#### Mdvertisements.

#### ORDINARY RATES.

Inside Page, each insertion, - 75 cents a line Back Page, each insertion, - - \$1.00 a line \*\*EFF or some classes of Advertisements, Special and Higher rates are required.

The above are charges per agate line—about eight words per line. This notice shows the width of the line, and is set in agate type. Engravings may head advertisements at the same rate per agate line, by measurement, as the letter press. Advertisements must be received at Publication Office as early as Thursday morning to appear in the following week's issue.



ROTARY PUMPS AND ENGINES: Their Origin and Development.—An important series of papers giving a historical resume of the rotary pump and engine from 1588 and illustrated with clear drawings showing the construction of various forms of pumps and engines. 38 illustrations. Contained in Supplements 1109, 1110, 1111. Price 10 cents each. For sale by Munn & Co. and all newsdealers.

# POWER & FOOT SHAPERS, PLANERS, DRILLS LATHES, MACHINE SHOP OUTFITS, TOOLS AND SUPPLIES, CATALOGUE FREE SEBASTIAN LATHE CO. 120 CULVERT ST. CINCINNAT I. O.



STILLSON WRENCH
which is particularly adapted for turning out the best
work without crushing the pipe in the least. All parts
are drop-forged. Once tried, it is always used. It has
many imitations but no equals. See explanatory cuts.
Price list on application to Price list on application to wALWORTH MFG. CO., 20 Oliver Street,Boston, Mass.



DRY BATTERIES.—A PAPER BY L. K BALLERIES.—A PAPER BY L. K. Bohm, treating of open circuit batteries, historical dry batteries, modern dry batteries, Hellesen's battery, Bryan's battery, Koller's battery, and the efficiency of dry cells With three illustrations. Contained in Scientific American Supplement, No. 1001. Price 10 cents. To be had at this office and from all newsdealers.

TRANSITS AND LEVELING INSTRUMENTS. PLUMBERS' IRON LEVEL With Double Plumb.



### Grooving and Channeling can be most quickly, easily and accurately done by using the



# RIVETT LATHE

se Miller). Mills and grinds work the whole of lathe. Easy to adjust. Does more and work than any other machine. FANEUIL WATCH TOOL CO., Boston, Mass., U. S. A

Ve can furnish the Latest Improved Eyelet Machines for making shoe eyelets and special eyelets of all descriptions. We are also builders and designers of Special Wireworking Machinery.

BLAKE & JOHNSON, P. O. Box 7, WATERBURY, CONN., U. S. A.

WELL DRILLING MACHINERY MANUFACTURED BY WILLIAMS BROTHERS. ITHACA, N.Y. MOUNTED OR ON SILLS, FOR

DEEP OR SHALLOW WELLS, WITH STEAM OR HORSE POWER
SEND FOR CATALOGUE
ADDRESS WILLIAMS BROS ITHACA.N.Y.

The Berkefeld House Filter. The only Filter Removing Typhoid and Cholera Baculti. Tested and indorsed by many leading authorities in Europe and America. It gives a continuous flow of filtered water, absolutely free from germs. It is easily cleaned, as all impurities remain on the surface of the filtering cylinder. Cylinders can be sterlized by boiling in water for one bour. Send for circulars and prices to the Berkefeld Filter Co., 4 Cedar St., New York See Mus. Article in Scientific American, June 23, 1894.



ARMSTRONG'S No. O THREADING MACHINE



Can be attached to bench or post-Designed for threading the smaller sizes of pipe, iron or brass, also bolts. Has two speeds, one for pipe ½ to 1 inch; the other for pipe ½ to 2 inches, inclusive. Uses the regular Armstrong adjustable dies. Oth-er attractive features. Send for particulars. The Armstrong Mfg. Co., 132 Centre Street, New York. Bridgeport, Conn.

Handle, J. O'Neill.
Harrow, disk. P. E. Little.
Harvesters, knotting mechanism for self-binding, J. F. Appleby.
Harvesters, segmental conveyer for potato, A. T. Dowden. ing, J. F. Appleby.

Harvesters, segmental conveyer for potato, A. T.

Dowden.

Hat, Gammons & Bracher.

Hat brims, machine for attaching bindings to curled or rolled, Gammons & Bracher.

Hay fork, automatic harpoon, J. L. Ritter.

Hay rake, borse, C. O. Luce.

Heat insulating article, J. Lumley.

Heat or dam per regulator, J. F. Burley.

Heat or dam per regulator, J. F. Burley.

Heater See Electric heater. Water heater.

Hinge, look, A. Rentsch.

Hook. See Belt hook. Snap hook.

Hooping machine, barrel, A. T. S. Roebling.

Horse dotacher, G. Grebe.

Horse foot protector, J. W. Thurlow.

Horse governor or chin rest, C. S. Baum.

Horseshoe, elastic, P. H. Graves.

Hose fastening, E. E. Gold.

Humidifier, Thompson & Soboni.

Hydrocarbon burner, G. C. Roberts.

loe cream mould and disher, T. F. Rankin.

Incandescent burner, J. B. De Lery.

Indicator. See Staton indicator.

Indicator sand recorder, E. L. Morgan.

Jack. See Lifting jack.

Jar. See Preserve jar.

Jug, W. M. Brewer.

Kitchen cabinet, F. Washington.

Ladder and duplex step therefor, L. W. Noyes.

Lamp burner, gasolene, A. M. Southard.

Lamp chimney attachment, R. L. & L. P. Moore.

Lamp burner, gasolene, A. M. Southard.

Lamp chimney attachment, R. L. & L. P. Moore.

Lamp holder, E. R. Holmes.

Lamp or lantern extinguisher, D. T. K. McEwen.

Lamps, system of lighting for hydrocarbon, R. L.

Doran.

Land roller, Middleton & Loomis. 591,614 591,388 591,755 591,635 591,652 591,416 Doran.
Land roller, Middleton & Loomis.
Lautern, C. Hamm Latch, P. F. Fleming.
Latch, gate, O. Bower.
Leather preparatory to dyeing, treating, E. Koster. 591,769

ter. 591,769
Lens, J., Gathmann. 591,476
Letter or character for signs, E. J. Lutwyche. 591,546
Lettering device, L. Rust. 591,552
Lifting jack, G. W. Turner. 591,738
Lingo, H. Rigby. 591,496
Lock, J. Link. 591,479
Lock, J. J. Link. 591,479
Locking drawers of cabinets, device for, D. E.
Hunter. 591,552 Locking drawers of cabinets, device for, D. E. Hunter.
Loom, B. Bosse.
Luggage carrier, J. H. Quinton
Magnetic coupling. T. J. Fay.
Mail bag holding and catching device, C. M. Ben-

Eaton

Potato digger, J. Schwartz.

Pottery moulding machine, J. A. Zengler.

Power. See Tread power.

Precious metals by solution, obtaining, E. J.

| Power. See Tread power. | Frecious metals by solution, obtaining, E. J. | Fraser. | 591,753 | Fraser. | 591,740 | Freserve jar, F. Dedreux. | 591,740 | Fress, O. Smith. | 591,740 | Fress, O. Smith. | 591,740 | Frinting press feed table and feeder, C. G. | Harris. | 591,648 | Frinting press feeding device, Harris & McNutt 591,634 | Frinting press feeding device, Harris & McNutt 591,649 | Frinting press feeding device, Harris & McNutt 591,649 | Frinting press feeding device, Harris & McNutt 591,649 | Frinting press feeding device, Harris & McNutt 591,649 | Frinting press feeding device, Harris & McNutt 591,649 | Frinting press feeding device, Harris & McNutt 591,649 | Frinting press feeding device, Harris & McNutt 591,649 | Frinting press feeding device, Harris & Harris & Frinting press feeding device, Harris & Harris & Frinting press feeding device, Harris & Harris & Harris & Frinting press feeding device, Harris & Harris &

Railway switch, street, D. W. & G. W. Hatfield. 591,628
Railway switch tongue rail, Martin & Price-Williams. 591,412
Railway vehicle window. J. A. Normand. 591,808
Range, reversible, W. P. Lewis. 591,654
Reel. See Tape reel. 591,654
Refrigerator, S. W. Bates. 591,374
Refrigerator, market, Harrison & Kelley. 591,401
Refrigerator shipping box, O. Andrews. 591,581
Register. See Cash register.
Regulator. See Damper regulator. Heat or damper regulator.
Rod coupling device, A. C. Ponkney. 591,690
Roller. See Land roller. 591,712
Rolling mill, J. S. Worth. 591,712
Rolling mill plate turner, J. S. Worth. 591,712
Rolling pipe couplings, appa ratus for, De Forest & Kenna. 591,742
Roof bracket. J. Matter. 591,742
Roof bracket. J. Matter. 591,742
Roof bracket. J. Matter. 591,742
Said slide, C. H. Worthen. 591,465
Said slide, C. H. Worthen. 591,465
Sash and drier, Merriman & Vought. 591,465
Sash and window screen hanger and operator, storm, J. D. Brainard. 591,792
Sash cord fastener, Byxbe & Petersen. 591,389
Sash fastener, J. M. Graham 591,483
Sash fastener, J. N. Neidl. 591,537
Saw set, J. A. Kldwell. 591,523
Soale, computing, I. C. Koehne. 591,522

Saw set, J. A. Kidwell.
Scale, computing. I. C. Koehne.
Scale, weighing. F. R. Moser.
Scoop, potato, W. A. Reddick.
Scraper, dumping. M. G. Bunnell.
Screen. See Half tone screen. Pulp screen.
Window screen.
Seal lock, Lee & Hoyt.
Sewing machine, D. H. & J. Agan.
Sewing machine, L. Onder dock.
Sewing machine, W. N. Parkes.
Sewing machine, deed mechanism, R. G. Woodward.
Sewing machine looper screen.

Sewing machine looper actuating mechanism, L. Onderdonk.

Sewing machine looper mechanism, L. Onderdonk.

Sewing machine looper mechanism, L. Onderdonk.

Sewing machine, overedge, J. T. Collins.

Sewing machine, overedge, J. T. Collins et al.

Sewing machine quilting attachment, W. Obuch 591,784
Sewing machine table top, N. A. Hull.

Sewing machine takeup mechanism, L. Onderdonk.

Sewing machine takeup mechanism, L. Onderdonk.

Shaft counling wabiele W. A. The Sewing machine takeup sewing machine takeup sewing machine takeup mechanism, L. Onderdonk. 591,546 591,764 591,558

sewing machine takeup mechanism, L. Onderdonk.

Shaft coupling, vehicle, W. A. Jackman.
Shaft locking device, A. G. Mather.
Shaft or blast furnace, F. Burgers.
Shaft, vehicle, W. H. H. Hallock..
Sheet metal, apparatus for removing scale from,
Davies & Thomas.
Ship's light and air port. T. Utley
Shoe stretcher. C. L. Passmore.
Shutter fastener, J. Bannan...
Skylight frame. C. W. Stran...
Slide gage, E. Weber.
Snap hook, C. A. Skeie.
Bnow guard, H. M. Esselen...

((Cantinued on 1946 271)

(Continued on page 271)

# STEAM ENGINEERING

Railroad, Municipal, 31 COURSES & Bridge eering; Surveying and Mapping; Meta n Cutting; Bookkeeping; Shorthand; h Branches; Mining; Metal Prospect'g

GUARANTEED SUCCESS. Fees Moderate, Advance or Installments.

Circular Free; State subject you wish to study.

International Correspondence Schools, Box 942, Scranton, Pa.

\$15 course in mech. drawing at Rockton Corresp. School of Mech. Engineering, Little Falls, N. Y., will make you a proficient draughtsman



the country.

This beats Wind, Steam or Horse Power. We offer the WEBSTER 2% actual horse power

TAUGH

GAS ENGINE
for \$150, less 10% discount for cash.
Built on interchangeable plan. Built
of best material. Made in lots of 100 therefore we can make the price. Boxed for shipment, weight 800 pounds.
Made for Gas or Gasoline.

\*\*To Write for Special Catalogue.\*\*

WEBSTER M'F'G CO., 1074 West 15th Street, CHICAGO.

HOISTING ENGINES

operating on GASOLINE, DISTILLATEOR RUDE OIL. Both Friction and Geared Hoist, from 10 to 50 H. P., for Mines. Quar-H. P., for Mines. Quanries, Docks. etc. Great
Saving over steam, especially
where wood, coal or water
are scarce. Send for catalog.
Guaranteed fully. State size
wanted. Address Weber
Gas and Gasoline Engine Co., 42 S. W. Boulevard, Kansas City, Mo.

SCIENTIFIC AMERICAN SUPPLE-MENT. Any desired back number of the Scientific American Supplement can be bad at this office for 10 cents. Also to be had of newsdealers in all parts of



WOLVERINE " GAS & GASOLINE ENGINES STATIONARY AND MARINE.

The "Wolverine" is the only revers-ible marine gas engine on the market. It is the lightest engine for its power. Requires no licensed engineer. Ab-solutely safe. Manufactured by WOLVERINE MOTOR WORKS,

12 Huron St., Grand Rapids, Mich

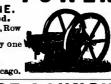
## VAPOR LAUNCH Complete for \$150.

ROW, SAIL and STEAM BOATS TOT \$15U RACINE YACHT AND BOAT WORKS, Racine Junction, Wis., Box A.

50 Per Cent Increase at no additional expense. VICTOR VAPOR ENGINE.
Local Agents Wanted.

Steam and Vapor Launches, Row and Sail Boats. Send for catalogue. Specify one wanted.

THOS. KANE & CO. 64-66 Wabash Ave.,



### ALCO VAPOR LAUNCH



Motor controlled from bow, Valve movement, 12 to 1. 16 to 60 ft. Launches. Twin Screws a specialty. 1, 2, 3, 5, 7, 12 14 and 20 h.p. No licensed engineer or pilot required. Speed and safety guaranteed. No dangerous Naphths or Gasoline used. No disagreeable vibration.

Send 10 cents in stamps for 1897 Catalogue.

Marine Vapor Engine Co., ft. Jersey Av., Jersey City, N. J THE MACHINERY OF A NAPHTHA

Launch—A detailed description of the motive power of a Modern Naphtha Launch, with sectional views showing all the parts of the boiler and engine. A most valuable paper. 4 illustrations. Contained in SUPPLE-MENT 1104. Price 10 cents. For sale by Munn & Co. and all newsdealers.

OLDS SEE ENGINE Has no moving parts in mixing device. No gears or levers. The two poppers. The two poppers valves are operated in straight line by plain ecceptric 1 ro m man that. Mechanically correct. Indorsed by economists,

Does not balk in either warm or cold weather. 1 to 50 horse power. P. F. Olds & Son Engine Works, Box418, Lansing, Mich.

HAWKINS' NEW CATECHISM OF ELECTRICITY WKINS' NEW CATECHISM OF ELECTRICITY

A PRACTICAL TREATISE

for Engineers, Electricians,
Wiremen and Amateurs. 550
pages 3011 lustrations, bound
in leather, pocketbook form,
gold titles and edges. Strictiy "Up-to-Date." Postpaid,
\$200. THEO. AUDREL & CO..
63 Fifth Avenue, New York,

Manufactory Established 1761.

LEAD PENCILS, COLORED PENCILS, SLATE
PENCILS, WRITING SLATES, STEEL PENS, GOLD
PENS, INKS, PENCIL CASES IN SILVER AND IN
GOLD, STATIONERS' RUBBER GOODS, RULERS,
COLORS AND ARTISTS' MATERIALS.

78 Reade Street, - - - New York, N. Y. Manufactory Established 1761.







THE J.B. WILLIAMS CO.,
GLASTONBURY, CONN.
SIDNEY (6) CLARENCE
SIDNEY (6) CLARENCE
SIDNEY (6) CLARENCE

Anyone sending a sketch and description may quickly ascertain our opinion free whether an invention is probably patentable. Communications strictly confidential. Handbook on Patents sent free. Oldest agency for securing patents. Patents taken through Munn & Co. receive special notice, without charge, in the

# Scientific American.

MUNN & CO.361 Broadway, New York Branch Office, 625 F St., Washington, D. C



The Queen Acme No. 5 Microscope NEW MODEL AS PER CUT.

The Ideal Microscope for Amateur Research. Stands unequaled for precise and accurate adjustments and optical excellence. With objectives giving from 50 to 500 diameters, in case, \$3.5.00.

Send for new Microscope Catalogue B. M.

QUEEN & CO., INC. 1011 Chestnut St., Philadelphia, Pa.



# Hrithmetic of Electricity

By Prof. T. O'CONOR SLOANE. 138 Pages, Illustrated, Price \$1.00



PRACTICAL Treatise on Electrical Calculations of PRACTICAL Treatise on Electrical Calculations of all kinds reduced to a series of rules, all of the simplest forms, and involving only ordinary arithmetic; each rule illustrated by one or more practical problems, with detailed solution of each one. Followed by an extensive series of Tables, including the following subjects: All Kinds of Units of Measurement of Electrical and Mechanical Work, Energy and Heat; Relations of Different Systems of All Kinds of Units; Relations of Different Systems of All Kinds of Units; Relations of Different Systems of All Kinds of Units; Relations of Different Electrical Properties of Wire of Different Sizes; Specific Resistances; Thermo-chemical and Electro-chemical Equivalents; Useful Factors, etc., etc.

This book may be classed among the most useful works published on the science of electricity, covering, as it does, the mathematics of electricity in a manner that will attract the attention of those who are not familiar with algebraical formulæ.

We can also furnish Prof. Sloane's works on electricity as follows:

Arithmetic of Electricity, 138 pages ..... \$1.00 Electricity Simplified, 158 pages...... 1.00

The above five volumes, comprising a COMPLETE ELECTRICAL LIBRARY, sold at the special reduced price of \$5.00 put up in a neat folding box. You save \$2.00 by ordering the set complete.

Five volumes 1,300 pages, over 450 illustrations.

Send for special circular containing full table of contents of the above books. MUNN & CO., 361 Broadway, New York.

KRAFTUBERTRAGUNGSWERKE RHEINFELDEN. Society for the Utilization of the Water 16,800 H. P. NOW AVAII.ABLE, TO BE INCREASED TO 30,000 H. P. The Company is in a position to let electric energy at exceptionally cheap rates and on the most favorable terms. They also offer to applicants wishing to establish themselves near the works, suitable land on either the German (Badish) or the Swiss side of the Rhine, in the vicinity of important railway lines. Cheap labor.

\*\*For further information please address The Manager, Kraftubertragungswerke, Rheinfeiden, Switzerland.