THE ATLAS CEMENT STONE MACHINE

BEATS THEM ALL!

MAKES all sizes and shapes of blocks; also ornamental designs, water tables, etc. Makes it face down and when made delivers the stone with the face upward, thus guaranteeing blocks with clean, sharp edges. It makes more perfect stone in eight hours than any other machine will in ten.

ATLAS CEMENT MACHINERY CO.
No. 341 South Avenue
Rochester, New York

WANTED—One good honest experienced agent to represent us in each state; must furnish best of references. A grand opportunity for right man. Write to-day.

THE O. K. Concrete Block Machine
The most complete and effective machine possible to construct at a minimum price.
$25.00 to introduce.
Write for booklet

The O. K. Hollow Concrete Block Machine Co.
431 McKinzie St. Youngstown, Ohio

Dixon's Silica-Graphite Paint
For the Preservation of all Classes of Metal and Wood.
WRITE FOR ILLUSTRATED FOLDER "B-6." JOSEPH DIXON CRUCIBLE CO., • JERSEY CITY, N. J.

COUPON
Cut out this coupon and mail to us with 25c in stamps and we will send you our 8-page catalog and sample$x
3.20 per face foot. Add $10.00 In cash to guarantee freight to your station, return to us. If you purchase machine, the $10.00 will be credited to your account.

THE CEMENT MACHINERY MANUFACTURING COMPANY of Burlington, Iowa,
agrees to ship their Junior No. 3, or Junior No. 4, 1906 Model, Chicago Machines to any responsible parties who will put the machine to work and make first-class blocks, for the following rental:
Two cents per block for full-size blocks, fractional blocks to be figured at the same ratio. At the end of 90 days after receiving machine if you desire to purchase the outfit, the rental due will be allowed to apply on the purchase price. Price of the Junior No. 3, $120.00; Junior No. 4, $180.00, all complete with attachments for making blocks of all lengths, widths and sizes. You will find our No. 4, Chicago Machine, 1906 Model, advertised in the October, November and December issues of this Journal. Give the block makers a trial and send us your order for a Junior machine. If you don't feel like buying a large machine to start with, rent a Junior at 2 cents per block. Good references must accompany order, also Bill of Sale in blank to guarantee freight to your station and return to us. If you purchase machine, the $100 will be credited to your account. The understanding that 100 blocks will be made each day.

We have for sale the following second-hand machines, good as new: 6 Normandia, $350.00 each. 8 Palmers, $250.00 each. 3 Palmer (24" and 30"), $200.00 each. Junior No. 4 model and read our ad carefully. Address Quotation Department, Cement Machinery Mfg. Co., Burlington, Iowa.
The Dykema Brick Machine

turns out cement brick at a cost low enough to compete with common clay brick.

That’s the field in which the money is made.

THE DYKEMA MACHINE is the quickest in operation, is built to wear, and is sold at a fair price.

That’s all!

THE NATIONAL BUILDER.

Send for printed matter about DYKEMA STONE MACHINES, and about the Dykema wet process molds—in which the stones are made that don’t take water.

Send 30c, stamps or coin, for our book of 40 plans.

DYKEMA CO., 2536 Pearl St., Grand Rapids, Mich.

IMPERIAL

The SPIRAL TWISTED METAL LATH

That is not an experiment—just a fact

WHY NOT JOIN OUR LARGE THRONG OF SATISFIED BUILDERS LATHERS and PLASTERERS?

One Testimonial from Many

Imperial Expanded Metal Co.,
1540 Monadnock Block.
CHICAGO.

You can do it by using our Lath, Studds and Furring

IMPERIAL EXPANDED METAL CO.,
CHICAGO.

GENTLEMEN:

Your Lath has given thorough satisfaction to plasterers, as it lays flat at the joints and takes less plaster to cover. It has a firm grip on wall or ceiling, is rigid and true and altogether, the best in use. Yours very truly, FREDERICK B. STEVENS, Detroit, Mich.

Please mention THE NATIONAL BUILDER when corresponding with Advertisers.
At The Cement Users Convention

**HERCULES**

1906 Model

**The Hercules Was the Star Performer**

At the Cement Users' Convention in Milwaukee in January the HERCULES CEMENT STONE MACHINE was the star performer.

Cement men had to see the Blocks, Ornamentals, Cornices, Lintels, Etc., made right before their eyes before they would believe that a simple constructed machine like the Hercules could turn out such a wonderful variety of shapes and sizes.

They were astonished—they were amazed and no wonder. They saw a machine so simple in construction, that not a cog, a chain, a spring, a bolt nor a pin entered into its make-up.

They saw the adjustments so easily and quickly made that many who had heretofore been prejudiced in favor of other machines freely admitted that the Hercules had them all beat from every point of view.

Skilled labor is not required with a Hercules, for the machine is so simple that any man with ordinary intelligence can operate it.

The Hercules, by a clever combination, can make two stones of the same size and design, or of different size and design, at one time; an arrangement that cuts the cost of labor in two, doubles the capacity of the manufacturer and saves the cost of purchasing two machines. Tamping is done directly on the face, which means a clear impression of the design, and gives the stone a more natural appearance.

Tamping on the face allows a 2 to 1 composition for facing, and 5 to 1 for backing, which means a great saving. It also allows the making of the mixture more wet which means a stronger stone.

The Hercules will produce more stone and stronger stone in much less time and for much less money than any other machine.

NEW CATALOG JUST OUT

We have issued a book (costing us over 20 cents each) which is brimful of things you ought to know about cement stone. It is beautifully illustrated and should be in the hands of every cement stone manufacturer. It's yours, free. Book B. Write for it to-day—it means money for you.

The CENTURY CEMENT MACHINE CO.

178 WEST MAIN STREET, ROCHESTER, N. Y.

IMPORTANT NOTICE: As we publish several catalogues of other machines, such as porch-column machines, curbing and gutter machines, cement tools, etc., it is essential that you mention the above book by letter B.
Good Fly Screens...

AT MODERATE PRICES.

Correct and handsome designs well made from good materials and delivered at your railroad station.

Send for Samples of Materials and illustrated descriptions.

The A. J. Philips Co.,
Department H.
FENTON, MICH.

ORDER TO-DAY

ORNAMENTAL HIP SHINGLES

Net Prices

For Prompt Acceptance

Size\n\n\nTin, painted, per 100\n
Galvanized Iron, per 100

3 x 7 \n
2.40 \n
1.70

3 x 8 \n
1.60 \n
1.20

3 x 9 \n
1.11 \n
0.82

4 x 8 \n
1.27 \n
0.95

4 x 9 \n
1.55 \n
1.18

3 x 10 \n
3.37

Packed in boxes of 120 and 9-5 inch. 6x8 and 6x9 are standard sizes for wood shingles. Half for slate.

MESSERER & PARKS

MANUFACTURERS OF

SHEET METAL WORK FOR BUILDINGS

51-53 S. WATER ST.
AURORA, ILL.

WE MANUFACTURE

Steel Roofing and Siding

OF ALL KINDS

Roofing Paints and Cement

GALVANIZED GUTTERS AND PIPE

ORNAMENTAL STEEL CEILINGS

PORTABLE AUTO HOUSES

Write for Catalogues and Prices. We can save you money.

THE LLOYD IRON ROOFING AND PAINT CO.
97 West Monroe Street, - - CHICAGO, ILLINOIS

HANNA PORTABLE SCREEN SHAKERS

NO FOUNDRY COMPLETE WITHOUT ONE

OPERATED BY EITHER STEAM OR AIR

SEND FOR CATALOG

HANNA ENGINEERING WORKS
820 ELSTON AVENUE, CHICAGO

Please Mention THE NATIONAL BUILDER when corresponding with Advertisers.
The great success of our process is its susceptibility to the reproduction of the architect's design.

The Peerless Cement Brick Machine

(PATENTED)

Is Made of Iron and Steel. It is Simple, Strong and Durable, a Wonder for Fast and Perfect Work. One Man Operates it, Delivering Ten Brick at a Time. Twenty Perfect Brick were Made in One Minute at the Minneapolis Convention in the Presence of Spectators.

What One of Our Customers Thinks.

GEORGE COOKE,
GENERAL CONTRACTOR,
227 BOSTON BLOCK,
MINNEAPOLIS, MINN.

December 19, 1905.

PEERLESS BRICK MACHINE CO.,
100 Lumber Exchange, City.

Gentlemen:

We have used five of your Brick Machines during the past season making the brick for the Twin City Rapid Transit Co's shop buildings at Snelling and University avenues, St. Paul, and the results have been in every way satisfactory to us. In fact, we consider your machine the speediest and most efficient brick machine on the market.

Yours truly,

C. E. COOKE, Supt.

You will write us a similar letter expressing satisfaction after you have bought a Peerless

PEERLESS BRICK MACHINE CO.

100 Lumber Exchange - Minneapolis, Minn.

All inquiries from Texas, Arizona, New Mexico and Southern California should be addressed to

PEERLESS BRICK MACHINE CO., Dallas, Texas

Please mention THE NATIONAL BUILDER when corresponding with Advertisers.
60 Mixes per Minute IS THE WAY THE AMERICAN MIXER MIXES

EACH BATCH IS THOROUGHLY AND EFFECTIVELY TURNED OVER SIXTY TIMES PER MINUTE AND THE DRUM IS CHARGED OR DISCHARGED AT FULL SPEED

THE AMERICAN MIXER IS ECONOMICAL TO OPERATE

Send for Catalogue "I"

THE INTERNATIONAL F. & FIREPROOFING CO.
COLUMBUS, OHIO

Best Made


MARTHA TOWN TROWEL WORKS
100 to 104 Eighth Ave., Marshalltown, Iowa.

SOME REASONS WHY MORE SMITH MIXERS ARE IN USE THAN ANY OTHER KIND.

THEY MIX BETTER and SAVE TIME
THEY MIX FASTER and SAVE LABOR
THEY MIX CHEAPER and SAVE CEMENT
THEY MIX ANYTHING and SAVE REPAIRS
THEY MIX RIGHT and SAVE MONEY

CONTRACTORS' SUPPLY AND EQUIPMENT CO.
Main Office CHICAGO Old Colony Building
NEW YORK PITTSBURG ST. LOUIS KANSAS CITY ST. PAUL SAN FRANCISCO
110 Broadway 304 Ferguson Bldg. 900 Wainwright Bldg. 500 W. 36th St. 301 Ger-Am. Bank Bldg. Fremont & Mission St.
The Polygon Improved Concrete Mixer.

The Cheapest Hand Power Concrete Mixer on earth. Cheapest because it produces better concrete in less time with less labor than any mixer made. It is roller bearing which insures ease of operation. There are plenty of mixers that will mix some kinds of concrete, but to use a mixer that will mix all kinds you should use a POLYGON IMPROVED. There is some satisfaction in using a mixer that will turn out uniform concrete.

It is roller bearing which insures ease of operation. There are plenty of mixers that will mix some kinds of concrete, but to use a mixer that will mix all kinds you should use a POLYGON IMPROVED. There is some satisfaction in using a mixer that will turn out uniform concrete.

The POLYGON IMPROVED HAND POWER MIXER HAS NO INSIDE MACHINERY. It changes the material from one end to another twice in every revolution of the drum. No stopping to load or dump; contents are in plain view of operator during mixing process; Buy up to date machinery. Get THE IMPROVED. We build 29 different sizes and styles, mounted to suit you. Let us book your order. Write

Baldwin & Scholes Mfg. Co.,
45-51 Lafayette Bldg., WATERLOO, IOWA.

Right on Top

Where they are
seen and admired
by everyone.
Made of Cement
and in DIFFER.
ENT COLORS.

Absolutely Waterproof. Our Roofing Tile Machine will manufacture enough roofing in one day to make it pay you to go into the Cement Tile Roofing Business. Write for our illustrated catalogue and be ready for the spring trade.

The Leusch Manufacturing Company
Waterloo, Iowa.

You Want to Make Money?

Every Man is looking for the best opening to better his condition. You cannot find a better money making business than CEMENT STONE.

To make the most money possible you need the right tools. We can furnish them because we have been in the Cement Stone Business for years and know what is needed. We have manufactured the largest Cement Stone buildings than any other company in the U.S. The magnificent Auditorium and Exposition building of the Texas State Fair at Dallas was erected last summer of stone made on our machines. It is the finest Cement Stone building in this country.

Our Proposition

We will furnish you with a complete outfit consisting of 1 Automatic Stone Machine, 1 Beastall Concrete Mixer, 1 Beastall Gasoline Engine, 1/2 H. P., 1 Beastall Fence Post Machine, 1 Beastall Window Cap and Roll Mold, and 2 Chimney Mold, all for $600.00 F. O. B. Waterloo, Iowa. Order now and save. It will pay you to have one of these outfits.

We carry a full line of cement workers' tools. Write for what you need.

Waterloo Automatic Stone Machine Company
WATERLOO, IOWA. Dept. A

Waterloo CEMENT TILE MACHINERY COMPANY
WATERLOO, IOWA

Manufacturers of
The Schenk Patent
Drain Tile & Sewer Pipe Machine
Capacity 350 to 400 per hour, 6 to 12 inch
STEWART CEMENT POST MACHINE
Also Dealers In and Manufacturers of All Kinds of Cement Working Machinery

Office: 315 Lafayette Building

Please mention THE NATIONAL BUILDER when corresponding with advertisers.
Buy a Baldwin Concrete Mixer
direct from the manufacturers at
$65.00 to $90.00
They mix better than
many high-priced mixers
and are just what the
block and side walk mak-
ers have been looking for.
Save Agent’s Commission
by ordering direct from
us. Our circulars tell
why the Baldwin Mixers
are such a success and
why you won’t have any
other after using. Write
salesman for samples.
Remember we are headquarters for a complete line of Cement Machinery,
such as Block Machines, Tile Machines, Fence Post Machines, Concrete
Mixers, Window Sill Molds, etc.

WATERLOO CEMENT MACHINERY COMPANY
WATERLOO, IOWA.

The Fisher Hydraulic Stone and Machinery Company
BUILDERS EXCHANGE, BALTIMORE, MD.

Correspondence is solicited with companies or individuals prepared to manufacture artificial stone blocks for large and important structures.
The only system producing blocks specified by eminent architects. The immense pressure, speed in action and volume of output, resulting from the Fisher machinery, give complete supremacy of the field wherever installed. Come and see the perfect stone turned out at the home plant and used in the rebuilding of the Monumental City. The outfit alone weighs 25,000 pounds. A Fisher plant insures the making of all shapes, styles and sizes of cement blocks of highest beauty, greatest strength, and at a price impossible for any other machine to attain.
There are no others in this class. The Fisher is the result of an investment of $60,000 and years of time. The system is now in successful operation at several important centers.
Don’t argue. Act by asking for facts.

The FISHER HYDRAULIC STONE AND MACHINERY COMPANY BALTIMORE, MD.

A revolution in the manufacture of hollow concrete building blocks

PERFECTION

The Perfection Power Block Machine
Concrete measured and subjected to 100 TONS’ PRESSURE to each block. Machines in operation the past season and now making 600,000 blocks for the new shops of the T. C. R. T. Co.

UNIFORMITY — DENSITY — CAPACITY

The Perfection Block Machine Co.
501 Kasota Building, Minneapolis, Minn.

Please mention THE NATIONAL BUILDER when corresponding with Advertisers.
Hollow Concrete Walls and Partitions

TWO PIECE SYSTEM

When you find
That one-piece hand-tamped blocks make wet walls,
That such walls are not stone, but cemented sand,
That damp sand and cement will not make true concrete,
That tamping damp sand displaces that already tamped adjoining,
That this produces a block lacking in density,
That you cannot safely plaster on such a wall without expense of furring,
That you have a soggy, wet wall for days succeeding every storm,
That you have a wall with only thirty per cent. of air space,
That you have no continuous horizontal air space,
That you have a wall with no cross bond.
That you have a system requiring two men to handle a block and a derrick to put it in the wall.
That you have a system slow and laborious in manufacture and laying,
That you have no way of facing your work,

Then write to

The American Hydraulic Stone Company
CENTURY BLDG., DENVER, COLORADO

Ask for a prospectus describing the two-piece wall containing the header bond, made of True Concrete, stronger in a 1 to 10 mixture than hand-tamped damp sand and cement is in a 1 to 3 mixture. Every block made under heavy pressure in steel moulds, in one set of which all the different widths of wall, from 3/4 inches to 36 inches, can be made by simply changing the adjustment, making a wall 50 per cent. hollow, containing an air chamber both in the horizontal and perpendicular, through which moisture, heat and cold cannot penetrate—a block easily handled by one man—to which any facing desired 1-inch thick is applied before the block is pressed. One thousand square feet of wall per ten hour day made, cured and cared for with nine men—three times the daily product possible under any other system.

The American Hydraulic Stone Co., Century Building, Denver, Colo.

Gentlemen: *** I have, I believe, investigated all the principal systems of Hollow Concrete Wall and Partition Construction now on the market, and have no hesitation in saying that your system of manufacturing is the only one I know of that obtains perfectly satisfactory results, both in the block and in the finished wall.

Very truly yours,

(Signed) JAMES M. WHITE, Professor of Architectural Engineering, University of Illinois.

THE IMPROVED

"MILES" CONCRETE BLOCK MACHINE

The Improved "MILES" Concrete Building Block Machine makes all blocks face down.

Write for illustrated catalogue. Prices and full information on application.

THE P. B. MILES MFG. CO.
214 S. Mechanic St., Jackson, Mich.

THE TEST THAT TELLS

On the high wave of popularity. The Ideal Hollow Concrete Block Machine.

Not a new machine.

Triied and tested over two years.

Satisfied users everywhere.

INTERCHANGABLE to various widths.

ADJUSTABLE to sixteen lengths.

No wheels, cogs, gears, chains or cranks.

Nothing to clog, break or get out of order.

Simplicity, Rapidity, Adaptability, Durability.

Face formed in bottom of the mold.

Cores withdrawn horizontally by lever.

Guaranteed capacity — two men, 10 hours, 200 blocks.

Portable—can be carried by two men.

Over 500 in use in the state of Indiana alone.

The only machine by which can be accomplished the facing of blocks by the Borst System.

A business proposition to the maker of blocks.

An appeal to the common sense judgment of the builder.

In corresponding with us make our business your interests.

Ideal Concrete Machinery Co., - South Bend, Ind.
**BARRETT’S IMPROVED COMBINATION ROLLER GAUGE**

Carpenters Recognize Its Advantages Over All Others

A simple device holds the beams in position while being adjusted. Accurately made and finely finished.


---

The Pettyjohn Portable Sill and Cap Machine fills a long felt want.

The Pettyjohn Portable Hollow Block Machine has proven the absurdity of attempting to move green concrete work, and all the more is it ridiculous to attempt to move such shapes as sills, caps, lintels, steps, posts, etc. This machine solves the problem. Does the business, does it rapidly and without waste or lost labor for we "Move the Machine—not the Block." Every well equipped block plant needs one. It is fully guaranteed and will be sent on trial.

**The Pettyjohn Co.**
612 N. Sixth Street
Terre Haute, Ind.

---

**THE WONDER OF THE AGE**

The Keystone is a face down machine and has proven itself to have a larger capacity and produces neater work than any other machine on the market. A postal will bring you full particulars and valuable information.

---

**THE KLINE**

The only machine making Blocks 6, 8, 10, and 12 inches wide, and 4, 6, 12, 16, 20, and 24 inches long: Including our return corner block, octagon, Broken Ashler, Veneer blocks and porch columns. All on one size pallet board.

Buy direct from factory and save agent's commission.

---

Please mention THE NATIONAL BUILDER when corresponding with Advertisers.
THE PAULY
System of Concrete Construction

FOR

Monolithic and Reinforced
Concrete Construction

NO FALSE WORK—DOES PERFECT WORK

The cost of False Work has always been a
drawback for Concrete Wall construction.
We have solved the problem with

PAULY'S
CONCRETE WALL MACHINE

PAULY'S HOLLOW CONCRETE
VENNEERING BLOCK MACHINE

Our Block Machine is designed for either hand or power press. Blocks
are made face up and are all uniform in size. Blocks of all sizes and shapes
can be made.

THIS IS THE MACHINE THAT HAS LONG BEEN NEEDED TO MAKE
PERFECT THE CONCRETE BUILDING BLOCK IDEA.

Can make blocks all one size 12x24 inches with mortar pointing space of ¾
inch subtracted, or broken up into any fractional size desired. The bed of
moulding press is so constructed that it is impossible to leave out the mortar
space calculation.

A GREAT SAVING OF MATERIAL IS GUARANTEED.

The labor cost in properly equipped plant in daily operation has been deter­
nined at 1½ cents per surface foot, when producing hollow concrete veneering
tile.

This is not a hypothetical calculation, but actual results obtained and
checked against the pay roll in the inventor's plant, which is literally crowded
with business, and turning away good orders for blocks every day.

FREEZING WEATHER HAS NO EFFECT IN OPERATING BY THE
PAULY SYSTEM.

Concrete Stone and Sand Co., Youngstown, Ohio
CAPITAL STOCK, $100,000.00

Please mention THE NATIONAL BUILDER when corresponding with Advertisers.
In buying a Block Machine the average purchaser has had no experience, but it is generally conceded that the most natural way to mould Building Blocks is with the face down, thus producing a more dense and more natural in the rock design.

You can afford to make a mistake, so avail yourself of the experience of others and investigate the merits of the

Automatic Block Machine

before buying. It is already an established success, manufactured in accordance with mechanical ideas and designed as a labor saving machine, with almost unlimited speed. Its operation is entirely automatic.

Write us for catalogue F.

The Anchor
Concrete Stone Machine

Makes the only Continuous Air Space Block.
Makes the only Frost and Moisture Proof Block.
All Blocks 6, 9, 10, 11 and 12 inches wide are made on the same

SOLID WOODEN PALLET

without changing a plate or the use of a wrench.

Anchor Concrete Stone Co.
ROCK RAPIDS, IOWA

The HELM Cement Brick Press

10 Pressed Brick at One Operation
10,000 Per Day, Guaranteed.
with less labor and expense than with any other hand machinery.

We offer a wonderful proposition, enabling anyone with limited means to engage in a profitable business, having unlimited demand. The success of our machine is measured by years, not days. It is used and proven. Don't buy an experiment, you will get nothing. Buy the Helm and you get something for a very moderate cost. Information you cannot buy is given in folder "C."

Helm Brick Machine Co
TRAVERSE CITY, MICH.

The INTER-STATE CEMENT BRICK MACHINE

IS NOW ADMITTED TO EXCEL ALL OTHERS

WHY IS THIS TRUE?

Because it is so constructed as to be used with either the wet or dry process in the making of brick.
Because it is the most simple, strong and practical, will make more brick with less labor than any other machine.
Because, if necessary, it can be operated by one man.
Because it has no cogs or wheels to clog with cement and sand, thereby saves time.
Because it is so simple that there is nothing to get out of repair.

* Because it can be so adjusted as to make any thickness of brick desired.
Because this machine will actually make from 7,000 to 8,000 brick per day.
Because it makes brick, such as are wanted in the construction of a building from bottom to top.
Because when you become acquainted with it and know its price, you will buy no other.
And on its merits we sell it.

THIS IS THE MACHINE TO BUY

For full information and further particulars, address

L. M. PRATT & CO.
BELLEVILLE, - KANSAS

Please mention THE NATIONAL BUILDER when corresponding with Advertisers.
The Cement Block
For You

If you are planning to go into the concrete block business, don't buy an expensive machine that makes blocks of questionable quality. Don't do it, because you can make more blocks, better blocks and cheaper blocks with

The Mandt Hand Tamping Outfit.

We can't tell you all about it here—you must send for the catalogue to learn of it's many points of excellence and superiority. But look at the blocks that it makes. See how one block binds three others. See the continuous air-space throughout the wall and in addition note that the blocks themselves are hollow, making a TRIPLE AIR-SPACE.

With this outfit you can make blocks for every possible use, in Smooth, Rock, Chiseled, Paned and Corrugated faces. Every size, too—all fractions of an inch from the regular mold.

Write for the catalogue today—now. Learn more about this system which is heartily endorsed by Architects and Contractors everywhere. Remember our outfit costs about one-fourth of what others do. Your name on a postal will bring booklet by return mail. Send today and learn the best way to make blocks—

MANDT-POWELL
Concrete Machinery
and Foundry Co.
STOUGHTON, WISCONSIN.

Please mention THE NATIONAL BUILDER when corresponding with Advertisers.
WHO WANTS SLATE?

ROOFING SLATE for Houses, Barns, etc. Always Clean,
Beautiful and Fireproof.

BLACK BOARDS for Schools, Colleges, etc. Needs no com-
mendation. universally used all over this and other countries.

STRUCTURAL SLATE. Electrical stock, Sinks, Toughs,
Washbins, etc. Superior to all stone for such purposes.

SLATE’S SUPPLIES. Handmade Slating Tools, Felt,
Cement, Nails, Snow guards, Punching machines, etc.

Write for prices and I will tell you all about Slate.

DAVID McKENNA, Slatington Pa., U. S. A.

Our own Sawmill
in the Indiana White Oak Belt.

Insuring a continuous supply of
seasoned lumber.

A Western and an Eastern factory
with large dry kilns and heated storerooms. Permitting prompt deliv­
er of goods.

Competent designers and hundreds of beautiful
designs guaranteeing satisfaction of customers. Send
for trade discounts and Catalog No. 10 on PARQUETRY.

WOOD-MOSAIC FLOORING CO.
ROCHESTER, N. Y.

NEW ALBANY, IND.

COLT’S CABINETMAKERS’ ADJUSTABLE ECCENTRIC CLAMPS
AND ADJUSTABLE SCREW CLAMPS.

For Cement Block Makers,
Carpenters, Builders

and

General Woodworking

Send for Catalog and price list

MANUFACTURED BY THE

BA TAVIA CLAMP CO.,
27 Center St., Batavia, N. Y.

STANDARD SHUTTER WORKER.

New and improved patterns and designs.

Opens and closes the blinds without raising the
window.

Automatically locks the blinds in any position de­
sired.

Made of gray and malleable iron. The best and most
durable kind known. Incomparable for strength, durabil­
ity and durability. Use on face of brick, stone or frame. Send for Illustrated Circular.

If your hardware dealer does not keep them, send

direct to

J. MALLORY MANUFACTURING CO.,
FLEMINGTON, NEW JERSEY.

The Schuller Continuous Automatic
:: :: Proportioning Mixer :: ::

Made in all sizes, equipped with any kind of power, AUTOMATICALLY
and ACCURATELY PROPORTIONS any two or three different kinds of
material, proportions vary to any amount desired, used for all gen­
eral contract and street work. All hand mixers fitted with pulley,

HARTWICK CONCRETE BLOCK MACHINE.

All blocks made FACE DOWN and can be used as a SIDE FACE MACHINE.

WRITE FOR PARTICULARS

The Celebrated BARTON TOOLS

Butt Chisel
Beveled Back
Polished Stained Handle
Heavy Brass Ferrule

Unequaled by any other make for keen, smooth, hard cutting edges. Last a lifetime, and give satisfaction to the end. If your hardware dealer does not keep them, send us for carpenter-tool catalogue. Be sure to specify "Carpenter."

MACK & CO., Sole Makers, BROWN'S RACE, ROCHESTER, N. Y.

If You Knew of a Man who could do as much work as 4 good men, would you hesitate to hire him? Don't believe you would wait a minute. Well, here is about the same proposition; one man with the No. 5 Union Combination Self-Feed Rip and Cross-Cut Saw will do as much as four men using hand tools, will do it easier and will do it better. Wouldn't it be economy for you to get a Union Combination Saw and save 3 men's wages?

No. 5 "Union" Combination Self-Feed Rip and Cross-Cut Saw

is suitable for various kinds of work—ripping (up to 3½ inches thick) cross-cutting, mitering, etc., and, with additional attachments, rabbeting, grooving, dadoing, boring, scroll-sawing, edge-moulding, beading, etc. Almost an entire workshop in one machine.

We build a complete line of Foot, Hand and Power Wood-Working Machinery, and guarantee each machine and attachment to be thoroughly practical and accurate. If they fail to give you entire satisfaction may be returned at our expense.

Send for Catalogue "A" fully describing our complete line of foot, hand and light power wood-working machinery.

The SENECA FALLS MFG. CO.
629 Water Street, Seneca Falls, New York, U. S. A.

Goodell Mitre Box
Made entirely of Steel
No more Breaking

First in Quality and Improvements
Automatic stops for holding up saw. Corrugated backs. Graduated. Gauge for duplicate cuts, and many other features. :: :: :: If you want the best you will take no other. Send for Circular E

March, 1906.

THE NATIONAL BUILDER.

Cordesman, Meyer & Co.

Manufacturers of High Grade

Wood-Working Machinery

44, 46 & 48 Central Avenue

CINCINNATI, OHIO.

Write for our Latest Catalogue and Prices

SCROLL SAW

CEMENT BRICK MACHINES
From $25.00 and up.
Capacity: 1,200 blocks per day.

BUILDING BLOCK MACHINES
From $50.00 and up.
Capacity: 150 blocks per day.

CONCRETE MIXERS
From $75.00 and up.
Capacity: 1.5 yds. to 15 yds. per hour.

MOLDS for Cap and Mill, Stair Steps, Columns, Base Rail and Balluster, Sewer and Conduit Tile, Sidewalk Tile, Keruing Tile, Fence Posts, Power Tampers.—Any-
tiling and everything in Concrete Machinery and Molds.

A. D. MACKAY & CO., 84 Washington St., Chicago.

BAND SAW

This Band Saw and many other Smith Wood-Working Machines were awarded the GOLD MEDAL at the St.

Louis World's Fair. We do not make the quick selling cheap sort. The Smith Machine is the kind that experts and
critical users everywhere always recommend. They cost but little more. Ask for prices. Address

H. B. SMITH MACHINE CO.

SMITHVILLE, N. J., U. S. A.

NEW YORK  CHICAGO  BOSTON

The Fox Square and Miter Improved

This tool with sliding and detachable blades is the best and most complete square and miter on the market.

Can be adjusted from 5 in. to 8 in.

A whole set of squares in one.

Of your dealer or sent on receipt at price $1.00

P. L. FOX, Sole Manufacturer

452 William St.

Bridgeport, Conn.

A COMPLETE FRAMING RULE ON
NICHOLLS FRAMING SQUARE

Every young carpenter will use it as it will save him years of study; the old carpenter will use it because it will save
time and avoid mistakes.

NICHOLLS MANUFACTURING CO.

Ottumwa, Iowa

MARSTON'S HAND AND FOOT
POWER CIRCULAR SAW

Iron frame, 56 inches high. Center part of top is made of iron accurately planed, with grooves on each side of saw gauge to slide with grooves on each side of saw for
gauges to slide in. Steel shafts and best babbit metal boxes. Gear are all machine-cut from solid iron. Boxing table and side pedals. 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.

SOMETHING NEW

Ideal Bevel Try Square

Any carpenter can accomplish more in laying off work. He can mark the square and bevel cut with one continuous stroke of pencil without having to change square. Bevel blade closes in handle making a regular try square.

SEND FOR PARTICULARS

NICHOLLS MFG. CO., Ottumwa, Iowa

Smith of Smithville
AN INTERESTING PROPOSITION

"Goods Direct From Factory to Consumer"—a phrase which interests everyone, because you know it means that you are paying just what the article is worth and not an agent's commission or middleman's profit. This is the proposition we make to purchasers of "Simplicity" Hollow Block Machine. Write for catalogue and price.

STANDARD SAND & MACHINE CO.
Cleveland, Ohio.
Manufacturers Mixers, Dryer, Conveying Machinery, Etc.

The "REED" Machines are in the Lead

TIME IS MONEY! WHY NOT WASTE TIME and MONEY? WHY use a MACHINE that you tear down and set up every time you manufacture a block? Why "NOT" use a MACHINE when adjusted for the dimension of block desired which manufactures blocks, and NOT WASTE TIME in tearing down and setting up for every block of the same dimension produced? The "REED" Face Side and Face Down Block and Brick machines are simple, quick and adjustable. Blocks and bricks are raised or turned out of the machines. Capacity 450 to 600 blocks and 0.000 brick in ten hours. If interested it will pay you to write us at once.

The Wichita Coal & Material Co.
Wichita, Kansas

AN INTERESTING PROPOSITION

"Goods Direct From Factory to Consumer"—a phrase which interests everyone, because you know it means that you are paying just what the article is worth and not an agent's commission or middleman's profit. This is the proposition we make to purchasers of "Simplicity" Hollow Block Machine. Write for catalogue and price.

STANDARD SAND & MACHINE CO.
Cleveland, Ohio.
Manufacturers Mixers, Dryer, Conveying Machinery, Etc.

The "REED" Machines are in the Lead

TIME IS MONEY! WHY NOT WASTE TIME and MONEY? WHY use a MACHINE that you tear down and set up every time you manufacture a block? Why "NOT" use a MACHINE when adjusted for the dimension of block desired which manufactures blocks, and NOT WASTE TIME in tearing down and setting up for every block of the same dimension produced? The "REED" Face Side and Face Down Block and Brick machines are simple, quick and adjustable. Blocks and bricks are raised or turned out of the machines. Capacity 450 to 600 blocks and 0.000 brick in ten hours. If interested it will pay you to write us at once.

The Wichita Coal & Material Co.
Wichita, Kansas

F. F. WILSON
Adjustable Building Block Machine

Adjustable Sides
Adjustable Cores
Self-Locking
PATENTED JULY

A simple, strong and practical machine for the manufacturing of Hollow or Solid Building Blocks

JAMES BROWN, Agent, 95 Clendenney Av., Jersey City, N.J.

High Grade Concrete Block, Brick, Post and Mixing Machinery

We Have The Leaders—"The Big 7"
1. Norman Concrete Block Machine (For Sale).
2. Peruvian Concrete Block Machine (For Sale).
3. American Concrete Block Machine (For Sale).
4. Chicago Concrete Veneer Block Machine (For Sale).
5. Favorite Sided Concrete Brick Machine.
6. Favorite Sided Concrete Brick Machine.

Cement Machinery Company, Jackson, Michigan

The Perfection Cement Block Machine

MAKES THE BEST HOLLOW CEMENT BLOCKS OF ANY MACHINE ON THE MARKET. It Tamps on the Face, an Important Fact to Consider when Purchasing a Cement Block Machine

Price
JUST THE THING
for the Mason, Builder, Contractor or any person with a Small Capital desiring to enter into a PROFITABLE BUSINESS
This machine has reached the height of Perfection in Simplicity, Durability and Quickness.

Weight
DON'T DELAY!
DON'T HESITATE!
Send for our Descriptive Circular and Prices.

ENTERPRISE FOUNDRY COMPANY
Office and Works: 83 Olean St.
Rochester, N.Y.

The "RUNYAN"

will make brick and blocks; no other block machine will do it. It will make five widths of blocks on one width pallet; other machines require five different width pallets to accomplish the same; notice this saving.

LESS than a second's time is required to form the mould with cores in position, or release the mould and remove the cores; one move of the lever does it all. A CHILD CAN OPERATE IT.

WE CAN PROVE IT
C. M. RUNYAN & Co.
Sales Agent
Elyria, Ohio

Please mention THE NATIONAL BUILDER when corresponding with Advertisers.
**Steer Clear of Cheap Roofing Material**

You cannot get any better but you can waste a great deal of valuable time hunting around for anything so good as the—

**Whitaker Old Style==Redipped==Resquared ROOFING PLATES**

The Whitaker Old Style Redipped is made by the Palm Oil Process from perfect, carefully annealed black plate, and carries 47 pounds coating of pure tin and new lead to the 20x28 box, weighs net—1C 250 pounds; 1X 322 pounds. Every sheet is resquared, inspected and packed with our guarantee. There can be no better Roofing Plate made.

**SAMPLE POSTPAID ON REQUEST**

**WHEELING CORRUGATING COMPANY**

Main Office and Works, WHEELING, W. VA.

Branch Offices and Warehouses

- New York City, 45-51 Cliff Street
- Philadelphia, 404, 406 Race Street
- Boston, 132 and 134 Pearl Street
- St. Louis, 412, 414, 416 South Eighth Street
- Cincinnati, 476 and 478 Lake Street
- Chicago, 45 and 47 Lake Street
- Chattanooga, 116 and 120 South Eighth Street
- Keokuk, Commercial Alley, Keokuk, Iowa

**Cement Brick Machinery**

The best brick machine made, and Mixers that do the work. **Write for Prices.** And the Bowen Improved Chemical Formula for Crystalizing Sand and Cement Very Quickly.

WITH the use of the chemicals you can use any good hydraulic cement and manufacture your Cement Stone or Brick in the coldest weather. You save cement and time. Send to-day for sample case, $3.60, that will make 5,000 brick or 150 building blocks. We will equip a plant that turns out 7,000 brick per day for less money than any one. All machinery guaranteed. Write us to-day for particulars. We have a plant in operation; come and see it work.

Keokuk Cement Brick and Block Co.
Commercial Alley, Keokuk, Iowa

**The Pass to a Larger Salary**

**PASS**

International Correspondence Schools

Box 1200, Scranton, Pa.

Send free booklet, "True Stories of Success" and use the undersigned to a full understanding of how he or she may quickly get a better salary in the position listed below. Send in today.

- Architect
- Architectural Drafter
- Structural Engineer
- Contractor & Builder
- Building Inspector
- Civil Engineer
- Mechanical Drafter
- Electrical Engineer
- Steam Engineer
- Civil Engineer
- Surveyor
- Mechanical Engineer
- Bookkeeper
- Bookkeeper
- Chemist
- All Others
- Commercial Law
- O.D. Service Exams.

**Name**

**St. & No.**

**City**

**State**

Have you ever stopped to consider what the above coupon is worth to you? Have you ever reasoned that it is the offer of the Largest Educational Institution in the World that has had 14 years of experience in qualifying tens of thousands of people for better positions and increased earnings, to help YOU obtain a better position and a larger salary? A coupon like the above has proved the pass to a larger salary, a better position, and increased happiness and prosperity to over 100,000 people, who are living proofs that we can do all we say. If you so wish, we can give you their names and addresses and you can obtain from them the truth of our statements.

If you really want to better yourself, the I.C.S. can and will help you, no matter how poor your circumstances are. Free send your coupon today and find out how great your education may be. No time lost from your present work. No books to buy. Pay in terms you can afford. If you realize the worth of this coupon, mark it and mail it to the Schools. It puts you under no obligation to do this. It is simply a free way to find out how to make a success of your life.

**USE YOUR PASS NOW**

Keokuk Cement Brick and Block Co.
Commercial Alley, Keokuk, Iowa

Please mention THE NATIONAL BUILDER when corresponding with Advertisers.
Barnes Hand and Foot Power Machinery

Complete Outfit for Carpenters and Builders.

Improved Has an adjustable table. Knives can be instantly reversed to suit the grain of wood. Speed of knife is 2,500 per minute, thus insuring smooth work.

We make sixty styles of knives. Improved No. 7 Scroll Saw.....

Send for New Catalogue

Warranted to be well made; will saw pine 3 inches thick at the rate of one foot per minute. Other woods in same proportion according to hardness.

W. F. & John Barnes Co.
436 Ruby Street, Rockford, Ill.

Price $15.00.

Safes and Vault Doors

Horizontal Folding Doors
Meaker Elevator Doors
Heat Retarding Doors

For All Purposes

The S. H. Harris Co.
29 and 31 Pearce St., Chicago

Protect Your Windows from Burglars

First, because it is the only holder that will keep windows from rattling. Second, it looks neat anywhere and cannot fail. Third, you can ventilate your rooms from the inside, or one can enter from the outside. For sale by all hardware stores, or send 35 cents for sample. Nickel or Old-dummy Copper.

State agents wanted.

H. H. Mayhew Co.
Shelburn Falls, Mass.

There is None Better Than

The "Special" Saw Set

We put only the best materials in it, and it does perfect work. What more could be said?

Chas. Morrill, 281 Broadway, New York

Do You Want to Earn $5 to $8 a Day?

The Man that Has a Trade Earns Just That

A course of practical instruction in either plumbing, bricklaying or plastering, at the only schools in the world recognized by the union qualifies you to earn such wages. Our graduates are admitted to the Plumbers' Union. You do not have to serve a 6 year apprenticeship. A course of practical instruction at your own home for those that cannot attend our schools.

American School of Correspondence, Chicago, Ill.

Name...........................................
Address...........................................
City and State..............................

N. Bld., Mar.'06

American School of Correspondence, Chicago, Ill.

Practical Instruction in Plumbing, Bricklaying and Plastering

Fill in and send this coupon to-day for free catalogue and information.

COYNE BROS. CO. TRADE SCHOOLS
New York.............Chicago.............St. Louis.............

Practical Instruction in Plumbing, Bricklaying and Plastering

Send free catalogue of your course.

Name.................................Address.............................
NOTES AND COMMENTS.

An increase in wages aggregating more than $1,000,000 a year was secured by the union carpenters of Chicago last month, through a three-year agreement with the Carpenters’ and Builders’ Association. By the terms of the contract the men are given an advance from 50 to 55 cents an hour for the first year, with a further increase to 65 1/2 cents per hour for the last two years of the agreement. About 10,000 members of the union are benefited by the increase and the advance for the first year means $1,000,000, allowing the average time worked to be 250 days. On account of the building boom last year the average time worked by the carpenters was more than 250 days and the officers expect an even more prosperous season this year. The agreement is subject to ratification by a vote of the membership both of the union and the association of employers, but that is considered a mere formality, as the contract was signed by the full committee of five from each side.

In other respects the contract signed is much the same as that in force last year, except that the man have gained some minor advantages in working conditions. The new agreement goes into effect April 1st. The contract stipulates that the men shall not be required to work with non-union men in their own craft. Sympathetic strikes to assist other unions are prohibited, as has been the case for several years.

The National Brick Company has signed a closed shop agreement with the Brickmakers’ Union. It was the evidence given by Mr. Webster last summer that caused the indictment and conviction of officials of the Illinois Brick Company and of the Brickmakers’ Union. Mr. Webster has always fought the union and for several months President Charles Hank has been waiting for an opportunity to “get even” with the man who procured his indictment. The opportunity came when the National Brick Company opened one of its yards in Evanston last month, as Mr. Webster is president of that company and was therefore concerned in the agreement, as it covers the three yards of the company, which is starting out as a rival to the so-called brick trust. The other two yards are located in Maynard, Ind., and Chicago Heights, but neither is ready to start the manufacture of brick. They are expected to be in readiness to open in a week or so.

It is not asking too much to inquire of our architects why more use is not made of our own history in the adornment of buildings, especially those devoted to public business. There are rich subjects in our career as a nation that might be symbolized in a most picturesque and appropriate manner. American architects and artists seem to dread any national decoration, if it may be so called, and it is probably accidental that the ornamentation of the Capitol at Washington was made to show American products and American subjects in place of the characteristics of some played out European power.
SOMEWHAT HUMOROUS.

The following amusing rhyming "skit" upon the general conditions of a specification appears in the current issue of the Architectural Association Journal. The gifted poet does not disclose his identity:

A Specification of Works
To be done for Sir Anthony Shirks,
Knight, G. C. M. G.,
At Ye Olde Hollie Tree,
Near Slough, in the County of Berks.

CONTRACTOR. Hereby I name you the Contractor,
It's a job you'll be sorry you're let in for,
As you will agree when you come to know me,
For I am John Jones, of Mosteley-at-Sea,
Yet I am the man whom you must respect,
For I am his honor, the Architect.

His honor, the Architect!

The Drawings, as you may possibly see,
Are numbered from one to twenty-three;
And whether they're right, or whether they're not,
Dimensions must always be checked on the spot.
A copy of any or all you select
Will be sent by his honor, the Architect.

His honor, the Architect?

The Contractor the works shall safely insure
In an office that's certified healthy and pure.
A competent foreman he also must keep
Day and night on the ground, and he never must sleep.
The Client will have the ownership
Of coins or relics that anyone finds.
The materials and all the workmanship
Must be of the best of their different kinds.
For I shall not pass a single defect.
As I am his honor, the Architect.

His honor, the Architect!

If any dispute on the works should arise
Between you or the client or even your wives,
And they, or yourselves, come to blows or black eyes
Why you've always an arbitrator honest and wise.

I truly hope that all who come
Herein may think "'Tis like a home!"
FIRE-RESISTING BUILDING MATERIAL

BY F. W. HAGLOCK, CLEVELAND, OHIO.

On Friday, February 2, 1906, a fire destroyed nearly $300,000 worth of buildings in less than four hours. My personal knowledge of the make-up of all the buildings in the vicinity, together with the opportunity of being on the scene during the destruction, enabled the gathering of data and such other information of interest to the builders generally, which I will state in brief words.

Twelve-inch walls built of red brick and lime mortar crumbled and fell within the time of the fire. Twelve-inch and a few eight-inch brick walls, laid in cement mortar, withstood the heat, but were so badly injured as to be condemned for future use. Terra cotta had been used only as a trimming and was only slightly injured. Sandstone trimmings were all rendered worthless, some being reduced to a powder.

Steel construction involved was all of a light character and was badly warped. An eight-inch wall built of concrete blocks bore the brunt and was injured to the depth of half an inch, the surface being charred, but by scabbing and plastering it over it will be as durable as ever. Carefully observing the plat, the reader will notice that the fire originated in a six-story brick building whose interior construction was principally wood. This building occupied by a knitting works, enabled the fire to spread so that in a few minutes it was a solid mass of flames from basement to roof, and the wind bore heavily to the southeast in the beginning and shifted to the south within two hours, consuming a two-story frame building adjoining the concrete building in one hour and twenty minutes.

The flames bore hard against the concrete wall, whose height is twenty-one feet, and over this building, partly destroying a frame section, occupied by a grocery store, which stock was damaged by firemen protecting the adjoining buildings.

In erecting this building during the winter months I had used four styles of concrete blocks, and I found but four blocks having been cracked through, all the rest being in a perfect state.

Even though this concrete building was in the direct path of the flames, and its woodwork badly burned at the openings, at no time did the firemen or myself find it necessary to vacate.

MIXING CONCRETE.

F. W. HAGLOCK.

Mixing.—There are various methods used in mixing concrete and the first object of the student is to study the requirements in mixing, and see that the process of mixing gives the proper results.

Object.—The object of mixing concrete composition is to uniformly mingle the various size grains of cement, sand and aggregate, thus making a composition as free from voids as possible and at the same time allowing the cement to unite all other particles.

The old saying you can not mix too much is not always applicable unless the process of mixing is perfect, but we have many processes of mixing that excessive mixing will cause the heavier particles to settle when over mixed; we also have mixers that fill the composition with air after same has been uniformly mixed and the machine allowed to continue.

Mixing machines operating continually (constantly receiving and constantly discharging) are rarely ever found to over mix; all processes of hand mixing in flat mortar boxes rarely ever injure composition, but the gravity and rolling mixers are subject to over mixing by allowing the cement to commence setting before being detected, as the influx of air into a well mixed composition makes careful attention necessary to discover the setting of cement.

The chief defect of any mixing process or machine is that of not mixing the entire composition uniform, and can readily be detected by even an inexperienced eye, as well mixed material is of uniform color and smoothness throughout and if the color is not uniform it lacks sufficient mixing; but if the color is uniform and the size of grains of the composition appear to vary in spots it has been over mixed.

It must be remembered that over-mixing is a rarity, but it is very detrimental, and on high class work over-mixed composition should not be used, as the cement having begun setting the mixing greatly reduces its strength in a very few moments.

In constructing an artificial stone building the builder discovered that all stone made on a certain day began crumbling, although the same material and proportion gave the same color as other stone whose hardness and durability could not be questioned. A close examination with a small lens (microscope) revealed the fact that the cement had gathered itself into small clots or pebbles and these pebbles refused to cement themselves to the sand, which indicated clearly that the cement had begun setting long before process of mixing was discontinued.

It is rare indeed to find an instance of over-mixing so clearly proven, but the fact that these stone began crumbling before placed in the wall (six weeks after they were manufactured) led to a close investigation of the cause, which revealed the fact that a lack of mixing processes of hand mixing in flat mortar boxes rarely ever injure composition, but the gravity and rolling mixers are subject to over mixing by allowing the cement to commence setting before being detected, as the influx of air into a well mixed composition makes careful attention necessary to discover the setting of cement.

The student is next instructed to carefully study the following methods of mixing concrete:

Hand mixing for all concrete work is best accomplished in a mortar box sixteen feet long, seven feet wide and ten inches high, which for permanent work should be made of concrete, but a well made plank box will do.

The cement and fine sand is placed in one end and drawn to the other by two men, one using a heavy garden rake and the other a mortar hoe, and again drawn back in the same manner; next add the coarse sand and repeat the process, and again add the aggregate and continue drawing from end to end until the mass is of uniform color throughout; then shovel same along the one side of the box and while one man throws a shovelful along the other side of the box let another sprinkle same, never failing to sprinkle every shovelful separately, then continue with the hoe and rake until a uniform color is obtained which, owing to the moisture, will be darker than the dry mixture.

The color of concrete always the same, as the color of the materials when uniformly mixed dry. Thus to know the color of finished season (hardened) stone mix your materials individually as you intend to use them and such, mixed before the addition of water, will be the color of the finished product.
Iron and Steel in Architecture—XII.

BY CHARLES A. MILLER JR., ARCHITECT.

Riveting.—In previous papers we have mentioned the use of rivets, their proportions, how they are driven, etc. Not less in importance is the manner of preparing the work for the rivets. The practice for this varies considerably between this country and European countries, and, while both sides have their points of superiority, there are certain economic reasons which have great weight with the owners, if not with the engineers who design the structures. In general, it may be stated that the European countries are in favor of drilling all holes for the rivets, while in this country the practice is to punch the holes by means of various forms of punches or punching machines. This is the usual method of punching work is superior to the punched work, as with most steel the tendency of the punch is to damage the plate in the neighborhood of the hole. The action of the punch seems to harden the metal around the hole, and if the punch is not in first-class shape the plate might even be cracked. There is a belief that the drill can be placed with greater accuracy than the punch, but if the holes are not very carefully entered and marked deeply there is still danger of the drill creeping out of line even farther than the punch would be set by a careful workman. The damage to the plate by punching can be entirely overcome by annealing, but this is a considerable expense and it is seldom done, and as the entire damage of punching and adding a little extra metal, would show that the required size, thus removing the damaged metal. The American engineer has, however, a better method of allowing for the damaged metal, if there is any such, and that is by considering the hole as

![10. Holes Before Riveting.](image1)

being slightly larger than it really is. Thus, if the hole is for a 1/2-inch rivet, it will be made 4/3 inches, but will be calculated as being 5/8 inches. This extra size will increase the amount of metal in the finished work very slightly, and is all on the side of safety, as when the member is in compression there would be no loss due to defective material, and it is the belief of many engineers that the amount of damage is greatly exaggerated. A comparison between the two methods, that is, between the cost of drilling all the holes and of punching and adding a little extra metal, would show that the drilling costs about five times as much. Drilling of structural pieces is seldom done except for connection purposes in the field, and in such cases the amount of drilling is very small and could not well be avoided. The marking of the flange plates and connection pieces would be very difficult, and even when accurately marked and punched it is likely that resort would have to be had to a punch to bring the holes in line, which would do more damage than good, and it is likely even then that there would be some holes which it would be necessary to drill to do a good job. As the holes can be accurately located and punched in one piece, it is an easy matter to bring the pieces together, and, clamping them together, drill the corresponding holes in the connection plates. Usually as soon as two or three are drilled they are riveted up so as to hold the pieces more solidly, and the remainder drilled and riveted.

When all the pieces are drilled from the solid it is necessary to mark out the pieces with great accuracy to avoid the necessity for redrilling the job. When the plates or pieces of a built-up member can be assembled in the shop before drilling it is so much the better, as there is then no drilling in this country except for connections in the field, and in such cases the amount of drilling is very small and could not well be avoided. The marking of the flange plates and connection pieces would be very difficult, and even when accurately marked and punched it is likely that resort would have to be had to a punch to bring the holes in line, which would do more damage than good, and it is likely even then that there would be some holes which it would be necessary to drill to do a good job. As the holes can be accurately located and punched in one piece, it is an easy matter to bring the pieces together, and, clamping them together, drill the corresponding holes in the connection plates. Usually as soon as two or three are drilled they are riveted up so as to hold the pieces more solidly, and the remainder drilled and riveted.

When all the pieces are drilled from the solid it is necessary to mark out the pieces with great accuracy to avoid the necessity for redrilling the job. When the plates or pieces of a built-up member can be assembled in the shop before drilling it is so much the better, as there is then no drilling in this country except for connections in the field, and in such cases the amount of drilling is very small and could not well be avoided. The marking of the flange plates and connection pieces would be very difficult, and even when accurately marked and punched it is likely that resort would have to be had to a punch to bring the holes in line, which would do more damage than good, and it is likely even then that there would be some holes which it would be necessary to drill to do a good job. As the holes can be accurately located and punched in one piece, it is an easy matter to bring the pieces together, and, clamping them together, drill the corresponding holes in the connection plates. Usually as soon as two or three are drilled they are riveted up so as to hold the pieces more solidly, and the remainder drilled and riveted.

17. As this is the same size as the hole in the top plate, no metal has been taken from it, but as the reamer is slightly larger than the punched hole, there would be a little more taken off, which would bring the hole to the extreme limit of the holes and would leave the hole perfectly round and smooth for the rivet. This is exactly the same result obtained by punching all the plates and drilling all at once, but the expense is only one-fifth as much. There is still another reason in favor of the punched holes which applies more to shop work than to field work. When the holes are drilled all at once by power presses can not have the head cut off and be driven out, but it must be drilled out, which is not easy work when the work is in place. When the plates are punched separately their is a considerable burr left on the plate, and while there is a probability that much of it will be removed in the reaming, there will still be enough left to prevent the plates being forced into such close contact that there is danger of the rivets flying. Of course, with hand riveting there is small chance of the occurring, but few rivets are put in that way now.

The fact that nearly or quite all of the work in this country is put together in this manner should be proof enough that the system is sufficiently accurate for the work in hand, for no failures have been recorded which can be traceable to the punching.

There are classes of work, however, where punching is not advisable, such as in boiler work. The majority of engineers will insist that all holes for rivets in boiler shells shall be drilled and not punched. There are boilers made with punched holes, however, and they seem to stand the pressure all right. The question of boilers hardly comes under this discussion.

(To be continued.)

AN AMERICAN INTERIOR ON "MODERN ENGLISH" LINES.

The illustration showing this "interior" is taken from "Cabinet Maker," and exhibits a style of finish and furnishing which is growing quite popular in some parts of the United States. While we are not "dead in love" with this style, we can not but admit that it possesses some charming features, and has a ruggedness about it that relieves one of the fear of breaking through the furniture while making use of it. There is one thing about it, any good workman can build his own home in this style and then furnish it with the product of his own hands—that is, if he can afford the time and money.
MY SQUARE AND HOW I USE IT IN MY DAILY WORK.

BY DWIGHT L. STODDARD.

My last article I closed by saying, "Don't let little things get you tumble side up; be on the square, keep your head level," etc. I hoped it would be the means of many, especially young mechanics, giving it more serious thought and earnest study, and quietly figure out with ease what might at first appear very difficult.

Of course, to form a complete ellipse the square has to be reversed. The laying out of a large arch is exactly the same thing. Simply take height of arch and one-half the width.

Figure 3 shows an oval formed very similarly, but let the one brad stay in the corner of the square and swing the stick and pencil around at one end and form a circle.

There are some quite complicated ways for centering an arch. Figure 4 shows the simplest and best way I know, after laying your arch out as illustrated, and divide it off into any number of spaces you wish. Then make an ellipse to correspond and divide that into the same number of spaces which will be the centering points.

Well, it is a problem in proportion and is just the same as any. Thus, if three men can build a cottage in nine days, how many can twelve men build in the same length of time? Or, if a thousand feet of lumber costs $22, how much would 800 feet cost? or thousands.
of other such examples just the same as this one that confronts us now.

Take the height and half the width, or we might call it the rise and run. Thus, as the rise of the ellipse is to the run, so is the (old run which is now the new) rise to the run of the one we wish to find. Remember there is no end to the number of examples that

FIG. 5.

can be figured with the square.

Figure 5 shows the taking of the rise on the tongue, and run on the blade; move the tongue up to the run, which will be the rise that we now want, and the blade will give the run we wish.

I hope the readers will not become disgusted with this poor, short article in this issue, but will study on and on and find that there is practically no end to the practical, every-day applications of the steel square along these lines.

AN ORGANIZATION CHART FOR BUILDERS.

BY KENDALL BANNING.

The tendency of modern commercial systems to find expression in organization charts has heretofore confined itself principally to manufacturing plants, and secondarily to retail and wholesale houses. Such a chart as applied to an organization whose business it is to do building work is of peculiar interest, not only because it is an innovation, but because of the many phases of work, none of which are necessarily dependent on the other from a business standpoint, which it must cover.

THE NATIONAL BUILDER.

THE DIVERSIFIED WORK CARRIED ON BY THE ORGANIZATION.

Among the prominent building organizations of New York is a concern which undertakes to superintend not only the building but every detail of structural and furnishing work. Its services include not only the superintendence of architects, but of engineers, masons, carpenters, decorators, furnishers and all the details which go toward the making of a complete building. This organization, in other words, selects all those men, methods and material which are best qualified to do the particular work at hand, and for or under a pre-determined sum. For this reason this organization can not properly term itself a concern of architects alone, as such work is only incidental to all the work which it does. For this the concern has originated a form of contract peculiar to itself and the organization is known as "contract designers." In accordance with the contract peculiar to this firm, whose duty it is to act in the capacity of professional adviser to the owner and whose work includes every detail from the drawing up of the original plans to the buying of the silverware, the owner agrees to devote a certain specified sum to the work on hand. The contract designers, accepting this predetermined sum within which to complete their work, distribute the expenses consistently over the whole, both for the purpose of securing a harmony of design and consistency of quality. The peculiar features of this contract provide that should the work be completed at below the estimated cost, a specified percentage of profit is deducted for the contract designers, and the difference between the sum of these two amounts and the estimated cost is returned to the owner. In this way the purpose of the contract of work which this concern—Hoggson Brothers—undertakes, an organization chart has been prepared on which it is shown the main divisions and subdivisions of all the details in the erection and furnishing of a building.

THE CHART MARKS DISTINCTLY THE LINES OF AUTHORITY.

As is indicated on the accompanying chart, Hoggson Brothers act as the executive and sole responsive head. To this executive is responsible all the details of work which are performed under their superintendence by outside parties. The work, which is properly connected with the executive office directly, is indicated by lines representing the routes of authority connecting this work directly with the executive. Thus on this chart is shown not only the various phases of labor conducted under the supervision of this executive, but the lines of authority as well. Although this chart covers a work considerably more inclusive than that of an architect's office, it is of interest to architects and builders in general, not only because of its completeness and clearness which it indicates the field which the organization covers, but the system of covering it.—System.

A very simple device for very greatly increasing the effectiveness of plain brickwork consists in raking out the mortar from the joints to a depth of one-half or three-quarters of an inch below the surface of the brick, the mortar in the joint being afterward pointed with a special tool which bevels the joint slightly so as to throw the water from each brick course. Work laid in this manner simulates, to a certain extent, the effect of the old brickwork which has stood for generations and from which the mortar has dropped out. The mere imitation of the old work of itself is not necessarily an advantage, but by accentuating the joints, especially if the joints are laid pretty full, the surface of the wall is broken up in such manner that it is impossible for it to have a monotonous appearance, each brick casting a sharp, well defined shadow. Such a method, of course, would be impracticable for a public building or any large structure, but it lends itself very successfully to a picturesque treatment, and especially when the bricks are laid with the Flemish bond it is the effect very satisfactory, says the Brickbuilder. The average mason is apt to make his joints too thin and to bring the pointing out beyond the face of the brick, or at least make a broad tuck joint which loses itself with the face of the brick and is apt to be characterless. In the early days of the use of pressed brick it was quite the custom, and is still, for that matter, in some cities, to paint the entire surface of the brick wall with red paint matching the color of the brick and afterward line off the joints in black paint. This was about as reprehensible a practice from an artistic standpoint as it could be imagined, but where smoothness and a monotonously even appearance were desired such procedure was quite to be expected. There is no handsomer surface considered as a wall texture than well laid brickwork, and especially if the joints are accented in the manner just given, as the surface can be a delight to any one who appreciates artistic effects.
LESSONS IN PRACTICAL CARPENTRY AND JOINERY.

SECTION IV.

Fig. 1.—Three straight lines being given, to form a triangle; take one of the given lines a b, and make it the base of the triangle; take the other line b c, and from a describe an arch at b; then take the third line b c, and from b describe another arch, crossing the former at e, and join a c and b c.

Note.—That any two lines must be greater than a third.

Figs. 2 and 3.—To make a quadrangle equal to a given quadrangle. Divide the given quadrangle (Fig. 2) into triangles, and in Fig. 3 make triangles in the same position, respectively equal to those in Fig. 2; then will the irregular polygon f g h i k be equal and similar to a b c d e.

Fig. 4.—To make a rectangle equal to a given triangle. Draw a perpendicular, c d, divide it into two equal parts at e, through e draw f g parallel to the base, a b; draw a f, b g perpendicular; then will be rectangle a b f g be equal to the triangle a b c.

Fig. 5.—To make a square equal to a given rectangle. Let a b c d be the given rectangle; continue one of its sides as a b out to e, make b e equal to the other side b c, divide a e in two equal parts at i, with the radius e i or i a make a semi-circle a i e, and draw b f perpendicular to a b; make the square b f g h, which is equal to the parallelogram a b c d.

Fig. 6.—To make square equal to two given squares. Divide the perpendicular sides a c and a b of the right-angled triangle cab equal to the sides of the given squares a and B, draw the hypotenuse c b, which is the side of the square C, equal to the two squares a and B.

GEOMETRY CONTINUED—NO. 5.

Fig. 3.—To describe a segment of a circle at twice, upon true principles, by a flat triangle. Let the extent of the segment be a b, its height c d, from the extreme b to the top d, draw d b, through the point d draw e d parallel to the base a b; make e d perpendicular to a b; then will be rectangle a b d e, which is equal to the segment required.

Fig. 4.—The transverse axis a b and conjugate g c of an ellipse being given, to draw its representation. Draw a d parallel and equal to n c, bisect it in E; draw c e and d g cutting each other at m, join m c, bisect it by a perpendicular meeting c g, produced at h; draw h d, cutting b a at k, and make n i equal to n k; n 1 equal to n h; through the points i, k, k, h, draw the lines h, i, k, l, and i, l, h, k, then describe the four sectors by help of the centers, i, l, k, h, and it will be the representation required.

Fig. 5.—To describe an ellipse by ordinates. Make a semi-circle on the length a b, divide it into any number of equal parts, at sixteen, on the end at a make a s perpendicular, equal to half the width, and draw the ordinate, through the points in the semi-circle draw the line s r t to the center then a s r will be the scale to set off the ordinates; take 12 from the scale and set it from 3 to 1, on the oval both ways at each end; then take 12 on the scale, and set it to 12 in the oval, and find all the other points in the same manner. A curve being traced through these points will be a true ellipse.

TO BE CONTINUED.

CUT OUT AND SEND WITH TWO DOLLARS.
CONSTRUCTING SPLAIED LININGS TO WINDOWS.

BY F. W. TOASEY.

Before describing the method of obtaining the true shape of the veneer for the soffit of an elliptical head to a window, it is advisable to explain how the shape for a semicircular head is obtained. The description of the elliptical lining will then be more easily understood.

Fig. 1 shows the plan of an ordinary cased sash frame in a 14-inch wall, with the linings splayed at an angle of 45 degrees. Fig. 2 represents an elevation of the same frame, showing also the sashes, the upper one having a semicircular marginal bar and radiating bars. Fig. 3 gives a section through the center line of the frame, but shows the splayed lining only. Fig. 4 gives a plan of the soffit lining developed. The plan of the opening is first set out as shown, giving the true position of the splayed lining. It is then set up in elevation as shown by Fig. 2—not necessarily the whole elevation, but at least enough of it to contain the springing line and the part above it. When the linings have been obtained, finishing at springing line A A, and produce lines B B1, B B2, from the center of the head, parallel with the springing line. From the line B B2, set off the angle of the splay, and extend the line of the angle until it cuts the springing line in C. Divide the outer line of the head from A to B into any number of equal parts as shown. Take C as center (Fig. 4) and radius C B1, C B2, and inscribe arcs D D, E E from B (Fig. 4). Mark off the same number of equal spaces as in Fig. 2. Join D C at each side of the figure, and the true shape of the veneer is obtained, D D and A A being of equal length.

Fig. 5 represents the plan of an opening of which is an ellipse, with linings splayed at an angle of 45 degrees; Fig. 6 is an elevation of the head; Fig. 7, the developed soffit; Figs. 8 and 9 showing the elevation and section of the cylinder or center on which the head is constructed. The width and rise of the arch being given, set up the vertical line as the center of the arch, with the springing line X Y at right angles to it. With radius A B (Fig. 6) inscribe arcs O O, P P. From centers A and radius A O and A P inscribe the arcs from the springing line, intersecting P P. Extend these arcs as shown by dotted lines at the right side of the figure, until they cut C C in vertical line from A1 in the springing. Produce B B1, B B2, C C1, C C2, at right angles to the vertical line, and parallel with the springing. From the line B B1 produce the angle of splay, extending the line of splay until it cuts through XY to D in the vertical center line (Fig. 7). With radius D B1 and B2, and from the center E in the vertical line, inscribe the arcs H H, H1 H2. From the line of intersection P (Fig. 6) mark off six equal parts to B. Produce from O to H (Fig. 7). From H set off the dotted lines to E. With radius D C (Fig. 6), mark off H to F in the line of intersection; and with F as center and radius D C1 and D C2, inscribe arcs H A, H2 A1. Divide the outer radius from the springing to P (Fig. 6) into four equal parts, and from H (Fig. 7) set off the same number of spaces and equal distances, and of moderately thin close-boarded lagging. Blocks cut to the proper angle are fixed to the lagging in positions as shown; the distance apart being determined by the thickness of the veneer. The thinner the veneer, the nearer apart the blocks would be required. The veneer is laid on the blocks face downward, and fixed with fine panel pins. When this is properly done, blocks of the desired thickness would be fitted to the back of the veneer, and well glued to each other and to the veneer. When the glue is set, the blocking is levelled off, the veneer carefully eased from the blocking, and the fine pins withdrawn. The remaining portion of the work, such as forming the tongue and the splay on the edge, is easily performed.

It is advisable to screw a couple of stretcher pieces across the lining during the time the lining remains unfixed.

HOUSE MOTTOES.

In this my House I live at ease,
And here I do what’er I please.

—Wiltet haben Gemach
—Bleib unter deinem Dach.

Translation.

Woldt thou put happiness to proof,
Then always live ‘neath thy own roof.

Hast du ein Haus
So denke nicht d’raus.

Translation.

Hast thou a home,
Then never roam.

Under a Fox chasing a Goose.
When the fox gets the goose this House will be done
When the fox gets the goose this House will be done

—1755.

This House ye Fox and Goose doth bear
That foxy men mayn’t enter here!
SOIL, WASTE AND VENT STACKS.—VI.

Soil stacks are the vertical lines of pipe that receive the discharge from water closets and urinals in addition to any other fixtures.

Waste stacks are the vertical lines of pipe that receive the discharge from any fixtures other than water closets and urinals.

A vent stack is a vertical line of pipe, running in conjunction with a soil or waste stack, and the purpose of which is to provide a supply of air to the traps of all fixtures discharging into the soil or waste stacks, so as to protect the water seal of the traps from siphonage and back pressure and to ventilate the system.

The soil stack connects to the house drain at the bottom with a Y fitting, and an eighth or sixteenth bend, and extends to a point about one foot above the roof (Fig. 33).

The soil pipe is the horizontal connection between the water closet or urinal and the soil stack (A, Fig. 33).

Soil, waste and vent stacks should be constructed of extra heavy cast iron pipe, or, where a little extra expense is not an important consideration, wrought iron pipe might better be used. Standard cast iron pipe is used to a great extent, but the plumbing regulations of many cities prohibit its use.

Necessary offsets in soil and waste stacks above the highest fixture should be made at an angle of not less than 45 degrees to the horizontal. All offsets in vent stacks should be made at an angle of not less than 45 degrees to the horizontal.

Soil, waste and vent stacks less than four inches in diameter should be enlarged to four inches at a point not less than one foot below the roof surface, by an increaser such as is shown at "B," Fig. 33, not less than twelve inches long. The increase in the size of the pipe is made in order to reduce to a minimum the possibility of the outlet being choked by frost in winter.

Where stacks pass through the roof the joint at the intersection of pipe and roof should be made thoroughly water tight by flashing with 16-oz. copper or 6-lb. sheet lead in the manner shown in Fig. 35.

Stacks should be supported at each floor, and where possible between floors with iron straps as at "A," Fig. 36, or by cutting the pipe so that a hub will occur at each floor (B, Fig. 36).

The sizes of pipes and stacks and some examples of their installation will be made the subject of the next issue.

THE DETAIL SHEET.

The elevation and details shown on the lower portion of the detail sheet are fine examples of English work. There are many things on this sheet that will prove suggestive to both architect and builder, and the workman, also, will find a number of things on the sheet that will prove of value to him.
Ganged work, as its name implies, consists in cutting and rubbing the bricks to special sizes and shapes according to requirements. The bricks used for this class of work are specially made for the purpose and are known as "rubbers" or "cutters." While they are hard enough to resist the pressure that comes upon them when they are built in the work, yet they are soft enough to be easily cut and rubbed to the desired shape.

One of the most important uses of these bricks is in the construction of arches. A brickwork arch is practically a curved beam made up of a number of separate pieces so arranged as to support their own weight and that of the wall above.

The complete elevation of a segmental arch is shown in Fig. 1. To set out the arch draw two short vertical lines (Fig. 2) at a distance apart equal to the width of the opening; this width being termed the span. Between these two vertical lines draw the horizontal springing line A B. At the center of A B erect a short vertical line, C D, equal to the given rise of the arch. Bisect the distance between A C by opening the compasses a little more than half this distance and drawing two arcs, one with A as center and one with C as center. Through the intersection of the two arcs draw the line E F to meet the rise continued at E. With E as center and radius E A, the intrados or soffit can be drawn. With a straight-edge against A and E, draw the skewback, A H. Mark off the depth of the arch on the rise continued as O K. With B as center and radius B K, describe the arc H K, representing the extrados of the arch. To fit in the courses of bricks draw a key brick three inches wide, so that half of it falls on each side of the center line. This can be done by marking off one and a half inches on both sides of K. With the points of the compasses three inches apart step around the extrados from M to H. If this distance fits in exactly that will do. If it does not, mark out a new key brick and try again till successful, using a distance less than three inches.

To draw the joints keep the straightedge at E, and against every point on the extrados in turn, and draw the part of the lines that falls between the outlines of the arch. The cross joints may be drawn with the compasses, though actually straight in practice. The workshop practice in setting out differs somewhat, as a rod falls between the outlines of the arch. The cross joints may be drawn with the compasses, though actually straight in practice.

To set off the rise half the span equals 3/2 feet. Multiplied by itself equals 3/2 x 3/2 equals 9/4. This divided by the rise equals 9/4 + 1/2 = 9/2. Add the rise thus, 9/2 + 1/2 equals 10/2 equals 5. Divide by 2, this equals 2 feet 6 inches, which is the radius of the curve.

By sticking a bradawl through a rod at this distance from the end and holding a pencil at the end, the soffit line can be described. By moving the bradawl back along the rod a distance equal to the face of the arch, and then placing it in the same hole in the board as before, the extrados can be drawn. Care must be taken to put the bradawl on a line square with the edge of the setting-out board and in the center of the span. To fill in the courses proceed exactly as on paper; the joints being obtained by holding a straightedge to the points on the extrados and against a nail driven into the center from which the curves were struck. A template is now made by continuing the joints of one course, Fig. 3, so that when a piece of wood is laid with its straight edge against one of the lines then the other can be squared up against the ends, giving the shape and size of the template. This piece of wood having been shot to the bevel to form a template, its accuracy must be tested by running it over the face of the arch. An easy method of securing accuracy is to make two templates and, laying one over the key brick, place the other in close contact with it, the line that marks the position of the soffit on each template being kept exactly over the soffit of the drawing. By means of two straightedges one template can be run over the arch. The template is laid on the key brick, and one straightedge buttet up against it. Then take away the template and replace it by the second straightedge. Now remove the first straightedge and put the template in its place, this process being repeated until the template ultimately reaches the end position, when it should have one of its sides coincide with the skewback.

The templates having been cut, a number of bricks, according to the number and size of the arches in hand, are prepared by trimming one large face to form the bed of the brick. This is done by rubbing the bricks on the circular rubbing stone, Fig. 6. In the case of plain arches the face of the brick that forms the face of the arch is next squared on the stone, and tested with the square (Fig. 8). Next, the end forming the soffit of the arch is cut to the required bevel in a plain cutting box, similar to Fig. 5, but having parallel sides and no end. The sides of this box are made of such a width that by running the wire saw (Fig. 12) over the top of them the brick is cut to the thickness required, to form an even back face in the case of arches only half a brick on soffit, or to form a sofit joint in thicker work. The length of the box is such that by putting the bricks in it so that they stand at an angle with the sides, they can be cut to the correct length and bevel. It only remains to cut the brick tapering so as to fit the template. This is done in a box similar to that shown in Figs. 4 and 6. Sometimes the bottom end is omitted. The sides of the boxes are made to stand up above the bottom so as to fit the prepared template. Fig. 3 shows a cutting box with a slate bottom which can be set by thumb screws, while Fig. 4 illustrates an easily made box. Care must be taken to allow for the thickness of the joints, 1-16 inch to 1-32 inch being allowed off each course for this purpose.
In cutting arches it is usual first to cut the bricks next to the key brick, and then to work toward the skewback; stacking each half of the arch in this way so that in setting it the right brick is at hand to begin with. The wire saw (Fig. 12) simply consists of a frame in which a blade, made by twisting two pieces of steel wire together after it has been softened, can be stretched. As this saw does not leave a perfectly regular surface, the bricks are finished, either with a file or with a flat piece of wood. A complete course of an arch, nine inches thick, can be cut to the template at once, the bricks forming it being fettled and bonded first.

To cut the skewback make a template to the bevel shown in Fig. 13. If there are many arches of the same size, it will be best to make a box to this template; if few are required, they can be marked out after having been reduced to the right thickness by placing the template on the face edge and scribbling the bevel with the tin scriber (Fig. 9). The bevel can be cut with the wire saw and finished either on the face or on the stone. The greatest difficulty a novice has is to keep the arises square and sharp, as they are easily rubbed off in the handling. It is upon these arises being sharp that the possibility of showing fine face joints depends.

Though it is not usual for experienced cutters to test their work, their skill being sufficient to ensure success, yet the beginner may find testing advisable. This can be done by setting up the skewbacks (only one of which is represented) as shown in Fig. 13, and placing the turning piece or center so that the bricks when cut can be laid dry upon it. Working from each end an opening will be left (when all the bricks have been placed in position) equal to the total amount allowed for the joints. The center should be tested by the setting-out board, and in arches where two or three ways of construction are possible, it is imperative that the setting-out board shall be used to make the center for the template. The center is fixed in a correct position between the reveals, and supported on imposts having folding wedges between them and the center, so that when the center is struck, after the arch has set, the wedges can be gradually loosened. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed. By doing this there is no risk of spoiling the arch. Ganged center is struck, after the arch has set, the wedges can be gradually removed.
of its principal features to an Assyrian source, and in his description of Greek architecture Ferguson refers frequently to this subject.

The earliest Persian palace of which remains exist was built by Cyrus the first king (560 B.C.) at Pasargadæ, where he defeated portions of the foundations of walls, which showed that the palace consisted of a central hall of columns and at least one portico.

The design was evidently of the simplest kind, showing that in its origin the Persian order had none of the elaboration found in the work of Xerxes. The same may be said of the palace built by Darius at Persepolis in 521 B.C.
TO OUR CORRESPONDENTS.

For the convenience of any reader who requires an answer to his question earlier than it would appear in the usual course in the columns of The National Builder, the Editor has decided to send by post, in advance of publication, a written answer furnished by the authority to whom the question has been submitted. Questions must be strictly confined to subjects within the scope of The National Builder. Readers who desire these advance or express replies must endorse each question at the top left hand corner with the words "Immediate Mail Reply," and must enclose a stamped and addressed envelope, together with 25 cents in stamps for each question. Readers must distinctly understand that this small fee of 25 cents does not represent payment for the information contained in the reply (for which no charge whatever is made), but is simply a contribution toward the cost of extra clerical and other work, postage, etc. The Editor, while endeavoring to insure prompt replies to urgent questions, can not undertake to forward such replies within stated period, and disclaims all responsibility for any delay that may possibly occur; nor can he guarantee that any question will be answered to the satisfaction of the querist as regards the special use or adaptability of the information rendered. Every answer sent by post may be printed afterwards in The National Builder, and must not be reproduced elsewhere without written permission.

Owing to the many questions that have been sent us of late, where the querists desired answers by mail, much time and expense have been incurred in processing answers and forwarding same to the correspondent, that we find it necessary to make this small charge toward covering expense of same. There will be no charge made for questions answered through the columns of the journal in the usual manner. Only a charge made where a correspondent wants an immediate answer by mail.

ANSWERS.

FLASHING A CHIMNEY.

From "Builder," Indianapolis—if "Roofers" will examine the diagram I send herewith (Fig. 1) he will see how good flashing ought to be done in his case. The slates or shingles lie upon the slanting plates and upright plates lie closely against the bricks.

ORNAMENTAL SHINGLING.

From "Western Carpenter," Duluth, Minn.—In answer to "Ambitious," Fond du Lac, Wis., I submit the following designs for fancy or ornamental shingling, from among which I think he will find what he wants. For diamond patterns a method is shown at Fig. 2, which consists in cutting the pattern shingles with a V end and throwing a shadow. This method is more clearly shown by Fig. 3, and shows the other method of forming shingle pattern. This method may be adapted to any size, and any number of shingles can be used. After the pattern is wholly laid the common shingles are taken up and the first row of arch shingles B should be double. After the arch is laid the common shingles are laid over the arch shingles and cut to the circle, as at S S S. If a full circle is desired the lower half must be laid as in Fig. 7, the outer row of arch shingles being laid over the common shingles as shown. The last or inner course of arch shingles should be partly covered with galvanized iron or copper flashing. A shingle arch is hardly a legitimate way of using shingles, as those near the spring must be laid nearly horizontal, which does not give very good protection from the weather. A segment arch may be formed in shingles in a perfectly legitimate and weather-proof manner, as shown in Fig. 8 all of the shingles being vertical, but instead of being laid in horizontal courses the courses are carried up over the arch, or opening, and the butts cut to the circle. The shingles of course D stop at the dotted line d, and those of course E at the dotted line e. This method, however, can not be adapted to a full half circle, as the shingles at the springing would be too much exposed to the weather.

FROM "Cementer," Buffalo, N. Y.—In reply to "J. D. C.," Jacksonville, Ill. The paper should be taken off the tiles as soon as the tiles are laid in the cement. This is done by wetting the paper until it is loose. This is necessary because, if any adjustment of the tiles is required, such adjustment should be done before the cement sets. For setting tile of this kind the cement should be neat, that is, without any admixture of sand.

Correspondence

The Editor does not hold himself responsible for the opinion of correspondents. Short, crisp answers will be appreciated. To insure publication, the name and address of the writer must accompany the communication, not necessary for publication. Readers who write for 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.

TO OUR CORRESPONDENTS.

For the convenience of any reader who requires an answer to his question earlier than it would appear in the usual course in the columns of The National Builder, the Editor has decided to send by post, in advance of publication, a written answer furnished by the authority to whom the question has been submitted. Questions must be strictly confined to subjects within the scope of The National Builder. Readers who desire these advance or express replies must endorse each question at the top left hand corner with the words "Immediate Mail Reply," and must enclose a stamped and addressed envelope, together with 25 cents in stamps for each question. Readers must distinctly understand that this small fee of 25 cents does not represent payment for the information contained in the reply (for which no charge whatever is made), but is simply a contribution toward the cost of extra clerical and other work, postage, etc. The Editor, while endeavoring to insure prompt replies to urgent questions, can not undertake to forward such replies within stated period, and disclaims all responsibility for any delay that may possibly occur; nor can he guarantee that any question will be answered to the satisfaction of the querist as regards the special use or adaptability of the information rendered. Every answer sent by post may be printed afterwards in The National Builder, and must not be reproduced elsewhere without written permission.

Owing to the many questions that have been sent us of late, where the querists desired answers by mail, much time and expense have been incurred in processing answers and forwarding same to the correspondent, that we find it necessary to make this small charge toward covering expense of same. There will be no charge made for questions answered through the columns of the journal in the usual manner. Only a charge made where a correspondent wants an immediate answer by mail.

ANSWERS.

FLASHING A CHIMNEY.

From "Builder," Indianapolis—if "Roofers" will examine the diagram I send herewith (Fig. 1) he will see how good flashing ought to be done in his case. The slates or shingles lie upon the slanting plates and upright plates lie closely against the bricks.

ORNAMENTAL SHINGLING.

From "Western Carpenter," Duluth, Minn.—In answer to "Ambitious," Fond du Lac, Wis., I submit the following designs for fancy or ornamental shingling, from among which I think he will find what he wants. For diamond patterns a method is shown at Fig. 2, which consists in cutting the pattern shingles with a V end and throwing a shadow. This method is more clearly shown by Fig. 3, and shows the other method of forming shingle pattern. This method may be adapted to any size, and any number of shingles can be used. After the pattern is wholly laid the common shingles are taken up and the first row of arch shingles B should be double. After the arch is laid the common shingles are laid over the arch shingles and cut to the circle, as at S S S. If a full circle is desired the lower half must be laid as in Fig. 7, the outer row of arch shingles being laid over the common shingles as shown. The last or inner course of arch shingles should be partly covered with galvanized iron or copper flashing. A shingle arch is hardly a legitimate way of using shingles, as those near the spring must be laid nearly horizontal, which does not give very good protection from the weather. A segment arch may be formed in shingles in a perfectly legitimate and weather-proof manner, as shown in Fig. 8 all of the shingles being vertical, but instead of being laid in horizontal courses the courses are carried up over the arch, or opening, and the butts cut to the circle. The shingles of course D stop at the dotted line d, and those of course E at the dotted line e. This method, however, can not be adapted to a full half circle, as the shingles at the springing would be too much exposed to the weather.

FROM "Cementer," Buffalo, N. Y.—In reply to "J. D. C.," Jacksonville, Ill. The paper should be taken off the tiles as soon as the tiles are laid in the cement. This is done by wetting the paper until it is loose. This is necessary because, if any adjustment of the tiles is required, such adjustment should be done before the cement sets. For setting tile of this kind the cement should be neat, that is, without any admixture of sand.
A SLIP JOINT.
From "Carpenter," Baltimore, Md.—For the benefit of J. S. K., Atlantic City, I submit the following diagram which illustrates what is known as a "slip carpenter's splice." Fig. 9. This makes a good solid splice and is very strong when well made. I show a wedge which is usually of hardwood and shows the grain cut for the wedge.

SPRAIED CIRCULAR JAMBER AND HEAD.
From "Another Workman," New York, N. Y.—In answer to "Workman," of Boston, Mass., I send you the following diagrams of a good method of "laying out" a splayed circular head. The angles of splay are shown on the upper diagram and the face of the head is shown in the lower diagram, Fig. 10. An examination of the illustrations is all that is necessary to guide the workman in the formation of this work.

RAMP OR KNEE.
From J. S. F., West Frankford, Ill.—In answer to "Carpenter," South Bend, Ind., will say see pages 180, 182 of "Stairbuilding and

HANDRAILING" for definition of ramp and knee. One is just the opposite of the other. Ramp, "A concave or convex curve or easement of an angle as sometimes required at the end of a wreath or an adjoining straight line." Knee, "A convex bend in back of handrail. A part of the back of a handrail of a convex form. The reverse of a ramp, which is a back of a handrail and is concave. Also any piece of timber bent to an angular point." Knowing that one is exactly the reverse of the other will help to get the exact idea of each.

QUESTIONS.
From "Carpenter," Scranton, Pa.—I have a brick elliptical arch to construct over a peak about twenty feet, and I wish to have a center made to turn this arch over. The wall will be eight inches thick, and a few hints as to the best methods of making a center for the purpose will be appreciated.

From "S. M. B.," Shellac, Iowa.—I see a number of saw-filing gaugeadvertised in The National Builder and I would like to know if any of The National Builder readers have used any of these devices, and if so which of them is best.

From "Joseph H.," Logansport.—I would like to ask the readers of this journal which is the best way to thrower a wall between a double house, and about what the cost would be per square?

BEVELS AND LENGTHS OF RAFTER WANTED. BY D. E. A., RED WING.
From "P. J. L.," Pittsburg, Pa.—I would be pleased to find out through your columns how to lay off the top stiles of a semi-circular window frame that sets in a circular wall and has a circular top, such to be radial?

A ROOF WANTED FOR THIS PLAN. BY JOHN C., HAMMOND, INDIANA.
From "Builder," Hoboken, N. J.—Will you kindly inform me as to the best method of keeping a basement wall dry? I wish to keep the wall perfectly dry from the stone footing up. Outside the walls the earth will be at least four feet above the level of the basement floor, and the brickwork will run down at least one foot six inches below the basement floor. The foundation is of stone.
From "A. K. S.," Fort Wellington, Ontario.—I would be pleased to see in The National Builder a sketch of a bake oven that an ordinary bricklayer could work from. Several illustrations of bake ovens have been published, but they do not seem to be the ones wanted, and they are not very plain. Perhaps some reader would give a working plan of an oven. I would be willing to pay for a good reader would explain the method of getting the lengths and bevels of rafters for this kind of roof.

From "W. B.," Zanesville, Ohio.—Will some architect or mason please describe how an elliptical stone arch should be set out and jointed?

From "John C.," Hammond, Ind.—I enclose herewith the outline of a building which I would be pleased to have some one of the readers of The National Builder to give me their ideas as to the roof plan or elevation. The roof will be on a level all around the building, and hips preferred in place of gables as much as possible. Roof to have one-half pitch, and cornice to project from fourteen to sixteen inches from wall line. The building is of brick with walls nine inches in thickness. Any assistance granted this request, will be thankfully received by one of the old time readers of The National Builder.

From "A. B. C.," Moncton, N. B.—Would some of your obliging correspondents be kind enough to answer the following questions: 1st: Is this roof truss (Fig. 1) strong enough to carry sixty pounds per foot square? 2d: Would you advise me as to a better way of framing, so not to affect the curve of my vault (see line on drawing herewith). 3d: Would the joining of arch "A," Fig. 2, be all right? The arch has to carry a weight of about ten tons. We are using a good, compact sandstone. No. 1 quality. 4th: Is there any better manner in building this style of arch?

From "John C.," Hammond, Ind.—I inclose herewith the out rough sketch of a roof I have to build and would be pleased if some reader would explain the method of getting the lengths and bevels of rafters for this kind of roof.

The following letter and specifications explain themselves:

NEW WESTMINSTER, B. C., Jan. 5, 1906.

V. A. JOHNSTRO, Editor National Builder:

Dear Sir,—I inclose you tracing and copy of the specification of my "Rafter Gauge," on which I have recently secured Canadian and United States patents.

Being regarded as an authority on this subject this will no doubt interest you. I don't think that I can supplement the specifications only to draw your attention particularly to this one point, and this is where I claim superiority for my invention over any previous device.

They give the lengths of the different styles of rafters for the different roof pitches for one foot run, while with mine you read the required length at once. You will notice that in the specification there is no provision made for cutting the octagon jack. The method will readily suggest itself to you.

In fact, the man well up on the subject would not require the graduations on the arc blade (e) but would be able to obtain all the required results with a tool of this construction graduated along the edge of the blade (c).

I give the most common of the roof pitches for the convenience of the novice. The space giving degrees will also be found a convenience, as we are frequently asked to frame a roof (hipped or otherwise) to thirty degrees pitch. Just one other point. This hip is the diagonal of common rafter and half the span. Yours truly,

V. A. JOHNSTRO.

SPECIFICATION.

To All Whom It May Concern:

Be it known that I, Victor A. Johnston, of the city of New Westminster, province of British Columbia, carpenter, having invented certain new and useful improvements in RAFTER GAUGES do hereby declare that the following is a full, clear and exact description of the same:

My invention relates to an improved means for determining the length of rafters whether for gable, hip or octagon roofs, and, the seat, plumb and side cuts of their ends. It is designed as a bevel square of particular construction, having means for setting the bevel blade to the specific angles required, the stock of which may be applied to an ordinary carpenter's square and the half span and pitch of the roof being determined, the length of the desired rafter may be read off from the blade of the bevel square or gauge which is the subject of this application, and the bevel of end cuts ascertained.

The determination of such particulars, although they can be ascertained from an ordinary steel square such as is used by carpenters, frequently requires a familiarity with the use of the square
A New Steel Square.
which carpenters do not always possess to a sufficient extent to avoid error, and my gauge is intended to facilitate such determination.

The particular construction of the gauge and its application to the carpenter's square is fully described in the following specification and illustrated in the drawings which accompany it, in which Fig. 1 is a plan of the square; Fig. 2 an end elevation; Fig. 3, a plan showing the application of the gauge to a carpenter's square in determination of the desired particulars.

In these drawings b represents the stock within a recess of which is mounted a blade, c, in such a manner that the zero end of the graduated portion of the blade is always coincident with the face edge of the stock. As to attain this coincidence it is impracticable to mount the blade upon a pivot pin, it is mounted upon two concentric arcs, d and e, d being of small radius and cut in the body of the blade from a center at the end of the blade. By mounting a short segment, f, secured in the body of the stock so as to selectively fit the arc d. The other arc segment, e, is of larger radius and of sufficient width to afford space for the various graduations required for builders and the edge of the blade is divided into inches which are subdivided into tenths so that its graduations may represent feet and inches.

In the spaces indicated by these figures a series of cross lines is inscribed indicating the angle of each arc. It is required for each pitch for common (C), octagon (O) or hip (H) rafters and if the blade of the bevel gauge is set to any one of these cross lines and the stock of the gauge placed against the tongue of a carpenter's square with the pivot center of the bevel to the dimension represented and move the zero end of the rafter ends will be given by the number of these divisions corresponding with those of the edge of the blade, and means for setting the blade at any desired angular position in relation to the stock.

In addition to the letters C, O and H on these several cross lines the arc e, is divided into any desired unit of angular measurement, such as degrees, and outside of this the surface of the segment is divided by a series of concentric arcs, g, which at the end where the arc is secured to the stock are marked with numbers which represent the various pitches of roof in terms of one foot run, as 6, 8, 9, 10, 12, 18 and 24.

In the spaces indicated by these figures a series of cross lines is inscribed indicating the angle of each arc. It is required for each pitch for common (C), octagon (O) or hip (H) rafters and if the blade of the bevel gauge is set to any one of these cross lines and the stock of the gauge placed against the tongue of a carpenter's square with the pivot center of the bevel to the dimension represented and move the zero end of the rafter ends will be given by the number of these divisions corresponding with those of the edge of the blade, and means for setting the blade at any desired angular position in relation to the stock.

In the spaces indicated by these figures a series of cross lines is inscribed indicating the angle of each arc. It is required for each pitch for common (C), octagon (O) or hip (H) rafters and if the blade of the bevel gauge is set to any one of these cross lines and the stock of the gauge placed against the tongue of a carpenter's square with the pivot center of the bevel to the dimension represented and move the zero end of the rafter ends will be given by the number of these divisions corresponding with those of the edge of the blade, and means for setting the blade at any desired angular position in relation to the stock.

In the spaces indicated by these figures a series of cross lines is inscribed indicating the angle of each arc. It is required for each pitch for common (C), octagon (O) or hip (H) rafters and if the blade of the bevel gauge is set to any one of these cross lines and the stock of the gauge placed against the tongue of a carpenter's square with the pivot center of the bevel to the dimension represented and move the zero end of the rafter ends will be given by the number of these divisions corresponding with those of the edge of the blade, and means for setting the blade at any desired angular position in relation to the stock.

In the spaces indicated by these figures a series of cross lines is inscribed indicating the angle of each arc. It is required for each pitch for common (C), octagon (O) or hip (H) rafters and if the blade of the bevel gauge is set to any one of these cross lines and the stock of the gauge placed against the tongue of a carpenter's square with the pivot center of the bevel to the dimension represented and move the zero end of the rafter ends will be given by the number of these divisions corresponding with those of the edge of the blade, and means for setting the blade at any desired angular position in relation to the stock.

In the spaces indicated by these figures a series of cross lines is inscribed indicating the angle of each arc. It is required for each pitch for common (C), octagon (O) or hip (H) rafters and if the blade of the bevel gauge is set to any one of these cross lines and the stock of the gauge placed against the tongue of a carpenter's square with the pivot center of the bevel to the dimension represented and move the zero end of the rafter ends will be given by the number of these divisions corresponding with those of the edge of the blade, and means for setting the blade at any desired angular position in relation to the stock.

In the spaces indicated by these figures a series of cross lines is inscribed indicating the angle of each arc. It is required for each pitch for common (C), octagon (O) or hip (H) rafters and if the blade of the bevel gauge is set to any one of these cross lines and the stock of the gauge placed against the tongue of a carpenter's square with the pivot center of the bevel to the dimension represented and move the zero end of the rafter ends will be given by the number of these divisions corresponding with those of the edge of the blade, and means for setting the blade at any desired angular position in relation to the stock.
Decorative plaster work is a much abused craft, inasmuch as it is so often made to pretend to be something that it is not, and the material is comparatively seldom allowed to give the quality of beauty with which it is intrinsically endowed. What is the particular charm of this material, and what is it that so often usurps the place of that charm? I think it may be said that softness of effect is the charm of this material, and what is it that so often usurps the place of beauty is so often made to pretend to be something that it is not, and the material is comparatively seldom allowed to give the quality of beauty it has a quality all its own. The dead level plaster face generally seen has a quality all its own. The modem work is generally lacking in that individual interest with which it is treated here. Architects and the ordinary materials in use today differ a good deal from those employed at this earlv date. Modem inventions have supplied us with new applications and new materials with which to work, and there is no reason why they should be shunned, for though we may lose something by not being able to make it as sharp, hard and mechanical as possible. Even if it were not so, and the ornament had been made expressly for that ceiling, however well the workman may have carried out the directions to give a frieze of light and shade to cover an awkward break, or perhaps the instruction to "put something there," it is all of a most uninteresting nature and expresses nothing but line, and that more often than not, merely accurately geometrical line and quite lifesize. Here is the earlier work of the period referred to! Be it only a piece of plain ground, no one can look at it without feeling that the surface had the hand of the modeler upon it instead of the dead level straight edge. The moldings are full of interest, variety, life and spirit and the very lines in the mottled grounds, the interest and character of the floral, birds, birds and butterflies, though they may have been rudely done and conventionalized to an unrecognizable degree, are full of vigor, and always convey the impression of a craftsman in love with his work and with nature around him, and working just for its own sake. The method thus used by those who should have the good luck to live with them. How are these beautiful Elizabethan and Jacobean plaster ceilings made? Can any tell us? It is doubtful. That the work was nearly all molded, and not modeled as has been previously said, the jointing of the casks can be masked. If it were of this kind, and it is evident, if the old work is carefully examined; but it is not evident how much was cast and allowed to set hard before being applied to the ceiling, nor how much was by some method pressed up when in a moist state. If we could find out how they were made, it would be very instructive and interesting, but I doubt whether the methods used would now-a-days be often employed.

What concerns us now is, how can we make a modern ceiling interesting with the common materials in ordinary use, what methods can we employ to attain this end, and what are we to avoid? Slight light and shade, of a degree of delicacy almost unobtainable in any other building material, homogeneity, and a feeling of stability, are the qualities to be sought. Sharpness of outline, dark, strong shadow and strong relief are qualities to them.

Plaster can no doubt be made to represent many materials, but it has a quality all its own. The dead level plaster face generally seen on the covering of the interior walls of our houses nowadays is not plaster work in the sense in which it is treated here. Architects generally despair of getting that delightful surface to be met with on the old plastered walls of two hundred odd years ago, and in many cases it would be out of keeping with its surroundings if it could be obtained, for the angles in the room would be too irregular to agree with the mathematical accuracy of the surrounding work in a modern house. If only the setting plaster were applied with a wooden hand-float and the last coat put on very wet with the same tool and the straight-edge discarded, some feeling of modelling would be obtained, giving even a flat wall-face some sense of interest. The ordinary materials in use today offer a good deal to those employed at this early date. Modern inventions have supplied us with new methods and new materials with which to work, and there is no reason why they should be shunned. For there are, as has been pointed out by their very nature, there are many points of advantage to be gained by them.

The chief difference is the use of plaster of Paris as against lime plaster, and the ease with which large sheets can be cast without using one-tenth of the material, by employing what is known as fibrous plaster, i.e., plaster of Paris strengthened with coarse canvas and stiffened with wood laths. These can readily be made eight feet square, and are screwed up to the joints, etc. The joints, however, should always be covered by a molding or masked by enrichments; if this is not done, the room will look like a shop instead of like a house.

What therefore is the simplest and most ready way of getting something of the character of the early ceilings into the work that is made of fibrous plaster? Suppose the type of design be one of the Elizabethan ribbed ceilings with its intricate geometrical pattern relieved by sprays of foliage. The size of the repeat of the design once obtained, it will be necessary to get a modelling-board large enough, and take the repeat, and to cover it with clay, and carefully model a ground all over it. Observation of the height, lighting, and size of the room in which it is to be fixed, together with experience, must teach the modeller how uneven his ground should be made. Then take a cast of this model; that is to say, make a mold from the model into this squeece the modelling clay, having well dusted the mold with French chalk to prevent the clay adhering; turn the squeece out, and lay it in its place on the pattern, pressing it well down until it takes the same undulations which the plaster-surface has beneath it, bending it to the required curves of the design, and softening down any of the lines which look too hard or the reverse. In doing this an effect will be produced very similar to that of the old plaster rib, and, at least, that appearance of cast-iron hardness is characteristic of most modern plaster-work will have disappeared.

If the curves are found to be too sharp to allow the clay to be bent to them, a separate piece of curved rib would have to be run and molded to give the necessary curve.

It has been said that this method is quite unsuitable to the severely classic forms of architecture; if so, then much the worse for a style which does not in any part of it, even in the carving or modelling, portray the hand of the modeler, which is so strikingly apparent between them? In the Elizabethan and Jacobean periods with that done, let us say, in the average bethan and Jacobean periods with that done, let us say, in the average

March, 1906. T H E NATIONAL BUILDER.

DECORATIVE PLASTER WORK.

BY LAURENCE A. TUNER.
CONCRETE RESIDENCE AT JACKSON, MICH.

BY THE DESIGNER.

The concrete residence of Sid L. Witte, of Jackson, Mich., illustrated in detail in this issue, is excellently arranged in every detail. This residence was designed by Sid. L. Witte, and the architect was Claire Allen, both of Jackson, Mich. Excavation started and first block made August 15, 1905; residence complete December 15, 1905; concrete work cost $620; carpenter work, trimming and painting, $3,000; plumbing and heating, $600; fixtures, $100; excavating and grading, $60; miscellaneous, $40; total, $3,400.

Foundation is made of 9x10x32 rock-faced block, with the special outside and inside rock-faced blocks for the corners as well as for the bay window octagon blocks. Water table has 2-inch reinforced with angle iron. They are made thereon an extended ornamental scroll and shell design which is about 8 inches high and 2 inches long, and makes a very handsome cap. Each of the 9-inch high and 41/2-inch blocks have vertical air chambers which are about as wide as one-third of the width of the block. Some of these air chambers have wires and pipes encased therein. In addition to the vertical air chambers in the blocks Mr. Witte had his men when they were making the blocks take their trowel and notch each bridge of concrete on the top of the block in an oval manner to a depth of about 3 inches. This left an opening on each end of the blocks, as well as in the center, in such a manner that when a block was laid on top of it it left a horizontal air chamber on each course, as well as a vertical one, the result being that it is impossible to have the walls filled with stagnant or damp air, as the first course in the cellar has openings in different places for draft, and the air passes upward and circulates until it reaches the base board of the roof, which is fastened to the top course of blocks. It then passes through this base board (11/4-inch holes have been bored in every 16 inches) into the attic, the result being an absolutely dry wall in the cellar and first floor, notwithstanding the fact that the first floor is furred and lathed, the inside of the cellar is washed with hydrated lime and is very clean and sanitary. Piers in cellars are of 16x16-inch blocks 9 inches high. Ash bin, and coal bin in cellar are made of blocks. The fruit and potato room in the cellar is made of sand cement brick.

Foundations for this residence, including those for boiler and grate, lay on foot and a half of concrete on the top of the block. It then passes through this base board (11/4-inch holes have been bored in every 16 inches) into the attic, the result being impossible to have the walls filled with stagnant or damp air, as the first course in the cellar has openings in different places for draft, and the air passes upward and circulates until it reaches the base board of the roof, which is fastened to the top course of blocks. It then passes through this base board (11/4-inch holes have been bored in every 16 inches) into the attic, the result being an absolutely dry wall in the cellar and first floor, notwithstanding the fact that the first floor is furred and lathed, the inside of the cellar is washed with hydrated lime and is very clean and sanitary. Piers in cellars are of 16x16-inch blocks 9 inches high. Ash bin, and coal bin in cellar are made of blocks. The fruit and potato room in the cellar is made of sand cement brick.

Foundations for this residence, including those for boiler and grate, lay on foot and a half of concrete on the top of the block. It then passes through this base board (11/4-inch holes have been bored in every 16 inches) into the attic, the result being an absolutely dry wall in the cellar and first floor, notwithstanding the fact that the first floor is furred and lathed, the inside of the cellar is washed with hydrated lime and is very clean and sanitary. Piers in cellars are of 16x16-inch blocks 9 inches high. Ash bin, and coal bin in cellar are made of blocks. The fruit and potato room in the cellar is made of sand cement brick. Foundations for this residence, including those for boiler and grate, lay on foot and a half of concrete on the top of the block. It then passes through this base board (11/4-inch holes have been bored in every 16 inches) into the attic, the result being an absolutely dry wall in the cellar and first floor, notwithstanding the fact that the first floor is furred and lathed, the inside of the cellar is washed with hydrated lime and is very clean and sanitary. Piers in cellars are of 16x16-inch blocks 9 inches high. Ash bin, and coal bin in cellar are made of blocks. The fruit and potato room in the cellar is made of sand cement brick.

Foundations for this residence, including those for boiler and grate, lay on foot and a half of concrete on the top of the block. It then passes through this base board (11/4-inch holes have been bored in every 16 inches) into the attic, the result being an absolutely dry wall in the cellar and first floor, notwithstanding the fact that the first floor is furred and lathed, the inside of the cellar is washed with hydrated lime and is very clean and sanitary. Piers in cellars are of 16x16-inch blocks 9 inches high. Ash bin, and coal bin in cellar are made of blocks. The fruit and potato room in the cellar is made of sand cement brick. Foundations for this residence, including those for boiler and grate, lay on foot and a half of concrete on the top of the block. It then passes through this base board (11/4-inch holes have been bored in every 16 inches) into the attic, the result being an absolutely dry wall in the cellar and first floor, notwithstanding the fact that the first floor is furred and lathed, the inside of the cellar is washed with hydrated lime and is very clean and sanitary. Piers in cellars are of 16x16-inch blocks 9 inches high. Ash bin, and coal bin in cellar are made of blocks. The fruit and potato room in the cellar is made of sand cement brick. Foundations for this residence, including those for boiler and grate, lay on foot and a half of concrete on the top of the block. It then passes through this base board (11/4-inch holes have been bored in every 16 inches) into the attic, the result being an absolutely dry wall in the cellar and first floor, notwithstanding the fact that the first floor is furred and lathed, the inside of the cellar is washed with hydrated lime and is very clean and sanitary. Piers in cellars are of 16x16-inch blocks 9 inches high. Ash bin, and coal bin in cellar are made of blocks. The fruit and potato room in the cellar is made of sand cement brick. Foundations for this residence, including those for boiler and grate, lay on foot and a half of concrete on the top of the block. It then passes through this base board (11/4-inch holes have been bored in every 16 inches) into the attic, the result being an absolutely dry wall in the cellar and first floor, notwithstanding the fact that the first floor is furred and lathed, the inside of the cellar is washed with hydrated lime and is very clean and sanitary. Piers in cellars are of 16x16-inch blocks 9 inches high. Ash bin, and coal bin in cellar are made of blocks. The fruit and potato room in the cellar is made of sand cement brick.
Legal Decisions

Where a builder was required to plaster a building which was not completed, and defended a suit for recovery of the contract price by an action of account, it was held that the court had jurisdiction to entertain the action, and that the defendant was entitled to recover the contract price, 

whereby plaintiffs by letter offered to install certain stairs and blowers under defendant's boilers, and defendant wired acceptance, there was an express contract, excluding any contract by implication. 

Where, in a suit to foreclose a mechanic's lien, nothing was alleged or shown to have been lien and the contract, relating solely to extra materials, was immaterial. 

Where a contract was alleged to have been made for the supply of materials, and the contractor was entitled to recover the balance due thereon, the court had jurisdiction to entertain the action and render a judgment for the balance due thereon. 

Where a mechanic's lien was alleged to be filed, and a judgment nisi was entered, and where the court, in the course of the case, held that the parties were bound by the contract, it was held that the court had jurisdiction to entertain the action and render a judgment for the balance due thereon.

Building Material

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Unit Price ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,400 ft No. Y. P. sheathing</td>
<td>1.20</td>
</tr>
<tr>
<td>40 ft oak stair</td>
<td>1.20</td>
</tr>
<tr>
<td>18 oak plinth blocks</td>
<td>1.80</td>
</tr>
<tr>
<td>2 oak corner heads</td>
<td>0.85</td>
</tr>
<tr>
<td>98 Y. P. casings, 6 in. by 6 ft.</td>
<td>2.44</td>
</tr>
<tr>
<td>48 Y. P. head casing, 6 in. by 12 ft.</td>
<td>4.44</td>
</tr>
<tr>
<td>48 Y. P. cap molding, 1/2 in. by 12 ft.</td>
<td>9.60</td>
</tr>
<tr>
<td>48 Y. P. apron, 4 in. by 12 ft.</td>
<td>9.60</td>
</tr>
<tr>
<td>48 Y. P. stool, 1/4 in. by 12 ft.</td>
<td>9.60</td>
</tr>
<tr>
<td>48 Y. P. door stop, 2 in. by 16 ft.</td>
<td>4.80</td>
</tr>
<tr>
<td>42 Y. P. window stop, 1/2 in. by 16 ft.</td>
<td>5.76</td>
</tr>
<tr>
<td>100 ft. oak picture mold</td>
<td>1.00</td>
</tr>
<tr>
<td>200 ft. oak stool</td>
<td>0.50</td>
</tr>
<tr>
<td>200 ft. oak picture mold</td>
<td>1.00</td>
</tr>
<tr>
<td>200 ft. oak stool</td>
<td>0.50</td>
</tr>
<tr>
<td>600 ft. 1x12x12 or 16 ft. clear fir finish, $45.</td>
<td>2.70</td>
</tr>
<tr>
<td>100 ft 1x8x14 ft. clear Y. P. finish, $45.</td>
<td>2.00</td>
</tr>
<tr>
<td>1.20</td>
<td></td>
</tr>
<tr>
<td>1.20</td>
<td></td>
</tr>
<tr>
<td>2.00</td>
<td></td>
</tr>
</tbody>
</table>

Total lumber bill | $238.58

Mill Work

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Unit Price ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.50 ft. 2x8-12-14 &amp; 16 ft..........</td>
<td>2.00</td>
</tr>
<tr>
<td>26 w. wood plinth blocks</td>
<td>0.75</td>
</tr>
<tr>
<td>25.30</td>
<td></td>
</tr>
<tr>
<td>26 w. wood casings</td>
<td>0.75</td>
</tr>
<tr>
<td>20 balusters</td>
<td>8.00</td>
</tr>
<tr>
<td>1.00 24 ft 1/4x12x12 ft. clear fir finish, $45.</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 48 ft 1x12x12 or 16 ft. clear fir finish, $45.</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 50 balusters</td>
<td>9.50</td>
</tr>
<tr>
<td>1.00 48 ft Y. P. apron, 4 in by 12 ft..............</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 120 ft Y. P. head casing, 4 in. by 12 ft—</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 150 ft Y. P. head casing, 4 in. by 12 ft—</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 5 thresholds</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 8 large door columns.</td>
<td>1.00</td>
</tr>
<tr>
<td>1.00 5 steps</td>
<td>2.25</td>
</tr>
<tr>
<td>1.00 1 porch spindles</td>
<td>0.75</td>
</tr>
<tr>
<td>1.00 20 balusters</td>
<td>1.00</td>
</tr>
<tr>
<td>1.00 16 w. wood plinth blocks</td>
<td>0.75</td>
</tr>
<tr>
<td>1.00 12 w. wood casings</td>
<td>0.75</td>
</tr>
<tr>
<td>1.00 24 ft 1/4x12x12 ft. clear fir finish, $45.</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 50 balusters</td>
<td>9.50</td>
</tr>
<tr>
<td>1.00 48 ft Y. P. apron, 4 in by 12 ft..............</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 120 ft Y. P. head casing, 4 in. by 12 ft—</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 5 thresholds</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 8 large door columns.</td>
<td>1.00</td>
</tr>
<tr>
<td>1.00 5 steps</td>
<td>2.25</td>
</tr>
<tr>
<td>1.00 1 porch spindles</td>
<td>0.75</td>
</tr>
<tr>
<td>1.00 20 balusters</td>
<td>1.00</td>
</tr>
<tr>
<td>1.00 16 w. wood plinth blocks</td>
<td>0.75</td>
</tr>
<tr>
<td>1.00 12 w. wood casings</td>
<td>0.75</td>
</tr>
<tr>
<td>1.00 24 ft 1/4x12x12 ft. clear fir finish, $45.</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 50 balusters</td>
<td>9.50</td>
</tr>
<tr>
<td>1.00 48 ft Y. P. apron, 4 in by 12 ft..............</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 120 ft Y. P. head casing, 4 in. by 12 ft—</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 5 thresholds</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 8 large door columns.</td>
<td>1.00</td>
</tr>
<tr>
<td>1.00 5 steps</td>
<td>2.25</td>
</tr>
<tr>
<td>1.00 1 porch spindles</td>
<td>0.75</td>
</tr>
<tr>
<td>1.00 20 balusters</td>
<td>1.00</td>
</tr>
<tr>
<td>1.00 16 w. wood plinth blocks</td>
<td>0.75</td>
</tr>
<tr>
<td>1.00 12 w. wood casings</td>
<td>0.75</td>
</tr>
<tr>
<td>1.00 24 ft 1/4x12x12 ft. clear fir finish, $45.</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 50 balusters</td>
<td>9.50</td>
</tr>
<tr>
<td>1.00 48 ft Y. P. apron, 4 in by 12 ft..............</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 120 ft Y. P. head casing, 4 in. by 12 ft—</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 5 thresholds</td>
<td>2.00</td>
</tr>
<tr>
<td>1.00 8 large door columns.</td>
<td>1.00</td>
</tr>
<tr>
<td>1.00 5 steps</td>
<td>2.25</td>
</tr>
<tr>
<td>1.00 1 porch spindles</td>
<td>0.75</td>
</tr>
<tr>
<td>1.00 20 balusters</td>
<td>1.00</td>
</tr>
</tbody>
</table>
THE NATIONAL BUILDER.

March, 1906.

ARCHES—XII.

Another arch theory, based on the hypothesis of least thrust as at present, is that of Dr. Scheff-

fier, in which, however, no account is taken of the hori-

zontal components of the external forces.

This theory does not, as is sometimes stated, assume that the stones forming the voussoirs of the arch are incompressible. It is, however, by Schéfer, the theory gives the po-

sition of the line of pressure for incompressible

vousoirs, but its author recognizes the fact that compression of the material affects the line of resistance so that it will be diverted towards the center line at points where it would otherwise be in close proximity to the outer boundary of the arch ring.

For the purpose of illustrating the application of this theory, we will take as an example, a segmental arch, of which the left-hand half is shown in Fig. 54. The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs shown in Fig. 54, The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoir...
IX. The line of resistance so obtained is indicated in Fig. 36 by broken lines. Comparison of the two lines of resistance shows that they are fairly in agreement above the joint of rupture for this particular arch, whereas the divergence is considerable below that joint, and increases as the springing is approached. It follows, therefore, that if reliance be placed upon Scheffler's theory, the thickness of the arch at the springing must be greater than that which is required by the other theory. As a matter of fact, the thickness will be greater than is actually necessary.

**TABLE III.—For the Application of Scheffler's Theory.**

<table>
<thead>
<tr>
<th>No. of Joint.</th>
<th>Area of the Load above each Joint. (w)</th>
<th>Horizontal Distance from the Centre of Moments to the Centre of the Joint. (r)</th>
<th>Horizontal Distance from the Centre of the Joint to the Centre of Resistance of the Joint. (w + r)</th>
<th>Area of the Load below the Centre of the Joint. (w - r)</th>
<th>Horizontal Distance from the Centre of Resistance to the Centre of the Joint. (w - r)</th>
<th>Horizontal Thrust required to Prevent Rotation about the Joint. (Q)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>27.9</td>
<td>2.9</td>
<td>2.5</td>
<td>1.1</td>
<td>1.4</td>
<td>34.7</td>
</tr>
<tr>
<td>2</td>
<td>37.9</td>
<td>3.9</td>
<td>3.1</td>
<td>1.6</td>
<td>1.5</td>
<td>54.4</td>
</tr>
<tr>
<td>3</td>
<td>47.9</td>
<td>4.9</td>
<td>4.1</td>
<td>2.1</td>
<td>1.6</td>
<td>74.1</td>
</tr>
<tr>
<td>4</td>
<td>57.9</td>
<td>5.9</td>
<td>5.1</td>
<td>2.6</td>
<td>1.7</td>
<td>94.4</td>
</tr>
<tr>
<td>5</td>
<td>67.9</td>
<td>6.9</td>
<td>6.1</td>
<td>3.1</td>
<td>1.8</td>
<td>114.5</td>
</tr>
<tr>
<td>6</td>
<td>77.9</td>
<td>7.9</td>
<td>7.1</td>
<td>3.6</td>
<td>1.9</td>
<td>134.8</td>
</tr>
<tr>
<td>7</td>
<td>87.9</td>
<td>8.9</td>
<td>8.1</td>
<td>4.1</td>
<td>2.0</td>
<td>155.2</td>
</tr>
<tr>
<td>8</td>
<td>97.9</td>
<td>9.9</td>
<td>9.1</td>
<td>4.6</td>
<td>2.1</td>
<td>175.5</td>
</tr>
</tbody>
</table>

**LEGAL DECISIONS.**

Where plaintiff sued to enforce a contractor's lien for the construction of a building, and did not allege that he was entitled to a lien as a material man, he was not entitled to enforce a lien for the furnishing of material for the plasterer's scaffolding. Gates v. O'Gara, 39 So. (Ala.), 780.

Where two buildings are built on the same or contiguous lots under different contracts, it is permissible to include in one lien account the account for the work and labor done under both contracts, describing separately the several amounts due on both contracts. Kittrell v. Hopkins, 90 S. W. (Mo.), 169.

Where, in an action on a building contract, the architect testified that a floor in the building was defective, the contractor was properly permitted to testify in rebuttal that he did not pay his sub-contractor for the floor until the architect "passed on it, and it was all right and accepted it." Wyman v. Hooker, 83 P. (Cal.), 79.

On an issue whether an employee employed to improve a building was to receive a commission on the amount of the pay roll for the work in addition to daily wages, evidence that the employer had previously worked for defendant and had been paid commissions in addition to the wages, was inadmissible. Shall v. Old Forge Co., 96 N. Y. S., 76.

Where a contractor's surety delivered the bond to him for the purpose of closing a building contract with plaintiff, the surety thereby constituted the contractor its agent, and in the absence of anything on the face of the bond tending to put plaintiff on inquiry the surety was bound. Grimman v. United States Fidelity & Guaranty Co., 82 P. (Wash.), 6.

Under mechanic's lien law (P. L. 1886, p. 328), section 1, where the building contract is not filed, a lien may be claimed for materials furnished to a subcontractor to enable him to carry out his portion of the construction of the building pursuant to the owner's contract with the principal contractor. Gardner & McKen's Co. v. New York Central & Hudson River Railroad Co., 62 A. (N. J.), 416.

A replication, alleging that plaintiff's failure to complete a house he had contracted to build for defendant by the time specified was due to the defendant's failure to furnish the materials until after such date, was insufficient, where it did not also aver that it was defendant's duty to furnish such materials. Gates v. O'Gara, 39 So. (Ala.), 729.

**THE EDWARDS**

**METAL CEILINGS**

A Combination in Harmony, the one beautifying the Interior and the other the Exterior.

Our new Catalog G, Illustrating and describing the Edwards Metal Ceilings, Metal Shingles and Metal Windows, sent free upon request.

The Edwards Manufacturing Co.

"The Sheet Metal Folk's"

MAIN OFFICE AND WORKS, 438 to 456 Eggleson Ave.

NEW YORK OFFICE.

52 Broadway

CINCINNATI, OHIO
BOOK NOTICES. 

"The Slate Roofer." This is a thoroughly practical work on roof slating, and contains some useful tables, which were published in the October number of The National Builder. This advertisement calls attention to the idea that a new numbering system, as follows, is the best in every way.

CONBED GUAGE AND SQUARE. 

The advertisement of H. H. Mayhew Company, of Shelburne Falls, Mass., on page 80 of this number, is one of the most interesting and useful patents of the National Builder. This advertisement calls attention to the idea that a new numbering system, as follows, is the best in every way. It has been thoroughly tested by the most competent contractors and builders in the country, and has been found perfect in every way.

The use of the tool as a marking or double gauge will revolutionize the work in the manner of the description received. The H. H. Mayhew Company have issued a four-page descriptive folder, which is well written by one who speaks the language of the tool. This circular will be forwarded on request.

THE UNIVERSAL SQUARE. 

The Duby & Shinn Manufacturing Company, of 34 East Twenty-ninth street, New York, manufacturer of concrete and brick block, are recommending such a large number of orders that they find some difficulty in filling them promptly. Mr. W. Hamberly, the company, states they contracted for a large number of these squares to be delivered as soon as possible, and the manager who took this order has been unable to produce the goods in sufficient quantities, and Mr. Waner states the company some time ago decided to build a plant for themselves, and it is now ready for occupancy. He also states that in a very short time they will be under their orders and looking after each one promptly on receipt. Mr. Waner realizes the fact that some orders have been delayed and that purchasers have not received their goods as promptly as could be desired. The popularity of this New Universal Square has brought about unlooked-for contingencies in the way of manufacturing them in large quantities. The company at the present time, however, are in a position to fill orders, and are the best of all their customers. The y have had so many cases of misunderstanding among the dealers who have filled orders, because of the incongruity of the "New Universal" because of the fact of the "New Universal" being No. 2, 3, and 3, and on account of these being similar numbers to those on the common squares, that they are compelled to adopt new numbering, and hereunto announce to the trade that henceforth their squares will be numbered as follows, viz., the 6-inch size, No. 6; the 10-inch size, No. 10; the 13-inch size, No. 13.

THE GORTON VAPOR VACUUM SYS-

TE.

In a hot water system it is possible to circulate the water through the system at a temperature that will not be injurious to the cast-iron radiators, as long as there is not a possibility of freezing. The system is designed to move the heat from the boiler, through the pipes and the water, to the radiator, in such manner as to avoid any possibility of freezing the water in the radiator. While the hot water system has advantages over the steam system, it also has many disadvantages, such as the size of the radiators, which are 50 to 70 per cent larger than steam, and in cold weather, the radiator will freeze if the fire goes out, and danger of leakage from defective pipe or fittings.

Building Superintendent.

March, 1906.

THE NATIONAL BUILDER.

March, 1906.
Look Over the SIMONDS SAW
AND YOU WILL SEE THE POINTS OF ADVANTAGE

Firstly, they are ground a true taper, which enables the user to run the saw with very little Set.
Secondly, each Simonds Saw is handled by a mechanic who thoroughly understands the hanging of the Saw, which guarantees this most important feature.
Thirdly, the filing and setting of the Simonds Saws are carefully done, and thoroughly inspected, that the Saws, on leaving the factory, are ready for work.
Fourthly, the steel used in the manufacture of Simonds Saws is a high carbon crucible steel, and will hold the cutting edge much longer than the ordinary steel generally used.
Fifthly, each Saw is put up in a separate case, thus avoiding fingering and rust marks commonly found on saws that are not encased properly.
Sixthly, because every Simonds Saw is guaranteed thoroughly. Any mechanic trying a Simonds Saw, and not finding same satisfactory, may return the Saw either to the dealer, or to the Simonds Mfg. Co., and get a new Saw or money paid back.

SIMONDS MFG. CO.

THERE'S THE SAW
Made of SILVER STEEL—will hold its keen cutting edge longer without re-filing. Taper ground and balanced just right, it will do its work easily and well. Ask your dealer for

ATKINS HIGH GRADE SILVER STEEL SAWS
"FINEST ON EARTH"
WRITE FOR UNIVERSAL TIME BOOK AND HAND SAW BOOKLET

The use of reinforced concrete in building construction has increased very rapidly and with it a demand for an expansion bolt that will enable the ordinary laborer to do work which otherwise requires the expense of a civil engineer or surveyor. It is possible to determine with this instrument the height of buildings, trees, or any object. The instrument is so simple in construction that it can be used readily by any one. It is adjustable and can not easily get out of order, and in case of breakage any part can be readily replaced at small expense. Every instrument is properly adjusted and tested before leaving the factory. The cost of this level is so low that it is within the reach of all. Full particulars and catalogue may be obtained by writing Edward Helb, Railroad, Pa.

NEW GRILLE WORK CATALOGUE.

The Northwestern Grille Works, 1466 Milwaukee avenue, Chicago, have issued a new catalogue for 1906. Attention is called to their many new and attractive designs of modern styles of grilles and to the facilities for furnishing all kinds of grille work in the shortest time possible. The wood used in the construction of all this company's work is of carefully selected, thoroughly seasoned and perfectly kiln-dried stock: workmanship is guaranteed to be the highest order and at prices that must command the patronage solicited. Small orders receive the same careful attention that large orders receive and it is the aim of the company to make everyone who deals with them a satisfied customer.

Christianson Bros., who are proprietors of the Northwestern Grille Works, show in this new catalogue page after page of new grille work, giving the prospective buyers a great number and variety of designs to select from. They are also prepared to furnish special designs or make estimates on architects' plans and specifications. The catalogue will be promptly mailed to all those who write for it.

reading matter issued by the Anchor Concrete Stone Company will explain the strong points about this wall and machine more fully.

DIAMOND EXPANSION SHIELDS.

The use of reinforced concrete in building construction has increased very rapidly and with it a demand for a high tensile bolt that can be used for attaching fixtures, etc., to floors which oftentimes are not more than two inches in thickness.
Let a 1½ Horse-Power Motor
Replace Six to Eight Men
at Floor Surfacing

This is what is being done by every owner of a Ransome Floor Surfacer—the machine is replacing eight skilled men. The owner of a Ransome Floor Surfacer gets the old prices for the new way of surfacing floors, and a small investment of money in the machine brings a large and steady income. The machine will surface and polish any kind of a floor—wood, marble, mosaic, tile, concrete, etc.—and do the work in a fraction of the time it can be done by hand. Moreover the machine does a better class of surfacing and polishing than is possible by hand work.

You can use either the electric light current for running the 1½ Horse-Power Motor, or we can supply a small gasoline driven generator which furnishes the power. We may add that the machine leaves a clean floor, for a small suction fan sucks up all the dust from the hood that surrounds the revolving disc that surfaces the floor. The adjustment of the disc is such that no marks or “rings” are made. Send for catalog 3 N. B. giving further details. State kind of current available.

The Ransome Concrete Machinery Company
11 Broadway, New York, U.S.A.
THE NATIONAL BUILDER.
March, 1906.

The Wagner No. 40 Roof Bracket.
Is a device gotten up to provide a bracket which can be quickly and easily put to use and taken away after use. All that is necessary is to place the bracket in position, which can be done in a moment's time. They are as quickly detached after use as they are put on.

By the use of the No. 40 roof bracket the timber can not possibly slip off, no matter what angle the roof. They claim it is the only roof bracket that can be used on a very steep roof. The safety hook holds the timber from slipping off. It can also be used for sheathing a roof. The cut shows the No. 40 bracket when used on a 4' pitch roof, one part shingled and one part sheathed. On a roof more flat the front is higher than the side next to the roof. When climbing from place to place on a roof a carpenter need not fear to take hold of the timber, as owing to the safety hook the timber can neither slip off or tip up edgewise. Either 2x4 or 2x6 lumber can be used.

It is made of steel and weighs 1/4 pounds each and retails at 25 cents. It is packed one dozen in box; weight per dozen, 22 pounds. For further information write the Wagner Manufacturing Company, Cedar Falls, Iowa.

PROPER TREATMENT FOR FLOORS.
The proper treatment for floors, woodwork and furniture is a book issued by S. C. Johnson & Son, Racine, Wis., which can be had by our readers who will write for Edition N. This is the most complete and practical book on beauty, durability, and economy. It contains instructions for every architect, contractor or builder in getting the most complete and practical book on beauty, durability, and economy.

The subjects covered are: Selection of woods, parquetry, veneers, timbers, etc.; Adventures of various kinds; Adventures of the woods; Adventures of the woods; Adventures of the woods; Adventures of the woods; Adventures of the woods; Adventures of the woods; Adventures of the woods; Adventures of the woods; Adventures of the woods; Adventures of the woods; Adventures of the woods; Adventures of the woods; Adventures of the woods.

FARRINGTON EXPANSION BOLT.
H. Farrington, of 45 Broadway, New York City, calls attention in this number to the Farrington expansion bolt. This bolt is simple, effective and inexpensive, three points which will recommend it to the average purchaser.

It depends for its expansive qualities upon the flexibility of a coil of wire engaging the thread of a common wood screw or for larger and heavier work on the taper of the mandrel of a screw bolt especially threaded. It can be used on the pitch of roofs or on the roof of a building. It is required and can be removed or replaced as easily as a common bolt with a nut without its expansive qualities being lessened. It is made up of two parts; the screw and coil of wire. The metal contained in the screw offers little resistance to the great power of the expansion of the coil, consequently when in place the spiral impression of the wire coil.

This bolt requires no sleeve to compress the expansive parts of the device. In its practical operation it requires to be driven into a hole in hard material with slight force until the head of the screw comes in contact with the object to be held. Then a few turns only of the screw will permanently and efficiently hold the fixture in place.

A descriptive circular has been prepared and will be forwarded on request to H. Farrington, 45 Broadway, New York City.

CONTRACTORS' ESTIMATE BOOK.
Messengers & Parks, 51 and 53 South Water street, Aurora, Ill., will send an estimate book for contracts to subscribers of The National Builder who get their request in before the issue is exhausted. This book is ruled up aranged so as to include everything from excavat to drainage. Besides this, there are a few illustrations of cornices and hip shingles shown with prices, also a lot of general information pertaining to erecting buildings which is always well to have on hand.

Messengers & Parks are manufacturers of architectural sheet metal work and their advertisement in this issue contains some very attractive prices on ornamental hip shingles. Their estimate book is well worth writing for.

A NEW ARCHITECT.
C. J. Bowell, Shenandoah, Iowa, has opened an office as an architect in that city. He wishes to have on hand catalogues and samples from manufacturers of goods that are likely to interest the architect.

Where a known, described and defined article is ordered for the manufacture of a particular purpose, still if the known, defined, and described thing be actually supplied, there is no implied warranty that it shall answer the particular purpose intended by the purchaser. Begg v. James Hanley Brewing Co., 92 A. (R. I.), 373.

COOK'S PATENT LEVEL
FOR CARPENTERS

MACHINISTS
Made in Wood, Iron, Aluminum. Of all dealers or
V. B. WILLIAMS, 197 California St., San Francisco, Cal.

PHOENIX
Inside Sliding Blinds
Comfort
Convenience
Economy

Prices. Ask for Our New Catalogue

WE MAKE
Art Glass

Schuler & Mueller
Madison and Canal Streets, Chicago

Structural Draftermen
Desiring to fit themselves for better paying positions should fill out and send this advertisement to Mr. A. W., State Street, Aurora, Ill., or send in one week's pay, and Civil Engineering, Heating, Ventilation and Plumbing, Architecture, Architectural Drafting, Mechanical Drawing, Telegraphy, Telephony, Textiles, etc.

American School of Correspondence, Chicago, Ill.

Name...................
Address..............
City and State......

Natl. Builder, Mar '06

COOK'S PATENT LEVEL
FOR CARPENTERS

MACHINISTS
Made in Wood, Iron, Aluminum. Of all dealers or

Davies & Co.
Catalogues on Request.

W. E. WILLIAMS, 197 California St., San Francisco, Cal.

Plumbers' Supplies
At Wholesale.

If you need anything in the line, and wish to
SAVE
20 to 40 Per cent
on every article, write for my free Illustrated Catalogue. Shipments from a very complete stock of guaranteed goods.
Small orders are as carefully handled as large ones.

B. Y. Karan, 236 W. Harrison St., Chicago, III.
LORENZEN MANTELS AND GRILLES
Also Contractors for Ceramic Mosaic and Tiles, Interior and Decorative Marbles, also manufacturers of Improved Scagliola for Bathrooms, Vestibules and Interior of Lobbies and Corridors in Banks, Libraries, Hotels and Public Buildings.

To Carpenters & Builders FREE
We will mail our large, handsome, 96 page (10x12) Catalogue, the largest Mantel and Grille book ever published, which cost us nearly 80 cents. Send us your business card and we will show you a way to make money by becoming our sales agent for your territory. Write today.

CHAS. F. LORENZEN & CO., Inc.
257 North Ashland Avenue, CHICAGO.

BUILDERS' HARDWARE CATALOG
Contains 75 pages of design door sets, and nearly 200 pages in all. Cuts are Photographs and show goods just as they are. The prices quoted enable a contractor to underbid one who has not this catalog. Costs you nothing.

CONCRETE BLOCK HOUSES
My Book of Concrete Block Houses contains handsome illustrations of exteriors, description, floor plans, estimate cost, etc., of many designs for artistic modern homes. AVAILABLE FOR HOME BUILDERS. Every plan original, artistic and practical.

BUILDERS’ HARDWARE CATALOG
Our New and Complete No. 207
Established 1872
Orr & Lockett Hardware Co.
71-73 Randolph St., Chicago.

CONCRETE BLOCK HOUSES
My Book of Concrete Block Houses contains handsome illustrations of exteriors, description, floor plans, estimate cost, etc., of many designs for artistic modern homes. AVAILABLE FOR HOME BUILDERS. Every plan original, artistic and practical.

A Solid Oak Mantel
with 3¼ inch columns made of Quarter Sawed Oak, Gloss Finish. Height, 6 feet 11 inches; 5 feet or 4 feet 6 inches wide; 16x28 inch Beveled Plate Mirror. With enameled Tile Facing and Hearth, and Combination Coal and Wood Burning Grate with Summer Front complete.

$23.00 Subject to a discount of 5 per cent if order is accompanied with cash.

Hornet Mantel Company
1112 to 1120 Market St. ST. LOUIS, MO.
The New Universal Square

"NEW STYLE"

Made in Three sizes:

No. 6 6 in. 10 in. 15 in.
No. 10 13 in.
No. 15 15 in.

Always ready, No adjusting. Made of best steel and is light. Coppered, then oxidized or nickel finish. Can't rust. Guaranteed. If found untrue will be replaced.

For sale by all leading tool dealers

Write for Circulars

Combination; Tri; pitch cut; Hip and Valley cut and mitre square. Draws circles; gauges lumber; escargon cuts; laying out mortise and tenons; plumb and level; straight edge, rule scale, and innumerable other purposes. To operate you simply reverse it from side to side. It marks ¾ inch on one side and ⅛ inch on the other.

THE DUBY & SHINN MFG. CO., Inc.
Office and Works: NEW YORK CITY

THE FURNACE FOR THE BUILDER

Because of its simplicity, its scientific heating principles and its success. Because it is as easy to set as a stove. The pioneer of all steel furnaces—riveted like a boiler, dust tight and gas proof. No packed joints or cracked fire pots to leak gas into the air chamber. Being of steel it radiates heat quickly and the indirect radiator doubles its radiating capacity. Investigate the

LENNOX TORRID ZONE FURNACES

and send for a 40-page illustrated catalog and submit pencil sketch of plans for an estimate from our heating engineer. Torrid Zone hot air furnaces are now sold from Pittsburg to Denver and from Canada to Texas.

THE LENNOX FURNACE COMPANY.
MARSHALLTOWN, IOWA

Please mention THE NATIONAL BUILDER when corresponding with Advertisers.
Steel Furnace Guaranteed $49.00

Set It Up Yourself
We furnish complete plans for heating your house. We are manufacturers and sell direct to you, saving you all profits.

Thousands of our furnaces in use and giving absolute satisfaction. Send for book of testimonials.

WE PAY THE FREIGHT
East of the Mississippi River

Hess Warming and Ventilating Company
707 Tacoma Building
Chicago, Ill.

Steel Furnace

When produced by an I. H. C. Engine is unquestionably the best and most economical power obtainable.

Every manufacturer, shop or mill owner or power user of any kind is interested in the cost of power, for ordinarily it represents the burden of expense in his business. The cost of power from an I. H. C. Gas or Gasoline Engine, however, is reduced to the minimum, only about one tenth of a gallon of gasoline per horse power per hour being consumed.

With an I. H. C. Engine there is no delay in firing up—no waiting for steam.

IT IS ALWAYS READY FOR WORK AND IT ALWAYS WORKS

Simplicity in design is a strong feature in the construction of the I. H. C. Engine. Thus it is possible for any person with ordinary intelligence to operate this engine. It is so simple that it does not require an engineer—additional evidence of its great economy as a power producer over the steam engine.

SAVE MONEY, SAVE TIME, SAVE LABOR
by using I. H. C. Gas or Gasoline Engines for any purpose requiring power with
in their rated capacity, as I. H. C. Engines are made in the following styles and sizes: Horizontal, Stationary and Portable—4, 6, 8, 10, 12 and 15 h.p. Vertical—2, 3 and 5 h. p. Our catalogue explaining the advantages derived from the use of I. H. C. Engines will be mailed upon request.

International Harvester Company
7 A Monroe St., Chicago, Ill.
Hand Elevators and Dumb Waiters

that can be placed in position by any Carpenter.

Catalogue Free.
ENGLISH ELEVATOR CO.
409 Cherry St., Philadelphia, Pa.

G O I N G TO BUILD?
Then have your Architect Specify

POLYGON
CONDUCTOR PIPE

As shown in the accompanying cut.

Why not in "The same old thing?" Polygon pipe costs no more than ordinary square pipe and adds greatly to the appearance of your home.

A TRIAL WILL CONVINCE YOU
Made in Copper and Galvanized Iron

THE AMERICAN ROLLING MILL CO.
MIDDLETOWN, OHIO

ARCHITECTS

desiring to "brush up" for more responsible work should fill out and send this advertisement to us to-day and receive our 200 page handbook (FREE) describing our Architects course and over 60 others, including Architecture, Architectural Engineering, Architectural Drawing, Electrical, Mechanical, Steam and Civil Engineering, Heating, Ventilation and Plumbing, Mechanical Drawing, Telephony, Telegraphy, Textiles, etc.

American School of Correspondence, CHICAGO, ILL.

MILBRADT’S ROLLING STEP LADDERS

RECEIVED
HIGHEST AWARD ST. LOUIS WORLD’S FAIR

Also the highest recommendations from thousands of customers. They are the finest ladders made, easiest running, work noiseless and are absolutely safe and durable. Made to order and TO FIT ALL KINDS OF SHELVING.

Besides ladder here shown, we manufacture 16 other styles, and are therefore in position to meet all requirements.

WRITE FOR CATALOGUE NO. 20

SPECIAL DISCOUNT TO CONTRACTORS AND BUILDERS

THE EBING MANUFACTURING COMPANY
1668 N. Eighth St., St. Louis, Mo.

Successors to G. A. MILBRADT & CO.
Johnson's Wood Dye

"For the Artistic Coloring of Woods"

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

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

Johnson's Wood Dye, any desired shade, is sold by the best paint dealers. Insist on getting the genuine — don't take a substitute.

Johnson's Dyes are Prepared in All Shades as Follows:

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

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

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

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

Send for Free Book. We have just published a new edition of the interesting, practical book, "The Proper Treatment for Floors, Woodwork and Furniture," that we will send you free on request. This is illustrated from life and written by a wood-finishing authority with over 23 years experience in this line of work. Contains many ideas for your business. Write us now. Mention edition NB3.

S. C. JOHNSON & SON

Racine, Wis.

"The Wood-Finishing Authorities"
THE NAT. March, 1906.

Montross Metal Shingles
Enable the architect to add much beauty to the building without increasing the total cost of the finished structure materially. To the owner and his family—comfort, perfect protection from all the elements, and the feeling of security that comes of dwelling under a fireproof covering. Send for catalog.
Montrose Metal Shingle Co. - Camden, N. J.

Protect the House from Fire.

Use Gendron's Chimney Thimble
(A) represents thimble, (B) guard rim, (C) extension into thimble, (D) large end entering chimney, (EE) guard.
This thimble protects the chimney from heat, the lath from fire, keeps water from soiling the walls and the plaster from bulging. Agents wanted. Send for full particulars.

Crescent Machinery
Quality is all right—so's the price
Band Saws, Jointers, Saw Tables
Band Saw Blades
Nothing else
Catalogue tells the rest
THE CRESCENT MACHINE CO.
10 Main St., LEETONIA, O.

Builders' Hardware
You cannot afford to be without our new builders' hardware catalog and net price list.

Why?
1st.—Because it contains the latest designs and newest finishes in builders' hardware.
2d.—It contains over 1,000 illustrations of hardware, tools and material used in constructions of buildings.
3d.—It contains 40 different designs in 15 different finishes.
4th.—It contains valuable information pertaining to Builders' Hardware.
5th.—It contains designs grouped in such manner, making selection and ordering easy.
6th.—Our price-list gives net prices on all goods illustrated, making figuring and estimating a pleasure.
7th.—All goods illustrated and priced are carried in stock.

Rehm Hardware Company
350 Blue Island Ave., Chicago, Ill.
CHICAGO MILLWORK SUPPLY CO.
Write us for prices on DOORS, BLINDS, SASH and INTERIOR WORK. We sell you direct at Manufacturers' price and furnish the best goods from this market.

NET PRICES AND ESTIMATES
EVERYTHING IN THE MILLWORK LINE.

HAVE YOU OUR CATALOG?
IT'S FREE. WRITE TO-DAY.

CHICAGO, U. S. A.

BOX WINDOW FRAMES
FOR CEMENT CONSTRUCTION

WE ARE PREPARED TO GET OUT, ON SHORT NOTICE, BOX OR PLANK FRAMES FOR CEMENT HOUSES.

LET US FIGURE WITH YOU WHEN IN NEED

WE ARE ALSO IN SHAPE TO FURNISH ALL THE MILLWORK FOR ANY KIND OF BUILDING.

HAVE YOU OUR 200-PAGE CATALOGUE?
IT IS YOURS FOR THE ASKING

SCHALLER-HOERR CO.
426 Blue Island Ave., CHICAGO, ILL
HEATING AND VENTILATION

For duroblo and asinitary floor* In
BLUFF AND CIST ST$, PITTSBURG, PA.

Repainging may be desire for change as well as from necessity. If a different
style in house-dress is desired, what so convenient, so economical and such grade pro-
OXIDE OF ZINC? Where, too, such variety of choice?

FREE

Our practical Pamphlet—"The Paint Quotations,
"Paints in Architecture," "Specifications
Architecture," "Pricing Government
"Paint: Why, How and When.

The New Jersey Zinc Co.
71 BROADWAY, NEW YORK

We do not grind zinc oil. A list of manufacturer
of high grade zinc paints will be furnished on application.

ARCHITECTURAL DRAFTSMEN

Young men desiring to fit themselves for paying positions should apply to the firm. The firm has
out and on page 108 designs of Superior
 Architectural Drafting, Electrical, Mechanical, Steam and Civil Engineering, Heating, Ventilation
Architecture, Mechanical Drawing, Telephony, Telegraphy, Textile, etc.

American School of Correspondence, Chicago

What's in the Job and How to Figure It

Get a Copy of

HICKS' ESTIMATORS' PRICE BOOK

and your troubles in estimating are over

WEATHER VIXES, TOWER ORNAMENTS, CHURCH CROSSES, FINE ARTS, ETC., ETC.

Mailed free to any address.

T. W. JONES, Manufacturer
22 Bathgate and 120 Fred St.,

NEW YORK

BUSINESS DIRECTORY.

ARCHITECTS.

M. L. Roen
Chicago

Class A. Zoller Jr.
New York

Henry Wernshall
Chicago

Leavitz Machine Co.
Orange, Mass.

BARGE SWING.

Barrows State Co.
Bingham, Pa.

E. J. Johnson & Co.
38 Park Row, New York

BLINDS—Sliding and Folding.

Phoenix Sliding Blind Co.
Phoenix, Ariz.

Keefle & Turner Co.

BLUE PRINT PAPER.

A. H. Wilcox, Jr.
Spring Valley, Minn.

D. L. Stephard
Indianapolis

Geo. W. Payne & Son
Canton, Ohio

PORTER, TAYLOR & CO.

BRACKET HOOKS.

Wagner Mfg. Co.
Cedar Falls, Iowa

BUILDERS' HARDWARE.

Orr & Leckett Hardware Co.
Chicago

Harman Hardware Co.

CEILINGS.

The Bronze Mfg. Co.
Cincinnati

Cincinnati

CEMENT BUILDING BLOCKS.

Anchor Cements Inc.
Boise, Idaho

Rock Island

Avon Mill Co.
Detroit

Atlee Cemenall black Co.
Roanoke, Va.

Beaver Fuel & Coal Co.
Red Bank, N. J.

Bowers Furniture & Granite Co.
Watertown

Cement Manufacturing Co.
Middletown, Ohio

Burlington, Iowa

Century Block Co.
Roanoke, Va.

Cement Mill Co.
Jackson, Ohio

Cement & Stone Co.
W. M. Davis

CONCRETE BUILDINGS.

Special attention given to the planning of concrete-block and
concrete buildings. (This model block house that is free from that customary ill, unsteady play-stone ap-
pearance and that will be attractive in design, yet inexpensive.

HERBERT C. CHIVERS
ARCHITECT

330 N. 7th

ST. LOUIS

Please mention THE NATIONAL BUILDER when corresponding with Advertisers.
HEATING.
Andrews Heating Co. M.... Milwaukee, Wis.
Lincoln & Ligonier Co. New York.
Shannon Bros. Paterson, N. J.
OSEWAY MOIST.
Benson Bros. Brooklyn, N. Y.
Stapley Works.... New Britain, Conn.

HIP SHINGLES.
Messinger & Parks.. Aurora, Ill.
The C. D. Britton Co. Clevelad, Ohio.
Wills Mill Co. - Galesburg, 111.

INTERIOR FINE FINISH.

IRON WORK—Ornamental.
J. E. Vail Iron Works, Davenport, Iowa.
Van Den Iron Works ... Cleveland, Ohio.
LEVELING INSTRUMENTS.
Davis & Groussett Co. Greenfield, Mass.

LUMBER.
L. N. Lumber Co. Chicago.

LUMBER—Retail.
Green Lumber Co. Chicago.

MACHINERY—Hand and Foot Power.
A. W. Burnett Co. Bridgeport, Conn.
P. F. Lorenzen Co. Chicago.

MASONRY.
Von Gerichten Art Glass Co. Columbus, Ohio.

PLANS.
Chivers, H. C. St. Louis, Mo.

PLASTER.
Napoleon N. Plaster Co. Napoleon, Ohio.

PLASTER—Pulp.
Garden City Supply Co. Chicago.

PLASTIC RELIEF.
Decorators' Supply Co. Chicago.

PLUMBING SUPPLIES.
B. Y. Karel Chicago.

PRINTS.
Lloyd Iron Printing Co. Chicago.

PORTABLE HOUSES.
C. W. C. Porter CLEVELAND.

PRISON CELLS.
Van Dorn Iron Works Cleveland, Ohio.

ROLLING STEEL DRAWS.
Ehlert Bros. Cincinnati, Ohio.

ROOFING MATERIAL.
American Stone Co. Middletown, Ohio.
Munro Metal Milling Co. The Weirts Co.

SHOE CORD.
David McKean. St. Louis, Mo.

SLEEPING SLATES.
Joseph Salm Co. St. Louis, Mo.

SHEET METAL WORK.

SHINGLES—Metal.

SHUTTER WORKER.

SHINGLING GAUGE.
James Divers, Bridgeport, Conn.

SHIELD WORK.
Broome Bros. Brooklyn, N. Y.

SPRING HINGES.
P. F. Fox & Co. Chicago.

STAIR BASE SHEATH.

STEEL CEILINGS.

STEEL JOINT HANGERS.
Van Dorn Iron Works Cleveland, Ohio.

TERRA COTTA.
N. W. Terra Cotta Co. Chicago.

TILE.
Star Eouastic Tile Co. Pittsburgh, Pa.

TOOLS.
Ehrenagy & Page... West Lynn, Mass.

WINDOW FLOORS.

WATER TAPES.
Gorton & Lidgewood.... New York.

WEATHER VANES.
T. W. Jones.... New York.

WOOD CARPET.
Foster-Munger Co. Chicago.

WOOD TURNING.
C. E. Zimmerman & Co. Syracuse, N. Y.

WOOD WORKING MACHINERY.
Cordeman, Meyer & Co. Cincinnati, Ohio.

WOODWORK.

Index to Advertisers.
THE NATIONAL BUILDER will be sent free for one year to any party purchasing over $10.00 worth of goods from current advertisers, provided the same was the result of such advertisements. Or purchasers who are already subscribers may have their subscription extended for one year by return of the remittance for the renewal of the same. No more than one free copy of the amount of the purchase and the premium will be sent as above.

American Corporation Schools... 26, 48, 69, 92, 56
American Concrete Block Co. 66
Ames Cement Co. 18
American Concrete Stone Co. 51
Andreas Heating Co. 24
A. H. Allen & Co. 25
Atlas Cement Machinery Co. 2
Atlantic Concrete Co. 50
Austin Harry 14
Automatic Building Lock Co. 13
Baldwin, School Co. 8
Baron's W. F. & John 26
Barrett Bros. 25
Bataia Clump Co. 13
Berry Bros. 24
Borisen Adjustable Grille Co. 23
Bosman Bros. 66
Bracth Hook Co. 66
Brito & Fitch 24
Butcher Polish Co. 3
Burton A. W. & Co. 24
Calvet, Samuel 13
Cavanaugh Working Machin Co. 13
Century Mooring Co. 12
Century Concrete Block Co. 13
Century Stone & Sand Co. 12
Contractor's Supply Co. 24
Cordeman Meyer & Co. 12
Cory Silver Co. 13
Cricket Machine Co. 14
Darby & Co. 24
W. M. Davis 24
Detroit Shoe Case Co. 29
Diamond Expansion Bolt Co. 24
Dinwiddie, Jas. 56
Dowling, Sens. 58
Dunham Co. Jas. 29
Duffy & Shildt Mfg. Co. 24
Drum, W. K. & Co. 24

Please mention THE NATIONAL BUILDER when corresponding with Advertisers.
Genuine Bangor Unfading Black Roofing Slate, Blackboards, Structural Slate
Manufactured and Manufactured from the Real Bangor Quarry.

ALL ORDERS FILLED PROMPTLY

The Bangor Slate Co.
Look Box 04. BANGOR, PA.

The Growing South
No other section is forging ahead so fast as the Southern States in Agriculture, Horticulture, Factory Building, and General Progress. The last year’s record along the Southern Railway and Mobile & Ohio Railroad of investments in factories and improvements was over $100,000,000; for three years $250,000,000.

Splendid Opportunities
exist in Alabama, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia; and in Southern Illinois and Southern Indiana, for investments of all kinds; in timber, mineral and other lands.

Factory Locations
Where all conditions are favorable for making and marketing iron and steel and their products, all kinds of wood using articles, and nearly every other line of industry.

Publications and special information furnished. Our department is a bureau of information for all seeking locations or investments.

M. V. Richards
Land and Industrial Agent
Southern Railway and Mobile & Ohio Railroad
WASHINGTON, D. C.

The Zimmerman Patent Iron Base for Wood Porch Columns. Preserves the Column floor and sill of the Porch and increases their period of service many times. Enclose your business card when writing for circulars.

Syracuse Corner Block Factory
C. E. ZIMMERMAN, Prop.
SYRACUSE, NEW YORK

Please mention THE NATIONAL BUILDER when corresponding with Advertisers.
THE AUTHOR'S NAME IS A SUFFICIENT GUARANTEE THAT THESE BOOKS ARE THE BEST AND MOST PRACTICAL IN THE WORLD

The Carpenter's and Builder's Standard Library

BROTHERHOOD EDITION

By FRED T. HODGSON, Architect

Complete in Ten Handsome Volumes, 5,000 pages, 2,600 Illustrations, or Sold Separately if so Desired. They are Practical, Omitting Nothing Essential and Containing Nothing Irrelevant

From the Carpenter's and Builder's Standard Library of books has been eliminated everything which can in the remotest degree divert the reader's mind from the essentials of the subjects treated; thereby providing him with the necessary and useful knowledge by the most direct route and shortest cut and saving him many hours of misspent study. Designed for the journeyman carpenter, architect or apprentice, the Carpenter's and Builder's Standard Library presents all the rules, formulas and principles of practical science, describing processes, machinery, tools, etc., in such a manner as to enable the reader to put into practice what he learns—in short, these works make a practical operator of the reader and not an eloquent theorist as is too often the case with the product of modern schools. The books are technical only within indispensable limitations, and in such instances care has been observed not to confuse the student with terms which, to an untrained reader, might appear ambiguous or obscure.

TITLES CONTAINED IN THE SET

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

- Practical Treatise on the Use of the Steel Square. Two large volumes. 500 pages. 500 illustrations. Price $3.00
- Modern Estimator and Contractor's Guide. For pricing all builders' work. 300 pages. Fully illustrated. Price $2.00
- The Up-to-Date Hardwood Finisher. 320 pages. 117 illustrations. Price $1.50
- Common Sense Stair Building and Handrailling. 200 pages. 200 illustrations. Price $1.50
- Twentieth Century Stonemason's and Bricklayer's Assistant. 320 pages. 400 illustrations. Price $2.50
- Builders' Architectural Drawing Self-Taught. 300 pages. 300 illustrations. 18 large double folding plates. Price $2.50
- Low Cost American Homes. 240 pages. 200 illustrations. Price $1.50
- Easy Lessons in the Art of Practical Wood Carving. 320 pages. 300 illustrations. Price $1.50

HOME STUDY AND SUCCESS

Education neither begins nor ends with the college. It depends, first or last, upon one's own efforts; upon one's ability to learn useful facts and put them into practice. Home study is the secret of success. Many of our great men have been self-taught. Lincoln is a striking example. The most complete home training school ever organized is now open to every earnest man or boy. It is within the pages of the "NEW CARPENTER'S AND BUILDER'S STANDARD LIBRARY," by Fred T. Hodgson. It provides no less than 100 Courses of Study, covering every phase of Carpentry and Building. To make this work distinctly practical Mr. Hodgson has worked over 50 years in gathering together this vast amount of practical information. No matter what your education or previous training, this unrivaled work will point out new practical examples which you have long wanted to know. If you have no aid or incentive to home study, you are losing ground. Questions are constantly coming up which require definite answers. You need the best books you can get, and that is easily the "New Carpenters' and Builders' Standard Library."

THE JOHNSON BOOK CO.—SPECIAL PRICE OFFER COUPON

THE JOHNSON BOOK CO., 505 Pontiac Building, Chicago, Ill.

Gentlemen:

Form 1—Cash Offer You may send me, all charges paid, One Complete Set, 10 Volumes, The Carpenter's and Builder's Standard Library, Brotherhood Edition, at your special price of $13.50. Amount enclosed herewith.

Form 2—Installment Offer You may send me, all charges paid, One Complete Set, 10 Volumes, The Carpenter's and Builder's Standard Library, for which I enclose $3.00 as first payment and further agree to pay you the sum of $2.00 per month for six months, until the full amount of $15.00 is paid, books to remain the property of the Johnson Book Co. until paid for in full.

Form 3—Volume Offer Please send me, all charges paid, Volume for which I enclose herewith the sum of...

My Express Company is ____________________________
My Express Address is ____________________________
My Express Number is ____________________________
My Express Company is ____________________________
My Express Address is ____________________________
My Express Number is ____________________________

Please print clearly.

Name ____________________________
Street and Number ____________________________
Town ____________________________
State ____________________________

Gentlemen:

Form 1—Cash Offer You may send me, all charges paid, One Complete Set, 10 Volumes, The Carpenter's and Builder's Standard Library, Brotherhood Edition, at your special price of $13.50. Amount enclosed herewith.

Form 2—Installment Offer You may send me, all charges paid, One Complete Set, 10 Volumes, The Carpenter's and Builder's Standard Library, for which I enclose $3.00 as first payment and further agree to pay you the sum of $2.00 per month for six months, until the full amount of $15.00 is paid, books to remain the property of the Johnson Book Co. until paid for in full.

Form 3—Volume Offer Please send me, all charges paid, Volume for which I enclose herewith the sum of...

My Express Company is ____________________________
My Express Address is ____________________________
My Express Number is ____________________________

Please print clearly.

Name ____________________________
Street and Number ____________________________
Town ____________________________
State ____________________________

Gentlemen:

Form 1—Cash Offer You may send me, all charges paid, One Complete Set, 10 Volumes, The Carpenter's and Builder's Standard Library, Brotherhood Edition, at your special price of $13.50. Amount enclosed herewith.

Form 2—Installment Offer You may send me, all charges paid, One Complete Set, 10 Volumes, The Carpenter's and Builder's Standard Library, for which I enclose $3.00 as first payment and further agree to pay you the sum of $2.00 per month for six months, until the full amount of $15.00 is paid, books to remain the property of the Johnson Book Co. until paid for in full.

Form 3—Volume Offer Please send me, all charges paid, Volume for which I enclose herewith the sum of...

My Express Company is ____________________________
My Express Address is ____________________________
My Express Number is ____________________________

Please print clearly.

Name ____________________________
Street and Number ____________________________
Town ____________________________
State ____________________________

Gentlemen:

Form 1—Cash Offer You may send me, all charges paid, One Complete Set, 10 Volumes, The Carpenter's and Builder's Standard Library, Brotherhood Edition, at your special price of $13.50. Amount enclosed herewith.

Form 2—Installment Offer You may send me, all charges paid, One Complete Set, 10 Volumes, The Carpenter's and Builder's Standard Library, for which I enclose $3.00 as first payment and further agree to pay you the sum of $2.00 per month for six months, until the full amount of $15.00 is paid, books to remain the property of the Johnson Book Co. until paid for in full.

Form 3—Volume Offer Please send me, all charges paid, Volume for which I enclose herewith the sum of...

My Express Company is ____________________________
My Express Address is ____________________________
My Express Number is ____________________________

Please print clearly.

Name ____________________________
Street and Number ____________________________
Town ____________________________
State ____________________________
THE NATIONAL BUILDER.

March, 1906.

SASH

COMPLETE STOCK
PROMPT SHIPMENT

DOORS

HIGHEST GRADES
LOWEST PRICES

MILLWORK

CATALOGUE

George Green Lumber Co.

Twenty-Second and Canal Sts., Chicago

TOPP’S FRAMING TOOL
A PERFECT TOOL and the only Tool for the purpose ever invented...

Saves time for the skilled mechanic, and enables the ordinary workman to frame the most difficult roof with absolute certainty.

Saves time for the skilled mechanic, and enables the ordinary workman to frame roofs with absolute certainty.

PRICE... G. A. TOPP & CO., Indianapolis Ind.
See Tool at your Hardware Dealer's.

Von Gerichten.... Art Glass Co
Von Gerichten.... Art Glass Co

Write or come to the
Von Gerichten.... Art Glass Co
Von Gerichten.... Art Glass Co

Worked in Glass

Bony Gerichten.... Art Glass Co
Bony Gerichten.... Art Glass Co

Designs and Decorative Glass

Designs and Decorative Glass

IT MATTERS NOT whether you live
in Maine or Mexico, Alaska or Alabama—
it will pay you to buy "Steel-Polished Perfection" hardwood flooring.

Many of our best customers live over a thousand miles from Milwaukee.

Send a trial order to-day and find out just what “good" flooring really is.

You will save money on the laying of "Steel-Polished Perfection". And besides, our flooring never shrinks.

Don’t wait for our salesman to call. We have no salesman. Order by mail to-day.

JOHN SCHROEDER
LUMBER COMPANY
Foot of Walnut Street,
MILWAUKEE, WIS.

THE BEST CARPENTERS USE
THE HAND D. SCREW DRIVER

R. I. W. PAINT
"REMEMBER IT'S WATERPROOF"

Sold in Barrels, $1.35 per gallon; S-gallon case at $3.30 per gallon, f.gal. per gallon, 1-10,000, S. O. R. Chicago

PROOF AGAINST WATER, ACID, FUMES or ALKALI
Special Elastic Compound for Each Specific Purpose

THE GARDEN CITY SAND CO.
188 E. Madison Street, Chicago

KEEP OUT DAMPNESS
PAINT YOUR CONCRETE BUILDINGS WITH

THE BEST CARPENTERS USE
THE HAND D. SCREW DRIVER

R. I. W. PAINT
"REMEMBER IT’S WATERPROOF"

Sold in Barrels, $1.35 per gallon; S-gallon case at $3.30 per gallon, f.gal. per gallon, 1-10,000, S. O. R. Chicago

PROOF AGAINST WATER, ACID, FUMES or ALKALI
Special Elastic Compound for Each Specific Purpose

THE GARDEN CITY SAND CO.
188 E. Madison Street, Chicago

THE BEST CARPENTERS USE
THE HAND D. SCREW DRIVER

R. I. W. PAINT
"REMEMBER IT’S WATERPROOF"

Sold in Barrels, $1.35 per gallon; S-gallon case at $3.30 per gallon, f.gal. per gallon, 1-10,000, S. O. R. Chicago

PROOF AGAINST WATER, ACID, FUMES or ALKALI
Special Elastic Compound for Each Specific Purpose

THE GARDEN CITY SAND CO.
188 E. Madison Street, Chicago

THE BEST CARPENTERS USE
THE HAND D. SCREW DRIVER

R. I. W. PAINT
"REMEMBER IT’S WATERPROOF"

Sold in Barrels, $1.35 per gallon; S-gallon case at $3.30 per gallon, f.gal. per gallon, 1-10,000, S. O. R. Chicago

PROOF AGAINST WATER, ACID, FUMES or ALKALI
Special Elastic Compound for Each Specific Purpose

THE GARDEN CITY SAND CO.
188 E. Madison Street, Chicago

THE BEST CARPENTERS USE
THE HAND D. SCREW DRIVER

R. I. W. PAINT
"REMEMBER IT’S WATERPROOF"

Sold in Barrels, $1.35 per gallon; S-gallon case at $3.30 per gallon, f.gal. per gallon, 1-10,000, S. O. R. Chicago

PROOF AGAINST WATER, ACID, FUMES or ALKALI
Special Elastic Compound for Each Specific Purpose

THE GARDEN CITY SAND CO.
188 E. Madison Street, Chicago