The Canadian Builder and Carpenter

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Vol. 4 TORONTO, JUNE, 1914 No. 6

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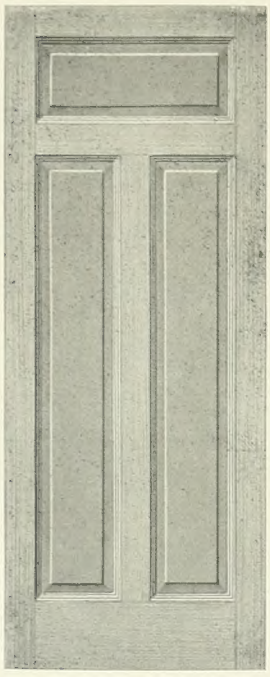

STOCK SIZES

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2-0 x 6-6
2-2 x 6-6
2-4 x 6-6
2-6 x 6-6
2-0 x 6 8
2-2 x 6-8

1 3/8 Inches Thick

The Pine Door, A1 Clear
No. 10

The Fir Door, Clear for Oil
No. 12

STOCK SIZES

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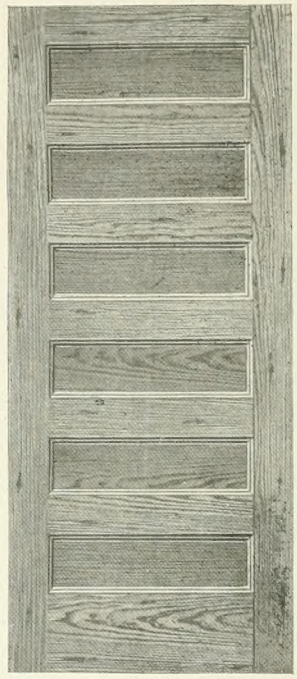
2-6 x 6-8
2-8 x 6-8
2-6 x 6-10
2-8 x 6-10
2-10 x 6-10

1 3/8 Inches Thick



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Until the Directory is extensive enough to give you what you desire, we will be glad to have readers write us for names of Architects, Patent Attorneys, Engineers, etc., whom we can recommend.

¶ For your convenience we are devoting this page to this "Professional Directory;" and in each issue we hope to see an added number of Professional Cards in this department. When you wish plans prepared—when you have an idea you wish to patent—form the habit of looking at this page in The Canadian Builder and Carpenter.

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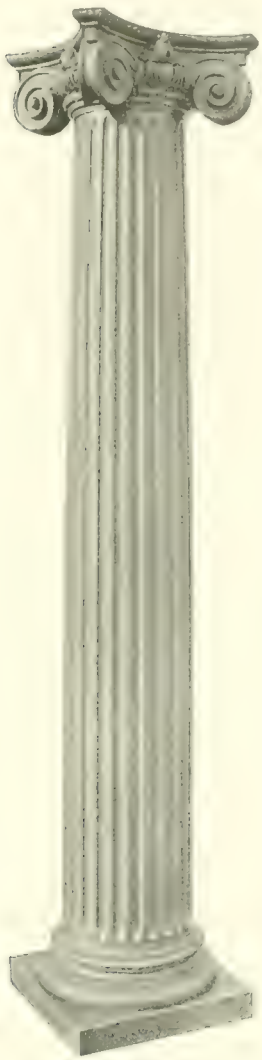

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Length	Diameter—			
	6 in.	8 in.	10 in.	12 in.
4 ft. Price	$3.10	$3.30	$4.20	$6.10
5 ft. Price	3.40	3.70	4.40	6.90
6 ft. Price	3.70	3.95	4.55	7.20
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9 ft. Price			5.75	9.65
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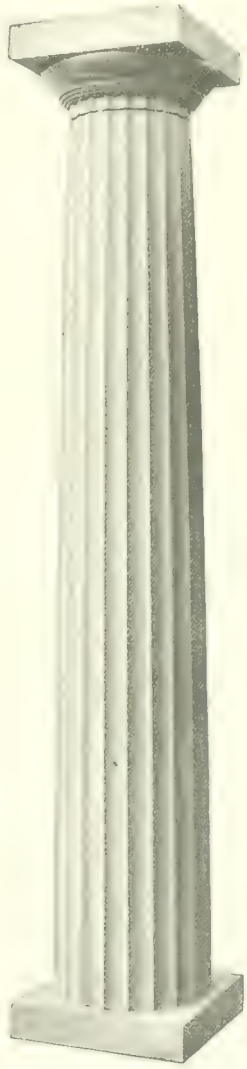
Length	Diameter—				
	5 in.	6 in.	8 in.	10 in.	12 in.
4 ft. Price	$2.60	$2.80	$3.70	$4.75	$8.00
5 ft. Price	2.85	3.10	3.85	5.00	8.50
6 ft. Price	3.10	3.50	3.95	5.45	8.75
8 ft. Price	..	..	4.55	5.95	9.75
9 ft. Price			4.95	6.50	10.50
10 ft. Price	..	..	5.20	6.75	11.00

Design B.L. No. 1

Length	Diameter—				
	5 in.	6 in.	8 in.	10 in.	12 in.
4 ft. Price	$1.60	$1.70	$2.25	$3.00	$5.00
5 ft. Price	1.85	2.00	2.40	3.25	5.50
6 ft. Price	2.10	2.20	2.50	3.40	5.75
8 ft. Price			3.10	4.20	6.75
9 ft. Price			3.50	4.75	7.50
10 ft. Price			3.75	5.00	8.00



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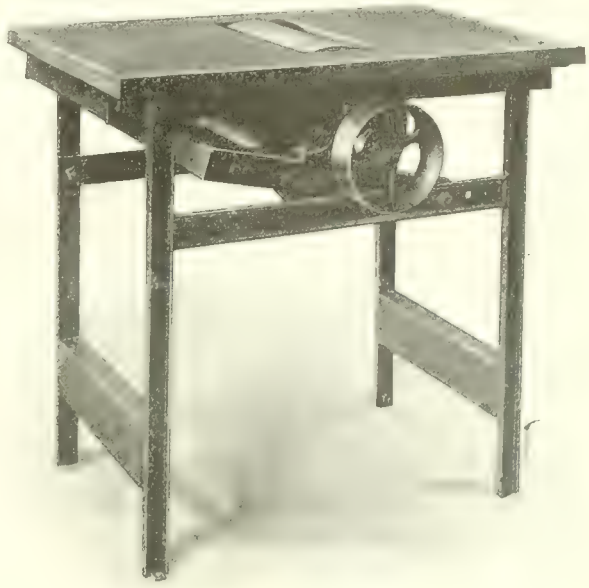

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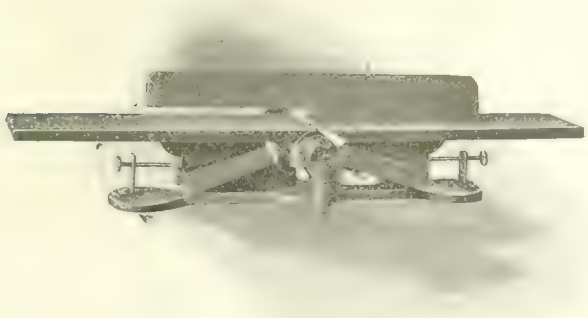

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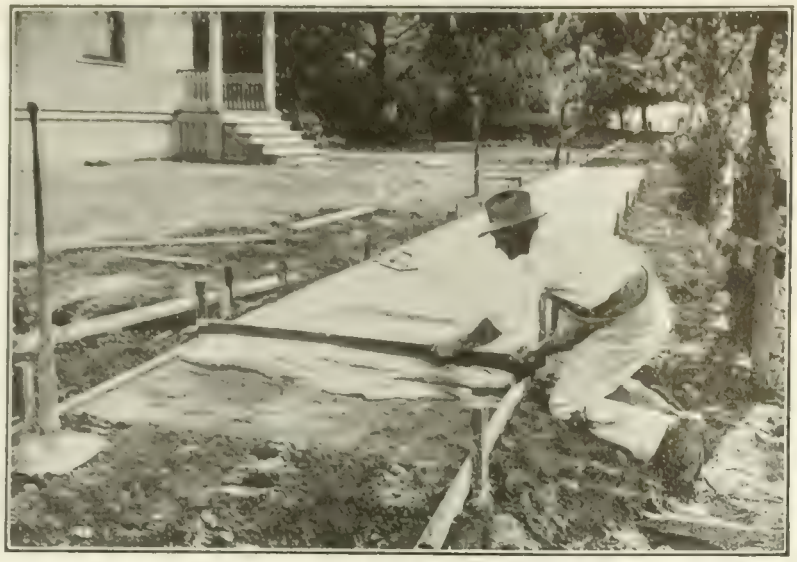

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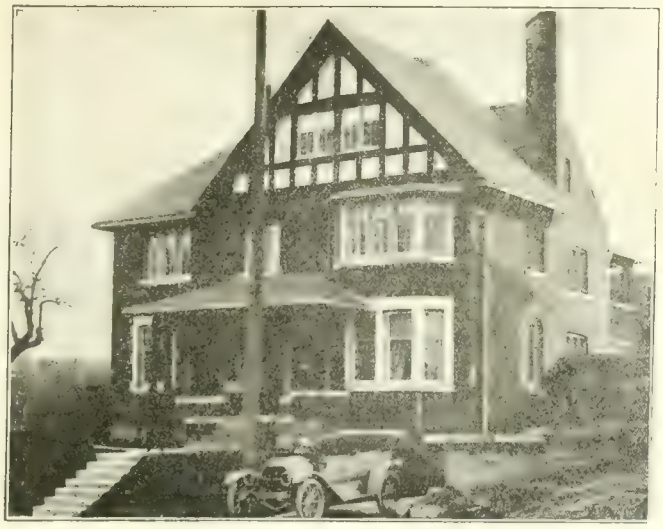


A Well Laid-Out Doctor's Residence With Up-to-date Garage

BY ERIC A. FORSON

Front view of Dr. O'Reilly's residence on St. Clair Ave.

A RESIDENCE for a doctor or some other professional man whose business is done mainly at home, must, of necessity, be laid out in a slightly different manner to the ordinary run of houses. For instance, there must be a waiting room and a consulting room, the latter equipped (in the case of a doctor) with lavatory and other conveniences necessary for a physician's work.

Reproduced herewith are plans of the residence of Dr. Chas. O'Reilly, on St. Clair avenue, Toronto. The general lay-out is excellent and not only embodies every facility that the owner needs in his profession, but gives all the comforts of an up-to-date home.

The house is built of red brick, on a stone foundation, and the accompanying photograph shows the stucco and paneled gable. The size of the lot is 53 x 100 feet. The exterior is finished in white and brown.

Hot water heating is used, and electricity supplies the lighting service.

The Garage.

A brick garage, capable of accommodating two cars, has been built on to the west side of the house, and is reached either from the outside or from the basement. Several radiators supply abundant heat. The ceiling is of hardwood.

A Roomy Basement.

The basement plan is compactly arranged and contains larder, fruit store room, furnace, and coal rooms, a general store room, maid's bedroom, wine cellar and a large smoking room. The house is built on high land so that the basement is well lighted and free from dampness, in fact, the maid's bedroom and the smoking room are as comfortable as those in other parts of the house.

The smoking room is located on the west side and is fitted up as a den. The windows are set high in the wall, and as there is a big lot between Dr. O'Reilly's house and the one next, plenty of light is had, and the location is ideal for a "bachelor's lair." The room is heated by radiators set on the ceiling, and by a large brick fireplace.

The Ground Floor.

The ground floor plan shows a wide vestibule, with a waiting room off this and the consulting room off the waiting room. The consulting room is equipped with lavatory and has several built-in bookcases on the walls.

On passing through the vestibule one enters into a small hall, which leads into the main square hall. The reception room and dining room are on one side and a large cloak room and the kitchen are in the rear of the consulting room. A roomy service pantry, containing sink and a drip board, is off the kitchen, and connects with the dining room. A balcony for the maids has been built off the kitchen.

In the parlor there is a mahogany mantel with coal fireplace. The hearth is done in light green tile.

The dining room is immediately in rear of the parlor, and the two rooms are separated by sliding doors.

French windows connect the dining room with a large sun room, containing 32 casement windows. This room faces the south.

The trim on this floor, and, in fact, throughout the whole house, except in the library, is in oak, light finish. The doors are of red gumwood, specially prepared under hydraulic pressure on seasoned hardwood.

First Floor Lay-out

The main stairway is in the middle of the hall. Halfway to the first floor is a large landing, and this is lighted by heavy leaded glass windows into which the family crest has been worked.

The rooms on the first floor have been laid out in the most convenient manner, as may be seen from the plan. There are two bathrooms, one at the front between the two front bedrooms, and another one on the east side of the hall. Each is equipped with a shower.

The library is located on this floor, in, perhaps, the best spot on the whole floor. Its windows face the south and west, which permits of the maximum of light being had.

It is evident that much work was spent on this room. In one corner is a buff brick mantel, extending right to the ceiling, and with a coal fireplace and tile hearth. In the opposite corner is an ingle with cozy corner and built-in bookcases. A seat has been built along one wall near the fireplace, the top of which lifts up and affords storage space for wood and coal. The beams on the ceiling are of heavy oak. At several places on the walls, cupboards, with glass doors, have been built, to house books, curios, etc. Small electric lights, placed at intervals around the room, add much to the whole effect.

Georgia pine trim, seasoned, and in mission finish, has been used in the library.

A large sun room has been built immediately in rear of the library, and is separated from the latter room by French windows.

A good idea has been brought out in the clothes closet in one of the bedrooms. The ceiling in this closet is high and on account of a shelf having been built at one end near the ceiling, three steps have been built, in order that this shelf may be easily reached.

Five Rooms in Attic.

The attic is divided into five rooms, four bedrooms and a store room. All are of good size, and each contains a roomy clothes closet. There is also a 3-piece bathroom.

Rear elevation of Dr. O'Reilly's home.

In commenting on his home, Dr. O'Reilly said to the writer, "There are two big features about the house, first, there is not a dark spot in it; the windows are so arranged that no matter where you go there is always plenty of light.

"The second feature is that you cannot see a nail any place in the woodwork. Myself and family have hunted time and again to find one, but without success."

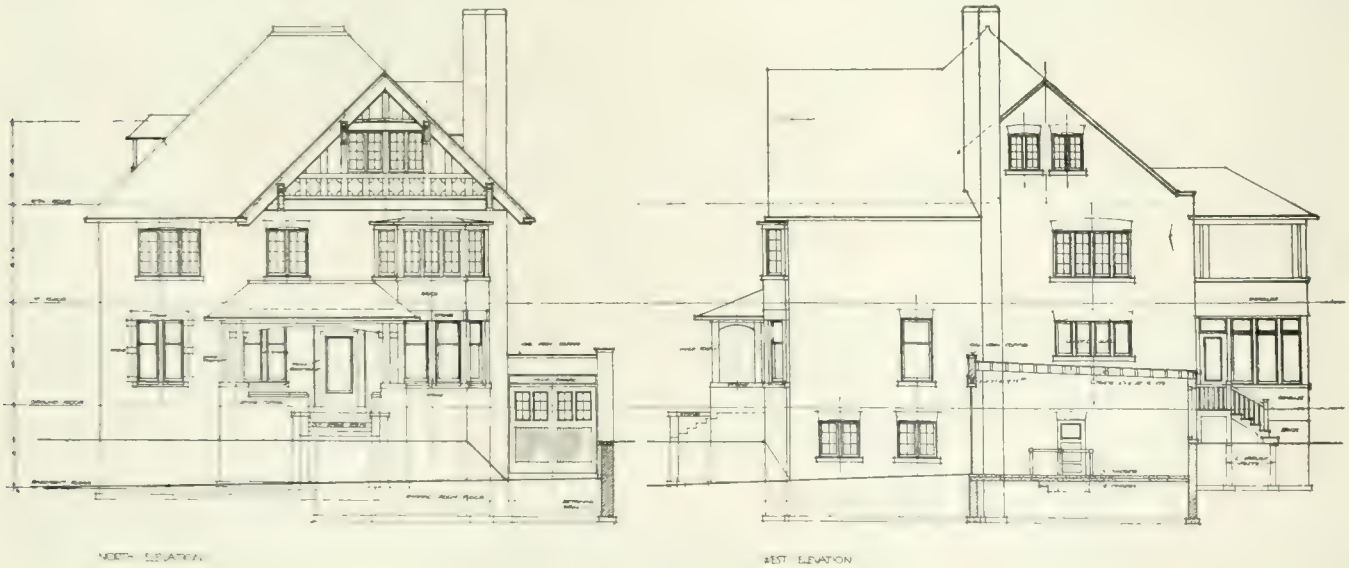
Making Tinted Paints

Tinted paints, at least those of light tint, consist practically of white paint with the addition of a small amount of coloring matter. The coloring materials used in tinting are not uniform, and it is not possible, therefore, to give exact directions for producing a particular shade, since the amount of color used will depend upon the individual characteristics of the particular lot on hand. In general, gray tints are made from white paints by the addition of a black pigment, such as lampblack or bone black, and sometimes a small amount of red or blue is used also. The total amount of coloring matter employed varies, but rarely amounts to as much as 5 per cent. Buff may be made by the addition of mixtures of ochre and umber; brown, by the addition of mixtures of black, red, and sometimes yellow; yellow and cream may be made by the addition of ochre or chrome yellow; frequently for this purpose golden ochre is used, which is ordinary ochre brightened by the addition of a small amount of chrome yellow. Blue tints may be made by the addition of small amounts of Prussian blue. This is a powerful tinting pigment, and it is seldom that more than 1 per cent. is required. With the white paints which contain no lead, ultramarine blue may be used instead of Prussian blue, but ultramarine blue should not be used with lead paints.

Besides the tinted white paints, bright colors are sometimes desired, especially green, for blinds, and reds for the trimmings of houses or for machinery. These paints seldom contain any large amount of the expensive lead and zinc white pigments, but consist of coloring matter and large amounts of the cheap white pigments.

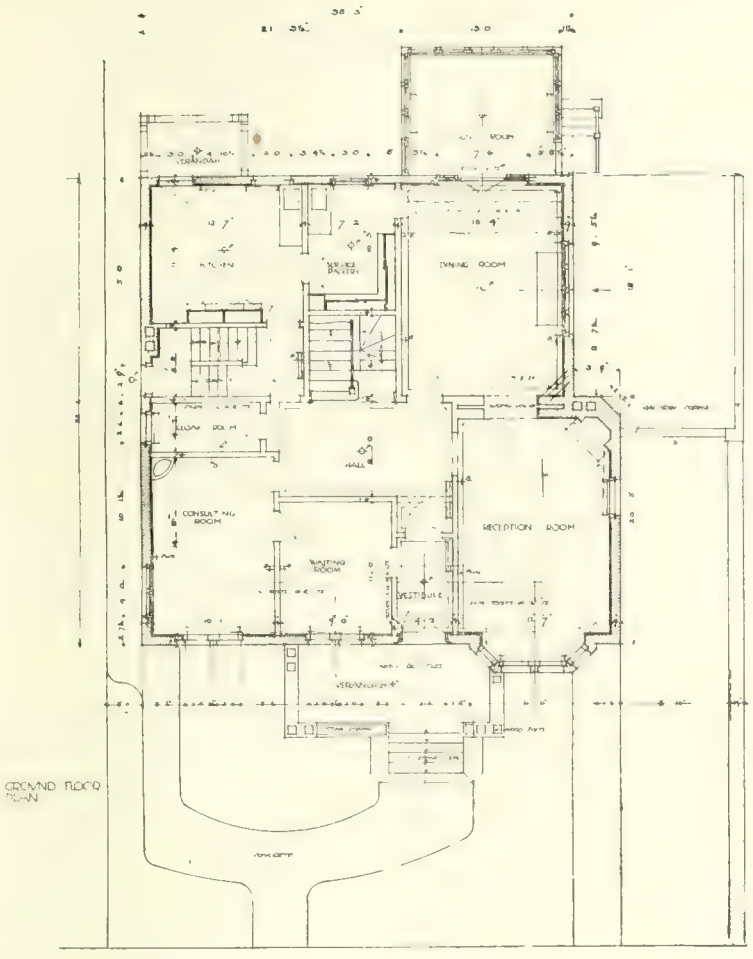
For black paints there is practically only one coloring substance, namely, carbon, which, however, occurs commercially in a number of forms. The color of so-called drop, or ivory black, is carbon obtained from charred bone; lampblack is carbon in the form of soot. The latter, although very pure, does not make a satisfactory black alone, the heavier forms of carbon, such as bone black, or even ground charcoal, producing a better black.

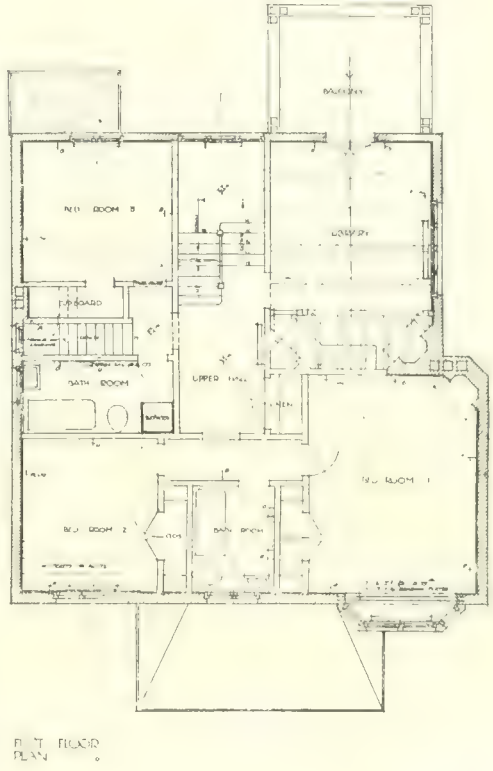
For dark shades of brown or red there is probably nothing which is as cheap as the oxide of iron pigments. These vary very much in shade, giving both

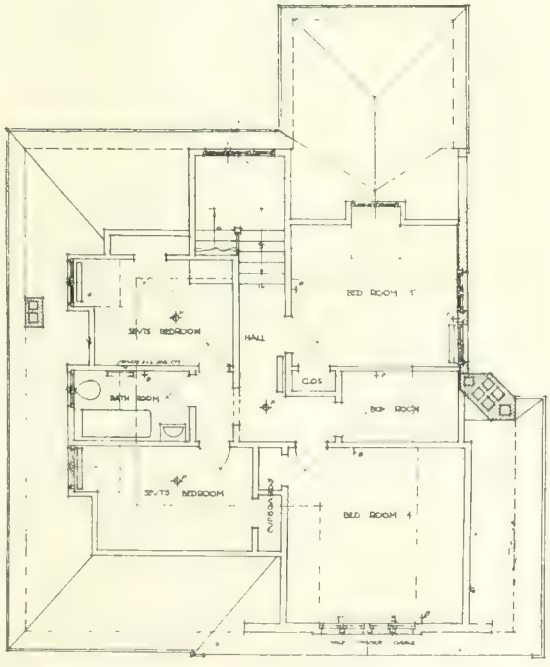


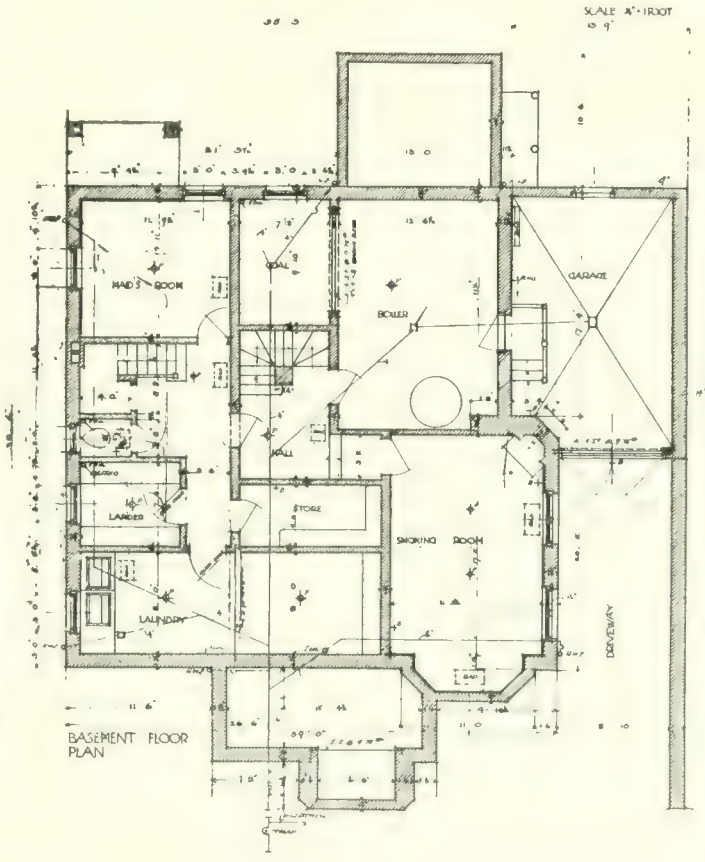
Elevations of a well laid-out doctor's residence.

Floor Plans of Doctor's Residence









browns and dull reds. A pigment that gives a very satisfactory reddish-brown and contains about 40 per cent. of iron oxide makes a satisfactory paint, containing approximately 56 per cent. pigment and 44 per cent. vehicle, the vehicle being very much the same as that used in a first-class white paint. Such a paint will weigh about 13.5 pounds to the gallon, which, therefore, will contain 7.56 pounds of pigment and 5.94 pounds of vehicle. This pigment is cheap, generally costing not more than 1 or 1½ cents per pound.

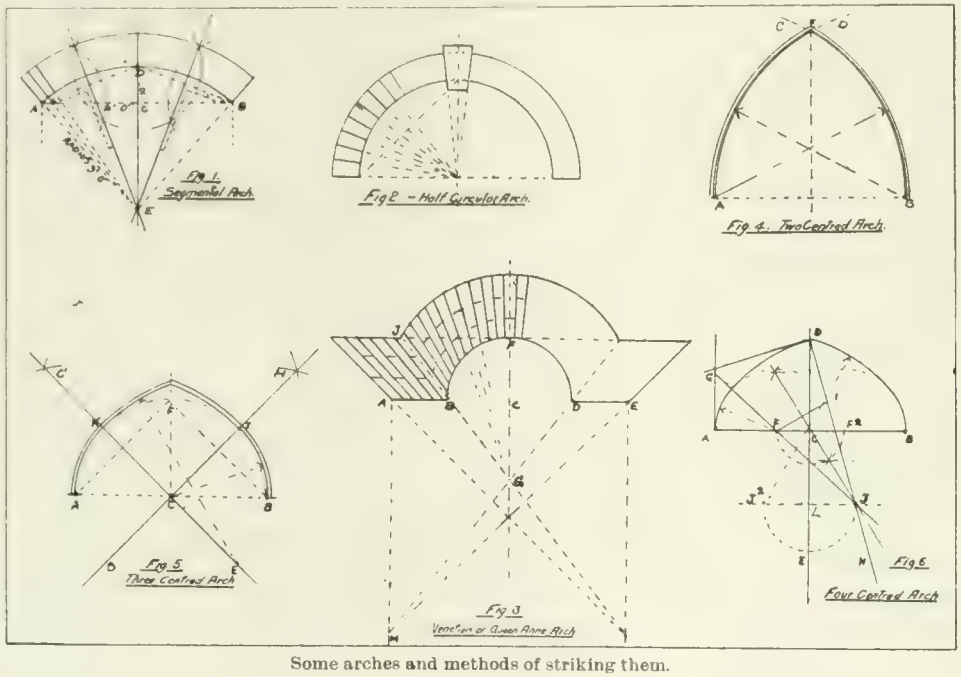
Several Designs of Arches and Methods of Striking Them

By John Webb.

THE arch, as a constructional feature, is met with on the majority of buildings, if not actually employed in the body of the building. It may be inside, as in the chimney breast, for instance, or as a trimmer arch, or, again, as a scoinson arch, and, even if the design of the building is in a trabeated style, the arch may still be there, even if concealed. It is a feature that is being constantly met with by artisans and mechanics in our line of business.

The most common type of arch in general construction is the segmental arch, generally employed in window openings, chimney breasts, inverted foundation arches, etc., and it is the simplest to turn and to centre for. The way to find the centre and radius of a segmental arch is as follows: Say the width of the window opening is 4 ft. in the clear, and the rise is 10 ins. Set out 4 ft. (as A-B in Fig. 1), find the centre C, and from C set up a line square from A-B, and mark off the rise, namely, 10 ins. at D. Connect A-D and B-D, and with compasses set at a little more than half the length of the lines obtained, set the compass leg on A, describe an arc; put leg on D, describe another arc, cutting the one already made, and draw a line through the intersection of the arcs till the line strikes the square line at E. Repeat the operation on the other side. E is the centre of the arch and is the point from which the haunch of the arch is drawn through A on one side and B on the other side. E is also the point from which the joint lines of the voussoirs and keystone diverge.

A simple way to do it on the job would be to take the board from which you are to cut the centreboard, mark off the middle of line A-D, and with a steel square set as shown, mark a line with a straightedge to E. Do the same again on the other side, thus getting the centre at point of intersection.



Some arches and methods of striking them.

The Half-Circular Arch

An arch that is also struck from one centre is the half-circular arch, which has its centre point on a line level with its haunches, Fig. 2. In this arch the rise is equal to half the width.

Another arch, in which the circular part is struck from one centre, is the Venetian or Queen Anne arch, Fig. 3. This arch is turned over a 3-light window, the window having one wide and two narrow lights. The window is divided in width into four equal parts, the middle light being the width of two parts, B to D. Mark the width into the four equal parts, A to B, B to C, C to D, and D to E. With centre C and radius C-B strike the half-circle B-F-D, then connect A-B and D-E, thus drawing the soffit line of the arch. To get the points from which to draw the haunch joint and the line of intersection between the wing and the circular arch at B-J, drop perpendicular lines from A and from E. Take the width, A to E, and mark down on the line from A to get point H. Do same on line from E to get point I. From I draw through A, which gives the haunch joint on that side. From H draw a line through E, thus getting the other haunch line. Where the lines intersect at G, is the point to which draw the joint lines of the circular part of the arch, as the dotted lines indicate.

Two-Centred Arch

Leaving one-centred arches, we now have an example of a two-centred arch. This is shown in Fig. 4, and is

characteristic of the English decorated period. To strike this arch, take the width A-B in the compass, and with leg on A strike arc B-C. Then with leg on B strike arc A-D, and the point of intersection E is the apex of the arch.

The three-centred arch appears in various examples of the perpendicular period and seems to be a connecting link between the decorated arches and the arches of the late perpendicular period. It is worked out in Fig. 5. This arch is like Fig. 2, with a pointed top. To get it, mark off the width A-B, find centre at C, and with radius A-C, and having leg of compass on C, strike the half-circle A-F-B. Make intersection arc at G and H, drawing lines from them through C and continuing through to take points D and E. Then take with the compass the width A-B, and with the leg on D make the arc J-I. Having done this, with the same width and with the leg of compass on E, strike the arc K-I, so completing the arch.

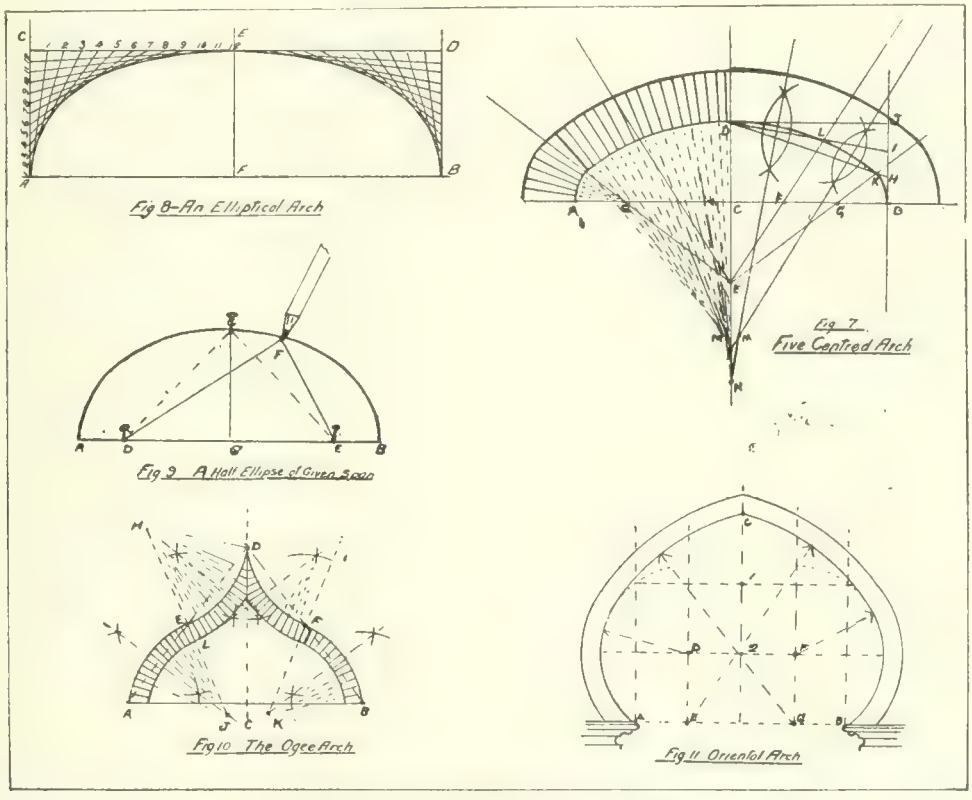
Four-Centred Arch

In the February issue of this journal a querist under the nom-de-plume "Young Spread," asked for a method of striking a four-centred arch. To this I replied with an answer and diagram describing this arch, but this method fills the bill only when the width is specified. Sometimes cases arise when the width and also the rise is specified and must be worked to. In Fig. 6 is shown the method by which a solution of the problem may be arrived at. Say A-B is the given span and C-D is the given rise. Mark off A-B, find the centre at C, and draw a perpendicular line through C to D and continue down indefinitely to E. Now draw a line up vertically from A. Divide the rise C-D into three equal parts and with two-thirds the length of C-D mark off the vertical line from A to G. Produce the line D-H at right angles to G-D. With compass set to length of A-G, mark off A-F on the span line, and, with the same length, viz., A-G, mark off the point I on the line D-H. Connect F-I. With arcs of intersection, bisect F-I at right angles, and run line through till it cuts D-H at J, and draw a line through J and F indefinitely. With compass set to length of A-F and with leg on F, draw the arc A-K, and with leg on J, and with radius J-K describe arc to D. This completes one side arch.

To get the centres for the other side take length C-F, and with it, from C, mark off F^2. Then draw a parallel line at right angles to D-E, and with length J-L, from L, mark off J^2, the centres of the arch being F and J, and F^2 and J^2

A Five-Centred Arch

Fig. 7 describes the method of striking an arch from five centres, the centres being at points G, M, N, M, and G. To proceed with this method lay the span A to B, find the middle at C, and at C set up a perpendicular line through C-D-E indefinitely. Mark off the rise of arch from C to D; also, with the same length, mark point E from C. Now draw the rectangle D-C-B-J. Divide C-B into three equal parts, thus getting the points F and G. Also divide the height B-J into three equal parts and so get points H and I. Join D-H and D-I. Draw a line from E through F, and from E draw a line through G. These lines intersect the lines D-I and D-H at points L and K respectively. With compasses on D and on L make arcs of intersection; draw a line through these arcs (as in sketch) and produce the line till it cuts the vertical line D-C-E at point N. N is the centre from which the top segment is struck, and is also the point to which the joints in the top section of the arch diverge. With compass on L and on K make arcs of intersection, draw a line through the intersections, and produce the line till it cuts the last line drawn to N at the point M. M is the centre for



Some arches and methods of striking them.

the middle section of the arch, and G is the centre for the bottom segment K B. The three segments should join accurately at points L and K on the first and second normals.

Elliptical Arches

This arch is not truly an elliptical arch, but is approximately so, and any type of this shape arch requiring more than five centres may be called elliptical and may be drawn as follows. Mark off the span A-B, set up vertical lines from A and B, mark off C and D to the height of the rise, and connect C-D. Divide C-A into equal parts (Fig. 8). Also divide C-E into the same number of equal parts, and connect as shown in Fig. 8. Repeat the operation on the other half of the rectangle. Join the points as shown, thus obtaining half of an ellipse.

A half-ellipse of a given span and given rise can be made in the following manner: Mark off the width of the span A-B, and from the centre set up a line vertically and mark off the rise at C. With compass set to length of C-G mark off points D and E, from the centre G, and fix three fine nails in each, D, C and E. Put an endless string or cord around the nails at D, C, and E (see the dotted triangle). Remove the nail at C, and with a pencil in its place and keeping the cord tight by means of the pencil and nails at D and E, work around and so describe the elliptic curve.

An arch that sometimes is required to be used in some buildings is the ogee arch. This arch is not a desirable one to use, from a structural point of view, as the voissoirs in the top halves of the arch are inverted, but cases are met with where this type of arch is specified. Fig. 10 illustrates a method of obtaining this arch. Set off the extreme length of the extrados of the arch A to B, find the centre at C, mark the extreme height of the apex at D, and connect A to D and B to D. Find the centre of each line at E and at F. Bisect A-E, producing line to carry the centre at J. Bisect E and D and produce line to carry centre at H. The length A to E is the radius of the segments, as are also E-D and D-F and F-B. With the compass set to length A-E and the leg on point J describe the thickness of the arch from this line and strike the inner arc, so forming the bottom segment of the soffit. With compass point on H, and having length E-D, strike the segment E-D. Expand the compass to point L, where the lower segment meets the normal H-J, and from that point draw the upper segment of the soffit line. Repeat as before on the other side of the arch.

Oriental Arch

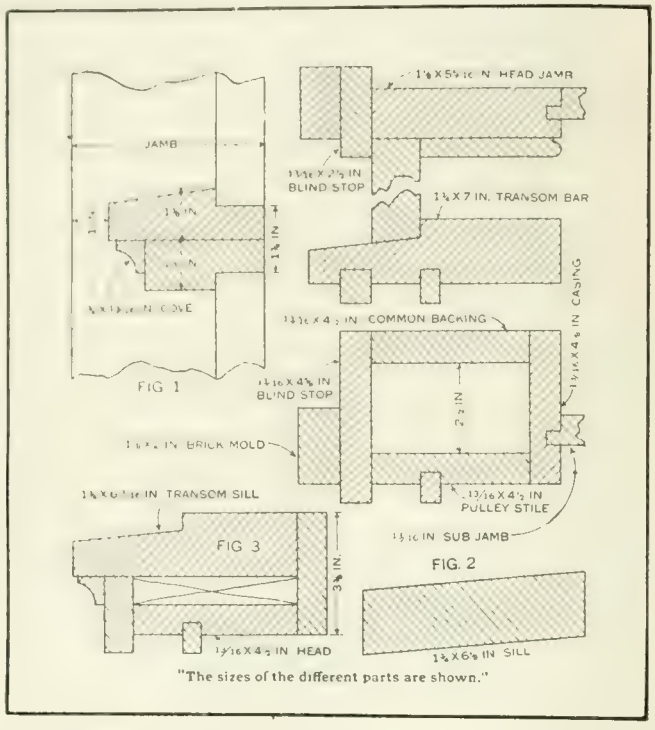
The Moorish or Oriental arch is seldom required, with the exception of decorative fittings in arcades, etc., or triumphal and festival arches. A very simple method of striking this arch is illustrated in Fig 11. Lay off the span in the clear as A-B, find the centre and set up a vertical line. With length A-B mark off C, this giving the rise. Divide A-B into four equal parts, and set up lines as shown by the dotted lines in Fig. 11. Divide the rise into three equal parts, and draw horizontal lines through the points 1 and 2. Where the vertical and horizontal lines intersect at points D and G are the centres for one-half of the arch, and points F and E are the centres for the other half of the arch.

* * *

Transom Bar Detail

Fig. 1 shows the transom bar we use on all outside door frames where no details are given. This is all made from 1½-in. stock and is housed ½ in. into the jambs. If it is desirable to have more space between door and transom, blocking of the necessary size may be inserted between the two pieces, the transom bar casing (not shown) covering the joint. We always make outside door jambs for brick walls 7½ ins. wide unless otherwise ordered.

Fig. 2 shows detail of box window frame for brick wall with transom head. The sizes of the different parts are shown and are standard with us when no details are given. The width of sub-jamb, which is billed with the interior finish, can be regulated to suit the distance from face of box to plaster. When there



is no transom the head is made 1⅛ in., as shown, and plowed for the parting stop. The wide head stop shown is, of course, billed with the interior finish.

If a heavier transom bar is wanted, the style shown in Fig. 3 is used. In this bar both pieces are set flush with inside edge of pulley stile, and a casing put on with the finish, to cover the opening between the two pieces caused by the blocking placed between them. W use the cove for molding these bars, as it makes a neat finish and can nearly always be picked up out of stock.—J. B. Lodge, in The Wood-Worker.

* * *

A Public School of Neat Design

Vacation time is drawing near, and as this is the time when schools are built, already local school boards are contemplating erecting new schoolhouses or remodeling old ones.

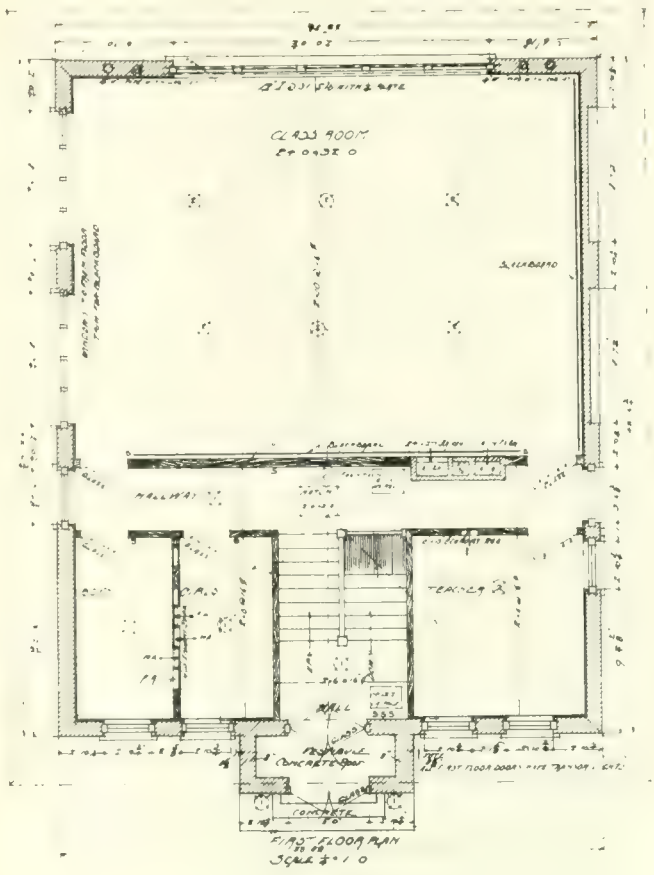
On the opposite page are reproduced floor plans of front and rear elevations of S. S. No. 8, Grantham Township (near St. Catharines, Ont.). These were drawn up by Jos. Daw, architect, St. Catharines, Ont., and the building construction was carried on by John George, also of St. Catharines.

It is of solid red brick construction on a stone foundation, and the manufactured stone window sills, lintels, and trimmings make up a pleasing combination.

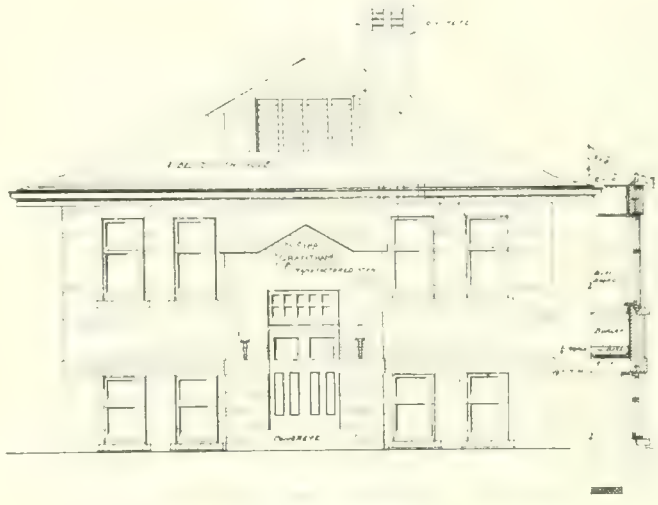
The roof is of asbestos shingles.

It will be seen that the layout is ideal for a school. The furnace, lavatories, and closets are located in the

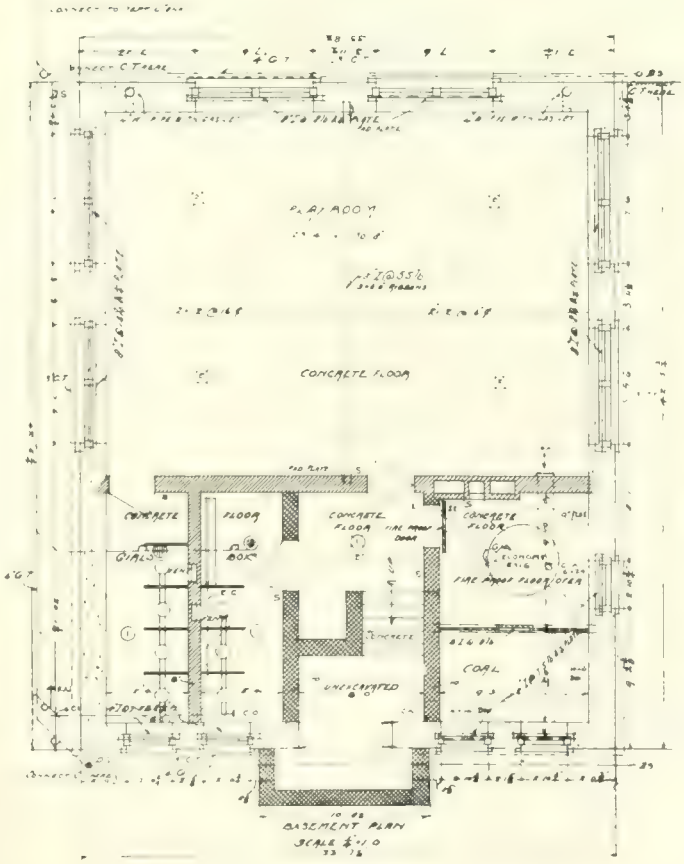
Plans of S.S. No. 8. Grantham Township



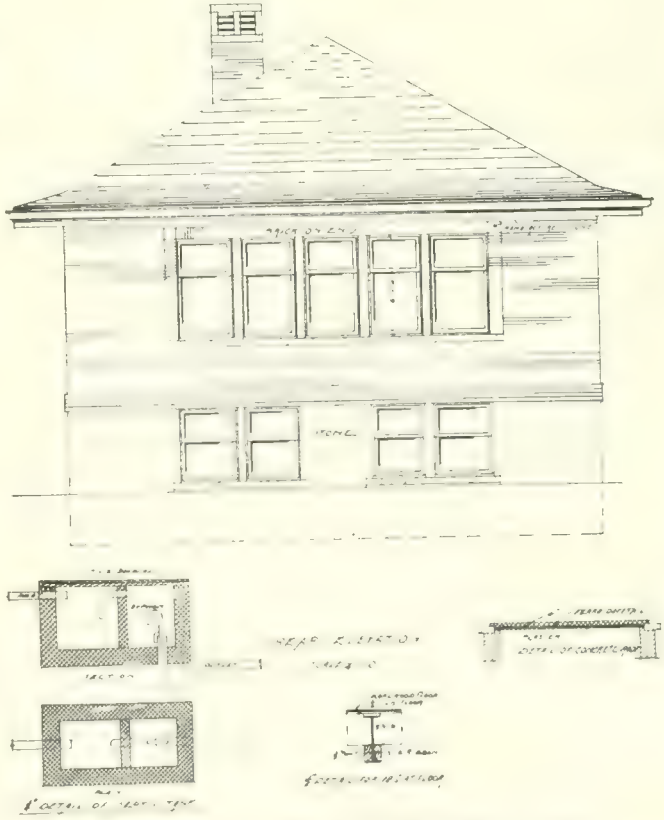
First floor plan



Front elevation



Basement plan



Rear elevation and sectional views of septic tank, concrete construction, etc.

basement, and the large playground provides space for recreation on wet days.

Upstairs, the larger half of the floor is taken up with the class room and the pupils' cloak rooms (divided for boys and girls) are located to one side of the main entrance, and the teachers' quarters occupy the other.

The building is equipped with a hot water heating system.

* * *

To Prevent Fires in Small Towns

The Western Canada Fire Underwriters' Association has done good service in issuing a pamphlet of "Suggested By-laws for Small Towns." This has been made as concise and free from technical detail as possible, and it is believed that the requirements are not too severe to be adopted in full by the smaller municipalities; it is in no sense intended to be used as a standard in the larger places, where the size of buildings and congestion of values require greater safeguards for life and property. It is to be hoped that that portion of the by-law relating to moving picture theatres will receive the earnest attention of municipal authorities. Secretary Stead, of the Western Canada Life Underwriters' Association, Winnipeg, doubtless will be glad to send a copy to any enquirer.

Questions with Answers Containing Valuable Information of Interest to Builders and Carpenters : :

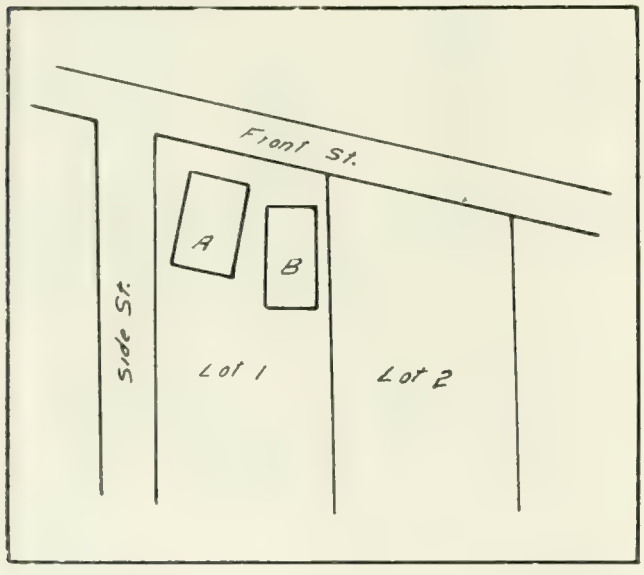
Answers are by Subscribers

More Questions Received

THE following questions have been received since the May issue of the Canadian Builder and Carpenter. Replies accepted for publication will be paid for at regular rates:

33. Repairing a Grindstone—I have a grindstone 2 ft. in diameter which has a 3-in. piece chipped out of it. Is there any satisfactory way of repairing it? I do not want to cut it down, if it can be fixed up in any way.—C. J. R.

34. Location of House.—How would you advise placing a house on a lot where the front street runs in a diagonal line with the lots? Let me illustrate. On the accompanying sketch which is right, A or B? A is at



right angles to the front street; B is in line with the lot. Would it make any difference if there was no side street?—J. H. B.

35—Details of Record Cabinet.—Can any reader furnish me with plans and details of a cabinet for holding phonograph records and let me know what woods are best?—J. O'H.

36—How to Clean Brick Work.—I would like to know of a good method or preparation for cleaning bricks. Can anyone tell me?—E. A. F.

37—House Moving.—Have any of your readers had any experience in house moving? I have a small frame house I would like to move to a lot on the other side of the street, but do not know how to go about it. It is on a concrete foundation.—G. G. C.

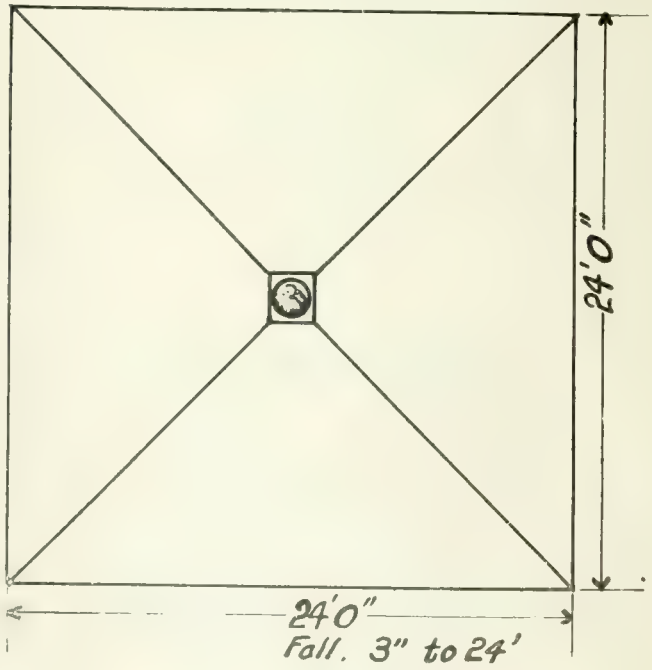
38—Estimating Paint.—Can you tell me of a reasonably accurate method for determining the amount of paint needed on a job?—C. E.

* * *

Answers to Questions

Question 15—Concrete Cellar Floors.

In answer to Perth, as to best means of laying floor for drainage purposes, I would suggest that he put trap in centre of cellar and slope his floor to it from the walls. I just finished putting in two concrete cellar floors that were 12 ft. x 12 ft. and 24 ft. x 24 ft. square. My method was, I put in a layer of broken brick and cinders for a good foundation and rammed



home hard till within about 4 ins. of the finished surface. For the mix, I used 1 part Portland cement, 3 parts sand, and 5 parts gravel or stone. The stone or gravel should not be larger than 1 in. or less than ¼

in, and should be free from all soft stone or fine screenings. I then put on a wearing surface of 1 in. composed of 3 parts Portland cement and 5 parts clean, sharp sand, mixed dry and screened through a No. 4 sieve. For the top coat the quantity of water used ought to be just enough so that the surface can be tamped and floated and finished within 20 minutes after being put on bottom coat, and when done should be firm and not quaky.—Jinx.

Question 22—Warmth of Houses of Hollow Tile Walls Stuccoed.

The question asked by Mr. F. Ireland, Saskatoon, was re warmth of 8 in. hollow tile walls, stuccoed, vs. a wall built of 2 x 4 studs, sheathed inside and out with shiplap and paper, and then covered with siding on outside and strapped and plastered on inside. If a six-cell 8 in. hollow tile is used for the exterior wall, you will procure two dead air spaces in the wall, whereas if above wood construction is used, you will procure only one dead air space, namely, between 2 x 4 studs. The slight air space between lath and inside sheeting is very likely to become more or less filled with the key of the plaster, unless 3 in. strapping is used.

As you are no doubt aware, a dead air space is one of the best insulators against heat and cold, and is similar to the principle involved in the manufacture of thermos bottles.—W. J. N.

Re Question 25.—Hollow Tile Construction.

Referring to Mr. M. B. Jeffery's questions re hollow tile construction:

(a) Must partitions be built in basement to carry ground floor?

The above all depends upon the span of the floor. Long-span combination floors are used up to a span of 25 ft. Either partition or steel beams, supported by columns, can be used if desired.

(b) How is one to proceed in working around a well-hole for stairs or other opening in a floor,

This all depends upon the size and shape of the well opening. Additional steel could be used in concrete joist nearest opening to carry throat of stair, or possibly a cantilever arch could be used where well-hole is of irregular shape.

(c) Should reinforcing rods run from one side of the building to the other, or should they run only from one bearing partition to another? Should these rods be bent at ends?

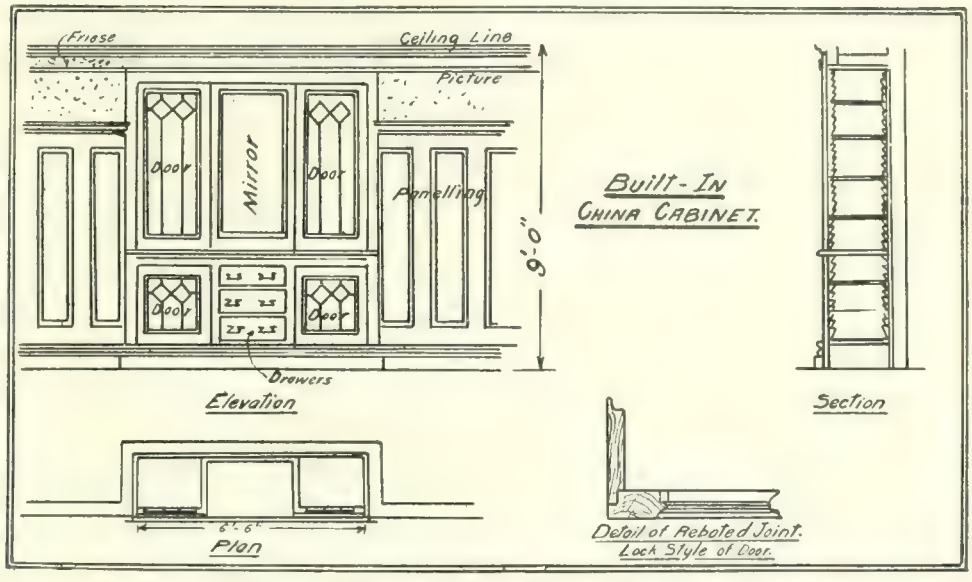
Referring to the first question, it is not necessary that the rods run from one side of the building to the other, it being necessary, though, that they run the full length of the span and project into the next span to take care of the negative bending moment of the steel.

Referring to the second question, it is not necessary that these rods be bent at ends, but is advisable where a simple span occurs. It is not used where continuous.

In designing long-span combination hollow tile floors, the same methods and practices are used as in reinforced concrete design.—W. J. N.

Question 29—Built-in China Closet.

The accompanying sketch would look well worked in either Georgia pine or cypress, medium dark finish. The whole back of the cabinet should be sheathed with 3/8 in. bead and match stuff. The shelves in the cupboards would be best to be made movable on racks. The size of the cabinet is 6 ft. 6 in. wide and 21 ins.



A well-designed china cabinet, with details.

deep. The height is governed by the height of the frieze and picture rail; 7/8 in. stuff would do for the carcass. Doors are 1 1/8 in. thick, finished.

When fixing the mirror, put a layer of soft paper next to the silvered back of the glass.—John Webb.

Question 30—Cross Hall vs. Straight Hall.

The position, shape, arrangement, and size of a hall must, of necessity, be influenced by several important factors. The site of the building, the aspect, and the approach, the type of building (if it be public or private), will often influence the position, also the type and position of the rooms, and very often the cost.

To generalize, it may be said that the straight hall is more suitable for the smaller kind of dwelling houses, as, for instance, cottages, terrace houses, workmen's dwellings, small villas, maisonettes, etc., and the cross hall is used more in the larger types of houses, as large residences, country halls, club houses, semi-detached and detached houses. This can by no means be accepted as a definite rule. In view of the economy of space, the straight hall is very useful for small houses, and, with good stair arrangement, can be made very effective.

The querist quotes for his example a small house.

Well, take a 30 ft. wide lot. After allowing for side walk and a little lawn space on each side, there is about 22 ft. width for the house. So, in a case like this, it is not easily possible to introduce a cross hall, as a cross hall would place the front entrance towards the centre of the house, and so make it impossible to have rooms of a fair average width. Therefore, a straight hall placed in a front corner is the best and most economical planning.

Very often cross halls lend themselves to more elaborate stair treatment, but in a small house, where space economy and useful planning have to be considered, this hardly compensates for the loss of useful space.

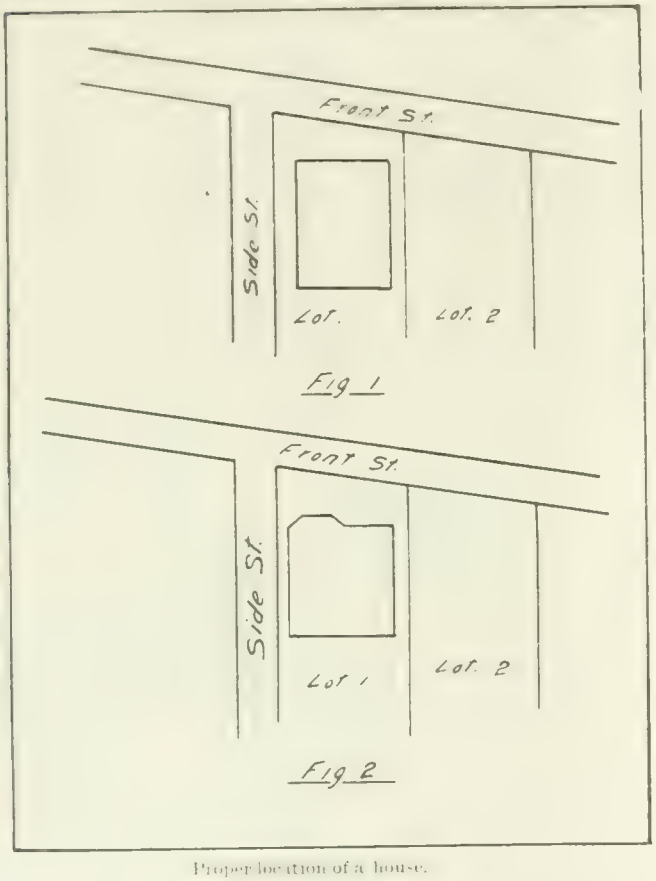
To sum up, in my opinion, the straight hall has points in its favor over the cross hall for a small house.—John Webb.

Question 32—Waterproofing for Bricks.

If "Subscriber" will refer back to the May number he will find two methods of brick waterproofing mentioned in my reply to Question 26.—A good oil preparation would be as follows: Melt 14 lbs. common resin. When melted, remove from the fire and add, while constantly stirring ½ gal. coal tar naphtha, ½ gal, boiled oil, ¼ gal, oak varnish, ½ gal. thick boiled oil, and 1 oz. lime. Mix well while warm. This preparation dries in about six hours. Apply when the brickwork is dry, and on a warm day preferably. Brush on well until all suction is stopped.

A silicate paint is a good thing, and does not affect the color of the brick. Two coats would make a good job of a wall. These silicate preparations can be bought.

Why not write the W. H. Thornhill Co., 160 Princess street, Winnipeg, and enquire if "Pudlo" can be used in any form as an exterior coating for this purpose?—John Webb.



Proper location of a house.

Question 28—Weeping Tile.

Since answering this question before I find that "Hodgson's Estimator" defines "weeping" tiles thus: "Weeping tiles may be common field tiles, or they may be ordinary drain tiles of small diameter. They are made use of occasionally to drain around a foundation wall or to drain under the concrete floors of a cellar."—John Webb.

Question 34—Location of House

It is considered good practice to place the house in a position parallel to the depth of the lot, as in Fig. 1. In this case the addition of a bay, as shown in Fig. 2, will often improve the appearance of the house and also permit of a very convenient and pleasing internal arrangement.

The absence of the side street would make no difference, nor would the relative importance of the two streets affect the problem, because the house is located with regard to the lot lines which conform in direction to the general plan of the town or city.—C. E. A.

A Hamilton House of Neat Design

On the opposite page are shown floor plans and elevations of a solid brick house erected in Hamilton, Ont., for F. Brooks. A house of this type is in good demand, particularly in the cities and larger towns. The layout is good and the available space has been used to best advantage. All the rooms are of good size, and arranged to be as convenient as possible.

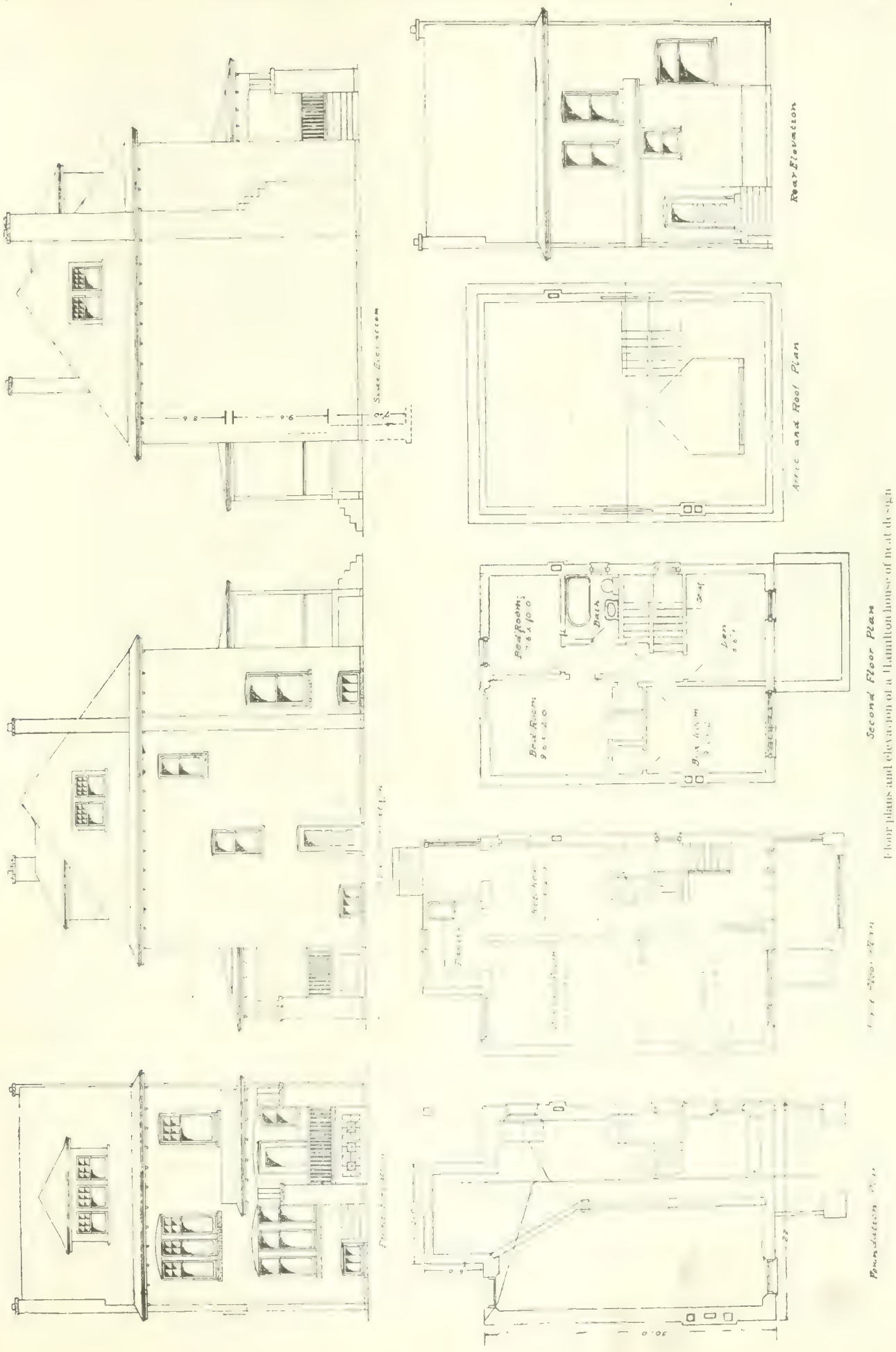
Montreal Exchange to Move into New Quarters

The Montreal Builders' Exchange has leased the whole of the third floor in a large building on Victoria square. The rooms are well lighted, and, when the present plans are completed, will be convenient and well suited for the work of the organization. In addition to the board room and the reading room and the secretarial offices, there will be three or four small offices to rent, preferably to parties engaged in some line connected with the building business.

Members from out-of-town exchanges will be made welcome, and the present board of directors is working incessantly on a system for the improvement of the exchange in order that it may be of greater value than ever before to the members.

Wettlaufer Bros. Open Warehouse in Regina Sask.

The firm of Wettlaufer Bros., of Toronto, manufacturers of concrete mixers and other heavy machinery, have opened a branch in Regina, Sask. They have secured temporary quarters in the old Monarch Lumber Company's warehouse, but will shortly erect a first-class warehouse of their own. The branch at Regina is the only one west of Winnipeg, and will control all the business in Saskatchewan, Alberta, and British Columbia. A. E. Hodgert will be the local manager.



Floor plans and elevation of a Hamilton house of neat design

Origin of the Word Lumber

It is probable that not one person in a thousand who makes common use of the word "lumber" knows its origin. To cover the ground quickly, it can be said that it is a long step from a bewhiskered member of an old Germanic tribe to a modern saw mill, but the connection is much easier to trace than it was for Darwin to prove that you and I are directly descended from the apes, and that the origin of the monkey may be logically traced back to inanimate protoplasm.

Long before the age of the safety razor, a wild tribe from the country now included in the German Empire swept down into Italy and made themselves at home. They were not welcome, and the former owners of the land scornfully called them by their most striking physical characteristic—long beards—or Longobards. They still remain "Lombards."

Later, the Lombards became the world's best goldsmiths, and some of them went to London and settled in a street called after them. They branched out into the banking and pawnbroking business, and every pawnbroker shop had a room for the storing of articles on which loans had been made. This room was often filled with broken furniture and boxes, and it came to be called the "lumber" room, the word being a corruption of "Lombard." The term is still applied to attics and other rooms where odds and ends are stored.

From its application to the material stored in these rooms, the word jumped across the Atlantic and was applied to good timber after being milled. In England it still means "trash," but it was applied to building material in this country long before the day of No. 6 boards.

The Use of the Steel Square in Unequal Pitched Roofs

BY R. L. HAMWOOD*

PERHAPS in the preceding articles the methods described will be criticized as being more difficult to understand than certain varieties of the pitch system. But when it comes to unequal pitches, the pitch system begins to flounder, while our system goes right on through.

Taking as example a hip roof with different pitches, as shown in Figs. 1, 2, and 3. Fig. 2 shows the roof in plan, the span being 16 and the end of the ridge 12 ft. from the end of the building. We want to lay out the hips for this case, not counting on any projection.

The first thing to be done is to find the length of the run of the hip, which lies from D to E, Fig. 2.

From E to F is 8 ft., and from F to D is 12 ft., so we measure the square from 8 in. to 12 in., as in Fig. 6. By this we find the horizontal distance from D to E to be 14 ft. 5 1-16 in.

Having obtained the run of the hip, it will be just the same as it was for the even pitched hip rafter. Measure from run to rise and find the length.

The run of the hip being 14 ft. 5 1-16 in., and the rise 7 ft., we measure the square from 14 ft. 5 1-16 in. to 7 ft., and obtain the length, 16 ft. 5-16 in.

The positions of the square in laying out this rafter will be very simple, but we still have one more item that we must find out before we can apply the square. As is suggested by the dotted lines in Fig. 2, the hip rafters splay on to the sides of the ridge, requiring a cut much longer than we had for the even pitched rafter. Therefore, we require to know how much to recede the square from the plumb line to mark the rafter for this splay.

In Fig. 8 we apply the square to the edge of a scantling with the two runs, the end run 12 ft. and the side run 8 ft., Fig. 8.

It will be readily seen that the amount marked A will be greater than the amount marked B, also that these two amounts represent the long and the short splays of this roof on the horizontal plane. Therefore, the amount A will be the one to use in laying out the hip.

We will designate the different moves by the numbers of the figures:

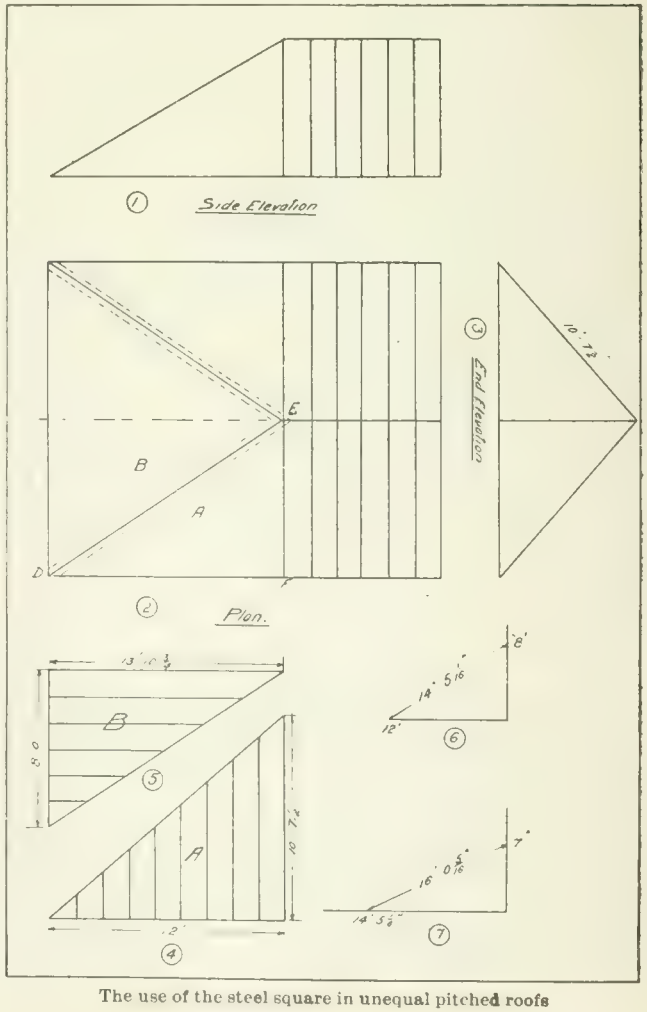
9—Mark the point cut.

10—Mark square across the top.

11—Mark the plumb line on the other side.

12—Recede the amount A and mark another plumb line.

13—Join these two lines on the top for the splay.



The use of the steel square in unequal pitched roofs

*Author of The Steel Square Handbook and Instructor.

14—Measure down the length, allowing for half the ridge.

15—Mark the seat cut.

Jack Rafters.

The jack rafters for this roof can be treated in the same way as the jacks in the even pitched roofs.

In section A the dimensions of the triangle to be filled in with jacks are the length of the side common rafter, 10 ft. 7½ in., and from it to the corner of the building. The amount that the jack rafters shorten successively will be known as the diminishing length.

Apply the square to a board, Fig. 16, with these dimensions, then slide down to the width of the spacing, as indicated by the dotted lines. The amount to diminish will appear where stated in the drawing.

To mark the splay cut, apply the square to the top of the rafter with the same measurements, Fig. 17.

To obtain the diminishing length and the splay for the end jacks will be a repetition of the same process, Figs. 18 and 19.

To mark the roof boards, apply the square with the same figures as for marking the splay of the jacks, but mark on the other side of the square.

Device for Jointing Screen Doors

Jointing the edges of screen doors on an ordinary jointer requires quite a little measuring until just the right cut is obtained. The operator usually has a 4-ft. rule lying on his machine and is compelled to pick this up and set against door, to try the measurement from four to eight times on each door. This always seemed to me to be a great deal of time and energy wasted, so, after quite a little thought along this line, I adopted the attachment shown in sketch. The use of this device will, I believe, prove of benefit to those who have wide jointing to do at various times.

In Fig. 1 the base is of cast iron, planed true on

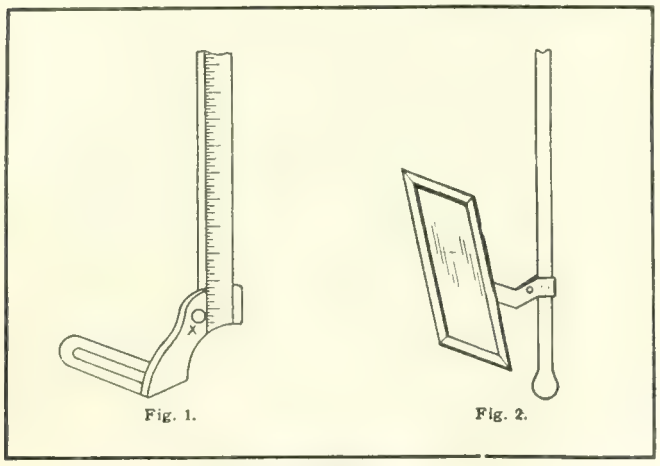
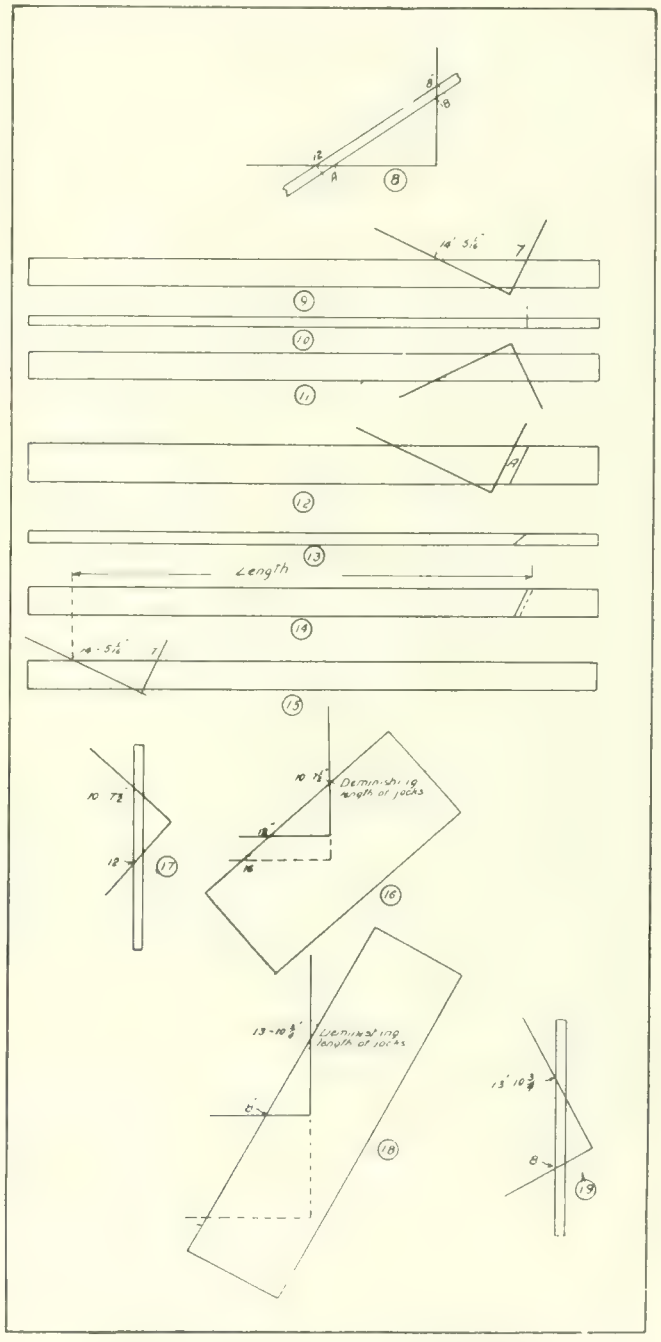


Fig. 1. Fig. 2.

Device for jointing screen doors

bottom and provided with slot for small handwheel, to use in fastening to rear or outfeeding table. The upper end of casting has a V-way cut through to hold the rule firmly. Along one side of the V-cut a jambscrew (X) is arranged to draw against edge of rule and allow for any slight adjustment to bring rule measurement right with table. The rule proper measures 60 ins., and is laid off in sixteenths. The figures are stamped in the ordinary manner up to the eye line, which is about 30 ins. above table. Above this I use a set of stencils, which reverse the figures, in order to use a movable mirror, which, when hung opposite, shows the figures in the proper position, and they are easily readable at a glance. The reason for this mirror arrangement is that after the work gets above the eye line the rule would be of little benefit were it not for the mirror catching and reflecting the exact point at which work passes rule.

The mirror—Fig. 2—is attached to a long brass tube, which, in turn, telescopes a ¾-in. solid rod. The rod is arranged in a slide, which allows same to move across



The use of the steel square in unequal pitched roofs

the width of machine. The vacuum formed by close fit of tube and rod is all that is necessary to retain the mirror at any position it may be placed. The mirror is also secured to tube by a pivoting bracket, which permits placing it in any position imaginable.

The rule attachment is fastened to machine directly over centre of cutterhead, with rule face flush with face of gage, so that work lies directly against same while passing over machine. The mirror attachment hangs just slightly to left of rule, allowing space

enough for work to pass between rule and mirror. Thus it will be seen that by simply arranging mirror at proper angle one can at a glance read the exact width to which machine is cutting, without any surplus rules or wasted energy.

In the manufacture of high-grade screen doors we joint the edges of at least 90 per cent. of the work. These edges are finished up complete, with paint or varnish, as the case may require, so all that remains for the fitter to do is to cut off top and bottom, let in his hinges and lock and hang up the door. By this method the moisture is to a great extent kept out of the lumber and life is thereby added to the screen door. It is a common occurrence to find doors which vary $\frac{3}{8}$ and $\frac{1}{2}$ in. between top, centre and bottom width measurements.—J. F. R., in The Wood-Worker.

A Bungalow that is Adaptable to the Smaller Places

Herewith are reproduced floor plans and elevations of a frame bungalow erected by Jas. Williams for M. Cavaney in Welland, Ont. The design is particularly adaptable to the smaller towns and to a big lot.

This house cost in the neighborhood of $1,600, without land. It is erected on a concrete foundation to grade.

The floors are of hardwood, and the trim is Georgia pine, oak finish.

The basement is not the full size of the house, only the back part having been excavated.

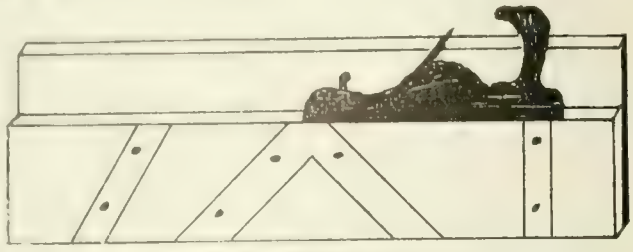
The verandah is the full width of the house, and has square columns, tapering at the top.

That the rooms are well laid out, may be seen from the plan.

Construction of a Shooting Board

The accompanying illustration shows a shooting board for trimming mitre and square ends. It can be made of pine or other material and answers the purpose as well as the more expensive article.

The sketch makes it plain as to construction. The bottom piece is 30 in. x 16 in. x $\frac{7}{8}$ in, and the top piece is 30 in. x 12 in. x $\frac{7}{8}$ in. The slats, or guides, are 3



A shooting board that does good work.

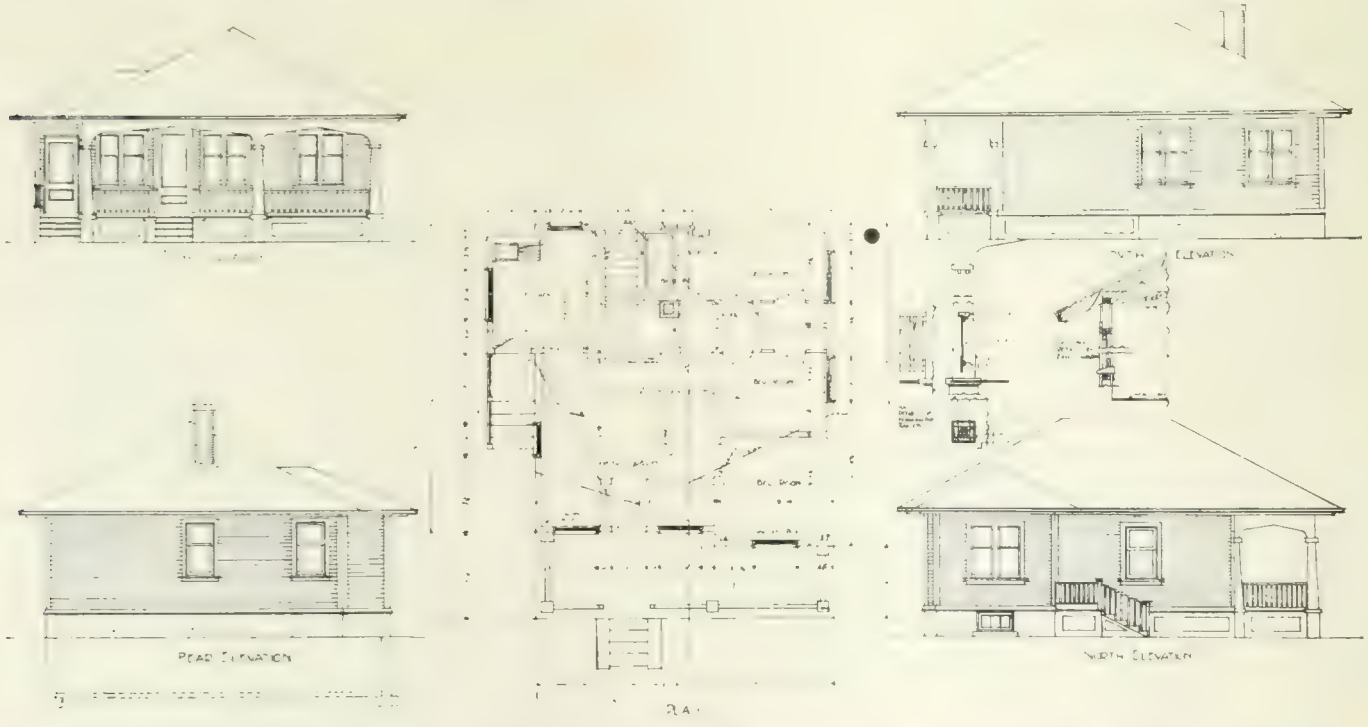
in. x $\frac{7}{8}$ in. The top and bottom are joined together by screws, as are the slats.

The bottom piece projects 4 ins. further than the top section, so that the plane will have a smooth and even surface to work on, and also that the top section will act as a guide.—Jinx.

A recent issue of the Ontario Gazette contains notice of the incorporation of the Hutchinson Woodworker and Contracting Co., Limited, Toronto, capitalized at $40,000. The firm will manufacture woodworkers and carry on a general building and contracting business.

That building operations are materially improving in Regina is shown by the fact that permits issued by the building inspector during the month of April were for buildings of an aggregate value of $408,100.

The Montreal Builders' Exchange Wall Chart, for 1914, containing names, addresses, and telephones of architects and members of the Montreal exchange, corrected to May 15th, is out.



Floor plans and elevations of M. Cavaney's bungalow residence in Welland. Builder, Jas. Williams; Architects, Corrigall & Forbes.

The Design and Construction of Up-to-Date Skating Rinks

BY A. A. GILMORE, ARCHITECT

SEVERAL years ago we did not see very many rinks in the smaller towns, and when we did see one, it was of the old tumbledown variety, having rough board sides and a rather flat roof, which had been covered with shingles quite a number of years ago. The low pitch of the roof generally caused the shingles to rot very fast, and I think that in very few cases have these rinks given much satisfaction. About ten years ago the circular roof rink became known, but at first the success with these buildings was not very gratifying. Several of these structures collapsed shortly after they were erected, and this seemed to give the idea a setback which, until recently, has not been overcome. However, a few have been working designing different means of strengthening the circular rib, because we knew that this was the cheapest form of construction for these large buildings.

The writer first erected a circular rib built with planks which were cut to correspond with the circle of the roof. These were lapped one-half, bolted and spiked, and stood edgewise, to which the roof boards were nailed. These ribs were set not further than 6 ft. apart, and covered with dressed matched lumber, over which a good heavy quality of roofing paper was used. This form of construction, although cheaper than the ordinary timber truss on account of it being more easily erected, still cost a considerable amount of money for roofing and roof sheeting, and after various changes, I finally adopted the circular rib, built with boards laid flat and bent one over the other, having joints broken and well nailed together. In this case I set ribs 12 ft. apart and spanned from rib to rib with 2 in. x 6 in. purlins set on about 2 in. centres, or to suit the joints of the corrugated iron roof, which I always used for this latest style of roof. This does away with all roof sheathing and gives a very strong building.

Possibly, the most important improvement which has been made on the circular rink construction is the means used to truss the ribs. This is done by using iron rods or wire cables. These run diagonally from close above the side seats, etc., up to almost the ridge of the roof, one running each way, of course, while the pressure across the centre is taken care of by a single horizontal wire or rod at this point.

By looking at the photographs which accompany this article, these truss rods can be clearly seen, and will give the reader an idea of how this is done. Possibly, it would be best for me to take some particular rink and discuss how it is laid out and how it is constructed. This would give a better idea than it would be possible to do by simply discussing the rink proposition in a general way. We will consider the new Arena, which was erected in the summer of 1913 in Preston, Ont. This building was designed by me for a joint stock company composed of six of the business men of the town.

The building is 100 feet wide and 228 feet long. The foundation is built of concrete, the main walls being 12 in. thick and running down to a depth of 3 ft. below the grade. At each rib or truss a buttress is built on the outside of the wall to take the extra weight and thrust at this point. Along inside of this wall, 10 ft. from the outside, another wall is built to carry the foot of the seat timbers, as well as form a base on which the cushion wall can be erected. Thirty-three feet from the front of the building a similar wall is built across the end and carries the ends of the large timbers which support the great front gallery, which runs up to a height of 30 ft. At the back end of the rink a wall is built across, allowing the same distance between it and the rear foundation wall as is allowed between the two side walls. This also carries the lower end of the rear seat timbers, and also supports the columns which carry the front of the upper gallery, which can be seen in the photographs used to illustrate this article.

Under the waiting rooms and across the entire front of the rink a basement has been built, and in this basement are the rooms for the different hockey teams and also furnace and fuel room.

The superstructure is, of course, built of circular rib construction, the system used being the flat board method which has already been discussed. These ribs are set 12 ft. apart and between them 2 in. x 6 in. purlins are used to carry the corrugated iron roof. The ends are studded up with 2 in. x 6 in. material set 2 ft. on centres. These ends are strengthened by the large front gallery and by the upper rear galleries. Otherwise, it would be necessary to use trusses to prevent the enormous wind pressure wrecking these great surfaces.

Exterior view of the completed arena at Preston, Ont.

The seating runs around the entire rink, sides and rear extending 10 ft. back from the inside walls and resting against the sides or ends, as the case may be. The elevation of these seats is considerable, and a person can see the ice very well from any point.

At the front end, the seats start very close to the ice and extend back and upward, covering the waiting rooms and walks. An idea of the size and height of this seating space can be gathered when it is known that there is accommodation for over six hundred people on this reserved gallery. Across the rear end the upper gallery holds quite a number as well. In fact, the total seating capacity is between three thousand five hundred and four thousand. The ice space is 80 x 185 ft., and the cushion wall is about 5 ft. high all around. This is sheathed with 7/8 in. matched lumber.

There are few windows in this rink, as I do not think it is advisable to have very many windows in a rink here in Eastern Ontario, because the heat of the sun

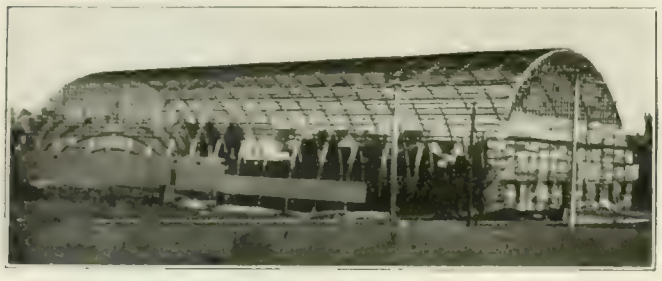
shining through these windows is sure to destroy the ice wherever it shines upon it. In fact, the only place that windows are used in the Preston rink are in either end, the complete lighting being done by electricity. In this rink there are five rows of large lamps, hung at a distance of about 16 ft. from the ice, and I believe that it is one of the best lighted rinks in Ontario.

The accommodation for the public is well arranged, as there are double wickets for selling tickets, and side aisles which lead to all seats. These aisles are placed under the seats, so that crowding is avoided, and once the person has taken his seat he is not disturbed by people climbing back and forward looking for their seats.

The waiting rooms are large and have good accommodation. One good feature which I have seldom found in the ordinary rink is that the heating is done by hot air and is more uniform than could be had if this was done by stoves, as is generally the case in these buildings.

The accommodation for the hockey players is also good, as shower baths, tables, and benches have been supplied in the basement rooms.

By examining the photographs, it will be seen that the outside appearance of this building is pleasing in-



The Preston arena in course of construction.

deed. Of course, it is really very difficult to make such a large building appear well proportioned, but I think that we have designed this one in such a way that both the inside and outside seem to be neat and have a rather pleasing appearance.

The small windows, which are to be seen just under the eaves of the roof are not fitted with glass, but have wire screens and tight board doors. These are used for air when freezing the ice; also small doors can be seen just above the foundation wall. These are also used for freezing purposes. It might be well to note that the rink must be well equipped with these doors or it will be found that it is almost impossible to get ice at an early date or, in fact, to keep it in good condition during winter. Another important feature is the ventilation through the roof, which carries off the fog formed by people's breath when large crowds are in the building.

Buildings similar to these are often used for agricultural fairs, and a similar type can be used for curling rinks, except that these are made considerably smaller. In fact, a circular roof building built along these lines is the most economical construction that can be had for wide spans where interior posts cannot be used.

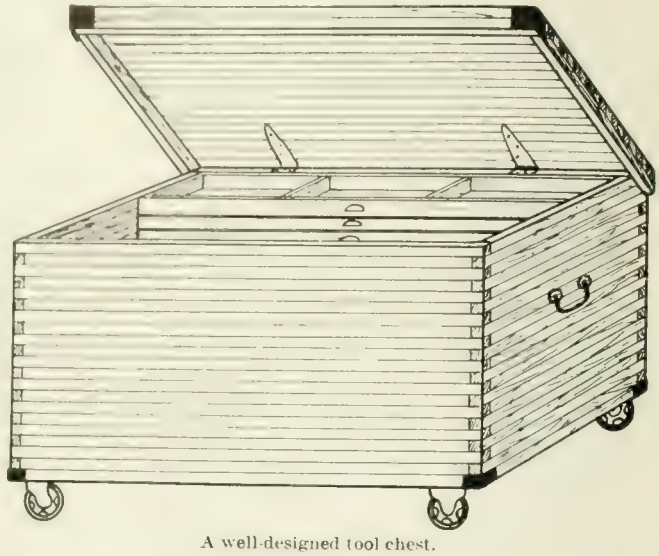
Details of Tool Chest

I am sending you a sketch of my tool chest, which is a little above the ordinary in style and strength. This chest is easy to build and is extremely handy, the casters making it very easy to move about.

The wheels are 2 in. wide by 4 in. in diameter, two being in swivel and two in stationary castings. These casters are not expensive and add greatly to the value of the chest. In moving it, I use a strap in the handle to draw by.

The chest is varnished in natural color and is very pretty when made out of two kinds of timber of different grain and color.

The inside dimensions of the chest are 34 in. x 22 in. x 18 in. deep. Two oak strips, 1¾ in. x 4 in. run the whole length of the chest, and to these the floor, which



A well-designed tool chest.

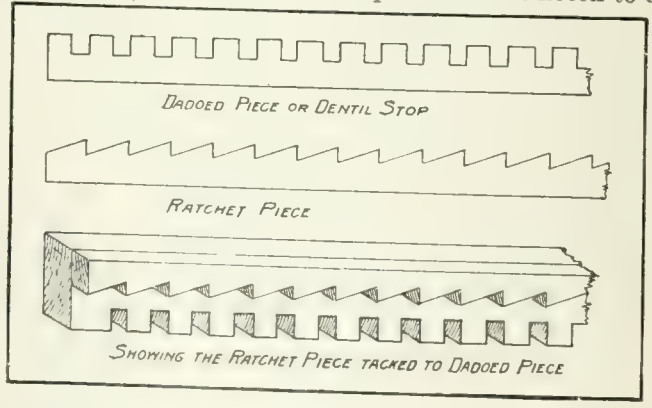
is ½ in. thick is nailed, forming a foundation for the sides. The sides are built up of ⅞ in. square strips, nailed and glued. I used two kinds of timber, chestnut and pine, and used a form to keep the chest true and square.

The drawers are 9 ins. wide by 3½ ins. deep inside, and are placed 1 in. below the top of chest to allow room for saws in lid. The top tray is partitioned off for small tools. The rim of lid is 2 ins. wide and fits over chest.

I am well pleased with the design myself and would like to pass it along to others.—W. Berry.

To Cut Dadoes

In cutting dadoes across a piece of stuff on a saw, such as dentil stops, pigeon hole sides, etc., I think it a good plan to cut a ratchet piece and tack it on the side of the piece to be dadoed. Stop the ratchet notch to a



nail in the saw gauge each time; when done, remove the ratchet stop and set it at another—J.M.T., in American Carpenter & Builder.

Getting Most Work from Combination Woodworker on Job

Interesting suggestions as to how to use the combination woodworker—
What a number of readers of this paper are doing with the machine

STAFF ARTICLE

THE modern builder is always on the lookout for new ideas and methods by which time and labor may be saved, and along this line much has been accomplished by the combination woodworker.

Different makers have developed their machines along various lines, but the object of all is to produce a machine which will handle the different classes of work required in building without being so heavy as to interfere with its portability, and without being so complicated in its construction that it will not be easily erected by a man who has not had very much mechanical experience.

Housing out stair stringer with an Elliot Woodworker in the shop of A. & A. Grant, Toronto

Some machines are driven by a motor, and may be operated any place where electric power is available; others are driven by gasoline engines.

A Systematic Use of the Machine Will Increase the Work Done.

To get the most work from the machine, which is equivalent to getting the biggest returns from the money invested, the builders recommend the following plan of procedure.

Suppose a pair of houses is to be built. The woodworker is brought on the job and housed in a shed. The lumber of which this shed is constructed may afterwards be used for fences, coal-bins, etc., where rough lumber is required.

First, all cellar doors and frames are laid out, and after they are cut the different pieces are piled by themselves ready for assembling. All joists are cut to the proper length and the ends ripped and mitred for bridging. Then all frames for superstructure are gotten out; all cuttings from 7/8 in. stuff may be cut into 7/8 in. by 1¾ in. balusters for attic stairs and balcony.

When ready for roofing, all foot and plumb cuts are made on rafters. Nearly all roof boards may be cut on the ground, and valley shingles cut to the proper mitre.

If rough double flooring is to be laid, the machine may be set for 45 mitre and the floor boards mitred two at a time, starting from the corner. When this floor is laid, the machine is moved into the building and the pine flooring cut up.

Next in order comes the stair work. Stringers are housed out and all treads and risers cut and ripped to width by means of the machine. The cuttings may be used for cupboard drawers, doors, etc.

The doors can be dowelled or half-checked; if mitre trim, the tops of casing are mitred and heads are cut and mitred to length. Mantel trim can be made in the same way. All the base is brought to the machine and rough lengths cut for each room; all short pieces being mitred to go around chimney breasts, etc. By putting molding knives on the dado head it may be run as a sticker for getting out moldings and plate rail.

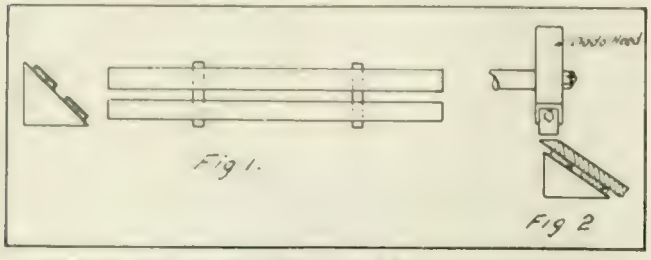
All doors are bored for locks before being sent to be hung; all stuff cut for the verandah, square columns,

base blocks, cut and molded, floors cut to length, fence boards cut, and almost any saw work may be done very quickly on the machine.

Some of the men who are using woodworkers follow this plan rather closely, while others find uses for their machine depending on the class of work on which they are engaged; but they all agree that a woodworker is a great help to them in their business.

Care is Necessary in Operating Power Machines.

The use of power machinery on the job introduces an element of danger which is not present where hand



Device used in connection with cutting frames for hanging style bay windows.

tools only are used, and the same care should be used in running this small machine as would be used in the operation of a larger machine in a factory. Its small size makes it none the less dangerous if carelessly operated.

One man keeps a notched stick beside the machine all the time, and so wastes no time looking for a suitable sawing stick.

What Some Readers of The Canadian Builder and Carpenter Are Doing With Their Portable Woodworker.

Mr A. Ballantyne, who is doing the carpentry work on the McLean office building for Wm. Cowlin & Sons, Toronto, says that by using a combination woodworker he can save five or six men on framing alone. He uses the machine for getting out material for stairs, doors, and windows, frames, etc., for mitring all trimming, for ripping, and finds it especially useful in making door jambs, which can be cut off and checked out in one operation. Holes are quickly and easily bored, and emery wheel is easily put on, so that all tools may be sharpened without leaving the job.

He thinks that it is an ideal machine for a jobbing shop, and estimates that, if he had had a woodworker last summer on a window framing job for a large apartment house he could have saved thirty per cent. Mr. Ballantyne intends to mount his motor on a truck and use it for driving a surface sander to finish the floors.

Mr. A. W. Betson, of Betson & Terry, Toronto, has a large and complete woodworking machine in his shop, and cuts a lot of his material before it is taken to the job: but he uses a portable woodworker on the job, and finds it very useful for ordinary sawing.

Mr. J. M. Walker, Toronto, makes good use of his machine. It is set up in a shack behind the houses being built, and his foreman, W. E. Brown, spends all his time when not actively engaged in superintending the work, in getting the material all cut out ready to be put together by the men. All molding and plate rail are made on the job, small pieces being utilized for making cupboards, etc.

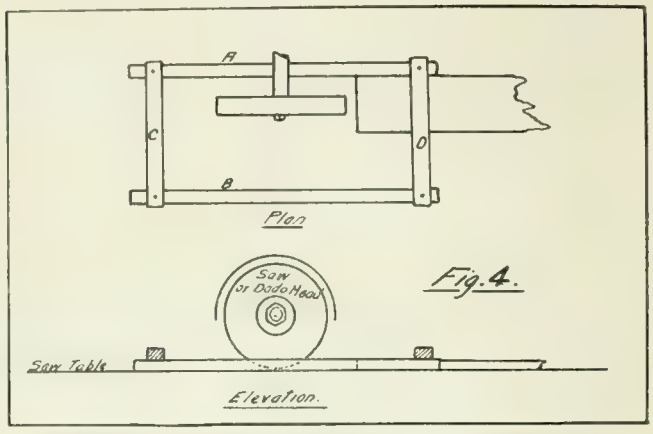
A large reduction has been made in the lumber wasted. With the machine in operation, only one load of lumber was taken from four pair of houses, whereas three loads were taken from one pair before.

The ingenuity of the operator is brought into play in making many special devices, which will facilitate the carrying out of his particular work on the machines.

The accompanying sketch, Fig. 1, shows a device used in connection with cutting frames for hanging style bay windows. The angle at which the cut is made is too sharp to allow the use of the saw, so the saw table is lowered down, the board placed on the rest, and cut taken off with the dado head, as shown in Fig. 2. Fig. 3 shows a woodworking machine being used for this purpose.

Fig. 4 shows an arrangement used to hold a board and keep it from jumping while it is being routed out with the grain. A and B are strips of wood of the same thickness as board. These are nailed down and strips C and D nailed across them. When the board is passed under strips C and D, it is held down firmly, where, without the strip, the springs provided to hold it down would give enough to cause a cut of uneven depth.

Mr. R. Oakley saves a lot of time on his heavy saw work, such as joists and rafters, and for this reason



An arrangement to hold a board and keep it from jumping while being routed out.

recommends a 1 h.-p. motor, which is strong enough to make the heavy cuts.

A. & A. Grant are erecting a whole block of houses. They have two woodworkers, one set up in a shop on the premises where building is going on, and the other in one of the houses, which is at too great a distance from the shop. One man with the machine is able to get out as many rafters in about one and a half hours as two men would get out in four hours by hand. They also use a sander, which is operated by the motor of the woodworking machine.

The experience of men who are using a combination woodworker seems to indicate that the best results are obtained on jobs where a larger amount of standard work is done, but the advantages on even the smallest jobs make it well worth the consideration of any builder.

* * *

The man who hunts around among the lumber mills to find what will fit in with his work best usually finds something worth while, but the man simply hunting for bargains seldom gets more for his money.

A harsh word is like a handful of sand thrown in a bearing. While it may grind to a loose fit, it accomplishes nothing but harm.

Recklessness around dangerous machinery is not a sign of bravery or personal courage, but an indication of foolhardy posing.

The Combination Woodworker on the Job

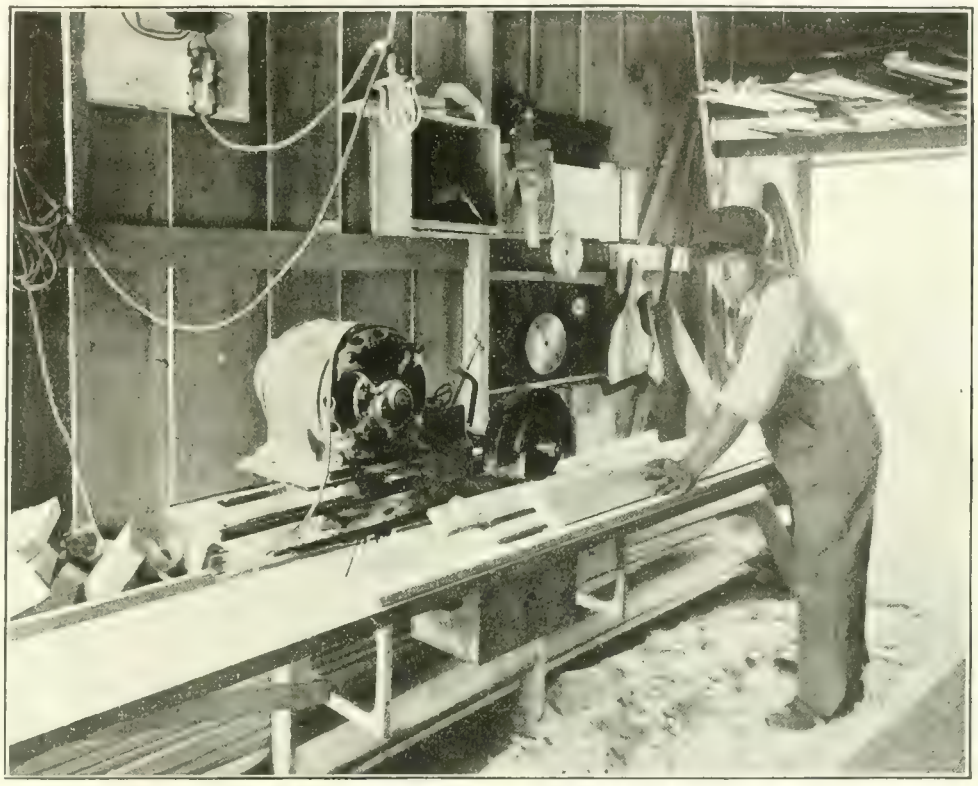
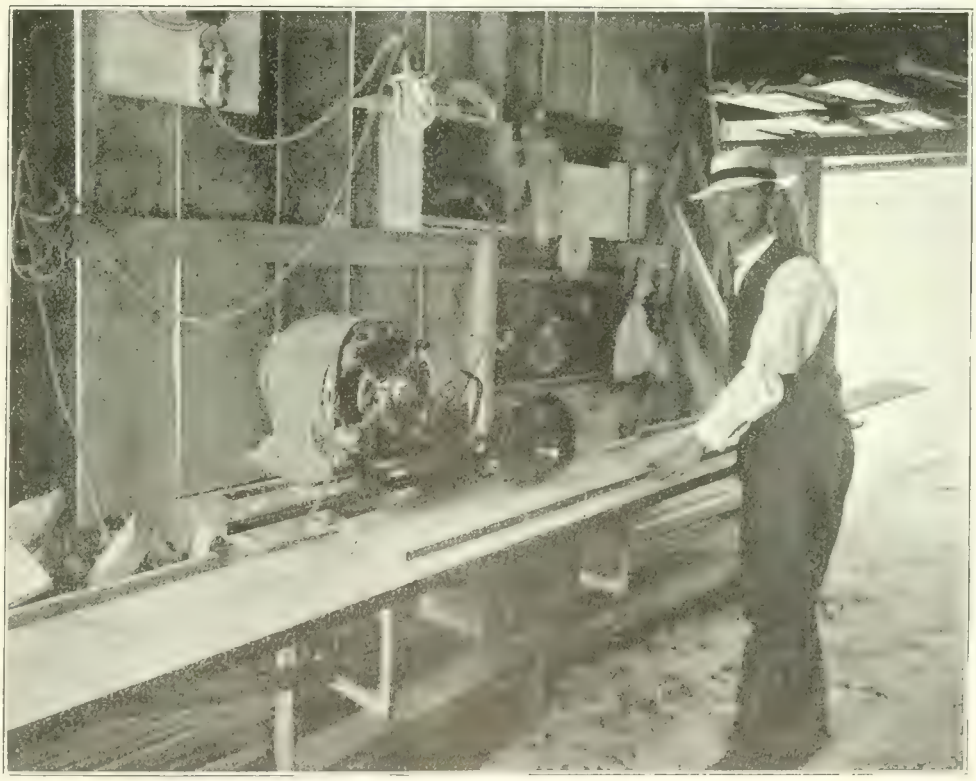


Fig. 3. This illustration shows how the dado head on an Elliot Woodworker may be used for bevelling a board when the angle is too small to use saw.

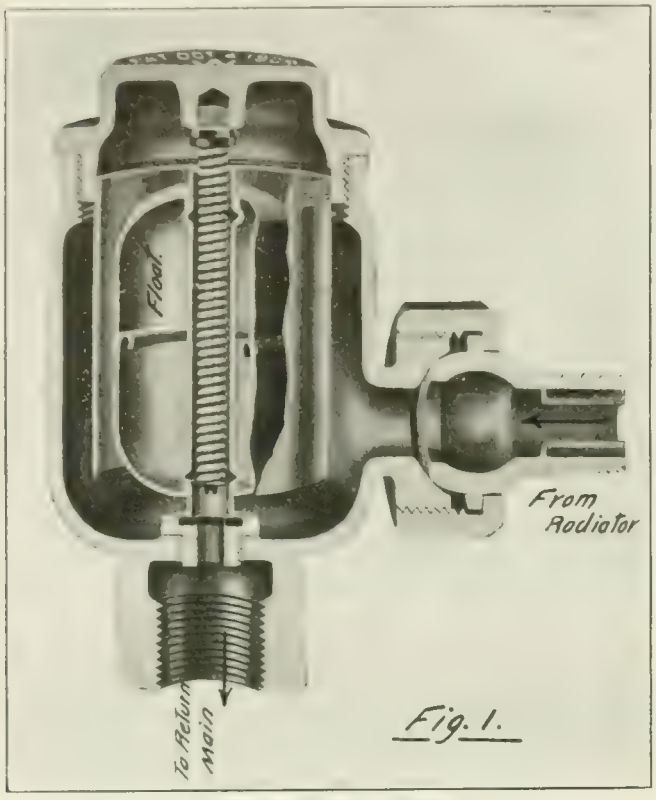


An Elliot Woodworker being used for ripping in Mr J. M. Walker's shop.

Vacuum Heating Systems

In the April number of The Canadian Builder and Carpenter a question appeared under the heading "Vacuum Heating System," asking for information that would help a builder to know when a vacuum heating job is well done. An outline of the principles involved and the methods used in installing such systems, should prove of value to the builder who is going to put in steam heating.

Steam heating, when classified according to the method used in disposing of the water formed by the condensation of steam, falls naturally under the two heads of gravity return system and vacuum system,



Float Type Vacuum Valve

and the loose application of the term vacuum to different heating systems has caused much trouble and confusion.

In the gravity return system the water of condensation is returned by gravity, either to the boiler or to a receiving tank whence it is pumped to the boiler.

In a vacuum system, the return mains are connected into a pump or other exhausting device, which draws the air and water from the return pipes and maintains in them a partial vacuum. At the return end of each radiator is placed a small trap, commercially known as a "vacuum valve," or "thermostatic valve," through which connection is made to the return mains. The purpose of these radiator traps is to allow the air and water of condensation to escape into the return main, but to keep back the steam.

These traps and the exhausting device are absolutely essential for a vacuum system, and if they are not present the builder may know that he is not getting a vacuum system.

The traps are of two general types. In the float type, shown in Fig. 1, the water collects in the trap until enough has gathered to lift the float which opens the valve and allows the water to escape. When water has escaped float drops again and closes the valve. The other type, which is known as the thermostatic type, makes use of some substance which expands when in contact with steam, closing the valve and contracts, opening the valve, when sufficient water or air has collected to cool it. In Fig. 2 the expanding substance is a liquid enclosed between the two corrugated discs. The two traps shown in the illustration merely illus-

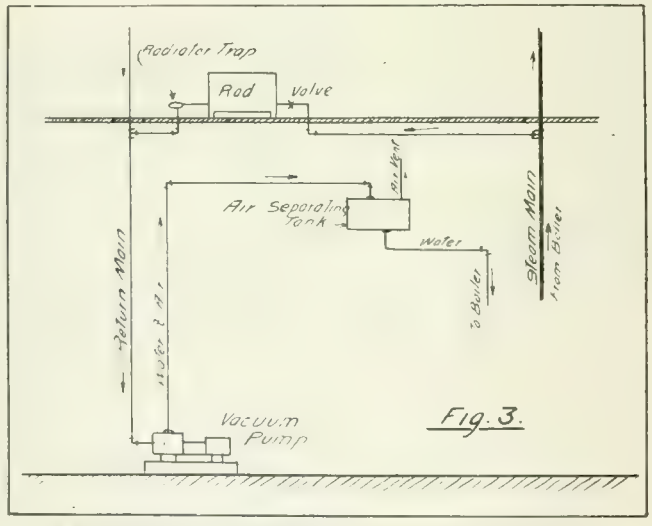
Fig. 2. — Thermostatic Type Radiator Trap (Courtesy of C. A. Dunham Co., Limited, Toronto).

trate the two types. Different manufacturers make valves whose construction and appearance are different but whose principle of operation is the same as the two shown.

In large installations a pump is generally used as the exhausting device, and Fig. 3 shows the method of connecting it up.

The steam leaves the boiler by way of the steam main, and enters the radiator, where it is condensed to water. The water formed by the condensed steam, and any air that may have entered the radiator, is drawn out by the pump, through the radiator trap, and pumped into the air operating tank, from which the air escapes through the vent to atmosphere, and the water runs back to the boiler. The radiator trap allows the air and water to be drawn through, but keeps back the steam.

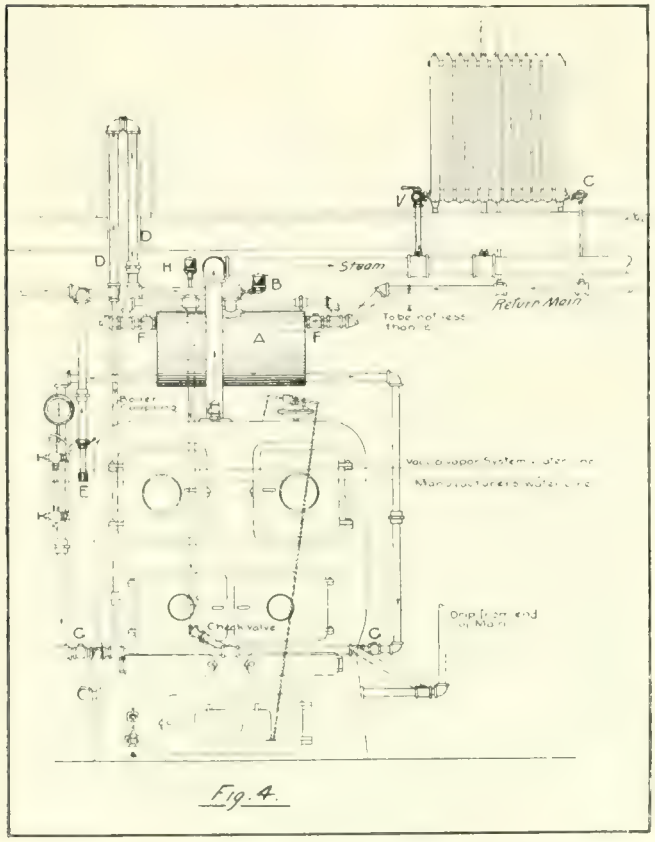
Fig. 4 shows an installation in which the tank "A"



Standard arrangement of Vacuum Steam Heating System. Pump used for exhausting return mains.

takes the place of and performs the duties of the pump. By referring to the figure it will be seen that the tube "D" extends down into boiler below the water line and looping above boiler and thence down into receiving tank "A." This tube keeps the pressure in the boiler from communicating itself to tank "A" until the water of condensation accumulating in tank "A" is of such quantity as to lower water in the boiler below the equalizing tube bell "E." At this moment steam from the boiler rushes up through the equalizing tube

"D" and into tank "A," immediately closing air valve "B," also check valves "F." Where the pressure in tank "A" becomes the same as that in the boiler the water in tank "A" flows into the boiler through checks "G" by gravity. The water thus entering from tank "A" raises the water line in the boiler and seals the equalizing tube "D," leaving tank "A" full of steam. This steam condenses and forms a suction of varying degrees throughout the return lines.



Vacuum Heating System where the exhausting tank "A" takes the place of the pump. In the vapor system no exhausting device is used

The air valve "H" is installed for the purpose of permitting air to continue to pass from the system when tank and boiler are equalizing.

A Less Complicated System Used in Residences.

The vacuum system is not recommended for residences, for, on account of the compact nature of the building to be heated, it is usually easy to obtain good steam circulation without the use of any exhausting device. For this work systems known as "vapor systems," "modulation systems," etc., are used extensively.

In these systems the steam is circulated at a low pressure (usually below two pounds), which gives the advantage of a mild heat which makes hot water such a good heating medium.

It is installed in the same way as shown in Fig. 4, except that the return main, instead of being connected to the exhausting tank "A," empties into a small tank from which the air escapes to atmosphere and the water runs by gravity back to the boiler.

The valve "V" is of quick-opening type, provided with an indicator to show how far open it is. By means of this valve, in conjunction with the radiator trap, the radiator may be partially or wholly filled with steam, to suit weather conditions.

The dampers of the furnace are controlled by the steam pressure and also by means of a thermostat in the room to be heated, so that the system is practically automatic in operation and requires very little attention. Since the air is removed through the return pipes, no air vents are required on the radiators.

In installing one of these systems, care should be taken to keep the lowest part of the return main at least twenty inches above the water line of the boiler.

The Combination Woodworker as a Labor-Saver

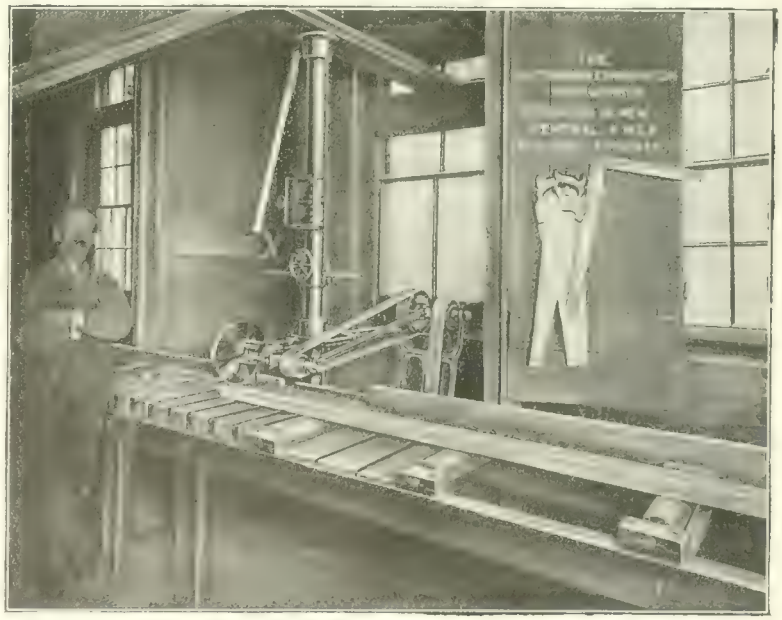
Wm. Woodley & Sons, Limited, Toronto, used a combination woodworker on the construction of the new Central Y. M. C. A. building, and found that it saved considerable labor and time.

The woodworker was installed in the Y. M. C. A. building as soon as there was a floor to stand it on, and remained until the job was completed. In spite of the fact that the builders operate a planing mill, where all their material is prepared, a man was kept busy on the woodworker installed at the job for over a year.

All joists, bridging, studding, and roof packing was cut with the woodworker, and when the rough work was done, all the trim was cut and mitred, and all stock cut and heads dadoed for door frames. A record kept of the work done showed that one hundred and five door frames were cut in one day.

Besides the regular work, a lot of odd jobs were accomplished very satisfactorily. For instance, all the strapping had to be plug-fastened, and these plugs, several thousand in number, were cut on the woodworker.

Mr. Woodley finds the machine very useful for heavy sawing work, and has never seen the saw stuck on any of his work. Mr. Woodley's machine is equipped with a three h.p. motor.



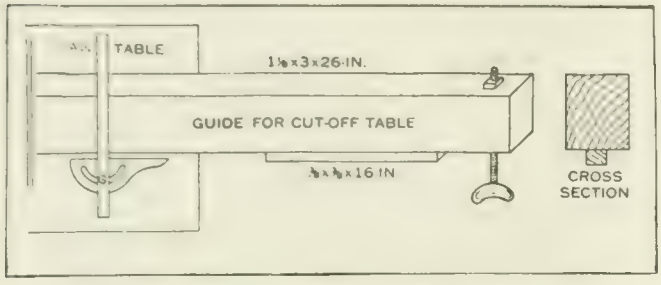
The Hutchinson Combination Woodworker used by Wm. Woodley & Sons, Limited in New Central Y.M.C.A. Building, Toronto.

Regina's permits for 1914, up to May 7, total $776,675.

Plowing Window and Door Frames

The device shown in sketch will be found very handy for plowing window and door frames. To make it, put a bolt down through the guide that you cut square and angle cut with, on the variety saw table, and on the under side of this piece tack a $\frac{3}{8}$x$\frac{3}{8}$x 16-in. strip to act as a guide. Then take a piece $\frac{7}{8}$x2-in., 32-in. long, and plow a $\frac{3}{8}$-in. slot, 18-in. long, in one end, leaving enough at end so as to not split the piece. At the other end plow a groove crosswise to receive a $\frac{7}{8}$x1$\frac{1}{2}$x8-in. cross-guide. This piece must be on square angles with dado head and extend above line of table as much as you plow for sill.

Now lay out and plow jamb for 30-in. glass. Place the sill dadoing on cross-guide, slide out until the head dadoing fits the dado head, and make a line to correspond with starting point. Now make a mark every 4 in. for 28, 26, 24 and 22 in. glass, and you will have scale for making window frames and will not have to



The piece must be on square angle with dado head.

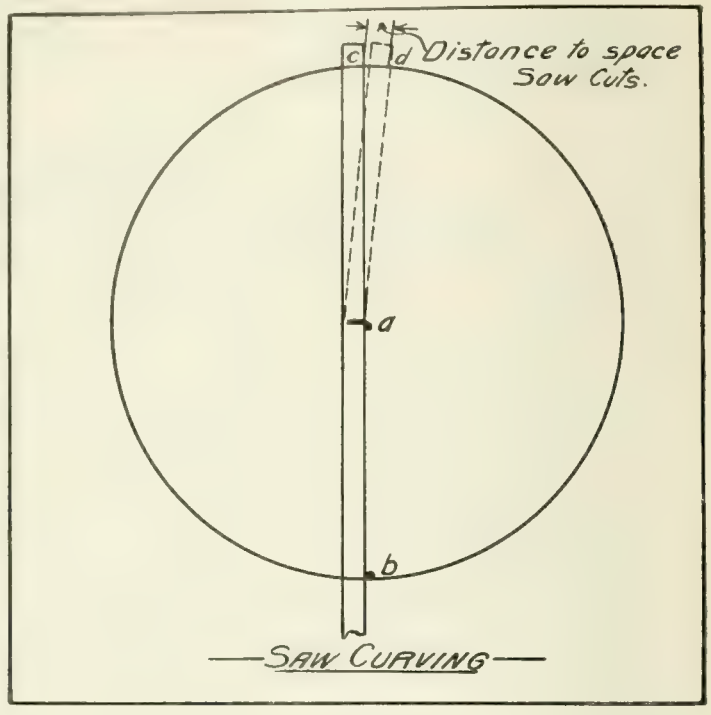
do any more laying out. For larger size windows and doors simply make a longer piece.

When making an order of frames, plow all your jambs for sill (half one way and half the other), then all you have to do is to put the strip in place, move it to the size glass you want, tighten the screw, and plow for your head. Right here is where nearly everyone falls down. You often wonder why there is always a leak around windows and a wet spot on the plaster at the lower corner of the window. I hunted for a long time before I found the reason, and one day, when not looking for it, I found it.

I was out of work and went to help a friend lath a house. While lathing under a window a very heavy downpour of rain came from the east and the water came running down off the bottom of the jamb in a stream. Naturally I started to investigate and found that in plowing, the frames had been plowed ½-in. for parting bead and only ⅜-in. for sill. Of course, that left a ⅛x½-in. hole for the water to follow the parting bead down and run through on the trim, then soak through the plaster. If you will turn that around and plow a little deeper for sill and head than you do for parting bead, you will do away with that leak at the bottom of window frames.—By D. T. Bennett, in Wood-Worker.

Saw Curving

The accompanying illustration shows a practical method of spacing saw cuts in a board to be bent about a circle of any diameter. Lay off the circle about which the board is to be bent and drive nails at a and b, the centre and any point on the circumference of the circle. Take any piece of wood of the same thickness as the board to be bent and cut with a saw to a suitable depth. With the piece of wood held rigidly against the nails a and b, and the cut at the centre of the circle, mark the point c where the edge of the wood cuts the circumference of the circle. Next, making sure that the lower part of the piece does not



move from its position against the nails, bend the top portion over until the cut closes. Mark d, the point where the edge in its new position cuts the circumference. The distance c-d gives the spacing of the saw cuts.

This spacing ensures the closing of all the cuts when the board is bent, and therefore maximum strength and rigidity.—W. Boland.

Notes of the Calgary Exchange

The Calgary Builders' Exchange is making a decided effort to have bid bonds and surety bonds substituted in place of marked cheques. The matter has been brought to the attention of the city authorities, and on the new industrial building surety bonds issued by a reputable company may be used.

T. C. Rankine, secretary of the Alberta Association of Builders' Exchanges, has written the different exchanges of that organization regarding the proposed new Mechanics' Lien Act, which the association, in conjunction with the Retail Lumbermen's Association, is trying to bring before the Alberta Government. It is to be hoped that the matter will receive favorable consideration, as it is most essential to the building trades and lumbermen.

The Calgary Builders' Exchange is petitioning the Board of Trade to form a construction committee for the purpose of seeing that all local contractors are given a fair opportunity to tender on all local and municipal work.

Annual Excursion of London Exchange

The annual excursion of the London Builders' Exchange will be held to Toronto on July 11, good for three days, returning up to Monday evening, July 13th, 1914.

A PRACTICAL MONTHLY PAPER

The Canadian Builder and Carpenter

PUBLISHED END OF FIRST WEEK

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VOL. 4 TORONTO, JUNE, 1914 No. 6

Editorial Comment

The Cheap Cottage Problem. From reports received from various towns and cities and from personal visits to industrial centres, we find an urgent call for more houses to let at a medium rental. It is unfortunate that there is not more enterprise shown in the erection of such buildings. The average wages of workmen employed in factories are not very high and do not permit a very large outlay for house rent, and unless he can secure a house at low rental two or three families have to crowd into a space intended for only one.

Many manufacturers have found it necessary to buy land and erect cottages, which are rented to employes at the lowest possible amount. This would be all right, but it ties up capital of a company which might be used for securing more business and thus give work to more men. Where the capital of a company is limited, this phase of the building problem is very serious.

Builders should consider seriously the question of erecting dwellings which may be rented for a low amount and yet give a fair interest on the investment. Financial men should also be interested in the question. From time to time we have given in The Canadian Builder and Carpenter plans of medium-priced dwellings, and it is to be hoped that the plans will be used and that many workmen's cottages will be erected this year in the growing centres of Ontario.

Giving Readers What They Want. To give readers what they want is quite a problem when the large circulation of this paper is considered, but that we are doing so is shown by the number of complimentary letters we have recently received. Requests have been made for plans of cottages, bungalows, apartment houses, moving picture theatres, etc. Plans of these have appeared during the last few issues and shows that we are giving readers what they want. In this issue are plans of several houses, showing various types of construction, and we have more on hand for future issues. We are always glad, however, to secure new plans and always appreciate it when readers send in plans and photographs of new buildings.

In reply to a circular sent out we have had requests for information on a large variety of subjects. We are following these requests carefully, and each issue will contain one or more articles dealing with the subjects on which information is desired. It will not be possible to answer them all in one or two issues, so that some readers may have to wait for a few issues for the information. Wherever possible, however, all inquiries have been answered by letter.

We are always glad to hear from our readers, whether they desire information or whether it is to send in articles for publication. We desire your co-operation and to co-operate with you in every way. We can be of most use to you when you let us know what class of articles are of most use to you.

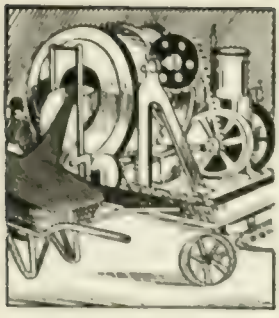
Advance in Nails Causes Debate. It is not often that nails are the subject of a debate in Parliament. In fact, we know of no instance in which they were until the other day. The cause of the debate in this instance was the advance in prices, which was announced a few days before. Those who brought the attention of the House to the matter averred that this advance was the direct outcome of the duty of $3.50 a ton that had been put on wire rods, from which, of course, wire nails are made.

As might be expected, a great many exaggerated statements were made during the debate. It is not, perhaps so much that they wished to exaggerate as it is a failure to ascertain the facts before they make their statements.

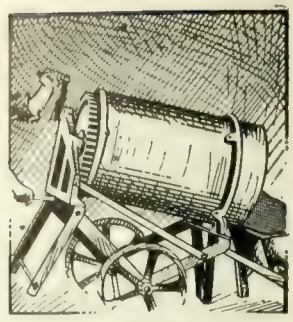
That the advance is the result of the duty on wire rods there can be no doubt, but it is only indirectly so. For some time the price of wire nails has been freely cut in this country, as well as in the United States, until quotations here as well as there have been reduced to a point much lower than they were a year ago. With a duty on wire rods it was felt by nail manufacturers that the time was opportune for putting prices on a more satisfactory basis. The advance of 15c a keg is the result of this realization. Jobbers as well as manufacturers are in agreement upon this point.

Even, however, with this advance, the base price is still much below that of last year at this time.

In the United States during the third week in May the base price was reduced 5c a keg, but it is significant that manufacturers refuse to book orders for future delivery, evidently believing that with the return of the anticipated improvement in business higher quotations will again rule.



Concrete Department



Simple Sidewalk Construction

To put down a concrete walk such as is common in towns and cities, involves more or less experience and requires time and money, though it would be a good investment if well done. Such walks are far cheaper in the end than any other continuous type equally satisfactory and durable. It so happens, however, that many persons cannot conveniently undertake the construction of a long walk with the certainty that work will not be interrupted, and walks of this character should be a continuous operation if the most economical results are to be obtained.

A simple method to construct a good serviceable walk would be to make a few shallow boxes, each about 3 feet long, 2 feet wide and 4 or 5 inches deep. Then make a concrete composed of 1 part Portland cement, 2 parts clean sand and 4 parts gravel or crushed stone, the stone not larger than ¾ inch. To make the concrete, first thoroughly mix the cement and sand in the dry state and then add the water. The stone should also be wet and the whole mass mixed together until of mushy consistency, a consistency that would be called "sloppy." Dump the concrete into the boxes to the depth of an inch or more, puddle and work it, and then on top of this first layer of concrete place common chicken wire cut to the size of the box. Then fill the box with concrete and just before the latter had taken its final set the surface may be broomed with a circular sweeping motion to give a texture that will prevent people from slipping. The concrete may be removed from the forms or boxes in 4 or 5 days and protected from sun, wind and freezing, as the case may be, and thereafter sprinkled daily for about a week. The result will be a fine slab of indestructible, artificial stone.

Modern sidewalk practice does not always include a drained sub-base, as many suppose, but on the contrary many sidewalks put down in the customary way have been successfully built by placing them directly on a compact earth surface. These slabs can be laid on a natural base where the soil is at all suitable. This plan means that a man may make just as few or as many slabs as he has time to make, once he has procured the raw materials. He could soon fill a half-dozen 3-foot molds and thus have 18 feet of walk in the forms, which could be refilled the moment the first lot was removed, or at any convenient time. In brief, he would be making so much concrete lumber, which could be distributed quickly and easily, in fact in less time than would be required to put down a well-made boardwalk.

In making his walks, one need not confine the dimensions of the slab to those given above. If preferred, a longer and wider slab can easily be made. The accompanying illustration shows a drawing of a simple type of form in which slabs may be conveniently cast.

Concrete walks of this character would not only last for all time, but could be conveniently changed to other locations or extended without the necessity of digging and filling a foundation, erecting side forms or cutting joints.

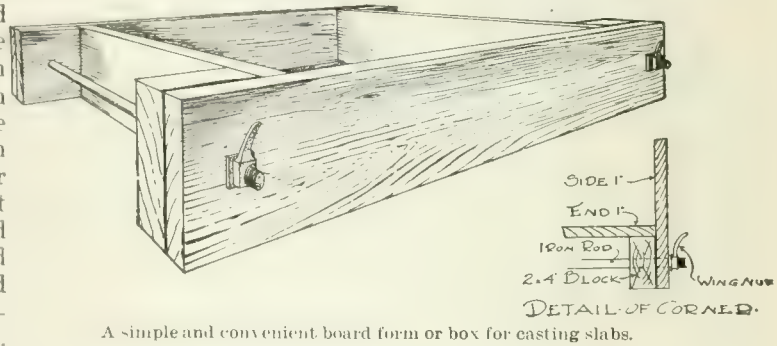
The Selection of Materials for Concrete

There are a few simple, yet essential, points in the selection of materials for the making of concrete, which, if followed out, will give better results and tend for a higher class of work.

Sand.

Do not use very fine sand. If there is a large quantity of fine sand handy, obtain a coarse sand and mix the two sands together in equal parts; this mixture is as good as coarse sand alone.

Sometimes fine sand must be used, because no other can be obtained; but, in such an event, an additional amount of cement must be used—sometimes as much as double the amount ordinarily required. For example, in such a case, instead of using a concrete 1 part cement, 2 parts sand, and 4 parts stone, use a concrete 1 part cement, 1 part sand, and two parts stone.



A simple and convenient board form or box for casting slabs.

Besides being coarse, the sand should be clean, i.e., free from vegetable matter. The presence of dirt in the sand is easily ascertained by rubbing a little in the palm of the hand. If a little is emptied into a pail of water, the presence of dirt will be shown by the discoloration of the water. This can be discovered also by filling a fruit jar to the depth of 4 ins. with sand and then adding water until it is within an inch of the top. After the jar has been well shaken, the contents should be allowed to settle for a couple of hours. The sand will sink to the bottom, but the mud, which can be easily recognized by its color, will form a distinct layer on top of the sand, and above both will be a clear depth of water. If the layer of mud is more than one-half inch in thickness, the sand should not be used unless it is first washed.

Having discovered that the sand you contemplate using is not clean, and provided you cannot readily

obtain any that is clean, you may use what you have, provided you wash it in the following manner:

Build a loose board platform from 10 to 15 ft. long, with one end a foot higher than the other. On the lower end and on the sides nail a board 2 by 6 ins. on edge, to hold the sand. Spread the sand over this platform in a layer three to four inches thick, and wash it with a hose. The washing should be started at the high end, and the water allowed to run through the sand and over the 2 by 6 in. piece at the bottom. A small quantity of clay or loam does not injure the sand, but any amount over 5 per cent. does.

Stone or Gravel.

This is known as the "coarse aggregate" of concrete. Great care should be used in its selection. The pebbles should be closely inspected to see that there is no clay on their surface. A layer of such clay prevents the "binding" of the cement. If necessary, stone or gravel may be washed in the same way as above described for sand. Indeed, it is more easily done than sand, as the water flows through the larger voids in the gravel more readily than through the voids in the sand. Dust may be left in the crushed stone without fear of its interfering with the strength of the cement, but care should be taken to see that such dust is distributed evenly through the whole mass, and when dust is found in stone, slightly less sand should be used than ordinarily.

As to the size of stone or gravel, this must be determined by the form of construction contemplated. For foundations or any large, thick structure, use anything from ½ to 2½ ins. in diameter. For thin walls, use ¼ to 1 in. stone.

The best results are obtained by the use of a mixture of sizes graded from small to large. By this means the spaces or voids between the stones or pebbles are reduced and a more compact concrete is obtained. Moreover, this method makes it possible to get along with less sand and less cement.

Pure Water Necessary in Mixing.

Water for concrete should be clean and free from strong acids and alkalies. It may be readily stored in a barrel beside the mixing board and placed on the concrete with a bucket. If you are at all in doubt about the purity of the water that you contemplate using, it would be well to make up a block of concrete as a test, and see whether the cement "sets" properly.

What Concrete Will Not Stand

Practically every failure, and near failure, in concrete has been due to confidence on the part of somebody that concrete can surmount all manner of bad usage. The fact is that there are plenty of good standards in concrete design and in concrete construction, but that they are not observed by many of those engaged in concrete building.

This neglect has a three-fold cause: Ignorance, undue economy, and over-confidence—and the first two could not exist were it not for the last. It is a pretty poor concrete man who does not know that frozen concrete will not set—but there are plenty who will take a chance with ten-day concrete at 40 degrees F. if they need the forms. Why? Primarily because they want to save the money that an additional set of forms would cost. But if there were not confidence that the concrete will stand up, the pocketbook would not govern judgment.

Practically every designer of concrete buildings will admit that 850 pounds per square inch is too high a stress in the concrete beams over the room where his own family sits down to dinner, but he is not so worried about that stress when it is in someone's garage. He feels confident that it will not fall down, in spite of tests which show it to have a low safety factor.

Throughout the whole field this pernicious combination of ignorance and complacency extends; instances might be multiplied almost without end. It is our duty to urge upon the workers in the industry a proper appreciation of the dangers of this over-confidence. Skinning of work is a species of ignorance, for nothing is quite so evident as the fact that good work in concrete construction pays. But the man who thinks he knows more than the so-called authorities is the hardest to reach because he is clad in the nearly impenetrable armor of conceit.

Every concrete failure means a slight betterment in methods, for a certain number of hitherto unconvinced practical or commercial men are shown by that most potent object lesson, a heap of ruins, just what concrete will not stand.—Engineering News.

Natural Mixture of Bank Sand and Gravel

Naturally mixed bank sand and gravel are sometimes found in the right proportions for making concrete. Generally, however, there is far too much sand for the gravel, and great care should be exercised in using this class of material. Unless the mixture runs very even throughout the bank, and is found to be made up of one part sand to two parts gravel, it is better to screen the sand out of the gravel and prepare the materials in the usual way.

How to Produce Color Effects in Concrete*

To produce color effects in concrete we may use the grey and white Portland cements, either by themselves, or mixed in certain proportion, adding to them suitable pigments. But, in many cases, the natural colored aggregates, sand, silica, pebble grits, marble and granite, will give excellent and more uniform results.

The importance of mixing the pigment thoroughly with the cement, before adding the aggregates, should be appreciated by anybody attempting to make concrete in colors and there should be great care to avoid undue weakening of the cement.

As a very simple method to test the proper amalgamation of the pigment with the cement, take a handful of the mixture, and press it under a sheet of stiff paper. This will produce an even surface of the material, and as long as this surface does not show absolute uniformity in color, the mixing is incomplete.

The absorptive qualities of concrete during its stage of curing and seasoning, offer opportunities for coloring concrete products by capillary action. By this method, the color is deposited in the pores of the surface, amalgamating with the concrete in a permanent unit. The possibilities of this treatment are unlimited, but individual knowledge of coloring values and judgment, so as not to impair the strength requirements of concrete, are essential for success.

Penetration Method of Coloring.

Coloring solution can be made to penetrate the surface of concrete six inches or more, if the object is

*Extract from paper read before the National Association of Cement Users.

placed in the solution in a very green state. It is rarely necessary to penetrate more than 1-32 in. to 1/8 in.; this thoroughly fills all pores, gives the desired color effects, and is less expensive.

Every atom of coloring matter absorbed by the concrete reduces the strength of the solution; and as some of the coloring matter used is quite expensive, good judgment in allowing only the necessary absorption of coloring matter is advisable from an economic standpoint.

Aniline colors and the sulphates of copper and iron are the most suitable to make solutions in which to color concrete by the capillary method.

The concrete to be colored can be treated after it is several days old. Concrete products with strength requirement, should not be subjected to the coloring bath until the concrete has attained its required strength, as the filling of the pores in the concrete stops the action of its curing by the usual methods.

Coloring by absorption is effective on surfaces of concrete after it comes out of the mould, or after being treated with acid or tools. Surfaces that have been colored by absorbing mineral or metallic colors become waterproof, and the action of the weather on the metallic colors is the same as on real metals, increasing the beauty of coloring by the usual oxidation noticed on bronze and copper. Surfaces of concrete treated by this method become so hard and dense that they will take a uniform dull or high gloss polish. I have treated such surfaces in the same manner as marble, granite and metal, under polishing or buffing machines.

Products made by these methods, such as flower pots, vases and boxes, will hold water after the second day of casting, and become so hard that when struck with a hammer they ring like a metal bell. I do not think waterproofing compounds are essential in obtaining this result, but consider the proper amount of water and thorough grading of the aggregates as all-important.

I have obtained excellent two and three-color effects by painting certain parts of objects before subjecting them to the coloring bath. The parts so colored would not be affected by the color in the bath.

The artistic possibilities of such treatment are limited only by the color sense and taste employed by the craftsman. By using certain non-absorptive aggregates, their natural color can be retained, while the absorptive parts will assume the desired color. In this treatment, precaution must be taken not to use certain acids in washing before immersion in the color bath, as the chemical action of the acids is likely to counteract the color value of the bath.

I find that concrete of proper age can be treated just like any natural stone, using the same tools and machinery to dress its surface and it is my strong conviction that the success of concrete stone for building purposes rests with a close affiliation of the stone-caster and the stone-cutter. In this way alone shall we be able to give concrete proper texture and the necessary qualities of dimension stone, so essential with the architect and builder.

For acid baths tanks of sufficient size should be constructed in a concrete shop, and the soaking of concrete surfaces in acid will not only result in a great saving of acid, but produce a class of work that cannot be obtained with the scrubbing brush.

This treatment preserves the edges and details of the design and makes the surface uniform.

Any of the hard spots not sufficiently affected by the acid bath can be treated separately after the article has been flushed with clear water. Care must be taken that aggregates of the surface are of nearly uniform hardness, or the acid will eat the soft portions out before the harder particles have been cleansed of the cement coating. I have had some very fine work spoiled, when, to obtain a certain fine effect, I mixed black marble (a limestone) with crushed granite. The acid bath left only the spaces where the black marble had been, while the granite showed a very fine texture and natural color.—By Adolph Schilling.

* * *

Concrete Work in Cold Weather

Concrete may be poured in freezing weather with little difficulty or additional expense. Great care, however, must be exercised to protect the work from injury. A shed should be constructed over the sand and gravel, and the sand and gravel heated by means of perforated steam pipes, attached to steam hose, the pipes being shoved down into the piles of sand and gravel. By this means and the use of hot water, the concrete will go into the building at such a temperature that initial hardening will be obtained before freezing can occur. The additional precaution should be taken of covering the fresh concrete with canvas.

* * *

Why do Architects Figure Low?

One of the striking differences between theory and practice is brought out in the matter of preliminary estimates furnished by architects on the plans they make. Perhaps it is not always the case that they underestimate their plans, but it happens so many times that it has become a byword among builders, and no contractor would agree to put up a building on the architect's estimate without figuring it for himself or taking some other builder's figures for it.

It may be that one of the reasons is really an unconscious one, and arises from a wish to make a desirable thing look reasonable in price to the prospective builder. If the architect goes too high, the party may not build at all, or he may try elsewhere for a more economical plan, so the preliminary estimate is based as nearly as possible on the prices of material available to the architect, and perhaps the price of labor on some similar building already erected. The estimator may not intentionally go lower than he thinks the work should be done, but he forgets that what really interests the owner is the price for which he can contract the job complete.

Sometimes architects ask for preliminary estimates from their friends in the various branches of contracting or manufacture, but very few concerns are willing to make up these estimates just as a favor to the architect, and he is really thrown upon his own resources for his costs, as he should be. However, an architect (and every architect who furnishes preliminary estimates) should get into closer touch with the methods of figuring practised by general contractors. He should take notice of the several things given a money value by the contractor and which the architect is prone to ignore altogether.

The general contractor must figure his office work, whether he maintains a down-town office or whether he does the work himself at his own home; he is at some expense for superintendence, besides the cost of a working foreman; he must spend sums for railroad fare and car fare; he is at expense for correspondence, telephone and telegraph; he must pay freight and drayage; he must make good the mistakes of his own men,

and also those of the sub-contractors, if they are not in a position to be held for their work. Of course, he should not buy of such concerns, but some good people get into trouble after they make contracts, and before they are completed their responsibility has to be assumed by the general contractor.

Another thing which the architect often loses sight of is the amount general contractors figure as a profit or margin for doing business. If one figures the cost of a job by adding up the items with prices at the various sources of supply, he is bound to be short, and away short. For instance, an item just lately brought to mind was that of a clock system bought for a large high school building. Of course, the architect was able to tell the school board what the system required would

An excellent idea for a fireplace arrangement with cozy corner. Reproduced from "The Modern Building Record."

cost, as he had the price from the manufacturers. It would be installed by some local plumber, as there were sundry pipes, wires and conduits to put in place. The plumber's bill, when the work was installed, was $1,200, and this was an item which did not enter into the bid of the general contractor nor into the estimate for the cost of the clock system. If this had been included in the work of the general contractor, he would have found out beforehand about the price of putting it in, and the discrepancy between the architect's estimate and the contractor's bid would have been that much greater.

There are two evils to the building business resulting from low preliminary estimates, and while they are not worthy the consideration of men who make a business of building, still the very fact that they arise unconsciously in the minds of the prospective builders makes them important to all parties concerned. The evils referred to are, first, the idea that the contractors are trying to get exorbitant prices for the work required, and, second, that the architect has purposely made the estimate low, so that the builder would go ahead and make his arrangements for building. Both of these ideas are unfortunate because they are both untrue and because they both might be prevented. The same thing holds in regard to the sub-contracts, if the architect gives the patron a figure on them separately.

How much better would the feeling be if the estimates furnished by the architects would a little more than cover the completed buildings they design. It would often mean relief from real financial embarrassment for the builder who makes his arrangements for capital before he lets his contracts. It would put the face of good will and honesty upon all parties interested, and that is where it should be in all legitimate business.

It must be borne in mind that it is no mean job for an architect to make up a reliable preliminary estimate without the aid of the men who do the work of sub-contracting. Very few general contractors figure the sub-contract work themselves, but get the bids of the various sub-contractors first hand, and from them and such other expense as will occur make up their bids on the whole building. The easiest way to arrive at something like a reliable figure is for the architect to compile a reference list of buildings and their actual cost for completion, and if he is diligent enough in this, he can, in time, match up the cost on just about anything he is liable to turn out himself.

There are some men who make a business of making preliminary estimates, but few architects like to go to this extra expense when the building itself is more or less problematical. If they could show the prospective builder the picture of a building, a sketch of its floor plans and verbal description of its interior, with a statement of what it cost complete, he would convey a better idea and at the same time relieve himself of a great deal of annoying and unprofitable work.

After the plans are approved and out for bids, then all the sub-contractors who are going to figure them get busy and do their several parts of figuring and turn the figures in to the general contractors who intend to bid on the work. If the architect could get these figures he would be in clover, but if he should get them on a preliminary estimate, the owner might conclude that he must cut it down $10,000 and that would cause the whole thing to be figured over again. Every concern in the building material business knows that it costs good money to make estimates, and unless it will give them some kind of advantage or preference they will not figure until the work is ready for the bids of the general contractors.—Wood-Worker.

A Patriotic Creed

We Believe in our country—The Dominion of Canada.

We Believe in her Constitution, her laws, her institutions, and the principles for which she stands. We believe in her future—the past is secure. We believe in her vast resources, her great possibilities—yes, more, her wonderful certainties.

We Believe in the Canadian people, their genius, their brain, and their brawn. We believe in their honesty, their integrity and dependability. We believe that nothing can stand in the way of their commercial advancement and prosperity.

We Believe that what are termed "times of business depression" are but periods of preparation for greater and more pronounced commercial success.

We Believe that in our country are being worked out great problems, the solution of which will be for the benefit of all mankind.

Plans of Inexpensive Cottages

At this season of the year Canadian builders are besieged with orders for cottages which must be done "at once." Very often builders are also asked to supply the layouts. The following plans, reproduced from the Ladies' Home Journal, will give several ideas for both cottages and sleeping rooms.

Summer home of Mr. Harry Sutton, Rideau Lakes, near Smiths Falls, Ont.

Fig. 1 shows a small cottage on the Rideau Lakes. It has a shed roof with verandahs front and side. A large platform 25 x 21 ft. was constructed and a building 17 x 13 ft. erected on one corner. The side verandah, 13 x 18 ft., is enclosed for a kitchen, while the dining-room is the corner of the verandah, 8 x 8 ft.

The middle plan, Fig. 3, is of a cottage with first storey of rough boards, battened and stained. The upper floor plan is shown in Fig. 4, central sketch.

The plan at the left of Fig. 4 is a sleeping shed. It contains two windows and a glass door. The bureau and washstand are merely shelves.

One of the features of the cottage shown in plan at the right of Fig. 4 is the sliding door between the dining-room and kitchen. The closet is a good-sized shelf hung with cretonne. All the interior walls are stained glass.

Finding the Good Material in Rough Lumber

When buying 1 in. x 12 in. material for fencing, it will be found a good policy to go through it and pick out some of the better grade. Often you will find pieces that can be used for shelving, cornice boards, door jambs, thresher boards, etc. You will also come across lots of good sides, which can be taken off and the rest used for sheathing.—E. A. F.

Summer home of the editor of The Canadian Builder and Carpenter, Rideau Lakes

A Concrete Hardening Material

Mention is made by the Engineer of a concrete hardening material containing 95 per cent. iron dust or iron flour, which is mixed with cement for finishing the surface of concrete floors. From 15 to 25 pounds of the material is mixed with 100 pounds of the cement while dry, and one part of this mixture to two parts of sand is used for the top coat, which varies from one-half inch to one-inch in thickness. It is said to make a hard and durable floor. It is serviceable also in making new concrete adhere to old concrete in repair work.

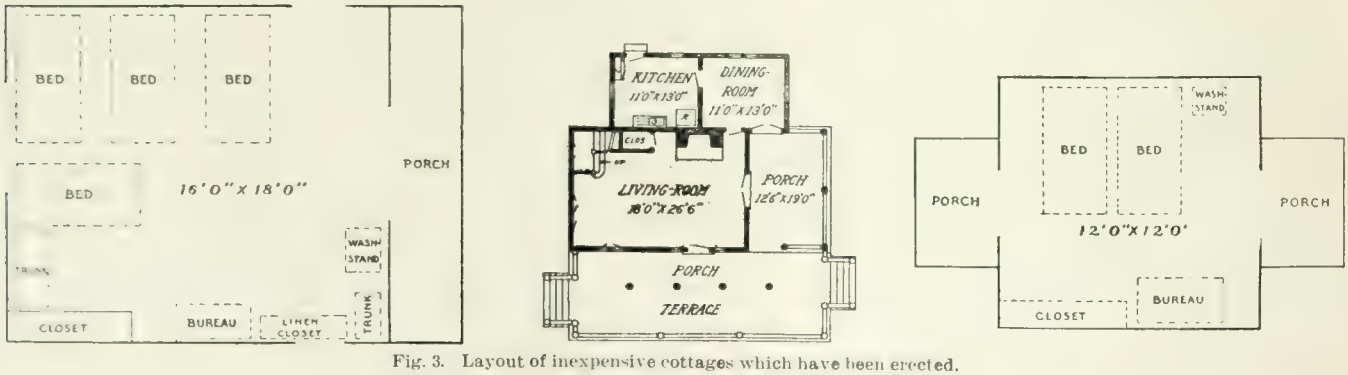


Fig. 3. Layout of inexpensive cottages which have been erected.

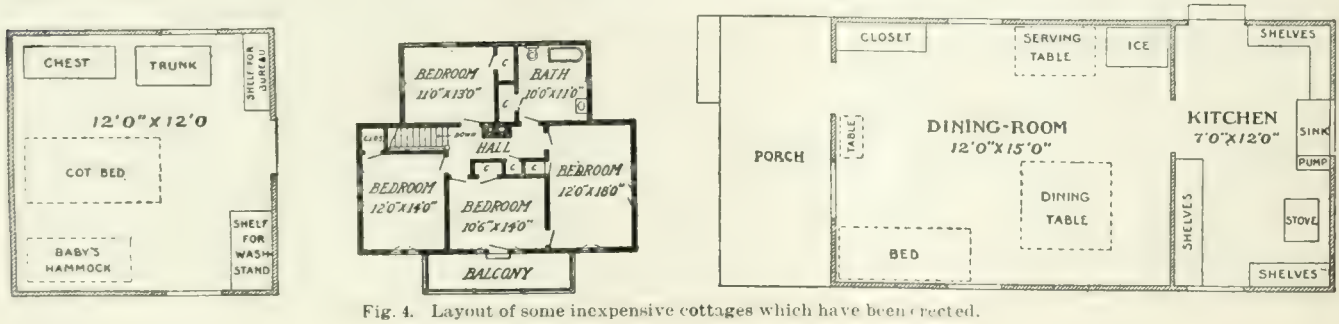
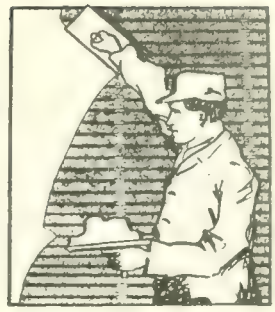


Fig. 4. Layout of some inexpensive cottages which have been erected.

Brick Work and Plastering



The Result of Several Experiments in Reinforcing Brickwork

During the past twelve months there has been introduced to Canadian architects and builders a system of reinforcing brickwork that has met with a considerable amount of success.

One of the principal architects in England, W. Harvey Brown, having had considerable experience with the erection of buildings constructed of reinforced concrete, and realizing that what was possible with concrete might be done with brick, conducted some investigations into the possibilities of a reinforcement for brick.

Mr. Brown produced several types, each, however, having the same fundamental principle, and only the details being improved. The final result was a wire mesh 2½ inches wide, consisting of three diagonal lacing wires of No. 19 gauge, which are wound round four straight tensional wires of No. 17 gauge, producing a mesh of triangles. This is known as "HB" Reinforcement, Fig. 1. The action of this new form of reinforcement is as follows:

The reinforcement is firmly bedded in the mortar joint and the tensional wires running the entire length and over the joints of support form a continuous bond, and give to the mortar a power to resist tensional stresses which it does not ordinarily possess. The stresses in a wall, whether lateral, or in the form of a load, tend to elongate these tensional members, and this where the cross or lacing wires come into action. As previously explained, they form with the tensional wires a series of triangles which are surrounded and filled with the mortar of the joint. Any tendency towards elongation by the tensional wires would result in a closing action of these triangles, and consequently of the mortar inside them, but the mortar, being strong in compression, resists this closing action, and absorbs the stresses of the wire, with the final result that a compound force much greater than the sum of the individual strengths of both mortar and steel is developed. Practical tests have shown that the mortar joint is as strong as the brick and we have a brick wall which is a monolithic structure not requiring continuous foundation and immensely stronger than plain brickwork.

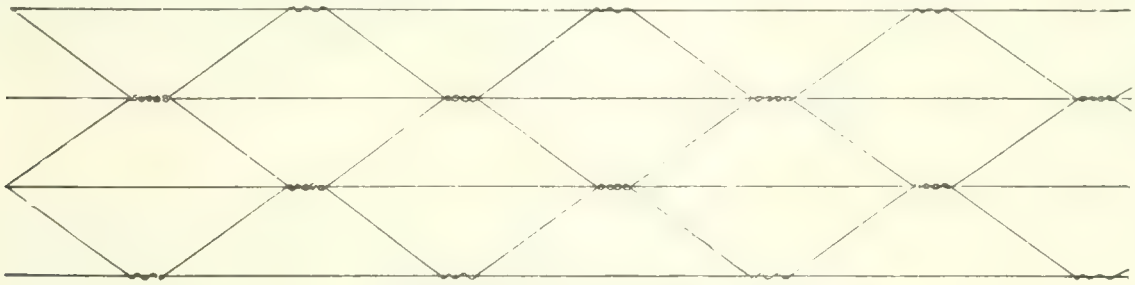


Fig. 1.—"HB" Reinforcement for brick

Interesting Test Made by Consulting Engineers.

Recently there was conducted at Toronto a test supervised by T. R. Loudon, of Messrs. James, Loudon & Hertzberg, Consulting Engineers, Toronto. The following particulars are taken from Mr. Loudon's report:

"The object of the test was to determine the maximum uniformly distributed load that could be supported without complete failure, first, by a cantilever; second, by a beam built between two piers. A solid 9-inch wall was built, 3 ft. deep, and supported by two brick piers, so as to form a simple beam 10 ft. clear span, and a cantilever beam 5 ft. clear length. The distance from the ground to the bottom of the wall was 3 ft. The two piers were 18 inches square, and were carried on a stone footing 3 ft. x 3 ft. x 6 in. The vertical joints of every second course of the cantilever brickwork were built right at the pier.

The cement mortar was a three to one mixture.

The reinforcing used was "HB," two 2½-inch strips being used per course (as the wall was 9 inches thick), and was run straight through beam, pier and cantilever. The work was allowed to dry out from the date of construction, August 20, 1913, until October 9, 1913. During this time the weather was dry and warm.

In order to obtain a uniformly distributed load, pig iron was used. This iron was piled on the cantilever and beam, care being taken to keep the load built up squarely at the ends, and also to keep the top of the pile level, so that uneven loading conditions might be avoided.

The first load was placed on the beam and cantilever on October 8, 1913, at 3 p.m., a warm, bright day, the loading being applied until the beam carried 7,197 lbs., and the cantilever carried 2,519 lbs.

Work was then discontinued until the following day, when loading was again begun at 10.45 a.m., the day again being ideal for the test. During the day, as loading went on, care was taken to avoid the dropping of pigs from any great height which would cause shock.

The idea followed out was, first, to load the cantilever to destruction. In order to give a fairly balanced condition, the beam was also loaded at the same time, as will be noted below. The following are total loads when work ceased for luncheon: beam, 14,927 lbs., deflection, .07 inch; cantilever, 6,337 lbs., deflection, nil.

After lunch loading was re-started and a photograph taken, Fig. 2, with loads 16,561 lbs. on beam, and 7,854 lbs. on cantilever, and when a load of 13,063 lbs. was reached, the cantilever sheared off at the pier. Outside of a small hair crack on the tension side of the cantilever, which appeared at 2.05 p.m., and a very slight opening of about half a brick length of a mortar joint, the cantilever was intact. As will be seen from an examination of Figs. 3 and 4, the bricks were broken across, no failure taking place horizontally along the mortar joints at the pier; or, in other words, the bricks did not pull out on the tension side, or crush on the compression side of the cantilever. It will be noted that the vertical joints of every second course of the cantilever brickwork were built right at the pier. Had there been no vertical joints immediately at the pier, the ultimate load would undoubtedly have been greater.

Just after the cantilever failed, a slight fracture was noticed on the upperside of the beam. There is no doubt that because of the cantilever shearing off at the pier and the whole load falling vertically, the footing of the pier must have been given a severe shock. This, and the sudden releasing of the stress due to the cantilever being continuous, would naturally tend to produce fracture in the beam.

Beam Loaded Further.

The beam was then further loaded until it was supporting a load of 36,190 lbs., and when this load was reached, it was noticed that the pile, having reached a considerable height, had a tendency to waver sideways.

It was felt, in consequence, that further loading would be carried on under rather dangerous conditions for the workmen. Loading was stopped, and seven men were instructed to use a 2 in. x 12 in. plank, 15 ft. long, as a ram, and to deliver blows on the lower side of the beam at the center. Seventeen blows were given, the result being a bad fracture as shown in Fig. 5. Even when fractured as badly as this photograph shows, the beam still held, and showed no inclination to fracture completely. The next blow, aimed at the central portion of the fractured material, caused ultimate failure.

Deflections.

Deflection readings were taken during part of the test. At failure the cantilever showed a deflection of ⅛-inch. The deflection of the beam, loaded with 16,561 lbs., and just after failure of the cantilever, was .101 in. Just previous to the load of 18,540 lbs. on the beam, the deflection was .115 in. At this load a fracture occurred in the beam, as explained above, and deflection readings were discontinued, as the fracture was thought to be more serious than subsequent loading proved.

Conclusions.

Total load on cantilever at failure, 13,063 lbs.; deflection on cantilever at failure, ⅛-inch; total load on beam when test stopped, 36,190 lbs.; deflection on beam with load of 17,495 lbs., .115-inch.

Equally instructive tests have been carried out in Winnipeg, Calgary and Vancouver, and the result is that the city authorities in most of the chief centres have amended the building by-laws allowing builders and owners to take full advantage of a system which permits of substantial reductions in thickness of walls.

* * *

A good working foreman is not necessarily a man that can be worked easily, but is preferably one who can easily get a lot of work out of the people under him.

Fig. 3.—Toronto Test. Showing Cantilever which collapsed at 13,063 pounds; note that the wall was intact except for one corner which was broken off by the falling pig iron.

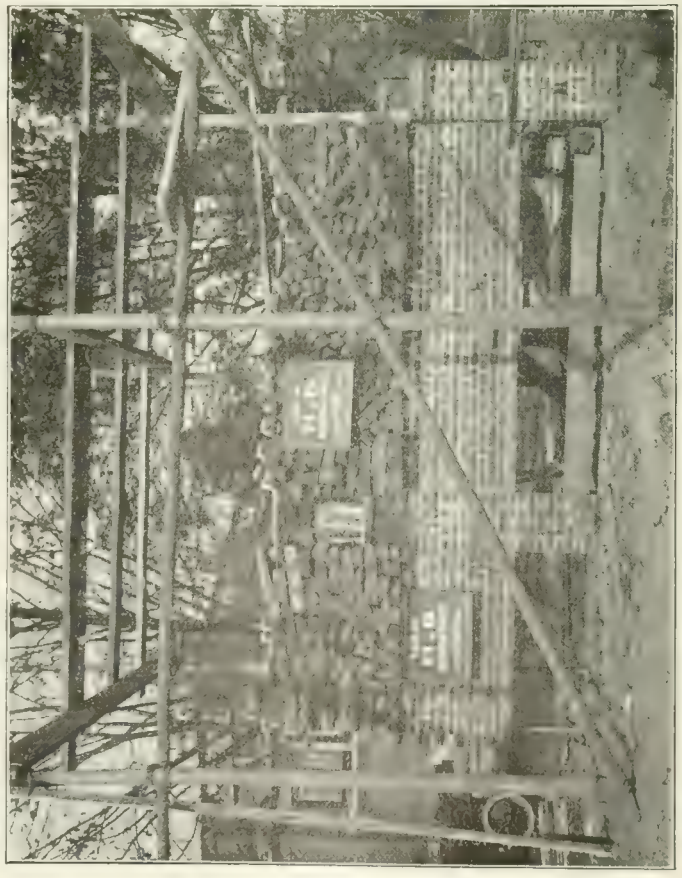


Fig. 2.—Toronto Test. Showing Cantilever carrying 7,854 pounds, and Span 16,561 pounds.

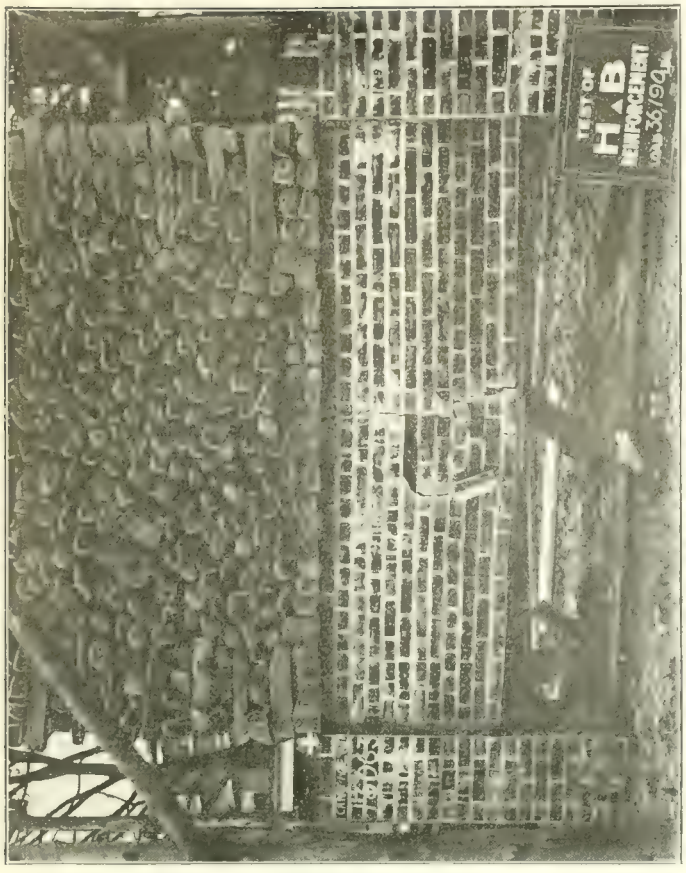


Fig. 3. Toronto Test. Showing the Span carrying 36,100 pounds, after having been rammed with a plank 17 times by seven men.

Fig. 4.—Toronto Test. Showing the remarkably clean fracture which resulted from the shearing of the Cantilever.

Nature in Technical Terms

A contributor, A. T., to the "Building World" of London, gives a number of very interesting instances where the technical terms of the building trade are drawn from the domain of nature.

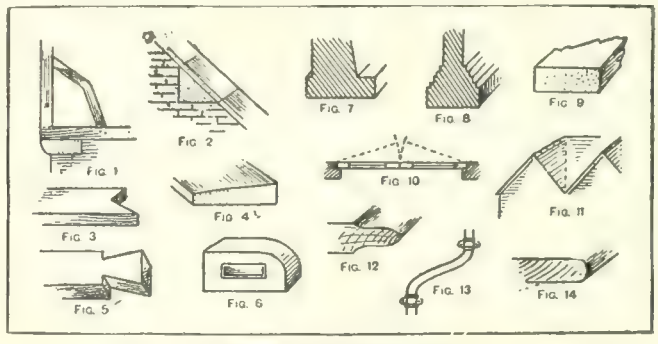
He might have gone much further in his array of words borrowed from the animal kingdom if he had decided to mention shop terms generally.

The very convenint "clawhammer" and particularly the "throats" and "gullets" and "arms" and "legs" and "ears" and "eyes" and so forth show how readily comparisons are made.

"Monkey wrench" is commonly believed to owe its title to the inventor, Charles Moncky, whose name sounded but was not spelled quite that way. There be those who probably think "monkey wrench" has some reference to the days when a careless mis-user of the wrench "monkeyed" with it by employing it as a hammer.

Here is the way in which "A. T." digs up his derivatives:

Many of the terms employed by builders are of some considerable age, and originated in old times, when large cities did not exist. Then the workmen employed on buildings lived in close touch with nature, and having to make out their own details of construction, natur-



Nature in technical terms.

ally turned to account many of the forms found around them, at the same time following the names ready to hand.

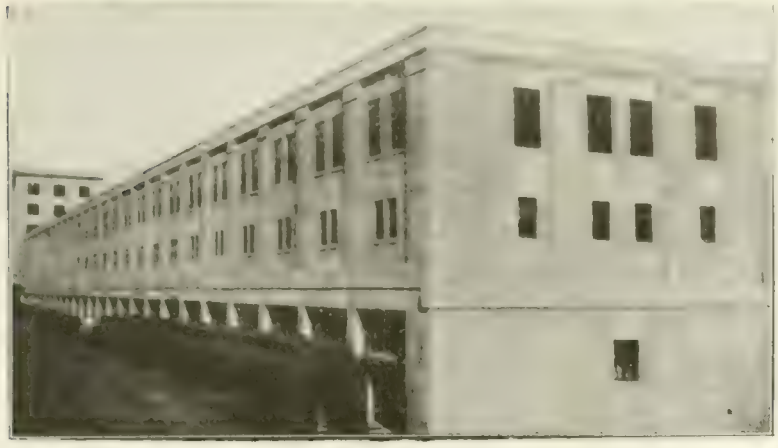
When building was of a rougher kind, and unworked pieces of timber were used in house building, naturally the word "tree" would come to be used for any piece of timber, hence we find "rooftree," "gantry," and so on. Then crooked pieces used in half-timber work were called "knees;" see Fig. 1. This word suggests "kneelers" (Fig. 2), as applied to solid pieces of coping used to give bond and support in gables. "Threshhold" calls to mind the time when thrashing was performed at the house door.

Birds evidently must have been favorites with the old workmen, for we find "bird's-mouth" (Fig. 3), used for a particular cut in woodwork, as well as "feathered;" see Fig. 4. Then there is a "wing" of a house, and one thing is "tailed" into another, and a certain joint in joinery is named a "dovetail," as Fig. 5.

The farmyard comes in, too, to supply a few terms, as "bullnosed" in bricks, and also "frog" in the same, see Fig. 6; "dog's hind leg," used as an uncomplimentary description of crooked work, or an awkward staircase. In walling the expression "toe," "footing," "heel" (see Figs. 7 and 8), and other references to the human body come in, not to mention a "squint" quoin (Fig. 9). Trees appear again as "leaves" in folding

doors (Fig. 10). Inanimate nature turns up in roofing, as "ridge," and "valley;" see Fig. 11.

Some terms have become distorted into nature, as "dragging tie" into "dragon tie," "rebate" into "rabbet." Even tools get some of their names from the familiar objects of country life. The joiner uses a "plow," and often forms a "lamb's tongue" molding (Fig. 12). A "swan's neck" bend (Fig. 13) is to be found in the pipes used to convey water from a roof to the ground, as well as a "head" and "foot." A "mouse" is turned to account in threading a sash cord, and is not a stair tread "nosed?" (Fig. 14).



Freight and office building of the Southern Railway, erected at a cost of half a million dollars.

Many of these expressions show more than a casual acquaintance with nature, so that one might easily think that the worker of those days, in cases at least, not only built houses, but performed agricultural duties. At any rate, they saw a good deal more of country than the present-day workmen do.

Only a few terms that come to mind have been mentioned, but enough has been said to draw attention to a very interesting subject which the reader can easily elaborate for himself.

* * *

The Relative Cost of Scraping Floors by Hand and by Machine

In order to definitely determine the relative costs of scraping floors by the old method of making the workman get down on his knees and scrape with a hand blade, and the more modern system of using a machine, the Fox Supply Co., Brooklyn, Wis., have secured some very valuable information. Mr. Campion, manager of the company, sent out 50 letters to carpenters who had bought Fox machines, and requested them to answer the following questions:

How many square feet of average flooring can a man scrape in one day by hand?

How many square feet of average flooring can a man scrape in one day with a Fox floor scraper?

Can a man do better work with a Fox floor scraper than by hand.

What daily wages do contractors pay journeyman carpenters in your community?

Replies were received from every section of the country. By averaging the figures submitted, it was found that 146 square feet is the average daily space covered by hand work, while 662 square feet represents the average area which the Fox scraper will surface in a nine-hour day, or 4½ times as much. It was also found that the average wage paid is $3.16 per nine-hour day. In other words, the cost of scraping 662 square feet of average flooring by hand is $14.22. When a Fox scraper is used the cost is $3.16, a difference of $11.06.

A Law Decision of Interest to Contractors

A judgment of interest to contractors, property-owners, and bonding companies was delivered recently by Judge Grant, of Vancouver, allowing Mr. Ramsay, a painting contractor, judgment for $280 against G. N. J. Westwood, owner of the Westwood Block, in a suit brought against Mr. Westwood and the United States Fidelity and Guarantee Co.

Ramsay had accepted a contract from the Western Construction Co. to do the painting for the Westwood Block. Before the contract was finished the construction company assigned, and the work was taken over by Mr. Westwood. The guarantee company had previously entered into a bond with the construction company to indemnify Westwood from loss.

His Honor held that the bonding company ,by reason of the assignment of the contractors, became principal contractors themselves, and gave judgment to Ramsay for the amount of the work done by him after Westwood took over the work.

Montreal Will Appoint a Scaffold Inspector

On the recommendation of Controller Ainey, the Montreal board of control has decided to appoint a scaffold inspector for the city. The workmen of Montreal have been agitating for such an official for some considerable time, as it is claimed that a large proportion of accidents occur owing to the improper construction of scaffolding. Mr. Chausse, chief building inspector, is looking for a suitable man.

An interior view of the freight and office building of the Southern Railway. The building is 742' 4" long.

Some of the Advantages of Quantity Surveying

Only those who have worked on both sides of the Atlantic can realize to the full the immense disadvantage of present methods of bidding on construction work. The maintenance of an estimating staff is a very heavy item in the overhead expenses of a contractor, and it is an item which the building owner finally has to pay, although it is difficult to make him realize this.

We have just sent in an estimate on a large reinforced building costing $200,000. Five other contractors did the same. In this office the services of one man for two weeks and another man for one week were spent entirely on this estimate, including a good deal of night work. The calculations covered twenty sheets closely written on both sides. Eighty requests for bids were sent out to sub-contractors. An equal amount of work was undoubtedly done by the other competing firms, only one of whom could secure the job. Comment is needless!

Plans are often incomplete or indefinite at the time bids are called for, and the bidder is always in doubt as to whether he has taken off the quantities correctly and whether he has clearly understood the requirements of the specifications. To cover himself he frequently has to add an item for contingencies or to increase his estimated quantities to guard against errors. Even with a well-drawn set of plans, careful specifications and ample time allowed in which to put in a figure, it is our experience that jobs are very frequently let for cost or less than cost to a bidder who, has left out some item which should be included in the contract. With plans that do not show clearly the requirements of a job or with indefinite specifications, absence of detail drawings, or too short a time in which to bid, we find that buildings are generally let for more than their actual cost, plus a reasonable profit.

The advantages from the builders' point of view of the supply of quantities by an independent surveyor are: First, the saving of time and expense in putting in a bid, for he can make up a bid in one or two days instead of spending as many weeks on the work. Second, he is certain he will not lose owing to some mistake in the calculation of the quantities.

The advantage to the architect would be that in a thorough examination of the plans by an independent quantity surveyor many small errors can be detected and adjusted before bids are asked for.

The advantage of the owner would be that bids would probably be closer. Also he would have the satisfaction of knowing that the lowest bid was probably a fair estimate of the cost of the work and that he would not be underpaying or overpaying the contractor owing to errors of the contractor in making up his estimate. Owing to the lower establishment charges a builder would be willing to work for less profit than at present. That there would be no trouble in settling for payment of extra work or deductions for omitted work. At present the owner generally considers that he is being plundered on any item of extra payment, while the contractor has great difficulty in getting a fair amount paid him.

At present every man is a law unto himself and probably no two contractors take off the whole of their work in the same way. For instance, among brick masons some measure the net cubical content of the brick walls, some do not deduct opening, some double the corners, and when they have arrived at the total cube of brick work some multiply by eighteen and others by twenty-one, twenty-two, or twenty-three to get the brick required for the job. Among concrete contractors some measure concrete to include forms, others measure forms separately, some measure by the board foot, some by the square foot of floor area, some by the square foot of forms that touch the concrete, and so on. Among painters some measure windows by the square yard, others allow three times the actual surface to be painted.

I believe that contractors generally are feeling more and more the need of eliminating the useless and wasteful expense of estimating which they are now put to, and we welcome any effort along this line and would be glad to add our influence and experience to any movement towards the establishment of quantity surveying.—Leslie H. Allen, in Concrete Cement Age.

Toronto Exchange Opens Cigar Stand

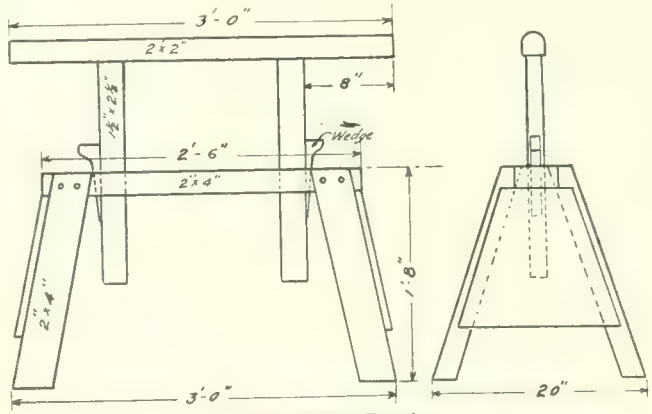
For the convenience of the members, the board of directors of the Toronto Builders' Exchange have decided to have a cigar stand in the exchange, with a good line of standard cigars and tobaccos.

The weight of one cubic foot of best pressed brick is 150 pounds. Common hard brick weighs 125 pounds per cubic foot.

A Useful Trestle

The accompanying illustration shows the construction of an adjustable trestle which Mr. A. W. Betsar finds very useful in connection with a woodworking machine.

The trestle is placed at such a distance as to catch and support the lumber as it leaves the end of the saw



An Adjustable Trestle.

table. In this way it is possible to avoid the inconvenience of a very long saw table in a place where space may be at a premium, and still keep the work from tipping up while it is being sawn.

By means of the wedges the height may be adjusted exactly to suit the height at which the saw-table is set.

Any architect, by a theoretical enforcement of all the provisions of his specifications, could ruin an ordinary contractor in a few jobs.—W. Arthur.

G. Silvester, president of the Alberta Association of Builders' Exchanges, returned recently from a business trip to Vancouver.

Price List of Building Materials—Revised to Date

EDITOR'S NOTE—Great care is exercised in obtaining prices for this department. They are as accurate as it is possible for us to make them. We know, however, that because of varying conditions, different dealers' prices are bound to vary somewhat; and our purpose in publishing this department is to give readers an idea of prices, rather than absolutely definite information.

In some cases a range of prices appears. This is given to cover the variation in quotations given by different dealers, and also to cover slight variations in conditions of measurement or purchases, which space will not permit us to specify in detail.

We will be glad to give readers prices on materials not appearing here (hardwood flooring and hardware trim for instance), and also the names of dealers from whom such materials can be obtained. Such information will be supplied promptly if you write us specifying in detail what is desired.

PRICE AT MONTREAL

Hemlock Lumber

2 x 4 in. to 2 x 12 in., 8 to 14 ft.	$24.00
2 x 4 in. to 2 x 12 in., 16 ft.	26.00
2 x 4 in. to 2 x 12 in., 18 ft.	28.00 to 30.00
1 in. hemlock No. 1.	22.00
No. 1 hemlock decking	23.00 to 25.00
No. 2 hemlock dimensions and 1 in.	26.00 to 30.00

Pine

1 in. common and better pine 8 to 12 in. wide, rough	$32.00 to 40.00
2 in. white pine, mill stock	29.00 to 33.00
⅞ x 8 and 10 in. pine shelving	36.00 to 45.00
⅞ x 12 pine shelving	42.00 to 50.00
No. 1 white pine flooring	40.00
No. 1 spruce flooring	30.00
No. 1 pine decking, D2S	40.00
No. 1 pine V. or beaded sheeting	40.00
No. 2 pine V. or beaded sheeting	30.00

Pine Trim for Paint Finish

4 in. casing, per 100 ft.	$1.75
5 in. casing, per 100 ft.	2.10
8 in. pine base, per 100 ft.	3.25
10 in. pine base, per 100 ft.	4.20
4 in. pine window stool, per 100 ft.	2.75

Shingles, Lath Roofing, Etc.

No. 1 pine lath	5.00
No. 2 pine lath	4.50
No. 1 spruce lath	4.00

Cedar Posts—Fence

6 in. at small end	5c. foot
7 in. at small end	7c. foot

Hardware

Nails, wire, common	$2.30 base keg
Nails, cut, common	2.50 " "
Sash weights, cast iron	1.50 per 100 lbs.
Tarred felt paper	.43 roll
Building paper	.35 roll

Brick, Tile, Terra Cotta, Sewer Pipe

No. 1 dry pressed red bricks	18.00
No. 1 dry pressed buff bricks	20.50
Red stock bricks	11.50
Grey stock bricks	12.00
Wire cut brick for foundation work	10.00
Fire brick	25.00
Sewer pipe, 4-inch	10c. foot
Sewer pipe, 6-inch	15c. foot

Price at Montreal—*Continued*

Cement, Plaster, Stone, Etc.

Cement (bags extra)	1.85 bbl.
Sand, for cement or brick work	1.15 ton
Lime	.30 per 100 lbs
Hydrated lime	10.00
Mortar color	5.00 bbl.
Plaster of paris	3.00
Crushed stone, 2 in.	1.50
Crushed stone, 1 in.	1.60
Crushed stone, ⅜ in.	1.75
Hardwall plaster	$9.50 to 12.00 neat
	6.50 sanded ton
Gravel	1.85 yard
Hair (plaster)	.03 per lb.

PRICE AT TORONTO

Hemlock Lumber

2 x 4 in. to 2 x 12 in., 8 to 14 ft.	$24.00 to 29.00
2 x 4 in. to 2 x 12 in., 16 ft.	24.00 to 29.00
2 x 4 in. to 2 x 12 in., 18 ft.	26.00 to 30.00
1 in. hemlock No. 1.	24.00 to 28.00
No. 1 hemlock decking	26.00 to 29.00
No. 2 hemlock dimensions and 1 in.	20.00 to 24.00

Pine

1 in. common and better pine 8 to 12 in. wide, rough	$28.00 to 35.00
2 in. white pine, mill stock	29.00 to 34.00
⅞ x 8 and 10 in. pine shelving	33.00 to 40.00
⅞ x 12 pine shelving	45.00 to 48.00
No. 1 white pine flooring	34.00 to 37.00
No. 1 spruce flooring	27.00 to 32.00
No. 1 pine decking, D2S	28.00 to 33.00
Spruce decking	27.00 to 32.00
No. 1 pine V. or beaded sheeting	35.00 to 39.00
No. 2 pine V. or beaded sheeting	30.00 to 33.00

No. 1 Common Yellow Pine

2 x 4 in. to 2 x 14 in., 10 to 16 ft.	$25.00 to 36.00
2 x 4 in. to 2 x 14 in., 18 to 20 ft.	29.00 to 38.00
2 x 4 in. to 2 x 14 in., 22 to 24 ft.	31.00 to 40.00

Yellow Pine Finish

4/4 x 6, 8, 10 and 12 B. & B. smoke finish	$41.00
5/4 x " " " "	45.00
6/4 x " " " "	45.00
8/4 x " " " "	45.00
4/4 x " " " steam finish	45.00 to 50.00
5/4 x " " " "	48.00 to 50.00
6/4 x " " " "	48.00 to 50.00
8/4 x " " " "	50.00 to 55.00

NOTE TO READERS. We would be glad to have suggestions from readers as to the extension or modification of this list.

Price List of Building Materials—*Continued.*

Price at Toronto—*Continued*

Pine Trim for Paint Finish

4 in. casing, per 100 ft.	$1.80 to 2.00
5 in. casing, per 100 ft.	2.00 to 2.50
8 in. pine base, per 100 ft.	2.75 to 3.25
10 in. pine base, per 100 ft.	4.00 to 4.50
4 in. pine window stool, per 100 ft.	3.00

Hardwood Trim, Flooring, Etc.

Quotations will be given on request. See editor's note above.

Shingles, Lath Roofing Etc.

XXX B. C. cedar shingles	$3.60 per M
N. B. extras	4.00
No. 1 pine lath	5.00 to 5.50 per M
No. 2 pine lath	4.75 to 5.00
No. 1 spruce lath	4.75
Roofing	1 ply—$1.60 per sq. 2 ply— 2.00 " 3 ply— 2.40 "

Cedar Posts—Fence

5 in. at small end	.25 each
7 in. at small end	.50 each

Hardware

Nails, wire, common	$2.35 cwt.
Nails, cut, common	2.95
Sash weights, cast iron	1.75
Tarred felt paper	.65 roll
Building paper	.45

Glass

United inches	Star	D.D.
Up 25	$4.25	6.25
26-40	4.65	6.75
41-50	5.10	7.50
51-60	5.35	8.50
61-70	5.75	9.75
71-80	$6.25	$11.00
81-85	7.00	12.50
86-90	7.75	15.00
91-95		17.50
96-100		20.50
101-105		24.00
106-110		27.50

Less 10 per cent. on Star and 25 per cent. on D. D. f.o.b. Toronto.

Wired glass ..... 18c. to 20c. per sq. ft.

Brick, Tile, Terra Cotta, Sewer Pipe

No. 1 dry pressed red bricks	$13.00 to 17.00 pr M
No. 1 dry pressed buff bricks	14.50 to 18.00
Red stock bricks	10.00 to 12.50
Sand Lime Brick	9.25 to 9.75
Grey stock bricks	10.50 to 12.50
Sewer Brick	11.00
Wire cut brick for foundation work	9.25 to 10.50
Porous terra cotta bricks	12.00 to 15.00
No. 1 enamelled bricks, all colors, from	80.00 to 150.00
Fire brick	26.00 to 30.00
Tapestry brick	15.00 to 34.00
Sewer pipe, 4-inch	10c. foot
Sewer pipe, 6-inch	16c. foot
Verandah post caps, 16 in.	1.45 each
20 in.	1.75 "
Chimney Caps, 1 flue in 1 piece	2.00 "
2 flues in 2 pieces	3.50 "
3 flues in 3 pieces	5.00 "

Cement, Plaster, Stone, Etc.

Cement (bags extra)	$1.80 bbl. (1.55 in car lots)
Sand, for cement or brick work	1.75 a yard
Lime	.35 cwt.
Hydrated Lime	10.00 ton
Mortar color	black, 3; red, 1½
Plaster of paris	$1.50 to 2.50
Crushed stone, 2 in.	1.30 to 1.40
Crushed stone, 1 in.	1.45
Crushed stone, ⅝ in.	1.50
Hardwall plaster	8.60 4.60 sanded
Gravel	1.80
Hair (plaster)	.05 lb.

Price at Toronto—*Continued*

PRICE AT WINNIPEG

Hemlock Lumber

2 x 4 in. to 2 x 12 in., 8 to 14 ft.	$29.00
2 x 4 in. to 2 x 12 in., 16 ft.	29.00
2 x 4 in. to 2 x 12 in., 18 ft.	29.00

Shingles, Lath Roofing, Etc.

XXX B. C. cedar shingles	$4.00 & 3.50 per M
No. 1 pine lath	5.75 per M
Metal lath	.16 to .20
Roofing felt (2 ply)	2.50 per roll

Hardware

Nails, wire, common	$3.00 per keg
Nails, cut, common	3.35
Sash weights, cast iron	2.75 cwt.
Tarred felt paper	1.00 per roll
Building paper	.90
Insulating paper	1.25

Glass

United inches	Single	Double
Up 25	$4.75	6.50
26-40	$5.10	$7.00
41-50	5.65	8.00
51-60	6.15	8.75
61-70	6.65	9.50
71-80	7.25	10.50
81-85		11.50
86-90		12.50
91-95		14.50
96-100		17.00
101-105		19.50
106-110		22.50

Brick, Tile, Terra Cotta, Sewer Pipe

No. 1 dry pressed red bricks	$25.00 to 50.00
No. 1 dry pressed buff bricks	25.00 to 50.00
Red stock bricks	13.00
Sand Lime Brick	12.00
Porus terra cotta bricks	18.00 per M
No. 1 enamelled bricks, all colors, from	100.00
Fire brick	45.00
Oriental brick	35.00
Sewer pipe, 4-inch	.10½ per ft.
Sewer pipe, 6-inch	.16½ per ft.

Cement, Plaster, Stone, Etc.

Cement (bags extra)	$2.50 per bbl.
Sand, for cement or brick work	1.75 a yard
Lime	.32 per bu.
Hydrated Lime	12.00 per ton
Mortar color	.05 per lb.
Plaster of paris	0.75 per bag
Crushed stone, 2 in.	2.50 per yard
Crushed stone, 1 in.	2.75

NOTE TO READERS. We would be glad to have suggestions from readers as to the extension or modification of this list.

CLASSIFIED DIRECTORY—A BUYER'S GUIDE FOR BUILDERS IN CANADA

Acetylene Lighting
Davis Acetylene Co., Niagara Falls, Ont.

Air Compressors
Stuart Machinery Co., Ltd., Winnipeg.

Alabastine
Alabastine Co., Paris Ont.

Asbestos
Asbestos Mfg. Co., Montreal.

Asbestos Goods
Asbestos Mfg. Co., Montreal.

Asphalt
Walkerville Roofing Mfg. Co., Walkerville, Ont.

Asphalt, Felt
Walkerville Roofing Mfg. Co., Walkerville, Ont.

Asphalt Paints
Walkerville Roofing Mfg. Co., Walkerville, Ont.

Asphalt Slate Shingles
Walkerville Roofing Mfg. Co., Walkerville, Ont.

Automatic Gas-Steam Boilers
Consumers' Gas Co., Toronto.

Barrows and Concrete Carts
London Concrete Machinery Co., London, Ont.

Baled Shavings
The R. Laidlaw Co., Limited, Toronto.

Band Saws
Henry Disston & Sons, Philadelphia.

Beaded Sheets
Metal Shingle & Siding Co., Preston.

Belting
Stuart Machinery Co., Ltd., Winnipeg.

Bevels
Henry Disston & Sons, Philadelphia.

Blinds, outside shutters
Georgian Bay Shook Mills, Midland.
The R. Laidlaw Co., Limited, Toronto.

Blinds, Venetian
Georgian Bay Shook Mills, Midland.
The R. Laidlaw Co., Limited, Toronto.

Blue Printing
Eugene Dietzgen Co., Ltd., Toronto.

Blue Print Papers
Eugene Dietzgen Co., Ltd., Toronto.

Boiler Feed Pumps
Stuart Machinery Co., Ltd., Winnipeg.

Boilers and Engines
Stuart Machinery Co., Ltd., Winnipeg.

Bricks (Common face and special face)
Sun Brick Co., Ltd., Toronto.
Milton Pressed Brick Co., Toronto.

Bronze Cast
W. H. Thornhill Co., Winnipeg.
Dennis Wire & Iron Work Co., London.

Builders' Hardware
Russill Hardware Co., Toronto.

Builders' Supplies
Bournival & Co., Montreal.
Georgian Bay Shook Mills, Midland.

Building Paper
The R. Laidlaw Co., Limited, Toronto.
Walkerville Roofing Mfg. Co., Walkerville, Ont.

Burial Vault Molds
Ideal Concrete Machinery Co., London.

Cars—Contractors
Stuart Machinery Co., Ltd., Winnipeg.

Casement and Sash (Steel and Bronze)
W. H. Thornhill Co., Winnipeg.

Carts, Concrete
London Concrete Machinery Co., London, Ont.

Ceilings, Metal
Metal Shingle & Siding Co., Preston.

Cement (Portland)
Braid & McCurdy, Winnipeg, Man.
Ontario Lime Association, Toronto.

Cement Tools
Wettlaufer Bros., Toronto, Ont.

Cement Stains
Russill Hardware Co., Toronto.
London Concrete Machinery Co., London, Ont.

Chain Hoists
Stuart Machinery Co., Ltd., Winnipeg.

Chain Sprockets
Stuart Machinery Co., Ltd., Winnipeg.

Circular Saws
Henry Disston & Sons, Philadelphia.

Colors for Concrete
Ideal Concrete Machinery Co., London.

Columns
Batts, Limited, Toronto.
Georgian Bay Shook Mills, Midland.
The R. Laidlaw Co., Limited, Toronto.

Combination Woodworkers
W. A. Elliot, Toronto.
Hutchinson Woodworker Co., Toronto.

Concrete Block Machines
Exeter Mfg. Co., Limited, Exeter, Ont.
Ideal Concrete Machinery Co., London.
London Concrete Machinery Co., London, Ont.
Wettlaufer Bros., Toronto, Ont.

Concrete Brick Machine
Exeter Mfg. Co., Limited, Exeter, Ont.
Ideal Concrete Machinery Co., London.
London Concrete Machinery Co., London, Ont.
Wettlaufer Bros., Toronto, Ont.

Concrete Floor Scrapers
Exeter Mfg. Co., Limited, Exeter, Ont.

Concrete Sill, Lintel and Dimension Stone Machines
Ideal Concrete Machinery Co., London.

Concrete Machinery
Bournival & Co., Montreal.

Concrete Mixers
Bournival & Co., Montreal.
Eureka Machine Co., Lansing, Mich.
Ideal Concrete Machinery Co., London.
London Concrete Machinery Co., London, Ont.
Stuart Machinery Co., Ltd., Winnipeg.
Wettlaufer Bros., Toronto, Ont.

Concrete Ornamental Forms
Exeter Mfg. Co., Limited, Exeter, Ont.

Concrete Sill, Lintel Machines
Exeter Mfg. Co., Limited, Exeter, Ont.

Concrete Tile Machines
Exeter Mfg. Co., Limited, Exeter, Ont.
Ideal Concrete Machinery Co., London.
Wettlaufer Bros., Toronto, Ont.

Concrete Reinforcements
Metal Shingle & Siding Co., Preston.

Contractors' Machinery
The Stuart Machinery Co., Winnipeg.
Wettlaufer Bros., Toronto, Ont.

Contractors' Plants
Stuart Machinery Co., Ltd., Winnipeg.

Conveying Machinery
Stuart Machinery Co., Ltd., Winnipeg.

Corrugated Sheets (Asbestos)
Asbestos Mfg. Co., Montreal.

Corrugated Sheets (Steel)
Metal Shingle & Siding Co., Preston.

Cranes and Hoists
Stuart Machinery Co., Ltd., Winnipeg.

Crestings
Metal Shingle & Siding Co., Preston.

Cross-cut Saws
Henry Disston & Sons, Philadelphia.

Crushers
Wettlaufer Bros., Toronto, Ont.

Curb Stone Machines
Ideal Concrete Machinery Co., London.

Cutouts
Duncan Electrical Co., Montreal.

Daylight Rods
Consolidated Plate Glass Co., Toronto.

Derricks
Ideal Concrete Machinery Co., London.
London Concrete Machinery Co., London, Ont.
Stuart Machinery Co., Ltd., Winnipeg.

Doors
Batts, Limited, Toronto.
Benson & Bray, Midland.
Georgian Bay Shook Mills, Midland.

Doors, Veneered
Batts, Limited, Toronto.
Georgian Bay Shook Mills, Midland.
Benson & Bray, Midland.

Door Trimmings
Metal Shingle & Siding Co., Preston.
W. H. Thornhill Co., Winnipeg.

Doors (Sheet Steel and Bronze)
W. H. Thornhill Co., Winnipeg.

Drag Scrapers
London Concrete Machinery Co., London, Ont.

Drain Tile Machinery
C. S. Wert, Kendallville, Ind.

Draughting
The Patent Selling & Mfg. Agency, Toronto.

Drawing Materials
Eugene Dietzgen Co., Ltd., Toronto.

Driers
London Concrete Machinery Co., London, Ont.

Eavetroughs
Metal Shingle & Siding Co., Preston.

Eavetrough and Conductor-Pipe
Metal Shingle & Siding Co., Preston.

Electrical Fixtures and Specialties
Duncan Electrical Co., Montreal.
W. H. Thornhill Co., Winnipeg.

Electrical Machinery
Stuart Machinery Co., Ltd., Winnipeg.

CLASSIFIED DIRECTORY—*Continued*

Electrical Supplies
Russill Hardware Co., Toronto.

Elevator Fronts
Dennis Wire & Iron Work Co., London.

Elevators—Pasenger and Freight
Stuart Machinery Co., Ltd., Winnipeg.

Emery and Emery Wheels
Stuart Machinery Co., Ltd., Winnipeg.

Engines and Boilers
Stuart Machinery Co., Ltd., Winnipeg.

Engines—Gas and Gasoline
Stuart Machinery Co., Ltd., Winnipeg.

Engineers' Instruments and Supplies
Eugene Dietzgen Co., Ltd., Toronto.

Excavators
Stuart Machinery Co., Ltd., Winnipeg.

Fences
Dennis Wire & Iron Work Co., London.
Dominion Ornamental Iron Co., Ltd., Toronto.
George B. Meadows, Toronto.

Fence Post Mould
London Concrete Machinery Co., London, Ont.

Files
Henry Disston & Sons, Philadelphia.

Finials
Metal Shingle & Siding Co., Preston.

Fire Brick and Fire Clay
Stuart Machinery Co., Ltd., Winnipeg.

Fir Doors
Georgian Bay Shook Mills, Midland.

Fire Escapes
Dominion Ornamental Iron Co., Ltd., Toronto.
George B. Meadows, Toronto.
Dennis Wire & Iron Work Co., London.
Eberhard-Wood Mfg. Co., Toronto.

Fireproof Windows
Metal Shingle & Siding Co., Preston.

Flooring
Batts, Limited, Toronto.
Benson & Bray, Midland.
Georgian Bay Shook Mills, Midland.
The R. Laidlaw Co., Limited, Toronto.
Wilson Bros., Ltd., Collingwood, Ont.
Siemen Bros., Ltd., Toronto.

Floor Scrapers
Fox Supply Co., Brooklyn, Wis.

Forge and Rivet Heaters
Consumers' Gas Co., Toronto.

Framing Tools
G. A. Topp & Co., Indianapolis, Ind.

Galvanized Chain Pumps
Metal Shingle & Siding Co., Preston.

Galvanized Iron Cornices
Metal Shingle & Siding Co., Preston.

Galvanized Tanks
Metal Shingle & Siding Co., Preston.

Gas Blow Pipes
Consumers' Gas Co., Toronto.

Gas Engines
Consumers' Gas Co., Toronto.

Gas Furnaces
Consumers' Gas Co., Toronto.

Gas Lighting Appliances
Consumers' Gas Co., Toronto.

Gas Fixtures
Consumers' Gas Co., Toronto.

Gasoline Engines
Ideal Concrete Machinery Co., London.
London Concrete Machinery Co., London, Ont.
Wettlaufer Bros., Toronto, Ont.

Gas Piping
Consumers' Gas Co., Toronto.

Gas Producer Plants
Stuart Machinery Co., Ltd., Winnipeg.

Gas Ranges
Consumers' Gas Co., Toronto.

Gas Water Heaters
Consumers' Gas Co., Toronto.

Gates
Dennis Wire & Iron Works Co., London.
George B. Meadows, Toronto.

Glass
Consolidated Plate Glass Co., Toronto.
The Toronto Plate Glass & Importing Co., Toronto.
Queen City Glass Co., Toronto.
Russill Hardware Co., Toronto.

Glue Pot Heaters
Consumers' Gas Co., Toronto.

Gravel Roofing
Walkerville Roofing Mfg. Co., Walkerville, Ont.

Gravel Screens (Power)
Ideal Concrete Machinery Co., London.

Green Slate Roofing
Walkerville Roofing Mfg. Co., Walkerville, Ont.

Grills, Steel & Bronze
Dennis Wire & Iron Work Co., London.

Hack Saws
Henry Disston & Sons, Philadelphia.

Hair (Plasterers')
Ontario Lime Association, Toronto.

Hammers
Double Claw Hammer Co., Brooklyn, N. Y.

Hand Saws
Henry Disston & Sons, Philadelphia.

Hand Scrapers
Fox Supply Co., Brooklyn, Wis.

Hard Wall Plaster
Crown Gypsum Co., Lythmore, Ont.

Hardwood Flooring
Batts, Limited, Toronto.
Georgian Bay Shook Mills, Midland.
The R. Laidlaw Co., Limited, Toronto.
Siemen Bros., Ltd., Toronto.

Heating Apparatus
Stuart Machinery Co., Ltd., Winnipeg.

Heaters—Feed Water
Stuart Machinery Co., Ltd., Winnipeg.

Herringbone Lath
Metal Shingle & Siding Co., Preston.

Hoists
Hall-Holmes Mfg. Co., Jackson, Mich.
Ideal Concrete Machinery Co., London.
London Concrete Machinery Co., London, Ont.
Wettlaufer Bros., Toronto, Ont.

Hoisting Engines
London Concrete Machinery Co., London, Ont.
Stuart Machinery Co., Ltd., Winnipeg.

Insulating Papers
Walkerville Roofing Mfg. Co., Walkerville, Ont.

Interior Trim
Batts Limited, Toronto.
Benson & Bray, Midland.
Georgian Bay Shook Mills, Midland.
The W. A. Moore Co., Ltd., Meaford.
Wilson Bros., Ltd., Collingwood, Ont.

Interlocking Hollow Building Tile
Sun Brick Co., Ltd., Toronto.

Iron Fences
Dennis Wire & Iron Works Co., London.
Eberhard-Wood Mfg. Co., Toronto.
Geo. B. Meadows, Toronto.

Joiners' Work
Georgian Bay Shook Mills, Midland.

Keene's Cement
Braid & McCurdy, Winnipeg, Man.

Lath
Batts Limited, Toronto.
Galt Art Metal Co., Galt, Ont.
Georgian Bay Shook Mills, Midland.
The R. Laidlaw Co., Limited, Toronto.
Wilson Bros., Ltd., Collingwood, Ont.

Lime
Ontario Lime Association, Toronto.

Lockers, Steel
Dennis Wire & Iron Work Co., London.
Geo. B. Meadows, Toronto.

Lumber
Batts, Limited, Toronto.
Georgian Bay Shook Mills, Midland.
The R. Laidlaw Co., Limited, Toronto.
Wilson Bros., Ltd., Collingwood, Ont.

Machinery—Brick and Tile
Stuart Machinery Co., Ltd., Winnipeg.

Machinery—Wood Working
Stuart Machinery Co., Ltd., Winnipeg.

Mechanics' Tools
Russill Hardware Co., Toronto.

Mill and Factory Supplies
Stuart Machinery Co., Ltd., Winnipeg.

Model Makers
The Patent Selling & Mfg. Agency, Toronto.

Mortar Colors
Ontario Lime Association, Toronto.

Mitre Box
Goodell Mfg. Co., Greenfield, Mass.

Mortar Gauges
Ideal Concrete Machinery Co., London.

Mortar Mixers
London Concrete Machinery Co., London, Ont.

Mouldings
Batts, Limited, Toronto.
Georgian Bay Shook Mills, Limited, Midland, Ont.
Wilson Bros., Collingwood.

Ornamental Iron Work
Dennis Wire & Iron Works Co., London.
Eberhard-Wood Mfg. Co., Toronto.
George B. Meadows, Toronto.

Nails
P. L. Robertson Mfg. Co., Milton.

Ornamental Bronze Work
Dennis Wire & Iron Work Co., London.

Ornamental Iron Work
Dennis Wire & Iron Work Co., London.

Ornamental Moulds
London Concrete Machinery Co., London, Ont.
Ideal Concrete Machinery Co., London.

Paints
Russill Hardware Co., Toronto.

Patent Attorneys
The Patent Selling & Mfg. Agency, Toronto.
J. A. MacMurty & Co., Toronto.
Stanley Lightfoot, Toronto.

Pile Driving Machinery
Stuart Machinery Co., Ltd., Winnipeg.

Plaster
Crown Gypsum Co., Lythmore.
Ontario Lime Association, Toronto.

Plaster (Hardwall)
Crown Gypsum Co., Lythmore.
Ontario Lime Association, Toronto.

Plaster Corner Bead
Metal Shingle & Siding Co., Preston.

Plaster Paris
Crown Gypsum Co., Lythmore.
Ontario Lime Association, Toronto.

Plumbs
Frank Sand Mfg. Co., Windsor, Ont.

Plumbs and Levels
Henry Disston & Sons, Philadelphia.

Plumbing Supplies
Russill Hardware Co., Toronto.

Portable Saw Rigs
Oshkosh Mfg. Co., Oshkosh, Wis.

Powder Paint
Russill Hardware Co., Toronto.

Mr. MANUFACTURER!

Build Your Factory With

"Ideal" Hollow Concrete Blocks

Reinforced Pilaster Construction

No Money Wasted for Wood Forms on This Factory

Cost $25,500

This shows the new desk plant of the Knechtel Furniture Co., Ltd., of Hanover, Ont., built by Henry Prast, contractor, of Hanover, Ont.

Dimensions: 181.5 feet x 80 x 46. The complete cost of the building was $25,500. It would be impossible to duplicate this splendid factory, in concrete or brick, for the same money.

Look at the Insurance Rate

Canadian Underwriters offered the Knechtel Co. a 25c. rate. This shows how the insurance companies regard "Ideal" construction. Large factory construction is one of the great possibilities with "Ideal" machines.

If you are planning a new factory or a big building of any kind, where strength, durability, low cost and absolute fireproofing are considerations—write us for full particulars.

THE KNECHTEL FURNITURE CO. LIMITED

HANOVER ONT ____ Jan. 13th. 1912.

MANAGER'S MEMO

Ideal Concrete Machinery Co.,
London, Ont.

Dear Sirs:

Your favor of the 8th is received. We are decidedly pleased with the construction and consider it a fortunate event that you happened along just when we were working on the plans. Our first intention as you know was to have solid concrete construction but we have reason to believe that the "Block" is superior in many respects, especially in the ease and speed with which a building can be carried up.

The Block construction IS IDEAL. We feel under great obligation to your Mr. Fuller for the assistance he rendered us in planning the building. We presume Mr. Prast the contractor, has given you dimensions and data of construction. The Canadian Underwriters' Association have offered us a 25¢ rate on the building and contents.

The factory will be operated on office desks, Ruling Devices, and Sectional Bookcases.

Yours truly,

THE KNECHTEL FURNITURE CO.
J. S. Knechtel
Managing Director

Further Details for the Asking

Ideal Concrete Machinery Company, Limited

211 King St., London, Ont.

38,750 "Ideal" Blocks

As Mr. Prast, the contractor, says, "The block used was the 8x8x16 in. Panel Face Design Ideal standard blocks for Main Building, and 8x10x16 in. for Dry Kilns, and Boiler and Engine House, all poured piers, also all Sills and Window and Door Heads were reinforced with 1-2 in. soft steel—and were handled much easier, cheaper and quicker than reinforced concrete or brick. This is without a doubt the best looking and most substantial factory building in town.

The Bigger the Factory

THE MORE MONEY YOU SAVE BY USING "IDEAL" Concrete Block Construction. You get the solidity of granite, the handsome appearance of stone, the durability of marble—at a price far cheaper than brick. There is no waste for long hauls, no freight charges, no delays, no disappointments. "Ideal" Blocks are made right on the ground, as fast as needed.

CLASSIFIED DIRECTORY—*Continued*

Power Plant Equipment
Stuart Machinery Co., Ltd., Winnipeg.

Pulpstone
Alabastine Co., Paris Ont.

Pulleys
Stuart Machinery Co., Ltd., Winnipeg.

Pumps
London Concrete Machinery Co., London, Ont.
Stuart Machinery Co., Ltd., Winnipeg.
Wettlaufer Bros., Toronto, Ont.

Quarrying Machinery
Stuart Machinery Co., Ltd., Winnipeg.

Ready Roofing
The R. Laidlaw Co., Limited, Toronto.
Walkerville Roofing Mfg. Co., Walkerville, Ont.

Receptacles (Electrical)
Duncan Electrical Co., Montreal.

Red Slate Roofing
Walkerville Roofing Mfg. Co., Walkerville, Ont.

Ridge, Galvanized
Metal Shingle & Siding Co., Preston.

Ridgings
Metal Shingle & Siding Co., Preston.

Rivets
P. L. Robertson Mfg. Co., Milton.

Rock Crushers
Wettlaufer Bros., Toronto, Ont.
Stuart Machinery Co., Ltd., Winnipeg.

Roofing
Asbestos Mfg. Co., Montreal.
Metal Shingle & Siding Co., Preston.
Walkerville Roofing Co., Walkerville.

Roofing Tile Machines
Ideal Concrete Machinery Co., London.

Rubber Roofing
Walkerville Roofing Mfg. Co., Walkerville, Ont.

Sand Sifting Machines
London Concrete Machinery Co., London, Ont.

Sanded Roofing
Walkerville Roofing Mfg. Co., Walkerville, Ont.

Sash
Batts, Limited, Toronto.
Benson & Bray, Midland.
Georgian Bay Shook Mills, Limited, Midland, Ont.
The R. Laidlaw Co., Limited, Toronto.
Wilson Bros., Collingwood.

Saw Mill Machinery
Stuart Machinery Co., Ltd., Winnipeg.

Scraper Knives
Fox Supply Co., Brooklyn, Wis.

Scrapers
Fox Supply Co., Brooklyn, Wis.

Scrapers, Drag
London Concrete Machinery Co., London, Ont.

Scrapers, Wheel
London Concrete Machinery Co., London, Ont.

Scraper Sharpening Device
Fox Supply Co., Brooklyn, Wis.

Screens, Sand
London Concrete Machinery Co., London, Ont.

Screens, window and door
Batts, Limited, Toronto.
Georgian Bay Shook Mills, Midland.
The R. Laidlaw Co., Limited, Toronto.

Screws
P. L. Robertson Mfg. Co., Milton.

Sewer Pipe
Ontario Lime Association, Toronto.

Sewer Pipe Moulds
London Concrete Machinery Co., London, Ont.
Ideal Concrete Machinery Co., London.

Shingles
Batts, Limited, Toronto.
Georgian Bay Shook Mills, Midland.
Wilson Bros., Ltd., Collingwood, Ont.

Sheeting
Batts Limited, Toronto.
Benson & Bray, Midland.
Georgian Bay Shook Mills, Midland.

Sidewalk Dividing Plates
London Concrete Machinery Co., London, Ont.

Sidewalk Forms, Steel
London Concrete Machinery Co., London, Ont.

Sidewalk Prisms
Consolidated Plate Glass Co., Toronto.

Siding
Batts Limited, Toronto.
Benson & Bray, Midland.
Georgian Bay Shook Mills, Midland.

Sill and Cap Moulds
London Concrete Machinery Co., London, Ont.
Ideal Concrete Machinery Co., London.

Silo Block Machines
London Concrete Machinery Co., London, Ont.

Sockets, Brass and Porcelain
Duncan Electrical Co., Montreal.

Soldering Iron Heaters
Consumers' Gas Co., Toronto.

Shooks
Georgian Bay Shook Mills, Limited, Midland, Ont.

Skylights
Metal Shingle & Siding Co., Preston.

Stairs
Batts, Limited, Toronto.
Georgian Bay Shook Mills, Midland.
The R. Laidlaw Co., Limited, Toronto.
Wilson Bros., Collingwood.

Stairs, Iron
Dennis Wire & Iron Work Co., London.
George B. Meadows, Toronto.

Stanchions
Metal Shingle & Siding Co., Preston.

Steel Buildings and Garages
Metal Shingle & Siding Co., Preston.

Steam Shovels
Stuart Machinery Co., Ltd., Winnipeg.

Stone (Crushed)
Ontario Lime Association, Toronto.

Stone Crushers
Stuart Machinery Co., Ltd., Winnipeg.

Store Front Bars
Consolidated Plate Glass Co., Toronto.
Detroit Show Case Co., Detroit.

Storm Sash
Batts, Limited, Toronto.
Georgian Bay Shook Mills, Midland.
The R. Laidlaw Co., Limited, Toronto.

Store Fixtures
Batts, Limited, Toronto.
Metal Shingle & Siding Co., Preston.
The R. Laidlaw Co., Limited, Toronto.

Surveying Instruments
Eugene Dietzgen Co., Ltd., Toronto.

Tanks—Steel
Stuart Machinery Co., Ltd., Winnipeg.

Terra Cotta
W. H. Thornhill Co., Winnipeg.
Toronto Plate Glass Importing Co., Toronto.

Thimbles
Metal Shingle & Siding Co., Preston.

Tile, Block and Brick Cars
London Concrete Machinery Co., London, Ont.

Tile Machine, Drain
London Concrete Machinery Co., London, Ont.

Tile Machine, Sidewalk
London Concrete Machinery Co., London, Ont.

Tiles (Brick)
Braid & McCurdy, Winnipeg, Man.

Timber
Georgian Bay Shook Mills, Midland.
The R. Laidlaw Co., Limited, Toronto.

Transfer Cars
London Concrete Machinery Co., London, Ont.

Transmission Apparatus
Stuart Machinery Co., Ltd., Winnipeg.

Trowels (brick and plastering)
Henry Disston & Sons, Philadelphia.

Trucks
Stuart Machinery Co., Ltd., Winnipeg.

Turbine Pumps
Stuart Machinery Co., Ltd., Winnipeg.

Valley, Galvanized
Metal Shingle & Siding Co., Preston.

"V" Crimp Roofing and Siding
Metal Shingle & Siding Co., Preston.

Veneered Doors
The W. A. Moore Co., Ltd., Meaford.
Batts Limited, Toronto.
Georgian Bay Shook Mills, Midland.
Benson & Bray, Midland.

Ventilators
Metal Shingle & Siding Co., Preston.

Verandah Columns
Batts, Limited, Toronto.
Benson & Bray, Midland.
Georgian Bay Shook Mills, Midland.
The R. Laidlaw Co., Limited, Toronto.

Wall Board
Georgian Bay Shook Mills, Midland.
The R. Laidlaw Co., Limited, Toronto.
Walkerville Roofing Mfg. Co., Walkerville, Ont.

Wall Plugs
Ideal Concrete Machinery Co., London.

Washers
P. L. Robertson Mfg. Co., Milton.

Waterproof Paper
Braid & McCurdy, Winnipeg, Man.

Waterproofing
Ideal Concrete Machinery Co., London.
W. H. Thornhill Co., Winnipeg.

Watering Bowls for Stock
Metal Shingle & Siding Co., Preston.

Waterworks' Supplies
Stuart Machinery Co., Ltd., Winnipeg.

Weather Strips
Eberhard-Wood Mfg. Co., Toronto.
William Pease Co., Hamilton.

Window Frames—Complete
Batts Limited, Toronto.
Benson & Bray, Midland.
Georgian Bay Shook Mills, Midland.

Window Frames
Batts, Limited, Toronto.
Georgian Bay Shook Mills, Midland.
Wilson Bros., Collingwood.

Window Trimmings
Metal Shingle & Siding Co., Preston.
W. H. Thornhill Co., Winnipeg.

Window Screens
Batts, Limited, Toronto.
Georgian Bay Shook Mills, Midland.
The R. Laidlaw Co., Limited, Toronto.

Wire
P. L. Robertson Mfg. Co., Milton.

Wire Rope
London Concrete Machinery Co., London, Ont.
The Stuart Machinery Co., Winnipeg.

Wire Work (Special)
George B. Meadows, Toronto.
Dennis Wire & Iron Works Co., London.

Wood Mantels
The W. A. Moore Co., Ltd., Meaford.

Woodworkers (combination)
Elliot Woodworker Co., Toronto.
M. Hutchinson, Toronto.
Parks Ball Bearing Machine Co., Cincinnati, Ohio.

Woodworking Machinery
Stuart Machinery Co., Ltd., Winnipeg.

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