cut it down with sandpaper, for the silex and varnish will form a harder cutting surface than the glue and sand of the sandpaper. After rubbing, the surface of the wood must be wiped off with a cloth in order to remove any surplus filler.

It is often stated that the wood is so completely filled by one application of the filler that it would be worse than useless to give the wood a second coat. This, however, is denied by many experienced hardwood finishers, who make a practice of giving a second coat of filler, especially on oak, chestnut and ash. This second coat of filler lies upon the surface of the wood in a thin, smooth film, as hard as glass, and acts more as a surfacer than as a filler. While it is perhaps desirable to use it when the finisher understands how to apply this second coat of filler, it is

not well to specify it in competitive bidding for the majority of hardwood finishers would regard it as ignorance on the part of the architect, or builder, and if required to carry it out, would probably fail to produce the result desired because they were ignorant of the method of doing it.

Wood fillers are not only used for the purpose of leveling the surface of the wood, but they serve the additional purpose of bringing out more fully the beauty of the markings of the grain. To this end they are not only used plain, but they are stained or colored with various pigments. Antique oak is produced, for example, by darkening the filler for oak wood by the addition of burnt Turkey umber, in varying proportions; golden oak is made by adding Vandyke brown and black asphaltum varnish to the filler; Flemish oak is made by the addition of Vandyke brown, burnt Turkey umber and drop black and forest green oak requires a filler stained with lamp black and chrome yellow. Other woods, such as mahogany, walnut and ebony are usually filled with a paste filler that has been toned up to match the color of the wood. Many beautiful effects can be produced by means of stained fillers, without any general staining of the wood.

Where a very light colored wood is to be filled, the oil in the varnish with which the filler is mixed might cause a darkening of the wood, if the filler were applied directly to the bare wood. Hence some finishers recommend the application of a very thin coat of shellac to seal up the pores and to prevent the oil from the filler from sinking into the wood and discoloring it. This would be necessary only in those cases where it is desired to avoid even the slightest darkening of the wood. For all ordinary cases the filler should be applied to the bare wood.

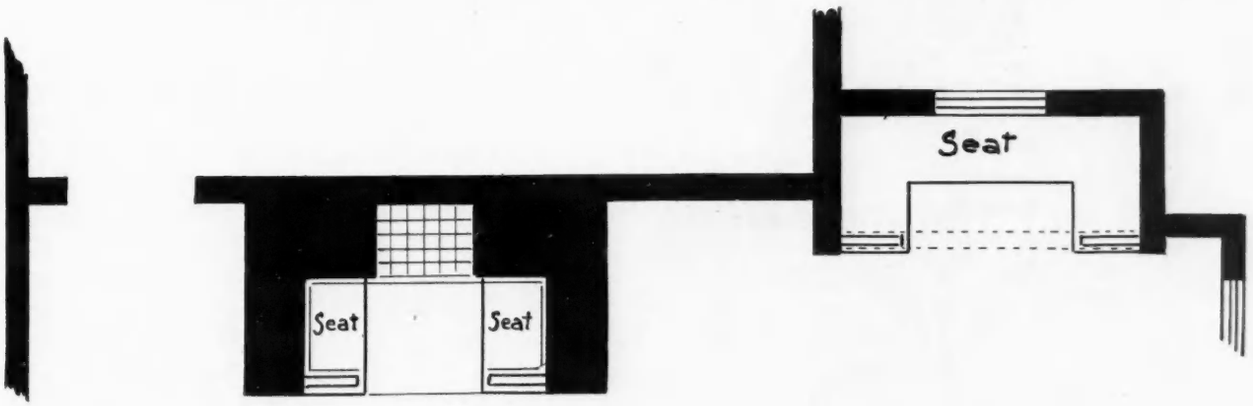
The use of a coat of linseed oil under a finish that is made up of varnish coats is strongly condemned as an oily undercoat will invariably cause subsequent coats of varnish to peel. In carriage and railroad car painting, where varnish is applied over paint, the colors are not ground in oil like house paints, but are ground in a peculiar kind of varnish known as grinding japan and are thinned to working consistency with turpentine.

Hall in a Country House

DESIGNS FOR A COUNTRY HOME SHOWING THE LONG FULL CURVES—COMBINATION OF COLOR TO USE TO GET THE BEST EFFECTS

By Sidney Phillips

THE scheme of decoration suggested by the accompanying sketches is particularly suited for the hall in a country or suburban house, though it might also be adapted to a dining room or a den. To make it more intelligible, we show a sketch plan in order to illustrate the fireplace, with its inglenook and stone seats, that could be made very attractive with gay cushions, and the bay with its window seat and arched beam supported by quaint twined columns and brackets with a long and graceful curve. As will be noticed by an inspection of the details of the design, it is carried out in the spirit of the modern art, the moldings having long, full curves, with no small members or quirks to gather dust and dirt. Of course, the design must be adapted to the shape of the room and the high panelled wainscot may be used independently of the fireplace or the window seat, or the arrangement of the apartment may make it necessary to have the fireplace on one side and use the bay window idea as a sort of cozy corner.

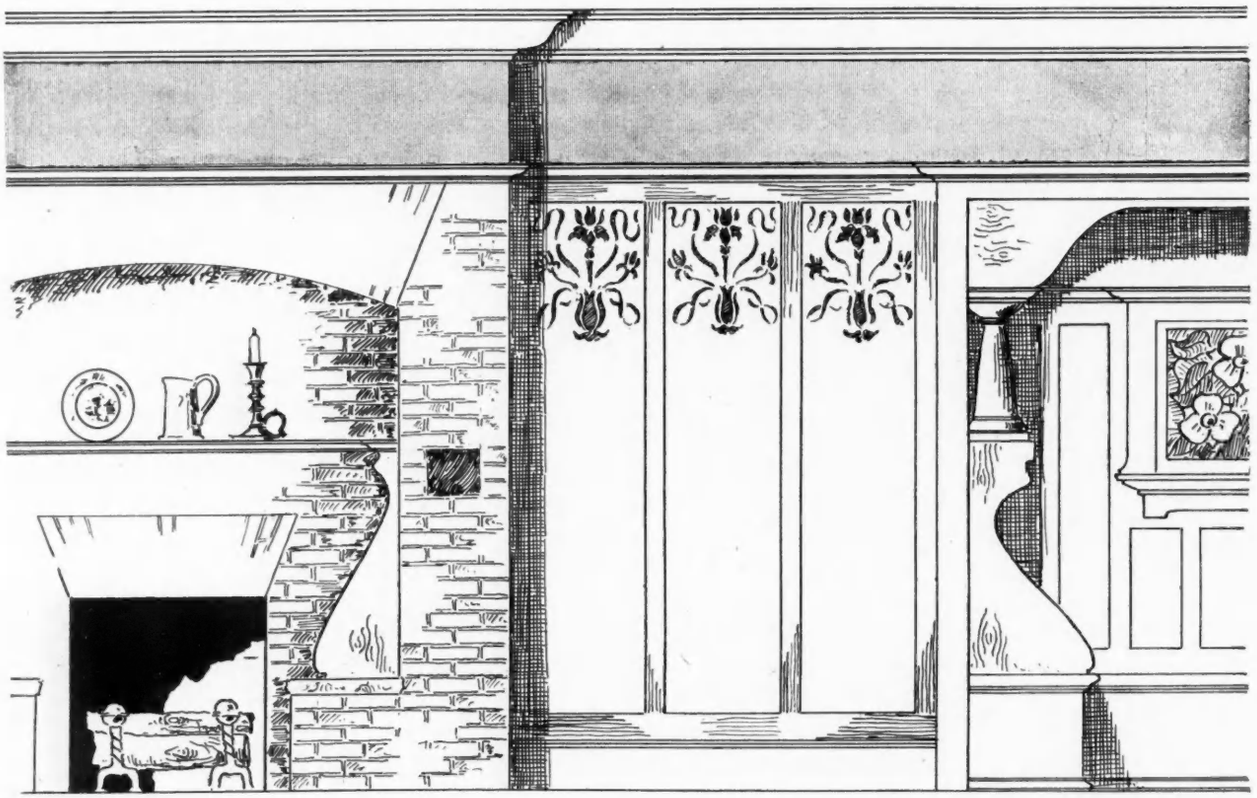


Sketch Plan

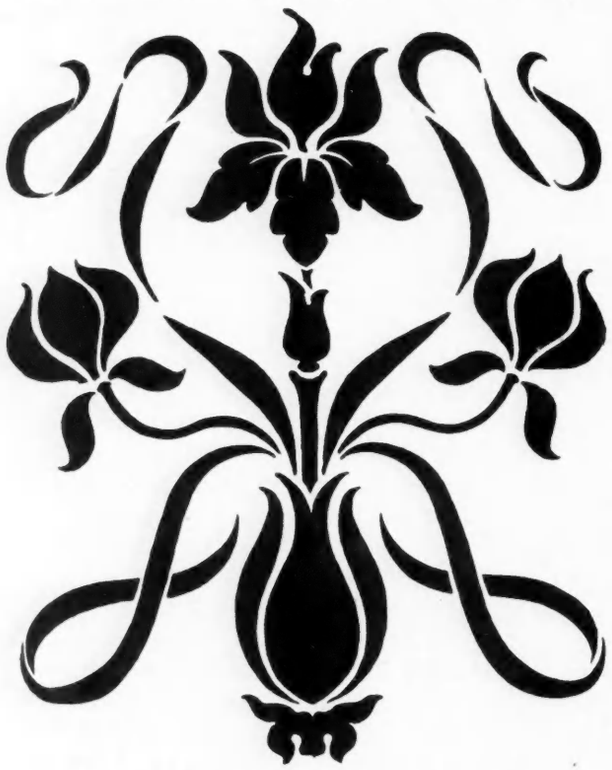
The room is intended to be panelled for a height of from six to eight feet with strips of three-quarter-inch boards, about three inches wide and having rounded edges, forming long panels, eighteen inches wide. These are to be filled with a blue, gray or very light green buckram, which is pasted on the wall. In the upper part of each panel a decorative design is stenciled—shown in larger scale or the detail drawing—

either in a dull blue, a dark green or a dull red. Or an aluminum or gold bronze might be used for this stencil work. The latter would look specially well on

The cornice is of wood, and the ceiling hung with a plain buckram of the same color as the wainscot panels. An excellent effect would be gained by panel-



a background of light brown or tan burlap or buckram. The frieze is to be hung with a plain burlap of



a dull blue or green tone, making an excellent background for quaint steins or other pottery.

ling the ceiling with flat moldings, similar to the wainscot, making panels about eighteen inches square. Both on the ceiling and the walls the fabrics should be hung before the carpenter does any work putting up the moldings. This will obviate any difficulty with the edges of the material.

The woodwork is either of oak or ash, stained a forest green and finished with a wax finish, or it may be dyed a silver gray, using specially prepared dyes, or may be darkened with ammonia or bichromate of potash, and neutralized with vinegar before being waxed. Another way would be to make the woodwork of whitewood (poplar) finishing it either in pale green or in ivory enamel. The broad moldings used in the design with the long sweeps to their curves, are particularly adapted to an enamel finish, although they are also very effective in the natural wood.

The chimney piece is to be built of rough, hard bricks, selecting as much as possible those that are darkened and half glazed by the fire, so as to get a pleasing play of color over the surface. They should be laid up with wide joints of gray cement, the joints being scraped out with a rounded stick to the depth of at least a quarter of an inch. The inside of the fireplace, itself, may be either lined with cast iron or built up of brick or tiles. On the face of the projecting cheeks of the inglenook, a square of rough tiling or of rough art glass is indicated as set in. This feature could also be introduced over the mantel shelf

or on the sides of these cheek walls. The seats are to be made of flag stone or some similar material. The fireplace floor should be of glazed tiles, while the hearth in front, between the seats, should be either of brick or red unglazed tiles. Of course, the seats are of little use except for ornament, when a big fire is used, but ordinarily only a stick or two of wood will be burned—just enough to make a pleasant glow, while other means must be depended upon for heating the room.

If the size of the room permitted, it would be better to make the inglenook from two to three feet wider than is indicated by the sketches. In any case it will be necessary to overcome the thrust of the low arch by running a half or three-quarter-inch rod concealed in the brickwork and coming out on the side of the cheek walls, where it terminates in a rosette boss or in an old-fashioned "S" or an ornamental device of wrought iron.

A leaded glass window, either in white glass or in opalescent colorings, in the bay, will add very much to the effectiveness of the room.

Constructing an Ordinary Stair

PLANS AND DEVELOPMENT OF THE RAIL ON A STAIR WHICH MAKES LESS THAN A RIGHT ANGLE TURN—SHOWING WHERE STAIR STOPS AT THE TURN AND WHERE IT CONTINUES BEYOND

By Lewis R. Steinberg

WE HAVE in Figs. A and B the plans and development of the rail on a stair which makes less than a right angle turn. In the case of Fig. A the stairs continue beyond the turn, while in Fig. B the stairs stop at the turn and the rail continues level. In Fig. A the pitch of the rail is the same throughout for the reason that the risers 2 and 3 are taken one-half a tread from the point 7. If this spacing is changed there will be a change of pitch at this point.

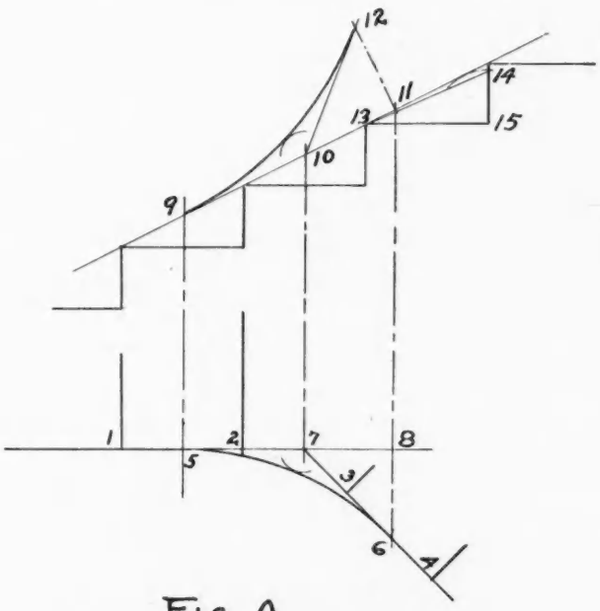


FIG. A.

To construct Fig. A draw the plan with the risers 1, 2, 3 and 4, locating the end of the curved piece of rail at the points 5 and 6. Then draw the elevation of the treads and risers to find the pitch line 9-11. Then project the points 5, 7 and 6 to the pitch line, locating the points 9, 10 and 11. Now in the prism the points 9, 10 and 11 will be vertically over the points 5, 7 and 8, respectively. Then at the point 11 erect a perpendicular, and with a radius equal to 9-10 and 10 as a center describe an arc cutting the perpendicular 11-12 at the point 12. Line 11-12 represents a line directly over and parallel to line 8-6, the point 12 being directly over the point 6. Now draw in the required curve tangent at the points 9 and 12. The bevel for both ends will be the angle 13, 14 and 15.

Fig. B is constructed very similarly, except that the landing begins with riser 2 and that the rail is level beyond the turn. The height of the level rail is usually several inches more than the height of the sloped rail above the tread at the riser. When the pitch line is drawn, the level continuation of this line is drawn as far above the landing as the above-mentioned difference in height of rail is found to be. Then project the points 3, 5 and 6 to the line of rail, locating respectively the points 7, 8 and 10. At 10 erect a perpendicular to the pitch line 14-9, and with 8 as a center and 8-17 as a radius describe an arc cutting the perpendicular at 11, connect 8-11 and draw in the curve tangent at 7 and 11.

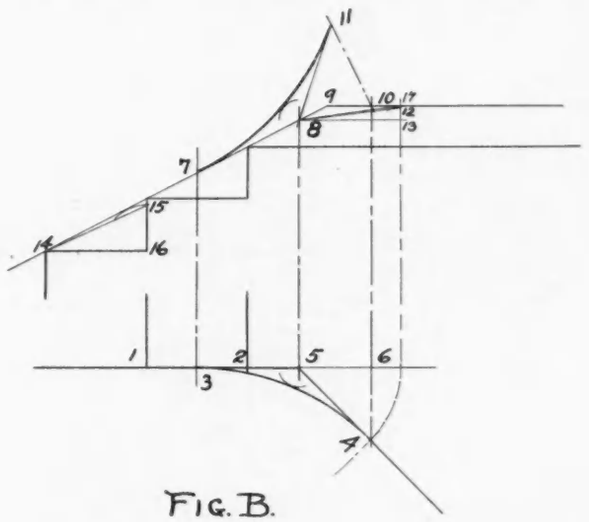


FIG. B.

Each end will have a different bevel because there is a change of pitch in the rail. The bevel for the end at 7 will be the angle 8-12-13, and the bevel for the end at 11 will be the angle 14-15-16.

These figures, and for that matter all the figures in

these articles, may be so cut and folded as to bring the different parts of the drawing into their relative positions. By cutting Fig. A along 8-7 to 7 and 11-10 to 10 and folding on 1-7, 7-10 and 9-10, always folding towards you, the problem will become very clear. Similarly with Fig. B, cut along 5-6 to 6 and along 11-8 to 8 and fold on 1-5, 5-8 and 7-8, observing the same direction as in Fig. A.

Drawing Lessons for the Carpenter

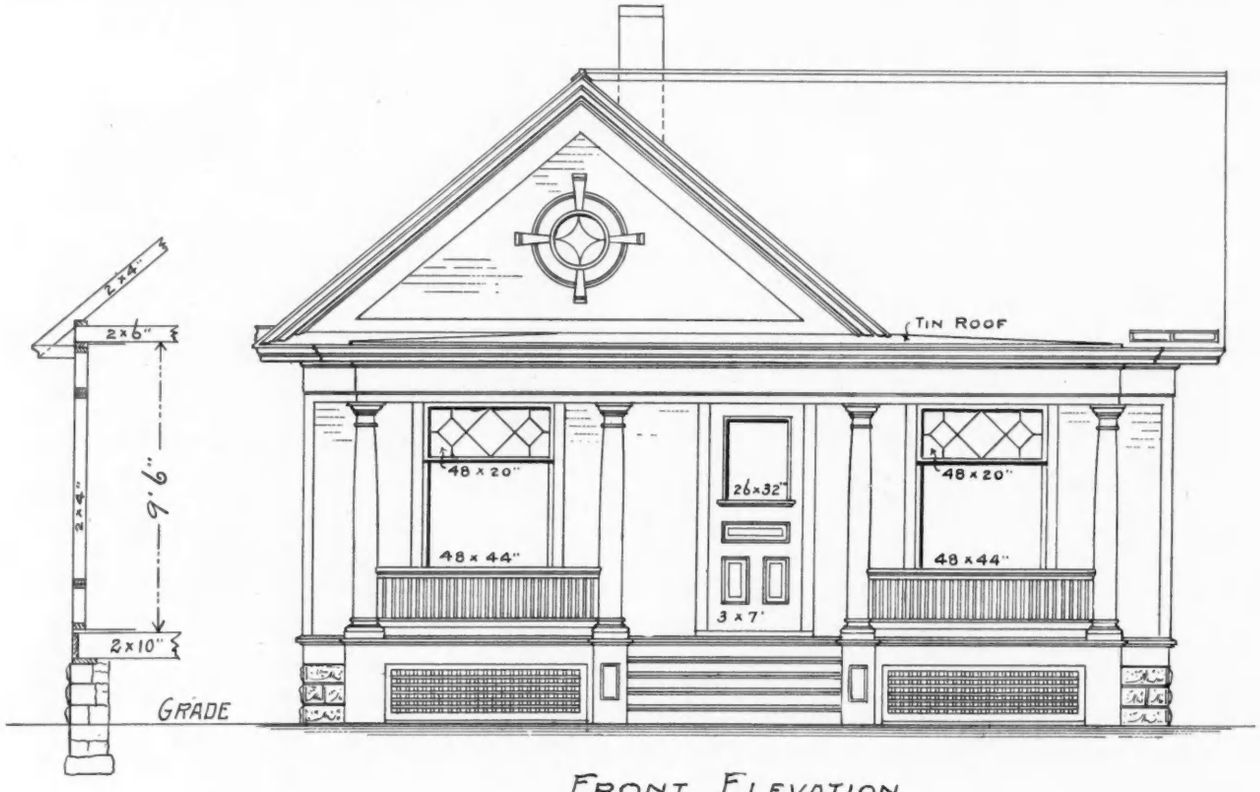
MAKING THE ROOF PLAN AND FRONT ELEVATION—DETAILED DESCRIPTION OF HOW TO DRAW THE VARIOUS PARTS—WHAT TO DRAW FIRST

By A. W. Woods

IN OUR last lesson we gave the foundation and floor plan of our subject. In this we give the roof plan and front elevation. The point of sight in a roof plan is from above, showing the location of the ridges, hips, valleys, dormers, skylights, chimneys and anything else that is in connection with the roof.

As long as the slope given the roof, that is, the same incline, the hips and valleys will rest at 45 degrees in black and white. The accompanying roof plan is for our subject. The dotted lines represent the outer line of the framework.

Now that we are satisfied that our roof is going to work out all right, we will start in on the front elevation. The first thing to do is to draw the section, as shown, showing the size of the timbers, height of story, pitch of roof and the projection of cornices.



FRONT ELEVATION.

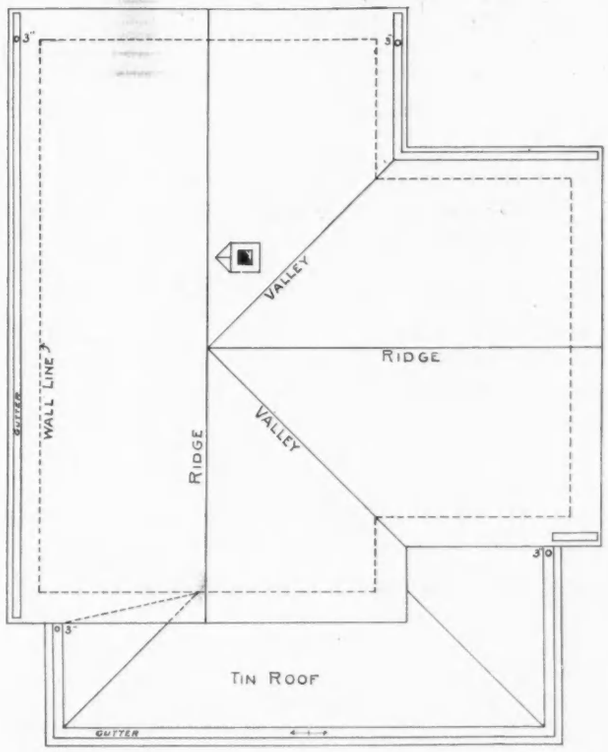
from the edge of the plate (provided the building has square corners), consequently a change of pitch would make no difference in the plan unless there are different slopes given the roof; and in that case the hips and valleys would not rest at an angle of 45 degrees from the plates.

It is a good idea to show the gutters and also mark the size of the outlets. The tinner can then see what is wanted as to quantity, size, etc., and can figure accordingly. It will save many questions and possible mistakes by locating these things while the mind is on the work; in fact, everything where a misunderstanding is likely to occur, should be, as the saying is,

This will serve as a scale for the height, etc., from which to make the elevation. Now take a strip of paper and lay across the front of the floor plans, and on it locate the corners, doors, windows and porch columns; then lay this strip on the drawing paper and locate the above points on same. Use the blade of the T-square for all parallel ruling, and the set square or triangle for the vertical ruling, as referred to in Lesson 1.

The frieze forms the top of the window and door heads and should be calculated accordingly. The interior doors should correspond in height with the outer openings, so as to give a uniform finish through-

out. In figuring the openings for windows, allow four inches in width and six inches in height in addition to that allowed for the glass. It is the custom to give the width of all openings first. This is im-



ROOF PLAN

portant, as the mill man will know at a glance which way the sash are to be made.

Draw the porch and railings complete before drawing the window and door that are in connection with same. In our next lesson we will take up the other elevations and follow with the detail drawings.

Patience and practice are the main essentials required in this work.

Kiln Drying of Wood

Drying is an essential part of the preparation of wood for manufacture. For a long time the only drying process used or known was air drying, or the exposure of wood to the gradual drying influence of the open air. Kiln-drying, which is an artificial method, originated in the effort to improve or shorten the process. By subjecting the wood to a high temperature, or to a draught of heated air, in a confined space or kiln, time is saved and a certain degree of control over the drying conditions is secured.

There are two points in the manufacture of lumber at either of which it may be kiln-dried. With softwoods, for instance, it is a common practice to kiln dry the lumber at the sawmill before it is shipped. This practice, however, is ill adapted for hardwoods, in which it would produce such checking and warping as would greatly reduce the value of the product. In practice, therefore, hardwoods are more or less thoroughly air dried before being placed in the kiln, where the residue of moisture may be reduced to between 3 and 4 per cent, which is much lower than is possible by air drying only. Yet another practice obtains in the case of a few woods which give up their moisture very slowly. With these woods, of which cypress is an example, the kiln is resorted to both at the sawmill and at the factory where they are remanufactured.

Kiln-drying is so important a process that a need is keenly felt for fuller information regarding it, based upon scientific study of the behavior of various kinds of woods at different temperatures and under different mechanical drying devices. In the effort to develop it to the highest efficiency, a variety of methods have been employed, but as yet these methods have not been carefully compared with a view to ascertaining which of them is best adapted to each special requirement of species or of manufacture. The Forest Service has begun a study of the dry-kilns throughout the country, first, to acquaint itself with the methods now in vogue, and second, to map out such improvements of the kiln-drying process as may render it in the highest degree satisfactory and profitable.

Mr. Frederick Dunlap, of the Office of Forest Products, in the Forest Service, who was assigned to this study, has during the past weeks inspected kiln-drying methods in the States of Indiana and Wisconsin, and in the city of Chicago. He found manufacturers disposed to aid the study by all means in their power.

In Indiana, a hardwood region, the prevailing method of kiln drying is based upon the use of steam pipes, which supply the dry heat required in the kiln. The pipes run on the floor of the kiln, and the lumber is placed over them. The radiated heat from the pipes dries the lumber. In Wisconsin softwoods are more widely manufactured and blower kilns are more generally used. In these air is pumped by means of a circular fan through a steam coil and so heated, and then passes on to the chamber in which the lumber is piled. After passing through this chamber, the air is sometimes returned to be reheated and sometimes allowed to escape.

In connection with the further study of kiln-drying processes, attention will be given to the value of the preparatory steaming of wood before the kiln-drying is begun. For this purpose work is planned in co-operation with firms which are interested in experiments to determine the value of steam treatment.

It's a waste of breath to tell other people not to waste theirs.

The value of experience depends on the after-effects.

PLUMBING

WM R. MARSHALL

Connections for Hot Water Boilers

SEVERAL SYSTEMS SHOWN WHEREBY WATER CAN BE HEATED—ORDINARY RANGE OR GAS RANGE USED—PROPER WAY OF MAKING VARIOUS CONNECTIONS

THE different ways of connecting a water front on any water heating device to an ordinary kitchen boiler, are governed, to some extent, by the conditions in each individual case by certain rules and laws which must be complied with.

In connecting a gas-heated water device, the connections should be made as shown in Fig. 1, which is known as a top connection—the particular reason being that it is possible, with a connection of this kind, to heat small quantities of water and to heat it quickly. The specific gravity of

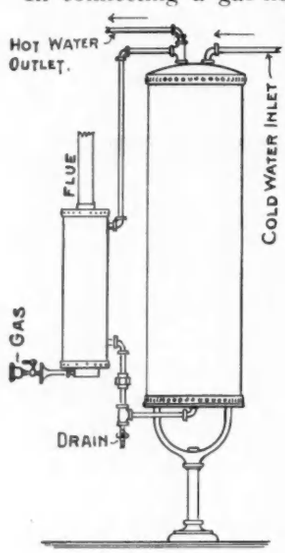


Fig. 1

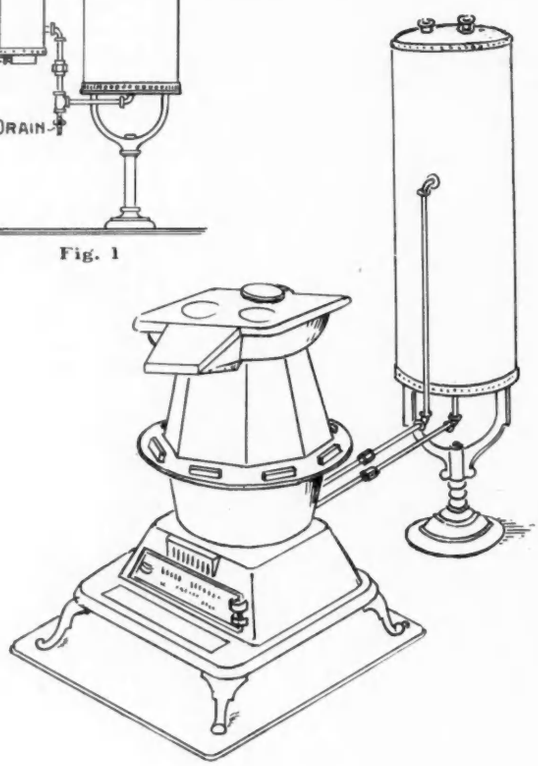


Fig. 2

hot water being less than that of cold water, the tendency is for the hot water to remain at the top, and with a connection of this kind, hot water can be drawn within five minutes after lighting the gas—the great advantage being the economy of fuel and time. A gas-heated water device should always be connected to a flue.

When connecting a kitchen boiler to a water front in a range, the connection should be made as shown in Fig. 2. As the range fire will probably be kept burning all day, the question of fuel economy is not to be considered—the advantage of a connection of this kind is that it gives a large body of water from which to draw at all times.

In Fig. 3 we show the "Brook's" system, which is a method of connecting and piping range boilers. It does away with the unsightly lead or iron pipe connections and pipe boards on the kitchen wall, and saves much time and expense. Before turning water into the boiler from the cold water supply, the valve is closed at "R." This valve should always be kept closed except when the boiler is to be emptied.

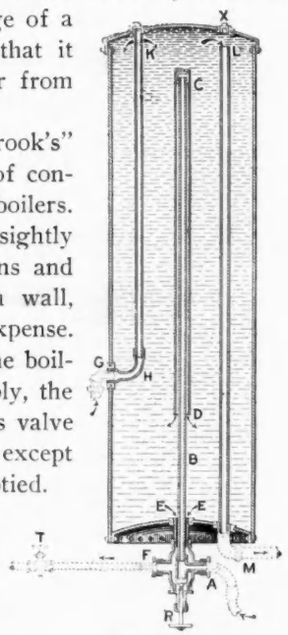


Fig. 3

Cold water enters the boiler through valve at "A" and passes up through the pipe at "B" to the top of the boiler, where at "C" the direction of the flow is reversed by a casing or outer pipe and the water flows down and out into this pipe at "D." Since the water is thus directed down by the casing, its inclination is toward the outlet at "E," where it leaves the boiler, flowing through the valve into the pipe "F," through the water front, where it becomes heated, returning to the boiler at "G," where it enters and passes in and up through the pipe at "G H K" into the top of the boiler, entering in an upward direction at "K" and being naturally deflected toward the other side by the top, which it strikes, and finds an immediate outlet at "L," whence it passes downward and out at "M" for use.

The only connections which are necessary to make,

are at "F" and "G" and at "M." The outlet at "A" is the drain pipe.

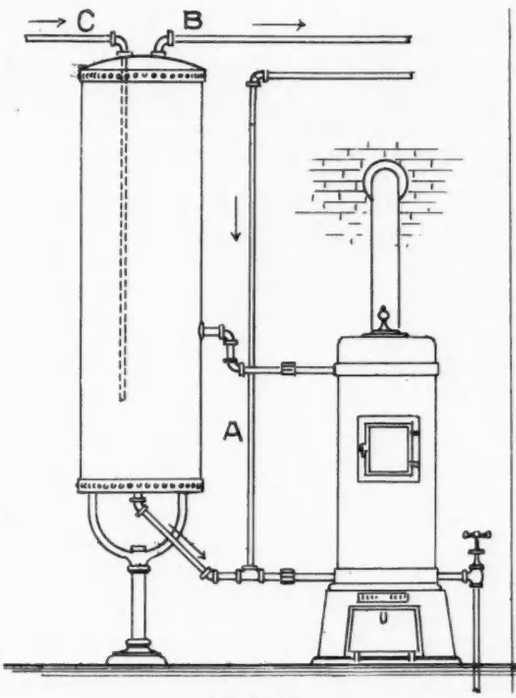


Fig. 4

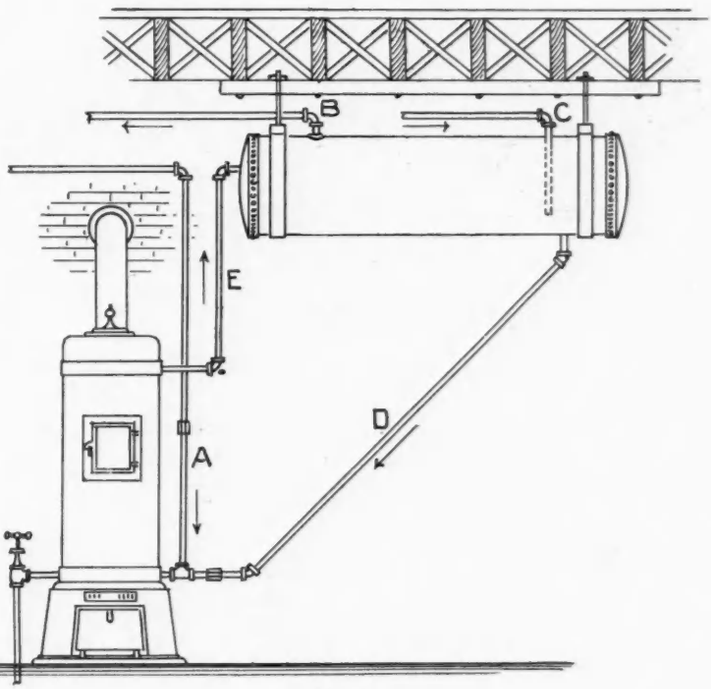
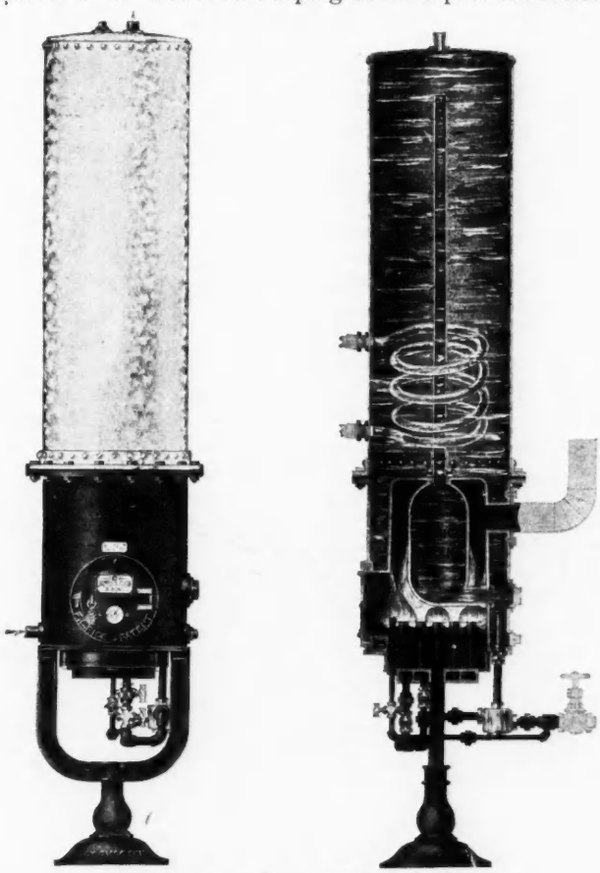


Fig. 5

To drain this boiler, shut off the supply, open the valve at "R" and loosen a plug at the top of the boiler,



Combination Reservoir and Heater

then by opening a cold water faucet in the basement (say, the laundry) for instance, all the water will drain out through the open faucet, or, in other words, the supply pipe is made to serve as a draw-off, an arrangement far more sanitary than the old custom of connecting the service pipes with the sewer. The valve at the bottom of the boiler is very simple, and yet, is the kernel of the whole matter. It can be taken apart and pipes disconnected with perfect ease, making it a very easy matter to clean them.

Connections to vertical and horizontal boilers, when connected to independent water heaters are shown in Figs. 4 and 5.

Another device recently put on the market, is a combination reservoir and heater. This heater is unique in construction of water compartments inasmuch as all surfaces are exposed very advantageously to the flame. The central water compartment being directly over the flame and the pipe which carries hot water to the top of the tank enables it to supply hot water within a very short time. The gas supply is regulated by a thermostat, which automatically decreases the flow of gas when water is heated and automatically increases the flow of gas as soon as the hot water is drawn from the tank. Two clusters of blue flame gas burners, which are independent of each other, and can be used separately or both at the same time, furnish the heating medium. The advantage of this boiler, outside of the economy of fuel consumption, is that it requires little space for the installation and a great saving in the piping. Again the automatic gas regulating feature prevents the boiler from becoming over-heated and from its subsequent dangers, as the temperature of water is maintained at about 170°.

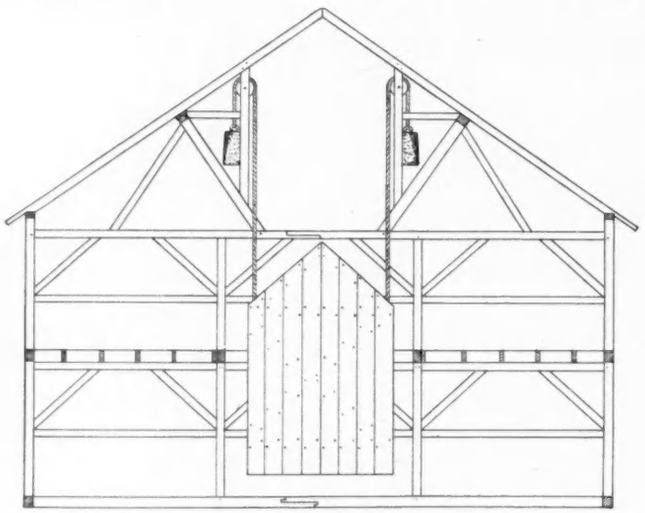
In the sectional cut shown here, we show a steam coil whereby the water can be heated with steam, in case it is installed, where steam is available.

Correspondence

Hay Door in Barn

To the Editor: Pittsfield, Ill.

I am sending you the plan of a hay door which I built in the gable of a barn. I never saw one before, but it worked so well that I have made three more like it. They are eight feet wide and extend from the cross tie to the peak of roof. I notice most carpenters hinge them at the bottom. Just imagine a door eight by thirteen hinged at the bottom—when it is open, the top is down. What a nice job it is closing it. If you make it in two parts it will not open back on account of the roof. Now you can decide for yourself which is the better way. I use two by fours for battens to nail the



door boards onto. You can have the weights run down on the outside of building if you wish, but it does not look so well. Where you put them on the inside you have to box them in, or they will not work when the mow is filled. Rope may be used on the weights, but I like a chain better. It is rat proof inside and the weather does not affect it on the outside. The best weights are made of concrete, which can be moulded in any desired shape, and does not take much bulk to make a heavy weight. A good fastener can be made by bending a rod in the shape of a staple. It can be moulded right into the weight, and will never pull out. The door can be hooked at top and bottom after it is closed. Hung in this way it is easily closed by one man. The pulleys can be mortised into door posts, or bolted onto sides with a board outside to keep the rope from running off. BEN JOHNSON.

Building Constructed of Deals

To the Editor: Campbellton, N. B.

In the last number of your magazine I noticed in your correspondence column an article by Mr. Kidner, describing a building constructed of deals. I have come across buildings constructed in the same manner. I looked into the matter and found that the price of refuse deals is three dollars, and deal ends two dollars and a half. These are used for foundations and basements for cheap houses. They are sometimes laid in mortar and last a number of years. I do not approve of these methods, and more modern and up-to-date houses are now being constructed. One building in particular that I have in mind was thirty by sixty feet. The basement was seven feet high, the first story eleven and the other two stories nine feet. Three-by-eleven-inch deals were used in the basement and the first story, while three-by-nine-inch deals were used on the top stories. They were well spiked together, and it would be an interesting problem for someone to figure out the number of feet of lumber in the walls of this building. W. H. WALLACE.

Dry Versus Wet Process

To the Editor: Cleveland, Ohio.

My attention has been called to the article on page 758 of the January number of the AMERICAN CARPENTER AND BUILDER, undersigned by the American Hydraulic Stone Co., wherein they censure my article on page 641—December number. The amusing features are that I have been for years advocating the very method of proportioning they mention, and the American Hydraulic Stone is technically speaking made by the dry tamped system, which their writer undertakes to condemn. The Engineering News, which is mentioned as an authority, gave my articles on hollow block making preference over all their prize contest articles, but I had declined to enter the contest. The American Hydraulic Stone System is among our best, but the writer like myself has much room for improvement. FRED W. HAGLOCH.

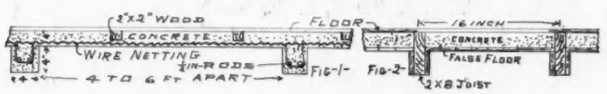
Concrete Floor for Building

To the Editor: San Marcos, Texas.

Will you please tell me the best way to fix a laboratory thirty-six by sixty feet? At one end will be center walls or sills twelve feet centers. I will want water, gas and drain pipes under the floor. What is the best size for joists, manner of putting them in, quality and thickness of concrete to make a good job? How can I fix the second story joist of a room thirty-six by sixty so as to avoid putting columns under, and will it do to use steel ceiling in a laboratory? The rooms above would have classes of sixty to one hundred in them at times. J. W. WHALEY.

Answer: To floor a building thirty-six by sixty feet for the purposes mentioned a live load of one hundred and eighty-five pounds per square foot will be a safe basis. The thickness of the concrete beams or wood joist is largely governed by the length of span. If posts every twelve feet is no objection then the first (concrete) floor may be built of concrete steel beams, eight inches wide and twelve inches high, crossing the building every twelve feet and spanning just twelve feet. Into these the four by eight-inch beams are built as shown in Fig. 1. The half-inch rods being placed two inches from the bottom and the wire netting (two-inch

mesh No. 10 wire) is placed one inch from the bottom of the four-inch concrete sheet. These beams are placed lengthwise of the building four feet apart and resting on or rather built in with the large beams just described. The iron in the



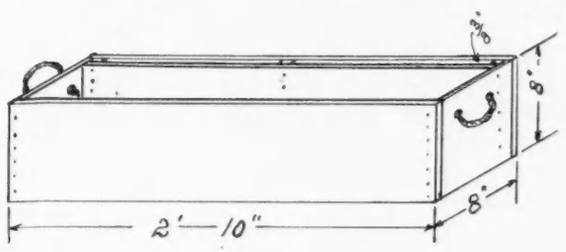
large beams are four rods five-eighths-inch thick, and all rods should be fastened with wire loops to the netting every three or four feet. The wood floor is nailed to wood strips two by two inches which are inserted into the top surface of the concrete. Fig. 2 is a section of flooring using wood joist, false floor and concrete for deadening and fireproofing suitable for your second floor. The concrete should be made of one part Portland cement, three parts sharp sand and three to five parts hard gravel mixed with sufficient water to become "sticky" and tamped hard in position. The longer the span the heavier concrete or wood is required.

FRED W. HAGLOCH.

Making a Tool Chest

To the Editor: Middletown, Ill.

This shoulder tool box I find very handy for all around purposes. The three-eighth-inch space makes an ideal place



for chisels, hatchet, etc. I used a bit gauge for boring mortises for locks, and the gauge was O. K., but got broken. I filed a small notch on the bit three and one-half inches from the cutter and find it very useful, and it is always in its place.

SAMUEL MORRIS.

Bisecting Angles

To the Editor: Sterling City, Cal.

Will you please explain in the AMERICAN CARPENTER AND BUILDER how to bisect the angle between brace and straining beam of a truss? There must be some rule for making this cut without working to a scale. I would also like an explanation of the best method of getting the length of a corner post for a tank tower where the batter is the same both ways.

J. W. FESCHER.

Answer: In the absence of a given example we will assume that the brace has a nine-inch rise or three-eighths pitch. The plumb cut for a brace of this pitch is at 12 on the tongue and 9 on the blade, with the cut on the latter. But since it must be cut to miter with the end of the straining beam the angle to be used on the steel square is at one-half that given for the plumb cut and intersects at four inches on the blade—the latter giving the cut. It must be remembered that the steel square is only a secondary instrument working in conjunction with that unseen but ever present factor "Degrees." In the case of the pitch of the brace 12 and 9 is used seemingly without any reference to the pitch in degrees, but they are there playing their part just the same. What is it? Answer: 36° 53′, and one-half of this is 18° 26½′ and falls at 4 on the blade as before mentioned. I mention these figures because they are the facts in the case. Now we will show how this angle may be readily found by the use of two steel squares by crossing the tongues at 12 and resting with their edges in line with 9 on the blade of the other square. The point of intersection is at 4 on the blades and is the desired angle. In Fig. 1 is shown this angle in connection with the cut, while in Fig. 2 is shown the application of the square on both timbers to obtain the cut. If the brace was resting at half pitch then its degrees would be forty-five, and one-half of this would be 22½° and would intersect the blade at practically five inches, and is in this case the same as for the octagon miter. Do not understand me to say that these figures are the only ones that will give the cuts. But I do say when other figures are substituted they must bear to one another the above proportions. The proper way to find the length of a corner post for a tower with an equal batter or pitch each way is to extract the square root of its run and rise. This, however, requires a mathematical solution that is quite beyond the average mathematician, it may be treated as for a hip, for such it is, and its length found by scale in like manner. Assume that the tower is twenty-two feet high and has a batter of two feet each way. Now by using the side of the steel square that is divided in one-twelfth inches we let the inches represent feet, the twelfths will then represent inches. Since the batter is two feet, the diagonal of two inches will represent the run of the post as shown in Fig. 3, which will be found to be thirty-four-twelfths or two and ten-twelfth inches, and this taken on the tongue represents the figures to use on that number. Then the length of a line from 2 10-12 to 22 will be the length per one-inch scale for the corner post. Therefore the variation of one-twelfth-inch would equal a whole inch in the length of the post. Its true length is twenty-two and two-twelfth inches, which is equal to twenty-two feet and two inches for the post.

A. W. WOODS.

Roof of a Barn

To the Editor: Ormstown, Que.

Please design a roof for a barn thirty-two feet wide by eighty-eight feet long. Beams will be two feet down on posts. How far from the side should the purlin post be set and how long?

GEO. W. SIMPSON.

Answer: I think it better in a roof of this kind to omit the purlin and interior posts as it will be so much better for the hay mow. In this case the plate is so near the floor that the rafters can be tied to the joists with a one by six on each side as shown in the sectional drawing. At the curb, fit in the angle a two by six block and extending between the one by six collar boards. Also nail a one by six board on each side of the block with the ends fitting square against the collar boards and covering the joint of the two by six rafters. At the peak, nail a two by eight cross piece on which to anchor the track for the hay fork. The rafters should be placed directly over the joists and should be two feet on centers. I have given the run and rise of each set of rafters and the pitches will be sixty and thirty degrees.

EDITOR.

Sawdust for Plastering

To the Editor: Walkerton, Ind.

In regard to the use of sawdust for plastering I must say it is very good, and can be worked with more ease than almost any other material as the weight is not so great and therefore does not pull off the plastering after it is once broken. I would be using it at the present time if sand was scarce, but at my present location I find that sand is plentiful and sawdust scarce. The proportions to use are about the same as sand plastering. At first it will be a trifle sticky, but it will not fall from the lath and will harden very nicely. I would recommend the use of Portland cement in mixing it; in fact, I do not believe any mortar ought to be used without plenty of cement.

WM. H. NIXON.

MANUAL TRAINING

IRA S. GRIFFITH

Something the Boys Can Make

HOW TO MAKE A HANDKERCHIEF BOX AND A GLOVE BOX—KIND OF WOOD TO USE—VARIOUS OPERATIONS FULLY DESCRIBED

EFFORT is being made to describe from month to month objects which shall be of varying difficulty so that boys of varying ability may find suitable work. The handkerchief box, Fig. 1, and the glove box, Fig. 3, are constructed with the simplest kind of a joint possible. This kind of a joint is

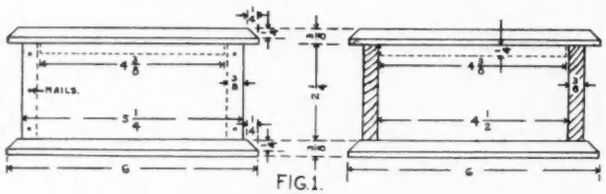


FIG. 1.

but seldom or never used on small work of this kind commercially. Boys who can are advised to use the miter joint or any of the other corner joints in common use. The ornamental metal corner pieces serve to make the boxes of the less experienced workman quite satisfactory. A square butt joint well made is preferable to a more difficult one poorly made.

Both boxes are similar in construction. The handkerchief box requires two pieces, squared up to six inches square by three-eighths of an inch thick; two pieces two and one-quarter inches by four and one-half inches by three-eighths of an inch; two pieces two and one-quarter inches by five and one-quarter inches by three-eighths of an inch; and one piece four and three-eighths inches by one-quarter of an inch. Soft poplar, or white wood, as it is commonly called, will answer best for beginners. It will be a good plan to use stock which has been planed at the mill to

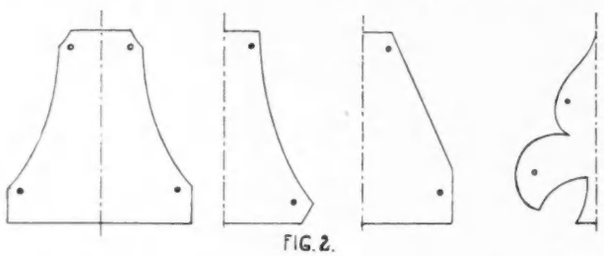


FIG. 2.

the required thickness if possible. This kind of stock is usually planed just a trifle thicker than the dimension given so that there is enough stock to allow the planing off of the mill marks with the smoothing plane providing the plane blade is set very shallow.

Mark the surface from which the mill marks have been planed XX for the working face. Plane an edge straight and square to this surface and mark it XX for the joint edge. Gauge for the width and plane carefully to the gauge line, keeping the edge square to the working face while planing. Gauge for the thickness, unless the stock is of the correct thickness, and plane the remaining surface to the gauge line. Square knife lines around the four smoothed sides as near one end as possible. Plane to these lines. Measure for the length and square the other end. sawing if there is more than one-eighth of an inch of surplus stock. Use this order in preparing each piece.

It will be noted that the kind of corner joint used requires that two of the sides shall be longer than the other two by twice the thickness of the stock.

The upper sides of both top and bottom pieces have

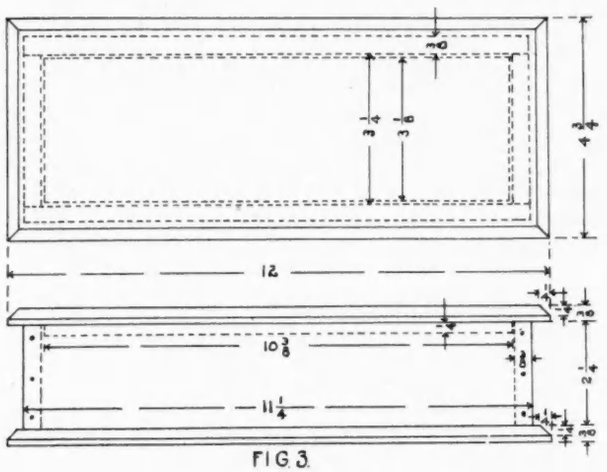


FIG. 3.

a one-quarter inch bevel. In gauging for the bevels use a pencil gauge; that is, one that has a lead-marking point instead of the customary steel one. Gauge on the two edges and the ends, gauging from the working face, then gauge on the working face from the two edges and ends.

Sandpaper all pieces with fine sandpaper held on a block, being careful not to sandpaper the sharp corners off the bevels. Do not sandpaper the ends of the pieces which go to make up the joints.

Nail the side pieces—the longer pieces—to the ends using two or three small wire nails at each corner.

Mark the position which this framework is to have on the bottom piece using a try-square.

As it is rather difficult to nail the bottom to the sides and watch the mark at the same time, a good way is to

start several nails from the bottom allowing the points to come through slightly. The sides can then be located properly and pushed down on these points while the bottom is right side up. This will serve to

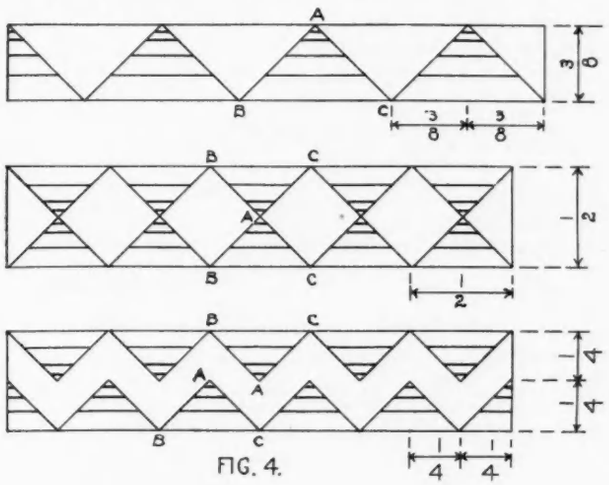


FIG. 4.

hold the parts in place when the whole is turned upside down for the finished nailing.

Care should be taken to locate the nails in the bottom that they will not strike the nails that hold the sides together.

The piece which holds the top in place is fastened to the underside of the top by means of four small screws one in each corner. It will be necessary to drill a hole through this under piece for each screw and to countersink so that the head may be flush.

To prevent warping, fasten these two pieces together so that the grain of the wood shall be at right angles one with the other. It is not good construction to do this, ordinarily, but with such small pieces the shrinkage is not sufficient to cause trouble.

Stain with some appropriate stain. Mahogany dye or acid stain, finished when dry with two coats of wax, brings out the grain nicely. Beware of varnish stains unless you are experienced in handling them.

The metal corner pieces may be made of very thin

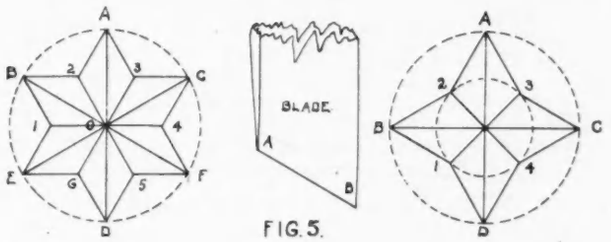


FIG. 5.

brass or copper. As these boxes are intended for beginners, the designs, Fig. 2, are made very simple. To make a design, take a piece of paper, draw a straight line on it, measure off two and one-quarter inches and draw freehand one-half of the design. Now fold the paper along the straight line and trace this half upon the other side. Transfer this design to the metal using carbon paper and cut it out with metal shears.

In making the design, avoid all lines and corners which cannot be got at readily with the shears.

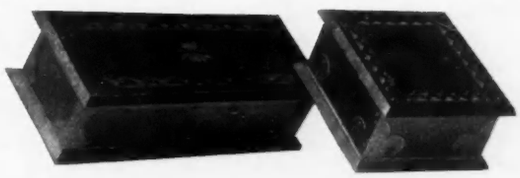
File up the rough edges if there are any and punch holes to receive the brass tacks.

Polish the metal with emery powder or cloth and fasten the pieces to the box. Hold a block on the inside of the box against the end pieces while driving in the tacks that go into those pieces.

The glove box requires for the top a piece squared up to four and three-quarter inches by twelve inches by three-eighths of an inch. It is beveled to one-quarter of an inch measured on the working face and edges and ends. The bottom is similarly made. The sides are two and one-quarter inches by eleven and one-quarter inches by three-eighths of an inch. The ends are two and one-quarter inches by three and one-quarter inches by three-eighths of an inch. The piece under the lid is to be squared up to three and one-eighth inches by ten and three-eighths inches by one-quarter of an inch. This box is put together as was the handkerchief box.

If desired these boxes may be decorated by pyrography instead of stain. This wood will take the burning nicely. If this is done, the metal corner pieces had better be left off.

The boxes shown in the cut are ornamented with chip-carving. This is a very easy kind of carving, and, when well done, gives quite a pleasing effect. It



is done with a special knife called a chip-carving knife. This knife is ground like the skew chisel, sharp on the end but very thin; the end from A to B, Fig. 5, being the cutting edge.

Some of the simplest designs are shown in Figs. 4 and 5. The dimensions may be varied but the designs are more difficult to cut if they are increased much in size.

To cut any of the borders, Fig. 4, make a vertical cut by holding the point of the knife at A and the heel over B and, pushing it into the wood about one-sixteenth of an inch, gradually swing the handle so as to make the heel touch the wood at B but not cut it. Make a similar vertical cut from A to C. Now, holding the blade almost parallel to the surface shave out the section A B C, beginning the cut on the surface at the line B C and increasing in depth to one-sixteenth of an inch at A. The shaded sections are the ones to be removed.

The six-point star, Fig. 5, is laid out by describing a circle having a radius of one-half an inch. Through the center draw a vertical diameter. Using the one-half inch radius, beginning at one of the places where the vertical diameter touches the circumference as at A, Fig. 5, step off the circumference. This gives points as at B, E, D, F and C. Connect every other one of these points by means of straight lines, as

A and E, A and F, E and F, etc. This gives the outline for the star.

Connect the points of the star by straight lines through the center of the circle, as B and F, A and D, etc. Also connect the points at which the sides intersect by straight lines through the center as 1 and 4, 2 and 5, etc.

The cutting of the star differs but slightly from that of the borders. Make three vertical cuts at each of the numbers, placing the point of the knife on the numbered point and cutting as from 1 to the center of the circle, 1 to B, and 1 to E. Cut about one-sixteenth of an inch deep at the numbers and gradually decrease the cut to nothing at the letters. Next, holding the blade almost parallel to the surface, beginning on the lines which run from the center to the points, as B O and E O, cut a gradual slope to the depth of the vertical cuts.

A section such as B O E can be cut after a little expereince in three vertical cuts and two oblique ones so that rapid progress can be made.

The four-point star is laid off using a circle of one-half inch radius within which is a concentric circle of one-quarter inch radius. The horizontal and vertical diameters are then drawn as A D and B C, Fig. 5. Now lay off lines which shall pass through the center of the circle at angles of forty-five degrees to the lines just drawn, as 1 to 3 and 2 to 4. Connect the points at which the horizontal and vertical diameters cut the circumference of the larger circle with those points at which the oblique lines cut the circumference of the smaller circle, as B to 2, 2 to A, etc.

In cutting the four-point star, the point of the knife is placed on the figures, as at 1, Fig. 5, and three vertical cuts made from each of these. The sections are cut as in the six-point star.

There are many other interesting forms which are quite common in chip carving. These are the simplest.

All carving must be done before staining.

In laying out any of these designs, a drawing board. T-square and the two triangles will enable the worker to dispense with the circles, as all the oblique lines used are at angles of 30°, 45°, or 60° to the horizontal. Many boys are familiar with the use of these instruments. The manner of laying out a pattern on paper will suggest itself to such.

Every boy ought to read the articles, beginning with the November number of the AMERICAN CARPENTER AND BUILDER, on "Drawing Lessons for the Carpenter," by A. W. Woods. The making of the board, T-square, and triangles will be described in this department ere long for the benefit of those who would make their own.

Would Not Be Without It

I wish to say that I would not be without the AMERICAN CARPENTER AND BUILDER if it would cost $5.00 a year, and I expect to be with you as long as I live.—M. C. Oster, Ray, N. D.

The Average Man

The average man is the man of the mill,
The man of the valley, or man of the hill,
The man at the throttle, the man at the plough—
The man with the sweat of his toil on his brow,
Who brings into being the dreams of the few,
Who works for himself, and for me, and for you.
There is not a purpose, project or plan
But rests on the strength of the average man.

The growth of a city, the might of a land,
Depend on the fruit of the toil of his hand;
The road, or the wall, or the mill, or the mart,
Call daily to him that he furnish his part;
The pride of the great and the hope of the low,
The toil of the tide as it ebbs to and fro,
The reach of the rails and the countries they span
Tell what is the trust in the average man.

The man who, perchance, thinks he labors alone,
The man who stands out between hovel and throne,
The man who gives freely his brain and his brawn
Is the man that the world has been builded upon.
The clang of the hammer, the sweep of the saw,
The flash of the forge—they have strengthened the law,
They have rebuilt the realms that the wars overran,
They have shown us the worth of the average man.

So here's to the average man—to the one
Who has labored unknown on the tasks he has done,
Who has met as they came all the problems of life,
Who has helped us to win in the stress and the strife.
He has bent to his toil, thinking neither of fame
Nor of tribute, nor honor, nor prize, nor acclaim—
In the forefront of progress, since progress began—
Here's a health and a hail to the average man!

—J. W. Foley.

Concrete in Manila

Under the progressive influence of the Philippine Commission the United States are rapidly modernizing and reclaiming Manila. Many of the new public buildings are constructed either of monolithic concrete, cement blocks or of cement plastered walls on expanded metal.

Most of the cement comes from a plant located on Green Island, China, off the coast of Macao, although several shipments have been made from the Eastern seaports of the United States.

The government cold-storage plant at Manila is one of the best examples of the architectural adaptability of monolithic concrete, illustrating very effectively the unlimited possibilities of concrete for such work.

Many of the Manila streets are being graded, filled and improved with concrete gutters, which are 12 inches wide by 6 inches deep.

Washington Building Laws

Some very decided changes are in contemplation in connection with the building laws of Washington. This results from an investigation of sanitary conditions, of proper light and air. It is now planned to prevent the construction of buildings covering the entire lot, and regulate the amount of air space to be left about the structure, and thus protect the health of the occupants of the buildings.

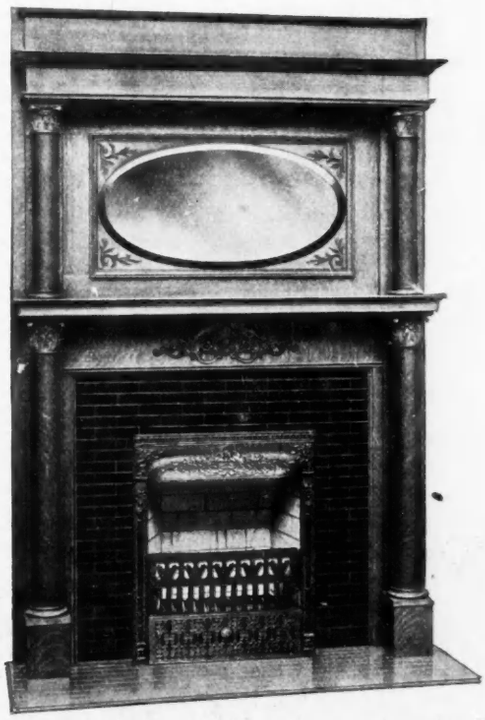
PRACTICAL TRADE APPLIANCES

Factories all Over the Country

In this number we show a design of a mantel taken from the latest catalogue of The Foster-Munger Co.

This firm issues the most complete book of its kind, over 800 pages devoted entirely to different articles used in the erection and completion of different styles of buildings.

Their large warehouses are located in Chicago, but they



have factories spread over the entire country, the Pacific Coast to the Eastern States, from Mississippi to Northern Wisconsin. It would be next to impossible to give a complete list of their specialties, but we call attention to a few such articles as Grilles, Mantels, Stairs, Wood Carpet, Cabinets of all kinds, Desks, Office Fixtures, Hardware, Carpenters' Tools, Refrigerators, Steel Ceilings, Paints, Glass Window Plate and Leaded Art, etc., etc.

Their large catalogue will be mailed to anyone sending 20 cents in stamps to cover cost of mailing. See their advertisement on another page.

Catalogue Free on Request

The Edwards Manufacturing Company, 401 Eggleston avenue, Cincinnati, O., has just issued a handsome catalogue showing the latest designs in steel ceilings, metal windows and metal shingles. This firm manufactures everything in sheet metal building materials. They advertise that if anyone desiring steel ceilings will submit a sketch of the space to be filled they will send a carefully prepared drawing showing just how the ceiling will look when finished. The Edwards Manufacturing Company are looking for good, live agents everywhere. Their latest catalogue is sent free to all who will write for it. Do not fail to mention that you are a reader of the AMERICAN CARPENTER AND BUILDER.

A Prosperous Publication

The Cortright Metal Shingle Advocate, started just a year ago with a circulation of 10,000, has now increased to 15,000 per month. The Advocate treats of practical roofing, its articles being contributed by practical men, and it aims to instruct home builders as to the advantages of the metal shingle over other forms of roofing.

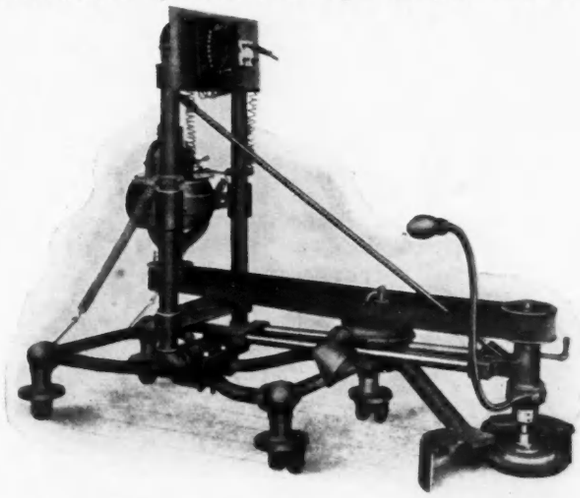
There is no charge for the Advocate. Anyone desiring it sent them regularly has only to address the Cortright Metal Roofing Co., 52 North 23d street, Philadelphia, who will be glad to send it to them if they mention the AMERICAN CARPENTER AND BUILDER.

Machine Dressed Floors

The accompanying cut presents an illustration of a remarkable invention, the Rapid Floor Surfacer. It is a one-man affair, the carriage runs on wheels, and is as docile to guidance as a carpet sweeper. The disc is operated by a one and one-half horsepower motor. The surfacing, abrasive, grinding or polishing disc is set with the precision of a cutter in a smoothing plane; the operator requires no other knowledge than to present all parts of the floor to the machine, thus producing a level surface absolutely unattainable under the old system of hand work.

For leveling and eradicating imperfections in marble, slate and composition floors, this machine has proven a decided success; and this is not at all remarkable or strange, considering that an abrasive disc traverses the surface in question at the rate of 3,000 revolutions per minute.

The Ransome Concrete Machinery Company, No. 11 Broadway, New York City, had their attention called to this remarkable apparatus, and realizing its immense field for usefulness, have acquired a controlling interest, but have aban-



doned the plan of selling exclusive territory rights, and will manufacture the machines in such quantities that the price may at once be placed in the lowest notch and a crusade inaugurated to distribute the Rapid Floor Surfacer throughout the length and breadth of the land, and in foreign countries as well.

The operative and structural principles of the machine, as

it was originally made, and also the recent improvements and attachments, are fully protected by United States patents. Because the machine is the first of its kind, the patent is exceedingly broad and far-reaching.

With the invention of this device, an entirely new mechanical art may be said likewise to have been invented, and a new field for the small investor, to operate a few machines and build up an ever increasing business, by soliciting contracts from both private individuals and contractors, to surface new floors and renovate old ones.

"The Ad-el-ite People"

"It's the democratic spirit that we have always fostered in our business relations with our employes that has brought us success," stated a prominent member of the Adams & Elting Company, "The Ad-el-ite People," of Chicago.

"We try, and I think successfully, to make each one of our men realize that we are all co-workers—all on an equality—and that the success of the Adams & Elting Company means his success."

This is the right principle in any business but it is not every company that "practices what it preaches" in this respect, as do these manufacturers of high class paints and paint specialties.

A trip through the various departments reveals many interesting points on the workings of this huge establishment. The filler and stain department, which supplies more furniture factories with high grade goods than, perhaps, any other firm in the world, constantly works at its full capacity.

The mixed paint floor is always ahum with machinery and the workers are laboring alertly and intelligently. In the shellac department, the varnish department, the varnish remover department,—in all the score or more of specialty departments there is the same perfect co-operation and intelligent effort on the part of the employes.

This kind of endeavor is bound to result in the still greater growth of this big concern and combined with this consistent adherence to the manufacturer of goods of quality only they may easily outstrip other houses that pursue a less broad-minded policy.

Fox Square and Miter Improved

This is a new tool and something that will interest all carpenters. It is a great improvement over the old Fox square and miter which was placed on the market a number of years ago, as it has a sliding blade that can be adjusted from five to eight inches, making a full set of squares in one; also a miter blade at opposite end of handle which makes a complete square and miter without a single change. The full length of handle comes next to the work in all cases thereby insuring accuracy. By having this tool a carpenter has a full set of squares and miter in one, which will save space and weight in his tool box; also the price of several tools. It is made of best material, light, accurate, durable and thoroughly warranted. P. L. Fox is the sole manufacturer. Address him at 432 William street, Bridgeport, Conn., and tell him you are a reader of this paper.

Shingles that Last

Under the above suggestive title the National Sheet Metal Roofing Company, 339 to 345 Grand street, Jersey City, N. J., has issued an attractively printed pamphlet of thirty-two pages relating to the metallic shingles and tiles which it manufactures. Special reference is made to galvanized, painted tin and copper shingles, and there are some comments on slate roofs, all of which cannot fail to interest the architect, builder and sheet metal worker. A statement is made as to the results accomplished by the use of Walters shingles and tiles, following which is an illustrated description of the patented expansion lock, by which the shingles are fastened together. Not the least interesting feature of the pamphlet is found in the directions for laying shingles and tiles, together with suggestions regarding flashings, paintings, covering old wood shingled roofs, advantages of close sheathing, etc. The concluding pages of the pamphlet are given up to list prices of painted and galvanized tin goods as well as roofing sundries. The advantages of artistic and durable roofing are becoming more and more widely appreciated and the company points out that the good opinion of metal roofing is due to Walters shingles and tiles more than to anything else.

The Hero Furnace

The Charles Smith Company are making a very attractive heating proposition to the carpenters and builders, in that they will tell you what it would cost to heat your building by the most approved methods by sending them plans or pencil sketches. They manufacture the well known Hero furnace which is all cast with the deepest ash pit made. It is gas tight and durable and is economical with any kind of fuel.

The Hero furnace is a good one, a furnace with large feed doors and independent grate bars which make it a favorite for soft coal. Full information can be had by writing to the manufacturers as they sell direct from their plant to you. Address Charles Smith, 40 Dearborn St., Chicago.

Columns and Porch Work

The Henry Sanders Co. of 70 to 80 Weed street, Chicago, make a specialty of columns, pilasters and porch work for the trade. They are the manufacturers of Koll's patent lock joint staved and turned columns and are the originators of the lock joint stave. They guarantee all their work. This

company claims to have the best equipped factory for the manufacture of columns in the country, making them from six to forty-five inches in diameter and proportionate in length.

The Henry Sanders Co. will be pleased to correspond with any of our readers who are in need of anything in their line, and as they make all kinds of columns, pilasters, pedestals, general porch work, hardwood and veneered columns for interior work, sun dials, brackets and consoles, as well as composition capitals, their output should appeal to our subscribers. They will send a catalogue for the asking.

Complete Electric Light Outfits

The National Stamping and Electric Works are selling motors, dynamos, arc lamps and complete electric light outfits for private residences, business blocks and hotels. With their system by means of a storage battery the current can be stored and used as needed. The outfits are simple in construction and thoroughly practical. They are built for steady work the year around. They are scientifically built and are of the best quality. These plants do not require a

skilled electrician to install and operate. Complete instructions and starting plans furnished with the outfits are very carefully made and state everything clearly, so that an inexperienced workman can easily set up and operate an outfit.

For further particulars of anything in the electric line or catalogue write to the National Stamping and Electric Works, corner of Clinton and Adams streets, Chicago, Ill., mentioning that you are a reader of the AMERICAN CARPENTER AND BUILDER.

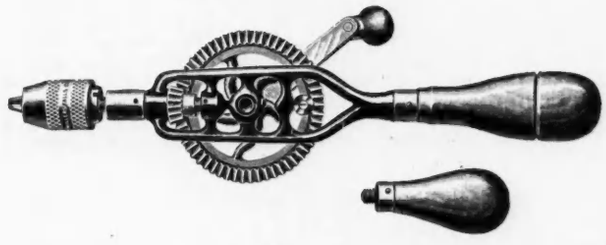
A New Skylight Lift and Lock

The accompanying illustration is of the Bickelhoupt Skylight Lift and Lock, which is a very handy device and should be on every house that has a skylight attached and needs ventilation. This skylight lift and opener is constructed of steel and malleable iron and has a movable slide holder to adjust itself. It raises and lowers as easily as a weighted window and is always locked automatically either open or closed. This lift can be applied to either hipped or flat skylights and easily and quickly. This concern also makes special corner hinges to be used in connection with the lift. This concern will send you one of their illustrated catalogues and prices upon application, they also want agents. They are the G. Bickelhoupt Company, 245 West 47th street, New York City, and they will answer you if you mention the AMERICAN CARPENTER AND BUILDER, when writing.

Who Wrote This Letter?

The Charles Smith Co., 40 Dearborn street, Chicago, received a letter last month from one of our subscribers in Normal, Ill. The writer neglected to sign his name to the communication, so the above firm was unable to follow up the matter. If he will write them again they will be pleased to give him the information asked for.

Hand Drills



Among the most convenient tools manufactured are small geared hand drills as illustrated. The use of these drills has become so universal that nearly every machinist, gunsmith, wood worker or user of tools of any description has one of them in his kit.

The Millers Falls Company of Millers Falls, Mass., and 28 Warren street, New York, were first in the field with a tool of this sort, which had chuck with jaws to grasp the bit or drill. They commenced the manufacture of such tools more than thirty years ago and the quantity distributed since has run into very large figures. The drills are shown in the Millers Falls Company's pocket catalogue "C" in a variety of styles and sizes. Anyone can have a copy of this catalogue by applying for it at the New York office of the company.

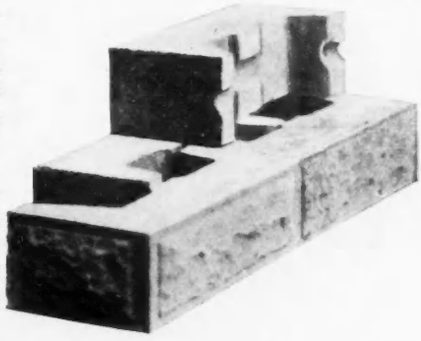
The Farrington Expansion Bolt

The Farrington Expansion Bolt depends for its expansive qualities upon the flexibility of a coil of wire, engaging the thread of a common wood screw, or for larger and heavier work on the taper of the mandrel of a screw bolt, specially threaded. It can be used most effectively wherever an expansion bolt is required, and can be removed and replaced as frequently as a common bolt with nut, without its expansive qualities being lessened.

In its practical operation it requires to be driven into a hole in hard material with slight force until the head of the screw comes in contact with the object to be held; then a few turns only of the screw will permanently and efficiently hold the fixture in place. It distributes the pressure equally on all sides of the hole in which it is inserted, and owing to the hardness of the wire, has no tearing or stripping effect, as in devices using soft material. It may be used not only as an expansion bolt, but in place of ordinary standard bolts with an embedded nut, such as is ordinarily used to unite the various parts of portable objects, like beds, chairs, tables, small buildings, etc. Its field of operation is practically unlimited. Those interested should write to Harvey Farrington, 45 Broadway, New York, N. Y., who will be pleased to furnish any information desired.

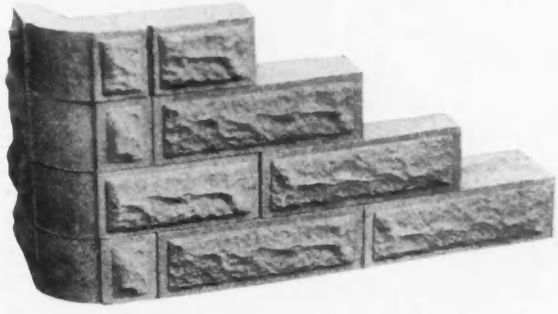
Barker's Perfection Block Machine

Dr. W. S. Barker, Marine Building, Toledo, Ohio, has invented a machine for making a concrete block to build a two piece block wall, for which he claims several advantages. His patent is dated September 26, 1905. One of his machines makes a block with 4 x 12-inch face and another 6x16 inches, and the thickness may be anything from 2 to 8 inches. The wall may be made of any thickness from 5 to 18 inches, and is hollow, being made with two solid block sections, as stated. Fractional blocks down to 2-inch dimensions, Roman brick, octagon, circle, round corner, inside or return corners, porch column and chimney blocks, keystones, all with any desired faces, are said to be possible on the machine, so that any requirement of the architect can be met.



The blocks being one-man size, one man can operate the machine alone, or it can keep four men busy getting the material to it and the completed blocks away from it.

The machine is not taken apart after each block is made,



but each is made face up and tamped with the face plate in less than five seconds, the block being then expelled through the top of the machine in one second by part of a turn of the lower handle. This is said to save much time and labor.

A special point is made by the inventor of the ability of the machine to meet architectural requirements, so that the

blocks made on it can be used for all parts of the building and not merely for the foundations, to which so many block makers confine themselves. He claims ability to make blocks with a wetter mixture than is usual in machines.

A cut of the machine can be seen in their advertisement in another column. Write for further information to Barker & Nighswander, Marine Building, Toledo, O.

"Cochran" Cement-Brick Machine

The increasing demand for various kinds of concrete-block machinery makes it pertinent to present the accompanying illustration of the Cochran double-mold cement-brick machine.

This machine is built with a double-mold box, one on either side of the machine. The machine is made in two sizes; No. 1, which molds 16 brick at a time, eight on each side of the machine, and No. 2, which molds 20 brick at a time, 10 on each side. It is claimed that this is the only cement-brick machine made on which one man can make and carry away 20 brick at each operation.

The pallets of this machine are 30 inches long, hold 10 brick each and are made of cast iron. Ten of them are furnished with each machine, including a master pallet from which to cast others.

The machines are all made of cast iron and steel, and all parts are fitted in a mechanical and workmanlike manner. There is nothing to clog, break or get out of order, and every machine is guaranteed to do all claimed for it.

The Cochran machine is manufactured and sold only by the Concrete Engineering & Equipment Co. of Butler, Pa., and Greensboro, N. C.

Hygienic Ice Making

Sanitary authorities and physicians agree that many epidemics have their origin in the ice that is used for household purposes. To safeguard against the dangers of impurities in ice, the Brunswick Refrigerating Co. has perfected a combined ice making and refrigerating machine which is attached to a household refrigerator box and secures to the user hygienic ice and pure sanitary refrigeration. The advantages of mechanical refrigeration are daily becoming better known and appreciated, and it has become indispensable to a great variety of industries as well as to every household. It makes possible the preservation of food products and supplies pure, hygienic ice at all times and forever does away with the lodgment of poisonous germs which accumulate in wood or metal-

Johnson's Wood Dye

"For the Artistic Coloring of Woods."

Johnson's Wood Dye is the result of years of experimentation. Because of its acknowledged superiority it has met with wonderful sale. Don't confound Johnson's Wood Dye with various "stains" now on sale. Water "stains" and spirit "stains" raise the grain of the wood. Oil "stains" do not sink deep into the wood, nor do they bring out the beauty of the grain. Varnish stains do not properly color the wood—the color being only in the finish. When varnish finish is marred or scratched it shows the natural color of wood—revealing the sham. Johnson's Dye is a dye. It penetrates the wood; does not raise the grain; retains the high lights and brings out the beauty of the wood. Johnson's Dye is the best for use on floors, interior woodwork and furniture.

Don't buy "stains" but be sure to get the genuine Johnson's Dyes if you desire best results. Don't take a substitute.

Johnson's Wood Dyes are Sold by all Dealers in Paint. They are Prepared in all Shades as Follows:

No. 131, Brown Weathered Oak; No. 129, Dark Mahogany; No. 172, Flemish Oak; No. 140, Manilla Oak; No. 126, Light Oak; No. 110, Bog Oak; No. 123, Dark Oak; No. 128, Light Mahogany; No. 121, Moss Green; No. 125, Mission Oak; No. 178, Brown Flemish Oak; No. 130, Weathered Oak.

Photographic illustration showing how Johnson's Wood Dye brings out natural beauty of wood.

One-half pint cans . . .	**30 cents**
Pint cans	**50 cents**
Quart cans	**85 cents**
Gallon cans	**$3.00**

One gallon covers 700 square feet upon hardwood, 400 square feet upon soft wood. It is very easily applied with an ordinary paint brush.

Special FREE Offer. We will send you a sample any shade, absolutely free for your paint dealer's name.

Send for FREE Book. We have just published a new edition of the interesting, practical book, "The Proper Treatment for Floors, Woodwork and Furniture," that we will send you free on request. It is illustrated from life and written by a wood finishing authority with over 23 years experience in this line of work. Contains many ideas for your business. Write us now. Mention edition ACB 2.

S. C. JOHNSON & SON, Racine, Wis.

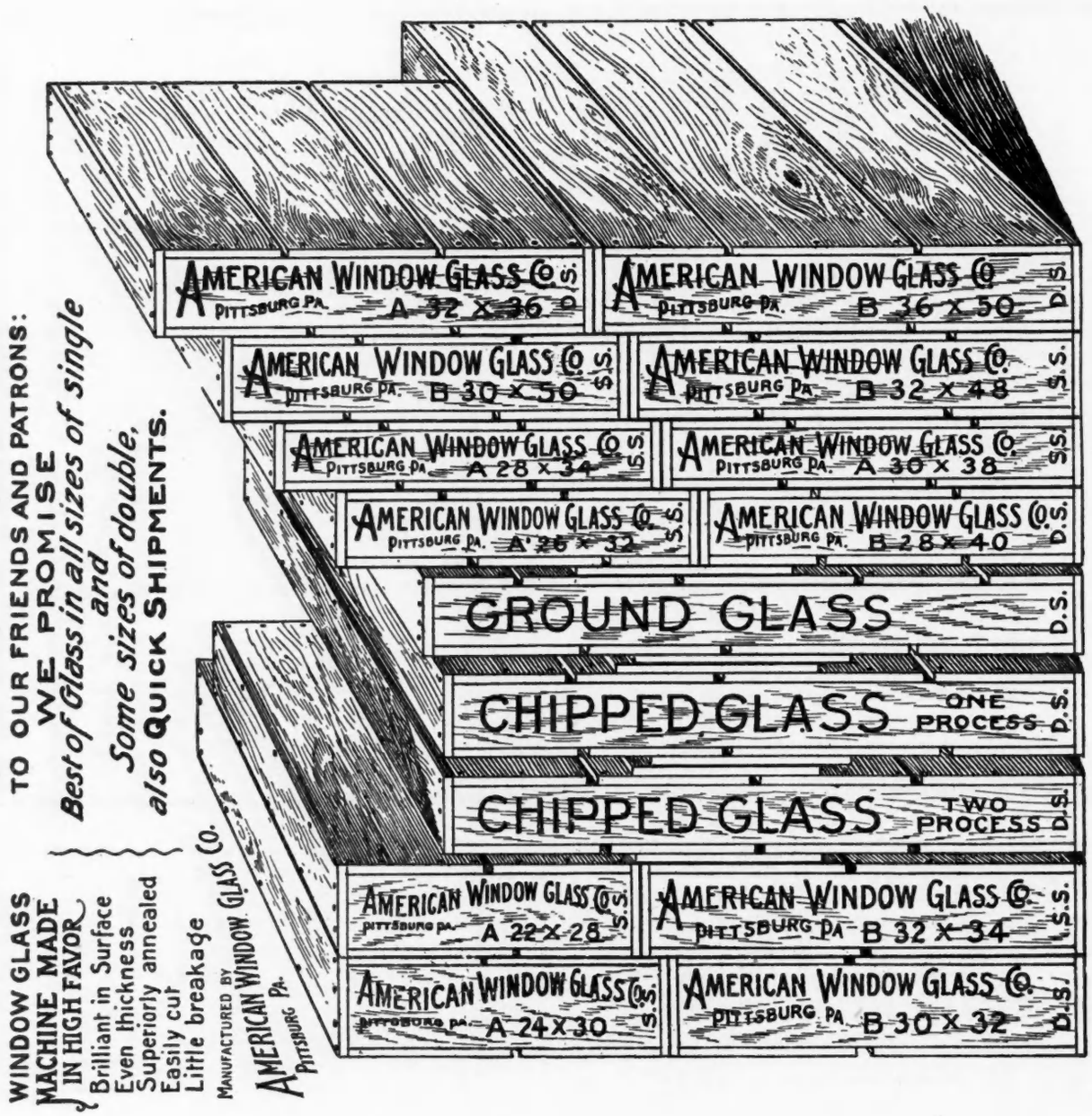
"The Wood-Finishing Authorities."

lined refrigerators that become water-soaked and soggy from melting ice.

They can be used in restaurants and markets where they are a necessity on account of the dry, pure air, low, even temperature and the sanitary conditions which prevail, keeping everything clean, sweet and dry. They are particularly desirable for dairies and creameries where sanitary conditions are of first and greatest importance.

Among the advantages of mechanical refrigeration are that you are no longer at the mercy of the ice man; you escape the slop, inconvenience and labor of getting in your supply of ice; you secure an even temperature, lower, if desired, than ice produces; you secure all these at an equal or less cost than with the use of ice.

For further particulars and catalogue write to the Brunswick Refrigerating Co., 1104-209 State St., Chicago, mentioning that you are a reader of the AMERICAN CARPENTER AND BUILDER.


TO OUR FRIENDS AND PATRONS:
WE PROMISE
Best of Glass in all sizes of single and
Some sizes of double,
also QUICK SHIPMENTS.
WINDOW GLASS
MACHINE MADE
IN HIGH FAVOR
Brilliant in Surface
Even thickness
Superiorly annealed
Easily cut
Little breakage
MANUFACTURED BY
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PITTSBURG PA.
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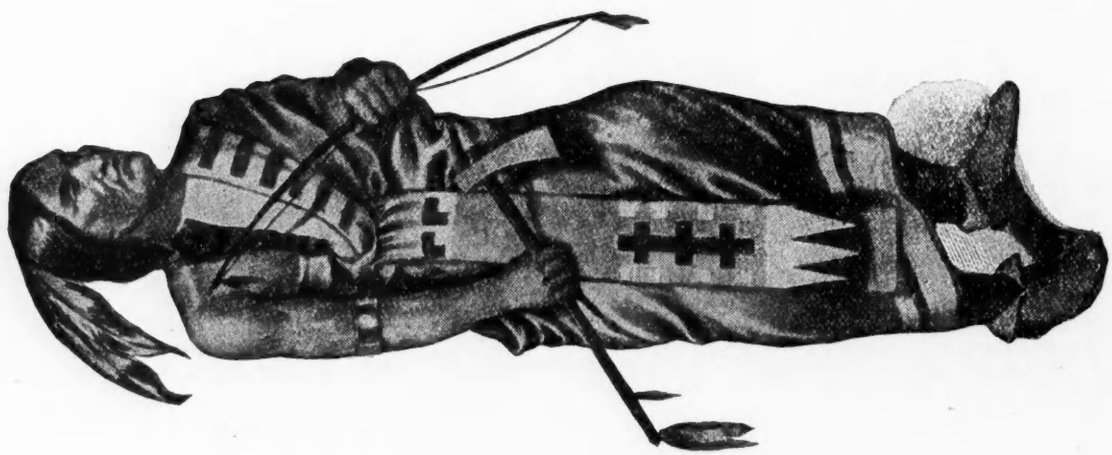
AMERICAN WINDOW GLASS Co. PITTSBURG PA. B 28 X 40 D.S.
GROUND GLASS D.S.
CHIPPED GLASS ONE PROCESS D.S.
CHIPPED GLASS TWO PROCESS D.S.
AMERICAN WINDOW GLASS Co. PITTSBURG PA. A 22 X 28 S.S.
AMERICAN WINDOW GLASS Co. PITTSBURG PA. B 32 X 34 S.S.
AMERICAN WINDOW GLASS Co. PITTSBURG PA. A 24 X 30 S.S.
AMERICAN WINDOW GLASS Co. PITTSBURG PA. B 30 X 32 D.S.

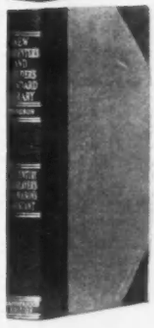


THE AUTHOR'S NAME IS A SUFFICIENT GUARANTEE THAT THESE BOOKS ARE THE BEST AND MOST PRACTICAL IN THE WORLD.

THE Carpenter's and Builder's Standard Library

BROTHERHOOD EDITION

By FRED. T. HODGSON, Architect.



Complete in Ten Handsome Volumes, 3,000 pages, 2,600 Illustrations, or sold Separately if so Desired. They are Practical, Omitting Nothing Essential and Containing Nothing Irrelevant.

FROM the Carpenter's and Builder's Standard Library of books has been eliminated everything which can in the remotest degree divert the reader's mind from the essentials of the subjects treated; thereby providing him with the necessary and useful knowledge by the most direct route and shortest cut and saving him many hours of misspent study.

Designed for the journeyman carpenter, architect or apprentice, the Carpenter's and Builder's Standard Library presents all the rules, formulas and principles of practical science, describing processes, machinery, tools, etc., in such a manner as to enable the reader to put into practice what he learns—in short these works make a practical operator of the reader and not an eloquent theorist as is too often the case with the product of modern schools.

The books are technical only within indispensable limitations, and in such instances care has been observed not to confuse the student with terms which, to an untrained reader, might appear ambiguous or obscure.

TITLES CONTAINED IN THE SET

Each Beautifully Bound in Half Persian Morocco, Silk Cloth Sides, Gold Tops and Titles.

Practical Treatise on the Use of the Steel Square. Two large volumes. 560 pages. 500 illustrations. Price.....$3.00

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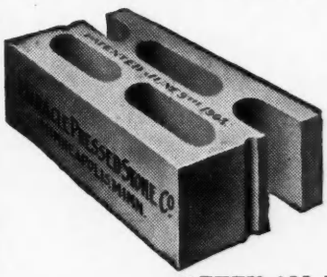

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