Adrertisements.

Inside Page, each insertion --- 75 cents a line.

Back Page, each insertion --- \$1.00 a line.

(About eight words to a line.)

Engravings may head advertisements at the same rate per line, by measurement, as the letter press. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.



Mill Stones and Corn Mills.

We make Burr Millstones, Portable Mills, Smut Machines, Fackers, Mill Piecs, Water Wheels, Pulleys, and Gearing, specially adapted to Flour Mills. Send for catalogue. J. T. NOYE & SON, Buffule, N. Y.

JAPANESE ART MANUFACTURES. By Christopher Dresser, Ph.D., etc. Paper read before Society of Arts. The Japanese Potter at Work. Curious mode of Making Searfs. How the Japanese Print on Cloth. Japanese Process for Silk Ornamentation. Japanese Weaving: How Fine Japanese Fams are made, Japanese Method of Making Moulds for Ornamental Castings for Vessels, Bronzes, etc. Japanese Lacquer Manufacture. Curious Method of Desporting Lacquer Work. The Love and Pursuit of the Beautiful in Japan. A very entertaining, instructive, and comprehensive paper. Contained in Scientific American Supplication of all newsdealers.

BUY THE BIGELOW ENGINE, 3 TO engines and boats. Send for circulars. E. H. GOODWIN & CO., 38 Oliver St., Boston.

Bound Volumes

Scientific American.

At present, I have on hand the following bound Volumes of the Polentypic American, which I will sell at \$1.00 each, either singly or by the quantity.

	 · · · · <u>· · · · · · · · · · · · · </u>	
OLD SERIES.	NEW SERIES.	NEW SERLES.
Vol. 73 Copies. " 115 " " 134 " " 141 " Vols. of the Old Series contain one year's numbers, and the New Series six months.	" 33 " " 46 "	s. Vol. 15. 7 Copies. " 16. 8 " " 23. 8 " " 3216 "
	· ·· ·· ·····	

The books will be sent by express on receipt of price. Address all communications to

JOHN EDWARDS, P. O. Box 773, New York.

THE FLOW OF METALS. BY DAVID TOWNSEND. Valuable experiments, with ten engravings, on Punching through thick plates. Evidences of a Flow of Metal. Effect of Flow on Dimensions, Deasity, etc., of Plate. Lines of Least Resistance, etc. Punching with and cross the grain. Practical Applic tions. Contained in Scientific American Supplement No. 119. Price 10 cents. Tobe had at this office and of all newsdealers.



MACHINISTS' TOOLS.

NEW AND IMPROVED PATTERNS. Send for new illustrated catalogue.

Lathes, Planers, Drills, &c.
NEW HAVEN MANUFACTURING CO.,
New Haven, Conn.

ESTABLISHED 1844.

JOSEPH C. TODD

(Formerly of Todd & Rafferty), Engineer and Machinst. Flax, Hemp, Jute, Rope, Oakum, and Bagging Machinery, team Engines, Boilers, etc. I also manufacture Maxier's New Por able Engine of 1877, of one horse power, complete for \$125; can be seen in operation at my store. I will furnish specifications and estimates for all kinds of machinery. Send for descriptive circular and price. Address

J. C. TODD,

10 Barclay St., New York, or Paterson, N. J.

SECOND HAND BOOKS—Scientific and General Catalogue free. E. WALKER, P. O. Box 4875, N.Y.

EMERY AND CORUNDUM WHEELS, for Grinding and Surfacting Metals and other materials. By ARTHURH BATEMAN, F.C.S. A paper read before the Society of Arts, London. Files, Chi. els, Grindstones, Composition of Emery, where found, Quality, Specific Gravity, and Hardness, Manufacture of the wheels, Emery Fowder, Butling, Polishing, Cutting Power, Corundum. The Magnesism or Union Wheel, the Taniet, the Northampton, the Vulcanite, the Climax, the Vitrilied, a porous wheel with central water supply. Fifty uses enumerated to which the wheels are put. for Metals, Stone, Teeth, Millboard, Wood, A gate, and Brick. How to mount a wheel. How to hold the work, and directions for various classes of work. Discussion and questions proposed and answered. Cont ined in Scientific American Supplement, No. 125. Price 10 cents. To be had at this office and of all newsdealers.

Do Your Own Printing! WELSTON



SECOND-HAND ENGINES.

HARRIS'IRON WORKS, TITUSVILLE, PA.

FOR ALL KINDS OF MACHINERY-Apply to S. C. HILLS, 78 Chambers St., New York.



HAV

LIQUID PAINTS.

The finest and most durable paints in the world for structural purposes. Send for Samples and References.

ASBESTOS ROOFING,

with white fire-proof coating, for steep or flat roofs, the only reliable substitute for tin.

Boiler Coverings, Steam Packing, Sheathing Felts, Roof Paints, Fire-Proof Paints, Coatings,

Cements, etc.

All these materials are prepared ready for use, and can be easily applied by any one. We guarantee the quality of our goods to be second to none in the world. From 15 to 25 per cent. of customary outlays can be saved by their use. Samples, Illustrated Pamphlets, Price-Lists, etc., sent free. Liberal inducements to dealers and large consumers. Send for Samples and Reduced Price-Lists.

H. W. JOHNS M'F'G CO., 87 Maiden Lane, New York.

PUNCHING DROP HAMMERS AND DIES, FOR Cut Brass Gears, list free. Grant, 94 Beverly St., Boston.

PRESSES.

The STILES & PANKER PRESS CO.,
Middletuwn, Conn.

SIIEPARD'S CELEBRATED

Middletuwn, Conn.

CAMERON Steam Pumps

For Mines, Blast Furnaces, Rolling Mills, Oil Refineries, Boiler Feeders, &c. For Illustrated Catalogue and Reduced Price List send to Works, Foot East 23d St., New York.

An assortment of **WOOD-WORKING MACHINERY**

made by Richards, London & Kelley (dissolved); also, a number of first-class MACHINE TOOLS (nearly as good as new) of Philadelphia construction, on hand and for sale. For list or inspection of machines and estimates, apply at the works of JOHN RICHARDS & CO., 22d and Wood Sts., Philadelphia, manufacturers of Standard Gauges and other Implements.

DAMPER REGULATORS **BEST** AND WEIGHTED GAUGE COCKS.
MURRILL & KEIZER, 4 HOLLIDAY ST., BALTIMORE.

MANUFACTURE OF BESSEMER STEEL MANUFACTURE OF BESSEMER STEEL and Steel Rails as pursued at the works of Messrs. Brown, Bayley & Dixon, Sheffield. By C. B. HOLLAND. A valuable and Instructive paper. Read before the from an Steel Institute. With five illustrations: the Plant; the Cupolas, Converters, the Ingot Pit, Blowing Engines, Hydraulic Machinery, etc. Hot Blast; Mode of Working, Improved Manufacture of Steel Rails. Contained in Scientific American Supplement, No. 124. Price 10 cents. To be had at this office and of all newsdealers.



\$50 Screw Cutting Foot Lathe.
Foot and Power Lathes, Drill Presses,
Screll, Circular and Band Saws, Saw
Attachments, Chucks, Mandrills, Twist
Drills, Dogs, Calipers, etc. Send for
catalogue of outfits for amateurs or
artisans.

H. L. SHEPARD & CO., SS, 90 & 92 Elm St., Cincinnati, Ohio.

PORTLAND CEMENT,

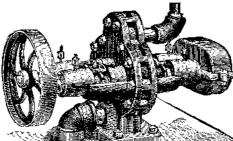
OMAN & KEENE'S. For Walks, Cisterns. Founda-ons, Stables, Cellars, Eridges, Reser voirs, Breweries, etc. Remit 10 cents for Practical Trea tise on Cements. S. L. Merchant & Co., 53 Broadway, New York.

TO ADVERTISERS | We will send free to all applicants who AYER & SON'S MANUAL

FOR ADVERTISERS, 160 8co, pp. More complete than any which have preceded it. Gives the names, circulation, and afterfieling rates of several thousand newspapers in the United States and Canada, and contains more infor ation of value to an advertiser than can be found in any other publication. All lists have been carefully revised, and where practicable prices have been reduced. The special offers are numerous and unusually advantageous Be sure to send for it before spending any money in newspaper advertising. Address N. W. AYER & SON, ADVERTISING AGENTS, Times Building, Philadelphia.

NEW ROAD LOCOMOTIVES, BY Marshall, Sons & Co. General description and one engraving. Supplement No. 56. 10 cents.

ROOTS' ROTARY HYDRAULIC ENGINE.



FOR **BLOWING ORGANS** AND RUNNING

LIGHT MACHINERY

OPERATED BY

HYDRANT PRESSURE.

GIVES GREATEST USEFUL EFFECT OF WATER.

IS A POSITIVE PRESSURE ENGINE.

P. H. & F. M. ROOTS, Manuf'rs, CONNERSVILLE, IND. S. S. TOWNSEND, Gen'l Ag't, 6 Cortlandt St., NEW YORK.

The 1876 Injector." ASTHMA & CATARRH.

Simple, Durable, and Reliable. Requires no special valves. Send for illustrated circular.

WM. SELLERS & CO., Phila.

Shafts, Pulleys, Hangers, Etc.

w. SELLERS & CO., 79 Liberty Street, New York.

Working Models

And Experimental Machinery, Metal of Wood, made to order by J. F. WERNER, 62 Centre St., N. Y.

ICE AT \$1.00 PER TON.

The PICTET ARTIFICIAL ICE CO.,

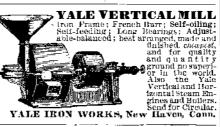


Address JOHN A. ROEBLING'S SONS, Manufactur crs, Trenton, N. J., or li7 Liberty Street, New York. Whod's and Rope for conveying power long distances Send for circular.

NOMENCLATURE OF BUILDING Stones and Stone Masonry. By J. James R. Croes, Wildiam E. Merrell, and Edgar B. Van Winkle. A paperread before the American Society of Civil Engineers. An exhaustive article on Stone Cutting and Masonry, various Methods of Dressing, and Tools embloyed, with 34 illustrations. 19 Tools, illustrated, with Dimensions and How to Make. Squared, Quarry-faced, Pitched-face, and Drafted Stones, Rubble, Cut. Pointed, and Crandalled Stones, etc. Axed or Pean Hammered and Rubbed Stones, Diamond Panels, Rubble, Squared Stone. Bush Hammered and Rubbed Stones, Diamond Panels, Rubble, Squared Stone. Range, Random, and Ashlar Musconry, 34 illustrations in all, with practical instructions. Cantained in Sofentific American Supplies office and of all newsdealers.

Relief is granulated or purchase trice refunded. Samples sent frost of any who may desire. The mediatic is put up in two sized mackaged, and retails for Sac, and still for the sized mackaged, and retails for Sac, and special for the sized mackaged for the sized for mediate period will have the mediate per unjuly forwarded by tefurn mail. Address A. KTHRUDGE, Manufacturer and Proprietor, Ruise, N. Y.

THE PHONOGRAPH AND ITS FUTURE THE PHONOGRAPH AND ITS FUTURE BY THOMAS A. EDISON. The instrument and its Action. Durability, Duplication, and Postal Transmission of Phonograph l'ates. The probable great utility of the Phonograph in Letter-writing, Busine's Correspondence and Dictation; Literature; Education; Law, Music; Oratory, etc. Application to Musical Roxes, Toys, and Clocks. Telegraphy of the Future; the Phonograph and Telephone combined. Being a most interesting and valuable paper by the author and inventor of the Phonograph himself. Cont ined in SCIENTIFIC AMERICAN SUPPLEMENT, No. 124. Price 10 cents. To be had at this office and of all newsdealers.



PERFECT

NEWSPAPER FILE

The Kech Putent file, for preserving newspapers, imagazines, and pamphlets, has been recently improved and price reduced. Subscribers to the SCIENTIFIC AMERICAN SUPPLEMENT can be supplied for the low price of \$1.50 by mail, or \$1.25 at the office of this paper. Heavy board sides; inscription "SCIENTIFIC AMERICAN," in gift. Necessary for every one who wishes to preserve the paper. Address

MUNN & CO.,

THE TANITE CO. STROUDSBURG, PA. EMERY WHEELS AND CRINDERS. G.EO. PLACE, 121 Chambers St., New York Agent.

ROCK DRILLING MACHINES AIR COMPRESSORS, MANUFACTURED BY BURLEICH ROCK DRILL CO. SEND FOR PAMPHLET FITCHBURG MASS

HARTFORD

STEAM BOILER

Inspection & Insurance COMPANY.

W. B. FRANKLIN V. Pres't. J. M. ALLEN, Pres't. J. B. PIERCE, Sec'y.

MACHINISTS' TOOLS

Best quality at low prices. Radial Drills, Engine Lathes, Iron Planers, Car Wheel Borers, Hydrostatic Presses, Axle Lathes.

NILES TOOL WORKS, Hamilton, Ohio.

H. R. WORTHINGTON,

239 BROADWAY, NEW YORK.

Hydraulic Works, Van Brunt Street, Brooklyn,
Manufactures Pumping Fingines for Water Works. In
daily use at 100 stations. Also Steam Pumps, Water
Motors and Water Meters. See Scientific American
Supplement, January 27th, 1877. Prices largely reduced
July 1st, 1877.

PERA GLASSES At Reduced Prices.

Telescopes, Thermometers. Send for Illustrated R. & J. BECK.

921 Chestnut St., Philadelphia.

A L C O H O L I S M. AN INTERESTING Paper upon the Relations of Intemperance and Life Insurance. The average Risks and Expectancy of Life of the Temperate and of the Intemperate. Physiological action of Alcohol; stimulating the Nervous System, Retarding the Circulation. Alcohol Oxidized in the System Insomnia, Congestion of the Lungs, Deterioration of Structure, Caiculus, and Liver Diseases as results of Liquor. Extended Medical Testimony. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 125. Price 10 cents. To be had at this office and of all newsdealers.



CAVEATS, COPYRIGHTS, TRADE MARKS, ETC.

Messrs. Munn & Co., in connection with the publication of the Scientific American, continue to examine Improvements, and to act as Solicitors of Patents for Inventors.

In this line of business they have had OVER THIRTY YEARS' EXPERIENCE, and now have unequaled facilities for the preparation of Patent Drawings, Specifications, and the Prosecution of Applications for Patents in the United States, Canada, and Foreign Countries. Messrs. Munn & Co. also attend to the preparation of Caveats, Trade Mark Reg lations, Copyrights for Books, Labels, Reissues, Assignments, and Reports on Infringements of Patents. All business intrusted to them is done with special care and promptness, on very moderate terms.

We send free of charge, on application, a pamphlet containing further information about Patents and how to procure them; directions concerning Trade Marks, Copyrights, Designs, Patents, Appeals, Reissues, Infringements, Assignments, Rejected Cases, Hints on the Sale of Patents, etc.

Foreign Patents .-- We also send, free of charge, a Synopsis of Foreign Patent Laws, showing the cost and method of securing patents in all the principal countries of the world. American inventors should bear in mind that, as a general file, any invention that is valuable to the patentee in this country is worth equally as much in England and some other foreign countries. Five patents—embracing Canadian, English, German, French, and Belgian—will secure to an inventor the exclusive monopoly to his discovery among about one HUNDRED AND FIFTY MILLIONS of the most intelligent people in the world. The facilities of business and steam communication are such that patents can be obtained abroad by our citizens almost as easily as at home. The expense to apply for an English patent is \$75; German, \$100; French, \$100; Belgian, \$100; Canadian. \$50.

Copies of Patents.-Persons desiring any patent issued from 1836 to November 26, 1867, can be supplied with official copies at reasonable cost, the price depending upon the extent of drawings and length of

Any patent issued since November 27, 1867, at which time the Patent Office commenced printing the drawings and specifications, may be had by remitting to this office \$1.

A copy of the claims of any patent issued since 1836 will be furnished for \$1.

When ordering copies, please to remit for the same as above, and state name of patentee, title of invention, and date of patent.

A pamphlet, containing full directions for obtaining United States patents sent free. A handsomely bound Reference Book, gilt edges, contains 140 pages and many engravings and tables important to every patentee and mechanic, and is a useful hand book of reference for everybody. Price 25 cents, mailed free.

Address MUNN & CO.,

Publishers SCIENTIFIC AMERICAN, 37 Park Row, N. Y. BRANCH OFFICE—Corner of F and 7th Streets, Washington, D. C.

UNN & CO.,
Publishers Scientific American" is printed with CHAS.
Publishers Scientific American" is printed with CHAS.
ENEU JOHNSON & CO.'S INK. Tenth and Lombard Sts., Philadelphia, and 59 Gold St., New York.