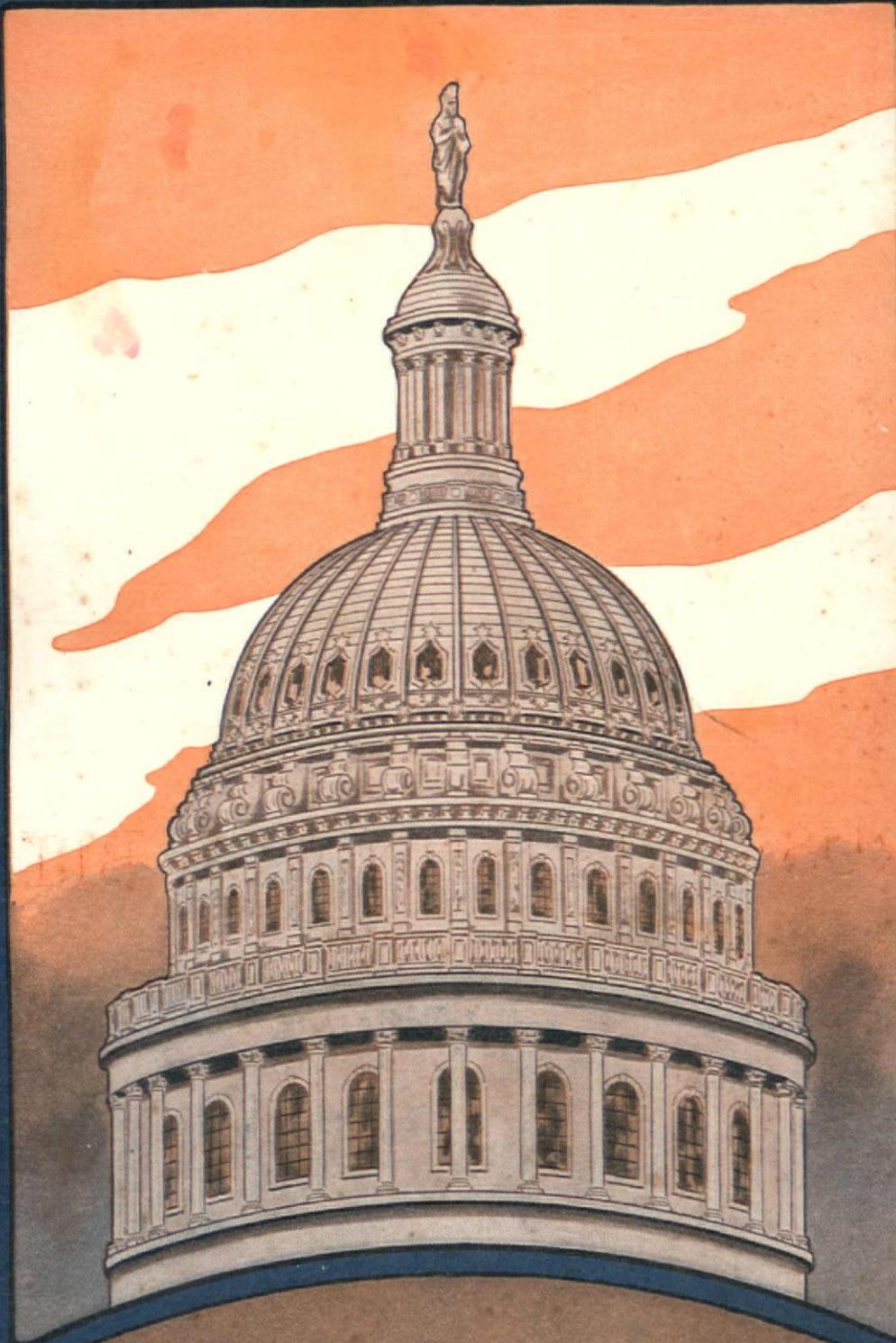


29,000
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THE NATIONAL BUILDER



PUBLISHED
On The 15th Day Of Each Month
Twenty Cents Per Copy Two Dollars Per Year

JANUARY, 1911

DISSTON



“Telegraph” Screw Driver

The Disston Telegraph Screw Driver has a round blade of Crucible Steel. It is hardened and tempered with the greatest of care. Bright finish.

Handle of Hardwood, stained cherry. Like all Disston tools it is unequalled for durability and efficiency. Neat and well finished appearance.

HENRY DISSTON & SONS

(INCORPORATED)

Keystone Saw, Tool, Steel and File Works
PHILADELPHIA, PA.

BRANCHES: Chicago Boston Cincinnati New Orleans Memphis San Francisco Seattle Portland Spokane Toronto Vancouver

AUGER BIT ESSENTIALS

The Third Reason why the well-known

RUSSELL JENNINGS BITS



are so extensively used is that they have clean-cut, properly shaped

SCREW POINTS

which lead the bit into the wood without forcing.

Our *double-thread* screw point is the standard for accurate work in soft or seasoned wood and in any wood not extremely gummy or hard.

Our *single-thread* screw point is for quick boring. The deep threads take a strong hold on gummy and hard woods. It does not clog in gummy wood and leads the bit into extremely hard woods, such as ironwood and lignum-vitae. It is suitable for end boring.



RUSSELL JENNINGS MFG. CO.

CHESTER, CONN., U. S. A.

21-26



As Sure as 2 and 2 Is 4

A Shearing Cut Gets Best Results in Floor Scraping

Why does a mechanic when scraping a floor by hand use the Shearing Cut? Because he obtains smoothest and quickest work so. When you whittle a piece of wood you use a Shearing Cut.

A Shearing Cut is ALWAYS made with the

"DAISY" FLOOR SCRAPER

With One Ten-Inch Blade Single Shearing Cut is Made

With Two Five-Inch Blades Double Shearing Cut is Made

The "Daisy"

CUTS EITHER WITH OR ACROSS THE GRAIN
CUTS RIGHT UP TO BASE BOARD AND INTO EVERY CORNER
IS EASIER ON THE OPERATOR AS IT REQUIRES ONLY A SLIGHT LIFT TO GET BEST WORK
WILL DO MORE WORK THAN ANY OTHER IN SAME LENGTH OF TIME
WILL DO PERFECT STRAIGHT EDGED WORK AND WILL PLEASE YOU
CLAMPS ARE INSTANTLY FASTENED
FILING DEVICE FILES BLADES TO RIGHT BEVEL
EDGE-TURNING DEVICE IS A WONDER

UNSOLICITED TESTIMONIALS

FRED L. WALTERS
CARPENTER AND BUILDER
Jobbing Given Prompt Attention
Estimates Furnished

Gillette, N. J., Oct. 11th, 1910.
THE DAISY MFG. CO.,
South Bend, Ind.

Gentlemen:-
The flooring has arrived and we have scraped it with your machine and I find it does all your claim for it. Inclosed you will find check as per agreement.

Thanking you for your kindness in allowing me to try this machine and for extending the time for trial,
I am, Yours respectfully,
FRED L. WALTERS.

KUTSCH BROTHERS
CARPENTERS AND CONTRACTORS
Jobbing and Repairing
Promptly Attended to
No. 2043 Washington Street

Dubuque, Iowa, Sept. 1st, 1910.
THE DAISY MFG. CO.,
South Bend, Ind.

Gentlemen:-
Immediately after using the Scraper we have found it to be satisfactory and superior to any we have seen in use.

We herewith inclose draft in full for same.
Yours truly,
KUTSCH BROTHERS
Per J. P. K.

Belle Fourche, S. Dak., Aug. 4, 1910.
THE DAISY MFG. CO., South Bend, Ind.
Gentlemen:-

After giving the three Floor Scrapers a trial we have decided that the "Daisy" is the one we want. Inclosed find draft in full for same.
Very respectfully,
NELSON & GOLDING

Ten
Days
Free
Trial
Offer

We will ship a "DAISY" Outfit to any responsible contractor who intends purchasing a floor scraper for a ten days free trial. Test it with others, if you do not find it best return it. The trial will not cost you a penny.

THE DAISY MFG. CO., SOUTH BEND, IND.



We Want A Builder In Every Town

We Have an Attractive Proposition for One Carpenter or Builder in Every Community to Take Orders for Our Widely Advertised

EDWARDS' METAL SPANISH TILE

ARE EASILY SOLD BY OUR AGENTS

Home Owners Everywhere Are Reading Our Advertisements in the Leading Magazines

EDWARDS' INTERLOCKING METAL SPANISH TILE

ARCHITECTS EVERYWHERE SPECIFY THIS ATTRACTIVE ROOFING

Edwards' Metal Spanish Tile are stamped out of the highest quality Worcester Grade Terne Plate, size 10 x 14 inches, furnished either painted or heavily galvanized. They are provided with our patented interlocking device, which conceals all nails, makes it possible to get a perfectly moisture proof roof without soldering and without danger of having the tile crack open in extreme cold or hot weather. Edwards' Metal Spanish Tile looks exactly like the best Terra Cotta Tile. They have the decided advantage of being much lighter, easier to apply, longer lived and cost much less.

Write us today about your territory. Here's an opportunity you should not miss. Many carpenters and builders have been so successful taking orders and laying our Metal Spanish Tile that they now devote their entire time to this business. Others have made big profits selling and laying our metal tile roofing "between jobs." We show you how to build up an independent, profitable business in your own community. Write for our proposition today. The territory is going fast. Don't be too late. Send a postal right now.

The Edwards Manufacturing Company

430-450 Eggleston Avenue

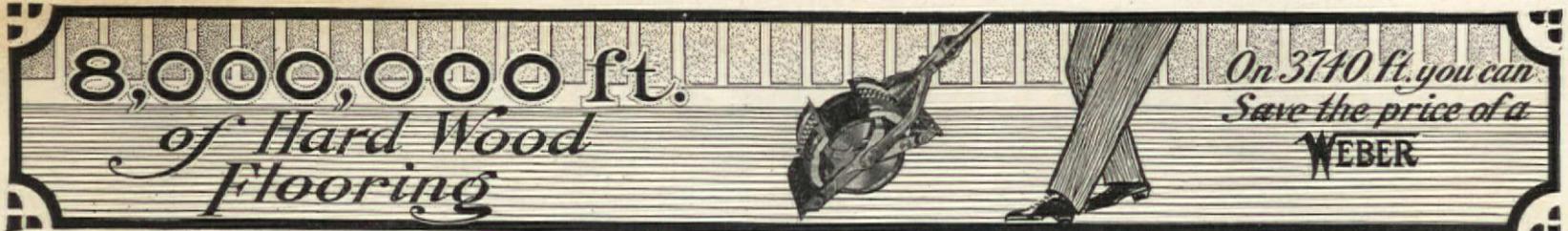
"THE SHEET METAL FOLKS"

Cincinnati, Ohio

THE WORLD'S LARGEST MANUFACTURERS OF METAL ROOFING, METAL SHINGLES AND METAL CEILINGS.

PASTE THIS DOME ON LETTERS THAT YOU WRITE ADVERTISERS. IT WILL HELP.





That's approximately what was finished with a Weber the past year—and at a saving of \$91,076.88 over hand work. It cost about 17-13 cents to hand-finish a single foot. A Weber does the same work for close to 2-5 of a cent. That means about \$1.53 a "square" by hand against 44 cents with a Weber. Here's a vital array of money-saving information. Can you beat it? Can you afford to put in another year scraping by hand or with some poor, flimsy scraper? Start 1911 right. Send for

FREE TRIAL

The WEBER DOUBLE ACTING Floor Scraper

5 to 10 DAYS

the Weber on trial. Test it out to a "dead certainty" for 5 to 10 days. Put it up against any floor scraper you've ever seen. If its work isn't more profitable to you, return it at our expense.

By Hand
\$1.53
per "square"
With
The Weber
44c

You wonder why I'm so confident. I'll tell you just a few of my reasons. To pull a machine all day becomes unbearably tiresome. The Weber has two movements—forward

and backward—which relieves you of that monotonous "all day" backward movement. Not only that, but you can smooth up uneven joints and remove dark stains easily and quickly because you can see exactly what you are doing, while it enables you to scrape clean across the centers of very narrow rooms.

Other Weber features are a Flexible Frame—which is guaranteed to prevent chattering and waves—Handle and Blade Adjustment—Sander—and Shearing Cut and Bowling Alley Attachments.

Write for Information

about a scraper that has every improvement it should have for perfect work on all kinds of wood floors.

John F. Weber, President, **WEBER MFG. CO.** 661 71st Ave., West Allis, Wis.

O. K.'d BY UNCLE SAM

Washington, D. C. and
Naval Training Station
North Chicago, Ill.

WATSON H. BARBER
Contractor

Installing of Cabinet
and
Joiner Work Specialties

Triple "A" Machine Co., Chicago, Ill.

Waukegan, Illinois, May 26th, 1910,

Gentlemen:—I herein express to you my appreciation for the work and capability of your Triple "A" Floor Surfacing Machine, both as to quantity and quality of the work your machine is capable of doing, as I think I have given the machine a hard test as I had about 2000 squares of oak and maple flooring to dress at the U. S. Naval Training Station, North Chicago, Illinois. This flooring was laid about 4 months before cleaning and was full of grit and dirt from being walked and worked over. This floor had to be dressed so as to pass Government inspection. I had tried different electrical sand paper machines without satisfaction and will say that the Triple "A" Machine is the only one that met the requirements. I would not hesitate to recommend the Triple "A" Machine to any and all that would desire a Floor Surfacing Machine that would do both quantity and quality work.

Yours very truly,

WATSON H. BARBER.

**THE TRIPLE "A"
SPRING-DRIVEN
FLOOR
SMOOTHER**

**STOOD THE TEST
(where others failed)
on 200,000 square
feet of oak and
maple floors of
the U. S. Naval
Training Station.**

Bear in mind that the Triple "A" Spring Driven Floor Smoother is practically a power machine.

Write for circular describing this up-to-date Floor Smoother and Automatic Sandpapering Attachment.

TRIPLE "A" MACHINE CO.

110 S. Clark Street
CHICAGO, ILL.

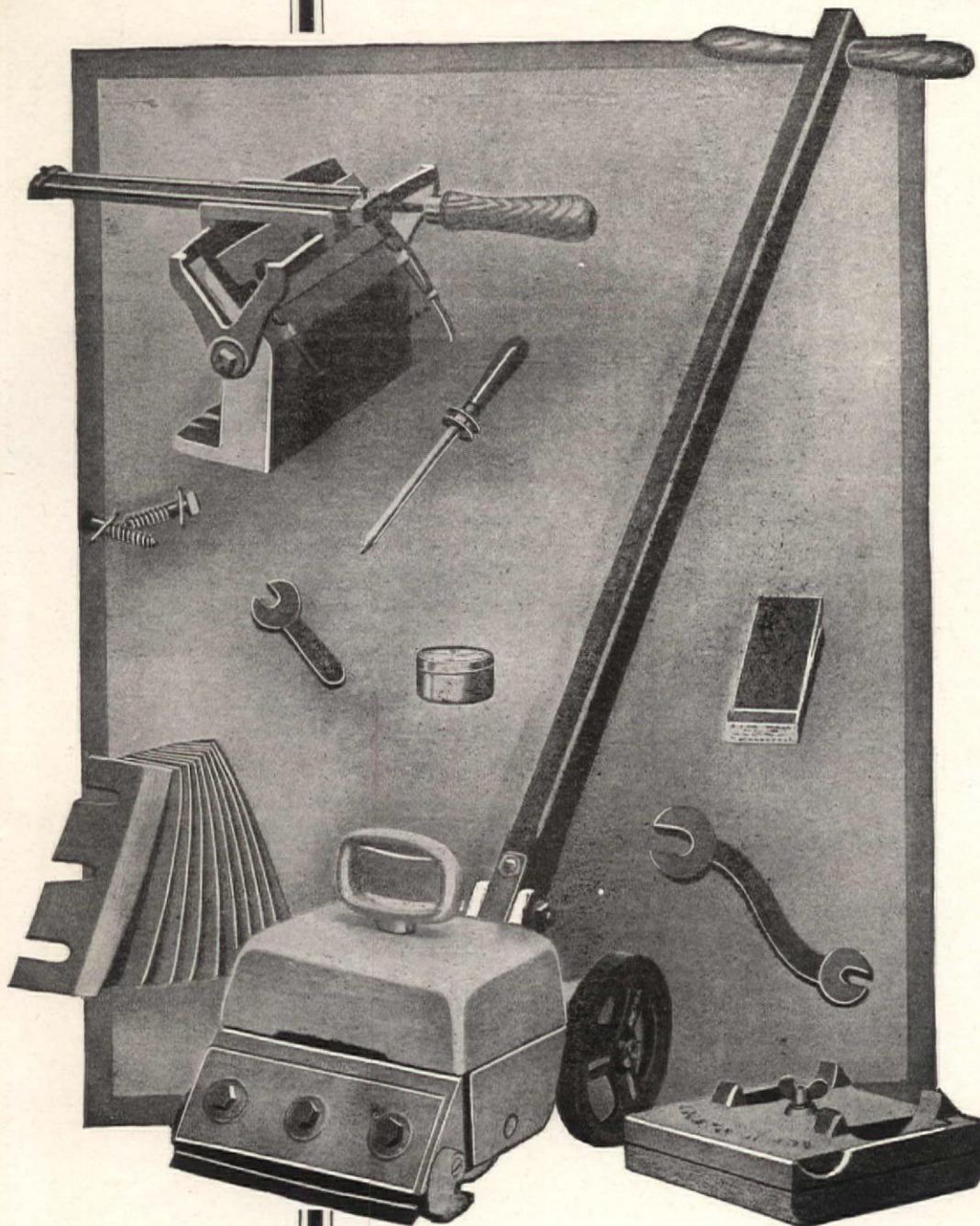


Triple "A" Floor Smoother in operation at Drill Hall, U. S. N. T. S.



PASTE THIS DOME ON LETTERS
THAT YOU WRITE ADVERTISERS.
IT WILL HELP.

Look This Over Carefully



Does this equipment look as though it is simply made to sell or has it the appearance of being constructed to do the work for which it is intended—Floor Scraping?

You can find out very easily and it won't cost you one cent. Just write me that you are ready to do some floor scraping and I will ship the **Acme Floor Scraping Outfit** to you on **One Week's Free Trial**. If, after you have given the machines a thorough test, you do not find them entirely satisfactory, pack them up and ship them back at my expense.

I have been making this **Absolutely Free Trial** proposition for the past three years and thousands of contractors have investigated into it. If you haven't—why not? You certainly want to save 75% of your floor scraping

labor expense, don't you? The **Acme Floor Scraping Outfit** offers the means for you to accomplish this saving.

Bear in mind that I devote my entire time to manufacturing floor scrapers. It is not a side issue with me. I superintend the construction of each **Acme Outfit** and can therefore guarantee it in every particular. You take no chances—I assume all responsibility.

I want to send you booklet and full details of my free trial offer. Write me for them to-day.

JOSEPH MIOTKE

249 Lake Street

Milwaukee, Wis.

PASTE THIS DONE ON LETTERS
THAT YOU WRITE ADVERTISERS.
IT WILL HELP.

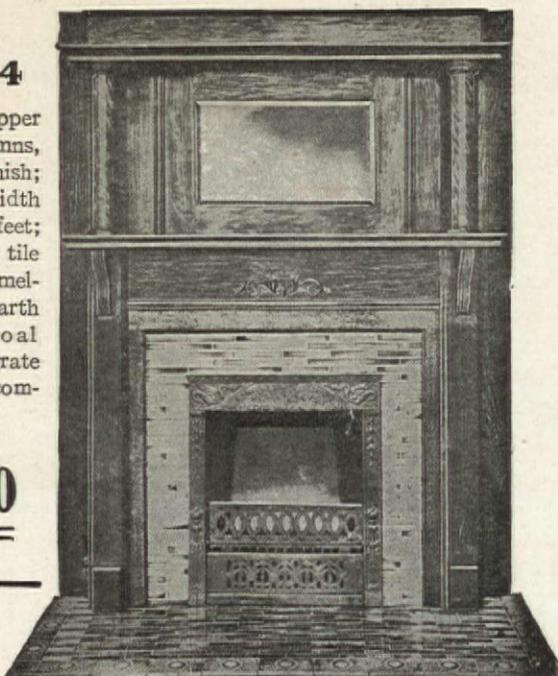


JUST A FEW NEW ONES FROM OUR 1910 LINE

Hornet No. 4

With 3-inch upper quarter-sawed columns, golden oak gloss finish; height, 77 inches; width 4 feet 6 inches or 5 feet; 14x24 bevel mirror; tile opening 36x36, enameled tile facing and hearth and combination coal and wood burning grate with summer front, complete for

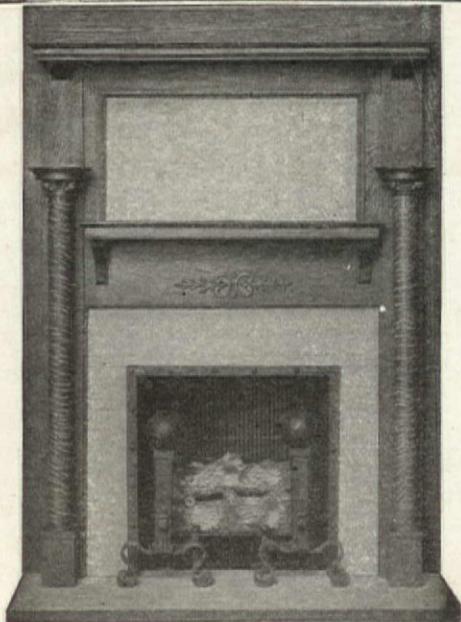
\$22.50



Hornet No. 5

With 3½-inch quarter-sawed oak pedestal columns; golden oak finish; height, 84 inches; width 5 feet or 4 feet 9 inches; 18x36 plate mirror; tile opening 36x39; enameled tile facing and hearth and combination coal and wood burning grate with summer front, complete for

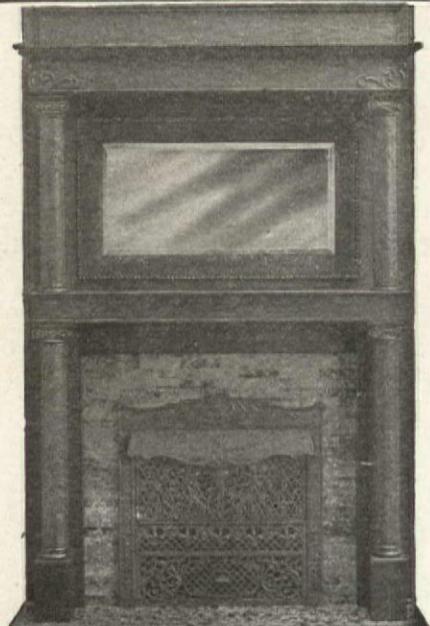
\$25.00



Hornet No. 6

With 4-inch quarter-sawed oak double columns. Made of selected oak or maple, finished imitation mahogany, rubbed and polished finish. Height 7 feet 4 inches, width 5 feet, tile opening 42 inches wide by 39 inches high, projection 3 inches. French bevel plate mirror 36 inches wide by 18 inches high. Enameled tile facing and hearth and combination coal and wood burning grate and summer front, complete for

\$30.00



Subject to 5 per cent discount if order is accompanied by cash. We guarantee these mantels to be as represented. Workmanship and materials first class. Prompt shipment. Furnished in oak or mahogany finish. Write for illustrated catalogue.

HORNET MANTEL COMPANY

Salesrooms: 1143 Market Street, ST. LOUIS, MO

You can see at a glance
what an advantage
you have in the

Round Sharpening Stone



You can use the entire surface of the stone. You get the rotary motion so necessary in the sharpening of chisels, planer irons and so forth—and, as it is made of Carborundum you get the fastest cutting, most efficient sharpening stone on earth

The Round Stone is a combination—medium coarse on one side, fine on the other. It is 4 inches in diameter.

Price *at your hardware dealers or direct.* \$1.00
In Oak Case 1.50

The Carborundum Co.

Niagara Falls, N. Y.



PASTE THIS DOME ON LETTERS
THAT YOU WRITE ADVERTISERS.
IT WILL HELP.

"PUT A STOP TO DEPRECIATION—BUILD WITH CYPRESS AT FIRST"



THE WOOD THAT LASTS
 SHALL BE FIRST with *wise*
CONTRACTORS



By honest and intelligent advice on **woods** we are not only saving losses to people who are going to **build anyhow**—but we are also

CAUSING MORE PEOPLE TO BUILD

This is going to be of more and more benefit to **you** month by month. It is **up to you** to intelligently take advantage of this by **learning for yourself** that **CYPRESS** is not only the **ONE BEST OUT-DOOR WOOD** for the owner—but also the **ONE BEST WOOD FOR YOU**. Cypress "**makes good.**" That helps your reputation. Cypress is easy to work—that's **good for your tools.**

We are giving away complete working plans and specifications for **THIS BUNGALOW**. Many thousands of people **ALLOVER THE U. S.** are writing for them. **THEY WILL HAVE TO GET YOU TO DO THE WORK.**

THEY WILL INSIST on CYPRESS.

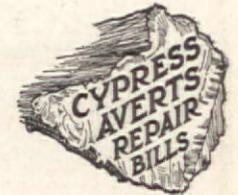
It will be **MONEY IN YOUR POCKET TO HELP THEM GET JUST WHAT THEY WANT.**

CYPRESS

is the "**comer**" in **YOUR** territory. **LISTEN FOR IT.**



(Plan by Henry L. Wilson, Architect, Chicago)



Why not **FIND OUT** what **CYPRESS** can do for **YOU, NOW?**

WRITE US—ASK YOUR OWN QUESTIONS—about your own needs, big or little. You can rely on detailed and reliable **CYPRESS** information if you address our "**BUILDERS' HELPS DEPT.**" We will recommend **CYPRESS ONLY FOR USES WHERE IT IS THE BEST WOOD TO USE.**

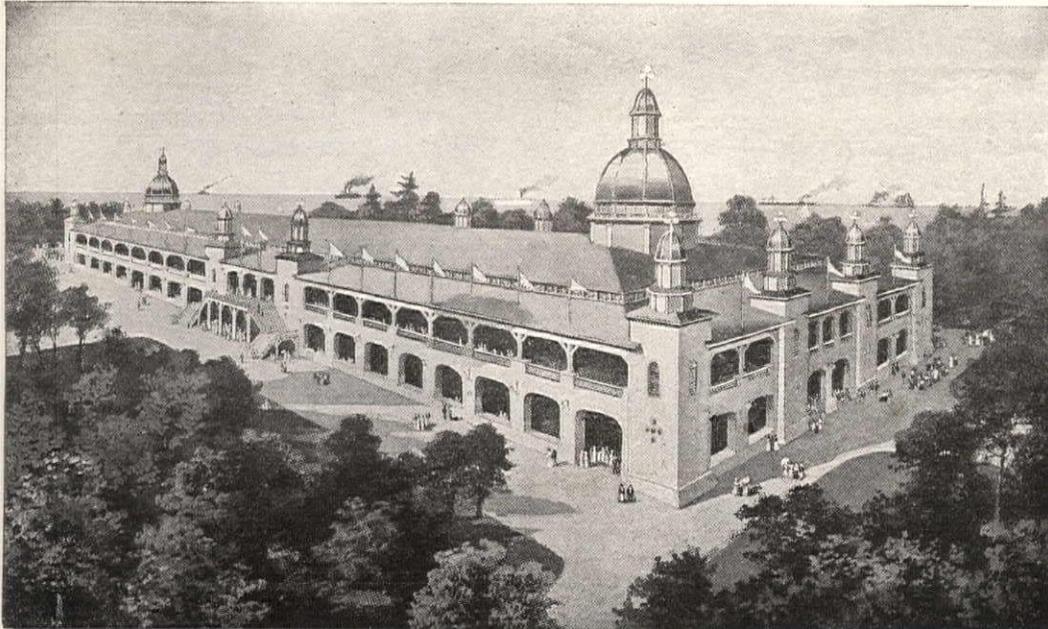
SOUTHERN CYPRESS MANUFACTURERS' ASSOCIATION
 1212 HIBERNIA BANK BUILDING, NEW ORLEANS, LA.

We are *producing* CYPRESS—and *talking it*—but not *retailing it*. **BUY IT NEAR HOME.** *ASK your lumber man if he sells CYPRESS; if he does not, ask him WHY.* **Then WRITE US.** *We will tell you where you CAN get CYPRESS.*

PASTE THIS DOME ON LETTERS THAT YOU WRITE ADVERTISERS. IT WILL HELP.



RED GUM



One of the most successful popular entertainment places in the West is at Cedar Point on Lake Erie.

The Cedar Point Coliseum is the largest building of its kind in the world.

It is an enormous Dancing Pavilion.

The Coliseum is three hundred feet long and one hundred and fifty feet wide—covering an area of 45,000 square feet. The point of particular interest about this building for our purpose is that the floor is built entirely of RED GUM.



They bought it because it was cheap and they like it because it is good.

Anyone planning to build apartment houses, office buildings, hotels, residences or specially designed furniture, should defer final arrangements and correspond at once with any of the following firms regarding samples, prices and lists of important buildings of all types wherein RED GUM has been used with eminent practical success and signal artistic satisfaction:

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|---|--------------------------|
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| THREE STATES LUMBER COMPANY | Memphis, Tennessee |
| CHARLES F. LUEHRMANN HARDWOOD LUMBER CO., | St. Louis, Missouri |
| HIMMELBERGER-HARRISON LUMBER COMPANY, | Cape Girardeau, Missouri |
| LAMB-FISH LUMBER COMPANY | Charleston, Mississippi |
| CARRIER LUMBER & MFG. COMPANY | Sardis, Mississippi |
| BAKER LUMBER CO. | Turrell, Arkansas |

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STAY-LOCKED COLUMNS
DO STAY LOCKED



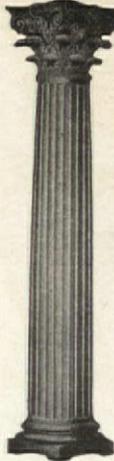
**WE
PAY THE
FREIGHT**

We cater to the careful man, *the man who cares.* Our columns cost him no more than the "don't-care-man" pays for the cheap, sure-to-open-up kind. Without a single exception they are the most beautiful and durable columns made.

THE JOINTS CANNOT OPEN. THAT'S WHY WE GUARANTEE THEM FIVE YEARS.

DESIGN BOOK 6 IS FREE; a postal brings it.

AMERICAN COLUMN COMPANY
BATTLE CREEK, MICH.



**GUARANTEED
5
YEARS**



\$8.50

FOR THIS COLONNADE



As a Specialty Bertelsen

COLONNADE No. 1-2

A VERY LOW PRICE FOR THIS STRICKING NEW COLONNADE

MATERIALS AND WORKMANSHIP FIRST CLASS THROUGHOUT.

DESCRIPTION OF COLONNADE.
SIDE CASINGS AND CAP TRIM NOT INCLUDED
MADE FOR 5 3/4-INCH JAMBS
MADE IN OAK OR YELLOW PINE, IN THE WHITE, HAND SMOOTHED, READY FOR FINISHING

PRICES
ANY HEIGHT NOT OVER 9 FEET.

Style No. 1-2 EACH \$8.50
Columns are 6 inches in diameter, tapering to receive 5-inch compo. cap, pedestals are 20 inches high over all and the width is 24 inches over all, and when set in to receive casings extension from jamb is 18 inches. Top shelf is 10 in. wide.

Style No. 2-2 EACH \$9.00
Same measurements as above, only pedestals are 30 inches wide over all and when set in to receive casings extension from jamb is 24 inches.

SEND YOUR ORDER NOW, DON'T LET IT GET AWAY FROM YOU.

BERTELSEN ADJUSTABLE GRILLE CO. 619 S. CLINTON ST. CHICAGO.



Foster-Munger GRILLES
Are Quick Sellers

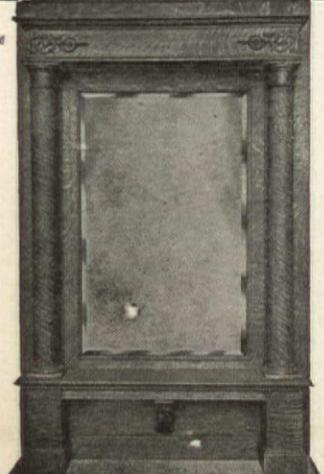
Perfect in symmetry and workmanship—designed by artists—created by master craftsmen.

- All woods selected with special care as to color and grain.
- Each and every detail is turned and finished with the same skill and attention required on the highest grade furniture.
- Superior mechanical equipment enables us to produce a greater quantity and still uphold quality.
- More than a hundred beautiful designs from which to make a selection. Special order designs quickly executed.
- Our prices are as surprisingly low as the quality is high.

Every dealer should have Book 108G—which shows the finest and most complete line of grilles in America; also colonnades, stairs, mantels, wood carpet and parquetry flooring. Mailed postpaid upon request. Write for book 108G—and price list today.

The Foster-Munger Co. Chicago, U.S.A.
AMERICA'S GREATEST SASH & DOOR HOUSE

Another book of interest to dealers—107G—showing 68 choice new patterns in wide stile cottage front doors. Prices about the same as you pay for common doors. Get the book!



Our No. 660

CONSOLES COLUMNS and GRILLES

add to the fine appearance and value of any building. Especially if they are made by us. In quality and price our work is not surpassed.

SEND FOR CATALOG NO. 16

It contains many beautiful designs of Consoles, Columns and Grilles.

You will make no mistake in writing us before ordering elsewhere.

NORTHWESTERN GRILLE WORKS, Office and Showroom 1824 Milwaukee Avenue, Chicago

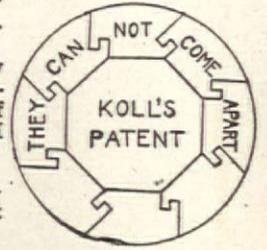
60,000 COLUMNS

at an average of \$5.00 each or 6,000 at \$50.00 each gives you an idea of the annual capacity of our plant.

We own the largest factory building in the world devoted exclusively to the manufacture of high grade COLUMNS and PORCH WORK.

A new and very complete catalogue of COLUMNS will be sent on request. Ask for T-40.

Hartmann-Sanders Company
Sole manufacturers of
KOLL'S PATENT LOCK JOINT COLUMNS
Elston and Webster Avenues, CHICAGO
Eastern Office: 1123 Broadway, New York City
The best columns for porches, pergolas or interior use.



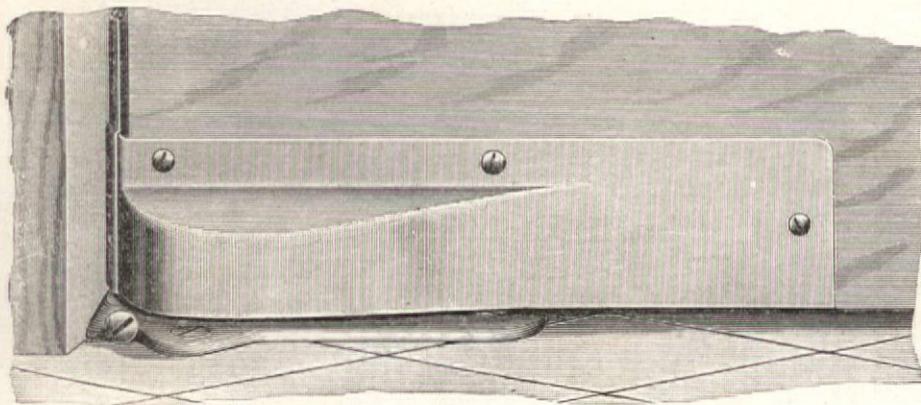
THEY CAN NOT COME APART

KOLL'S PATENT



PASTE THIS DOME ON LETTERS THAT YOU WRITE ADVERTISERS. IT WILL HELP.

“Standard” SPRING FLOOR HINGES



- Double Acting
- All Steel
- Fool-Proof
- Durable
- Simple

“Everlasting service” is not an idle claim but an assured fact with **Standard** Double Acting Spring Floor Hinges. Just a glance at the illustration and a study of the description will convince you how indefinite life is an assured fact. You will be able to see for yourself how our statements of simplicity, durability and compactness are fully borne out by the hinges themselves.

The **Standard** controls doors that swing in both directions. It is absolutely positive in action, moves smoothly and without noise, is adjustable to doors of various weights, holds doors open in either direction and is very easily and quickly applied.

It is of all-steel construction—no malleable or other castings are used at all. The case-hardened ball-bearings and wearing surfaces not only take care of the weight of the door, but the spring thrust too.

Details Upon Request

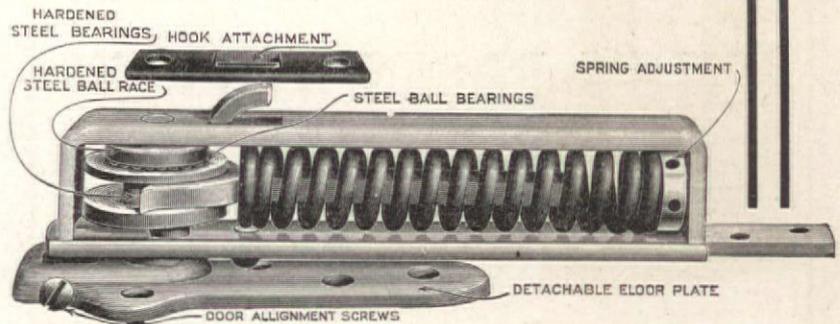
No practical carpenter and builder can afford to overlook the many advantages offered in this wonderful hinge. The unique construction and low price allows it to be used, not only on particular work, but on all work. Send a postcard along today for full particulars—or ask your local hardware dealer to show you one.

The Standard Mfg. Co.
Shelby, Ohio

Notice the alignment feature in the floor plate; this allows a door to be adjusted to its proper position without changing the position of a single screw. This floor plate is flexible on the hinge post to accommodate itself to uneven floor.

Perfect silence in operation is accomplished by means of a short flexible plunger which is not rigidly fixed in the hinge frame, but takes the same side movements as the coil spring.

A hook-attachment obviates the necessity of making a finished mortise up the rear edge of the door when attaching hinge to door. Furthermore, this feature allows the weight of the door to increase the strength of the fastening. Finish plates are applied to the surface of the door with wood screws—after hinge is on. This method covers any defects in cutting the wood in applying the hinge.



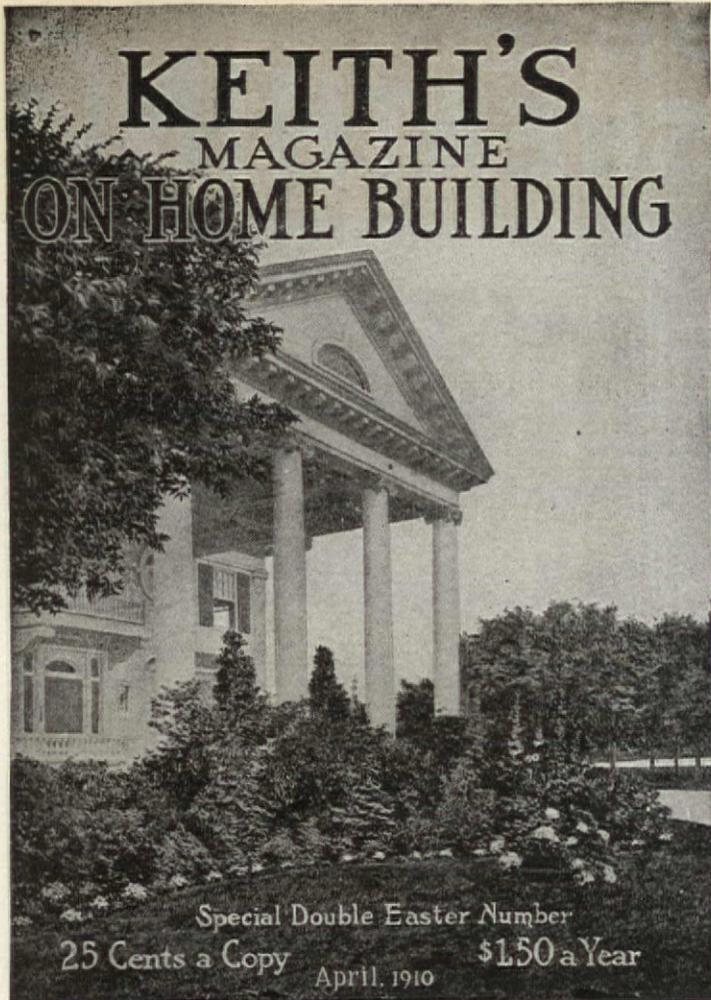
\$10.⁰⁰ For You

We will pay ten cents per word—or ten dollars for one hundred words—to the carpenter or builder who sends us the best argument on why **Standard** Double Acting Spring Floor Hinges are *better* to use than others. This article should not contain more than one hundred words—if it contains less we pay the ten dollars just the same—and should reach our office not later than March 15th. The winning answer will appear in the National Builder later.

We are not looking for a literary masterpiece; all we want is the frank opinion of users—we want to know what your experience has been—how they have satisfied your customers—and how they compare with others. Take a pencil, a piece of paper and ten minutes off, and write us at once. It's very little to do and may earn ten dollars for you.

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THAT YOU WRITE ADVERTISERS.
IT WILL HELP.





The Recognized Authority

EACH issue of 72 to 80 pages is complete with instructive articles finely illustrated by half-tone cuts, artistic designs for moderate cost homes, contributed by leading architects. A year's numbers furnish a splendid variety of strictly new and high class work.

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Send \$2 and I will mail you any one of these \$1 books, enter you for a 1911 full year's subscription to KEITH'S monthly magazine and mail you now 3 recent back sample copies (\$3 value for \$2.)

Any 3 books and a year's subscription \$5.
Fill Out This Coupon and Mail Today

M. L. KEITH, 613 Lumber Exchange, Minneapolis

Dear Sir:

I accept your Special Offer and enclose \$2 for a year's subscription to the well known KEITH'S MAGAZINE on Home Building, with 3 recent sample numbers extra and one of your \$1 books. I have selected from your list, Vol. No. _____, which please mail to me at once.

SIGNED _____

ADDRESS _____

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It enables an **owner** to find out where the leaks are creeping in. It assists the **manager** to maintain a building at a minimum cost and derive a maximum revenue. It aids the **architect** by showing what other successful buildings have installed, the relation of the construction and equipment to the renting. It helps the **real estate agent** to obtain valuable suggestions on renting, leases and advertising for tenants. It gives the **engineer** and superintendent ideas on operating and service.

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PORTER, PATTERSON & CO., Publishers.

Pontiac Building, Chicago

Enclosed please find \$2.00 for which enter my subscription to BUILDING MANAGEMENT for one year, beginning

with issue.

NAME

ADDRESS



PASTE THIS DOME ON LETTERS THAT YOU WRITE ADVERTISERS. IT WILL HELP.

BISHOPRIC WALL BOARD AND SHEATHING

ANY WEATHER is "Good Building Weather" when you use Bishopric Wall Board as a substitute for lath and plaster. It is cheaper and better and does away with all delays in building. It is nailed to studding dry, ready for immediate application of paper, paint, burlap, or any other kind of decoration.



Bishopric Wall Board Easily Applied

This substitute for lath and plaster is made of kiln-dried, dressed lath, imbedded in hot Asphalt Mastic, surfaced with sized cardboard and cut at the factory into 4x4 ft. sheets, which are easily and quickly nailed to studding, ready for immediate application of wall paper, paint, burlap, or other decoration.

It is applied dry, is guaranteed not to swell, shrink, warp, crack, flake or blister; is clean, sanitary, and odorless; is proof against moisture, cold, heat, and vermin; saves fuel in winter and keeps out summer heat; also deadens sound.

It is suitable for dwellings, factories, new partitions in old buildings, finishing attics, porches, laundries, cellar ceilings, garages, etc.



Applied Dry
Winter or
Summer

Shows Construction of Bishopric Wall Board.

PRICE AND SHIPMENT—Crate of 16 sheets, covering 256 square feet of surface, \$6.40 per crate, or \$2.50 per 100 square feet, f. o. b. New Orleans, La., Cincinnati, or Alma, Mich. We ship from nearest point.

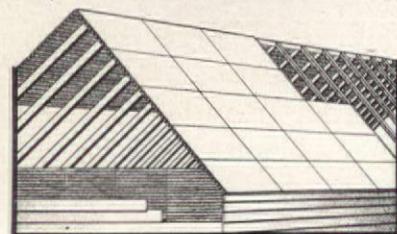
Cheaper Than Lumber.
Saves 75% on Labor.
Does away with Building Paper.

BISHOPRIC SHEATHING

Ideal Material for Cement Buildings or Stucco Exteriors. Proof against Dampness.

Bishopric Sheathing is made of same materials as Wall Board, but finish is not necessarily so fine, therefore costs less. It is of uniform thickness, insuring a perfectly even surface when applied.

Bishopric Sheathing is nailed to studs, with lath and asphalt side exposed. Over laths, weather boards are nailed or cement applied.



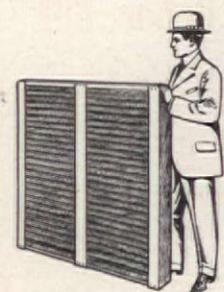
Shows Bishopric Sheathing over rafters ready for Bishopric Roofing, also Weather-boards over Bishopric Sheathing.

Bishopric Sheathing makes a more solid and substantial wall than lumber. There are no gaping joints; no widening cracks due to shrinkage; no knot holes.

The Asphalt Mastic in Bishopric Sheathing is a non-conductor, moisture cannot penetrate it. It is proof against vermin. The pests cannot bore through the tough, gummy Asphalt Mastic. In applying weather-boards over the laths, dead air space is left between the laths forming splendid insulation. Does away with the expense of building paper and cost of its application.

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

The cost of applying Bishopric Sheathing is but \$2.50 per 1,000 feet—A SAVING OF ABOUT 75 PER CENT. Furthermore, 1,000 square feet of wood sheathing covers but 750 feet of surface, 20% less being due to tongue and groove. In Bishopric Sheathing 1,000 square feet covers 1,000 square feet of space.



Wall Board and Sheathing are shipped in crates.

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

Bishopric Sheathing insures comfort during the construction of the building. As soon as the building is closed in with Bishopric Sheathing, the men may work in comfort on the inside during bad weather, finishing the outside on suitable days. This insures continuous work, without loss of time, enabling the contractor to hold his men and complete the work in the least possible time.

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

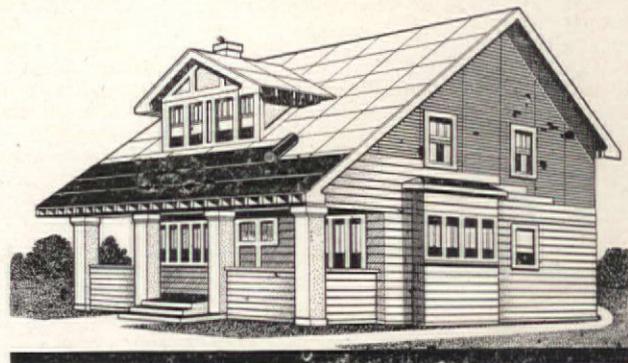
ITS MANY USES—Bishopric Sheathing also is used with excellent results as a lining for dairy barns, ranch houses, poultry houses, driving stables or any out-door building where protection from the elements, Summer or Winter is desired.

Bishopric Sheathing is the ideal material for cement buildings or stucco work. Cement firmly adheres to the laths and Asphalt Mastic and makes a solid, smooth exterior. For factory or residence this form of concrete or stucco construction is the cheapest and best known.



Shows construction of Bishopric Sheathing. Arrows point to Asphalt Mastic into which laths are imbedded.

PRICE AND SHIPMENT—Crate of 16 sheets, covering 256 square feet of surface, \$6, or \$2.35 per square of 100 square feet, f. o. b. New Orleans, La., Cincinnati, or Alma, Mich. We ship from nearest point



Ideal home showing Weather-boards over Bishopric Sheathing, lath side exposed, also Bishopric Roofing over Bishopric Sheathing. (smooth side of sheathing exposed)

Write for Descriptive Booklet and Samples of Bishopric Wall Board, Bishopric Sheathing and Bishopric Roofing—All will be sent free.

THE MASTIC WALL BOARD AND ROOFING MFG. CO.

27 East Third Street, CINCINNATI, O.

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THE NATIONAL BUILDER

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Wm. C. A. Stevenson } Associate Editors.
Louis Muller

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Volume 52

CHICAGO, JANUARY, 1911

Number 1

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Stanley Tools

This Company is the largest producer in the world engaged exclusively in the manufacture of Carpenters' and Mechanics' Tools.

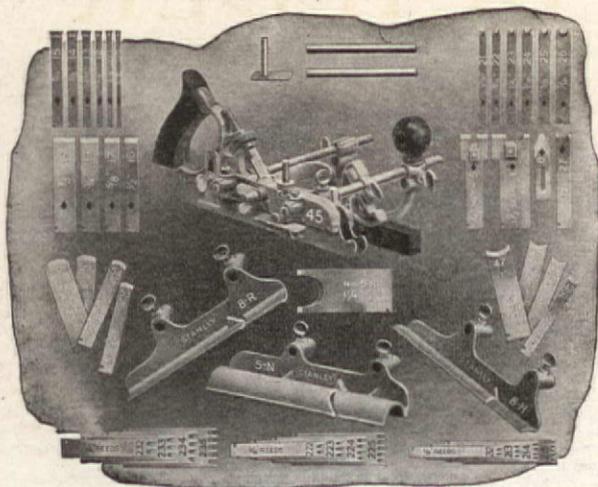
Stanley "45" Plane

This tool is regularly furnished with twenty cutters. Extra Reading cutters as shown in cut, can be furnished at slight additional cost. By substituting specially formed detachable bottoms, also shown in the cut, special cutters known as "Hollows," "Rounds" and "Nosing Tool," can be worked.

Every tool we manufacture is guaranteed as to workmanship and material.

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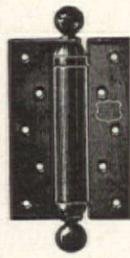
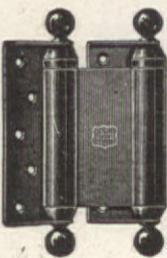


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Bommer Spring Hinges are sold by all Hardware Dealers

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IF SO, No Sash Pulley Can be Classed with the

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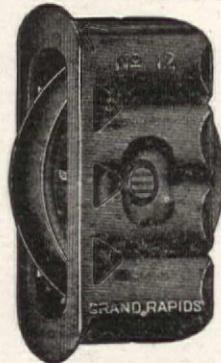
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or bore four holes with a single bit and it's done.

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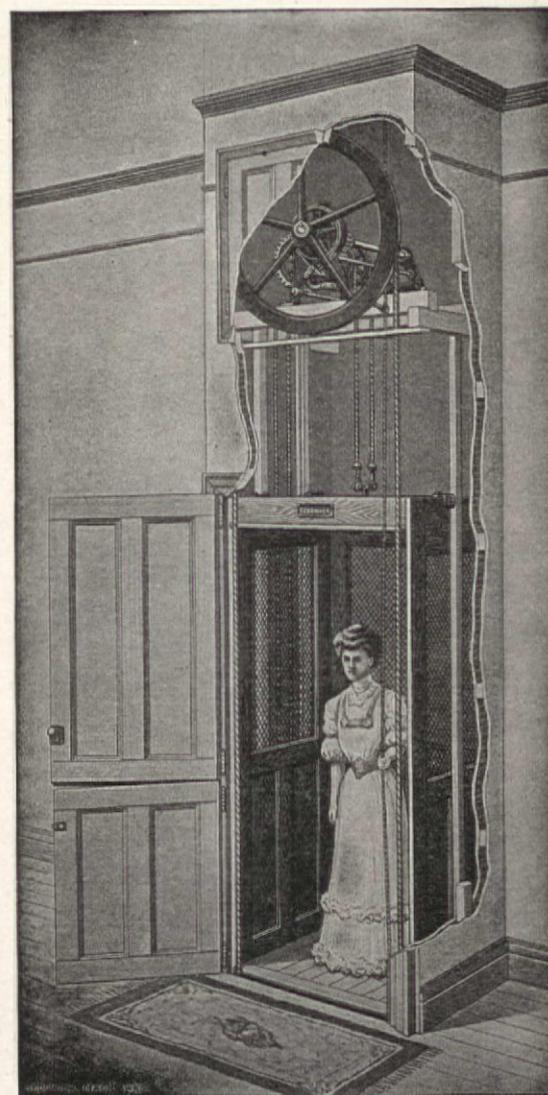
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GRAND RAPID MICH.

Quadruple Bit Price \$5.00
 Can not be used in a hand brace



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for all purposes

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Sedgwick Machine Works

130 Liberty St. New York

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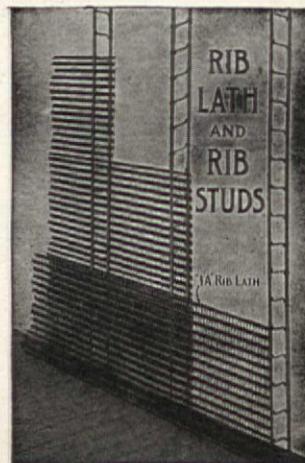
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Does away with weakening of walls by floor joints. Saves labor in building. Avoids cutting and weakening of timbers.

Trus-Con Joist Hanger is made from open hearth steel and is proven by actual tests to be the strongest on the market.

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For Hollow Partitions—Sound-proof, damp-proof, and economical. Rib Studs are open for passage of conduits.

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Use Hy-Rib for solid partitions, walls, floors and roofs.

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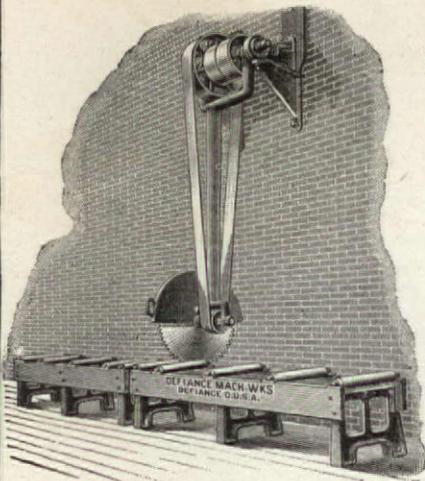


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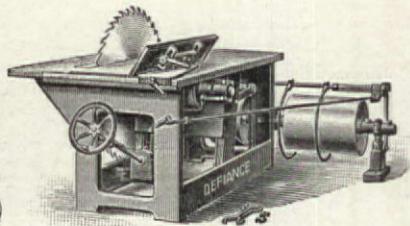
"DEFIANCE WOOD WORKING MACHINES" are the trustworthy kind for producing hubs, spokes, rims, wheels, wagons, carriages, automobile wheels and bodies, shafts, poles, neckyokes, single-trees, hoops, handles, spools, bobbins, insulator pins, table and chair legs, balusters, oval wood dishes and general wood work.

THE DEFIANCE MACHINE WORKS
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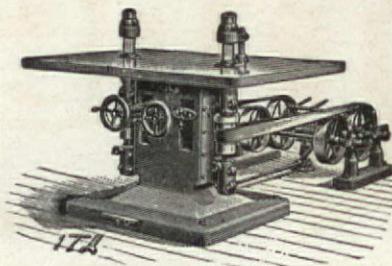
WRITE FOR QUOTATIONS, CATALOGUES OR ANY INFORMATION REQUIRED.



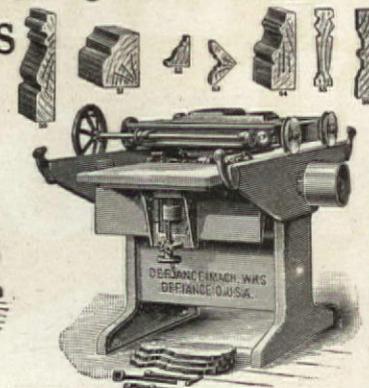
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No. 9 HEAVY RIP SAW

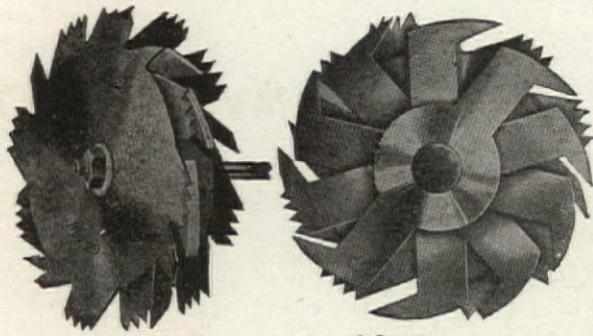


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HUTHER BROS. PATENT GROOVER OR DADO HEAD
WILL SAVE COST IN THREE DAYS USE



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are at liberty to return at our expense. We also make a specialty of concave ground smooth cutting Mitre Saws, for either rip or cross cut; Grooving Saws for all kinds of special work; Lock Corner Cutters, Concave Saws, Etc.

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For cutting any width groove from 1/8" to 2" or over. Will cut a perfect groove, either with or across the grain, and leave edges smooth. Will ship to any responsible firm on ten days' approval; if not satisfactory you

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The FIRST and ORIGINAL COMBINATION of Circular Saw, Jointer and Band Saw, ever placed on the market.

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Each machine is sold separate or can take a circular saw and add to it all desired.

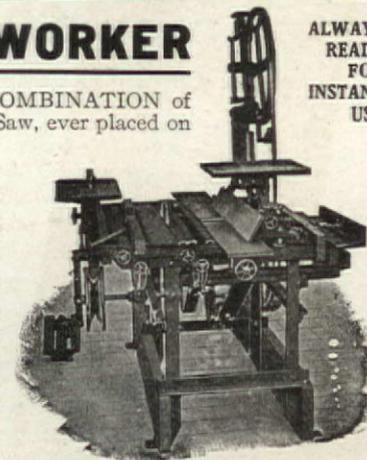
The long base best arranged for Portable Use with engine attached.

BUY from the ORIGINATORS and LEADERS in improvements and you will be sure to get the best

Our Ball Bearing Machines are the greatest improvement ever made in Foot and Hand Power Circular and Band Saws.

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Write for Catalog and Prices.

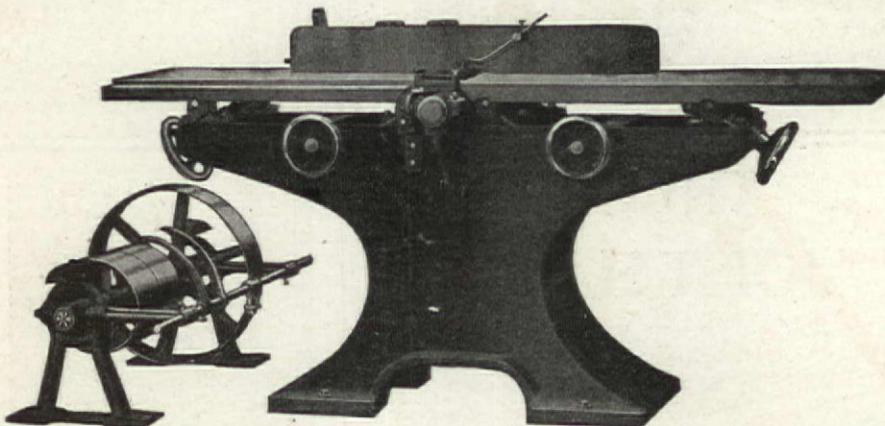


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PROTECT YOUR FINGERS
by using a CRESCENT Jointer with Safety Head

The knives in CRESCENT Safety Heads are made of high speed steel which will hold an edge longer and turn out better finished and more work than can be done on a common jointer with ordinary knives. You may crowd the machine to the limit and the quality of work will be just the same as though you hadn't crowded it a bit.



The price of these splendid machines is very reasonable considering the very high quality of the machines and the enormous amount of accurate work they are capable of turning out.

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Vulcanite Roofing



The Samples Tell The Story SEND FOR THEM

We might easily fill page on page of this publication telling you about the merits of Vulcanite Roofing. We could dilate on its permanency—on its fire-and-water-proof qualities—on the fact that it will not freeze or crack in winter nor crumble in dry weather.

We could describe its construction in a technical way—cite the results of experimental and pile up the favorable testimony of actual users who declare that Vulcanite is the best of all composition roofings—could enumerate the

high awards Vulcanite has won at expositions, and show you why it costs more to make than any other roofing of its kind.

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That's why we ask you to

Follow The Arrow and Fill Out The Coupon.

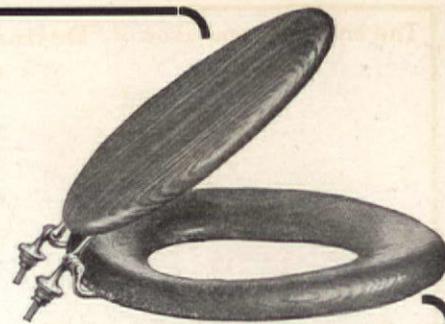
Patent Vulcanite Roofing Co.
Chicago, Ill.



Patent Vulcanite Roofing Co., Chicago, Ill.

Please send us sample of your Vulcanite Roofing and descriptive literature.

Don't Install Trouble-Making Wooden Seats and Tanks



You know that wooden seats and tanks are made in many pieces and glued, bolted or wired together—that they are constantly warping, opening up and falling to pieces. Wood is porous and absorbs moisture and foul odors, so can never be made sanitary. Wooden tanks swell and throw fittings out of adjustment.

J-M Sanitor Seats and Tanks

eliminate all these troubles because they are moulded in one solid mass from specially treated wood fibre. They are absolutely unaffected by moisture, so cannot swell, warp or fall apart like wood.

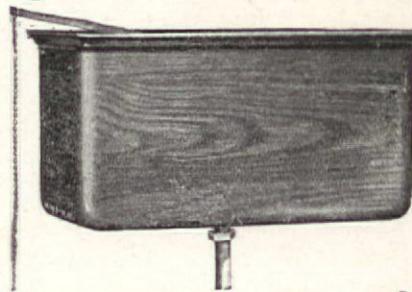
Tanks never swell or throw fittings out of adjustment. Are non-absorbent, therefore do not harbor germs or vermin, so cannot spread disease. **Are absolutely sanitary.**

They are finished equal to wood and have a lustre that is far more lasting.

In some places seats and tanks made of this material have been in continuous service from 16 to 20 years and are practically as good as new.

Write nearest branch for booklet and sample of Sanitor material.

H. W. JOHNS-MANVILLE CO.



Manufacturers of Asbestos and Magnesia Products

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Asbestos Roofings, Packings, Electrical Supplies, Etc.

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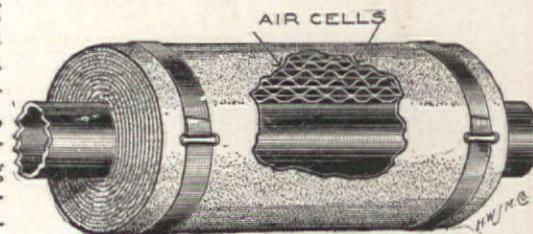
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Toronto, Ont. Montreal, Que.
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Improperly Covered Steam Pipes Cause Fires

The following which appeared in a recent issue of a leading engineering magazine, shows the importance of covering steam and hot water pipes with a fire-proof covering, to prevent them setting fire to building:



J-M ASBESTOCEL

"If the contact of wood with a heated surface is continued sufficiently long, the temperature of a few degrees only above the boiling point of water is enough to produce a semi-carbonized film on the wood, which will start smoldering at a very low temperature. The heat arising from an oil or gas flame some distance away is sufficient to start the smoldering combustion. The temperature of a steam or hot-water pipe has often been found sufficient to cause ignition, due probably to the long continued heat generating certain hydro-carbons of low ignition point, which remain occluded in the pores of the semi-charred wood and are there brought into close contact with the occluded oxygen. In fact, a constant draught, or even a sudden rush of air, coming in contact with highly carbonized wood is sufficient to cause serious conflagration."

J-M Asbestocel Pipe Covering is made of Asbestos and cannot burn. It is not only a positive protection against fire from heated pipes, but the most efficient and durable Pipe covering on the market. A postal request will bring the report to you.

Write Nearest Branch for Sample and Booklet.

H. W. JOHNS-MANVILLE CO.

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PASTE THIS DOME ON LETTERS THAT YOU WRITE ADVERTISERS. IT WILL HELP.





I. For Ripping.

Carpenters! Builders!

Our new foot and hand power Circular Saw No.4, the strongest, most powerful and in every way the best machine of its kind. For ripping, cross-cutting, boring, grooving, dadoing etc

Solid Iron Table Planed Perfectly True.

COUNTERSHAFT IF DESIRED.

Send for Our New Catalogue



III. With Universal Mitre Gauge.

Foot and Hand Power Machinery, Lathes, Scroll Saws, Formers, Mortisers, Tenoners, etc.

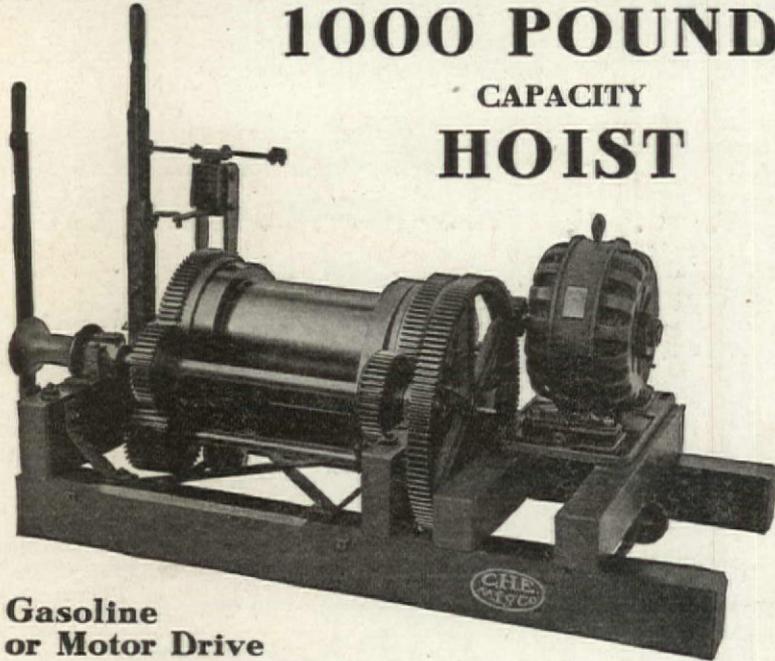


II. For Cross Cutting.

W. F. & JOHN BARNES CO.

436 Ruby Street, ROCKFORD, ILL.

1000 POUND CAPACITY HOIST



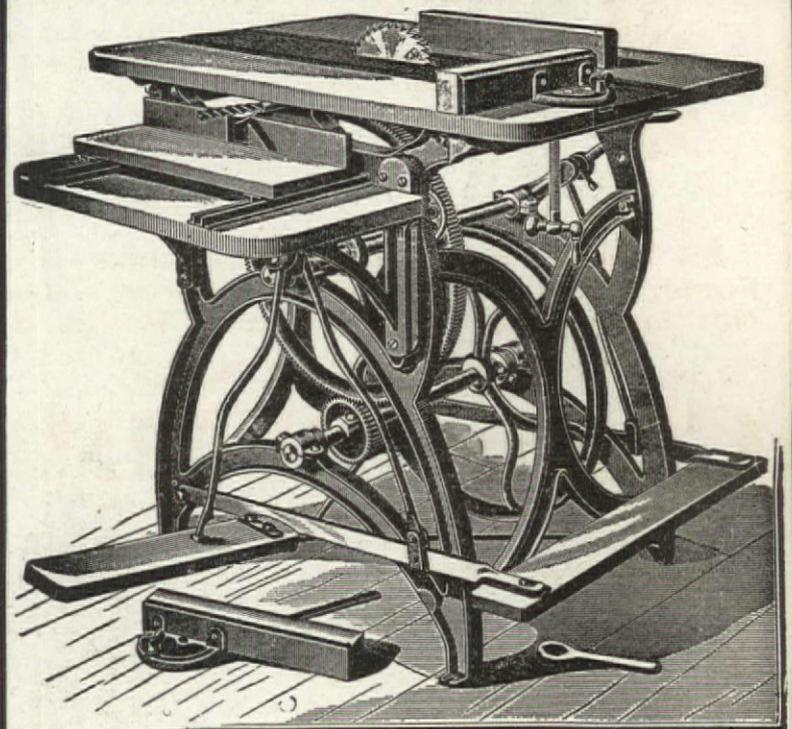
Gasoline or Motor Drive

The "C. H. & E." 1000 Pound Capacity Double Acting Builders' Hoist for carpenter and mason contractors, to hoist lumber, brick and mortar. Six horse power water cooled engine or motor drive. Lifting capacity 500 pounds at 350 feet per minute; 1,000 pounds at 200 feet per minute. All gears machine cut, all shafts turned and ground, all bearings babbited. Entire outfit simple, noiseless and reliable.

WRITE FOR ATTRACTIVE FOLDER AND PRICE.

C. H. & E. Manufacturing Co. Inc.

319 Mineral St., MILWAUKEE, WIS.



MARSTON'S Hand and Foot Power CIRCULAR SAW

Iron frame, 36 inches high. Center part of top is made of iron accurately planed with grooves on each side of saw gauges to slide with grooves on each side of saw for gauges to slide in. Steel shafts and best babbitt metal boxes. Gears are all machine cut from solid iron. Boring table and side treadle. Two 7-inch saws and two crank handles with each machine. Weight, complete, 350 pounds.

SEND FOR CATALOG

J. M. MARSTON & CO., 193 Ruggles Street, BOSTON, MASS.

Are You Still Depending on the Planing Mill

to supply the finished material used in your business?

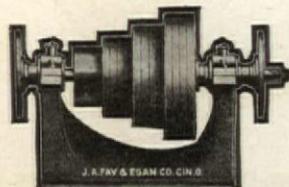
Why not do your own mill work and save the loss of time in waiting on planing mills and other inconveniences?

You will not only realize a great saving in time and expense in employing a few woodworking tools, but an enlargement of your business and an increase in profits.

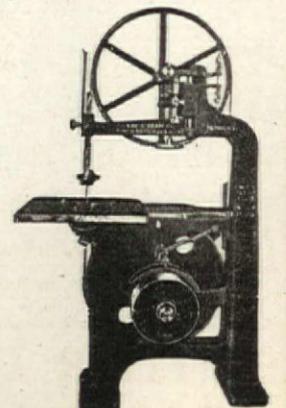
The two machines illustrated herewith will be found a good investment. With a Lathe and Scroll Saw you can turn out an almost endless variety of special decorative woodwork, such as corner blocks, balusters, etc., and various wood novelties.

These machines are inexpensive and will pay for themselves in a short time.

Let Us Tell You More About Them in Our Large Illustrated Circulars



Victor Wood Lathe



No. 155 Band Scroll Saw

J. A. FAY & EGAN CO., 327-347 W. Front St. CINCINNATI, OHIO



PASTE THIS DOME ON LETTERS THAT YOU WRITE ADVERTISERS. IT WILL HELP.

6 Months Free Trial



This Luther Diamond Tool Grinder sharpening outfit will help any shop, factory, contractor, or any carpenter, mechanic or tool user to earn more money. This is exactly what we want you to prove by six months' free use of this **genuine Luther Carborundum Grinder** shop and factory outfit. We want tool users generally to try out this outfit for six months free—to sharpen every kind and as many tools as possible free for six months, and then, if you are not fully satisfied that this outfit is a big money-maker for you, send it back at our expense. Send back the coupon at the

bottom of this page for particulars of 6 months' Free Trial, and special offer on shop and factory outfit, also Free booklet about Carborundum.

25 Times Faster Than Grindstones—6 Times Faster Than Emery—Will Not Draw Temper—Not Emery Called by a Fancy Name, But

GENUINE CARBORUNDUM WILL NOT DRAW TEMPER

Carborundum is a wonderful sharpening substance. There's nothing else like it, or near like it in the world. Nothing except the genuine diamond itself is so hard. In fact, Carborundum is made of artificial diamond crystals, actually **created** in the terrific heat of electric furnaces at Niagara Falls, which fuses the elements of real diamonds into hard, sharp, beautiful carborundum crystals. In this **utmost** heat, far beyond the measurements of science, in which fire brick melts and runs like butter, Carborundum crystals get a temper and sharpness that cuts hardest steel as emery does copper. Wheels actually made of genuine South African diamonds would sharpen tools no quicker. And all this speed and ease of tool sharpening is done **without danger of drawing temper from tools, and with no need of cooling with water.** Grindstones and emery wear steel away; frictional heat caused by the necessary heavy contact draws the temper. But Carborundum cuts steel away without frictional heat, **peeling off** tiny shavings of hardest steel at lightest touch.

No need of heavy pressure, no water cooling needed, no danger of drawing temper if it is **genuine Carborundum.** And you can be highly suspicious of anything described as we have described Carborundum, but called by any name other than Carborundum, no matter how fancy the name. There is only one Carborundum; there is nothing else like it.

SEND COUPON TODAY FOR 6 MONTHS' FREE TRIAL OFFER

Often you work with dull tools because it's not easy to sharpen them. This outfit makes any sharpening the work of only a few minutes. Keen, bright tools mean faster work every moment of the day, and that means **more money made,** to say nothing about the time saved in sharpening and the money saved, because there is no danger of drawing temper, and all your tools will last longer. The Carborundum wheels will outlast any number of emery wheels or any other abrasive. We guarantee the wheels for five years. But don't take our word; let the outfit itself prove all this in your own shop, on your **own** tools. If you don't want it after six months' free test, send it back. The six months' use will cost nothing.

Send back the coupon today and get our liberal Free Trial offer, also interesting story about the discovery of Carborundum, reprinted from McClure's Magazine.

RETURN THIS COUPON

LUTHER GRINDER MFG. CO.
55 Madison Street - - MILWAUKEE, WIS.

Special Offer on Shop Outfit LUTHER DIAMOND TOOL GRINDER

This genuine Carborundum Sharpening Outfit is a remarkable value—the most liberal, reasonably priced outfit ever offered. It provides for every kind of sharpening, buffing and polishing work. The coupon below will bring you our Six Months' Free Trial Offer, and Special Outfit Offer, also a reprint of an interesting article from McClure's Magazine about Carborundum—the wonderful abrasive, made of artificial diamonds.

READ WHAT OTHERS SAY ABOUT THIS GRINDER:

"Our machinist is very much pleased. He tells us that he ground a chisel on this tool grinder in two minutes which would have taken an hour on the grindstone."
W. H. Sears, Pentwater, Mich.

"Enclosed find remittance for grinder which I find to be as good as recommended."
S. Schrantz, Stonington, Ill.

"In many respects I like the machine better than a power machine, since its speed can be varied instantly at will."
Elwood Haynes, Pres. Haynes Automobile Co., Kokomo, Ind.

"The grinder has been placed in our work room and proves satisfactory. I heartily recommend it."
George Leonard, Pioneer, Ohio.

"We consider your Mechanics Special the best thing on the market for grinding tools. It will give us pleasure to recommend the grinder to our friends."
MacLean & Carrick, Palmer, Mass.



10 TOOLS IN ONE

The Mechanics' Special Shop Outfit, on which we are making this special offer, embraces ten sharpening appliances. The special attachments make it easy for even inexperienced persons to do difficult grinding, such as twist drills, chisels, etc. The outfit consists of one Mechanics' Special, with the following accessories:

WILL NOT DRAW TEMPER

1. One rough genuine Carborundum wheel
2. One fine genuine Carborundum wheel
3. One Chisel grinding attachment
4. One twist drill attachment
5. One buffer
6. One polisher
7. One genuine Carborundum oil stone
8. One genuine Carborundum hone in leather case
9. One genuine Carborundum sickle stone
10. One foot power attachment

BUILT LIKE A HIGH GRADE LATHE

The Luther Mechanics' Special, forming the basis of this shop and factory outfit special offer, is built substantially for a lifetime of service. The genuine Carborundum wheel will not get lopsided. The Mechanics' Special is built with steel and malleable construction—dust-proof, bronze bearings—machine parts run in bath of oil—machine cut spur gears—speed 2,500 revolutions per minute. It will stand the severest, hardest service, out-wear and give better service than any number of emery wheels, grindstones, or anything else.

- A.—Twist drill attachment to give twist drills proper angle and clearance.
- B.—Bronze Bearing. C.—Chisel Sharpening Attachment.
- D.—Spur gear cut from solid steel.
- E.—Large spur gear machine-cut, oil bath.

Return the Coupon Below for Six Months' FREE TRIAL OFFER



COUPON

Luther Grinder Mfg. Co., 55 Madison St. Milwaukee:

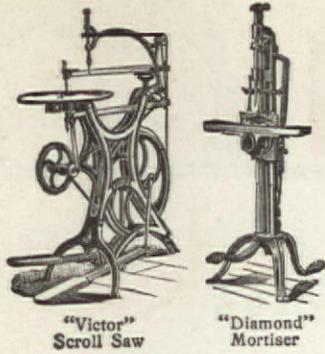
Gentlemen: At no obligation, please send Six Months' Free Trial Offer on Shop and Factory Outfit. Also interesting booklet about Carborundum. This coupon does not mean that I will buy; it simply means I want full details, and does not obligate me in any way.

Name _____

Address _____

PASTE THIS DOME ON LETTERS THAT YOU WRITE ADVERTISERS. IT WILL HELP.





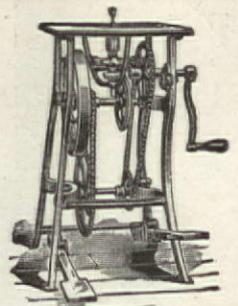
"Victor" Scroll Saw

"Diamond" Mortiser

FOOT, HAND AND POWER WOOD-WORKING MACHINERY

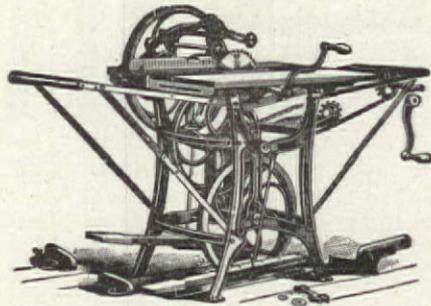
FOR CARPENTERS, BUILDERS, CABINET-MAKERS AND OTHER WOOD-WORKERS

Built for Hard Work, Accurate Work and Long Service



"Rex" Moulder

ONE MAN with one of these machines will do the work of four to six men using hand tools; will do it easier, will do it better.



"Union" Combination Self-Feed-Rip and Cross-Cut Saw

WE GUARANTEE each machine to be thoroughly practical and accurate. Machines sent on trial, and if not found entirely satisfactory, may be returned at our expense.



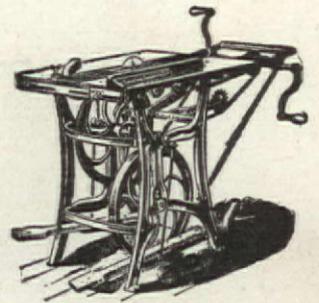
No. 8 "Union" Power Saw

Enterprising mechanics are quick to see the superior merits of our machines. It will pay you to investigate these advantages.

Send for Catalog "A"

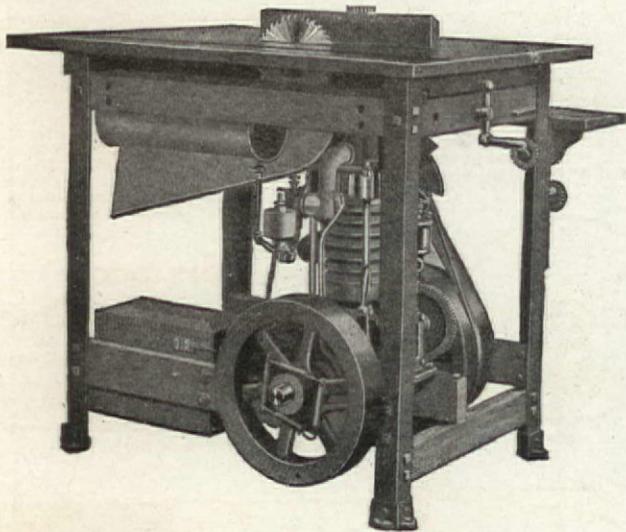
The Seneca Falls Manufacturing Co.

629 Water Street, Seneca Falls, N. Y., U. S. A.



No. 6 "Union" Combination Saw

Have You Investigated The Grimm Woodworker?



Type A with Gasoline Engine. Weight 400 lbs.

NINE MACHINES IN ONE

- | | |
|-------------------------|-------------------------|
| 8-inch Rip Saw | Moulder (8 prs. knives) |
| 8-inch Cross Cut Saw | 10-inch Sander |
| 6-inch Dado Head | 4-inch Jointer |
| Boring Machine (3 bits) | Jig Saw (3 blades) |
| Two Emery Wheels | |

Progressive building-contractors are fast coming to realize the importance of substituting practical machines for hand labor. The **Grimm Woodworker**, furnished with either gasoline engine or electric motor and combining so many important attachments in one machine, is undoubtedly one of the greatest time, labor and material savers yet brought out.

Write for descriptive booklet and our attractive selling plans.

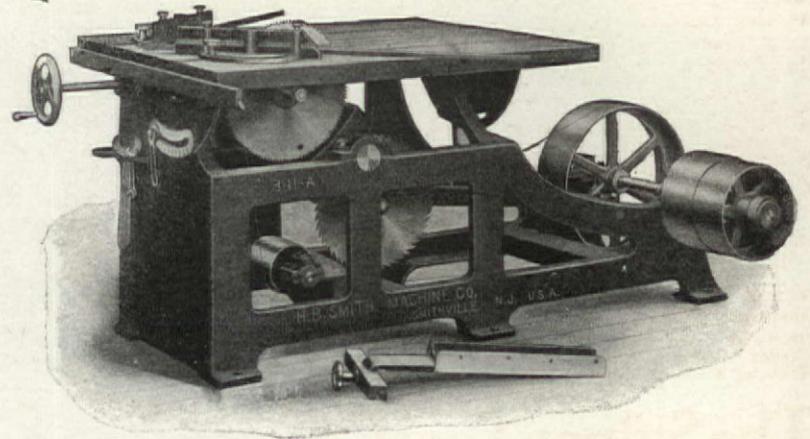
Grimm Manufacturing Company

42 Erie Street, Buffalo, N. Y.

New Combination Saw Bench

Made By

Smith of Smithville



The above cut represents our **New Double Arbor Universal Saw Bench**, adapted for cross-cutting, ripping or grooving, due to the fact that it is fitted with two arbors, the one arbor being fitted with a rip saw and the other a cross-cut saw or dado head as may be desired, and by a few turns of a hand wheel either saw can be brought into operation while the machine is in motion. The table tilts for bevel sawing and is fitted with cross-cutting, slitting and mitre gauges.

For further particulars concerning this or any other wood-working machines, address

H. B. SMITH MACHINE CO. SMITHVILLE N. J. U. S. A.
NEW YORK CHICAGO ATLANTA MEMPHIS



PASTE THIS DOME ON LETTERS THAT YOU WRITE ADVERTISERS. IT WILL HELP.

FAMOUS Universal Woodworkers

The FAMOUS JUNIOR for \$150.00 is the greatest offer in Woodworking Machinery ever made

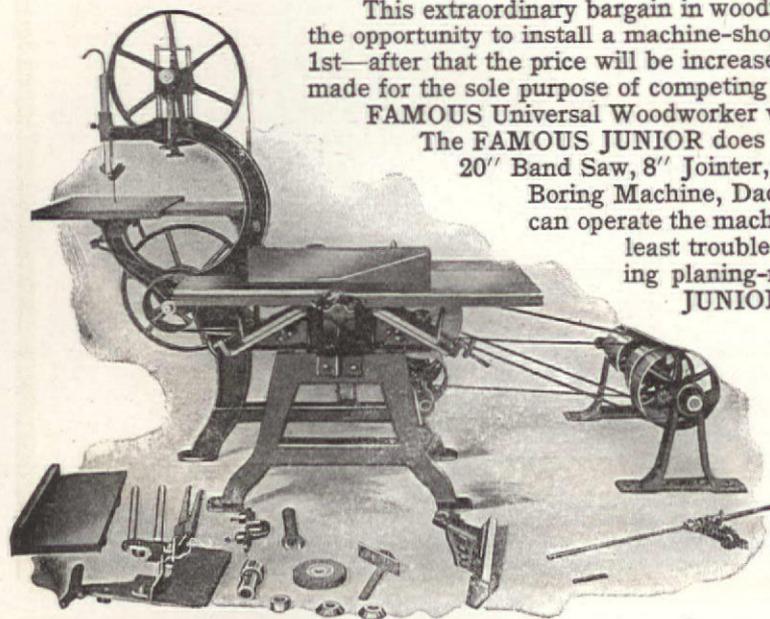
This extraordinary bargain in woodworking machinery gives every carpenter, builder and contractor in America the opportunity to install a machine-shop for the total investment of \$150.00. The offer holds good until February 1st—after that the price will be increased. The present low price is about 50 per cent below the usual cost; it's made for the sole purpose of competing with inferior machines, and to convince the trade how much extra profit a FAMOUS Universal Woodworker will put in their pocket.

The FAMOUS JUNIOR does eight different kinds of work, and embodies the following eight machines: 20" Band Saw, 8" Jointer, Felloe Rounder, Emery Grinder, Saw Table with raising or lowering arbor, Boring Machine, Dadoing Machine, Vertical Shaper. One man, with no previous experience, can operate the machine; there is nothing complicated, nothing to wear out, nothing to cause the least trouble. It means an end to the planing-mill bugbear, because in addition to saving planing-mill bills, there is the saving in time and trouble. Buying a FAMOUS JUNIOR is like putting money in the bank—only the dividends are bigger.

Half Price—Until February 1st

Hundreds upon hundreds of contractors have already taken advantage of our "half-price" offer. You have a clear month to make your application and to lay the foundation for a more profitable business. The year of 1911 will be a busy one for contractors and builders—prepare to meet it by installing the FAMOUS JUNIOR. Think of it—a complete machine-shop for only \$150.00 (there are positively no extras).

The FAMOUS JUNIOR is for hard service. We guarantee it—not for a year but for LIFE. Doesn't matter how long you have it, our guarantee is always good. No other manufacturers of woodworkers in the world can afford to make such a sweeping guarantee. But we know what the FAMOUS JUNIOR IS. We know how strong it is—how simple in construction and operation, and how it will live up to its guarantee. Yet the total outlay that you are called upon to make is \$150.00. And then we sell on trial and will take time payments



The FAMOUS No. 14 is an Ideal Woodworker for Contractors' Use

While our FAMOUS JUNIOR is the best universal woodworker on the market today for small contractors and builders, this No. 14 FAMOUS is unquestionably the most satisfactory for carpenters, builders and contractors who have a large amount of millwork done, and a great variety, as on the one machine SIXTEEN DIFFERENT KINDS OF MILLWORK CAN BE DONE, SIMPLY BY MAKING A FEW SIMPLE ADJUSTMENTS.

The No. 14 FAMOUS Universal Woodworker is, without the shadow of a doubt, the most unique piece of woodworking machinery, and the greatest time and labor saver, ever invented. On the one base are embodied the following sixteen wood-working machines:

- | | |
|---|--|
| 1. 27" Band Saw | 9. Single End Tenoner |
| 2. 12" Jointer | 10. Drum Sander |
| 3. Saw Table with raising and lowering Saw Arbor | 11. Disc Sander |
| 4. Single Spindle Shaper | 12. Knife Grinder |
| 5. Boring Attachment arranged on Special Boring Spindle | 13. Emery Grinder |
| 6. Pony Planer | 14. Band Re-saw |
| 7. Tongue and Pole Rounder | 15. Spoke Tenoner, Rim Borer and Wheel Equalizer |
| 8. Hollow Chisel Mortiser | 16. Adjustable Felloe Rounder |

Send for Literature

We have special literature telling all the details and will be sent free upon request. Don't think you do not need a woodworker—you DO. Don't think you cannot afford a FAMOUS woodworker—because you CAN. Once you get the machine installed it will pay for itself each month—and save money in the bargain. Write for literature at once—before you do another thing.

The Sidney Tool Co.
Sidney, Ohio

Canadian Agents

THE A. R. WILLIAMS MACHINERY CO.
Front Street, TORONTO, CANADA

THE A. R. WILLIAMS MACHINERY CO.
57-61 Alexander Street, VANCOUVER, B. C.

THE A. R. WILLIAMS MACHINERY CO.
260 Princess Street, WINNIPEG, CANADA

WILLIAMS & WILSON
320-328 St. James Street, MONTREAL, CANADA

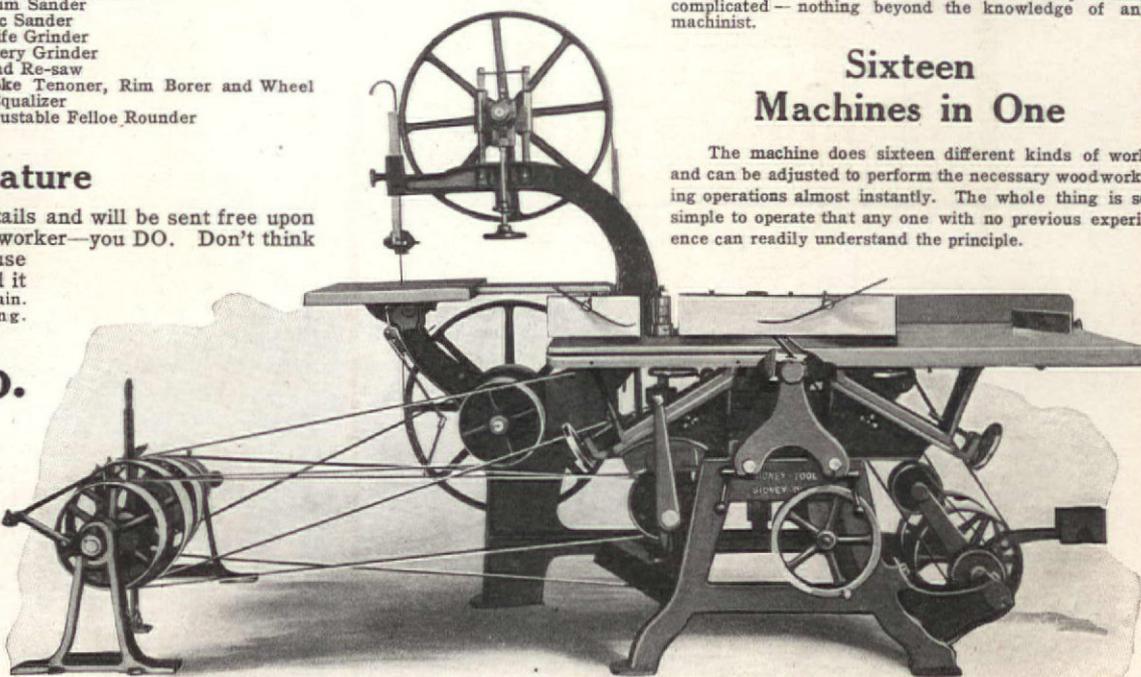
RECORD SALES FOR 1910

Over five hundred contractors bought FAMOUS woodworkers during the past year; over a thousand will buy during 1911. We have never had a machine returned for repairs—we have never had an unsatisfactory report. Such a record points to a machine possessing REAL MERIT—a proposition which every contractor should inquire into.

Think what it means to install a machine that does the work of sixteen. Consider the saving in initial cost—in ultimate cost—in power transmission equipment—in floor space—in time—in labor. And remember that we guarantee the machine for life. Only the highest quality materials obtainable are used; the durability is wonderful. Yet, notwithstanding the adaptability of the machine there is absolutely nothing complicated—nothing beyond the knowledge of any machinist.

Sixteen Machines in One

The machine does sixteen different kinds of work and can be adjusted to perform the necessary wood-working operations almost instantly. The whole thing is so simple to operate that any one with no previous experience can readily understand the principle.



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THAT YOU WRITE ADVERTISERS.
IT WILL HELP.

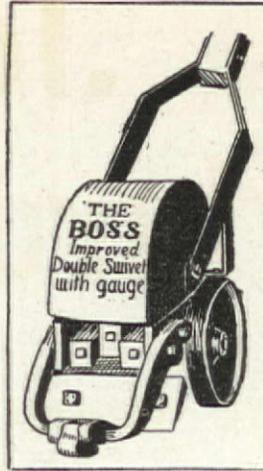




Samson Spot Sash Cord

IS made of extra quality fine yarn, and warranted free from imperfections of braid or finish. It can always be distinguished by our trade mark, the Colored Spot. Carried by all dealers. Send for samples and tests.

Samson Cordage Works
BOSTON, MASS.



The Boss Improved Floor Scraper

Has double swivel allowing the knife to be set in any position. Gauge can be set for any thickness of shaving and keeps knife from making depressions in floor. Gives knife double support. The pear-shaped wheel which is in the gauge is attached to the gauge in front so that when the scraper is let down to take shaving, it lets the knife down gradually, and prevents the knife from making a deep cut. With this gauge and wheel attachment, the knife will leave no mark. Impossible to do poor work. Adjustment simple—positive. Gauge can be removed instantly. Sanding attachment. Prices very low. Write for descriptive circular.

GEORGE J. KEPPLINGER
DWIGHT, ILLINOIS
Adv. Dept. B.



Makes any angle, allows for settling of building—keeps windows from frosting. The most beautiful, practical and durable bar in the world. Made in metal.

"Holds with a grip of iron, yet with a touch of velvet." Glass set from the outside. More good features explained in our catalog—*it's fine*—send for a copy before you build or repair. Write today.

VOLTZ MFG. CO.

1101-1103 S. 8th Street, St. Joseph, Mo.

Full Line of Plumbing Supplies



Sold Direct at Wholesale Prices

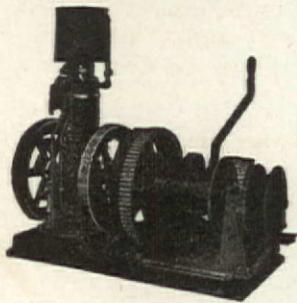
20 to 40 per cent Saving

Complete bath room outfits—tubs, closets, lavatories, kitchen sinks, etc. Prompt shipment from a complete stock. The only house selling up-to-date, guaranteed goods at wholesale direct. Write for illustrated catalogue and prices.

B. Y. KAROL, 768-72 W. Harrison St., Chicago, Ill.

Material Hoists

For Double Platform Elevators



SIMPLE, STRONG, DURABLE

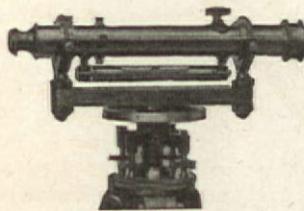
The most economical method for elevating building material. Two sizes, 4 and 6 horse power.

Contractors send for Bulletin No. 5 and get our proposition.

Also a full line of engines from 1 to 35 horse power.

Bates & Edmonds Motor Co.
1146 MILL ST., LANSING, MICH.

IMPROVED LEVEL



THE newest and most accurate level for CARPENTERS, BUILDERS, ARCHITECTS and CONTRACTORS

Every instrument is absolutely guaranteed.

Write today for descriptive circular and get details of the special introductory offer we are now making.

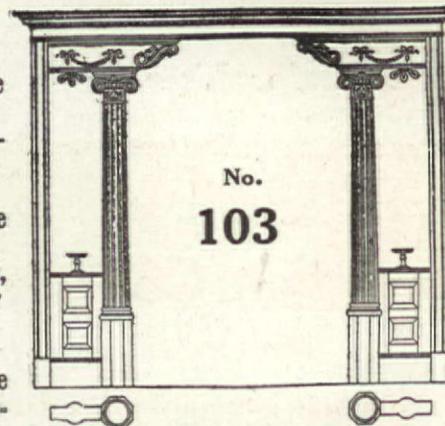
DAVID WHITE CO.

421 East Water Street

MILWAUKEE, WIS.

CHICAGO GRILLE WORKS

During the month of February we will fill all orders reaching us accompanied by Post Office or Express Money Order, New York or Chicago Exchange, for \$18.00 for the opening herein shown, our No. 103, in plain red oak, birch, yellow pine or cypress, in the white.



OUR LEADER

Put in a six months' supply—
This chance will not come again

No orders will be filled at this price unless accompanied by Cash. REMEMBER

FEBRUARY

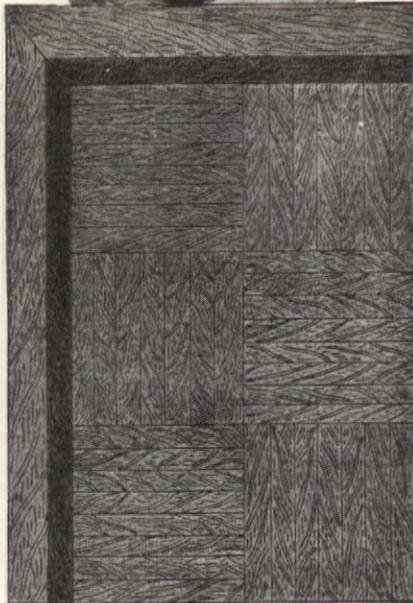
838 WELLS STREET, CHICAGO, ILL.



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Johnson's Hardwood Floors



Parquetry No. 60, Laid Straight.

are recognized by authorities as the most elegant and highclass floors on the market. If you are interested in hardwood floors you cannot afford to be without our new Illustrated Floor Catalog containing the latest original designs. Mail us the coupon below today, and get it FREE.

You See

Every Johnson Hardwood Floor is the product of 20 years' close attention to the manufacture of fine hardwood floors.

Every Johnson Hardwood Floor is of the most carefully selected stock from the woods of Wisconsin, Michigan and Minnesota, which our location gives us special advantages in obtaining.

Every Johnson Hardwood Floor is cured and finished with the utmost caution in every detail by the world's most skillful workmen who have been in our employ for years.

Every Johnson Hardwood Floor is absolutely guaranteed to be first-class. We stand back of it with our reputation.

Please note the three floor designs in this advertisement, and the following prices on same:

Parquetry No. 60. 12 x 12 inches.
Plain Oak, 13c sq. ft.
Quartered Oak, 18c sq. ft.

Parquetry No. 811. Oak.
Maple and Cherry, 42c. sq. ft.

Border No. 721. 16-inch. Oak and Dark Oak.
60c lineal ft. Corners \$1.00 each.



Parquetry No. 811.

We have hundreds of other beautiful designs in our catalogue

Any good carpenter can easily lay our floors over old floors.

We have just published our new Illustrated Catalogue of Ornamental and Plain Hardwood Floors. It is the most elaborate and complete catalogue of its kind, and should be in the hands of every Carpenter and Builder, and others interested in



Border No. 721.

floors. It contains valuable information about floors—Ornamental, Plain and Parquetry—and about different kinds of wood. Please fill out coupon below, mail and we will send catalogue FREE. Write today.

S. C. JOHNSON & SON RACINE, WIS.

"The Wood Finishing Authorities."

FREE
COUPON

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

Without any obligation on my part, please send me FREE (prepaid) your illustrated catalogue of Ornamental and Plain Hardwood Floors.

Name.....

Town and State.....

N.B. 1

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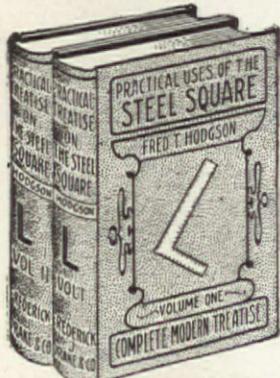
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PRACTICAL BOOKS FOR THE BUILDING TRADES

THE STEEL SQUARE—TWO VOLUMES. A PRACTICAL TREATISE ON THE USES OF THE STEEL SQUARE. By Fred T. Hodgson. 600 Pages, 500 Illustrations.

Two Vols., Cloth Binding. Price.....\$2.00
 Single Vols., Part I, Cloth. Price..... 1.00
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Mr. Hodgson was the first—as well as the last—person who has written on this important tool, and the two volumes now issued contain the earliest and the latest up-to-date methods of applying the STEEL SQUARE for the solution of the many problems this wonderful instrument can solve when in capable hands. The two volumes, named herewith, contain about all that is possible to be done with the square, that is of practical value to the workman, and, as they show nearly all the simple, as well as the difficult things, that can be accomplished with the aid of this tool, there will be little trouble for the workman to work out any minor problem that may confront him, if it is within the purview of the tool. In short, the two volumes contain all that can now, or hereafter, be accomplished with the square. They are profusely illustrated with diagrams, and explanatory sketches, which cover the whole ground of steel square practice. Two volumes of the greatest possible value to the young carpenter.

BUILDERS' ARCHITECTURAL DRAWING SELF-TAUGHT. By Fred T. Hodgson. F. A. I. C. 336 Pages, 250 Illustrations and 18 Folding Plates, 12mo, Cloth Binding. Price.....\$2.00



This work is especially designed for carpenters and for students of architecture, woodworkers and others who desire to learn drawing at home, and who have not the means, time or opportunity of taking a regular course in school, or college, nor of availing themselves of the offers made by one or other of the "Correspondence Schools."

The work commences with a description of drawing instruments and accessories, with rules for using them, and hints as to their care and management. Rules for laying out simple drawings and executing same are given, and the student is taught step by step to draw to scale, first the plans, next the elevations, and finally the details of a cottage, including foundations, walls, doors, windows, stairs and all other items required for finishing a small building complete in every particular.

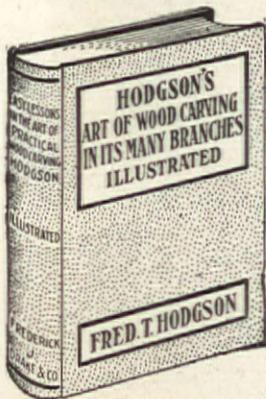
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As every mechanic employed in the building trades must necessarily have some knowledge of architecture, a book of this kind will be found by him to be a great assistance in acquiring such knowledge without a great expenditure of effort. A part of this work has been for years a sort of text-book in schools where architecture is taught, and is a catechism to some extent. The questions and answers are easily understood and as easily remembered.

The second part of the book deals more particularly with architectural styles, while the first part is mostly devoted to the classic orders, Greek and Roman. Full explanation of the latter styles are made, and illustrations show these styles and give a brief history of their growth and decay.

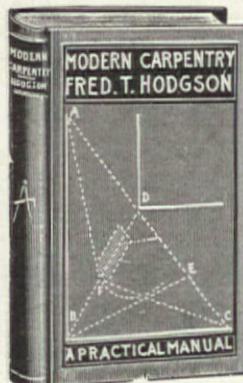
EASY LESSONS IN THE ART OF PRACTICAL WOOD CARVING. By Fred T. Hodgson, F. A. I. C. 284 Pages, 200 Illustrations, 12mo, Cloth Binding. Price.....\$1.50



This work, "Easy Lessons in Practical Carving," is prepared in the same happy, easily understood style of writing that has made the name of the author so famous among the working men of English-speaking countries.

The lessons given in this new book begin at the very beginning of carving and lead the young workman by easy steps through the mazes of the art, until he is able to turn out work of a creditable character. The use and care of carvers' tools are given and explained, and the tools described and shown in illustrations, with methods of sharpening and honing the tools, in a clear and interesting manner. All necessary appliances are shown, described, and illustrated, both for holding the work, and for preparing the tools and finishing up the carvings. The various styles of carving are fully explained, such as flat carving, chip carving, incised carving, scratch carving, figure carving, carving in relief, round carving and jewelry carving.

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This volume contains some examples of work, with a description of the way the work is performed, and the materials employed. Many very difficult problems are here shown and the solutions and explanations are given and fully explained, many things that at first seem formidable to the unpracticed workman, become quite easy of solution under the magic wand of the author's method of explanation.

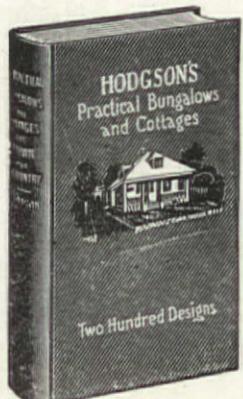
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This is an excellent work for the young carpenter who is ambitious of becoming an expert in hand-railing and stairbuilding, inasmuch as it commences at the very beginning of the art, and shows how to lay off a stair on the floor, placing the newels, laying off treads and risers, strings, winders, wells and flyers.

The object of the author is to lead the student step by step, in such a way that he takes in the whole art of stairbuilding before he is aware of it. This is decidedly the best and most practical work on stairbuilding in the market, and just what the untrained workman wants. The part of the book devoted to handrailing exhibits three different methods of laying out and working handrails suitable for any kind of stairs, straight, circular, elliptical, or for stairs with landings, doglegged, newels, or cylinders. These systems of handrailing have been taken from the best sources on the subject, and have been revised and edited in the most careful manner.

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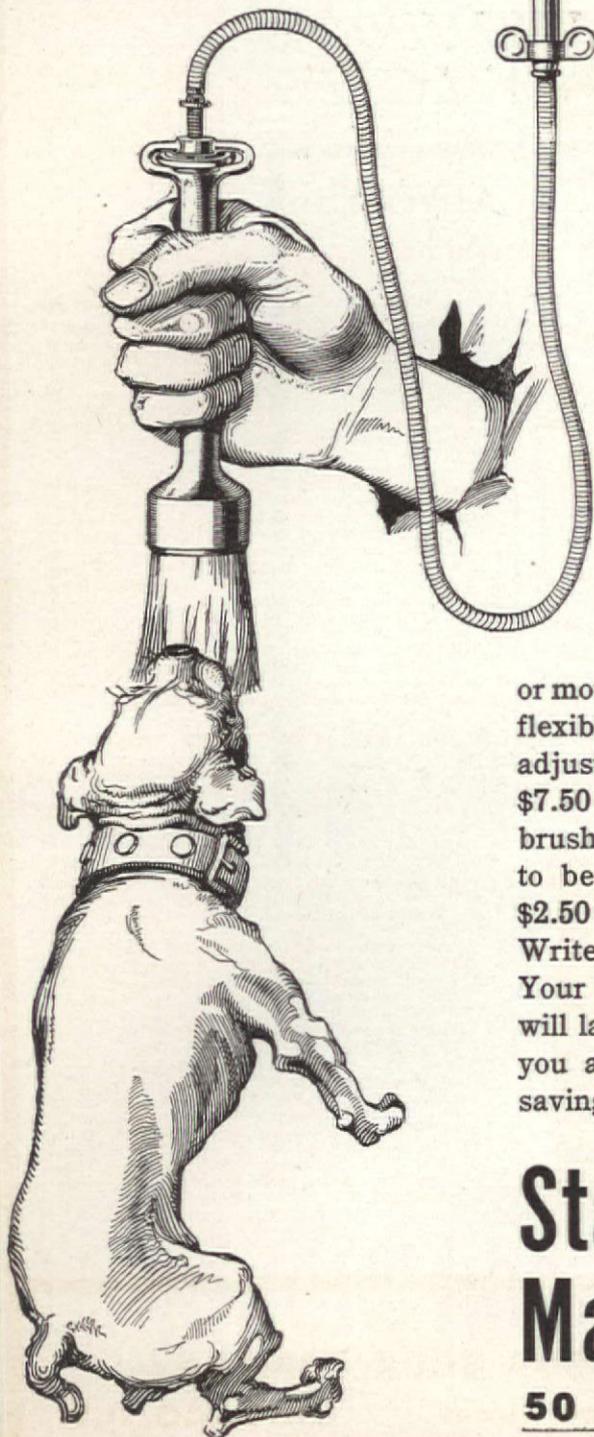


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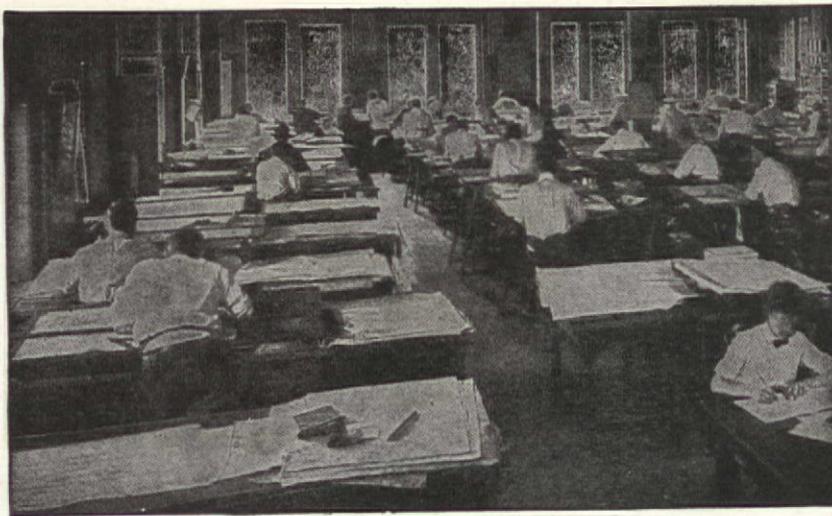
No carpenter is first-class and competent unless he is an A-1 Draftsman in addition. Without this knowledge he can never rise any higher and will remain only a Carpenter paid by the hour or day.

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Where draftsmen Draw from twenty-five to seventy-five dollars per week

GOOD DRAFTSMEN IN DEMAND

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than ever. The immense amount of building which is going on and the increasing demand for more and larger structures, gives the man with actual drafting room experience splendid opportunities for steady employment at high wages, besides the chance for advancement. There is no class of men who make better architectural draftsmen than the carpenter and contractor.

The experience gained by actual work on all kinds of buildings makes it much easier in studying and also in holding a responsible position afterwards. No employer cares for diplomas—neither does he care or will pay big wages to just a mere copier. What the employer wants today is originality and prac-

tical ability, and this requires practical training. The quickest and best way to be trained on practical drafting room work and to get the required practical experience is to receive personal and individual instruction from a high grade practical man at the trade, with a reputation as the most experienced man in training men to become competent and successful draftsmen.

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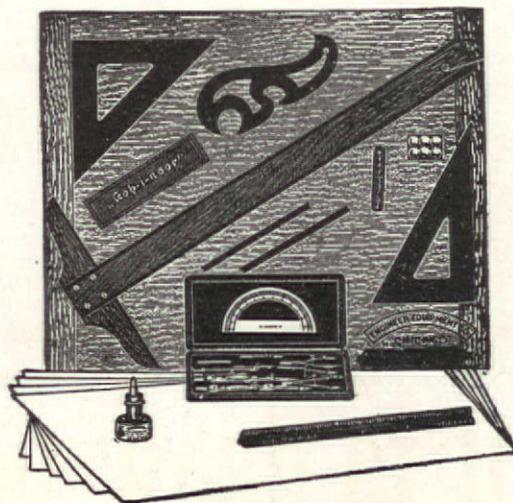
edge that is understood and will stick forever. A special gift that 99 out of 100 do not have.

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Mr. Dobe has been an advertiser in this paper for a good many years and will send his "Successful Draftsmanship" prospectus, 6 by 9, also list of open draftsmen positions and full information free. His advertisement appears on last page of this paper. Anyone interested should write to him.



Mr. F. B. Dobe



This Outfit, value \$13.85, furnished free by Mr. Dobe to his students

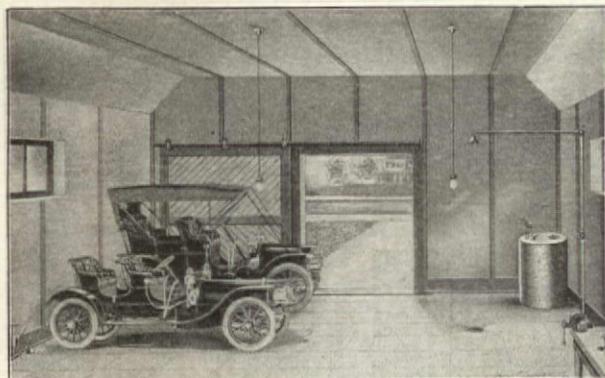
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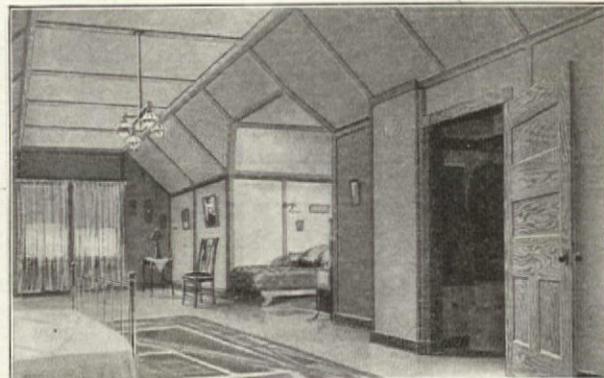
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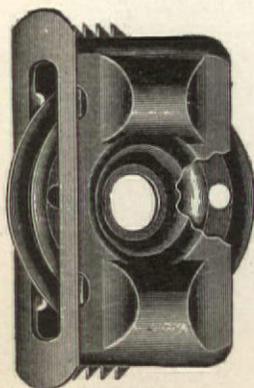
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Cabot's Shingle Stains, Waterproof Cement Stains, Waterproof Brick Stains, Conserve Wood Preservative.

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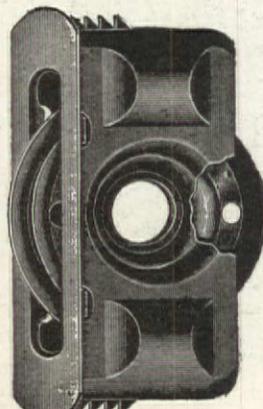
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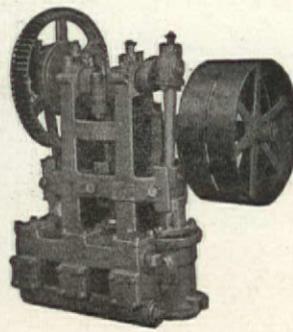
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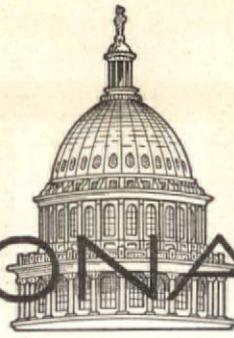
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THE NATIONAL BUILDER



Vol. 52

CHICAGO, JANUARY, 1911

No. 1



THE RUSSEL HOUSE

NATIONAL BUILDER DESIGN No. 337

Built at Omaha, Neb., I. P. Hicks, Architect

For Floor Plans, Elevations and Details, See Supplement of This Number. Estimated Cost, Architect's Fees Not Included, \$8,671.00

THE RUSSEL HOUSE

A house of stately design recently built at Omaha, Neb., is shown in the supplement sheet this month. The feature that dominates the design is the front portico with classical columns running through two stories by which the design strongly favors the colonial. The dip of the roof at the eaves is another prominent feature of the exterior.

The photograph shows the sweep of the porch along the left side to the large bay window of the sitting room from which access is had to the side steps of the porch.

The exterior is of siding and the roof is shingled. The first floor plan contains the reception hall with seat and stairway to the second floor; a colonnade opens into the parlor from which the sitting room is entered through sliding doors. The dining room is accessible from both the parlor and sitting room. In the second floor are five chambers and the bath room. The house throughout is very conveniently arranged and contains all manner of accommodations not found in the ordinary house. The roof plan is one that is unusually difficult to frame, and it is the subject of an illustrated article in this number, which will interest many readers.

ESTIMATE OF RUSSEL HOUSE*

By I. P. HICKS

| EXCAVATING AND MASONRY. | |
|--|----------|
| 330 yards excavating, 35c..... | \$115.50 |
| 9 yards broken stone, \$2.50..... | 22.50 |
| 6 yards stone chips, \$2.25..... | 13.50 |
| 28 barrels Portland cement, \$2.00..... | 56.00 |
| 14 yards sand, \$1.50..... | 21.00 |
| 46 lineal feet 12x12 flue lining, 40c..... | 18.40 |
| 22,500 brick laid in foundation walls, at \$13.00..... | 292.50 |
| 320 rock face cement blocks, 8x8x16..... | } 135.00 |
| 215 rock face cement blocks, 4x8x16..... | |
| 45 rock face cement blocks, 4x4x16..... | |
| 70 rock face cement blocks, 4x8x16..... | |
| 4 stone caps for porches, 32x32x3 1/2..... | |
| 2 stone caps for porches, 32x38x3 1/2..... | } 135.00 |
| 2 stone caps for porches, 3 ft. 3 in. x 1 ft. 2 in. x 3 1/2..... | |
| 7 stone window sills, 5 in. x 9 in. x 3 ft. 4 in..... | |
| 1 stone window sill, 5 in. x 9 in. x 4 ft. 0 in..... | |
| 1 stone door sill, 5 in. x 9 in. x 3 ft. 8 in..... | |

*Materials are figured at Omaha prices. Carpenter labor figured at 40 cents an hour.

| | |
|---|-----------------|
| 36 M No. 1 W. P. lath, \$5.50..... | \$198.00 |
| 18 bbls. Ash Grove lime, \$1.30..... | 23.40 |
| 7¼ tons Fort Dodge plaster, \$8.00..... | 58.00 |
| 1 ton finish plaster..... | 8.00 |
| 24 yards Platte River sand, \$1.50..... | 36.00 |
| Total | \$997.80 |

| | |
|--|-------------------|
| 60 ft. 1½x12x16 ft. Y. P. cellar stairs, \$50..... | \$ 3.00 |
| 40 ft. 1x8x16 ft. Y. P. cellar stairs, \$50..... | 2.00 |
| 1,600 ft. ¾x2¼ face or S. W. O. fig., \$80..... | 128.00 |
| 2,000 ft. ¾x2¼ face maple fig., \$60..... | 120.00 |
| 1,200 ft 1x4 in. Star Y. P. fig., attic, \$35..... | 42.00 |
| Total lumber bill | \$1,534.63 |

LUMBER BILL.

| | Feet. |
|--|---------------|
| 4 2x8x16 ft. partition plates, basement..... | 84 |
| 10 2x4x16 ft. coal bin | 110 |
| 4 6x8x16 ft. sills | 256 |
| 1 6x8x18 ft. sills | 72 |
| 2 6x8x20 ft. sills | 160 |
| 1 6x8x22 ft. sills | 88 |
| 2 6x8x14 ft. sills | 112 |
| 20 2x10x14 ft. sills, first floor joists..... | 460 |
| 30 2x10x18 ft. sills, first floor joists..... | 900 |
| 26 2x10x16 ft. sills, first floor joists..... | 702 |
| 14 2x10x10 ft. sills, second floor joists..... | 189 |
| 28 2x10x18 ft. sills, second floor joists..... | 840 |
| 30 2x10x16 ft. sills, second floor joists..... | 810 |
| 8 2x10x14 ft. sills, second floor joists..... | 184 |
| 16 2x6x18 ft. attic joists | 192 |
| 30 2x6x20 ft. attic joists | 600 |
| 6 2x6x10 ft. attic joists | 60 |
| 18 2x6x12 ft. attic joists | 216 |
| 6 2x6x14 ft. attic joists | 84 |
| 24 2x6x16 ft. attic joists..... | 384 |
| 34 2x4x14 ft. attic ceiling joists..... | 306 |
| 34 2x4x16 ft. attic ceiling joists..... | 374 |
| 3 2x6x24 ft. hip rafters | 72 |
| 2 2x6x20 ft. valley rafters | 40 |
| 2 2x6x18 ft. hip rafters | 36 |
| 2 2x6x16 ft. hip rafters | 32 |
| 2 2x6x16 ft. valley rafters | 32 |
| 20 2x4x20 ft. rafters | 260 |
| 30 2x4x18 ft. rafters | 360 |
| 30 2x4x16 ft. rafters | 330 |
| 20 2x4x10 ft. rafters | 130 |
| 36 2x4x16 ft. for dormers | 396 |
| 40 1x4x12 ft. No. 1 com. for bridging | 160 |
| 60 1x6x12 ft. No. 1 com. for braces | 360 |
| 40 2x2x18 ft. No. 1 com. for furring | 240 |
| 60 1x3x10 ft. No. 1 com. for backing | 150 |
| 6 1x6x16 ft. No. 1 com. for ribbon boards | 48 |
| 160 2x4x20 ft. outside studding | 2,080 |
| 90 2x4x20 ft. partitions | 1,170 |
| 18 2x6x20 ft. partitions | 360 |
| 100 2x4x18 ft. partitions | 1,200 |
| 70 2x4x16 ft. plates | 770 |
| 80 2x4x16 ft. for attic | 880 |
| 42 2x8x10 ft. porch joists | 567 |
| 6 2x8x16 ft. porch joists | 126 |
| 30 2x6x12 ft. ceiling joists, porch..... | 360 |
| 4 2x6x16 ft. ceiling joists, porch..... | 64 |
| 30 2x4x16 ft. porch rafters | 330 |
| Total ft. framing lumber | 17,736 |
| 17,736 ft. framing lumber, at \$28..... | \$496.60 |
| 3,500 ft. 8-inch No. 2 Y. P. shiplap, rough floors, \$28..... | 98.00 |
| 3,800 ft. 8-inch No. 2 Y. P. shiplap outside walls, \$28..... | 106.40 |
| 500 ft. 8-inch No. 2 Y. P. for tin roofs, \$28..... | 14.00 |
| 2,700 ft. 6-inch No. 2 Y. P. sheathing for roofs, \$27..... | 72.90 |
| 24½ M clear R. C. shingles, 5 to 2, \$4.75..... | 116.37 |
| 4,250 ft. ½x4-inch clear R. C. siding, \$32..... | 136.00 |
| 20 rolls tarred felt, \$1..... | 20.00 |
| 700 ft. 1½x4 in. x 16 ft. clear fir fig., porch, \$50..... | 35.00 |
| 550 ft. 5⁄8x4 in. x 16 ft. clear fir ceiling, porches, \$32..... | 17.60 |
| 680 ft. 5⁄8x4 in. x 12 to 16 ft. clear fir, ceiling cornice plancher, \$32 | 21.76 |
| 400 sq. ft. 1x6x16 ft. clear fir finish, \$50..... | 20.00 |
| 100 sq. ft. 1x4x16 ft. clear fir finish, \$50..... | 5.00 |
| 400 sq. ft. 1x10x16 ft. clear fir finish, \$50..... | 20.00 |
| 400 sq. ft. 1x12x16 ft. clear fir finish, \$50..... | 20.00 |
| 400 sq. ft. 1x8x16 ft. clear fir finish, \$50..... | 20.00 |
| 140 sq. ft. 1½x12 to 16 ft. clear fir finish, \$50..... | 7.00 |
| 60 sq. ft. 1½x10 ft. corner boards, \$50..... | 3.00 |
| 200 ft 1x12x16 ft. Y. P. shelves, \$50..... | 10.00 |

MILL WORK.

| | |
|---|---------|
| 4 porch columns, 22 in. at base, 18 in. at neck, 18 ft. 7 in. long over all, square blocks at base of column 4 in. thick, \$20 | \$80.00 |
| 10 porch columns, 10x10 in. x 9 ft. 0 in., No. 2217 W. P., \$3.50 | 35.00 |
| 10 square bases, 14 inches square, 1¾ in. thick, 50c..... | 5.00 |
| 11 porch newels, 6x6x12 ft. 10 in., W. P., \$1..... | 11.00 |
| 3 porch newels, 7½x7½x2 ft. 10 in., W. P., \$1.25..... | 3.75 |
| 800 ft. 1¾x1¾ No. 2007 W. P. balusters, 2c..... | 16.00 |
| 2 pcs. bent top rail, No. 2001, \$2.50..... | 5.00 |
| 2 pcs. bent bot. rail, No. 2002, \$2.50..... | 5.00 |
| 2 pcs. porch rail, top, 2½x5¼x14 ft. 0 in., 10c..... | 2.80 |
| 1 pc. porch rail, top, 2½x5¼x 9 ft. 6 in., 10c..... | .95 |
| 3 pcs. porch rail, top, 2½x5¼x14 ft. 0 in., 10c..... | 4.20 |
| 2 pcs. porch rail, top, 2½x5¼x12 ft. 0 in., 10c..... | 1.20 |
| 5 pcs. porch rail, bot., 2½x5¼x14 ft. 0 in., 10c..... | 7.00 |
| 2 pcs. porch rail, bot., 2½x5¼x12 ft. 0 in., 10c..... | 2.40 |
| 1 pc. porch rail, bot., 2½x5¼x 9 ft. 0 in., 10c..... | .90 |
| 1,000 pcs. No. 8005 W. P. mold., 2½c..... | 25.00 |
| 120 pcs. No. 8002 W. P. mold., 2c..... | 2.40 |
| 1 ice box dr. frame, 1 ft. 8 in. x 2 ft. 4 in. oak sill rabt. outside, 1¾ | 2.00 |
| 2 pcs. W. P. casing, 1½x2½x7 ft. 0 in., 3c..... | .42 |
| 1 sash frame 18x24, 1 lt. Mo. cap slip head, sash to slide up 18 inches | 1.50 |
| 1 sash, 18x24, 1 lt. 1¾..... | 1.00 |
| 16 ft. No. 8286 W. P., 2¼c..... | .36 |
| 16 ft. No. 8016 W. P., 1¼c..... | .20 |
| 2 pcs. bent crown mold, No. 8005, radius 9 ft. 1¼ in., \$2.50 | 5.00 |
| 2 pcs. do., rad. 9 ft. 7½ in., \$2.50..... | 5.00 |
| 2 pcs. No. 8030, rad. 10 ft. 3¾ in., \$2.50..... | 5.00 |
| 1 or. circle cone, No. 8061, rad. 7 ft. 9¾ in..... | 1.50 |
| 400 ft. dental strips, 1x4, W. P., 3c..... | 12.00 |
| 2 pcs. do. 1-3 pitch, 10 ft., 4c..... | .80 |
| 350 ft. No. 8033 W. P. mold., \$1.60..... | 5.60 |
| 580 ft. No. 8143 W. P. mold., .90..... | 5.52 |
| 250 ft. No. 8061 W. P. mold., .70..... | 1.75 |
| 120 ft. No. 8285 W. P. mold., 2.30..... | 2.76 |
| 1 O. S. dr. frame, 2 ft. 10 in. x 7 ft. 0 in., rab. 1¾ in. oak sill, molded cap..... | 2.50 |
| 1 O. S. dr. frame, 2 ft. 8 in. x 6 ft. 8 in., rab. 1¾ in. Mo. cap, oak sill..... | 2.50 |
| 3 O. S. dr. frames, 2 ft. 8 in. x 6 ft. 8 in., rab. 1¾ in., Mo. cap oak sill, \$2.25..... | 6.75 |
| 1 front dr. frame, 3 ft. 0 in. x 7 ft. 0 in., rab. 1¾, oak sill, side cas., 9½ in., rab. 1¾ in., Mo. cap..... | 2.75 |
| 2 side lt. frames, 1 ft. 2 in. x 5 ft. 0 in. x 1¾ in., side cas. 2½ in. side cas 5½ in., tacked on Mo. cap, cas. below sill 2½ in. wide, \$2..... | 4.00 |
| 1 outside dr. 2 ft. 8 in. x 6 ft. 8 in., 1¾ No. 309 W. P. glazed D. S. | 4.50 |
| 3 drs., 2 ft. 8 in. x 6 ft. 8 in., 1¾ No. 309 W. P., No. 309, glazed D. S., \$2.50..... | 7.50 |
| 1 O. S. dr., 2 ft. 10 in. x 7 ft. 0 in. x 1¾, No. 1078 Q. S. W. O. 2 s. glazed, 1 lt. beveled plate..... | 24.00 |
| 1 O. S. dr., 3 ft. 0 in. x 7 ft. 0 in. x 1¾ in., No. 1160 Q. S. W. O., 2 sds., glazed bev. plate, 1 lt..... | 26.00 |
| 1 wd. frame, 60x18x42, 2 lt., Mo. cap..... | 2.50 |
| 3 wd. frames, 40x30, 2 lt., Mo. cap, \$2.25..... | 6.75 |
| 2 wd. frames, 32x30, 2 lt., Mo. cap., \$2.25..... | 4.50 |
| 1 wd. frame, 36x30, 2 lt., Mo. cap..... | 2.25 |
| 1 wd. frame, 28x30, 2 lt., Mo. cap..... | 2.25 |
| 2 wd. frames, 18x20, 2 lt., Mo. cap., \$2..... | 4.00 |
| 1 wd. frame, 40x26, 2 lt., Mo. cap..... | 2.25 |
| 4 wd. frames, 36x26, 2 lt., Mo. cap, \$2.25..... | 9.00 |
| 2 wd. frames, 32x26, 2 lt., Mo. cap, \$2.25..... | 4.50 |
| 1 wd. frame, 30x26, 2 lt., Mo. cap..... | 2.25 |
| 1 wd. frame, 26x26, 2 lt., Mo. cap..... | 2.25 |
| 1 wd. frame, 20x26, 2 lt., Mo. cap..... | 2.25 |
| 2 wd. frames, 18x20, 2 lt., Mo. cap., \$2..... | 4.00 |

| | | | |
|---|---------|--|---------|
| 1 wd. frame, 20x20, 2 lt., Mo. cap..... | \$ 2.00 | 12 pcs. 8309, 12 ft. Y. P., 2c..... | \$ 2.88 |
| 2 sash frames, 36x18, 1 lt., Mo. cap..... | 4.00 | 2 pcs. 8267, 14 ft. Y. P., 3c..... | .84 |
| 1 triple frame, 2 side sash 14x25, 1 lt., center wd. 20x12, 2 lt., no head casing, 4 in. mullions, side casing, 10 in. | 6.00 | 200 ft. 8428½ Y. P., 4c..... | 8.00 |
| 2 mullion sash frames, 20x26, 1 lt., no head casing, 4-in. mullions, sash to slide up 12 inches, 11½-in. side casings, \$3.50 | 7.00 | 7 oak thresholds, 3 ft. 1 in., 15c..... | 1.05 |
| 1 piece oak extension sill, 8 ft. | .40 | 260 ft. 8422 Y. P., ½c..... | 1.30 |
| 6 pieces oak, 1¾x 2 in. x 2 ft., W. P..... | .25 | 350 ft. 8379 Y. P., 2½c..... | 8.75 |
| 6 pieces casing, 1½x11½x3 ft., fir..... | .72 | 34 base blocks, 1½x4¼x10 in., No. 1013½, O. S. W. O., 10c | 3.40 |
| 7 cellar wd. frames, 12x16, 2 lt., \$1.75..... | 12.25 | 8 blocks do. Y. P., 5c..... | .40 |
| 1 cellar wd. frame, 16x16, 2 lt..... | 2.00 | 4 pcs. plate rail, 12 ft., Q. S. W. O..... | 4.80 |
| 7 cellar sash, 12x16, 2 lt., 1¾, 80c..... | 5.60 | 1 pc. nosing, 1½x3¾x16 ft., Y. P..... | .64 |
| 1 cellar sash, 16x16, 2 lt., 1¾..... | 1.00 | 1 pc. nosing, 1½x3¾x 6 ft., Y. P..... | .24 |
| 1 wd. 18x20, 2 lt., 1¾ ck..... | 1.50 | 4 pcs. 8309, 7 ft. 0 in., Q. S. W. O..... | 1.24 |
| 3 wds., 40x30, 2 lt., 1¾ ck., D. S., \$5..... | 15.00 | 34 pcs. 8309, 6 ft. 6 in., Q. S. W. O..... | 8.84 |
| 2 wds., 32x30, 2 lt., 1¾ ck., D. S., \$4.05..... | 8.10 | 16 pcs. 8309, 6 ft. 0 in., Q. S. W. O..... | 3.84 |
| 1 wd., 36x30, 2 lt., 1¾ ck., D. S..... | 4.30 | 1 pc. 8267, 6 ft. 8 in., Q. S. W. O..... | .35 |
| 1 wd., 28x30, 2 lt., 1¾ ck., D. S..... | 2.70 | 3 pcs. 8267, 5 ft. 0 in., Q. S. W. O..... | .25 |
| 1 wd., 40x26, 2 lt., 1¾ ck., D. S..... | 4.35 | 3 pcs. 8267, 4 ft. 8 in., Q. S. W. O..... | .70 |
| 2 wds., 32x26, 2 lt., 1¾ ck., D. S., \$3.10..... | 6.20 | 2 pcs. 8267, 4 ft. 4 in., Q. S. W. O..... | .45 |
| 4 wds., 36x26, 2 lt., 1¾ ck., D. S., \$3.90..... | 14.60 | 1 pc. cap, No. 8410, 7 ft. 0 in., Q. S. W. O..... | .21 |
| 1 wd., 30x26, 2 lt., 1¾ ck., D. S..... | 3.00 | 3 pcs. cap, No. 8410, 5 ft. 0 in., Q. S. W. O..... | .45 |
| 1 wd., 26x26, 2 lt., 1¾ ck., D. S..... | 2.35 | 3 pcs. cap, No. 8410, 4 ft. 8 in., Q. S. W. O..... | .42 |
| 1 wd., 20x26, 2 lt., 1¾ ck., D. S..... | 1.80 | 1 head cas., 8397, 6 ft. 8 in., Q. S. W. O..... | .35 |
| 2 wds., 18x20, 2 lt., 1¾ ck., D. S..... | 1.50 | 3 head cas., 8397, 5 ft. 0 in., Q. S. W. O..... | .75 |
| 1 wd., 20x12, 2 lt., 1¾ ck., D. S..... | 1.65 | 3 head cas., 8397, 4 ft. 8 in., Q. S. W. O..... | .70 |
| 1 wd., 20x12, 2 lt., 1¾ ck., D. S..... | 1.00 | 2 head cas., 8397, 4 ft. 4 in., Q. S. W. O..... | .45 |
| 2 sash, 14x25, 1 lt., 1¾ Div., \$1.20..... | 2.40 | 1 pc. cove, 1½x1½x7 ft. 0 in., Q. S. W. O..... | .10 |
| 4 sash, 20x26, 1 lt., 1¾ Div., \$1.30..... | 5.20 | 3 pcs. cove, 1½x1½x5 ft. 4 in., Q. S. W. O..... | .20 |
| 1 sash, 36x18, 1 lt., glazed mitered beveled plate..... | 6.00 | 3 pcs. cove, 1½x1½x5 ft. 0 in., Q. S. W. O..... | .18 |
| 16 pcs. No. 8085, 8 ft. Q. S. O., 1½c..... | 1.92 | 2 pcs. cove, 1½x1½x4 ft. 8 in., Q. S. W. O..... | .12 |
| 14 pcs. No. 8084, 12 ft. Q. S. O., 1c..... | 1.68 | 3 pcs. apron, 8397, 9 ft. 0 in., Q. S. W. O..... | 1.08 |
| 4 pcs. No. 8309, 6 ft. 6 in., birch, 3c..... | .89 | 2 pcs. apron, 8397, 7 ft. 0 in., Q. S. W. O..... | .56 |
| 84 pcs. No. 8309, 6 ft. birch, 3c..... | 15.12 | 3 pcs. apron, 8397, 4 ft. 0 in., Q. S. W. O..... | .48 |
| 28 pcs. No. 8309, 5 ft. birch, 3c | 4.20 | 9 pcs. apron, 8397, 3 ft. 6 in., Q. S. W. O..... | 1.28 |
| 60 ft. No. 8267 birch, 4c | 2.40 | 3 pcs. cap, No. 8410, 9 ft. 4 in., Q. S. W. O..... | .84 |
| 70 ft. No. 8381 birch apron, 3c | 2.10 | 1 door, 2 ft. 10 in. x 7 ft. 0 in., 1¾, No. 1078, Q. S. W. O., 2 sds., gla., 1 lt., bevel plate, 24x36..... | 22.00 |
| 270 ft. cap, 1½x2¼, birch, No. 8396, 3c..... | 8.10 | 6 drs., 2 ft. 8 in. x 6 ft. 8 in. x 1¾, No. 381, birch, 2 panel, \$6 | 36.00 |
| 280 ft. cove, 1½x1½, birch, 1c..... | 2.80 | 6 drs., 2 ft. 6 in. x 6 ft. 8 in. x 1¾, do. \$6..... | 36.00 |
| 22 pcs. 8085, 14 ft. birch, 1¼c..... | 3.85 | 6 drs., 2 ft. 4 in. x 6 ft. 8 in. x 1¾, do. \$5..... | 30.00 |
| 30 pcs. 8084, 14 ft. birch, 1c..... | 4.20 | 4 drs., 2 ft. 0 in. x 6 ft. 8 in. x 1¾, do. \$4..... | 16.00 |
| 580 ft. 8428½, birch, 4c..... | 23.20 | 2 med. case drs., 1 ft. 8 in. x 2 ft. 8 in. x 1½, 1 lt., birch, gla. bevel plate mirror, 16x28 in., \$3..... | 6.00 |
| 600 ft. 8422 birch, ½c | 3.00 | 2 clothes chute drs, 11x16x7½ in., birch, 1 panel, \$1.25.. | 2.50 |
| 300 ft. 8264, birch, 1½c | 4.50 | 2 med. case frames, 1 ft. 8 in. x 2 ft. 8 in., 6¼ in. deep over all, 3 adjustable shelves..... | 2.50 |
| 88 base blocks, 1½ in. x 4¼ in. x 10 in. No. 1013½ birch, 10c | 8.80 | 2 inside cols., 7½x7½x5 ft. 6 in. over all, No. 1301, Q. S. W. O., mitered corners, square box..... | 40.00 |
| 1 inside cased opening frame, 8 ft. 0 in. x 7 ft. 6 in., Q. S. O. | 1.50 | 2 inside pedestals, 2 ft. 0 in. high, 1 ft. 9 in. out from jambs, case 4¼ inch, base 8428½, No. 1302, Q. S. W. O. | 15.00 |
| 1 inside frame, 3 ft. 0 in. x 7 ft. 0 in., Q. S. O..... | 1.00 | 1 birch case drawers, in bedroom | 20.00 |
| 3 inside frames, 2 ft. 8 in. x 7 ft. 0 in., Q. S. O., 90c..... | 2.70 | 1 birch case drawers on first floor..... | 18.00 |
| 3 inside frames, 2 ft. 6 in. x 7 ft. 0 in., Q. S. O., 90c..... | 2.70 | 1 birch case drawers in pantry | 15.00 |
| 7 inside frames, 2 ft. 8 in. x 6 ft. 8 in., birch, 80c..... | 5.60 | 2 china closet drs., 2 ft. 4⅞ in. x 4 ft. ¼ in. x 1½, 1 lt., D. S., \$2..... | 4.00 |
| 5 inside frames, 2 ft. 6 in. x 6 ft. 8 in., birch, 80c..... | 4.00 | 1 birch case in pantry..... | 12.00 |
| 5 inside frames, 2 ft. 4 in. x 6 ft. 8 in., birch, 75c..... | 3.75 | 10 pcs. 8084, 12 ft. 0 in., Y. P..... | 1.50 |
| 5 inside frames, 2 ft. 0 in. x 6 ft. 8 in., birch, 75c..... | 3.75 | 1 rim, rear box stairs, birch..... | 30.00 |
| 1 inside frame, 3 ft. 0 in. x 6 ft. 8 in., birch..... | .90 | 1 rim box stairs, Y. P., attic..... | 20.00 |
| 1 window, 60x18x42, 2 lt. ck., top glazed beveled plate, bottom plain plate | 35.00 | 2 Y. P. newels, 5x5x3 ft. 2 in., sqr. box, Mo. cap., \$3... .. | 6.00 |
| 2 side light sash, 10x55, 1¾ glazed, mitered bevel plate, \$4 | 10.00 | 1 pc. rail, No. 1180, 16 ft. Y. P..... | .80 |
| 1 pc. 8395, 6 ft. 8 in., Q. S. O..... | .28 | 50 balusters, 1½x1½x2 ft. 8 in., Y. P., square, plain.... | 2.00 |
| 3 pcs. 8395, 5 ft. 0 in., Q. S. O..... | .60 | 2 birch C. C. drs., 1 ft. 11¼ in. x 4 ft. ¼ in. x 1½, 1 lt., D. S., \$2 | 4.00 |
| 3 pcs. 8395, 4 ft. 8 in., Q. S. O..... | .56 | 2 birch cupboard drs., ope. for doors, 4 ft. 7 in. x 2 ft. 4 in., drs. 1½, 2 flat panels, rab. center..... | 5.00 |
| 2 pcs. 8395, 4 ft. 4 in., Q. S. O..... | .40 | 1 vestibule dr., 3 ft. 0 in. x 7 ft. 0 in. x 1¾, No. 1145, Q. S. W. O., 2 sds., gla. bevel plate, 22x58 in..... | 24.00 |
| 3 pcs. 8395, 9 ft. 0 in., Q. S. O..... | 1.08 | 1 dr., 2 ft. 8 in. x 6 ft. 6 in. x 1¾, 5 + panel, Y. P... .. | 2.60 |
| 2 pcs. 8395, 7 ft. 0 in., Q. S. O..... | .56 | 3 drs., 2 ft. 6 in. x 6 ft. 6 in., 1¾, 4-panel..... | 6.00 |
| 3 pcs. 8395, 4 ft. 0 in., Q. S. O..... | .48 | 1 ice box dr., 2 ft. 6 in. x 2 ft. 8 in., 1¾, 2-panel, W. P..... | 2.00 |
| 9 pcs. 8395, 3 ft. 6 in., Q. S. O..... | 1.28 | 1 run O. S. W. O. main stairs, 35 ft., ¾x2 in. face, O. S. W. O. fig. | 120.00 |
| 2 pcs. cap, No. 8410, 7 ft. 4 in., Q. S. O..... | .60 | 1 O. S. W. O. oak seat in hall..... | 5.00 |
| 3 pcs. cap, No. 8410, 4 ft. 4 in., Q. S. O..... | .52 | 20 balusters, 1½x1½x2 ft. 8 in., Y. P., plain sqr..... | 1.20 |
| 9 pcs. cap, No. 8410, 3 ft. 10 in., Q. S. O..... | 1.44 | 3 ft. No. 1182 Y. P..... | .30 |
| 3 pcs. cove, 1½x1½, 9 ft. 6 in., Q. S. O..... | .42 | 7 pcs. No. 8309, 6 ft. 6 in., birch..... | 1.84 |
| 2 pcs. cove, 1½x1½, 7 ft. 6 in., Q. S. O..... | .22 | | |
| 3 pcs. cove, 1½x1½, 4 ft. 6 in., Q. S. O..... | .21 | | |
| 9 pcs. cove, 1½x1½, 4 ft. 0 in., Q. S. O..... | .54 | | |
| 210 ft. 8428½, Q. S. O., 5c..... | 10.50 | | |
| 220 ft. 8422, Q. S. O., 1c..... | 2.20 | | |
| 242 ft. 8464, Q. S. O., 2c..... | 4.84 | | |

| | |
|--|---------|
| 12 birch blocks, No. 1013½, 1½x4¼x10 in., 8c..... | \$ 0.96 |
| 1 ice box dr., 1 ft. 8 in. x 2 ft. 4 in., 1¾, 2-panel..... | 2.00 |
| 1 piece No. 8428½, 14 ft., birch..... | .70 |
| 1 inside dr. frame, 2 ft. 4 in. x 6 ft. 8 in., birch..... | .80 |
| 1 inside dr. frame, 2 ft. 8 in. x 6 ft. 8 in., Y. P..... | .65 |
| 1 slide dr. frame, 6 ft. 0 in. x 7 ft. 6 in., O. S. W. O., 4 side jambs, 7⁄8x5, 1 head jamb, 7⁄8x12 in..... | 3.00 |
| 60 ft. 8428½, Q. S. W. O., 8c..... | 4.80 |
| 8 pcs. 8309, 12 ft., Q. S. W. O..... | 3.89 |
| 2 pcs. 8397, 12 ft., Q. S. W. O..... | .96 |
| 1 pc. 8397, 14 ft. birch..... | .56 |
| 10 shelves, 1 x 18 in. x 3 ft. 6 in., red cedar..... | 6.00 |
| 5 shelves, 1 x 14 in. x 4 ft. 0 in., red cedar..... | 3.00 |
| 5 shelves, 1x14 in. x 2 ft. 8 in., red cedar..... | 2.00 |
| 1 front screen dr., 3 ft. 0 in. x 7 ft. 0 in., No. 449, Q. S. W. O..... | 3.50 |
| 1 screen dr., 2 ft. 10 in. x 7 ft. 0 in., No. 447, Q. S. W. O..... | 3.50 |
| 1 screen dr., 2 ft. 8 in. x 6 ft. 8 in., No. 499, Q. S. W. O..... | 2.75 |
| 3 screen drs., 2 ft. 8 in. x 6 ft. 8 in., 1½, W. P., \$1.90..... | 5.70 |
| 6 cellar sash screens, 12x16, 2 lt..... | 3.00 |
| 3 wd. screens, 40x30, 2 lt., \$2..... | 6.00 |
| 2 wd. screens, 32x30, 2 lt., \$1.75..... | 3.50 |
| 1 wd. screen, 36x30, 2 lt..... | 2.00 |
| 1 wd. screen, 28x30, 2 lt..... | 1.75 |
| 2 wd. screens, 18x20, 2 lt., \$1.50..... | 3.00 |
| 1 wd. screen, 40x26, 2 lt..... | 2.00 |
| 4 wd. screens, 36x26, 2 lt., \$2..... | 8.00 |
| 2 wd. screens, 32x26, 2 lt., \$1.75..... | 3.50 |
| 1 wd. screen, 30x26, 2 lt..... | 1.75 |
| 1 wd. screen, 26x26, 2 lt..... | 1.70 |
| 1 wd. screen, 20x26, 2 lt..... | 1.50 |
| 1 wd. screen, 20x12, 2 lt..... | 1.20 |
| 1 wd. screen, 20x20, 2 lt..... | 1.30 |
| 4 sash screens, 20x26, 1 lt., \$1..... | 4.00 |
| 1 sash screens, 18x24, 1 lt..... | 1.00 |

Total cost mill work\$1,374.95

CARPENTER LABOR.

| | |
|---|-----------|
| 17,736 ft. framing lumber, \$10..... | \$ 177.36 |
| 7,800 ft. boarding, \$10..... | 78.00 |
| 2,700 ft. roof boarding, \$10..... | 27.00 |
| 24½ M shingles, \$2.25..... | 55.12 |
| 4,250 ft. siding, \$1.50..... | 63.75 |
| Add for mitered corners..... | 12.00 |
| 700 ft. porch floor, \$1.50..... | 10.50 |
| 550 ft. porch ceiling, \$1.50..... | 7.75 |
| 1,120 lineal ft. cornice, 15c porch work..... | 168.00 |
| 1,600 ft. oak flooring, \$35..... | 56.00 |
| 2,000 ft. maple flooring, \$35..... | 70.00 |
| 1,200 ft. Y. P. flooring, \$20..... | 24.00 |
| Finishing 8 cellar window frames, \$1.25..... | 12.00 |
| 4 cellar door frames, \$2..... | 8.00 |
| 3 outside doors, \$4..... | 12.00 |
| 3 outside doors, \$3..... | 9.00 |
| 1 vestibule door..... | 3.50 |
| 1 set sliding doors..... | 10.00 |
| 1 cased ope..... | 8.00 |
| 1 cased ope..... | 2.00 |
| 28 doors, \$3..... | 84.00 |
| 24 windows, \$2.50..... | 36.00 |
| Setting door jambs..... | 8.40 |
| Setting window frames..... | 7.20 |
| Attic frames..... | 12.00 |
| Inside base, 1,050 ft., 5c..... | 50.25 |
| Plate rail..... | 5.00 |
| Picture molding..... | 10.00 |
| Setting up cellar stairs..... | 5.00 |
| Setting up attic stairs..... | 15.00 |
| Setting up rear stairs..... | 20.00 |
| Setting up front stairs..... | 40.00 |
| Pantry work..... | 20.00 |
| Case first floor..... | 8.00 |
| Case second floor..... | 8.00 |
| Medicine cases..... | 5.00 |
| Closets..... | 10.50 |
| Porch work..... | 60.00 |
| Hanging screens..... | 20.00 |
| Incidentals, 10 per cent..... | 123.83 |

Total estimate\$1,362.16

RECAPITULATION.

| | |
|------------------------------|------------|
| Excavating and masonry..... | \$ 997.80 |
| Lumber bill..... | 1,534.63 |
| Mill work..... | 1,374.95 |
| Carpenter labor..... | 1,362.16 |
| Hardware and nails..... | 200.00 |
| Plastering..... | 475.00 |
| Heating (hot water)..... | 600.00 |
| Plumbing..... | 700.00 |
| Electric wiring..... | 90.00 |
| Tin work..... | 157.00 |
| Painting..... | 457.00 |
| Fireplace..... | 100.00 |
| Tile floors..... | 65.00 |
| Cellar cementing..... | 145.00 |
| Incidentals, 5 per cent..... | 412.92 |
| Total estimate..... | \$8,671.46 |

ESTIMATING THE HEATING SURFACE OF A BUILDING

In his work, "Baldwin on Heating," William J. Baldwin gives the following rules for estimating the amount of heating surface necessary to maintain the heat of the air of enclosed spaces in buildings to the desired temperature:

The heating surface necessary to warm a room, of course, should be proportional to the cooling surface, and the glass of the windows and the outside walls form the largest factors in cooling. The glass which forms the windows forms the highest cooling factor in ordinary practice, and it may be taken as 1,000, in which case the following table shows approximately the value of other building materials:

| | |
|---|----------------|
| Window glass..... | 1,000 |
| Oak and walnut sheathing on walls..... | 66 to 100 |
| White pine and pitch pine..... | 80 to 100 |
| Lath and plaster, walls good..... | 75 to 100 |
| Lath and plaster, common..... | 100 to 150 |
| Common brick (rough)..... | 150 |
| Common brick (hard finish)..... | 200 |
| Common brick (hollow walls, hard finish)..... | 150 |
| Sheet iron..... | 1,100 to 1,200 |

A square foot of glass and a square yard of ordinary outside wall have about the same cooling value. It has been found that 1 square foot of heating surface with steam at 1 pound pressure will just about offset the cooling done by 2 square feet of glass, when the outside temperature is 70 degrees. This is so well established now that it need not be questioned. In the early days of steam heating the writer was acquainted with this fact, and he devised the following rule:

Divide the difference in temperature between that at which the room is to be kept and the coldest outside atmosphere, by the difference between the temperature of the steam pipes and that at which you wish to keep the room, and the product will be the square feet, or fraction thereof, of pipe surface to each square foot of glass (or its equivalent in wall surface).

Thus: Temperature of room, 70 degrees; less temperature outside, 0; difference, 70 degrees. Again: Temperature of steam pipe, 212 degrees; less temperature of room 70 degrees; difference, 142 degrees. Thus: $70 \div 142 = 0.493$, or about one-half of a square foot of heating surface to each square foot of glass, or its equivalent.

It must be distinctly understood that the extent of heating surface found in this way offsets only the windows and other cooling surface it is figured against, and does not provide for cold air admitted around loose windows, or between the boarding of poorly constructed wooden houses or for ventilation. These latter conditions, when they exist, must be provided for separately.

Sometimes orders are procured by simply exhibiting photographs of buildings previously remodelled with the improved lighting sash. There is considerable work ahead for the trade in this line.

Warman—"Ours is the worst neighborhood for gossip I ever saw."

McNix—"Why so?"

Warman—"If they see carpenters coming out of your house they'll pass it around that you're keeping boarders."



1911!!

Wishing each and every one of you, a happy, peaceful, and prosperous New Year.

* * *

Let the good resolutions made at the first of the year, remain with you, and hold fast to you, during the whole of this 1911.

* * *

It has been the custom for several years with many of our readers who are employers of labor, to gladden the hearts of a number of their deserving workmen each year, by presenting each of them with a paid-up subscription to THE NATIONAL BUILDER, for the incoming year. This is an excellent custom, and one that must commend itself to people who are desirous of bettering the conditions of their working men. The generosity of the employers is more than amply rewarded by the better efforts, and improved efficiency of the men receiving the journal. You have not adopted this custom, of giving to your younger employers, some token or reward for their services rendered or services anticipated, should try this experiment, and we are convinced you will be agreeably surprised. You need not confine your gifts to the giving of THE NATIONAL BUILDER. There are many suitable books advertised in our pages, from which some special one, particularly adapted to the requirements of the individual for whom the gift is intended, that could be presented with profit to both giver and receiver, besides, it is always more "blessed to give than to receive."

* * *

There are other things besides "THE NATIONAL BUILDER," or technical books, that may be suitable and appropriate gifts to workmen. Take for instance, a pair of saws. "A cut-off and a rip"—or the one hundred and one other tools, such as planes, chisels, hammers, mitre boxes, scrapers and gauges. What better gift to a plasterer, or a bricklayer than a set of trowels, pointers, plaster molders, floats, etc.? These little evidences of appreciation by the employer, when given in a proper spirit, will most assuredly bring back profits on the investment, added to by the gratification of knowing you have helped on the road to success, a struggling laborer, whose load of home responsibilities, debarred him from purchasing the class of tools that would enable him to perform a greater and a better service in a shorter time. An old Scotch saying has it, "That naething is lost a freend gets," might be amended and made to read—"That what ye gae to yer deserving workmen, is money saved."

* * *

Dealers who advertise in this, or similar journals, and who have no further use for this paper, after looking over it, would be doing themselves and some deserving workmen, good service by giving their paper to them as they are published, instead of casting them into the waste-basket or throwing them on the floor for the office boy to destroy. It may be that in some instance or another, you may, by this little act of kindness, kindle a spark of action or genius, that will one day be of great importance to the world at large. "Do good and be happy!"

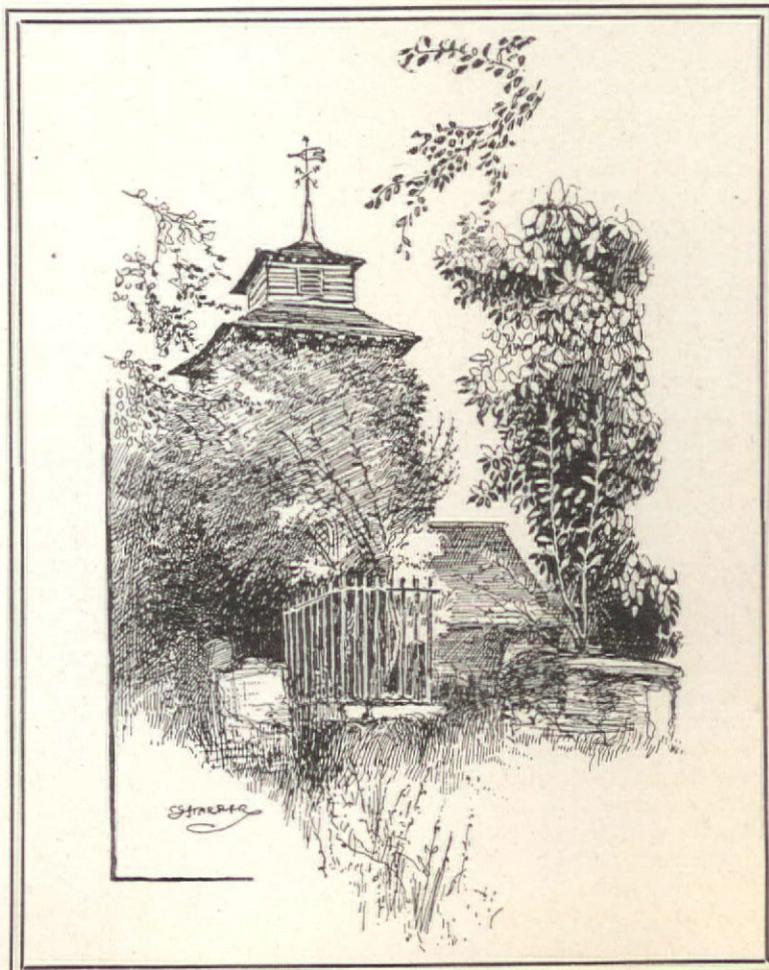
* * *

The policy of THE NATIONAL BUILDER, has always been of a conservative kind. We have at all times refrained from "blowing trumpets or beating drums," or announcing ourselves as the "biggest thing on earth," and have confined ourselves to "pegging away" in our own sphere of influence, that is to say, we have made no attempts to invade the domains that properly belong to the purely high class architectural journals such as "The American Architect," "The Western Architect," "The Architectural Record," and a few others, but have contented ourselves with working among contrac-

tors, operative builders, and decorators, and in these fields, we are vain enough to think we have been fairly successful, owing in a great measure, we fancy, to the fact, that we know—from personal knowledge—what to serve up to readers in these classes, and, we imagine, we have served it up in such a manner as to be acceptable to those for whom the meats were intended; as evidence of this, we have but to call the attention of our readers to the figures showing our circulation. No journal devoted to the interests we represent, ever before had a circulation as large as these figures show, either in this country of "immensities," or in Europe; but these figures were not reached without effort, and a very large expenditure. We are not given to boasting or of making promises, but sometimes it is necessary to inform readers of some of the things they may expect during the coming year, and because some of our subscribers have intimated they would like to get information on the several subjects asked for in their correspondence. We have engaged the services of an expert to prepare for our pages, a series of articles on STEEL CONSTRUCTION, also wood and steel construction, and brick, concrete, and steel construction. A series of papers on Architectural Drawing, lettering, etc., will be continued. A column of real practical hints and methods will appear each month, and articles of interest to the workman, contractor and builder, will be furnished by our regular correspondents, and our question and answer columns will give every reader of the paper a chance to ask for any information he may want, also opportunities to air his views on any of the subjects submitted or discussed. We can safely say to our readers that the NATIONAL BUILDER for 1911 will equal in every particular, and excell in many, any previous issue of the paper, and this is saying a great deal.

* * *

While some people live in cellars, others live in \$25,000 rented flats. Until lately no millionaire in New York could, if he wished, pay a higher rental than \$20,000 a year for his flat. But that disability has now been removed. They are building in Fifth avenue a block of flats, seventeen in number, each of which is to be rented at \$20,000 a year. Each flat contains eighteen rooms, of which the four principal rooms—salon, dining and living rooms, and gallery—cover an area of 2,500 feet, which can be converted at will into one immense hall for entertaining. Each flat has its own elevator, refrigerating plant, and incinerating apparatus for the destruction of refuse, as well as vacuum cleaners and electric laundry and ironing machinery. Of course the appointments of the living rooms are amazingly luxurious.



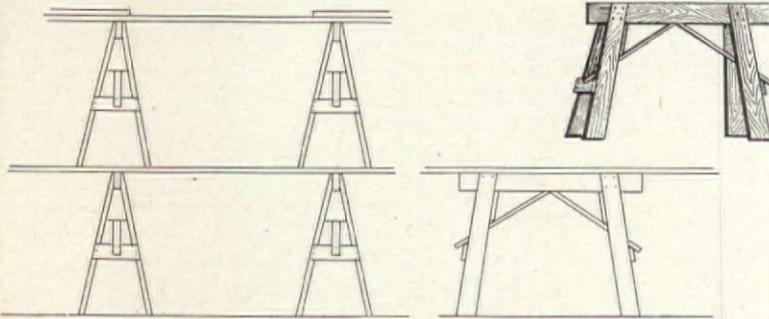
THE IMPORTANCE OF SAFE SCAFFOLDING

By OWEN B. MAGINNIS

AMONG the numerous auxiliaries employed in, or essential to safe and successful building construction, there is none more important than the scaffolding, so in this article it is my intention to consider it in its most practical sense and analyze some details.

The word or technical term "scaffold" is very ancient, like the trade or art itself, having been employed in building and engineering works from time immemorial, but as it is not the purpose

Fig. 1.



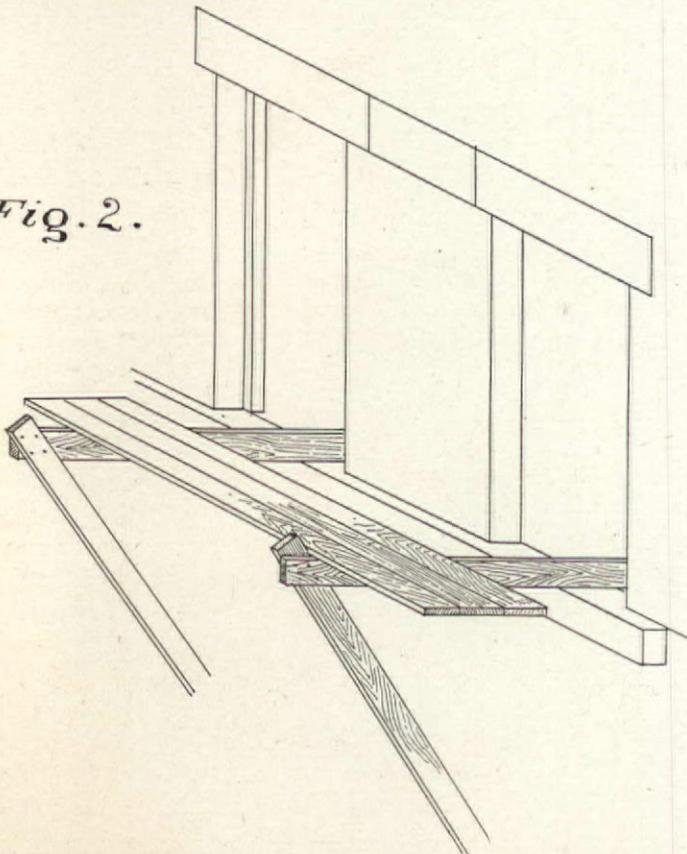
of this article to treat the subject historically, we will proceed to the actual modern practice.

Primarily of course, the first and perhaps the most useful appliance we meet with for ordinary heights, is the sawhorse, or mason's horse, familiar to all readers, but they can be built up to any height in tiers as shown at Fig. 1, where a series of two tiers is represented.

Assuming that one row of horses gives a height of 4 or 5 feet, two would give 8 or 10 feet 2 inches, the thickness of the planks being added, so 3 tiers would give 12 feet 4 inches or 15 feet 4 and so on, as required to the height desired.

The old form of pole and putlog scaffold is rarely now used on the western hemisphere, having been superseded, either by a series of sawn square timbers framed or cleated together after the fashion of Fig. 3, or the adoption of the outrigger or thrust-out

Fig. 2.

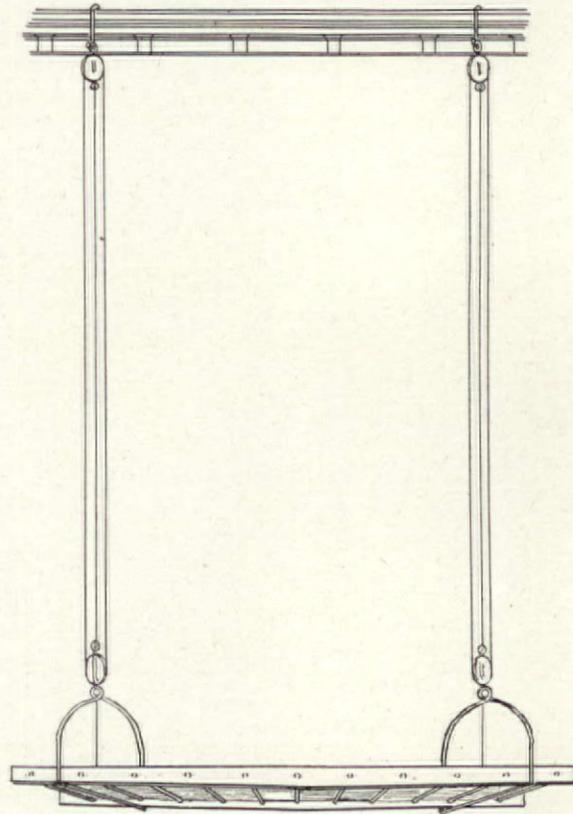


method, Fig. 2, which is admirable but should not be made liable to sudden shocks, jars, or overloading.

Pertaining to this form of scaffolding, the New York Building Code ordains as follows: "Whenever outside scaffolds are re-

quired to carry on the construction of buildings over eighty feet in height, whether the same be constructed by poles or thrust-out scaffolds, there shall be erected on its outer edge and ends an enclosure of wire netting of not over two-inch mesh, or of boards not less than three-fourths of an inch thick, placed not over one and one-half inches apart, well secured to uprights, not less than two inches by four inches, fastened to planks on timbers and resting on putlogs or thrust-outs. * * * The said thrust-outs shall be not less than three-by-ten of spruce or yellow pine and to be doubled or trippled, as may be required for the load to be carried, and to be thoroughly braced and secured; or said timbers can be in one stick in proportion to the load.

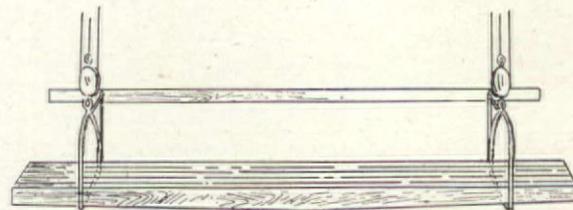
The flooring on thrust-outs and putlogs shall be tightly constructed with plank. This said floor and enclosure shall not be



THE "L" HOOK.

"S" HOOK.

Fig. 4.



removed until a like floor and inclosure is already prepared and in position on the story above."

From the foregoing excerpt, builders will realize how the pedestrian public is protected, but those who are practical will note that the safety of this form of scaffolding is entirely dependent upon the strength of the timber, and as accidents have already occurred through the sudden fracturing of a thrust-out, it behooves both the foreman or whoever is directing the operations and the men also to examine each timber minutely, though to my mind

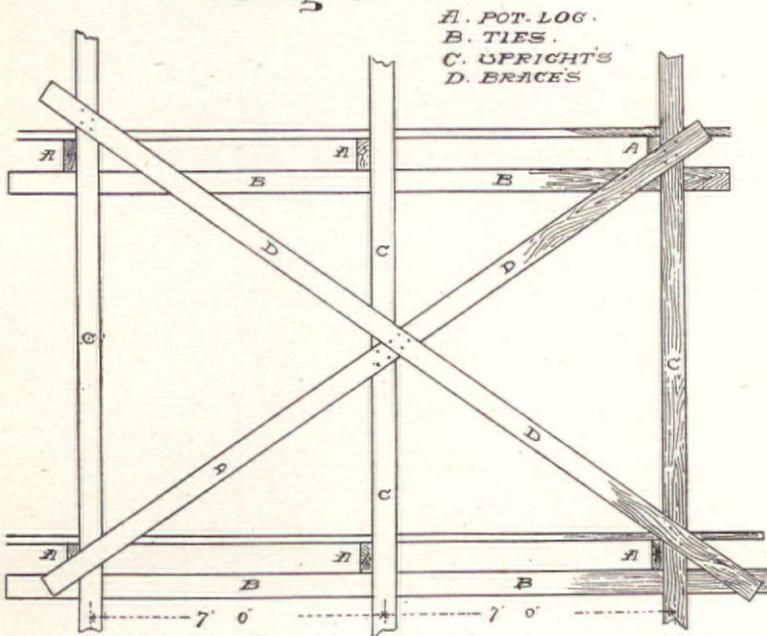
it would be better to add supporting braces indicated in the sketch, if a footing can be found for the bottom ends, which may be often obtained on the sills below.

At this juncture, we must take up the matter of nailing, when putting up the different parts of scaffolds together. This should be done most carefully, and not in the slipshod fashion in which I often see it done. If cut nails are used, they should have their flat sides running parallel with the grain of the wood, be dovetailed or driven in an oblique or slanting direction, well in, until the head is buried in the woody fibre. It is a dangerous mistake not to drive them home, and I once, in the east, knew a builder who was so anxious to save nails that a scaffold broke, a carpenter was killed, and \$2,000 of the builder's money went to console the widow and children.

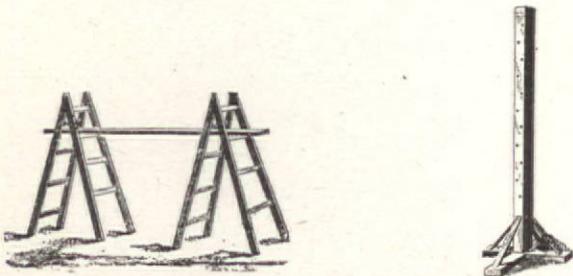
Similarly, it is not always wise to trust too much to the bearing value of nails, so when a scaffold is to be weighted with materials, it would be well to nail cleats, or blocks under the putlogs or ledgers to gain extra strength and safety.

For scaffolds for great height, there is no method which excels that represented in Fig. 3, which is, as all readers will note, simply the reliable, time-honored system of diagonal bracing worked out in elevation as a series of squares, oblongs or parallelograms, the uprights being the sides, the putlogs or bearing ledgers, the top and bottom lines, and the braces the diagonals. The nailing and bolting is as usual.

Fig. 3.



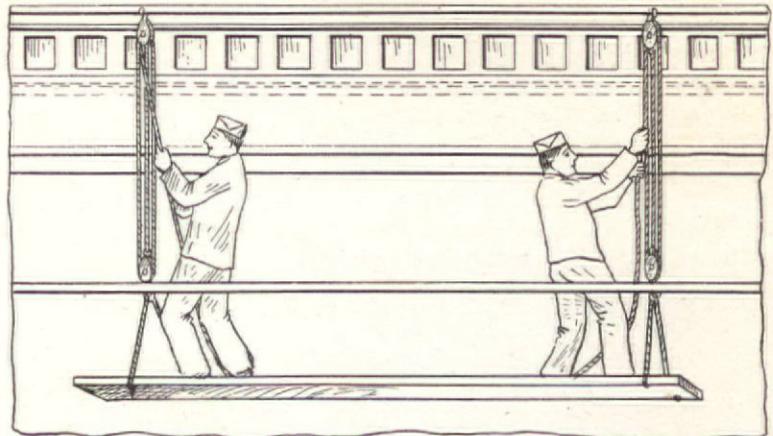
For outer or front wall scaffolds of this description, I would recommend that the outside, or street side line of uprights, be battered, or sloped from the edge of the sidewalk or curb line up, and that the whole structure be securely bound to each rising and succeeding tier of floor-beams, with cables or ropes.



This cut shows two trusses and a plank used as a temporary stage. This arrangement is simple but very strong and firm. This Standard, or Parlor Truss, is usually made in sets of six or more. With a set of six and a few planks a scaffold for frescoing a room 15x25 ft. can be very quickly made. Height, 6 to 12 ft.

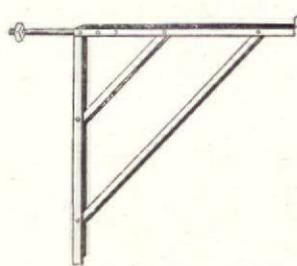
Coming now to the subject of swinging scaffolds which in these days of the construction of very high buildings play so important a part, I would draw the attention of readers to the illustration where a scaffold of this character is shown swung ready for the mechanics. It is used by masons and bricklayers for pointing up and washing down, in masonry and brickwork, by painters for their work, also for whitewashing or repairs, as the occasion demands, and it is therefore a very essential part of a build-

er's plant. In this sketch is shown also the necessary hook which combined with the blocks and tackle make up the whole complete appliance.

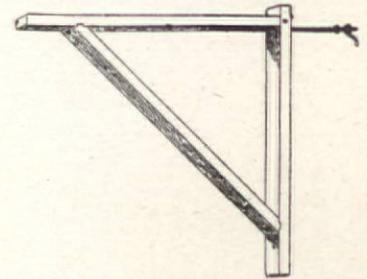


SCAFFOLDING.

Let me here dwell for a moment on the value of a knot Fig. 4, and readers will see that to be safe, and to be able to work

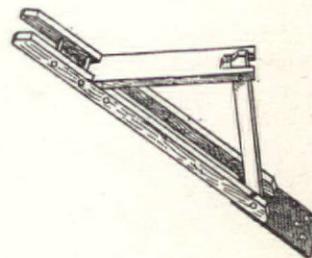


IRON WALL BRACKET FOR PAINTERS AND DECORATORS.



WOODEN WALL BRACKET FOR CARPENTERS, PAINTERS AND DECORATORS

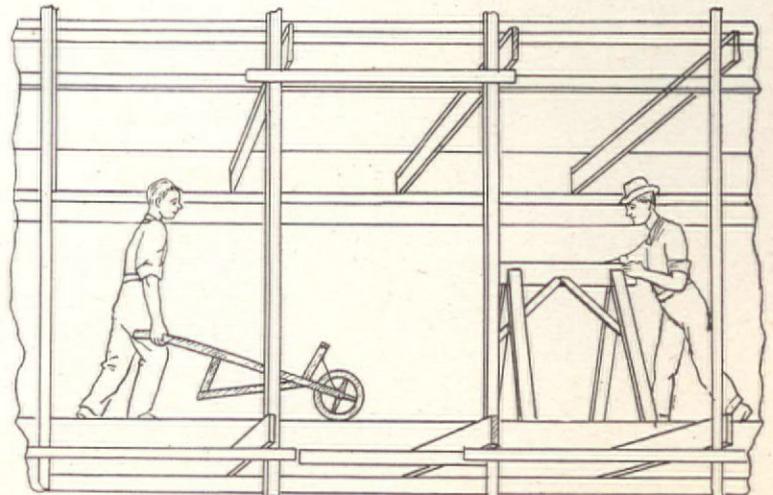
easily and without danger—each man must make his knot properly and thoroughly on either end of the scaffold platform lest it may drop and the mechanic be precipitated to the ground below. And



FOLDING SHINGLING BRACKET.

then how is this knot to be made?

It is simple enough, but must be sure. So many things are so simple and not always sure. A simple half hitch turned over the hook and it will hold, but hempen ropes are unreliable in wet weather and should be knotted with an 8-knot or a timber hitch.



The remaining illustrations show the best forms of scaffolds for modern work.

As under each caption and figure their value is explained, I do not deem them worthy of extensive description. Suffice that they are valuable and necessary are easily within the scope of the construction of the practical builder.

In connection with the swinging scaffold subject, I might state that there are in present use many forms of patented kinds, some being hung with wire ropes, and some by steel rods butted together. The former are hung from projected I beams, set on the roof tier of beams of the steel frame of the building. The cables are lowered or raised by means of endless chains as ropes working on a screw and pawl set on the beams. I regret that the inventors

will not allow the publication of their designs, so readers must perforce use their own observation in the cities where these scaffolds are in daily use on high building construction.

Finally, as there is dependent so much on safe scaffolding and successful building, I would conclude this article by saying, "Surely the whole splendid cause of building construction has numbered enough martyrs, and surely it is not too much to ask that all scaffoldings should be safe, in order that craftsmen, artisans and laborers can execute their work with a sense of security and profit.

If this article can draw the attention of the building community in this direction. I shall have reason to be thankful.

ADVICE TO ASPIRING CONTRACTORS

By CHAS. ANDERSON

AS another springtime approaches with all indications of another record year for builders, there will no doubt be a large number of journeymen carpenters and other building tradesmen making their initial step as contractors. In the writer's opinion there could be no more opportune time to offer a few words of advice.

It is not my purpose to try to discourage any, but it is an undeniable fact that probably not more than 10 per cent of those who start into business succeed from the first. Some fail once and succeed on the second attempt; while a great many of the most prosperous business men of today have failed three times before they have succeeded.

It would seem that many must learn from actual experience how to overcome the many snares that lie in the path of the business man before they are able to steer around the dangerous shoals that cause wrecks.

The late P. T. Barnum once said that a man must fail three times before he knew how to succeed. The writer believes that business is being reduced more and more to a science year after year, therefore a great many business disasters could be averted if the inexperienced man would profit more by the advice of others who have made a success, instead of relying so much on his own individual judgment.

CONTRACTING VS. OTHER BUSINESS.

The contracting business is one of those peculiar undertakings that require very careful and judicious management; it is unlike almost any other business.

The merchant has his business concentrated in one place where he can watch it, while with the contractor his work is scattered, a job here, another there, etc. It is impossible for a man to be everywhere at the same time, he therefore is compelled to trust largely to hired help. There are a great many leak holes where the profits may be lost that the inexperienced contractor may never think of until too late. Perhaps one of the largest leaks is the loss of materials (stolen from the work). The writer knows of a case in an eastern city where a builder was erecting a row of dwellings recently who lost something like \$1,000 worth of materials in this way, and finally was compelled to put on a night watchman. This is getting to be an item that the contractor must take into consideration when making his estimates. There is so much material that cannot be placed under lock and key, and many people seem to think that a few boards, a 2x4 inch, a bundle of lath or shingles, will never be missed from a large pile. Needless to say, many a contractor's profits are badly cut into in this way.

THE BUSINESS END.

There are many A-1 mechanics who make the mistake of thinking that their mechanical ability will carry them through. This is, indeed, a serious blunder; some of the best mechanics have made the greatest failures. Unless you have a fair knowledge of business tactics the writer would advise leaving contracting alone until you first take up a commercial course. In fact, the business end is the more essential of the two; you can hire good mechanics, but it is very difficult to hire the business head that will work to your interest. Business systems for contractors will be made the subject of a future article, as space does not permit dealing with it here.

SOME COMMON ERRORS MADE.

First, many take their first contract too cheap in order to get started, and never do the second.

Second, some take too much work; more than they can prop-

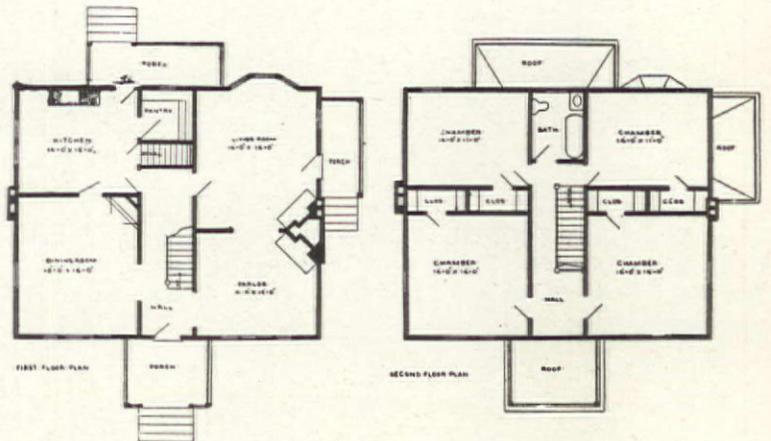
erly attend to or perhaps finance. It must be remembered that there is more profit to be made out of one job well managed than out of two jobs neglected; it is not always the man with the most work on hand, employing the largest crew, that is making the most money.

When you have more work than you can take care of properly you cannot give satisfaction to your customers. (A satisfied customer is your best ad.) Do not try to get every job in sight in order to look big.

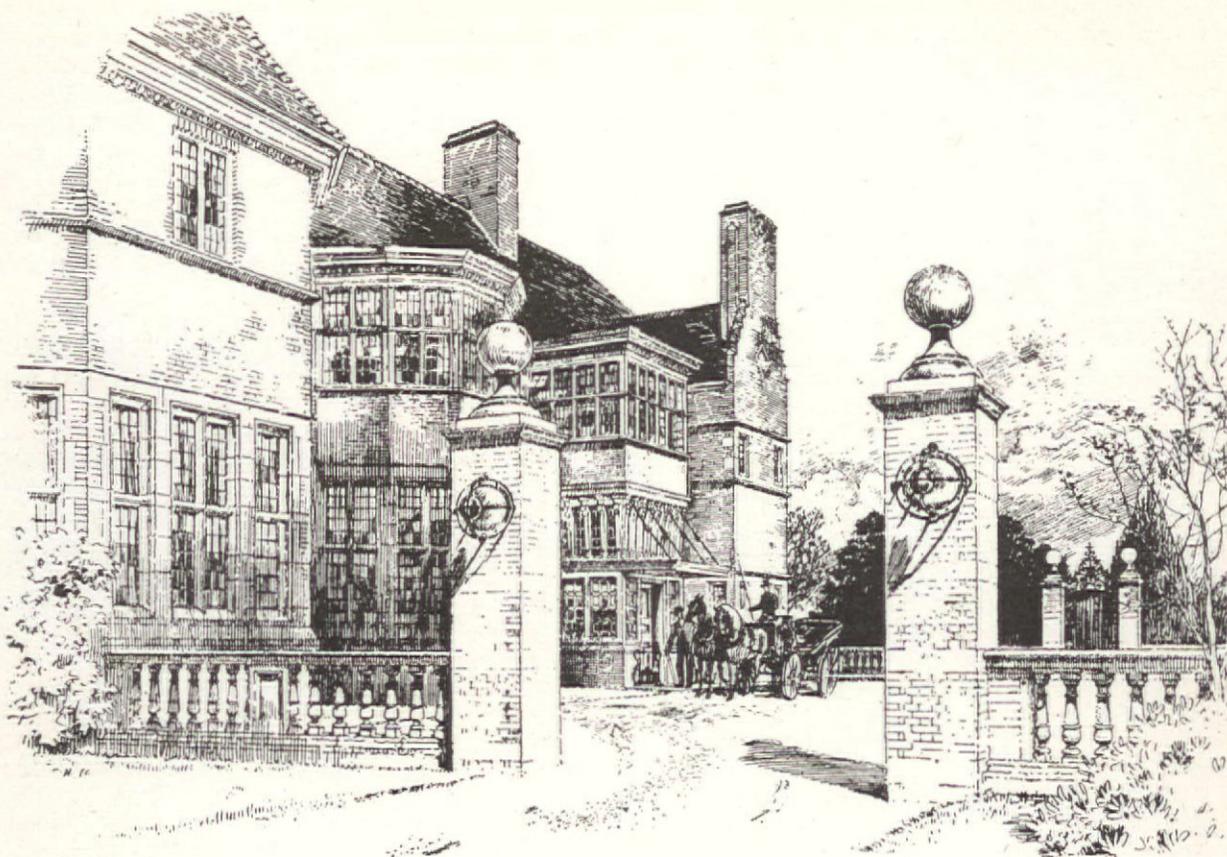
Third, improper and inexplicit plans and specifications are the cause of many failures; with such you are often called upon to do more than you figured on doing. Know exactly what you must do before you sign a contract; it is not wise to be too exacting in small matters, but many beginners are overzealous to please and allow themselves to be imposed upon. Diplomacy used in the right manner will usually let you out of such positions without causing friction. The contractor must always carry himself cool and collected; consider well before you act or speak.

Fourth, the purchasing of supplies, estimating, handling the prospective builder, handling help, etc., are very important considerations that will be dealt with later.

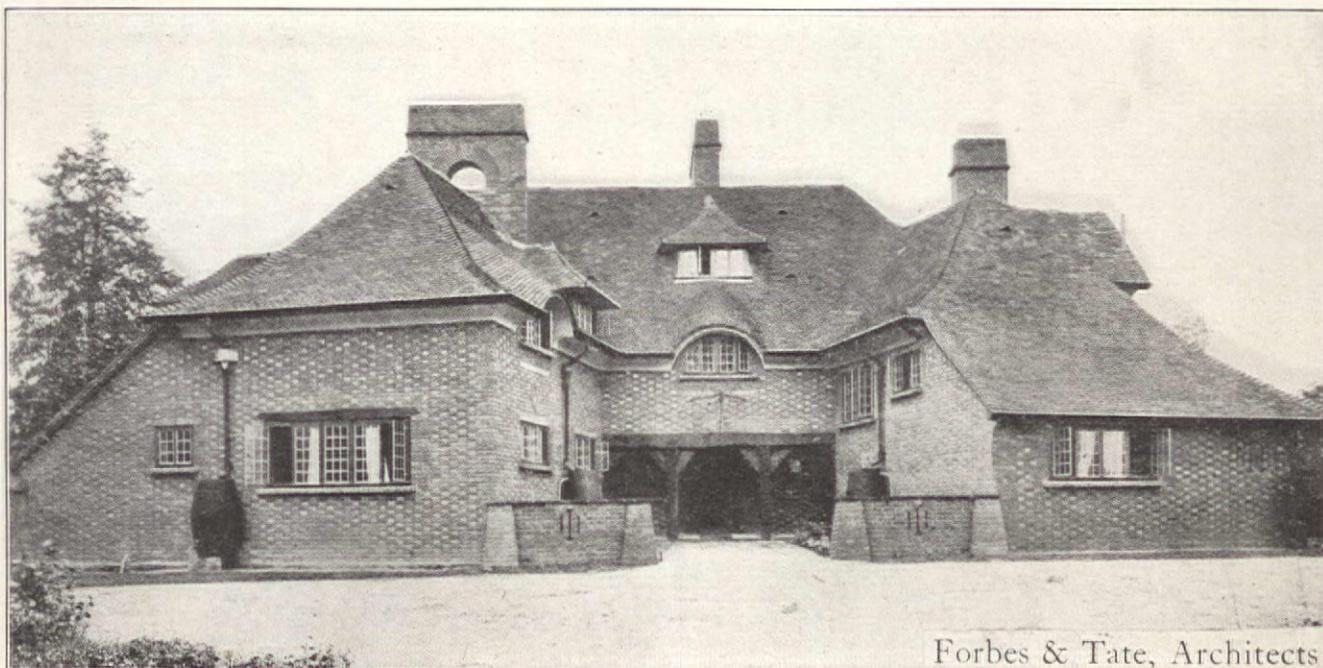
(To be continued.)



HOUSE OF MODERATE COST.



A HANDSOME PILE OF BRICKWORK.



Forbes & Tate, Architects

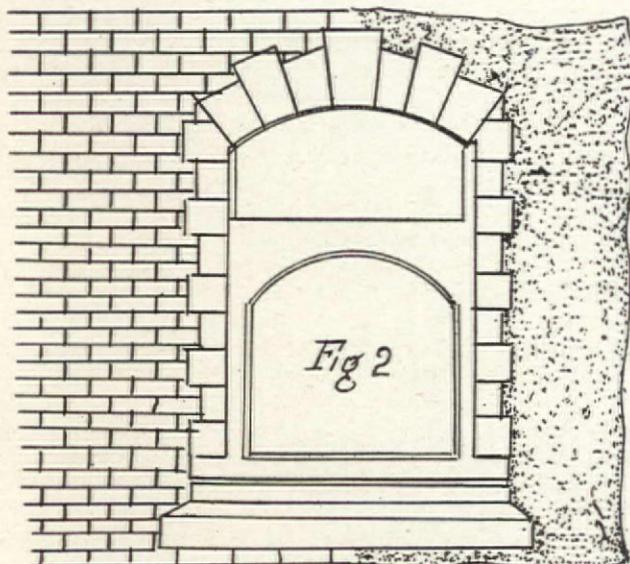
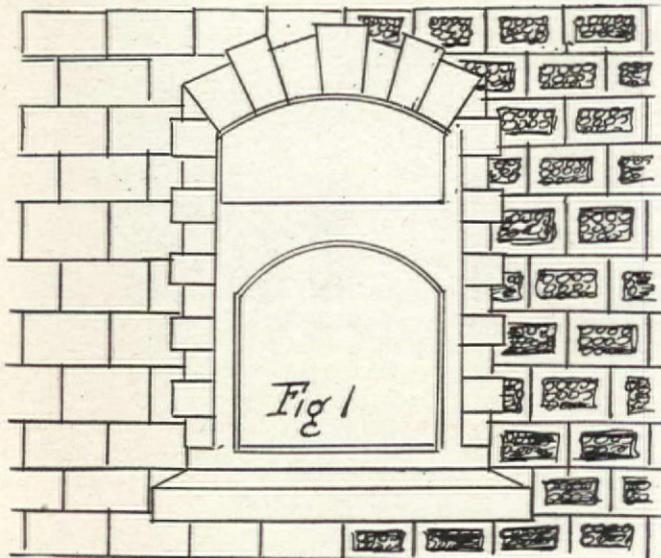
A BRICK BUNGALOW ON THE IRISH COAST.

CASEMENT WINDOWS AND CEMENT BLOCKS

By GEORGE RICE

THE accompanying drawings were made from models of casement windows and cement blocks seen by the writer. The elevations are of the common type of mullion casement window with sash and fixed transom. In Fig. 1 the sash is set up in random coursed stone, on the exterior of which are the patterns of cement blocks. Each figure shows two styles of settings, one style on either side.

In some cases roughly squared ashlar is used in the frame. Dressed stone jams are required and a sill and segmental arch. But it is mainly of the cement wall we write in this article. There



has been considerable progress in this line of work in all parts of the country in the past few years, as is well known to builders and contractors. Nearly all of the firms are obliged to put in apparatus for working with the stones of cement.

The draughting rooms of the architects are full of plans with hollow blocks as the center about which the work of building hinges. Wherever the writer visited he was confronted with plans of which the architects and builders are going to do with the ever-increasing designs of hollow blocks made from cement. Therefore in many of the offices I noticed sketches drawn up with various types of hollow block architecture as a part of the plan, as in the accompanying illustrations. One of the schemes for showing the effect of the cement block combination consists in erecting the casements in small size and building with the blocks, as in the cuts.

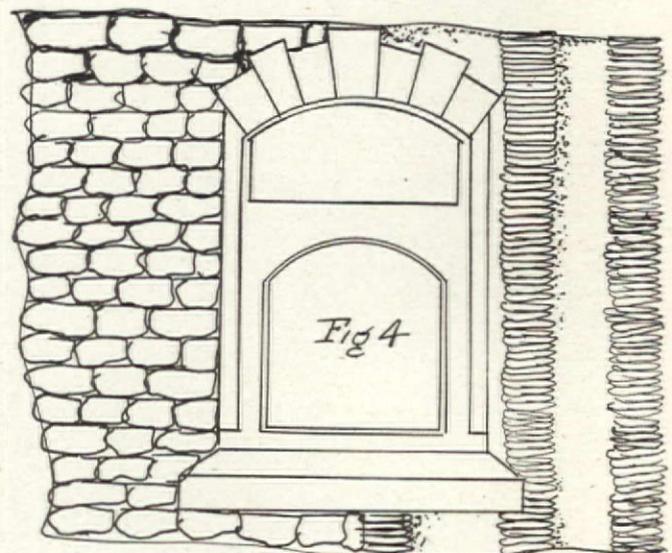
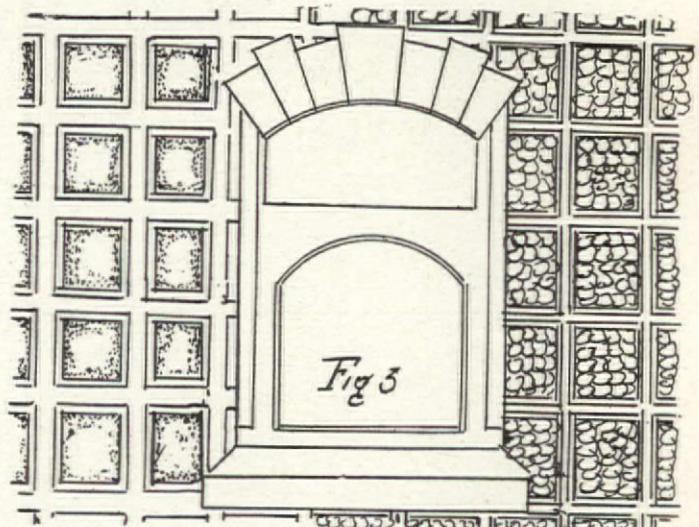
It is very easy to handle the little model blocks. Some very unique designs of architecture can be worked out in the office and the table of the architect. In one place they showed me a mill with very artistically patterned windows, set in hollow block designs.

Undoubtedly the era of design in the hollow cement block is at hand. While the plain blocks are almost always preferable from a building standpoint, no harm is done in having the face of the blocks indented with floral or figure design, providing that the designs do not sink too deeply into the body of the stone. I saw some very much weakened blocks in one model of a building, due to the impressions and indentures which were necessary in order to model the figures on the front of the blocks. But for the common pattern which is used on blocks, no material weakness results. In the cut in question the blocks on one side of the casement are entirely smooth. The smooth block is always popular.

The users of hollow blocks select the smooth, firm, plain surfaces much oftener than they choose the patterned blocks. However, there are some builders who demand the face blocks with various impressions and figures defined thereon. The style of face blocks shown on the right side of the cut are in good demand.

Then there are some builders who require blocks finished off in representation of ordinary bricks. Just why anyone should demand a pattern of this nature is not known. But the makers of concrete blocks tell me that there are often calls for this class of work, a sample of which is shown at the left side of the sample in figure 2.

In the construction of the blocks with brick lines defined on



them, the operation is the same as in the making of the smooth-faced blocks, except that the brick lines are impressed therein by the employment of the necessary risings at proper intervals on the face side of the mould. Occasionally you will find instances of hollow brick made and finished on the pattern of the hollow cement block, and the size no larger than the ordinary clay brick. Then there are people who want the smooth, speckled surface way across the front, such as is shown in Fig. 2 at the right. I have seen this requirement carried to the extreme of plastering over the

entire finished surface, so as to present a new and entirely smooth surface for the wall. The concrete block makers have introduced some blocks which can be set up with almost invisible lines, thereby creating what is apparently a solid front. But the lines at the juncture almost always reveal themselves in time. Therefore in order to fill the requirements of the odd taste of some folks, the contractors are obliged to go over the wall with a thickness of cement. This surface is then worked to make the proper concrete face representation. Another style of block is exhibited at the left side of the diagram No. 3. This is one of the styles in which the block is edged, and these smooth edges fit snugly, forming the effect as shown.

In recent years there has been quite a demand for a mottled style of block. There are calls for cement blocks set with broken bottle glass, and some set with stones, as at the right in Fig. 3.

I find that the manufacturers of concrete blocks do not encourage these odd schemes. The manufacturers believe in the simple, substantial, practicable grey block, properly finished for building purposes. But the manufacturers cannot have it all their own way. They are often called upon to make blocks with peculiar finish and form. Hence the pebble block may be seen in service

as well as the block which requires some of the workmen of the plant to go to the junk shops and get old bottles. These old bottles are broken and the broken material is adjusted by hand in the soft block when the latter is first made. The workmen cut their hands and are otherwise annoyed.

Then there comes the man who orders concrete blocks made for his building in representation of common stones, as at the left side of Fig. 4. This is not by any means an exceptional order. Some of the concrete block makers refuse these bothersome orders on the plea that they are too busy with regular work, or that they do not have the proper moulds for shaping the odd patterns. Other manufacturers, desiring to build up their business and to accommodate, undertake the work, although there may be little money in the job. The new moulds have to be made, and this costs money and consumes time. However, from what I could learn by calling at a number of concrete block works, the majority of proprietors were willing to furnish whatever styles of blocks they could make, even though the margin of profit might not be large. As a whole the profits run high and are liberal. The cement block maker, whether he is turning out the regular run of blocks or special patterns, can always depend upon good prices and fair profits.

MILL CONSTRUCTION

By WARFIELD WEBB



MILL and factory construction, as well as residences and office structures, demand a material that will withstand the test of severe flames. There are several materials that will add to the possibility of this hope, and there is a more notable advance in this direction of late than has been noted in the past.

While the subject of fireproof factory construction can become a matter of importance to every industry, naturally that of combustible materials, or materials that are easily consumed, should demand the most imperative consideration. Not alone does this demand apply to owners, but to contractors as well, and they should see to it that the matter is given a clearer understanding and more intelligent co-operation by both owner and builder.

The admirable qualities of concrete, for instance, are being generally appreciated for the building of many kinds of plants. For the manufacture of lumber, wood working specials, fabrics, and kindred lines, as well as for combustible materials, find in concrete a most desirable structural material. If we consider the immense losses each year from destruction by fire of such plants, it will bring quite forcibly to our minds the need for the adoption of some structural material that will prevent the onslaught of the flames. Aside from the danger, which is often imminent, from loss by fire in such plants, the increase in the hazard, making insurance difficult and well nigh prohibitive to obtain, only by paying the most exorbitant rates.

The danger then, that a mill or factory operator incurs where the building is of frame or poor construction is a matter for his serious consideration. As is often the case these plants are isolated, and the protection that would otherwise be accorded them is impossible to obtain. The matter then assumes one of grave import for the owner, and is one that must not be overlooked by the builder.

There is a more careful inspection into this matter and it is becoming more properly understood and appreciated by a larger percentage of operators. For various reasons, primarily their unbelief in concrete, their hesitation to use other materials than those with which they have long been accustomed; the cost, which they believe would be far too great to permit of its adoption—it can be said that these are at least a few of the reasons why concrete has failed to impress itself upon the average factory man as it might have done in the past.

It is not saying too much to admit the fact that for ordinary factory construction concrete has been found a very admirable material. This includes its several forms, reinforced, brick and block. The one item of fire protection is of such importance that there should be no hesitation on the part of any one who operates a plant of the above description to look at it in this light. We recall an instance of where a frame factory building was consumed by fire that was very near the city limits, and still too far to be reached to any advantage by the fire department. The result was a total loss and complete destruction, simply from a lack of water being supplied to extinguish the flames. A concrete structure under like

circumstances, would have withstood the flames, and the loss, at most would have been trivial. The outcome was that the company realizing its loss did not rebuild the plant.

As a contrasting incident to this there has recently been completed a large lumber manufacturing plant that is removed far from the city, and that would have no possible chance of escape from destruction, should fire start therein. However, to obviate this the company builded it of concrete, and is safe in feeling a relief from this danger. This is cited to show the forethought on the part of the owners, and as this happens to be a large lumber manufacturing company, it might seem a trifle strange that they would adopt this form of construction.

The fact that lumber is scarcer and naturally more costly than it was several years ago, is only another argument in favor of the erection of factories with some form of material other than wood. Durability is a vital consideration in this connection, and there should be more concern given the matter of permanency by manufacturing concerns. There is a saving too, in the concrete structure over a few years ago. Improvement in methods of construction, reduced cost of materials, and a greater knowledge about the industry have been factors that mean much to the prospective builder.

Contractors are giving more consideration to concrete as a structural material. So many builders, of all classes, are now being erected with concrete, either as a whole or in part, that it becomes a matter of more than passing interest to give concern to every progressive builder.

If we consider the matter of sanitation in the construction of many plants to-day, which becomes a vital factor, there is much to be found in favor of concrete. If there is to be heavy machinery installed the foundation and floor will assist in making the structure more durable, and the danger of damage to equipment in this respect less liable. These and many other points are of enough importance to interest every contractor, and are points that he can use in favor of mill construction of concrete. With more factories constructed in this way there will be fewer losses from fire, and a reduction in the insurance rates, two factors that are worthy to be borne in mind. With the fire danger reduced we will insure greater permanency to our buildings, and in other ways reduce the losses that have become so enormous in this country, and that must increase unless the proper remedy has been found and adopted to prevent them.

Seen and Heard on Long Island

A teacher tells me that at a Brooklyn school, not long since, the class in geography was asked: "What are some of the natural peculiarities of Long Island?" The pupils tried to think, and after a while a boy raised his hand. "I know," said he. "Well, what are they?" asked the teacher. "Why," said the boy, with a triumphant look, "on the south side you can see the sea, and on the north side you hear the sound."—Spare Moments.

NOTES ON BRICKWORK

WHERE possible every brick in the footings of a wall should be laid a header. The reason of this will be clear on a little consideration. The bricks laid in the outer course of footings, if put in stretchers, only lap in the wall two inches and there is a great tendency for them to become displaced, as indi-

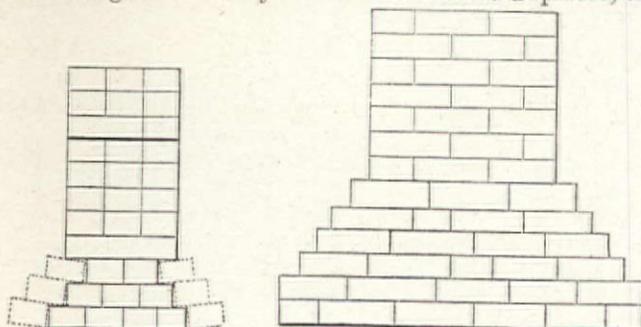


FIG. 1. DISPLACED BRICK. FIG. 2. FOOTINGS FOR HEAVY WALLS.

cated by Fig. 1. Where, however, they are laid headers, three-fourths of their length is bound into the wall, and they can scarcely fail, except it be by reason of the bricks themselves splitting into

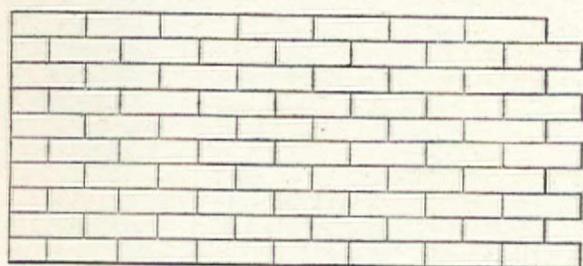


FIG. 3.

pieces. The general form recommended for footings is that shown in Fig. 2, and the arrangement will produce as strong footings as can be had. In the case of very heavy buildings the tendency of

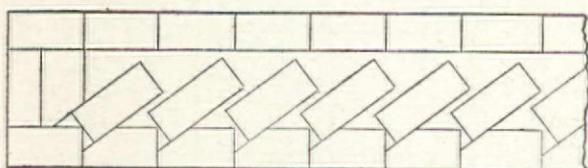


FIG. 4.

the brick to break may be overcome by building in two courses at the bottom, which is the weakest point.

The diagrams, Figs. 3, 4 and 5, show the plans and elevations of an external wall in running bond. Fig. 4 shows plan or wall

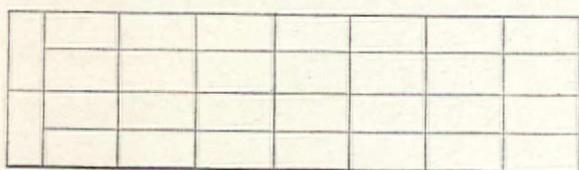


FIG. 5.

having diagonal bond. This style of bonding makes a very strong wall and is often used in front walls, particularly when the walls are faced with pressed bricks, or with stone or marble slabs—or tiles. Sometimes this bond, like the bond consisting of five, or less, courses of stretchers and one of headers, is called, wrongly, "American bond." It was used long before America was discovered, in Germany, England, Holland and Spain.

FINISHING HARDWOOD FLOORS

The efficiency of the hardwood floor depends very greatly on the character of its finish. Here are some suggestions for finishing oak, maple, and other hardwood floors, which will prove of service to the builder.

Oak floors require a filler, if good, smooth finish is desired in the natural, no matter what material is used. Maple does not require filling. For oak floors a good mineral paste filler and two light coats of grain-alcohol shellac varnish, or, in place of the latter, waxing often with a good floor wax will keep the floor from darkening.

AN ORDER OF INDUSTRIAL MERIT

"Fifty per cent of the accidents to American life and labor are preventable," according to an official of the American Museum of Safety, "and it proposes to show how this can be done, through its permanent exposition of safety devices in New York City."

At the exercises in connection with the formal opening of the new museum two gold medals offered by the Travelers Insurance Company and the Scientific American to the individual industrialist or corporation that has done the most for the safe-guarding of its machines and processes, and for the best safety device exhibited at the Museum, respectively, will be awarded by the trustees of the Museum, November 21, at the Engineering Societies' Building.

Among the exhibits already received are a series showing the work of the factory Safety Engineer and the Safety committees, another idea of the new thought in conserving human life, by establishing in the up-to-date plant an official whose sole work is the promotion of safety.

WHITE OAK VERY SCARCE

The so-called white oak timber of our markets is often a mixture, not only of various species of the white oak group, but also of other species, such as the red oak. This generally unknown fact is reported by the Department of Agriculture, which, as a part of its forestry work is often called upon to pass judgment upon the identity of market woods in dispute.

Foresters divide all the oaks into two distinct groups, the white oak group, and the black oak group. The black oak requires two years to mature its acorns, and the white oaks but one year. The woods of the two groups are structurally different. In the early days of its abundance, market white oak was derived almost entirely from Queros Alba, the true white oak. This species combines the utmost strength and toughness of any of the timber oaks. The immense inroads made upon what were regarded as the inexhaustible white oak forests, which stretched from the Atlantic seaboard to Missouri, gradually so reduced the supply that the use of other species became inevitable.

It is almost impossible, at the present time, to obtain a consignment of white oak that does not contain pieces of some other species. The species most used, in addition to the true white oak, are burr oak, chestnut oak, chinquapin oak, post oak, swamp white oak, cow oak, and overcup oak. Real white oak timber of No. 1 quality is usually cut into quarter-sawn boards, while a combination of one or more white oak and red oaks may constitute other cuts of "white oak." In many markets the term "cabinet white oak" is now understood to include a mixture of white oak and red oak, while it often signifies red oak only.

The Department of Agriculture affirms that, for the ordinary purposes for which true white oak is used, practically all the trees of the group yield woods that can be interchanged, and will serve equally well.

FIRST AID FOR THE INJURED

A large woodworking factory should have a special room set aside for the purpose of rapidly rendering assistance to employes who have sustained serious injury from the machinery installed in the workshops. Guards of all kinds have been devised, it is true, but still the risk with circular saws and cutters, revolving at a high speed, is very considerable. In these days of compensation it is in the interest of the employer to use every endeavor to prevent complications arising from a wound which may lead to a prolonged absence from work. Among two or three hundred workers someone is frequently getting injured, no matter how careful they may be nor what precautions are taken to ward off danger by means of safeguards and warnings.

The first-aid appliance need not be costly, but should be kept in a dust-proof cabinet or cupboard. The modern surgeon insists above all things on cleanliness, and before a cut is bandaged it should be thoroughly cleansed, and so it stands to reason that all the appliances should be spotless and aseptic.

Splints, bandages, restoratives and glass bowls, with warm water for washing cuts or wounds, are essential, and there should be telephonic communication with the nearest medical man or club doctor.

There are times when the ability to stop a flow of blood by pressure on the artery may save a fellow-worker from succumbing from loss of blood before medical aid arrives.

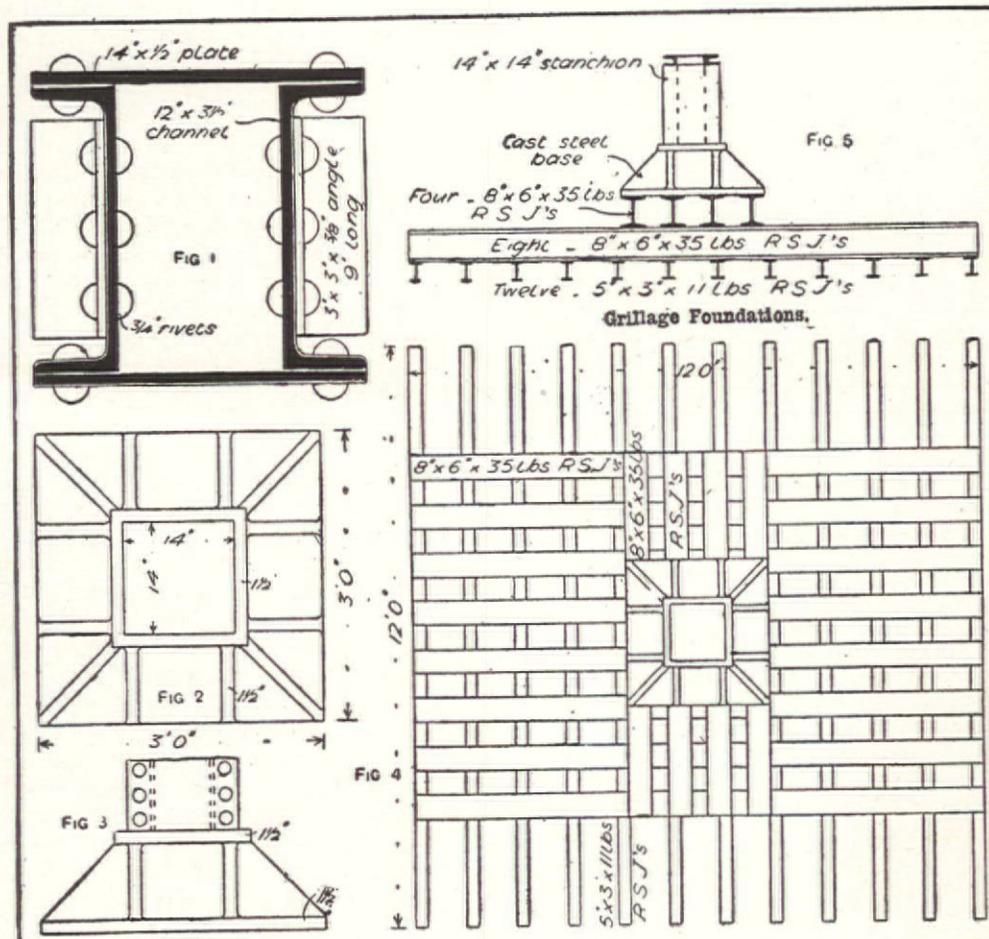
CONSTRUCTION OF GRILLAGE FOUNDATIONS

A CORRESPONDENT, living in a large city, wishes to know what is meant by grillage foundations and asks us for a sketch and description of such that would carry about one and a quarter tons to the square foot. We reproduce the following, which is from a paper prepared by Mr. H. Adams, C. E., which we think covers the ground:

Grillage foundations are composed of rolled steel joists laid side by side under the base of a stanchion and resting upon another layer of rolled joists extending wider, and so on until the pressure per unit of area is reduced to that which the soil is capable of bearing safely. The joists are usually embedded in cement concrete. And the matter is of sufficient importance to readers of NATIONAL BUILDER to give a full answer. In designing a grillage foundation commences with the load to be carried and the safe pressure upon the earth. In this case the load is 175 tons, and the safe pressure

load pressing upwards is 1.25 tons per square foot, the joists twelve in number, their overhang $\frac{12 - 7.5}{2} = 2.25$ ft., so that they must be calculated as cantilevers under a distributed load, the maximum bending moment being $\frac{w l^2}{2} = \frac{1.25 \times 2.25^2}{2} = 3.164$ ton-ft.

Then the equivalent distributed load on a beam supported at the ends would be found from $\frac{W L}{8} = 3.164$, whence $W L = 8 \times 3.164 = 25.312$, which is the load in tons 1 ft. would carry. Referring to tables, a B.S.B. 6, 5-in. by 3-in. by 11-lb. joist is found to be sufficient. Taking the middle layer, there are eight joists covering a width of 7.5 ft., say 12-in. center to center. Their



1.25 tons per superficial foot, then $\frac{175}{1.25} = 140$ sq. ft. area required at base of foundation, and $\sqrt{140} = 11.83$, say 12 ft. width of side, with twelve rolled-steel joists. The stanchion will be approximately as Fig. 1, composed of two 12-in. by 3 1/2-in. by 32-lb. channels, and two 14-in. by 1/2-in. plates, with 3/4-in. rivets, 4-in. pitch. The sectional area will be about 33 sq. in. and the stress $\frac{175}{33} = 5.3$ tons per square inch. The base may be built up of plate, gussets, and angles as for resting on stone or concrete, but a more usual method is to put a cast-steel base under the stanchion, as in plan (Fig. 2) and section (Fig. 3), allowing, say, 20 tons per square foot. $\frac{175}{20} = 8.75$, $\sqrt{8.75} =$ say 3-ft. side of cast-steel base. Placing the first layer of joists at 9-in. centers, there will be four required in the top row, projecting midway from the steel base to the outside of foundation, giving a length of $\frac{12 - 3}{2} + 3 = 7.5$ ft. The number of joists in the middle layer $= \frac{4 + 12}{2} = 8$. Then the plan of the foundation will be as Fig. 4, and section as Fig. 5. The next step will be to calculate the size of the rolled joists. Beginning with the lower ones, the distributed

projection will be $\frac{12 - 3}{2} = 4.5$ ft., and the load they will have to bear $4.5 \times 12 \times 1.25 = 67.5$ tons, or $\frac{67.5}{8} = 8.44$, say 8.5 tons each. Then, as before, $\frac{w l^2}{2}$ or $\frac{W L}{2} = \frac{8.5 \times 4.5}{2} = 19.125$ ton-ft. Then for an equivalent distributed load over a beam supported at the ends, $W L = 8 \times 19.125 = 153$, which is the load in tons 1 ft. should carry. Referring to the tables, it will be found that this value is given very nearly by a B.S.B. 14, 8-in. by 6-in. by 35-lb. joist. Next for the top layer, the projection is $\frac{7.5 - 3}{2} = 2.25$ ft., and the load the joists have to bear will be 175 tons $= \frac{175}{4} = 44$ tons each on the length of 7 ft. 6 in. $= \frac{44}{7.5} =$ say 6 tons per ft. run $= 6 \times 2.25 = 13.5$ tons on the projecting portion. Then $\frac{W L}{2} = \frac{13.5 \times 2.25}{2} = 15.2$ ton-ft., and equivalent distributed load on beam supported at ends $W L = 8 \times 15.2 = 121.6$, which is the load in tons 1 ft. would carry, requiring a B.S.B. 14, 8-in. by 6-in. by 35-lb. joist as before. The joists would be bedded in 1:3:6 concrete to enable them to spread the pressure properly, and also for their protection against corrosion.

FRAMING THE RUSSEL HOUSE ROOF

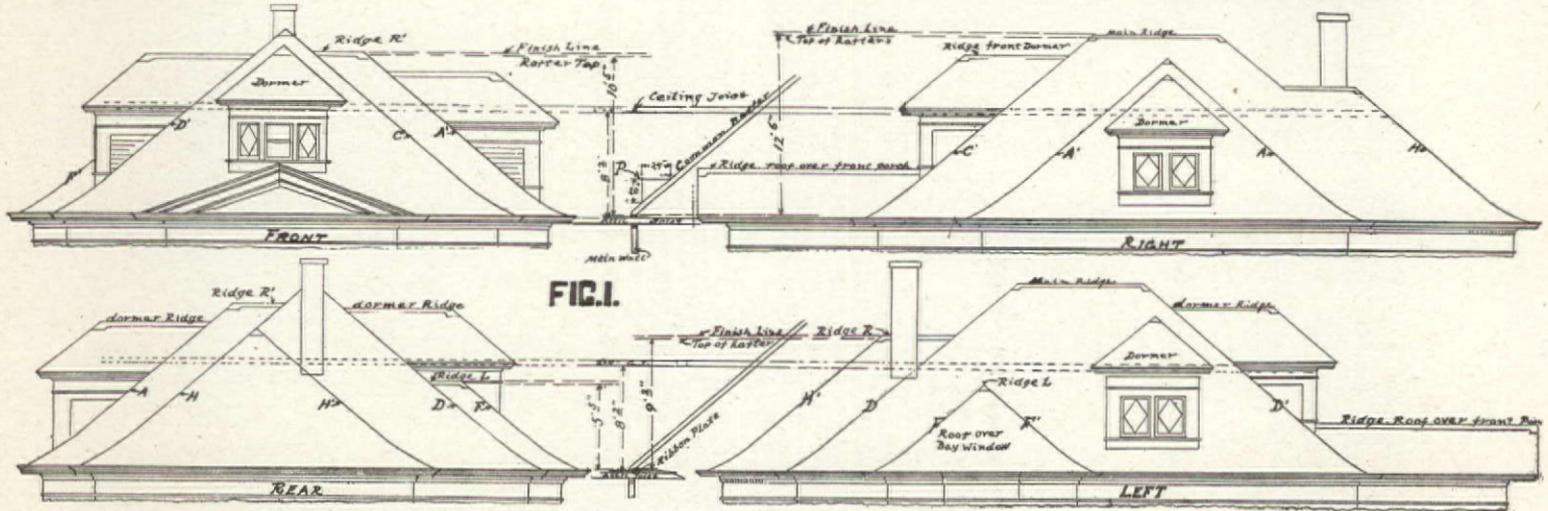
By WM. C. A. STEVENSON



THE roof of the Russel House, published in this month's supplement, is perhaps the best example lesson in roof framing that we have published for a long time, there being only four common rafters in the main roof; it is made up of hips, valleys, jacks and cripples. Many mechanics who consider themselves good roof framers would find that this roof would start the wheels in their head working overtime.

In framing in the dormers cut a trimmer between the rafters marked s, which should be doubled, allowing the rafters in the main roof to extend down to this trimmer as shown by the dotted lines; the main roof is then boarded over and the dormer roof allowed to die onto it, thus forming the valleys for the dormers without cutting a valley rafter in, the framing of the dormer hips, etc., is the same principle of the main roof.

The same plan may be followed for the valleys E-E' over the



To explain this roof fully, illustrating every part, would take up more space than can be given to it here. I have, however, been as explicit as possible in the limited space allotted to it, so that the workman with any knowledge of roof framing at all will be able to understand.

For the benefit of the inexperienced, I will here define the five different rafters used in roof framing.

The Common: The straight, plain rafters running from the plate to the ridge.

The Hip: The rafter running diagonal from an external angle of the plan and forming an external angle of two sides of the roof.

The Valley: The rafter running diagonal from an internal angle of the plan and forming an internal angle of two sides of the roof.

Jacks: The rafters running from the plates and cutting against the hip.

The Cripples: The rafters cutting between hips and valleys, or valley to ridge.

Fig. 1 shows the four elevations of the roof lettered to correspond to the same pieces on the plan Fig. 2. (The valleys cannot be seen in the elevations.)

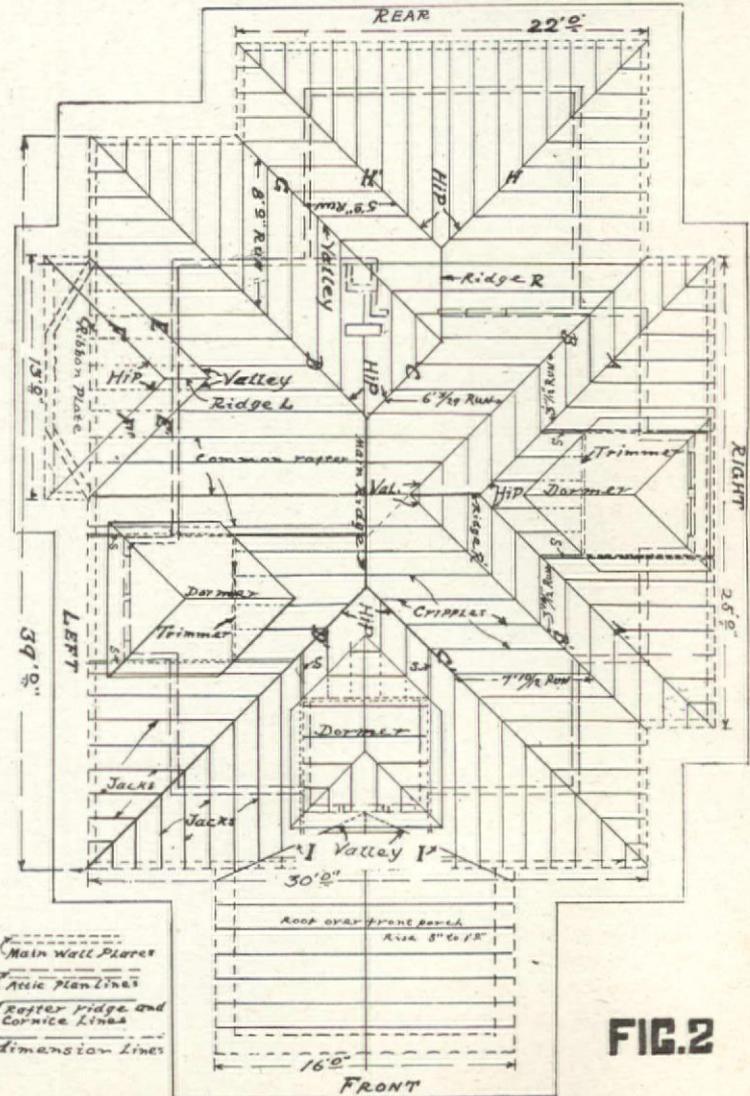
It will be seen at Fig. 1 that the pitch of this roof is 10 inch rise to the foot run (except the roof over the front porch, which is 5 inch rise to the foot run); the common run at the widest is seen to be 15 feet, half of 30 feet, the main ridge is therefore 15x10=150 inches=12 feet 6 inches high above the plates. Ridge R' is 25 feet ÷ 2=12 feet 6 inches x 10=125 inches=10 feet 5 inches high above plates. Ridge R is 22 feet ÷ 2=11 feet 0 inches x 10=110 inches=9 feet 2 inches high above plates. Ridge L is 13 feet ÷ 2=6 feet 6 inches x 10=65 inches=5 feet 5 inches high above plates. (See dimensions given on Fig. 1.)

Before we take up the question of finding the lengths of bevels and cuts we will discuss the best method to frame this roof and where to begin, as this is where not a few find difficulty? If the reader will now look at Fig. 2 I will try to explain what I deem the best and most practical method.

The hip rafters marker D-D' and C' I would raise first, putting in the main ridge, which would require a temporary shore under it where D meets it, to hold it up until valley B and a few cripples are in place. Note.—Valley B is extended up to the main ridge as shown by the dotted lines, valley B' cutting to it at the intersection of ridge R, which is just 2 feet 1 inch on the level below the main ridge. Next raise hips H-H' and valley G, then the short hip C, and a few cripples from valley B to ridge R. The roof will now be self-supporting; the balance may be erected as desired.

bay-window, by running the ribbon plate through as the dotted lines show. Valleys I-I' are formed likewise.

It will be seen by the detail of the cornice on the supplement, that the cornice projection is formed by planting the rafter tails



on top of the main rafters, thereby forming the bell-cove seen in the roof at the eaves, therefore, in cutting the rafters, we only require to cut them flush with the main wall plates.

At Fig. 3 is illustrated how to find the lengths of the various rafters with the square. Note.—The use of the side of the square graduated to twelfths. This enables us to work to a 1/12-scale, an inch representing a foot, and a twelfth an inch.

As the pitch of this roof is 10 inches to the foot run, to find the length of the common rafter we measure across the diagonal of

edge—long to short point. The others can be found in like manner by multiplying the run as marked by 15 8/12 inches.

In order to find the length of a hip or valley the run must first be known, which is the diagonal of the square of the common run. Example: Fig. 2 shows the common run to the main ridge to be 15 feet 0 inches; therefore, to get the run of hips D-D' and C' we

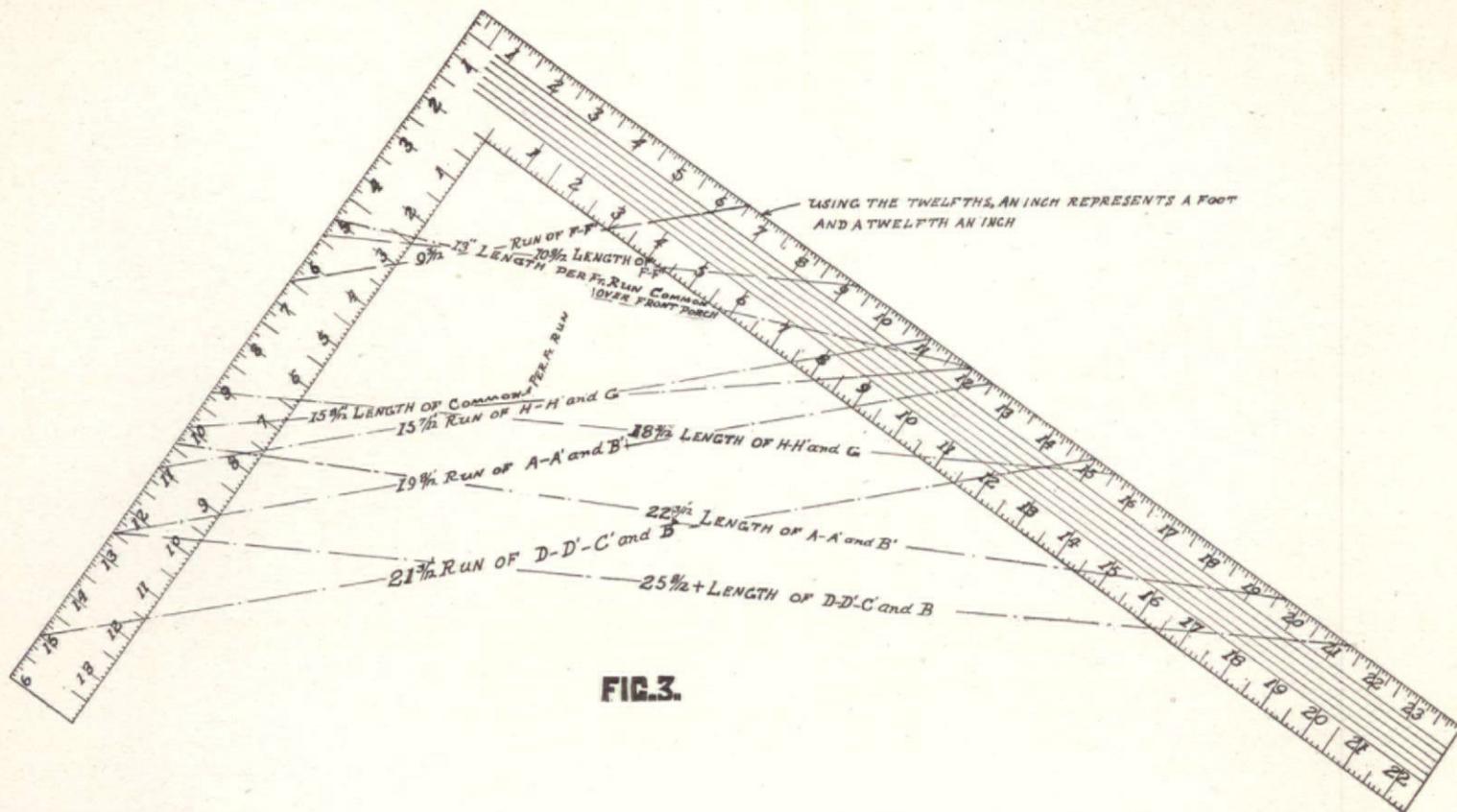


FIG. 3.

the square from 12 on the blade to 10 on the tongue, which is seen to be 15 8/12-inch, the length of the common s, jacks and cripples, to each foot of run, the figures 12 giving us the foot or seat cut, and 10 the plumb cut. The jacks have a cheek cut also, where they fit to the hips, the cripples having a cheek cut at both ends to fit both hips and valleys, except when the one end extends to the ridge; then there is only a cheek cut at one end. (The method of finding cheek cuts was described in the December number. It will therefore not be necessary to take that up here, as the reader can refer to it.)

The first jack set 20 inches from the corner would also have a run of 20 inches = 1 2/3 feet, multiplied by 15 8/12 inches = 26 2/12 inches long; spacing them at 16 inch centers each one would therefore have 16 inches more run than the preceding one. Sixteen inches is 1 1/3 feet multiplied by 15 8/12 inches = 20 11/12 inches longer. (Each jack is therefore 20 11/12 inches longer than the last.)

The cripples in each run between hip and valleys would all be the same length. Example: To find the length of the cripples from valley B' to hip C' the run is seen to be 7 feet 10/12 inches x 15 8/12 inches = 111 8/12 inches = 9 feet 3 8/12 inches length on top

measure the diagonal of the square from 15 inches to 15 inches as at Fig. 3, and we find it measures 21 3/12 inches, the run for these rafters, and also the valley B as it extends to the main ridge.

As before found, the main ridge is 12 feet 6 inches high above the plates, this will be the rise and 21 3/12 inches the run on the square, which shows us that these rafters are 25 8/12 inches = 25 feet 8 inches long.

Further explanation ought not to be necessary, as the diagrams show clearly how they may be found.

I have not made any allowance for the ridge boards, hips and valleys in calculating the lengths, having worked to the centers in each case; the workman would therefore require to allow for the wood taken up with these in cutting the rafters and cut them that much shorter. Thus, jacks would require to be cut half the thickness of the hips shorter; the commons half the thickness of the ridge; the cripples half the thickness of the valley at one end, and half the thickness of the hip at the other end.

The roof over the front porch is simply a common rafter roof, rising 5 inches to the foot run, which is seen to be 13 inches long to each foot run.

COST OF SAND-LIME BRICK

The following information shows the cost of producing sand-lime brick in a single unit factory, capacity up to 20,000 brick of standard size, per day of 10 hours:

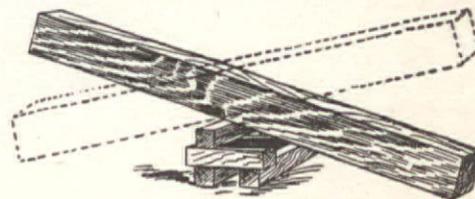
- 1 foreman.
- 1 engineer (to do his own firing).
- 1 engineer (night watchman).
- 8 common laborers.
- 2 1/2 tons lime.
- 3 tons steam coal or equivalent.
- Oils, waste, \$2.00.
- Repairs, wear and tear, \$5.00.
- Total for 20 M. brick.

Expense for management, insurance and incidentals are to be added.

If the sand has to be shipped in, add the cost of two cubic yards for each thousand brick.

RAISING A HEAVY TIMBER WITHOUT TACKLE

A heavy stick of green timber 12 inches by 14 inches and 48 feet long was raised to a height of 7 feet 6 inches in fifteen minutes without the use of tackle, and one assistant. The timber was



raised as is shown in the sketch, by see-sawing it and building up a crib of blocks beneath it. Each time one end of the timber went up a new block was placed, the work proceeding in this manner until the desired height was attained.—The Operative Miller.

STEEL A SUBSTITUTE FOR WOOD BEAMS

By S. VAN RAALTE



THE BEST modern practice, and the demands of municipal building laws, compel the use of fireproof beams for the support of all masonry walls, over openings of large span. While the calculation of these is more in the province of the architect and engineer, it often happens especially in alteration work, that our versatile friend, the contractor, finds he has it to do.

There are many methods of calculation more or less complicated, for steel beams supporting walls, floors, roofs, etc., all involving the use of a standard handbook, which comparatively few of us possess. Even if we do, and are not familiar with the use of it, we have a tedious problem with several liabilities of error.

The table in this article gives in the heading of each part the size of a beam, white pine or hard pine as the case may be. The left hand column gives the various spans, the next column being the maximum distributed load that the wood beam can carry, and not deflect or sag down more than one thirtieth of an inch for every foot of span.

The third column gives the depth and weight per lineal foot of the I beam which will safely carry the same load as the wood beam, and deflect no more than it. The fourth column gives us the same data but it deals with channel beams.

The fifth column gives the depth and weight per lineal foot of each of two I beams that will together safely carry the load with the same restrictions as before, and the last column gives the same particulars of each of two channels.

6-in. x 6-in. White Pine.

| Span in Feet. | Safe Load. | I Beam. | C Beams. | 2-I's Each. | 2-C's Each. |
|---------------|------------|--------------------|--------------------|--------------------|---------------------|
| 6 | 4320 | 4-in. @ 7.5 pounds | 5-in. @ 6.5 pounds | 3-in. @ 5.5 pounds | 4-in. @ 5.25 pounds |
| 8 | 2652 | 4-in. @ 7.5 pounds | 5-in. @ 6.5 pounds | 3-in. @ 5.5 pounds | 4-in. @ 5.25 pounds |
| 10 | 1698 | 4-in. @ 7.5 pounds | 5-in. @ 6.5 pounds | 3-in. @ 5.5 pounds | 4-in. @ 5.25 pounds |
| 12 | 1176 | 4-in. @ 7.5 pounds | 5-in. @ 6.5 pounds | 3-in. @ 5.5 pounds | 4-in. @ 5.25 pounds |

6-in. x 6-in. Hard Pine.

| Span in Feet. | Safe Load. | I Beam. | C Beams. | 2-I's Each. | 2-C's Each. |
|---------------|------------|---------------------|--------------------|--------------------|---------------------|
| 6 | 5336 | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds | 4-in. @ 7.5 pounds | 4-in. @ 5.25 pounds |
| 8 | 3564 | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds | 4-in. @ 7.5 pounds | 4-in. @ 5.25 pounds |
| 10 | 2280 | 4-in. @ 7.5 pounds | 5-in. @ 6.5 pounds | 4-in. @ 7.5 pounds | 4-in. @ 5.25 pounds |
| 12 | 1584 | 4-in. @ 7.5 pounds | 5-in. @ 6.5 pounds | 4-in. @ 7.5 pounds | 4-in. @ 5.25 pounds |
| 14 | 1164 | 4-in. @ 7.5 pounds | 5-in. @ 6.5 pounds | 4-in. @ 7.5 pounds | 4-in. @ 5.25 pounds |

6-in. x 8-in. White Pine.

| Span in Feet. | Safe Load. | I Beam. | C Beams. | 2-I's Each. | 2-C's Each. |
|---------------|------------|---------------------|------------------|--------------------|--------------------|
| 6 | 7680 | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds | 4-in. @ 7.5 pounds | 5-in. @ 6.5 pounds |
| 8 | 5760 | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds | 4-in. @ 7.5 pounds | 5-in. @ 6.5 pounds |
| 10 | 4026 | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds | 4-in. @ 7.5 pounds | 5-in. @ 6.5 pounds |
| 12 | 2796 | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds | 4-in. @ 7.5 pounds | 5-in. @ 6.5 pounds |
| 14 | 2052 | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds | 4-in. @ 7.5 pounds | 5-in. @ 6.5 pounds |
| 16 | 1788 | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds | 4-in. @ 7.5 pounds | 5-in. @ 6.5 pounds |
| 18 | 1572 | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds | 4-in. @ 7.5 pounds | 5-in. @ 6.5 pounds |

6-in. x 8-in. Hard Pine.

| Span in Feet. | Safe Load. | I Beam. | C Beams. | 2-I's Each. | 2-C's Each. |
|---------------|------------|----------------------|----------------------|---------------------|------------------|
| 6 | 11520 | 6-in. @ 12.25 pounds | 8-in. @ 11.25 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 8 | 8640 | 6-in. @ 12.25 pounds | 8-in. @ 11.25 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 10 | 5406 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 12 | 3756 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 14 | 2760 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 16 | 2400 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 18 | 2112 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 20 | 1868 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 22 | 1668 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 24 | 1572 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |

6-in. x 10-in. White Pine.

| Span in Feet. | Safe Load. | I Beam. | C Beams. | 2-I's Each. | 2-C's Each. |
|---------------|------------|----------------------|----------------------|---------------------|------------------|
| 6 | 12000 | 6-in. @ 12.25 pounds | 8-in. @ 11.25 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 8 | 9000 | 6-in. @ 12.25 pounds | 8-in. @ 11.25 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 10 | 7200 | 6-in. @ 12.25 pounds | 8-in. @ 11.25 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 12 | 5466 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 14 | 4194 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 16 | 3498 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 18 | 3072 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 20 | 2430 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 22 | 1968 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 24 | 1868 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |

6-in. x 10-in. Hard Pine.

| Span in Feet. | Safe Load. | I Beam. | C Beams. | 2-I's Each. | 2-C's Each. |
|---------------|------------|-------------------|----------------------|----------------------|---------------------|
| 6 | 18000 | 7-in. @ 15 pounds | 9-in. @ 13.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 8 | 13500 | 7-in. @ 15 pounds | 9-in. @ 13.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 10 | 10800 | 7-in. @ 15 pounds | 9-in. @ 13.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 12 | 7332 | 7-in. @ 15 pounds | 9-in. @ 13.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 14 | 5400 | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 16 | 4692 | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 18 | 4122 | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 20 | 3258 | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 22 | 2640 | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 24 | 2166 | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 26 | 1830 | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |

6-in. x 12-in. White Pine.

| Span in Feet. | Safe Load. | I Beam. | C Beams. | 2-I's Each. | 2-C's Each. |
|---------------|------------|-------------------|----------------------|----------------------|---------------------|
| 6 | 17380 | 7-in. @ 15 pounds | 9-in. @ 13.25 pounds | 5-in. @ 9.75 pounds | 7-in. @ 9.75 pounds |
| 8 | 12960 | 7-in. @ 15 pounds | 9-in. @ 13.25 pounds | 5-in. @ 9.75 pounds | 7-in. @ 9.75 pounds |
| 10 | 10368 | 7-in. @ 15 pounds | 9-in. @ 13.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 12 | 8640 | 7-in. @ 15 pounds | 9-in. @ 13.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 14 | 6936 | 8-in. @ 18 pounds | 9-in. @ 13.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 16 | 6042 | 8-in. @ 18 pounds | 9-in. @ 13.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 18 | 5310 | 8-in. @ 18 pounds | 9-in. @ 13.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 20 | 4200 | 8-in. @ 18 pounds | 9-in. @ 13.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 22 | 3402 | 8-in. @ 18 pounds | 9-in. @ 13.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 24 | 2808 | 8-in. @ 18 pounds | 9-in. @ 13.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 26 | 2358 | 8-in. @ 18 pounds | 9-in. @ 13.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |

6-in. x 12-in. Hard Pine.

| Span in Feet. | Safe Load. | I Beam. | C Beams. | 2-I's Each. | 2-C's Each. |
|---------------|------------|-------------------|----------------------|-------------------|----------------------|
| 6 | 25920 | 9-in. @ 21 pounds | 12-in. @ 20.5 pounds | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds |
| 8 | 19440 | 9-in. @ 21 pounds | 12-in. @ 20.5 pounds | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds |
| 10 | 15552 | 9-in. @ 21 pounds | 12-in. @ 20.5 pounds | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds |
| 12 | 12960 | 9-in. @ 21 pounds | 12-in. @ 20.5 pounds | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds |
| 14 | 9306 | 8-in. @ 18 pounds | 10-in. @ 15 pounds | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds |
| 16 | 8106 | 8-in. @ 18 pounds | 10-in. @ 15 pounds | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds |
| 18 | 7128 | 8-in. @ 18 pounds | 10-in. @ 15 pounds | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds |
| 20 | 5628 | 8-in. @ 18 pounds | 10-in. @ 15 pounds | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds |
| 22 | 4760 | 8-in. @ 18 pounds | 10-in. @ 15 pounds | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds |
| 24 | 3768 | 8-in. @ 18 pounds | 10-in. @ 15 pounds | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds |
| 26 | 3168 | 8-in. @ 18 pounds | 10-in. @ 15 pounds | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds |

8-in. x 8-in. White Pine.

| Span in Feet. | Safe Load. | I Beam. | C Beams. | 2-I's Each. | 2-C's Each. |
|---------------|------------|----------------------|---------------------|---------------------|--------------------|
| 6 | 10240 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 4-in. @ 7.5 pounds | 5-in. @ 6.5 pounds |
| 8 | 7680 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 5-in. @ 6.5 pounds |
| 10 | 5368 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 12 | 3728 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 14 | 2736 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 16 | 2384 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 18 | 2096 | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |

8-in. x 8-in. Hard Pine.

| Span in Feet. | Safe Load. | I Beam. | C Beams. | 2-I's Each. | 2-C's Each. |
|---------------|------------|----------------------|----------------------|---------------------|------------------|
| 6 | 15360 | 7-in. @ 15 pounds | 9-in. @ 13.25 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 8 | 11520 | 7-in. @ 15 pounds | 9-in. @ 13.25 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 10 | 7200 | 6-in. @ 12.25 pounds | 8-in. @ 11.25 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 12 | 5008 | 6-in. @ 12.25 pounds | 8-in. @ 11.25 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 14 | 3680 | 6-in. @ 12.25 pounds | 8-in. @ 11.25 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 16 | 3200 | 6-in. @ 12.25 pounds | 8-in. @ 11.25 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 18 | 2816 | 6-in. @ 12.25 pounds | 8-in. @ 11.25 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 20 | 2224 | 6-in. @ 12.25 pounds | 8-in. @ 11.25 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |
| 22 | 1800 | 6-in. @ 12.25 pounds | 8-in. @ 11.25 pounds | 5-in. @ 9.75 pounds | 6-in. @ 8 pounds |

8-in. x 10-in. White Pine.

| Span in Feet. | Safe Load. | I Beam. | C Beams. | 2-I's Each. | 2-C's Each. |
|---------------|------------|-------------------|----------------------|----------------------|---------------------|
| 6 | 16000 | 7-in. @ 15 pounds | 9-in. @ 13.25 pounds | 5-in. @ 9.75 pounds | 7-in. @ 9.75 pounds |
| 8 | 12000 | 7-in. @ 15 pounds | 9-in. @ 13.25 pounds | 5-in. @ 9.75 pounds | 7-in. @ 9.75 pounds |
| 10 | 9600 | 7-in. @ 15 pounds | 9-in. @ 13.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 12 | 7288 | 7-in. @ 15 pounds | 9-in. @ 13.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 14 | 5352 | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 16 | 4684 | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 18 | 4096 | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 20 | 3240 | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |
| 22 | 2624 | 7-in. @ 15 pounds | 8-in. @ 11.25 pounds | 6-in. @ 12.25 pounds | 7-in. @ 9.75 pounds |



8-in.x10-in. Hard Pine.

Table with 5 columns: Span, Safe Load, I Beam, C Beam, 2-I's Each, 2-C's Each. Rows 6-24.

10-in.x12-in. Hard Pine.

Table with 5 columns: Span, Safe Load, I Beam, C Beam, 2-I's Each, 2-C's Each. Rows 6-24.

8-in.x12-in. White Pine.

Table with 5 columns: Span, Safe Load, I Beam, C Beam, 2-I's Each, 2-C's Each. Rows 6-24.

10-in.x14-in. White Pine.

Table with 5 columns: Span, Safe Load, I Beam, C Beam, 2-I's Each, 2-C's Each. Rows 6-24.

8-in.x12-in. Hard Pine.

Table with 5 columns: Span, Safe Load, I Beam, C Beam, 2-I's Each, 2-C's Each. Rows 6-24.

10-in.x14-in. Hard Pine.

Table with 5 columns: Span, Safe Load, I Beam, C Beam, 2-I's Each, 2-C's Each. Rows 6-24.

10-in.x10-in. White Pine.

Table with 5 columns: Span, Safe Load, I Beam, C Beam, 2-I's Each, 2-C's Each. Rows 6-24.

12-in.x12-in. White Pine.

Table with 5 columns: Span, Safe Load, I Beam, C Beam, 2-I's Each, 2-C's Each. Rows 6-24.

10-in.x10-in. Hard Pine.

Table with 5 columns: Span, Safe Load, I Beam, C Beam, 2-I's Each, 2-C's Each. Rows 6-24.

12-in.x12-in. Hard Pine.

Table with 5 columns: Span, Safe Load, I Beam, C Beam, 2-I's Each, 2-C's Each. Rows 6-24.

10-in.x12-in. White Pine.

Table with 5 columns: Span, Safe Load, I Beam, C Beam, 2-I's Each, 2-C's Each. Rows 6-24.

12-in.x14-in. White Pine.

Table with 5 columns: Span, Safe Load, I Beam, C Beam, 2-I's Each, 2-C's Each. Rows 6-24.

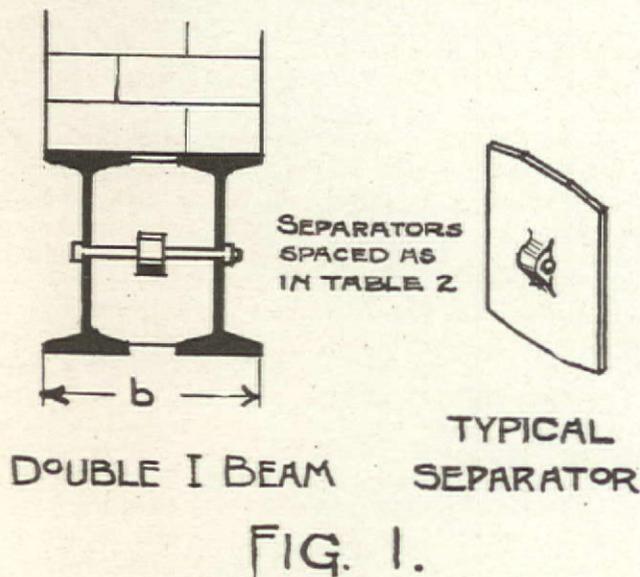
12-in.x14-in. Hard Pine.

| Span. | Safe Load. | I Beam. | C Beam. | 2-Is Each. | 2-C's Each. |
|-------|------------|--------------------|------------------|------------------|--------------------|
| 6 | 70560 | 12-in.@40 pounds | 15-in.@33 pounds | 10-in.@25 pounds | 12-in.@20.5 pounds |
| 8 | 52920 | 12-in.@40 pounds | 15-in.@33 pounds | 10-in.@25 pounds | 12-in.@20.5 pounds |
| 10 | 42336 | 12-in.@40 pounds | 15-in.@33 pounds | 10-in.@25 pounds | 12-in.@20.5 pounds |
| 12 | 35280 | 12-in.@40 pounds | 15-in.@33 pounds | 10-in.@25 pounds | 12-in.@20.5 pounds |
| 14 | 30240 | 12-in.@40 pounds | 15-in.@33 pounds | 10-in.@25 pounds | 12-in.@20.5 pounds |
| 15 | 25752 | 12-in.@31.5 pounds | 15-in.@33 pounds | 9-in.@21 pounds | 12-in.@20.5 pounds |
| 16 | 22632 | 12-in.@31.5 pounds | 15-in.@33 pounds | 9-in.@21 pounds | 12-in.@20.5 pounds |
| 18 | 17880 | 12-in.@31.5 pounds | 15-in.@33 pounds | 9-in.@21 pounds | 12-in.@20.5 pounds |
| 20 | 14484 | 12-in.@31.5 pounds | 15-in.@33 pounds | 9-in.@21 pounds | 12-in.@20.5 pounds |
| 22 | 11976 | 12-in.@31.5 pounds | 15-in.@33 pounds | 9-in.@21 pounds | 12-in.@20.5 pounds |
| 24 | 10056 | 12-in.@31.5 pounds | 15-in.@33 pounds | 9-in.@21 pounds | 12-in.@20.5 pounds |

The application of the table is direct, if the size of the wood beam is known, as it would be, if we were taking out an old beam and substituting a steel one for it, but there is a factor that must be kept in mind. It is this, steel beams are inclined to twist sideways when used for long spans and fully loaded. The usual handbook rule is that beams shall be braced against twisting, at spaces of 20 times their flange width or the load shall be reduced accordingly. In our table the loading has been cut down considerably in order that the vertical deflection shall not exceed one-thirtieth of an inch per foot of span, so the bracing against sideways distortion can be safely spaced at distances of thirty times the flange width.

From this it can be easily seen that each of the four arrangements of beams have more or less advantages over the others, or perhaps it might be better stated that each style of beam is best adapted for a particular purpose.

For supporting a wall load two I beams, or two channels used with cast iron separators between, form probably the safest and most convenient beam. In these, separators as shown in figure 1 should be spaced at distances of 30 times the flange width of a single beam, in order that the two may act together. The usual pipe separators should not be used unless the interior space is filled with concrete, or masonry.



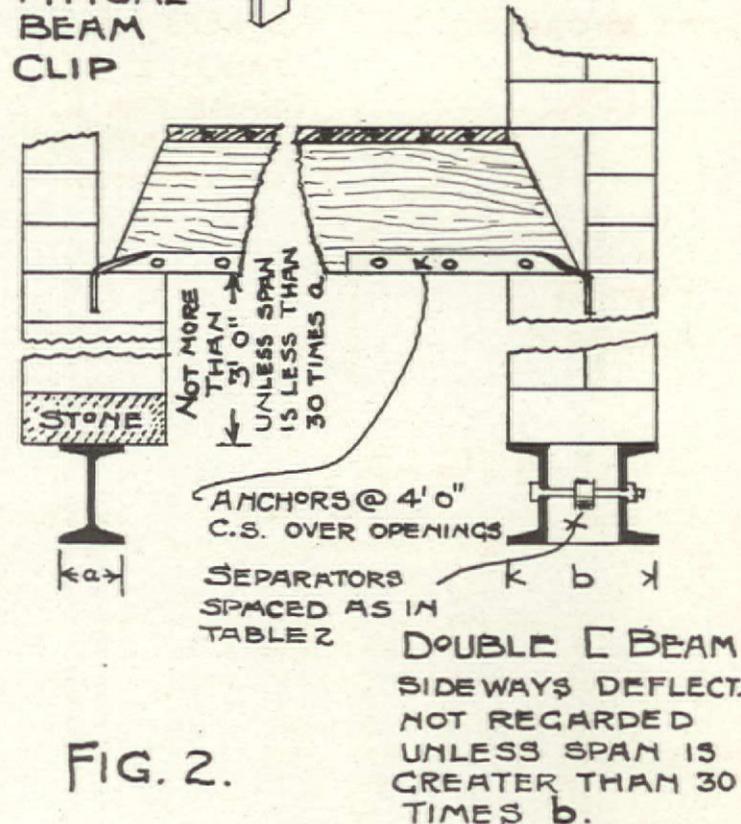
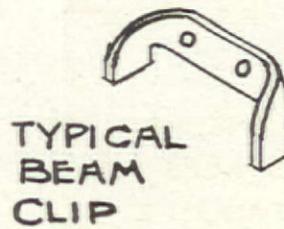
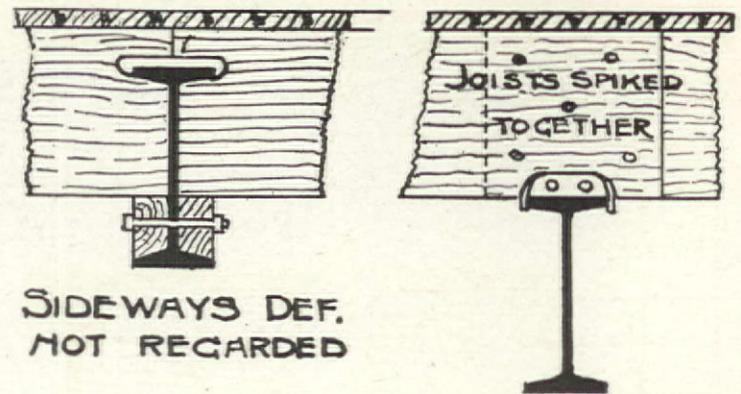
For the sideways distortion or twisting, the width out to out of the assembled beam may be considered as the flange width. By spacing the beams a sufficient distance apart any exterior bracing becomes unnecessary. In cases where either a double or single beam is used as a lintel, if the wall is anchored by the joists three feet or less above the top of the lintel, the twisting of the beam may be disregarded.

The I beam used singly is usually the most convenient support for roof and floor joists, and where the joists abut the web on both sides, the beam may be reckoned safe from twisting. If they simply rest on the top flange, some kind of clip must be used at the 30 times flange width spacing. This clip need only grip the top of the beam, and if it is not furred and cased, can be made so small that the ceiling plaster or boards will cover it.

Where the joists are on only one side, a clip must be devised to hold the top flange of the beam, and this is also good where a beam supports a wall and has the joists on one side only.

The channel used singly is best adapted for the support of floor joists against a wall, but it can be utilized for the same purposes as an I beam, keeping always in mind that it is narrower and must be braced against sideways distortion.

Summing up it can be generally said that a double beam should be used to support masonry, and the single beams to carry floor, ceiling and roof loads.



Below is a table giving the flange width and spacing of clips or bracing in single beams, and of separators in double beams, but it must be kept in view that this spacing only holds good where the load has been reduced for deflection.

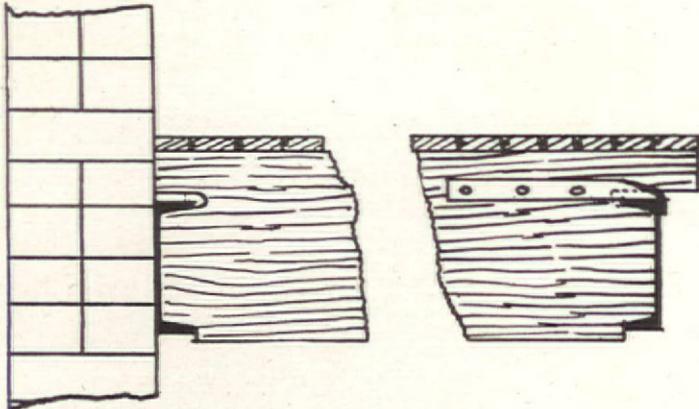
Where this is not done, that is, where beams are loaded to the manufacturers tabular load, the spaces should be two-thirds of that given here.

Spacing of bracing or separators in Standard I beams and channels, loads being corrected for a deflection of 1-360 span.

| I BEAMS. | | | | CHANNELS. | | | |
|----------------|----------------|-----------------------|-----------------------------------|----------------|----------------|-----------------------|-----------------------------------|
| Depth of Beam. | Width of Beam. | Weight per Lintel ft. | Spacing of Bracing or Separators. | Depth of Beam. | Width of Beam. | Weight per Lintel ft. | Spacing of Bracing or Separators. |
| 3-in. | 2 1/4-in. | 5 1/2 pounds | 5 ft. 10-in. | 3-in. | 1 7/8-in. | 4 pounds | 3 ft. 6 1/2-in. |
| 4-in. | 2 3/4-in. | 7 1/2 pounds | 6 ft. 8-in. | 4-in. | 1 3/4-in. | 5.25 pounds | 3 ft. 11-in. |
| 5-in. | 3-in. | 9 3/4 pounds | 7 ft. 6-in. | 5-in. | 1 3/4-in. | 6 1/2 pounds | 4 ft. 4 1/2-in. |
| 6-in. | 3 1/2-in. | 12 1/4 pounds | 8 ft. 4-in. | 6-in. | 1 3/4-in. | 8 pounds | 4 ft. 10 1/2-in. |
| 7-in. | 3 3/4-in. | 15 pounds | 9 ft. 2-in. | 7-in. | 2 1/10-in. | 9 3/4 pounds | 5 ft. 3-in. |
| 8-in. | 4-in. | 18 pounds | 10 ft. 0-in. | 8-in. | 2 1/4-in. | 11 1/4 pounds | 5 ft. 7 1/2-in. |
| 9-in. | 4 1/2-in. | 21 pounds | 10 ft. 10-in. | 9-in. | 2 1/2-in. | 13 1/4 pounds | 6 ft. 0 1/2-in. |
| 10-in. | 4 3/4-in. | 25 pounds | 11 ft. 8-in. | 10-in. | 2 3/5-in. | 15 pounds | 6 ft. 6-in. |
| 12-in. | 5-in. | 31 1/2 pounds | 12 ft. 6-in. | 12-in. | 2 1/2-in. | 20 1/4 pounds | 7 ft. 4 1/2-in. |
| 12-in. | 5 1/4-in. | 40 pounds | 13 ft. 1 1/2-in. | 15-in. | 3 2/5-in. | 33 pounds | 8 ft. 6-in. |

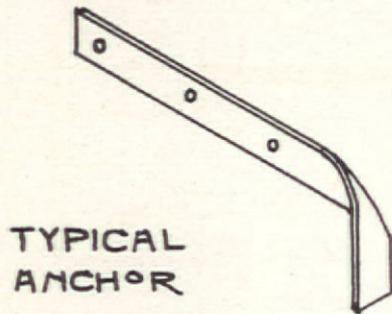
Another point to bear in mind is that holes in the web of steel beams do not greatly reduce the strength, but holes in the flanges do, so that if lagging is required, it should be so arranged that all the holes are in the web.

The loads given in these tables are kept in stock by every manufacturer and kept while in some cases special beams would be more economical, the difficulty of obtaining them in small quantities prevents their use.



SIDEWAYS DEFLECTION NOT REGARDED

ANCHORS AT SPACES AS IN TABLE 2. SAME FOR I UNDER SIMILAR CONDITIONS



TYPICAL ANCHOR

FIG. 3.

The various drawings give a few suggestions of good methods of using steel beams, with typical anchors and separators.

To the poet life's a song;
To the doctor life's a patient
That needs treatment right along.

To the soldier life's a battle,
To the teacher life's a school;
Life's a good thing to the grafter,
It's a failure to the fool.

To the man upon the engine,
Life's a long and heavy grade,
It's a gambler to the gambler,
To the merchant life is trade.

Life's a picture to the artist,
To the rascal life's a fraud;
Life perhaps is but a burden
To the men beneath the hod,

Life is lovely to the lover,
To the player life's a play,
Life may be a load of trouble
To the man upon the dray.

Life is but a long vacation
To the man who loves his work;
Life's an everlasting effort
To shun duty to the shirk.

To the heaven blest romancer
Life's a story ever new;
Life is what we try to make it—
Brother, what is life to you?

ZINC ROOFS

By H. M. SANDERS



THE rise of zinc for roofs of buildings is better known and more generally practiced in England and other European countries, than in this country. In view of this fact it may not be considered an inappropriate subject for us to consider at this time. It is true that the use of zinc for roofs in these European countries, is confined to the cheaper class of buildings, and rarely if ever used for buildings of a permanent character. It is also true that some years ago the Society for the protection of ancient buildings in England, issued a pamphlet characterizing zinc roofs as a "pest" spreading over the country. Still, England, like this and other countries, is constantly putting up a large class of a more temporary character, seeks a cheaper material for the roofs, than lead or copper, whose value as to durability is measured by centuries of use and not by years. So that because of its cheapness as compared to lead or copper, it has thus become more or less a favorite as a roof material for a large class of buildings.

In this country the prevailing metal roofs for our cheaper class of buildings is tin-plated metal. Now how does a zinc roof compare with a tin roof, as to durability?

Not so much perhaps because of the simple fact that it was being used on the cheaper class of buildings, but rather because, realizing that great durability and lasting qualities was the one thing essential in a roof material for permanent buildings, and knowing something of the nature and character of zinc, that it was a short lived metal for roofs as compared to sheet lead or sheet copper whose durability for roofs, had become so well established by centuries of use they seemed to look upon the use of zinc on the cheaper buildings as a kind of menace in the future to what might become the roofs of the permanent buildings. This of course would depend very much upon conditions. What conditions? First, the comparative value of the metal used for the roof, not only as between the zinc and tin plate metal, but the comparative value of the roofing tin plate today as compared to that used 50 or 60 years ago.

Zinc roofs would compare favorably with tin roofs whose base plate was steel, as most of it is as manufactured today, but it would not compare so favorably with the tin plate, whose base is charcoal iron such as was manufactured 75 or more years ago. The tin roofs of this class has a record of 75 years endurance and durability on building. But since the introduction of the steel, as the base of our tin plate, it may be said with truth we believe, that the zinc roof properly put on is the most durable roof, for it will last from 25 to 30 years.

It is true, zinc may vary in value, but, we believe, all that which is made in this country is of a uniform grade of value. In foreign countries, where they use more of it for roofing purposes than in this country, there are more entering this field of its manufacture, and the competition has tended to cheapen the metal in localities both in price and quality. But the best and purest sheet zinc obtainable in Europe, we believe, is that known as the V. M., made by the Vilella Montague Zinc Company of Belgium, as the spelter from their sheet zinc is made is practically pure; as shown by the following analysis:

| | |
|-----------------|-------|
| Zinc | 0.995 |
| Iron | 0.004 |
| Lead, etc. | 0.001 |
| | 1.000 |

While absolutely pure zinc is not obtainable, commercially, the amount of alloy in this formula is so small that it is considered practically pure. So that from the very nature of the metal itself being practically pure like lead and copper, and as it is not a plated metal tin plate, requiring a baser metal for its body plate, is not subjected to the same disparaging conditions as to value, as the tin plate.

The distinguishing feature of a good sheet of zinc, is in its light even color, whereas a cheaper grade would be of a darker hue, with more or less of a mottled appearance, caused by the presence of other alloys, and be more likely to crack when bent, or working it into shape and form.

(To be continued.)

BUILDER'S COURSE IN ARCHITECTURAL DRAWING

RALPH F. WINDOES.

(Continued from December.)

PLATE IV.

EXERCISES IN PLANE GEOMETRY.

LAY out this plate as you did Plate III, as there are six problems to work. Be careful as to where you place the figures in the squares, as you want room left for the lettering. Make your figures large enough, so they will look well, and above all, understand each problem as you work it out, as these exercises will be of great value to you in the future.

Bisect the lines AB and CD by perpendiculars meeting at D, and with D as center draw a circle through the points.

PROBLEM 10.

An Arc of a Circle Being Given to Complete the Circle.—Join the extreme points of the arc by the chord AB, and bisect it by the perpendicular DE. From A draw chord AC and bisect it by FO and where it meets DE is the center of the circle of which ACB is an arc.

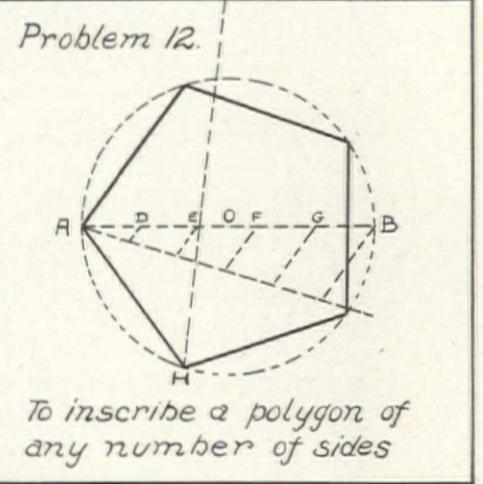
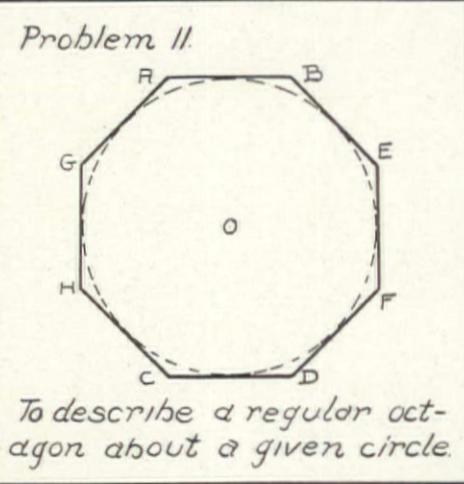
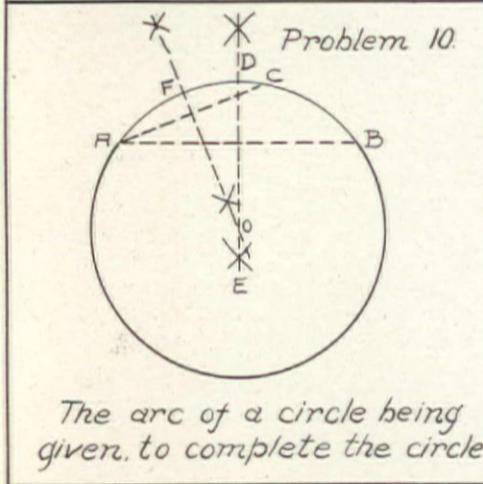
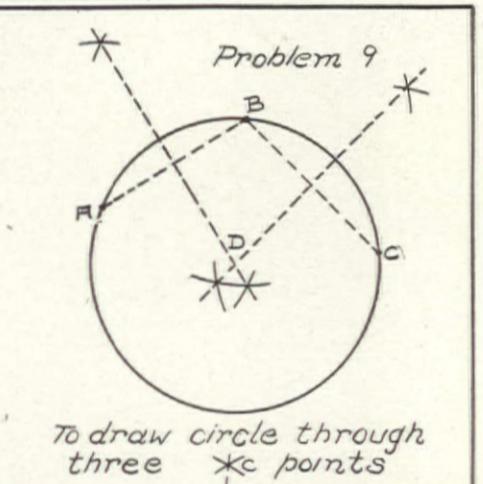
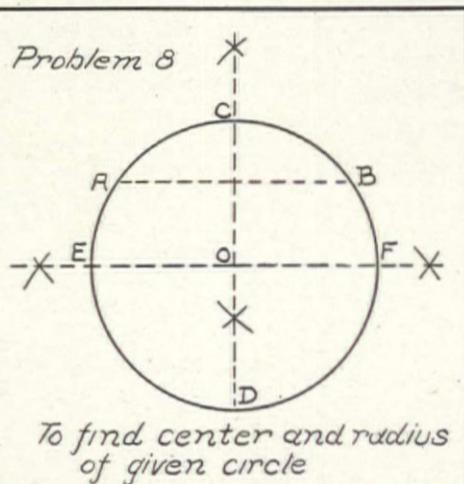
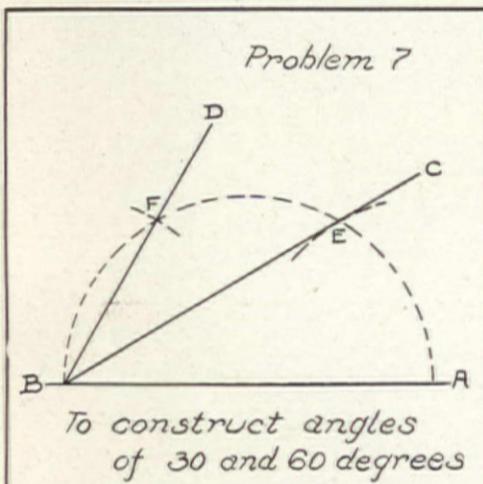


PLATE IV. NAME.

PROBLEM 7.

To Construct Angles of 30 and 60 Degrees.—Draw line AB and at any point on it strike a semi-circle. With A as center and radius equal to the radius of the semicircle, draw an arc intersecting at E. With B as center and same radius, draw an arc intersecting at F. Draw lines from B through E and F. Angle ABC is an angle of 30 degrees, and angle ABD is an angle of 60 degrees.

PROBLEM 8.

To Find the Center and Radius of a Given Circle.—Draw the chord AB and bisect it by the perpendicular CD. Bisect CD by the line EF and the intersection at O will be the required center, and OF the radius.

PROBLEM 9.

To Draw a Circle Through Three Points Not in a Straight Line.—Locate the points ABC and join them by straight lines.

PROBLEM 11.

To Describe a Regular Octagon About a Given Circle.—This method is purely a mechanical one, and strictly speaking should not be called a problem in plane geometry. Draw the circle whose center is O and the horizontal AB and CD parallel to each other and touching the circle. Next draw the verticals EF and GH parallel to each other and touching the circle. With the 45 degree triangle complete the octagon.

PROBLEM 12.

To Inscribe a Polygon of Any Number of Sides.—This is a very good method and should certainly be retained in the memory of the student. By it you can draw a regular figure of any number of sides. For example, we will draw a pentagon, or five-sided polygon. Draw the circle whose center is O and divide the diameter into the same number of parts as there is sides to the figure, in

this case five. To divide the diameter, use the method given in Problem 4. With A as center and radius AB, strike an arc at C, and with B as center and same radius strike an intersecting arc. Through C and the second division E, draw CH to the circumference. Then chord AH is one side of the pentagon. Step off the remaining sides with the dividers.

PLATE V.

EXERCISES IN PLANE GEOMETRY.

Lay out this plate as you did Plates III and IV, and finish it the same.

PROBLEM 13.

To Draw a Tangent to a Circle at Any Point.—Given circle whose center is O. To draw a tangent to it at point A. Draw OA and continue it. Lay off AD equal to AE. At E and D, strike arcs intersecting at B and C. Connect these points and BC is tangent to the circle at point A.

PROBLEM 14.

To Draw a Spiral Composed of Arcs and Circles.—Produce a straight line through AB indefinitely both ways. With A as center and AB as radius, describe the semi-circle C; then with B as center draw the semi-circle D, joining C, and continue this operation, using the centers A and B alternately.

E, F, G, H. With O and P as centers, and radius equal to OH, describe arcs between HG and EF, to complete the figure.

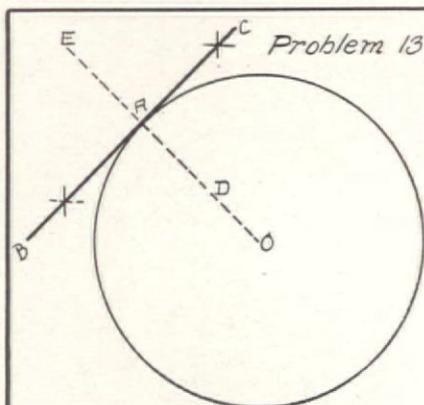
PROBLEM 17.

To Draw an Ellipse, the Length and Breadth Being Given.—This is also a false ellipse and should properly be called an oval. With E as center and EC as radius, draw arc cutting AB in F. Divide FB into three equal parts and continue another to 4. Take the distance B4 and set it off on each side of the center E, at H and I. With H and I as centers and radius equal to HI, describe arcs cutting each other at P and R. From these last points draw indefinite lines through H and I. With H and I as centers, and radius equal to HA, draw the arcs OL and MN. With P and R as centers and radius PD, describe the arcs ON and LM, to complete the figure.

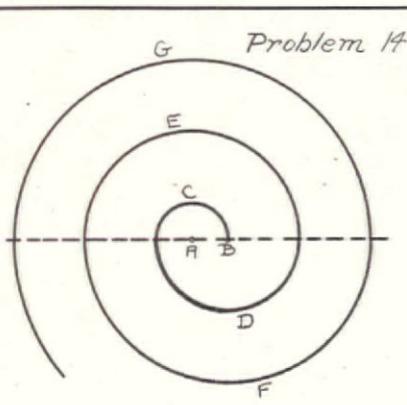
PROBLEM 18.

To Construct a Helix.—If a point travels around and up, or down, a cylinder with a uniform motion, we say the path it describes is a helix. The screw thread is an example of this. The line of a winding stairway is a helix and not a spiral stairway as it is commonly called. The pitch of the screw thread is the distance between threads measured along the axis of length. The pitch of the helix is the same. In Problem 18, AB is the pitch.

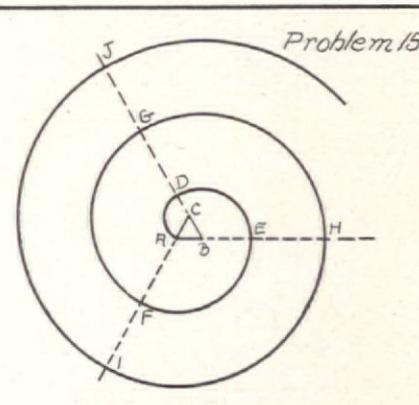
To draw the curve the diameter of the cylinder and the pitch



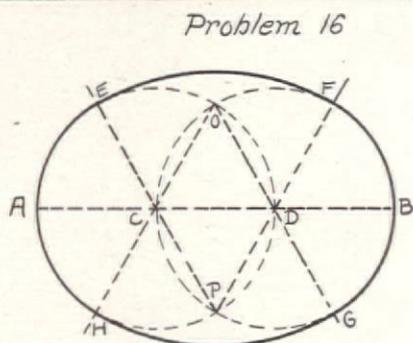
To draw a tangent to a circle at any point.



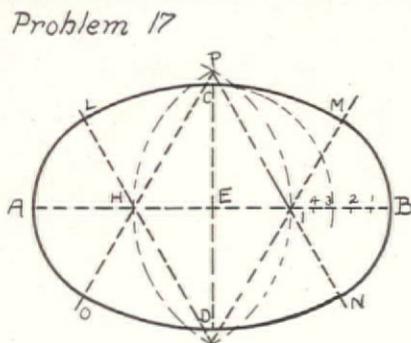
To draw a spiral composed of arcs of circles



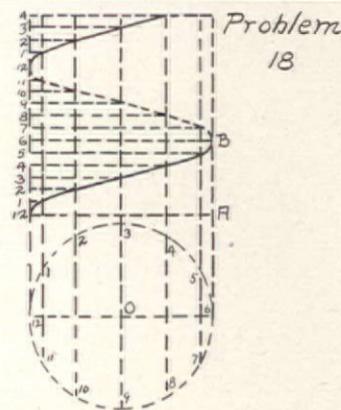
To draw a spiral. Another method



To draw an ellipse, the length being given.



To draw an ellipse the length and breadth being given.



To construct a helix.

PLATE V. NAME.

PROBLEM 15.

To Draw a Spiral (Another Method).—Construct the small equilateral triangle ABC and produce its sides. With C as center and AC as radius, describe the arc AD. With B as center and BD as radius, describe the arc DE. With A as center and AE as radius, describe the arc EF. Continue this operation, using successively points C, B, and A.

PROBLEM 16.

To Draw an Ellipse the Length Being Given.—This is not a true ellipse, as it is composed of the arcs of circles, but it serves as one in nearly every case. Divide the given length into three parts, AC, CD, and DB, all equal in length. With C and D as centers, and AC as radius, describe two circles cutting each other in OP. From OP, draw lines through CD, cutting the circles in

must be known. Draw the circle whose center is O with the given diameter. Divide the circumference into an even number of equal parts, in this case twelve. Lay off a rectangle above the circle whose base is equal to the given diameter. On one side of the rectangle lay off the pitch. Divide the pitch into the same number of parts as the circle was divided. Number the points on the circle and on the rectangle. Draw vertical lines up from the points on the circle, and intersecting horizontal lines over from the points on the rectangle. Points of like number should intersect. Through these points draw a neat irregular curve, as shown. Where the line comes up on the other side of the cylinder, it is out of our view, so it is put in dotted.

(To be continued.)



OUR READERS' PAGES

[The Editor does not hold himself responsible for the opinion of correspondents. Short, crisp letters will be appreciated. To insure publication, the name and address of the writer must accompany the communication, not necessarily for publication. Sketches of work or methods will receive our earnest attention. These columns are open to our readers at all times without charge, and any questions or experiences will be given proper space.—Editor.]



ANSWERS

STAIRS WITH WINDERS.

From One of the "Chips," Toronto, Ontario.—In answer to "Mechanics," of Rochester, N. Y., I send the inclosed diagram, which will show him how to set out his treads full size on the

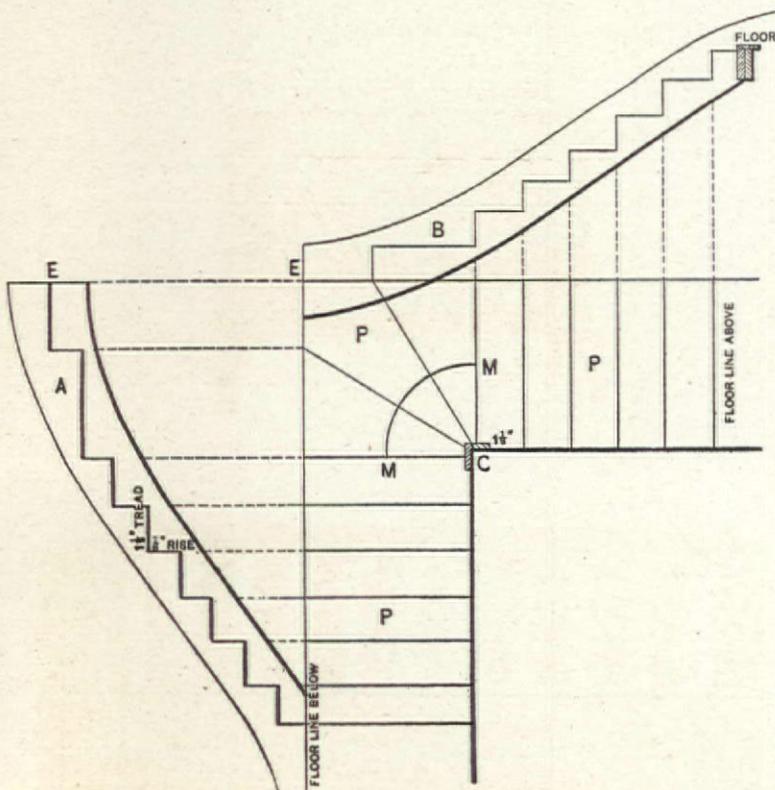


FIG. 8.

floor directly under where the stairs are to stand. Fig. 8 shows the plan for a stair in which both flyers and winders are seen, both in the plan and on the strings. P P P is the plan, A and B the strings, and E E the joint when in place. The bevels are found at E E, and at the foot and top floor. M M shows the quarter cut, which is divided into three parts, and from the center C lines are drawn cutting the quadrant at the points of division, and continued through until the other side of the stair is reached. This division makes the lines for the winders. Another plan of stairs having four winders is shown at Fig. 9. Explanations are unnecessary. Another plan having seven winders is shown at Fig. 10. This has a circular well, as seen at A B C D E. Treads and winders are all numbered, so the whole is plain and easily understood.

OCTAGON BAY WINDOW.

From "One of the Chips," Toronto, Ont.—In answer to this request I send you the following method of forming an octagon, and from this any window or other structure can be laid out. Let H J, Fig. 7, be the given side; at right angles to H J draw J S and H R indefinitely; on J as center with J H, as radius mark the quarter circle O K N; on H as center with the same radius, mark the quarter circle P L M; bisect the quarter circles K and

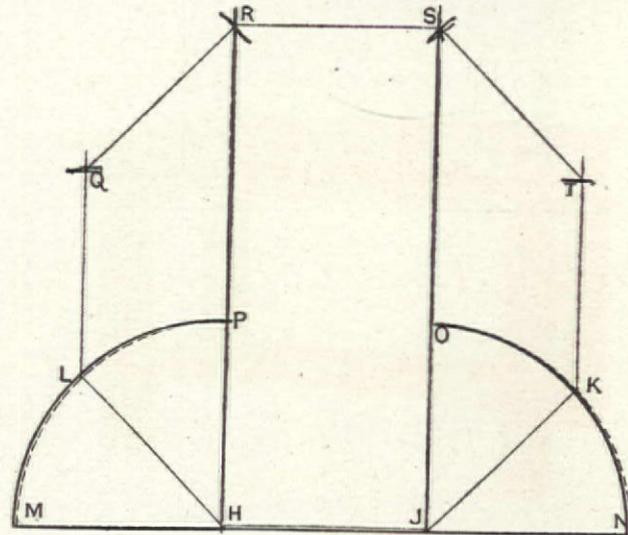


FIG. 7.

L; connect J K and H L; draw K T and L Q parallel to J S and H R; make K T, T S, L Q and Q R each equal J K or H L; connect T S R Q and the figure is complete.

CUTTING PLATE GLASS.

From "A. Ashmun Kelly," Malvern, Pa.—The painter of Duluth, Minn., who wishes to know how to cut plate glass, as his diamond will not cut deep enough, is advised to secure a heavier diamond, one made for the purpose. I have seen men cutting the heaviest plate glass with a heavy diamond, and as easily as a painter will cut an 8x10 window glass. He will draw the diamond steadily along the straight-edge, then take it up in both hands and give it a slight knock on his knee and the piece cut off will break away nicely. Having had some little experience with cutting window glass, as a painter, I was surprised to see how apparently recklessly the professional cutter did his work, and I asked him if he did not feel nervous or fearful of breaking the glass, as that was always my feeling. He replied no, that if he should happen to break a light or plate, even, there were plenty more on hand. It requires nerve or confidence to become an expert glass cutter, and the man who hesitates when cutting glass is usually lost.

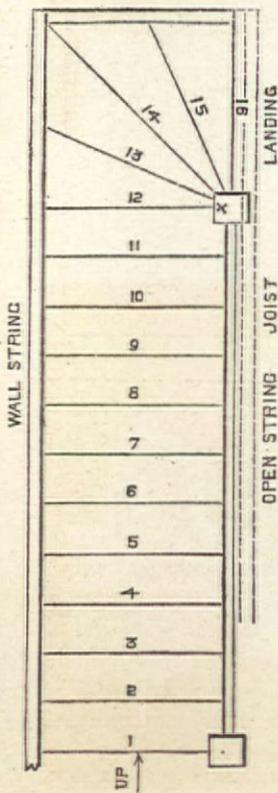


FIG. 9.

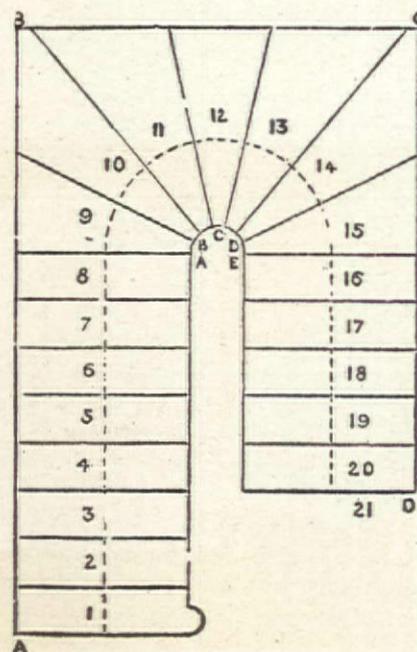


FIG. 10.

CUTTING PLATE GLASS.

From "J. A. B.," Lake Megantic.—In answer to question relating to the cutting of plate glass, I have done the cutting very easily, in making a line with the diamond on both sides of the plate to be cut. I have not experienced any difficulty in separating the glass. I think if Mr. Painter of Duluth, Minn., makes a trial of it he will be pleased with the results.

RUBENS.

From "G. M. L.," Ontario, Canada.—Replying to "Clam Digger," Norwalk. Rubens painted his great picture, "The Descent from the Cross," in 1608. This picture is considered his masterpiece, and is now in the Cathedral of Antwerp.

BIRD'S EYE MAPLE.

From "C. H. R.," Hutchinson, Kans.—I am comparatively a new subscriber and I am quite pleased with THE NATIONAL BUILDER. Some months ago I noticed an inquiry regarding "bird's eye maple," and up to date I have not seen it properly answered, so I send you the following: "Bird's eyes, or the similar marks, are formed by the circular inflections of the fibers formed around spicules, or small sharp points, which protrude from the inner surface of the bark into the soft woody tissues. A plank is covered with numerous small spots, like minute knots, looking like 'bird's eyes,' hence the name."

INSIDE FINISH AND CABINET WORK.

From "Joiner," Chicago, Ill.—Before being able to reply intelligently to the query asked by "C. M. K.," Modesto, Cal., I would require more particulars of what he really wants. If he will ask again and say whether it is moldings, door trim, window trim, stairs, base or what, and I will try and answer and send for publication. I will leave to others acquainted with cabinet work better than I to submit designs in this branch of woodwork.

CABINET WORK.

From "Wm. R. W.," Toledo, Ohio.—Replying to "C. M. K.," Modesto, in part, I submit the following designs, which I think

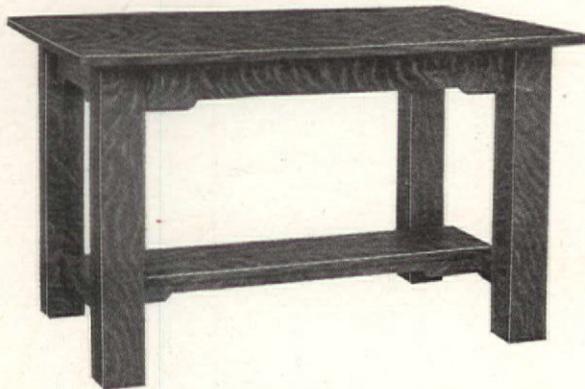


FIG. 4.

may prove useful. Fig. 1 shows designs for bedroom furniture which are not expensive, and may be made of oak, mahogany, cherry



FIG. 5.

or birch stained. Fig 2 is "a buffet" of simple design and construction. Fig. 4 shows a mission table in simple lines. Fig. 5 is a kitchen cabinet, and so designed that any ordinary workman will be able to make one. These pieces are designed mostly for oak, but they may be constructed of almost any wood material and stained to suit. I might say that real good works on modern cabinet-making are published by "The Popular Mechanics" of Chicago, and by The Manual Training School Publishing Company, Peoria, Ill. These books do not cost much. They run, I think, from 50 cents to one dollar each. I daresay they could be obtained through the publishers of THE NATIONAL BUILDER like other books they advertise.



FIG. 2.



FIG. 3.

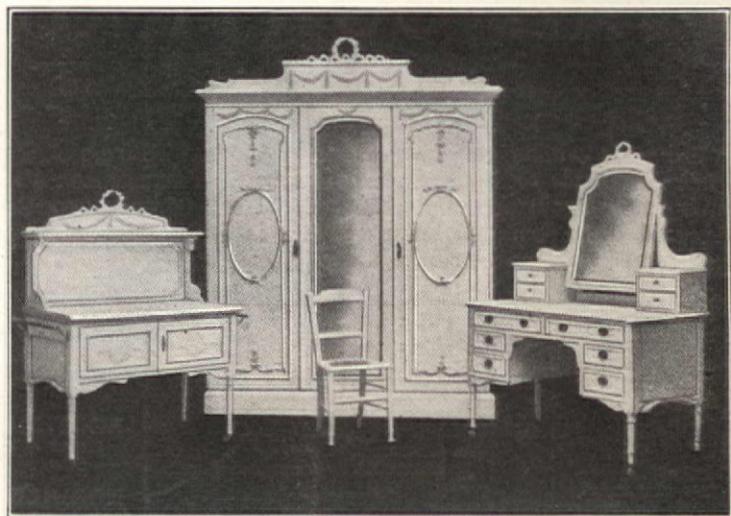


FIG. 1.

SPECIFICATIONS.

Answering C. W. C., Vancouver, B. C.—We are preparing just such a set of specifications as you ask for, and will begin their publication shortly.—(Ed.)

BUFFETS AND SIDEBOARDS.

In reply to D. H. J., Syracuse, N. Y.—We have published from time to time designs of furniture such as you ask for, and will continue to do so, and will bear you in mind when choosing designs for publication in future issues.—(Ed.)

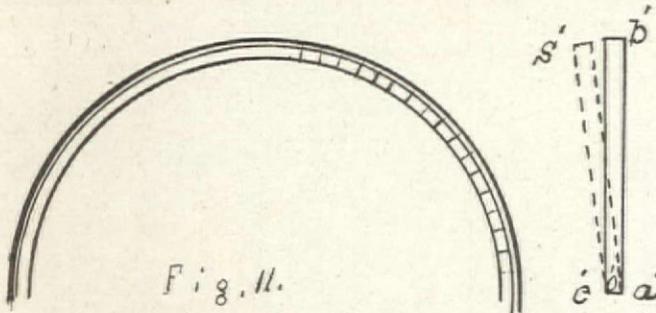
INLAYING.

From "A. D. A.," Chicago, Ill.—Answer to question on inlaying from J. C. O. L., Milwaukee, Wis.: It took me a long time to find out where I could get a book on inlaying or marquetry. The only book of this kind was written by Wm. Bemrose, and is published by Bemrose & Sons., 23 Old Bailey, Derby, London, England.

That is where I sent for one. The book shows how to do the work fully and has ninety colored plates and designs. The price is \$3.00. I learned to do the work from my book, and will sell it to you at much less than cost. I am not in the book business, but always willing to help a reader of THE NATIONAL BUILDER.

KERFING.

From "T. A. F.," Washington, D. C.—If G. F. H., San Francisco, Cal., will first find the radius of his circle, then take a piece of stuff of a suitable length and equal to the thickness of that which is to be bent, as at c a, and let a b be equal to the radius of the curve around which it is to be bent; make a saw kerf at c' o' having a thickness of 1/4 of an inch uncut; nail the piece below

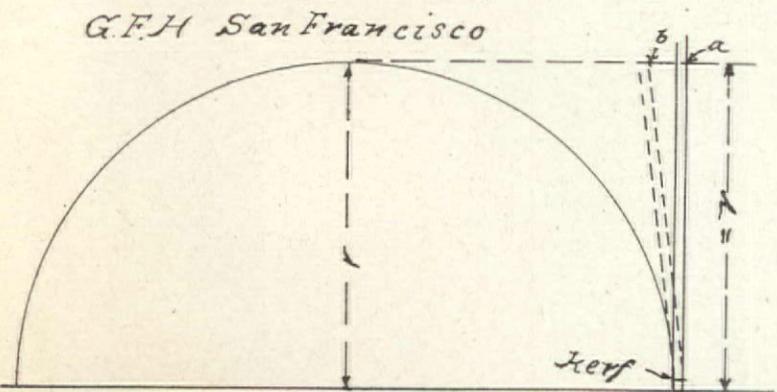


c' a' and move it from b' to s', or enough to close the saw kerf at c', then b' s' will be the given distance between two saw kerfs. Use the same saw for all the kerf.

NOTE.—The editor has fully a dozen answers to this inquiry which have been sent in to him, and there is a sameness in them all. Those given are all that are required, but we thank our readers for their answers, although we may not use them.

KERFING.

From "J. W. S.," Los Angeles, Cal.—In order to get proper curves it may be necessary to experiment a little to get the proper number of saw cuts, and the proper distance of them. Take a piece of lumber—the same kind you are going to use—and the size of



the piece you are going to bend; it need not be longer than radius of your circle. Saw a kerf near the end, place it in the vise and screw tight, then bend over until the kerf closes; the distance the top moves, as from A to B in Fig. 6, will give the distance between kerfs. Use the same saw all the time and saw to the same depth, leaving about a quarter of an inch solid wood below the kerfs.

QUESTIONS

BAY WINDOWS.

From "Joel Winder," Manitown, Wis.—I would like to see a few designs for bay windows, with or without transoms, and having small lights on top. I would like also to see a design for a step-window for a hall running up the incline of the stairway. Would like three sashes, or three sheets of glass in the bays, and in the step-window. Such designs would be very much appreciated by one of your oldest subscribers?

TIN ROOFS.

From "R. O. N.," Scranton, Pa.—Is it good policy to paint tin roofs, and if so, what kind of paint should be used?

SHINGLE ROOFS.

From "Michael Z.," Green Bay, Wis.—How long should ordinary shingles hold good? Does painting a shingle roof add to the life of the roof? In painting a roof, what kind of paint is the best to employ for the purpose? Any other information on the question of shingle roofs will, I am sure, interest many readers beside the writer.

FIREPROOF ELEVATOR SHAFTS.

From "Chicago Man," Chicago, Ill.—I am about to build a "Skyscraper" in which there will be several elevator shafts, and I would like to find out if there is any method of making the shafts fireproof, or nearly so, and of preventing the shafts from becoming a flue in case of fire? I am somewhat confused on the question owing to getting so many conflicting opinions on the subject. I will draw my own inferences from whatever you may say, and I think, judging from past experiences, that I will get some good pointers from you and your subscribers.

TAPER FRAMING.

From "John W. K.," New Ontario, Ont.—How are the bevels obtained for framing tapered work, such as the shoulders on posts, the bevels on braces, etc.?

TAR AND GRAVEL ROOFS.

From "A. J. C.," Erin Springs, Okla.—Will some kindly disposed reader please inform me of the best method of putting on a tar and gravel roof, and the best materials to use for the purpose, and oblige an old reader?

HIPS AND VALLEYS.

From "J. A. B.," Lake Megantic.—I would be thankful if some reader would send to this department of "our favorite paper" if there is a way of finding the lengths and bevels of hip, valley and jack rafters without the need of making a drawing. Any answer on the subject will be greatly appreciated.

REGISTER DESK IN WALL.

From "Davis," Sacramento, Cal.—I am to make a register desk and would like some information as to the way it should be made. I give the conditions as near as possible. The register book is 18x20 inches when open, and it must be made to hold the book when closed, and the desk or cabinet must not project beyond the wall to which it is fastened more than 3 or 4 inches, as the space is limited. Any information will be thankfully accepted.

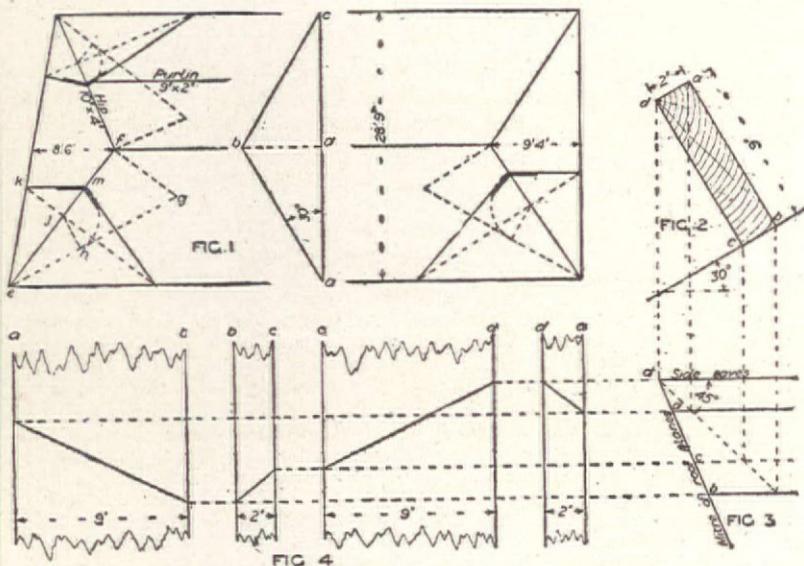
From F. H. R., Buffalo, N. Y.: I have been a subscriber to the NATIONAL BUILDER for the last three or four years and like it very much. I would like to see some designs of houses of about 24x38 ft., or 26x40 ft. in size and of true Colonial design published in the BUILDER soon. I would appreciate this very much.

From J. B. R., Palestine, Texas: Can't find information. Have any of the brother contractors used what is called Beaver Board, made by the Beaver Board Company at Buffalo, N. Y.? It is made to take the place of plaster on the inside and to decorate with. This country is damp and I think it will go and come to the weather. I have tried from leading architects to get this information but have failed. It seems new to them. If any contractor has used it please answer through the BUILDER's columns his experience with it and I will appreciate same.

OUR PRACTICAL COLUMN

BEVELS FOR HIP RAFTERS AND PURLINS MAY BE OBTAINED AS FOLLOWS:

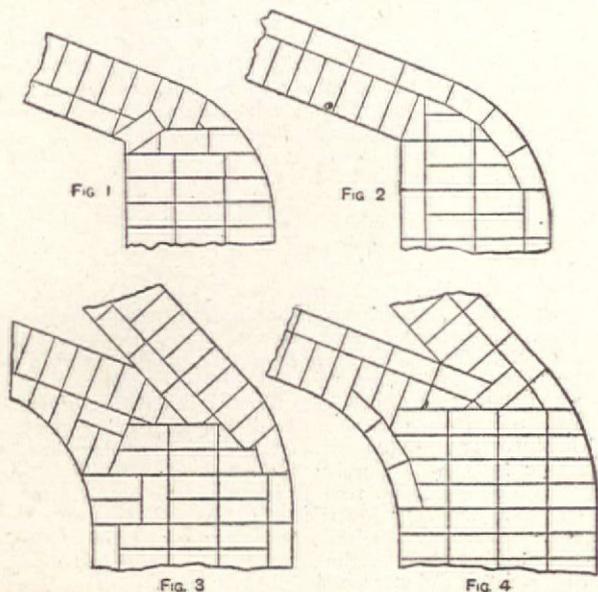
Draw the plan of the roof as in Fig. 1, and the outline section a b c d. For the backing of hip rafters draw f g at right angles to e f and equal to b d. Join g e, and from any point h in e g draw h j at right angles to e g. Through j draw k j l at right angles to e f, cutting the end and side eaves in k and l. With center j and radius j h describe an arc cutting e f in m. Join k m and l m, and the angle k m l gives the backing of the hip rafter; but it must be observed that the backing is not uniform for the two sides, being e m l for one side and e m k for the other. The backings of the other hip rafters may be found in a similar manner, as shown in Fig. 1.



To find the bevels of the purlins draw sectional elevation of the purlin marked in Fig. 1 at its proper angle, as in Fig. 2, and the plan as Fig. 3, where a line of 45 degrees is drawn from d to receive the projections from Fig. 2. Lines are then drawn parallel with the eaves through the intersections to meet the mitre line of roof planes. Then from the points a b c d on the mitre line project across to the corresponding elevations of the four faces of purlin in Fig. 4. Join the two points on each face of purlin, and the required cuts will be obtained. The same process may be adopted for the other purlins.

FLUES.

The bonding, of which many different arrangements might be given, for outside wall of flue at the point where it meets bedroom or other inside wall, is shown in Figs. 1 and 2, while the bonding for the two middle walls of the flues at their junction with



the middle wall of the bedroom is shown in Figs. 3 and 4. The width of the flue is marked 5 feet on the pencil sketch sent, but this makes no difference in the bonding of the walls, but affects the setting out of the work and requires careful attention.

COST DATA FOR APPROXIMATE ESTIMATES AND APPRAISALS.

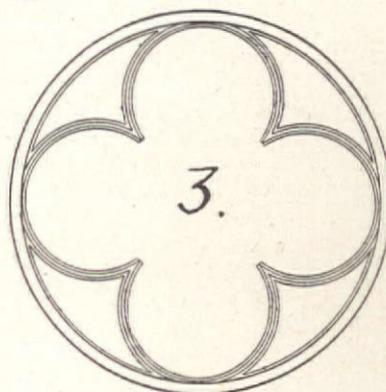
The cost is based on per cubic foot of Building Contents exclusive of Scenic or other features, Lighting Fixtures, Mural and Art Painting, etc., and are charged at from 6 1/2 to 7 1/2 cents per cubic foot.

| | TYPES OF CONSTRUCT ON | | | |
|---|-----------------------|-------------|------------|-----------|
| | ORDINARY | FIRST CLASS | HIGH GRADE | ELABORATE |
| Architect's Fee | 1 1/8 | 1 1/4 | 1 3/8 | 1 3/4 |
| *Brick and Brick Work | 4 | 4 1/2 | 5 3/4 | 6 3/8 |
| Bronze and Brass Work | 3/4 | 1 1/4 | 2 1/2 | 3 3/8 |
| Carpenter Work | 4 1/8 | 1 1/2 | 2 1/8 | 3 1/4 |
| Cast Iron | 3/4 | 7/8 | 1 1/8 | 1 3/8 |
| Composition Flooring | | 1/8 | 3/8 | 1/2 |
| Concrete | 1 1/8 | 3/8 | 3/8 | 1 1/4 |
| *Concrete Block Work | 3 | 3 | 3 1/2 | 4 1/4 |
| Concrete Reinforcement | | 1/2 | 3/4 | 1 1/4 |
| *Cut Stone and Cut Stone Work | 3 1/8 | 6 | 6 3/8 | 8 1/2 |
| Electric Work | 1 1/4 | 2/3 | 3/4 | 1 1/2 |
| Elevator Work | 1 | 1 | 1 1/4 | 1 3/4 |
| Excavation | 2 1/2 | 1/4 | 1 3/8 | 3/8 |
| Foundation Work | 1 1/4 | 1 1/4 | 1 3/8 | 2 1/4 |
| Gas Fitting | 1 1/8 | 1 1/8 | 1 1/8 | 1 3/4 |
| Glass and Glazing | 1 1/8 | 1 1/8 | 1 1/8 | 3/8 |
| Hardware | 1 1/8 | 1 1/8 | 1 1/8 | 3/8 |
| Heating and Ventilating | 1 1/8 | 1 1/4 | 1 3/4 | 1 3/8 |
| Lathing | 1 1/4 | 1 1/4 | 1 3/8 | 3/8 |
| Ornamental Metal Work | 3/4 | 1 1/8 | 1 1/8 | 1 1/8 |
| Painting | 1 1/2 | 3/4 | 1 1/8 | 2 3/8 |
| Plastering | 1 1/8 | 1 1/8 | 1 1/8 | 2 1/4 |
| Plumbing | 1 1/2 | 3/4 | 1 1/8 | 1 1/8 |
| Power Plant | 3/4 | 3/4 | 1 1/8 | 2 3/8 |
| Roofing and Accessories | 1 1/2 | 3/4 | 1 1/8 | 1 3/8 |
| Sheet Metal | 1 1/8 | 1 1/8 | 1 1/8 | 3/8 |
| Skylights | 1 1/8 | 1 1/8 | 1 1/8 | 1 1/4 |
| Structural Steel and Iron | 2 1/2 | 2 1/2 | 2 1/2 | 2 1/2 |
| Stucco Work | 1 1/4 | 1 1/4 | 1 1/4 | 1 3/4 |
| *Terra Cotta and Faience (Trim) | 1 1/2 | 3/8 | 3/8 | 1 1/4 |
| Terra Cotta Blocks | 3/8 | 3/8 | 3/8 | 3/8 |
| Tiling and Mosaic | 1 1/4 | 3/8 | 3/8 | 3/8 |
| Waterproofing and Dampproofing | 3/8 | 3/8 | 3/8 | 3/8 |

Note.—These items are alternates for exterior work and are used or omitted as design may determine. For interior work the averages are approximately correct. Prepared by Duncan M. Robertson.

QUATRE-FOIL.

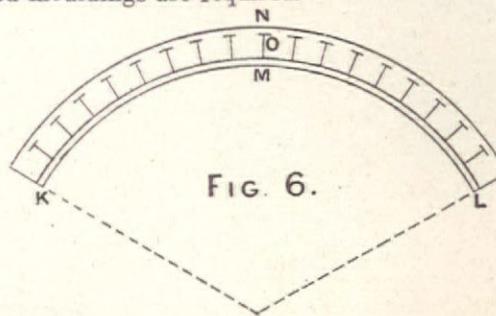
Fig. 3 shows a method of forming a quatre-foil, which is often used in gothic work.



KERFING.

The method of kerfing shown in Fig. 6 is not valued very highly, yet occasionally it is made use of to good advantage.

For bending mouldings, saw kerfing was once in general use in this city; now no superintending architect will allow it; solid or laminated mouldings are required.



Let K M L be a thin veneer bent over the required form. Clean the dust out of the saw kerfs and put plenty of glue in and on the face, then lay the saw kerfed stuff on the veneer as shown—braces should be screwed over the whole at intervals, to keep them snug to the form till the glue is set. The form may be built so that N, the convex surface, or M, the concave, may be face-side. Saw kerfed work without the veneer glued on the kerfed side, as here shown lacks strength and is good for nothing.

BOOK NOTICES.

PRACTICAL STEEL CONSTRUCTION.—Dealing with all phases in the construction of our modern steel buildings. With illustrations, drawings and valuable tables. Compiled and edited by Fred T. Hodgson, F. R. I. C. A., author of "The Steel Square and Its Uses," "Practical Carpentry," "Estimators Guide," "Light and Heavy Framing, etc., etc.," published by Frederick J. Drake & Co., Chicago, Ill. Cloth, 105 pp. Price, postpaid, \$1.00.

This is a valuable little book for steel constructors—men who do the work—as it gives many hints as to the various methods, and the tables will be found quite useful in determining the ditch and place of rivets, and many other things that a foreman or workman ought to know. It is simply a manual of an advanced kind, and informs the student regarding live and dead loads. What floors in houses, shops, factories, and warehouses should carry per square foot, and how to calculate for this strain; along with many other items of useful and necessary information.

DUSTMAN'S BOOK OF PLANS AND BUILDING CONSTRUCTION.—Consisting of drawings, plan drawing, figuring and estimating, specifications, building bungalows, farm buildings, concrete work, Joiners finishings, and building work generally. By U. M. Dustman, licensed architect. 240 pp., 8x12 inches, over 300 illustrations. Published by The Chas. C. Thompson Co., 545-549 Wabash avenue, Chicago, Ill. Canvas bound. Price, \$2.00.

This is somewhat of a pretentious book in appearance, but its contents do not belie its looks, as it is really a "big book," in fact as well as in looks, containing as it does, an immense amount of really useful and practical information for the general builder, the carpenter, the bricklayer and the mason. Its chief value, however, lies in the large number of house plans, bungalow plans and plans for barns, stables, garages and other farm and domestic buildings. The book also contains articles on the arrangement of rooms, conveniences, method of planing, and on many other live subjects; also a very full treatise on carpenter's geometry, and methods of laying out work of various kinds. Another good feature is the showing of working details in the latest style. It is a good all around book for the general workman, and its low price puts it within the reach of everyone. It is well bound, and is printed on fine heavy calendered paper.

We note that our popular Cotem., "Woodcraft," of Cleveland, Ohio, has invaded the British Empire and opened a publishing office in London. We congratulate Brother Clegg and wish it may bring them all the success they deserve.

STANDARD PRACTICAL PLUMBING. By R. M. Starbuck, author of *Modern Plumbing, etc.* 450 pp. and upwards of 340 illustrations, specially made for the purpose and drawn in such a manner the reader will have no difficulty in understanding. The work is published by the well known firm of Norman W. Henry Publishing Company, New York, N. Y. Cloth bound, heavy paper. Price \$3.00.

We have gone over this work at greater length than usual and have no hesitation in stating that we are satisfied it is equal, if not superior, in both quantity and quality of matter presented, to any work we know of, on the subject of plumbing, and the style of text and manner of presenting it seem to be well adapted to the readers for whom the work was prepared—i. e., the operative plumbers. It is a plainly written book, in the simplest of English, and each page bristles with good sense and profitable instructions. The drawings are practically presented and suited to practical men having practical wants.

Of the three hundred and forty-seven illustrations contained in the book, one hundred of them are full page illustrations. The illustrations, all being drawn expressly for this work, show the most modern and best practice in plumbing construction.

Plumbing in all its branches is treated within the pages of this book, and a large amount of space is devoted to a very complete and practical treatment of the subject of hot water supply and circulation and range boiler work.

Another valuable feature is the special chapter on drawing for the plumber.

The book is well made, is strongly bound in boards, and the paper used is of fine quality, while the press work is beyond reproach. The type is large and clear, and the diagrams and illustrations are fine and clear, every line being distinct and well defined.

BROOKS' AUTOMOBILE HAND BOOK. By L. Elliot Brooks, M. E. Revised and enlarged by Calvin F. Swingle, M. E., and other experts, 1911 edition, brought to date and includes all recent inventions and improvements. Over 700 pages and between three and four hundred diagrams and illustrations. Published by Frederick J. Drake & Co., Chicago, Ill. Limp leather covers, well bound. Price, prepaid, \$2.00.

To those having anything to do with the making, repairing or managing a motor car of any kind, this book is an indispensable requisite, as it deals with every item that goes into the "make-up" of a complete machine. It is a strictly up-to-date treatise, and deals in a thoroughly practical manner with all the various questions relating to the construction, care and operation of gasoline, electric and steam motor cars, with diagrams of each part, together with clear, concise explanations of the principles governing their action; correct methods are also given for dealing with road troubles, motor troubles, carburetor and ignition troubles of every kind. It also contains valuable information regarding ignition systems, carburetors, magnetos, valve setting, indicator work and other important matters. There are also a number of useful tables, rules and formulas, which add much value to the work and make it an exhaustive compendium of automobile knowledge; and the text is laid before the reader in a style that is at once simple and understandable. The book is nicely gotten up, printed in medium sized type on good, strong paper, well bound, and may be used as a pocket reference book if desired. Every motor car should carry one of these books in a waterproof case in some corner that would be handy to reach. It would often be found useful in emergencies.

LATEST LEGAL DECISIONS

Under St. 1890, p. 370, c. 418, requiring the execution of a formal contract for the erection of a public building for a city in addition to the acceptance of the proposal, and providing that every proposal shall be accompanied by a deposit for the performance of the proposal, a bidder for the erection of a schoolhouse, who agrees that if, within 20 days after a specified date, notice that his proposal is accepted be given him, he will deliver a contract for the work, and that the deposit shall be the property of the city on his failure to carry out the proposal, must stand by his proposal, at least until the expiration of the specified time, and the acceptance by the city of a lower bid is not a rejection of his bid, and a subsequent acceptance of his bid within the specified time, after refusal of a lower bidder to enter into a contract, is binding on the bidder, and on his failing to execute the contract the deposit is the property of the city.—*Wheaton Building & Lumber Co. v. City of Boston*, 90 N. E. (Mass.) 598.

Property cannot be subjected to a mechanic's lien for material furnished under a contract with one who is not the owner's agent.—*H. C. Behrens Lumber Co. v. Lager*, 125 N. W. (S. D.), 574.

A building contractor could not recover for work done till it was approved and accepted by an architect, as the contract provided.—*Papot v. Barbour*, 51 So. (Ala.), 725.

A carpenter engaged in the construction of a building and a man operating a freight elevator in a retail store are engaged in different departments of labor, and are not "fellow servants," under Civ. Code, Sec. 1970, as amended by St. 1907, c. 97, limiting the fellow servant rule to cases of servants of the same master engaged in the same department of labor.—*Morgan v. J. W. Robinson Co.*, 107 P. (Cal.), 695.

The owners of an amusement park and contracting plumbers doing work on the premises might be held jointly liable for an injury to an employe of the plumbers as wrongdoers acting independently, whose tortious conduct concurrently contributed to the injury, where the injury resulted from the servant slipping on oil on the floor from a defective oil cup in a building in which he had been sent in the night time.—*Bagley v. Sonderland Co.*, 91 N. E. (Mass.), 317.

While a waiver must be made with knowledge of all the facts by the party waiving it, the agent of a company which was surety on a construction contract by accepting the balance of the contract price after the contractor had abandoned the work, and stating that the owner need not worry as the matter would be settled up, waived notice to the surety of the contractor's defaults, as required by the surety contract.—*Boppart v. Illinois Surety Company*, 126 S. W. (Mo.), 768.

There was testimony that plaintiff was discharged successively by two employers, because each of these employers were successively warned by an agent of the defendant, a labor union, that, if the employer kept the plaintiff in his service, all members of the union would quit his employment in a body. The purpose of this warning was to impress upon the employer the danger that he would be stripped of his ability to complete certain contracts unless he discharged the plaintiff, and the purpose was ultimately to coerce the plaintiff, who was a member of a local in another union, to join the defendant union. Held, that the finding of the court sitting as a jury that the plaintiff was entitled to recover against the union for inducing his discharge was not error.—*Ruddy v. United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers of the United States and Canada, Local No. 24. 75 A. (N. J.)*, 742.

Plaintiff, a carpenter, employed to do certain work in an elevator shaft, was injured by the sudden operation of the elevator by another of defendant's servants without warning. Plaintiff and the elevator man had agreed that, before the elevator was moved, the operator would call out to plaintiff, and should not move the elevator until answered, "All right." He did move it without calling out and plaintiff was injured. Held, that, though plaintiff assumed the risk of injury involved in working in the shaft, he did not assume the risk of the negligent use of the elevator by defendant, under the rule that an employe by voluntarily putting himself in a place of danger does not thereby necessarily assume the risk of injury from his employer's want of care.—*Morgan v. J. W. Robinson Company*, 107 P. (Cal.), 695.

The mechanic's lien act (Laws 1897, c. 418) provides for enforcement of such liens in a court which has jurisdiction in an action founded on a contract for a sum of money equivalent to the amount of the debt, and provides that the lien may be enforced "against such property and against the person liable for the debt," and required the filing of a lis pendens when the action is brought, whether in a court of record or not, and provides that failure to do so shall not abate the action as to any personal liability for the payment of the debt. The Municipal Court act (Laws 1902, c. 580) gives municipal courts jurisdiction of "an action to enforce a mechanic's lien on real property in which the court shall have power to render judgment for the sum due with interest * * * and to declare the amount a valid lien against the interest of the defendant in the property described in the complaint * * * where the amount does not exceed \$500," but provides that such court cannot render judgment for the foreclosure and sale of the property. Held, that the meaning of the statutory provisions relating to the jurisdiction to enforce a mechanic's lien must be ascertained from all the provisions considered together, and from the general scope of the statutes and purpose in view, and that the Municipal Court has jurisdiction to enforce a mechanic's lien.—*Nelson v. Hajek*, 121 N. Y. S., 1018.

The NORTHWESTERN TERRA COTTA COMPANY

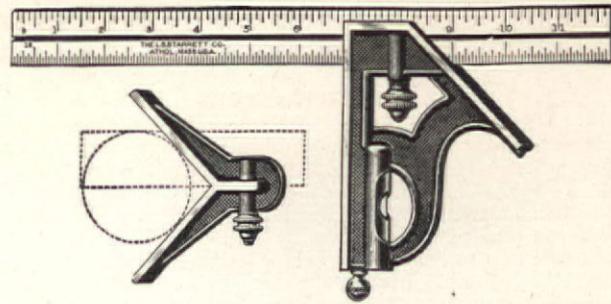
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It's the easiest thing in the world to interest a client in a roofing that needs no repairing or painting—especially if he has had experience with an old time roofing.

The bare fact that Asbestos "Century" Shingles are made of reinforced concrete is a convincing argument in itself. There's no getting away from the permanence of reinforced concrete—the tests it has stood in every climate, the disastrous fires and the centuries of time.

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The Keasbey & Mattison Company, Factors, Ambler, Pa.



Asbestos "Century" Shingle Roof—Somerville Hospital, Somerville, Mass.; W. P. Leavitt Sons Co., Newton, Mass., Contractors

They are the first practical lightweight roofing of reinforced concrete—made of hydraulic cement with interlacing asbestos fibres—compacted by tremendous pressure.

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You can get Asbestos "Century" Shingles in shapes and sizes to fit any architectural scheme. Three colors, Newport Gray (silver gray) Slate (blue black) and Indian Red. Ask your roofer for new quotations. Write for booklet "K & M 1910."

PASTE THIS DOME ON LETTERS
THAT YOU WRITE ADVERTISERS.
IT WILL HELP.



TRADE REVIEW

A GOOD CARPENTER SHOP AND FARM TOOL.

A new grinder, made of Carborundum, the abrasive which is said to be displacing emery wheels and other grinding wheels in all large manufacturing plants, is now being offered. At experiment stations, where this grinder has been tried out, it has given the utmost satisfaction, and in a very short space of time it has sprung into very pronounced popularity. This popularity is due to its perfect fitness for carpenter shops and farm tool equipments, and to the fact that all the grinding and polishing wheels are made of Carborundum.

Carborundum is made in a mammoth furnace at Niagara Falls from the same elements that go into the making of diamonds; it is 25 times as hard and will cut 25 times as fast as the ordinary grindstone. It cuts into the hardest steel, as if it were chalk. No matter how long it is used, a Carborundum wheel never becomes smooth or has to be dressed, as other wheels must. Mower sickles, plow shares, cultivator blades, scythes, axes, corn knives, kitchen cutlery, chisels, hatchets, pocket knives—in fact nearly every tool used can be sharpened and polished bright as new, on the Luther Grinder. It has nine Carborundum sharpening devices and three other attachments.

Carborundum is made in large electric furnaces at Niagara Falls. This new substance has all the chemical properties of the real diamond—the immense electric energy developed at Niagara Falls makes the manufacture of it possible and now within the reach of all. At first it sold at \$550.00 a karat. The mechanical world recognizes it as the greatest sharpening substance in the world.

The Luther Grinder Manufacturing Company, 55 Madison St., Milwaukee, Wis., are the oldest and largest makers of grinders in the world and they give a five-year guarantee on this machine. In putting this machine out they have announced that it will be sent to a limited number in every locality on free trial, merely to secure universal introduction as quickly as possible. The offer made by the Luther Grinder Company is very liberal, and as many of our readers are already acquainted with the Company, on account of several years of previous advertising in THE NATIONAL BUILDER, it is safe to say that a large number are already using this grinder and are perfectly satisfied with them. Those who have never tested the merits of this good grinder, can easily do so now with every assurance of liking it.

THE MILKS FRAMING INSTRUMENT.

The Milks Framing Instrument is claimed by the manufacturers to be one of the most remarkable and wonderful inventions in the building field. The claims for this framing instrument are as follows:

It will do the figuring work instantly and with absolute accuracy without mental calculation; gives the length and cuts of hips, valleys, common rafters, jacks and cripples, on any width of building or any pitch of roof, roofs out of square or different pitches of roof; figures stairwork in all its branches, straight or circle, giving the proper number of steps to go in the space; the exact width of treads and rises and all other measurements necessary; divides distances, figures octagons, circles and braces of all kinds. It can be used by anyone who can read and write. It lasts a life-time. In nineteen seconds it will do the work that it takes an ordinary mechanic from two to three hours to accomplish. It will give the answer to puzzling problems, even to a fraction, in less time than it would take to get pencil and paper ready, preparatory to figuring them out. Gives correct answers quickly and accurately, thereby saving expense, worry and mistakes. It is the only instrument ever invented that figures stairwork with absolute accuracy, giving the proper number of steps, and the exact run and rise of each.

Mr. Milks, the inventor of this instrument, also claims that lengths of all rafters used in the construction of building could be figured in less than one minute. In proof of this statement a test was made that demonstrated his contentions were correct.

The signed statement which follows is a copy of the original on file at the office of the Parsons Mfg. Company:

"We timed Mr. Milks in giving the answer to the following problem: What would the lengths of all the rafters be for a hip roof to be placed on building 26 ft. 8 in. square? In 30 seconds Mr. Milks gave correct answer to the problem, including lengths of hips, jacks and common rafter. Geo. S. Lynd, Pres.; J. H. Kent, Treas.; P. A. Morrison, Rec. Secy.; S. A. Speas, member, U. B. of C. & J. of A., Local No. 1022.

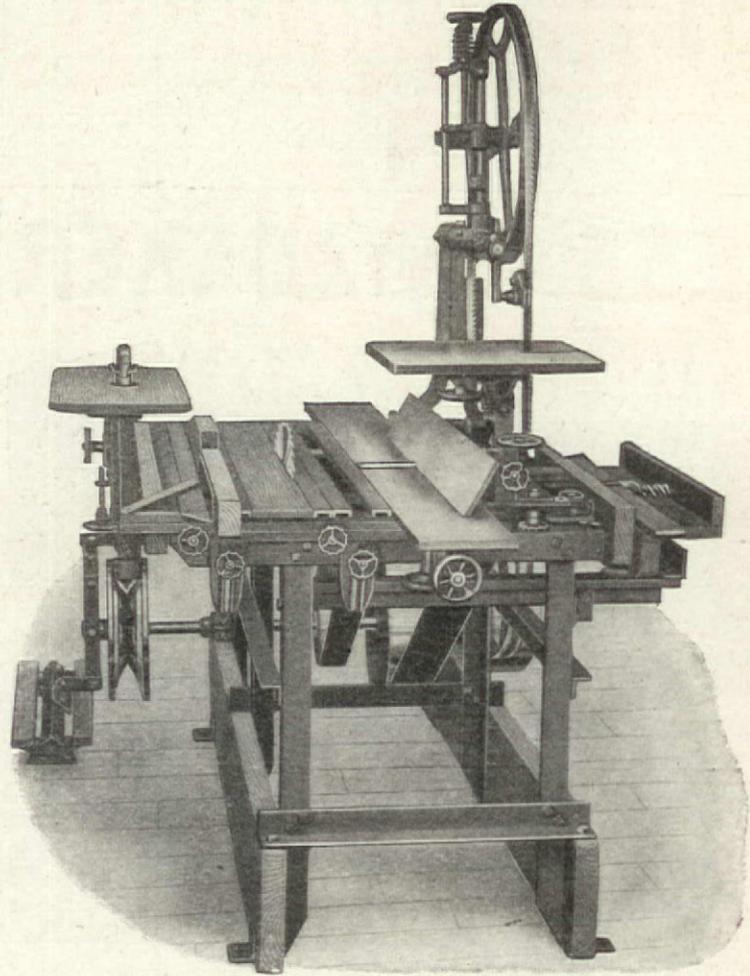
The Milks Framing Instrument is manufactured by the Parsons Manufacturing Company, Parsons, Kas, who also manufacture the Milks \$1.00 Pocket Miter Box. Reading matter fully describing both framing instrument and miter box will be sent on request.

PARKS COMBINATION WOODWORKING MACHINE.

One of the latest additions to the already extensive line of woodworking machinery turned out by the Parks Ball-Bearing Machine Co., Knowlton and Fergus streets, Cincinnati, Ohio, is the combination circular saw, 6-inch jointer, band-saw and reversible spindle shaper with boring or mortising and rabbeting attachments, which we show in the accompanying illustration. The machine is really six in one, and cannot fail to prove interesting to carpenter contractors, builders and others operating woodworking shops. The frame is made of extra heavy angle iron strongly braced and securely bolted together. It is mounted on a long, substantial base, which it is claimed greatly increases the steadiness of the machine, as it gives more foundation and distributes the strain over more of floor space. The length of base is 4 feet, 2 inches, and the width 24 inches.

The saw table is made of heavy iron and channel steel and the top surface is finished by grinding on special machine. The height

is 2 feet, 10 inches, the width is 22 $\frac{1}{4}$ inches, and the length, 3 feet. The heavy angle steel on each side makes a substantial support to which to bolt wood extensions any width or length desired. The shaper spindle is made to reverse by means of two friction disks which slide on the countershaft and driven with a key in the shaft. The table is raised and lowered by means of a hand screw in order to adjust the depth of the cut. It is furnished with shaft, bearings and pulley so that it can be used independent of this machine if desired.



PARKS COMBINATION WOODWORKING MACHINES.

The jointer has hand-wheel incline adjustment for both front and rear plates. The band saw has all the necessary adjustments and tilting table. The machine will do ripping, cross-cutting, band sawing, boring, planing, straightening, squaring, beveling, grooving, rabbeting, etc. The machine is equipped with a 22-inch band saw set in the rear wheel. The boring attachment has adjustable sliding support and takes bits with $\frac{1}{2}$ -inch straight shank.

THE CANTON ART METAL COMPANY'S CONVENTION.

Progressive business concerns are alive to the benefit that comes from the free exchange of ideas among their business associates and employees. This fact has led the Canton Art Metal Company of Canton, Ohio, to hold conventions at stated times to promote the interests of the salesmen, the employer and the trade. In a handsome souvenir program the company announce their second annual Sales Convention of branch houses and representatives held at the main office, December 27 to 31.

This convention was attended by some thirty representatives. The portraits of a number of these, besides views of the company's extensive plant, appear in the souvenir. It is evident from the portraits that the company's organization embraces a force of men of high efficiency.

During the thirty-four years of the company's existence the products have increased from the more common lines to include metal furniture and filing devices, embracing office, bank, court house, library, school and vault equipment; improved metal ceilings, side walls and wainscoting; cornices, skylights, ventilators, crestings, finials, ornaments, building fronts and special work; formed and roll roofing, siding, shingles, paints, sheet copper, zinc, black sheets, galvanized sheets, corrugated sheets, "Toncan" metal, tin plate, tin roll roofing, solder; eaves trough, gutter, ridge roll, conductor pipe, formed valley, conductor heads, cut-offs, elbows, hangers.

As the lines manufactured were multiplied and found to meet the approval of the trade, increased facilities for manufacture were necessary, and although the plant is now extensive in size and equipment, plans are under way for a still further enlargement. The company has always followed the policy of making quality the first consideration, and attributes much of its success to this practice.

The company's metal ceiling with punched nail holes and repressed joints has had a sale beyond all anticipations. The metal furniture department is equipped to handle all contracts. Among the contracts on hand for this line are entire equipments for many court houses.



THE very first step taken toward making a Simonds Saw—the making of the steel—is specialized under a Simonds Process. By it we produce Simonds Special Crucible Steel—for Simonds Saws only.

No other process produces a better steel for Saws. It is tough, flexible, with a temper taking quality that makes it when treated, tempered, ground, finished, and made into a saw blade, in the Simonds way, in the Simonds shops, the best saw that can be bought at any price.

Another thing: should even the slightest defect crop up in a Simonds Saw, while in the process of making, that condemns it to the scrap heap. Remember you can always be sure of buying high grade quality when you buy a **SIMONDS**.

To buy the right saw, let it be rip, hand or panel, see that the Simonds (Si-monds) name is on the **BLADE**.

Let us send you a free copy of Simonds "Guide for Carpenters." Tell us what kind of a Saw you will need soon.

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PASTE THIS DONE ON LETTERS
THAT YOU WRITE ADVERTISERS.
IT WILL HELP.



VANADIUM STEEL SAWS AND MACHINERY.

BY GEORGE E. LEES.



TYPE "H" VANADIUM STEEL SAW WITH BLADE COILED.
After remaining thus for thirty days, the blade was released, and returned to perfect alignment.

Ten years of the new century have just closed. Looking back over the accomplishments of its first decade, we can credit it with more wonderful and useful results than have ever come to us before in the same period of time. The automobile has been made practical for business and pleasure; wireless telegraphy has linked the intelligence of ships with ships and land over miles of empty space; radium has been harnessed into useful service and the age of steel has been revolutionized by the application of a new element, Vanadium.

Ten years ago the metal Vanadium was a curiosity of the laboratory; it was used in a small way for tinting glass and giving beautiful colors to expensive porcelain. It was first discovered in a piece of remarkably ductile and excellent Swedish iron that had been made from the ores of Tabert in Sweden. It was also found in these ores, but in very small quantities. Owing to the extremely high melting point of Vanadium, it could not be introduced directly into steels and irons during the process of manufacture, but it was soon found that an alloy made of one part Vanadium and two parts of iron melted very readily and could be dissolved in molten iron and steel in the crucible or the open hearth furnace. Irons and steels of the most remarkable qualities resulted, but the supply of Vanadium was so small that Vanadium steels could not be placed on the open market.

Some five years ago, however, the engineers of the American Vanadium Company of Pittsburg located a rich and extensive Vanadium deposit about three miles up the Andes mountains in Peru, and a factory was built near Pittsburg for the commercial reduction of the ores and the manufacture of a suitable alloy known as "Amervan" Ferro Vanadium.

A revolution in steel then began and the results today are little short of amazing. Before the period of Vanadium steel, a one-inch square steel bar could scarcely be made to support a vertical load of 100,000 pounds, but today Vanadium steel bars of this size can be seen holding weights of 225,000 pounds.

Vanadium steels have been very largely employed in railroad and automobile work; locomotives are now built around Vanadium cast steel frames, with Vanadium iron cylinders and all the forged parts of Vanadium steel.

The advantages of using small quantities of Vanadium appear in the remarkable increase of strength and elasticity given to the steel and in the fact that Vanadium steel won't crystallize or "get tired" and break

unexpectedly. It is not brittle and possesses the most surprising wearing qualities.

About three years ago the American Vanadium Company made some carpenters' saws and had them coiled up and locked with a steel band as shown in the engraving. After thirty days one of the saws was released and returned to a perfectly straight line; after a year another was released and showed no signs of curvature. The same result was obtained after two years with a third saw and the one shown in the engraving is going on its third year and will be released in Atlantic City at a large convention next June.

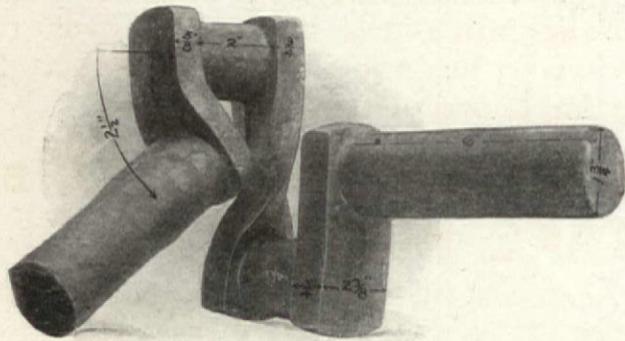
One of these Vanadium saws taken at random was bent from point to handle in both directions and returned to its original condition. Two twenty penny steel spikes were then driven in a plank and the plank was sawed in two, straight through the spikes, without any perceptible injury to the teeth. After that a 2-inch steel gas pipe was sawed in two pieces by the same saw. With a hammer one of the teeth was then bent at right angles to the blade, and then again bent in the opposite direction till it came to a right angle, when it was returned to its proper position unharmed. In sawing concrete molds covered with cement, this saw has a record of two weeks against an ordinary saw's three days without re-sharpening.

The demand for Vanadium steels in railroad and large engineering work has been so great that its use in small tools has been somewhat neglected, but with this surprising proof of the absolute superiority of Vanadium steel over all other types of steel, the carpenter and builder has now come into his own and is able to hold a saw that saws.

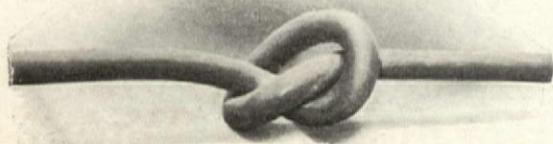
[Editor's Note.—Mr. Lees' address is 324 Frick Building. On request, Mr. Lee will mail full particulars about Vanadium steel, hand saws, etc., and will also place your name on his list for a free copy of a new book he is making up on the subject.]

THE ASHLAND FOLDING SCAFFOLD BRACKET.

Everyone knows that in placing a new building device or material on the market the manufacturer generally find his hardest work in making sales right at home among his friends. So when he does find his friends coming to him and ordering the new folding scaffold, and that is what this article is about, it is a pretty good indication that the buyer is getting the best. When re-orders are placed again and again by the first customers, it is a stronger indication that the folding scaffold has unusual merit. The Ashland Folding Scaffold Bracket, although only on the market a short time, is used by nearly all the carpenters and contractors in the city it is manufactured in. The makers claim unusual strength for it, unusual convenience in folding up and taking from job to job and it is especially easy to put on any kind of siding, without



BENT UNDER 2,500 LB. STEAM HAMMER BY REPEATED BLOWS WITHOUT ANY SIGN OF FRACTURE. A HIGH GRADE ORDINARY STEEL FAILED UNDER THE SAME TEST.



ONE INCH BAR OF VANADIUM STEEL TIED INTO A KNOT COLD. ELASTIC LIMIT 100,000 LBS.

damaging it. The Ashland Folding Scaffold Bracket is made of metal, and is folded and unfolded instantly without the use of pins or bolts. Each bracket weighs only 17 pounds. No holes are bored in the siding, but instead just drive four ten penny nails and it is claimed that each bracket will safely hold up at least 1,000 pounds. When placed upon the siding the Ashland Bracket is so arranged that swaying or wiggling of the scaffold from side to side is impossible. While the bracket is especially adapted for carpenters' use, it is said to be the most practical bracket made for painters, tinnerns, and brick masons. For scaffolding on the roof for building chimneys, etc., they are also most useful.



SHOWING ASHLAND FOLDING SCAFFOLD BRACKETS IN USE ON SIDES AND FOR CHIMNEY WORK.

A special discount is being made on this bracket to introduce them in every town. The manufacturers are the Ashland Folding Scaffold Company, 17 Washington st., Ashland, Ohio.

The guarantee given by the Company on their bracket is very liberal. Circular "N" will give further particulars and prices will be quoted also when writing for it.



How a New York Contractor Made a Barrel of Money on 150 Suburban Houses!



The Gordon-Van Tine Catalogs OPENED HIS EYES!

Here's just **one example** of the way our business grows. A New York Contractor, conducting extensive building operations in the suburb of Far Rockaway, Long Island, noticed an advertisement of the Gordon-Van Tine Co. of Davenport, Iowa, offering high-grade, guaranteed Millwork, Lumber and all other Building Material—**direct from the mill**—at a big saving over retail dealers' prices. It interested him. He wrote for our Catalogs. When they came, the low prices opened his eyes to the enormous savings offered.

Comparison of Our Prices With Local Dealers' Made Him "SIT UP AND TAKE NOTICE"

He said to himself, "Great Scott, if there's as big a saving as that, **me for Gordon-Van Tine!**" He made careful comparison of our quotations with the prices asked **on the same class of stuff** by local re-

tail lumber dealers and millwork men. He decided to risk a trial order, as he found our bank references O. K. and our rating in Dun and Bradstreet satisfactory.

Sent Us a "TRIAL ORDER"—Goods Shipped Quick and Proved to be HIGHEST QUALITY

We filled the order in the usual way—**promptly, carefully, conscientiously.** We didn't know he had "150 houses up his sleeve." It wouldn't have made any difference even if we had. The contractor was delighted with our stuff.

It was not only better than he expected, but everything came through "shipshape"—due to our extreme care in packing. He saved so much money on the "trial order" that he felt like he had tapped a "pay streak."

Orders Material for 150 HOUSES and Becomes a STEADY CUSTOMER of the Gordon-Van Tine Co.

The pictures at the top show the class of houses which this wide-awake contractor built from our materials exclusively. He made a barrel of money on those 150 houses

and is a steady buyer of our materials. There are over half a million fellows throughout the country who have also "seen a great light" out in Iowa.

Honestly, MR. CONTRACTOR, Why Not Investigate?

Our immense concrete warehouses are packed and with bargains in sash, doors, millwork, stair and porch material, flooring, roofing. Everything ready for quick shipment anywhere; **quality, safe delivery and satisfaction guaranteed.** Get the Free Catalogs. Compare prices, note the big saving, and send us a **trial order.**

GORDON-VAN TINE CO., 555 Federal Street, Davenport, Iowa

PASTE THIS DOME ON LETTERS THAT YOU WRITE ADVERTISERS. IT WILL HELP.



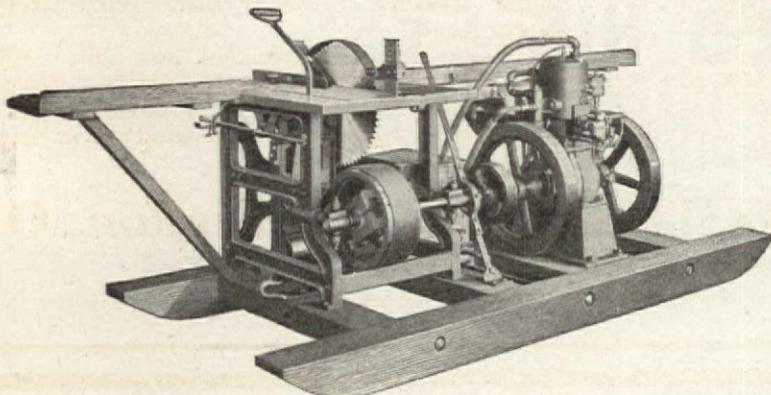
OSHKOSH PORTABLE SAW RIG.

The Oshkosh Logging Tool Company of Oshkosh, Wis., are manufacturing a portable rip and swing cross saw rig, which will be of interest to our readers. This machine is manufactured with either a gasoline engine or electric motor for power and is mounted on heavy hardwood skids, so bolted and mortised together as to afford a base practically as solid as a permanent foundation, thus insuring perfect and permanent alignment of shaft, boxes and belts, an extremely important consideration in the constitution and operation of a portable saw rig.

The machine part of this rig, it is claimed, is the only one of its kind on the market today, and is fully covered by patents. The feature of this machine is the swinging arbor which is made to swing for cross cutting and held rigid for rip sawing and is controlled by a lever on the side of the machine. A lever is placed in a suitable position for operating the saw when cross cutting. These machines are equipped with sliding scale for sawing various widths, also miter device for all kinds of miter sawing. The saw is covered by an adjustable saw guard which may be set to any height. Iron saw tables are made amply large enough. Attached to the iron tables are two side tables which make the sawing of long and heavy lumber much more handy. A hook is fastened on each end of the skids which allows the handling of this rig by team of horses and may be hauled to any desired place.

The portable saw rig is made in two sizes. Size No. 1 carries 14-inch saws and weighs 1,800 pounds and has a 6 horsepower gasoline engine; with the same saws and with a 5 horsepower electric motor weighs 1,400 pounds. Size No. 2 carries 20-inch saws with a 10 horsepower gasoline engine, weighs 2,400 pounds; with the same size saws and 10 horsepower electric motor weighs 1,600 pounds.

Contractors will find this machine a great help to them as they may haul this machine to the place of construction. As a letter below states, it has done the work of six carpenters in one day. This machine can



OSHKOSH SAW RIG.

also be used to great advantage for contractors in the construction of concrete forms. Retail lumbermen have been using this machine to a large extent in their yards for sawing up broken, warped and defective lumber and have found it to be a money maker in their line of business. With this saw they cut out the bad places in the lumber, thus turning a low grade of lumber into a more profitable grade which would otherwise have gone into the waste pile.

We print below a letter from the Deatherage Lumber Company, which we think fully backs up this statement. The following will give a good idea of the high qualities and money making advantages of the Oshkosh portable saw rig:

Sioux Falls, S. D., September 26, 1910.

Oshkosh Logging Tool Company, Oshkosh, Wis.

Gentlemen: In reply to yours of the 23d would say that we have one of your portable saw rigs on this job.

We have ten buildings here on this contract for the John Morrell & Co. packing plant, most of which are reinforced concrete.

We would say that we have a carpenter and a helper on this saw and that they work practically eleven hours every day. We have never lost any time on this work on account of the saw rig being out of order except from changing dry cells.

We can recommend this machine as a money saver on any job, large or small, and would say that if we had this job to do over again that we would buy two.

A carpenter and a helper on this saw easily do the work of six carpenters. Thus you will see that we consider this machine has already paid for itself on this job, although it is yet as good as new.

We can heartily recommend this saw rig to all contractors as it fills a long-felt want in our business.

Yours truly,
COLLINS BROS., General Contractors,
Office, Rock Island, Ill.

A Copy. Chicago, October 4, 1910.

Oshkosh Logging Tool Company, Oshkosh, Wis.

Gentlemen: Replying to your letter of September 23, would say that the portable saw rig purchased from your company some six weeks ago and placed on our work at Kansas City has given excellent service and has proven its efficiency under all conditions.

Yours truly,
GEO. B. SWIFT COMPANY,
General Contractors.

Kansas City, Mo., December 5, 1910.

Oshkosh Logging Tool Company, Oshkosh, Wis.

Gentlemen: We are in receipt of yours of December 13 and are

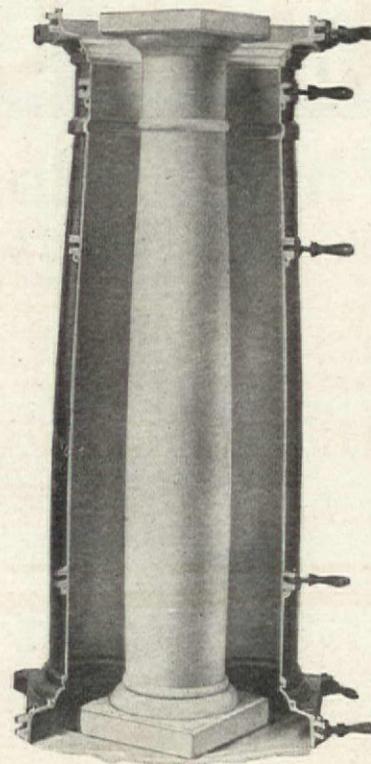
pleased to inform you that the portable saw rig has been in operation since September and the saving in time and the utilization of what would, without the use of the machine, be waste or low grade material, has been a source of constant satisfaction and profit to us.

In one day it saved us the net amount of twenty-two dollars (\$22). It has been operated throughout by the regular yard force, among whom there is not one making any pretension of mechanical knowledge.

Yours very truly,
DEATHERAGE LUMBER COMPANY.

The Oshkosh Logging Tool Company, Oshkosh, Wis., manufacturers of this portable saw rig, have been making a high quality of logging tools for over twenty-five (25) years, and their reputation in financial standing is such that contractors and lumbermen are assured of the fairest treatment. They guarantee their saw rig for good hard usage and plenty of it, and they will replace any parts that may be defective one year after delivery. A catalogue, fully describing and illustrating their rig, will be mailed upon request.

HOOSIER COLUMN MOLDS.



The tendency of the property owner is to have not only an attractive home, but one that has as many conveniences for comfort as possible. The roomy veranda or porch, is rightfully becoming more popular every day. When well designed and built, the veranda or porch should add to the attractiveness of the house. The Colonial Column is being specified and used in nearly every part of the country by owners desiring a building material which seldom fails to add greatly to the fine appearance of the home. The Hoosier Molds now being placed on the market by the Hoosier Mfg. Company, Goshen, Ind., will give contractors and cement workers a mold which makes a Colonial Column of cement, complete with top and base, without flutings or sections, all in one solid piece.

The Hoosier Porch Column Mold makes a column 54 and 60 inches high. The top is nine and one-half inches; base, eleven and three-quarters inches square and the diameter is nine inches. Two or three of these cement columns can be made each day with a Hoosier mold. The Hoosier Mfg. Co. claims that a cement Colonial Column made in their mold retails from \$3.50 to \$7.50 each. The cost

of manufacturing is said to be 50 cents, or where made of Medusa Portland cement and White Silica sand about \$1.00. Only two buckets of cement, five buckets of sand and one hour's time is required for each column. From this, it presents a very attractive proposition as a money maker, for the man who wants to manufacture his own porch columns, or for the cement workers who desire to make them to sell. Everyone knows that a well made cement column has many advantages—and there ought to be a ready market for cement colonial columns. The Hoosier Mfg. Co. gives a very strong guarantee on their molds, and one that is worth investigating, especially as the price seems mighty reasonable.

THE NEW IMPROVED SEBCO SCREW ANCHOR.

A radical departure from the usual run of fixture fastening devices is now being put on the market by the Star Expansion Bolt Company, of 147-149 Cedar street, New York City, makers of the famous Star Expansion Bolts.

The Sebco Screw Anchors, constructed on an entirely different principle than the star Screw Anchor, consists of a lead composition, anchor corrugated and cut in the form of a star at the screw end.



This star adds to the inner expansion and is also a formidable preventative against the fracturing of the two jaws.

In the old types a too great expansion would quickly split the jaws. The Sebco also allows a deeper and more even expansion.

Free samples and a beautifully bound 70-page catalogue will be mailed to any inquirer addressing catalogue department 30.

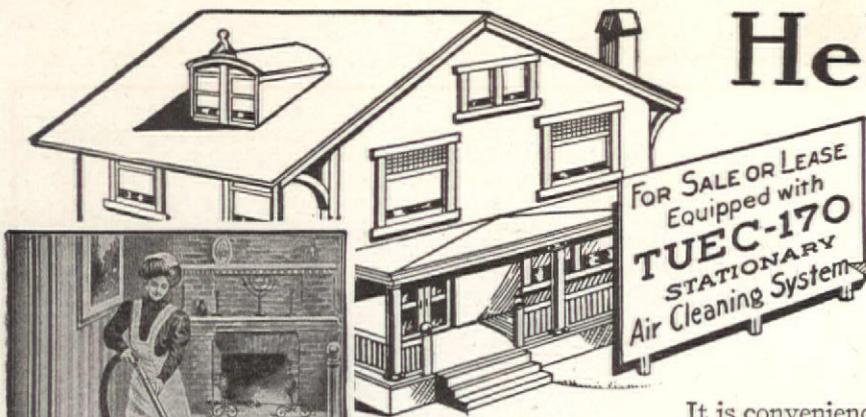
PATENTS.

976,777. Gravity sash-lock. Edw. N. Brown, assignor of one-half to J. R. Peterson, and one-half to J. M. Bostick, Canton, Ohio.

976,652. Device for handling cement blocks. R. L. Hensley, Terre Haute, Ind.

976,182. Reinforced concrete column girder and beam. John A. Jones, Cincinnati, Ohio.

Helps you Sell or Rent



It is conveniences that count. Add to the lighting, heating and plumbing systems in your houses a cleaning system of equal efficiency and convenience and you'll have more people after them and at better prices. Ask now about the

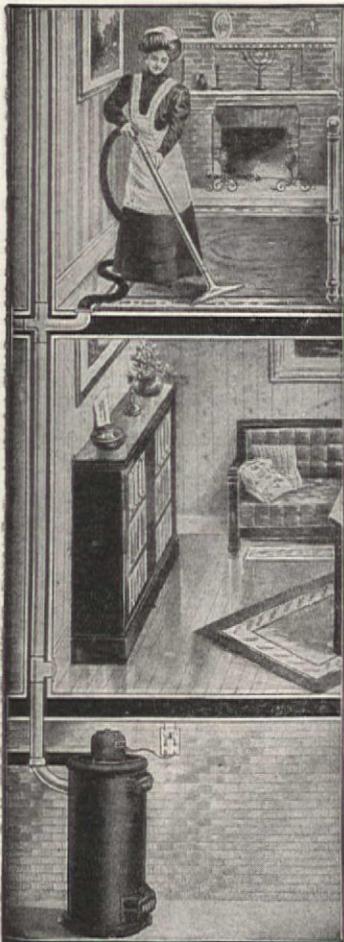
TUEC-170 STATIONARY Air Cleaning System

The illustration shows how it is installed. To clean any room attach end of hose to pipe-opening on that floor, press the electric button and a suction of 170 cubic feet or 300,000 cubic inches per minute draws in all the coarse dirt and all the fine dust from carpets, curtains, walls, etc., and all the germ-laden air from the house. Down the pipe it goes to the cellar, the dirt remaining in the machine, the tainted air passing through the chimney-flue outdoors. Complete with aluminum tools for every purpose.

Not a rotary or diaphragm pump system but a powerful centrifugal fan protected by patents owned by The United Electric Co. No complicated parts to make trouble or wear out. Absolutely guaranteed. Easy to install in any house now built or under construction. A great investment—increases the value of your property far more than the cost of the system. Write today for free booklet.

THE UNITED ELECTRIC CO., 3 Hurford Street **Canton, O.**
Agencies in All Large Cities

We make larger sizes of the TUEC Air Cleaning Machines for hotels, schools, apartment houses, public buildings, etc. Write for further information.



WE INITIATE—NEVER IMITATE

A Good Tip

All "National" Butts are now equipped with the new tip.

AN EXCLUSIVE "NATIONAL" FEATURE

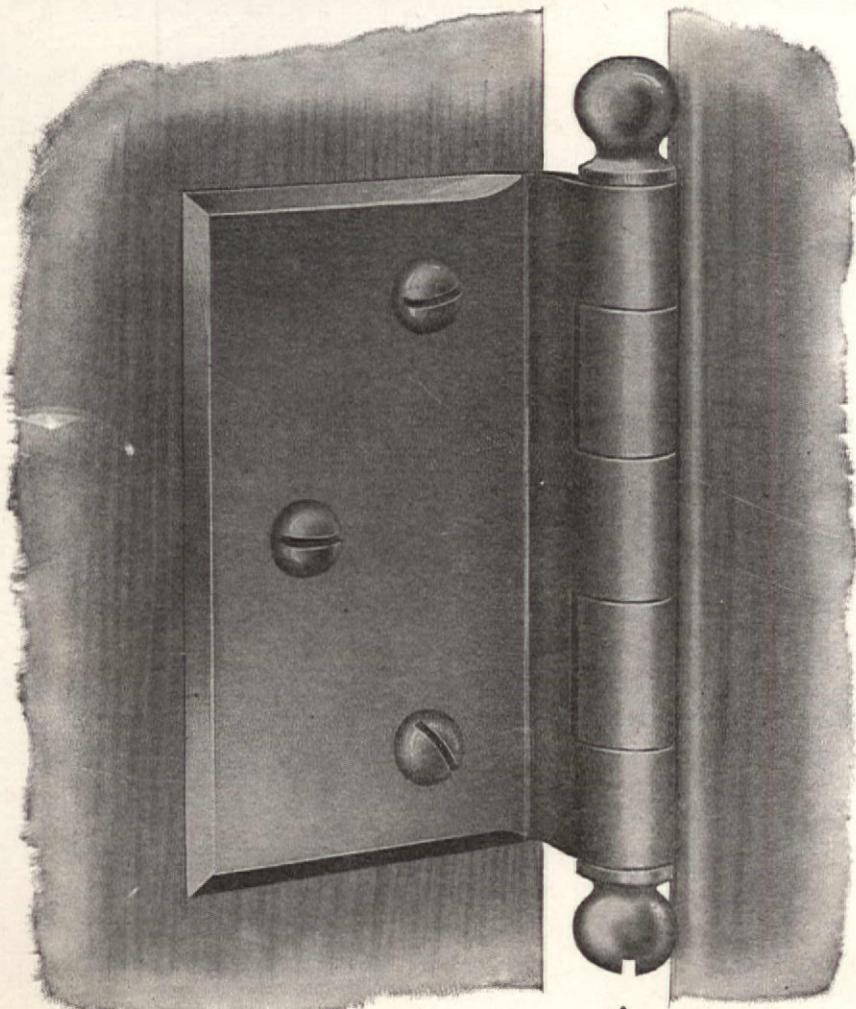
The tip is threaded and screws into the butt. It is also slotted for a screw-driver, making it easy to remove the tip and affords ready access to the pin.

The slot also indicates instantly which is the bottom of the butt.

Catalog "A" tells all about the most attractive line of butts you can get anywhere. Ask for it and give your dealer's name.

NATIONAL MANUFACTURING COMPANY
 STERLING, ILLINOIS

SEE THE SLOT



Design No. 450 B.

PASTE THIS DOME ON LETTERS THAT YOU WRITE ADVERTISERS. IT WILL HELP.



LADDER ELEVATORS.



Masons, stucco workers and painters should be interested in ladder elevators shown in accompanying cut. For working on stucco houses particularly they are practically invaluable. Every contractor knows how much it costs to scaffold these houses. Using the ladder elevators, a couple of men can erect their scaffold and be at work on it in ten minutes. Afterwards they can raise or lower themselves by easy stages, at will, for the elevator can be operated either from the scaffold, or any place necessary on the ladder; it locks automatically and positively every foot.

On stucco houses the scaffold must not touch the work for fear of marring; just the narrow steel brace touches the house, and that at two points only. A broad, comfortable platform is provided for the workmen to stand on, and the second narrower platform holds tools and material within easy reach. This is a great help in getting work done quickly and well, for it saves strength as well as time of the workmen, in that it takes away the necessity for stooping down from time to time, which is the heaviest part of the work.

A scaffold erected on a pair of these elevators is absolutely safe. There is nothing about them to break or get out of order, and with proper care they will last a lifetime. The runways of channel steel more than double the strength of the ladders, and there is no strain on the rungs, for they are used for support. Elevators are run on and off while ladder is up, and after removing two wing nuts they can be folded for shipment.

Contractors who study into it will quickly appreciate the returns possible from an investment in this equipment. With these elevators in a given time a man will do several times the work possible from any other kind of scaffold.

James L. Taylor Manufacturing Company, the manufacturers, at Bloomfield, N. J., will be glad to furnish full particulars and prices on request.

A GREAT TRIUMPH FOR CABOT'S SHEATHING QUILT.

The North Pole having been discovered by an American, other nations are hatsening toward the South Pole. From England Capt. Scott sailed last June on an expedition which has been carefully planned to follow up the great progress made by Lieut. Shackleton, and from Japan another start has been made.

Capt. Scott has the most complete outfit ever carried on such an expedition, including ice-automobiles and especially made portable houses which can be quickly set up to protect his men from the terrible cold.

These two items were worked out under Capt. Scott's personal supervision. The houses must be as absolutely cold-proof as possible, and yet must be light in weight for ease of handling. After careful investigation Cabot's Sheathing Quilt was chosen for insulating these huts, and the illustration shows a truckload of Quilt on its way to the steamer for shipment to England for this purpose.

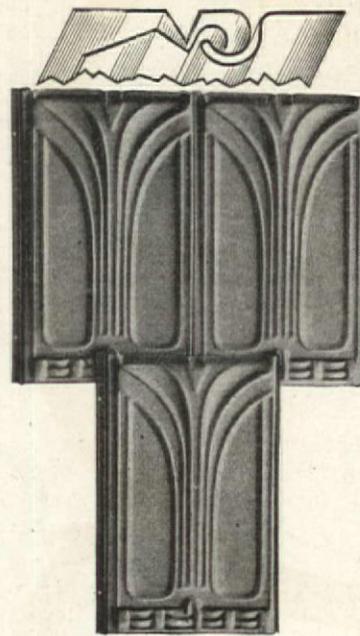
Some Comments of the English Press Follow:

"The British Antarctic Expedition.—As a protection against extremes of temperature, the living huts and observatory for Capt. Scott's Antarctic Expedition, all of which were made by Messrs. Boulton and Paul, of Norwich, have been lined throughout—walls, floors, and roofs—with two layers of the double-ply Cabot's Quilt."—London Times, June 29, 1910.

"It is interesting to learn that the living huts and observatory for Capt. Scott's Antarctic Expedition have been lined with two layers of Cabot's double-ply Quilt. This is a fine feather in the cap of Arthur L. Gibson & Co., of Twickenham, by whom the Quilt was supplied.—The Architect (London), July 1, 1910.

"We have been informed that the living huts and observatory of Capt. Scott's 1910 Antarctic Expedition have been lined throughout with two layers of the double-ply Quilt.—The Engineer (London), August 26, 1910.

NEW INTERLOCKING AJAX SHINGLES.



The Edwards Manufacturing Company have a new metal shingle that they are placing on the market, known as "Edwards Interlocking 'AJAX,'" and which promises to be as popular among architects, carpenters and property owners as Edwards Spanish Tile and their other metal roofings.

The particularly perfect embossing and sharpness of pattern makes this shingle unusually attractive. The manufacturers claim it is the most perfect metal shingle on the market.

The Interlocking Device, which provides for expansion and contraction and conceals all nails from the weather. These shingles, when properly applied, are absolutely guaranteed to be wind, weather, storm, fire and lightning proof. The patented Interlocking Device is so constructed that it is impossible for the hardest rain or driving snow to penetrate. They are manufactured from best quality Worcester Grade Terne Plate, furnished painted or galvanized (regalvanized after formation, size 10x14 inches.

The universal use of Edwards Interlocking "AJAX" metal shingles would prevent, it is claimed, such disasters as the Chelsea conflagration, and at the same time give the property owner a very attractive roofing material.

Full particulars, prices, etc., can be had by writing the Edwards Manufacturing Company, 430-450 Eggleston Ave., Cincinnati, Ohio.

RICHARDS-WILCOX MANUFACTURING CO.



Thousands of practical builders are now acquainted with the Richards Manufacturing Company's line of trolley hangers. But not many know that scarcely more than a half a dozen years ago this company employed only a few men, had a very small plant and was competing against larger and stronger companies.

The Richards Manufacturing Company have just announced the consolidation of their interests with the Wilcox Manufacturing Company, making door hangers, etc. The business will be conducted under the name of the Richards-Wilcox Manufacturing Company, with the following officers: W. H. Fitch, president and general manager; Lee Mighell, vice president; Milton D. Jones, secretary and treasurer; P. L. Hoffman, superintendent.

From the small beginning made about six years ago, this consolidation is a fitting climax of an unusually rapid and substantial growth developed strictly upon the merits of a type of trolley hangers for barns, warehouses, garages and residence doors which is said to have no equal.

Richards trolley hangers are easy running, easy to put up and adjust and do not jump the track. They have proved so satisfactory to architects, contractors and property owners that hardware dealers all over the country carry, as a rule, the complete line.

A great deal of attractive and instructive literature will be sent out to builders wanting full details on door hangers. The location of the factories and office of the Richards-Wilcox Manufacturing Company is Aurora, Ill.

NEW MARKING GAUGE WITH SAWTOOTH WHEEL.

The Nicholls Manufacturing Company, Ottumwa, Iowa, are placing on the market a new improved Roller Marking and Mortise Gauge, called the "Nicholls No. 17 Sawtooth."

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



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

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

It is also made so that one rod slips inside of a hollow tube, making the same appearance as a single gauge; and, by slipping the inner rod out, you have a perfect single marking gauge. Both rods are graduated. Very near the end of the outside rod they have placed a steel point pin to admit of being used close up into a rabbet or corner.

This gauge is strongly made and will last a lifetime and will be found a desirable addition to the carpenter's kit of tools.

It actually costs less to lay a Slate Roof and to **keep it in perfect condition** during the whole life of any building—than to get similar results with any other roofing material.

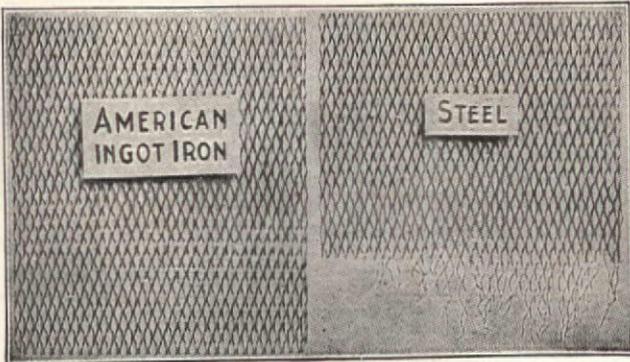
Sea Green and Purple Slate

is the toughest and best roofing slate ever quarried. It is easy to handle—easy to lay—outlasts any building. Its first cost is the only cost—there are no paint bills—no repair bills. It is fire-proof—lightning proof.

Let us give you the **proofs**—tell you why it will pay you—how it will please your trade—and send you our book "Roofs" giving interesting facts on comparative roofing costs and values. All free for the asking.

American Sea Green Slate Co.
150 Clark Street, - GRANVILLE, N. Y.

TO ARCHITECTS AND BUILDERS WHAT DOES THIS SIGNIFY?



Subjected to Same Acid Test

COMPARE
THE
RESULTS
OF
THIS TEST

WHY NOT
SPECIFY
THE
BEST?

IT IS PROOF THAT

"Imperial Spiral Expanded Metal Lath"

MADE FROM
PURE "AMERICAN INGOT IRON" RUST RESISTING SHEETS

Will last **LONGER** than any Steel Lath on the market. Approved by the U. S. Government. Furnished in Nos. 27-26-24 Gauges. Samples and Prices cheerfully furnished on request.

WRITE DEPT. "A"

AMERICAN ROLLING MILL CO.
MIDDLETOWN, OHIO

How About YOUR ROOFS?



—be they **NEW** or **OLD**,
Ready-to-Lay

Burmite

FLEXIBLE-CEMENT-1
BURLAP INSERTED **MATERIAL**

(PATENT APPLIED FOR)

WILL BE FOUND NOT ONLY

**THE MOST DURABLE AND INEXPENSIVE
BUT THE HANDSOMEST AND MOST PRACTICAL**

FOR THE

ROOFING AND SIDING

Of Factory, Residence and Business Buildings, Churches,
Warehouses, Summer Homes, Bungalows, Out-
buildings, Garages, Barns, Etc.

MADE IN TWO SURFACES—

BIRD-SAND and "Twolayr" SLATE-CHIPS
TO MEET EXTREME WEATHER CONDITIONS

Sparks, Hail, Sleet, Sliding Ice, Rain, Snow or the Extremes of Cold and Hot
Weather do not affect the **Storm-Resisting** and **Fire-Retardative** Qualities of
BURMITE.

CAN BE APPLIED IN COLD WEATHER

For the "Twolayr" **Slate-Surfaced Material**, Natural colored Slate of Unfading
Quality is used, the fine slab-shaped Slate Chips being imbedded into the **Pure Asphalt**
Composition so thoroughly—and put there to stay—that a smooth, even upper min-
eral surface (there being two layers of the Slate-Chips) is the result, thus securing the
well-known imperviousness and **Weather-Resisting** Qualities of Slate, at One-
fourth the Cost.

2 Permanent
Natural
Slate Colors—
SLATE-RED and
SLATE-GREEN



Uniform Solid Slate
Surface
Requires no Painting
Kept Clean and Bright
by the Rain

Natural size of the Slate Chips

DURABLE ECONOMICAL ARTISTIC

A practical roofer, with thirty years' experience in selling and applying other
makes, recently used our **BURMITE** for roofing his own building—which, by the way,
was a flat roof—although he had on hand at the time a large stock of the other kinds he
had been selling. In speaking of the many advantages of "Burmite," he writes us:

"It is not necessary to take off your shoes for fear of dam-
aging the storm-resisting and fire-retarding surface of a
"Burmite" Roof—the strongest and most durable made."

THE BEST BY TEST

SOLD ON ITS MERITS AND LASTING QUALITIES. THE FIRST COST—THE ONLY EXPENSE.

As a rule, other grades must be coated at least three times in seven to ten years;
and if the cost of paint and labor is added to the original cost of the material and
applying, it will be at once apparent that "Burmite" will be found not only the **Most**
Durable but **More Economical** than others.

Architects, Contractors, Builders, Roofing Experts, Owners and Occupants will find
our **Samples and Booklet**,

"BURMITE QUALITY COUNTS"

Illustrated with buildings, beautifully printed in colors, showing effect of **BURMITE**
MATERIAL, applied as a Roofing and Siding, both interesting and instructive.
Mailed free of all charges and obligation. **WRITE TODAY.**

Birmingham & Seaman Co.

ROOFING MANUFACTURERS

GENERAL OFFICES 1208-1226 Tribune Building **CHICAGO**
PLANT, 56th, Armitage and Grand Avenues

BEAVER BOARD, COATING for Prepared Roofing.
PAINT for Structural Iron Work. **ROOFING BRUSHES.**

CHICAGO BUFFALO, N. Y. CINCINNATI, O. GREEN BAY, WIS.
GRAND RAPIDS, MICH. PITTSBURGH, PA. ST. PAUL, MINN.

CUT AND USE THIS COUPON

Birmingham & Seaman Co., Tribune Building, Chicago.
Mail to my address, Samples and Booklet. This places me under no obligation.

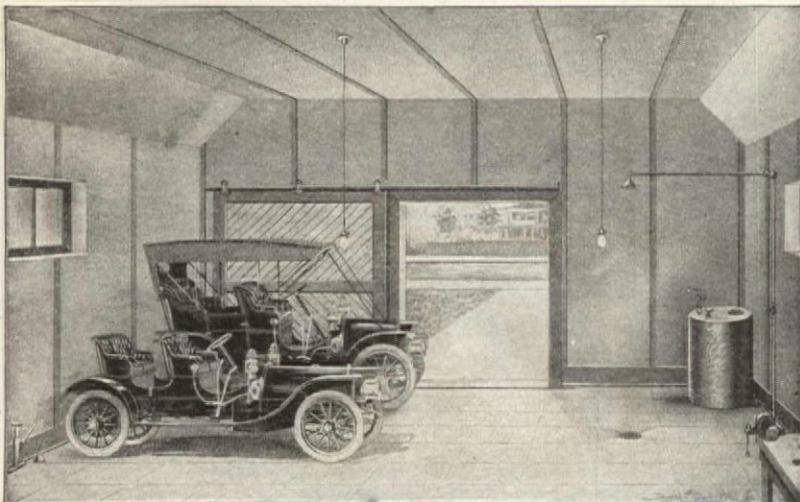
Name
Address
Business N. B. 1-11

PASTE THIS DOME ON LETTERS
THAT YOU WRITE ADVERTISERS.
IT WILL HELP.



UTILITY WALL BOARD.

The contractor or builder visiting Chicago who is fortunate enough to see the process of making Utility Wall Board will go away convinced that the day of lath and plaster is limited. While wall board will not take the place of lath and plaster at once in certain kinds of buildings, still it can be used to splendid advantage even now in a great many places and in rooms of the finest residences. Its use in both new building and repair work is now acknowledged to be growing at a rapid rate. Utility Wall Board is made in sheets 30 inches wide and 8, 9, 10, 11 and 12 feet long. It is claimed to be cheaper and better than lath and plaster. Wall board can be put on by the most inexperienced workmen in a very satisfactory way. Carpenters, however, are especially fitted to get unusually fine results from it. Being easy to handle, easy to decorate, easy to put on and a good material in every way, it offers the builder an unusual opportunity in specifying Utility Wall Board for many places in his work.



UTILITY WALL BOARDED.

The Heppes Manufacturing Company, 4502 Fillmore street, Chicago, are the originators and manufacturers of Utility Wall Board. They offer to send samples and literature on request.

REFRACTORY CONCRETE.

Mr. E. R. Stowell, Portland, Ind., is the patentee and owner of United States Patent No. 819467—"Refractory Concrete," a composition of Portland Cement and Carborundum. Mr. Stowell states that he will make contracts with reliable contractors and cement workers on very liberal annual rentals for using this process. This does not mean that Mr. Stowell will sell the material itself, which can be had in any quantity from 100 pounds to carload lots from Niagara Falls or from the many company branch stores located in different parts of the United States.

Pavements, floors, stair treads, or any surface that is finished with Mr. Stowell's Cement-carborundum finish will never wear out, it is claimed, and the material will become so hard that it will grind steel or glass. At the same time, it will have a fine, live, sparkling surface and will be anti-slipping and dustless.

In addition to "Refractory Concrete" being invaluable for use in pavements, floors, etc., the composition will make an absolutely fireproof concrete. The patentee claims that a concrete can be made with it, which can be heated to white heat repeatedly and it will not disintegrate. Besides, it will not expand or contract in heating or cooling. Neither can this wonderful material be affected by oils or acids. Mr. Stowell states that his cement-carborundum material can satisfactorily take the place of fire clay products and terra-cotta for many uses and that the cost is much less.

As a proof of what cement-carborundum is already doing, attention is called to the runways in the Hudson Terminal Buildings, to the floors in the Hudson Tunnel Cars and in 325 of the Interborough Subway Cars, New York, all being finished with cement-carborundum finish. There are also a number of important buildings in the East having floors, stair-treads, walks and vault lights finished with the same material.

With such evidences to see, it would seem that Mr. Stowell's proposition was worth investigating. It is these new materials that offer the architect, contractor and cement workers opportunities of increasing their business and at the same time making more money.

ROOFING OF QUALITY.

A unique folder in the form of a house with the invitation printed on the roof to "have one on the house" has been circulated by the H. W. Johns-Manville Company, 100 William street, New York. The invitation, while a well known phrase to the convivial, refers in this connection to the company's J-M Regal roofing, which can be depended upon to protect the building from the severest attacks of rain, snow, sun, etc. The wool felt used in J-M Regal roofing is made to exactly suit the very dense saturation it must receive. It is long-fibred, pliable and strong. This felt is thoroughly coated on both sides with specially prepared genuine Trinidad Lake asphalt. It does not melt, dry out, harden, rot, crack or crumble with time. It remains pliable and retains its water and fire-

resisting properties indefinitely in any climate. Every roll of J-M Regal roofing is absolutely warranted against leaks due to defective roofing material. And the warranty is signed by a \$3,000,000 company which has been making roofing for more than half a century.

A roof of J-M Regal roofing is to your building what time tested armor plate is to a battleship.

A NEW HAND BOOK ON CONCRETE.

A new hand book on concrete brick and block making is just coming from the press. This book is a regular standard text book on concrete and is right up to the minute with information on the following subjects and many others:

The field for concrete.
Various building systems.
How to proportion them.
How to cure it.
Plant arrangement.
How to estimate.
Comparative tests.
Table of compression working values.
Ways of making product.
Selecting materials.
Forming the product.
Steam curing.
A waterproof building system fully illustrated.
Weights of materials.
Hints on selling.
Profits in concrete.

It has cost a lot of money and time to gather this valuable information, but this book is being mailed absolutely free to all who ask for it, as it is designed to assist those now in the concrete business and those who contemplate it in putting their concrete plants on the best possible basis.

This book is being mailed free by the Queen City Brick Machine Company, 381 Bank Bldg., Traverse City, Mich. These people are the manufacturers of the well known line of Helm presses for making Dry Wall blocks and pressed cement brick. The Dry Wall block system saves the cost of furring and lathing for the builder and the blocks meet with a ready sale wherever introduced. Full information pertaining to this improved line of machines for hand and power operation will also be mailed free to anyone interested.

A POPULAR TOOL.

The great popularity of Fay & Egan Company's No. 61 hand planer and jointer is evinced by the fact of its general introduction into the best woodworking shops in the land.

This machine is said to be remarkably simple. The accuracy, precision and superiority of work performed, together with the immense saving effected over hand labor, has made it a universal favorite among carpenters, contractors and retail lumbermen.

The manufacturers designed this machine for general jointing and rabbeting, planing straight or out of wind, cornering, chamfering, making glue joints, and a great variety of similar work.



J. A. FAY & EGAN COMPANY'S NO. 61 HAND PLANER AND JOINTER.

In its construction the manufacturers have given special attention to the frame, casting it sufficiently heavy, making it perfectly free from vibration.

Tables are planed perfectly true, and are each vertically and horizontally adjustable, independent of each other. They are mounted on inclines tongued into each other. Each incline has an independent micrometer adjustment for perfectly aligning the tables. They can be instantly drawn away from cutter head on each side to facilitate the setting and sharpening knives and for swinging large cutters.

Cylinder is of forged steel, four sided and slotted, running in reservoir self-oiling bearings. The manufacturers furnish their safety cylindrical cutter head with this machine when ordered.

Fence bevels to 45 degrees and is equipped with spring post for holding down material while passing over head.

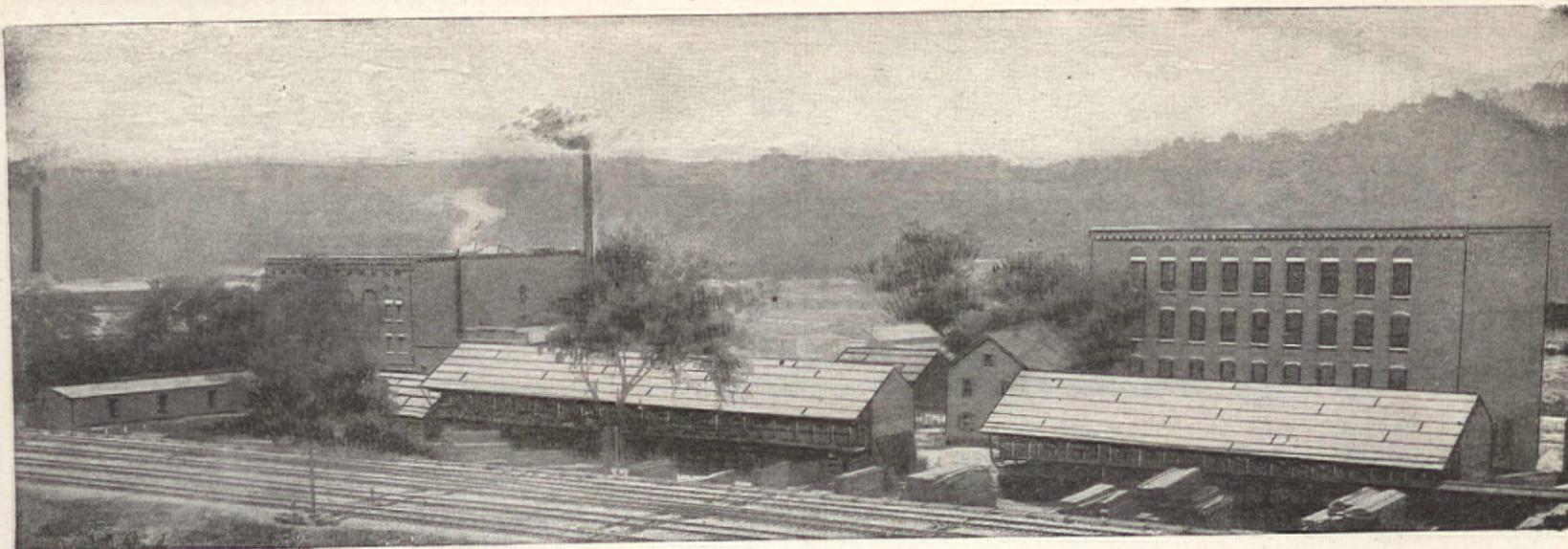
For further information regarding this machine you are invited by the manufacturers to write for large illustrated circular. The proper address of the manufacturers is 327-347 West Front street, Cincinnati, Ohio.

PATENTS.

976,183. Reinforced concrete floor slab. John A. Jones, Cincinnati, Ohio.

976,575. Window operating and locking mechanism. F. Karsitz, assignor of one-half to W. Ehaus, Bridgeport, Conn.

976,198. Metallic window-sash. A. W. Merritt, Lynch Station, Virginia.



Amatite

ROOFING

**Buy It—and You'll Never
Need Roof Paint**

When a man is under the necessity of using a lot of roofing, he is pretty sure to study the subject with great care. That is why Amatite is so often used on the big ready roofing contracts. A man who has only a few hundred feet of roof will often be careless in his choice of roofing, but when it comes to thousands of square feet (as above), Amatite is sure to be used.

The following is a typical instance:

Waterbury, Conn.,
Nov. 19th, 1909.

Barrett Manufacturing Company:

DEAR SIR:—We wish to inform you that the "Amatite" Roofing which we have used on our office, storehouse, lumber shed and barn has given most satisfactory service. The area that these roofs cover is about 15,000 square feet. The roofing is unusually attractive in appearance, and in our judgment is the

most durable and satisfactory made. The fact that it requires no painting appeals to us very strongly, and this feature makes it by far the cheapest ready roofing on the market.

Yours truly,

CITY LUMBER & COAL COMPANY.

[Signed] F. B. Boardman, Treasurer.

The economy of Amatite is not only in its durability and its price (lower than any other mineral surfaced ready roofing on the market), but also in the fact that *it requires no painting*.

You may be sure it would cost something to paint their big roofs if they used a roofing that needed painting. All that is saved with Amatite.

A sample of Amatite and further information will be sent you for inspection, free, if you will send name to the nearest Barrett office at once.

BARRETT MANUFACTURING COMPANY

New York Chicago Boston Philadelphia Cleveland St. Louis Cincinnati Minneapolis Pittsburg
New Orleans Seattle Kansas City London, Eng.

PASTE THIS DOME ON LETTERS
THAT YOU WRITE ADVERTISERS.
IT WILL HELP.



Packed in wooden box, wrapped in oiled paper.

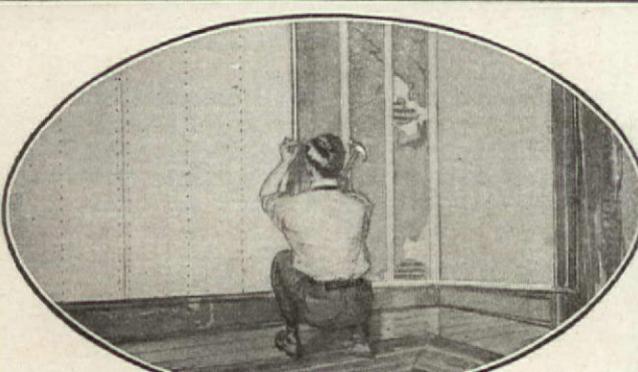


E. C. S.
KEEN KUTTER
Special Slim Taper Files

Particularly adapted for filing fine saws. These files are cut with a very thin edge and are in every respect the equal in quality and cutting of the larger sizes.
Every one guaranteed, and, if not entirely satisfactory, money refunded. If not at your dealer's, write us.

SIMMONS HARDWARE COMPANY (Inc.)
Div. No. N. B. St. Louis and New York
U. S. A.

Free Sample Sent on Request.



SEE THAT

Compo-Board

IS IN YOUR SPECIFICATIONS

It is the most satisfactory wall lining yet devised. It will last longer than lath and plaster.

Compo-Board is easily and cheaply put on, and the walls will look well as long as the building lasts. They will never be disfigured with ugly cracks or blemishes from moisture accumulating on the walls. Will not crumble, crack or fall off. Cannot be marred by jamming furniture into them. Compo-Board makes dry, warm, moisture-proof, fire-resisting walls, ceilings and partitions. The rooms will be free from draughts, warm in winter and cool in summer. Not only is Compo-Board a superior wall lining, but it has many uses around the house, in offices and factories. It is made of thoroughly seasoned, kiln dried strips of lumber well glued together. They are covered with a thick coat of cement on either side and an outside covering of thick paper.

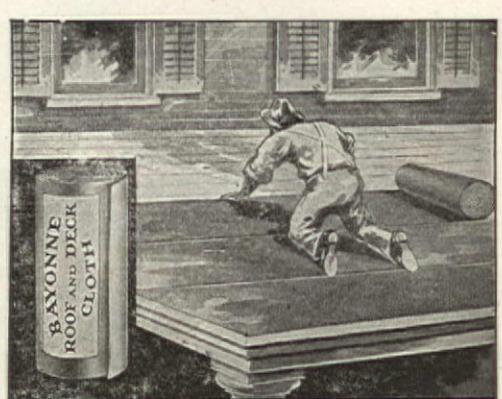
You can buy it in strips four feet wide and one to 18 feet long, any length you want in even feet. Send for BOOKLET and SAMPLE.

It explains the many uses and advantages of Compo-Board and you can get an idea of what it is from the sample.

NORTHWESTERN COMPO-BOARD CO.
5776 Lyndale Ave. No., Minneapolis, Minn.

The border of this advertisement is a cross section view of Compo-Board

For CANVAS ROOFS



Order the Scientifically Prepared—

BAYONNE ROOF AND DECK CLOTH

Easiest to lay—Lasts longest. Requires but one coat of paint.
The treatment permeates the fabric and preserves the fibre

BEST FOR PIAZZA ROOFS AND PORCH FLOORS

Ask for Sample Book B-6 and Prices

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70-72 Reade Street **New York**
202 and 204 Market Street, **ST. LOUIS**

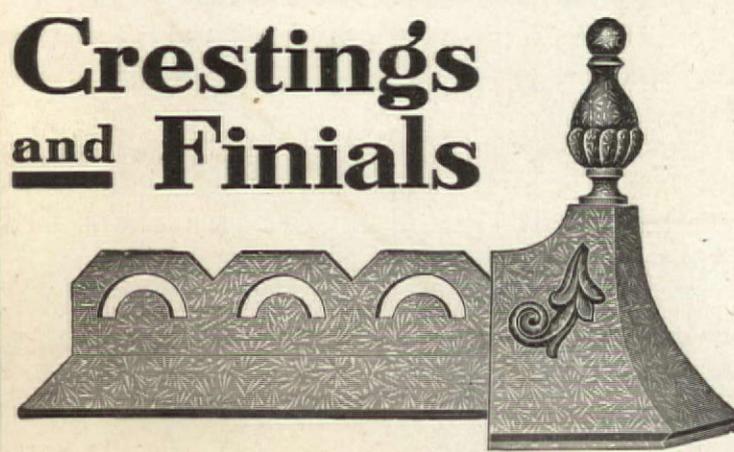
The Standard Brand of White Canvas
All Widths—All Weights—Any Quality



Our co-operative department gives complete instruction for laying
BAYONNE or GULF STREAM

JOHN BOYLE & CO.'S Awning Stripes have been the Standard for 50 years.

Crestings and Finials



CRESTING No. 107. FINIAL No. 97

WRITE TO

Willis Mfg. Co.

GALESBURG, ILL.

FOR CATALOGUE No. 5, ILLUSTRATING A FULL LINE OF

Crestings, Finials, Store Fronts, Bay Windows, Cornices, Skylights, Deck Crestings, Gable Ornaments, Ventilators, Willis Hip Shingles, Steel Ceilings and Side Walls, Fireproof Windows and Doors, Steel Roofings and Sidings, Ornamental Stamped Work.

SEND US YOUR PLANS FOR AN ESTIMATE ON THE SHEET METAL



PASTE THIS DOME ON LETTERS THAT YOU WRITE ADVERTISERS. IT WILL HELP.

Will You Answer This Advertisement And get these samples Delivered Free?

RIGHT by actual test we want you to know all about Johnson's Wood Dye and Under-Lac. A single trial will prove their superior merits. We will gladly bear the expense of sending samples that you may be familiar with the quality of our goods. There's a great difference between

Johnson's Wood Dye

and a mere stain. It is a real deep-seated dye that penetrates the wood, giving a rich, permanent color that will not raise the grain in the slightest. Johnson's Wood Dye is made in fourteen standard shades as follows:

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|-------------------------------|------------------------------------|
| <i>No. 126—Light Oak</i> | <i>No. 130—Weathered Oak</i> |
| <i>No. 123—Dark Oak</i> | <i>No. 131—Brown Weathered Oak</i> |
| <i>No. 125—Mission Oak</i> | <i>No. 132—Green Weathered Oak</i> |
| <i>No. 140—Manila Oak</i> | <i>No. 121—Moss Green</i> |
| <i>No. 110—Bog Oak</i> | <i>No. 122—Forest Green</i> |
| <i>No. 128—Light Mahogany</i> | <i>No. 171—Flemish Oak</i> |
| <i>No. 129—Dark Mchogany</i> | <i>No. 178—Brown Flemish Oak</i> |

Half Gallons—\$1.50 Each.

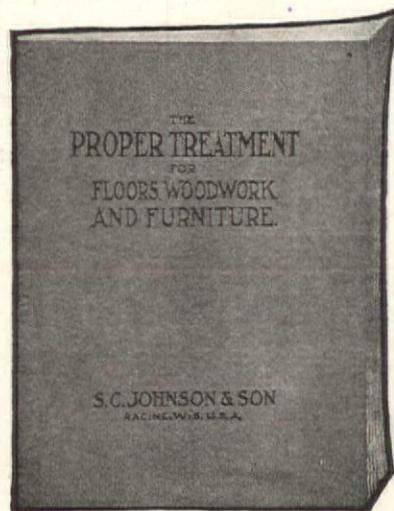
Johnson's Under-Lac

is a spirit varnish which will not chip, mar or scratch. It is better than shellac or varnish, as it can be easily applied and does not raise the grain, nor is it thick and sticky like varnish—dries in half an hour. Gallons \$2.50. In answering use attached coupon for samples of Johnson's Under-Lac and Dyes. State carefully the number of shades wanted. With samples we will also send a copy of our booklet, "The Proper Treatment for Floors, Woodwork and Furniture" showing all shades of dye.

S. C. Johnson & Son
"The Wood Finishing Authorities"
Racine, Wisconsin, U. S. A.



Free Sample of Under-Lac



Free Book



Free Sample of Dye

Please send FREE samples of Johnson's Under-Lac and Wood Dye No. 000 Also booklet, "The Proper Treatment for Floors, Woodwork and Furniture." I agree to test the samples and if they are satisfactory will use and recommend them in my work.

Name

Address

N. B. I.

PASTE THIS DOME ON LETTERS THAT YOU WRITE ADVERTISERS. IT WILL HELP.



Get Out of the Shovel Class

Some men dig, dig, dig, all their lives and never get out of the rut. Always striving—never succeeding—they need but a helping hand to point the way. Are you doing the same? Every carpenter, brick-layer or any man in the building trades who wants to get out of the rut should devote his idle time this winter, when work is slack, to a course in DRAFTING. The course is short, but complete, and includes



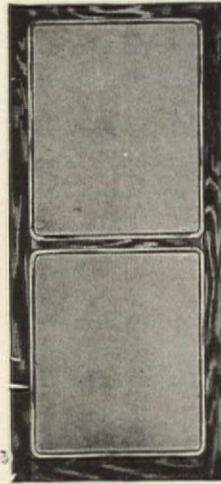
Estimating, Plan Reading

Building superintendence, building materials, carpentry, stair building, re-enforced concrete, masonry, estimating, contracts and specifications, the law of contracts and liens, hardware, plastering, painting, heating, ventilation, steel construction, elevators, sheet metal pattern drafting, mechanical and architectural drawing and blue printing.

Most practical course ever planned. Hundreds of plans of buildings in actual course of construction at disposal of students. Individual instruction. Personal attention given each student. Classes now forming—students can enter any time. Write for catalogue—not to-morrow, but to-day. DO IT NOW!

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CUSTOM MADE FLY SCREENS



Our work is far superior to the usual output of local mills and has a style and finish not obtainable from those who do not make a specialty of FINE SCREENS.

Our screens have water-proof coped joints and the frames are weather-proofed before the finishing coats are applied.

Best grades of Wire Cloth, Enameled, Gavanized, Genuine Bronze, fastened by most approved methods.

Intending purchasers may have free by mail sample of woods, finishes, wire cloth and a copy of catalog and price list. Agencies in nearly all large cities. Agents wanted in smaller cities.

Special Terms to Contractors and Builders.

De livered prices will be quoted.

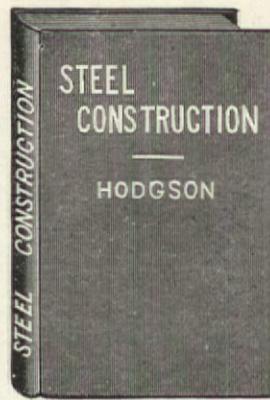
Goods laid down at your railway station.

A. J. PHILLIPS & CO. LeRoy St. FENTON, MICH. 25 YEARS EXPERIENCE. 3 1/2 ACRES OF FLOORS.

PRACTICAL STEEL CONSTRUCTION

BY FRED T. HODGSON, F. R. I. C. A.

12-mo, cloth, 120 pages, fully illustrated. Price \$1.00



A COMPLETE guide for the architect and erecting engineer in the design and construction of steel superstructures, in which the elements of strength depend upon the framework of steel. Specifications are given concerning what shall constitute the "Dead Load" and also the "Live Load" per square foot, for each of the following types of buildings, viz: city dwellings, country dwellings, theatres, churches, school rooms office buildings, assembly halls, ball rooms, drill halls, factories for light or heavy work, warehouses, etc. The weight per cubic foot of various kinds of materials is given. Foundations of all kinds are thoroughly treated upon in every detail. This includes pile foundations, also steel beam grillage, all being clearly illustrated by line drawings. Cantilever foundations are also described and illustrated, and formulæ given for the calculations to be employed in determining

the reactions, and the bending moment on cantilever girders. Formulæ are also presented for determining the properties of usual rolled steel sections. These formulæ are simple and practical, while at the same time they thoroughly cover the subjects, being clearly illustrated by accurate dimension drawings. Careful instructions are given regarding the selection of steel column sections, outline sketches being given of the various shapes. The Gordon or "straight line" formulæ for figuring the strength of columns, are given in detail, also data for calculating stresses. Specifications are given concerning the proper sizes of rivets to be employed on all parts of the structure. All the various styles of bracing are described and illustrated, and rules given for calculations. Girders and their classification, dimensions, etc., form the subject matter for discussion in one section of the book, numerous formulæ and rules for calculating strength, etc., being given, the whole being explained and made plain by means of dimension drawings.

The construction of roofs and trusses is also ably discussed, a large space being given to the subject of rivets and riveting.

The bending moment and bending stresses are two subjects which are thoroughly handled, and discussed at length, and in such a manner as to make the meaning plain and easily understood. The book is also well indexed.

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There are 35 Styles and 75 Sizes

Each One a Labor Saver

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Send for the "Yankee" Tool Book. Tells all about them. A postal brings it.

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NORTH BROS. MFG. CO., Dept. N, Philadelphia, Pa.

PERFECT COLUMNS

THEY NEED NO ARGUMENT

EXAMINE THE CONSTRUCTION

STEEL BOUND

Made in All Kinds of Wood, Any Size Do Not Open or Crack

For information and prices write

CALVIN CUNNIUS, Long Branch, N. J.

Last a Lifetime and Give Satisfaction to the End!



The Famous Barton Planes and Edge Tools for Carpenters and other workers in wood

Unequaled by any other make for keen, smooth, lasting edges. If your hardware dealer does not handle these Famous Barton Tools and is unwilling to order for you, send direct for catalogue. Be sure to specify Carpenter's Catalogue. A postal will bring it, together with our story book "True Stories," which will be found very interesting and instructive to those who are satisfied with the best tools only.



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Brown's Race

Rochester, N. Y.

Metal Ceilings

WITH

Punched Nail Holes

REDUCE COST

ONE-HALF

SEND FOR PARTICULARS

CANTON ART METAL CO.

CANTON, OHIO

EASTERN BRANCH

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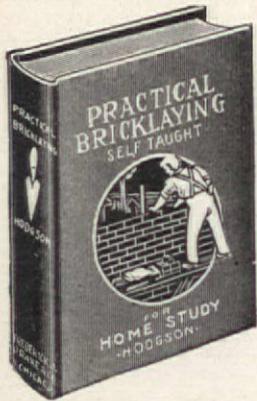
206 South Third Street, Minneapolis, Minn.

PASTE THIS DOME ON LETTERS THAT YOU WRITE ADVERTISERS. IT WILL HELP.



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Bricklaying is becoming quite an art, and the "bricklayer" is becoming of as much importance today as he was in the 16th and 17th centuries. It is absolutely necessary now-a-days that, in order to take his proper place among the arts and crafts, he become familiar with all the minutiae of the trades. As much art can be displayed in brickwork as in any other of the trades, and it is up to the working bricklayer to get all the knowledge possible regarding his calling, so as to enable him to execute any kind of work relating to his trade. This book is designed to help him out in this matter, and discusses the various kinds of bond, ornamental brickwork, damp courses, quality of brickwork, forming of pilasters, quoins, skew arches, splay work, brick joints, chimneys, fireplaces, flues, brick-pavings, and many other classes of brickwork. The work contains 300 fine illustrations.

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This book deals with stone cutting and mason's work, methods of building walls in rustic rubble, ashler square, uncoursed, random coursed, irregular corners, snecked and square rubble polygonal ragwork, and other styles of masonry and stone cutting are explained and illustrated. Finished stones, such as window sills, window heads, coping, arch stones, key stones, and similar dressings are described and illustrated. Stone arches and joints are described and illustrated, with ample instructions for working them.

The book contains hundreds of illustrations and diagrams, and is a complete cyclopedia of practical instructions in masonry and must prove of inestimable value to the operative mason.

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SELLING TALK No. 9

DID YOU EVER KNOW THIS?

That Cortright Metal Shingles are just as desirable and successful for siding as for roofing?

This has been conclusively proven by their many years of service for this purpose. They're laid in the same manner as when laid on the roof and we supply a corner finish for use at the corners of the building, similar to the hip-covering we supply for the roof.

All the same advantages which apply to Cortrights on the roof apply when used as siding, prominent among them being their protection from fire and their permanence. And what could be more ornamental than the Cortright design?

The above picture is of our Metal Slate, but always remember that we also supply three other styles.

Get the actual photographs of buildings roofed with Cortrights—see how they look in practical use.

These are in our two free illustrated books and all you need do is to send us your name, when we'll forward them by return mail.

This is one of a series of Selling Talks published to help you make more profit through Cortright Metal Shingles.

Next month's talk will explain how an absolutely tight roof is guaranteed with Cortright Metal Shingles.

CORTRIGHT METAL ROOFING COMPANY
PHILADELPHIA and CHICAGO



Lincoln Lodge Odd Fellows Hall
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The Lodge Business

is just one of the many fields open for the man who wants some of the profits which are being made by our agents selling



These steel ceilings are the world's standard—our agency system sells them.

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SPECIFY DULL KOTE PAINT FOR FINE INTERIOR DECORATING

JOHNSTON'S

DULL KOTE PAINT—No Gloss—Smooth—Soft—Beautiful—Washable—Paint
In many beautiful tints. It can be applied by anyone with satisfactory results and does not show laps or brush marks. Lasts for years and **WASHES LIKE TILE.** Finest paint made for interior walls of **Schools, Churches, Libraries, Residences and Public Buildings.** **JOHNSTON'S UNUSUALLY GOOD PAINTS** for both exterior and interior use, are right in quality and price. Our Varnishes and Stains will please you also.

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THE WINTHROP

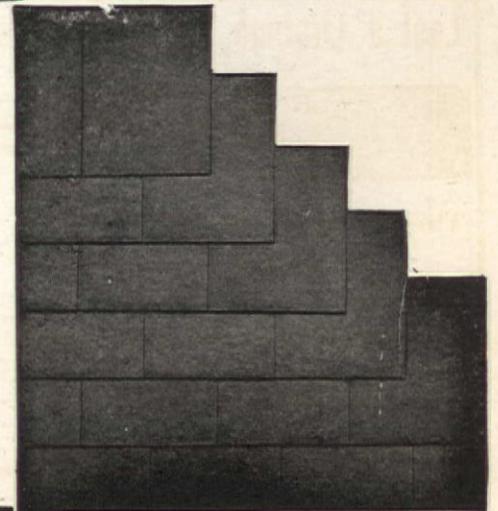
SOLID TAPERED ASPHALT SHINGLES

Are of a Cool, Gray Slate Color

And have the durability of asphalt—the fine appearance of slate and the light weight and low cost of wood shingles. They are fire-resisting—weather proof—wind and sun-proof and never crack, break or fall off.
Laid with regular shingle nails, the same as wood shingles.

Special Inducements to Those Who Apply First Roof in Each Town. Catalogue on Request

WINTHROP ASPHALT SHINGLE CO., 1100 THE TEMPLE CHICAGO, ILL.



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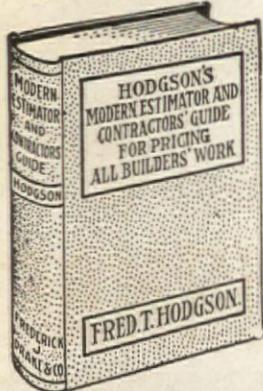
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A practical, up-to-date work on Sanitary Plumbing, comprising useful information on the wiping and soldering of lead pipe joints and the installation of hot and cold water and drainage systems into modern residences. Including the gravity tank supply and cylinder and tank system of water heating and the pressure cylinder system of water heating. Connections for bath tub. Connections for water closet. Connections for laundry tubs. Connections for wash-bowl or lavatory. A modern bath room. Bath tubs. Lavatories. Closets. Urinals. Laundry tubs. Shower bath. Toilet room in office buildings. Sinks. Faucets. Bibb-cocks. Soil-pipe fittings. Drainage fittings. Plumber's tool kit, etc., etc. The composition and properties of solder and how to make it, are carefully treated and a chapter is devoted to useful information. There are given a large number of valuable tables giving the pressure at different elevations, capacity of pipes, etc. The work also contains over fifty carefully prepared drawings, giving complete piping connections for home, tenement and office buildings.

MODERN ESTIMATOR AND CONTRACTOR'S GUIDE. FOR PRICING ALL BUILDERS' WORK—WITH MANY TABLES, RULES AND USEFUL MEMORANDA. By Fred T. Hodgson, F. A. I. C. 318 Pages, 100 Illustrations, 12mo, Cloth. Price.....\$1.50



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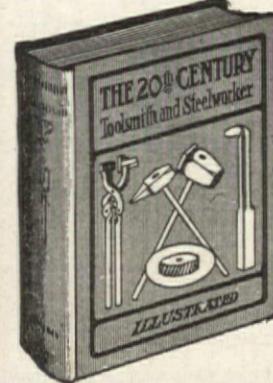
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The closing chapter, devoted to useful kinks, contains information on a variety of subjects which will be found of interest and value to the workman, as will also the many useful tables given at the end of the volume.

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This book is written in the interests of all mechanics connected with the working and manufacture of steel into tools, and gives all the secrets and obstacles to be overcome towards making steelwork or toolmaking a success. It will be invaluable to the young mechanic and place him years in advance of his fellow workman, by the reading and a little reflection of its contents.

It is not comprised of quack theories or foolish ideas, and is not written by a college student, who knows nothing except what he has been told or gathered up from papers and periodicals. But is written by a thorough expert mechanic who has spent the best part of his life over the anvil with the hammer and tongs.

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HOW TO USE CONCRETE

Price \$1.00

Every carpenter, builder and contractor should have this book. Over 240 pages telling how to make concrete steps, walks, balusters, laundry tubs, vases, porch columns, wainscoting, blocks, tile, brick, etc. Full instructions for making molds, proportioning mixtures and placing the concrete.

WRITTEN IN PLAIN ENGLISH

This is a book for the man who works with his hands. The instructions are clearly given and illustrated with a hundred diagrams and pictures. The book is printed in large clear type on fine paper. Bound in cement-colored cloth.

One Dollar per copy. We pay the express.

CONCRETE PUBLISHING CO.

501 Owen Bldg. DETROIT, MICH.

HOW TO USE CONCRETE

Electric Weld

(NEW STYLE)

Range Boiler

RIVETLESS CONSTRUCTION

Guarantees to you and your client absolute satisfaction.

Worth your trouble to investigate.

Defects common to other types eliminated.

Send for circular.

Specify the "Electric Weld" (New Style) Range Boilers in your work and insure yourself against trouble and annoyance.

The most dependable Range Boiler possible to construct.

JOHN WOOD MANUFACTURING COMPANY

CONSHOHOCKEN, PA.

Branches throughout the United States



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You can buy our furnace direct from our factory AT THE FACTORY PRICE, and test it 60 days in winter weather. If not pleased, return it at our expense for freight both ways, and pay us nothing.

This offer, and lots of good furnace information, will be found in our free 48-page booklet. Ask us for one. A postal card will do.

Hess, 907 Tacoma Building, Chicago

BUY A BOVEE FURNACE

DIRECT FROM THE FACTORY

And Save \$50.00 to \$100.00 on your Heating Plant

They actually save from one-third to one-half of the fuel

We have one of the best equipped furnace factories in the west and make more than 30 different furnaces of seven leading styles and can furnish our customers with practically any size or style of furnace they may desire, either UPRIGHT or HORIZONTAL, sufficient to heat a large church or school house, down to a cottage heating plant complete with all pipe, registers and fittings for \$55.00.

Our furnaces are the only furnaces having a PERFECT VENTILATING SYSTEM for every part of the house.

We ship our furnaces cut to fit. Any handy man can install them without the aid of a tinner.

Catalogue and full specifications free.



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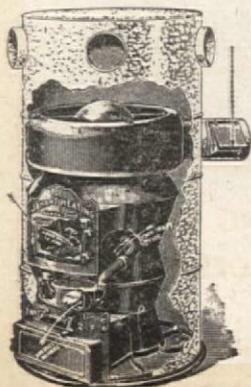
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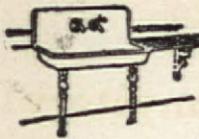
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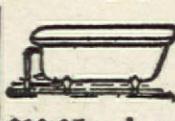
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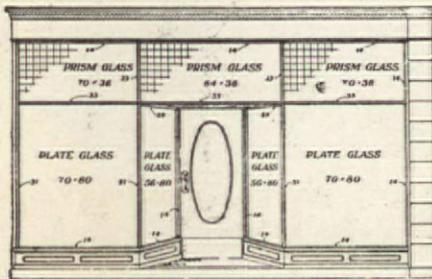
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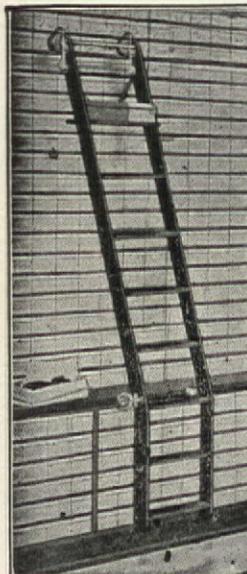
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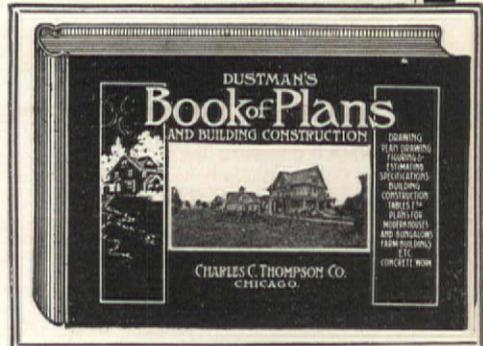
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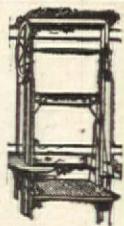
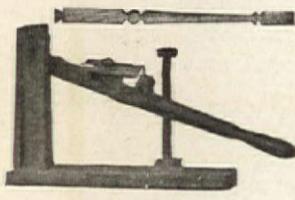
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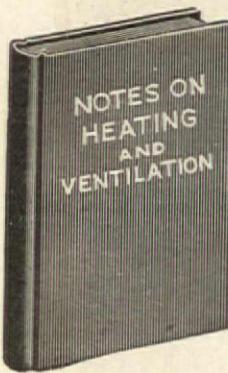
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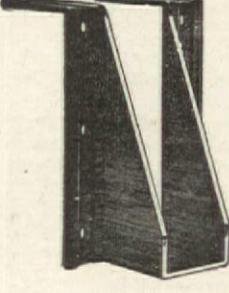
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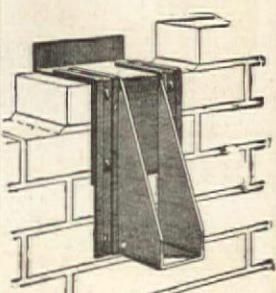
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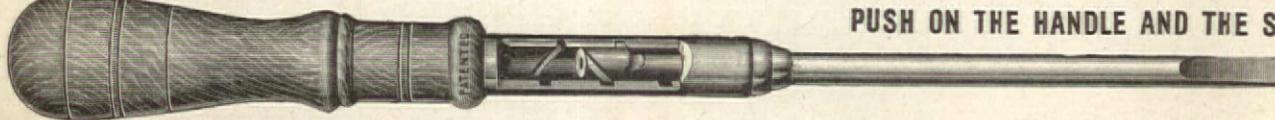
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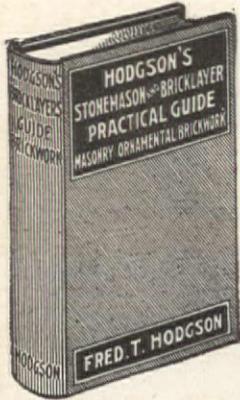
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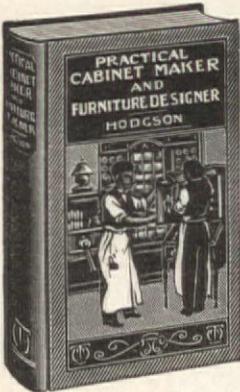
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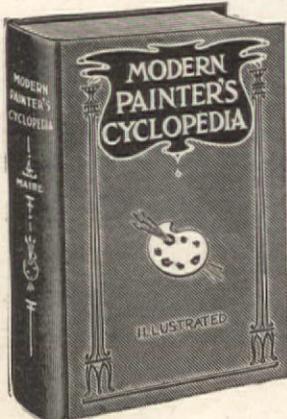
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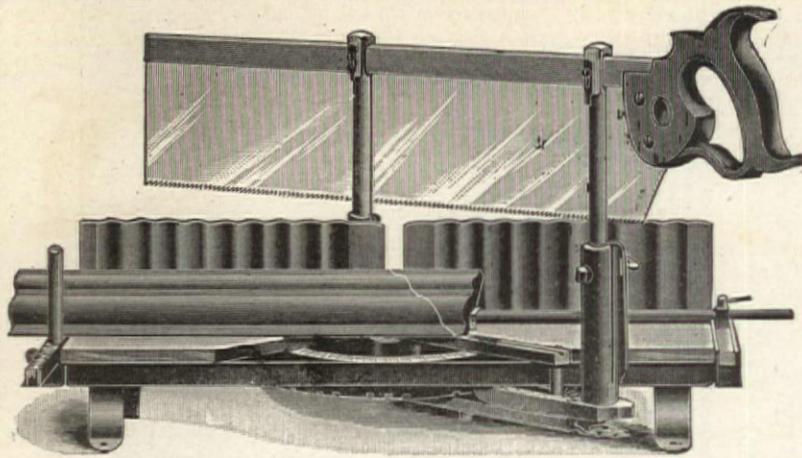
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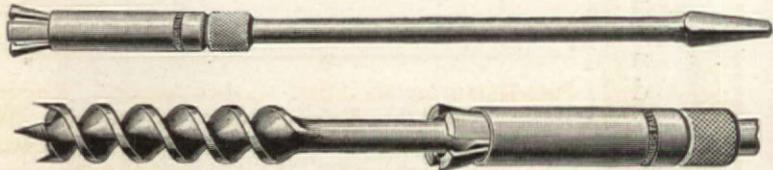
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bit shank will go between them, holding them very rigidly. This extension is durable and capable of performing all that can reasonably be expected of it. The tool is most useful to electricians and plumbers.

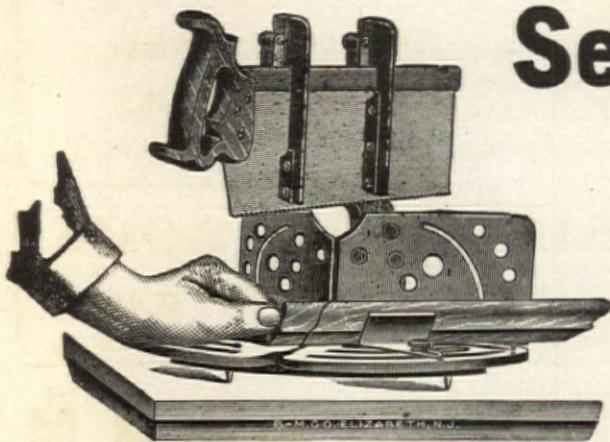
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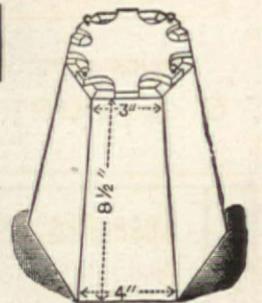
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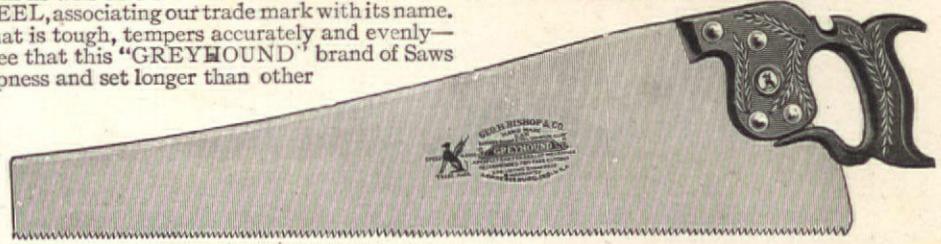
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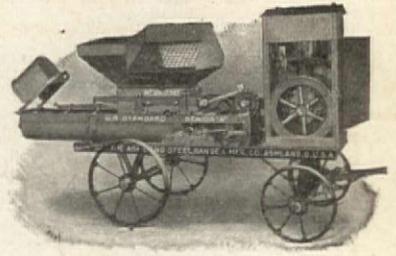
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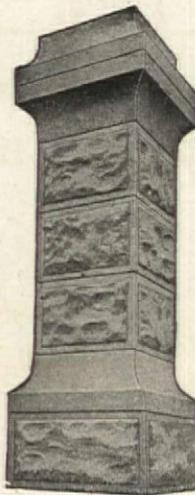
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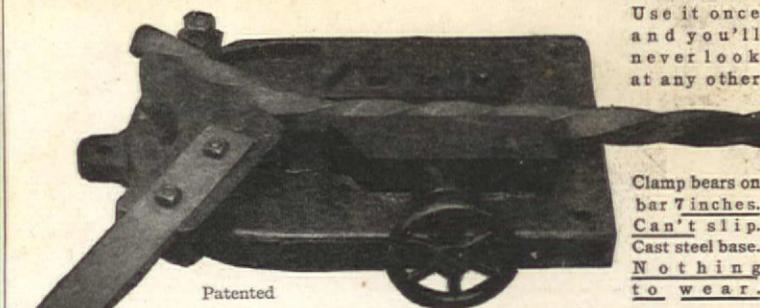
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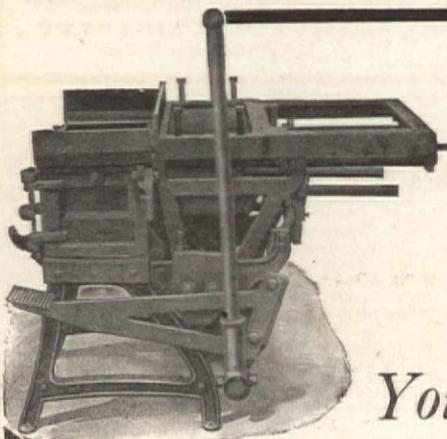
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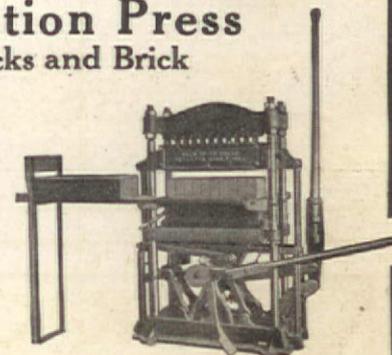
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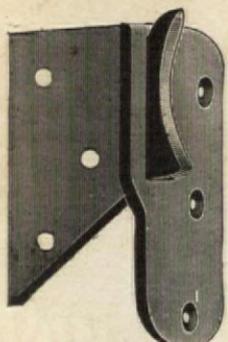
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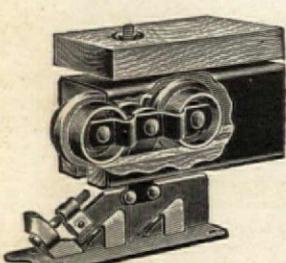
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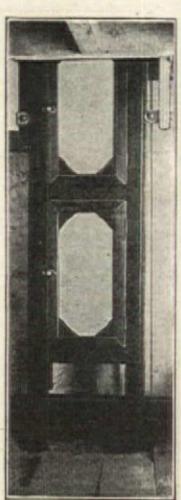
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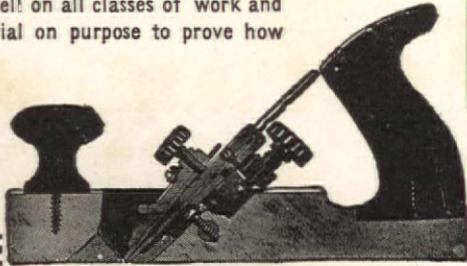
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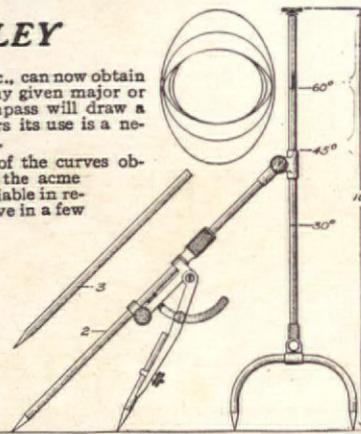
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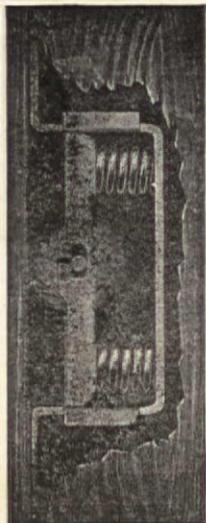
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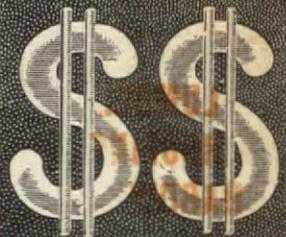
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