

Advertisements.

Inside Page, each insertion --- 75 cents a line. Back Page, each insertion --- \$1.00 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.

ROCK DRILLS, COMPRESSORS, FUSE, BATTERIES, POWDER. HAND DRILL CO. 21 PARK ROW, N. Y.

Send for Catalogue of the FIRMENICH SAFETY STEAM BOILER, For burning smoke and all gases from coal and all kinds of fuel.

VALUABLE PATENT FOR SALE. Self-Measuring Fluid Tank. Best in the market. Satisfactory reasons for selling. Address Box 143, Geddes, N. Y.

!!New and Improved!! Engraving Process!!! Perfect Substitute for Wood-Cuts. Photo-Plate Company 63 Duane St. New York.

MILLING BOOKS Descriptive CATALOGUE FREE. KAY & BRO., Springfield, Ohio.

HARDWARE MERCANTILE AGENCY. Report Issued 30th September, 1878. Containing the names of all dealers and manufacturers in U. S. of

Hardware, Carriage, Saddlery and Ship Hardware, Agricultural Implements, Guns, Pistols, IRON, STEEL AND METALS.

H.W. JOHNS' ASBESTOS LIQUID PAINTS, ROOFING, BOILER COVERINGS, Steam Packing, Sheathings, Fire Proof Coatings, Cements.

WANT 2d-HAND WATER WHEELS. Address MILL WORKS, Drawer 294, Indianapolis, Ind.

LAP WELDED CHARCOAL IRON Boiler Tubes, Steam Pipe, Light and Heavy Forgings, Engines, Boilers, Cotton Presses, Rolling Mill and Blast Furnace Works.

Mill Stones and Corn Mills. We make Burr Millstones, Portable Mills, Smut Machines, Packers, Mill Picks, Water Wheels, Pulleys, and Gear ng, specially adapted to Flour Mills. Send for catalogue.

BURR MILLS. For the best Vertical and Horizontal Mills, French Grinding Mills, Portable Flouring Mills, and Mill Machinery, address the Manufacturer and Patentee. C. C. PHILLIPS, 4048 Girard Avenue, PHILADELPHIA.

DYSPEPSIA. BY DR. C. F. KUNZE. Symptoms. Appetite Diminished. Stomach Digestion much slower than Normal. Constipation. Symptoms in Children. Chronic Cases. Dyspepsia as caused by too much Food; by Indigestible Food; by General Derangement; by Altered Conditions of Innervation.

TO ADVERTISERS! We fill orders for the insertion of advertisements in the newspapers of the United States and Dominion of Canada. To furnish advertisers with reliable information concerning newspapers and their rates, and thus enable the most inexperienced to select intelligently the mediums best adapted to any particular purpose, we issue SEMI-ANNUAL EDITIONS OF AYER & SON'S MANUAL FOR ADVERTISERS.

BOILER COVERINGS.

SAVE 10 TO 20 PER CENT.

THE CHALMERS-SPENCE CO., Foot East 9th St., New York.

Portable Steam Engines With Automatic Cut-off. No Commissions to Agents. Bottom Prices to Purchasers. SEND FOR CATALOGUE. Armington & Sims A. & S. were lately with THE J. C. HOADLEY COMP.

American Standard Gauge and Tool Works, PHILADELPHIA, U. S. A. Standard Gauges and Measuring Implements, Hardened Steel Turning, Moulding, Adjustable Blade Reamers, Patent Tool Holders, Lathe Drivers. JOHN RICHARDS & CO., 23d and Wood Streets, Philadelphia.

J. LLOYD HAIGH, Manufacturer of WIRE ROPE of every description for Railroad and Mining Use, Elevators, Derrick, Rope Tramways, Transmission of Power, etc. No. 81 John St., N. Y. Send for price list.

PORTLAND CEMENT, ROMAN & KEENE'S. For Walks, Cisterns, Foundations, Stables, Cellars, Bridges, Reservoirs, Breweries, etc. Remit 25 cents postage stamps for Practical Treatise on Cements. S. L. MERCHANT & CO., 53 Broadway, N. Y.

Every Man His Own Printer! The \$3 Press. Prints Labels, Cards, Business, Pressures, and old Catalogue of P. Essey, Type, Etc., for 2 stamps. KELSEY & Co., Meriden, Conn.

SPARE THE CROTON AND SAVE THE COST. Driven or Tube Wells furnished to large consumers of Croton and Ridgewood Water. WM. D. ANDREWS & BRO., 414 Water St., N. Y., who control the patent for Green's American Driven Well.

ROOTS' ROTARY HAND BLOWER.



FOR ALL KINDS OF BLACKSMITHING. DOES MORE AND BETTER WORK, SAVES ROOM, LABOR, AND COAL, AND LASTS TEN TIMES LONGER THAN BELLOWS.

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

FRIEDMANN'S PATENT INJECTORS and EJECTORS Are the Most Reliable and Economical BOILER FEEDERS And Water Conveyors IN EXISTENCE. MANUFACTURED EXCLUSIVELY BY NATHAN & DREYFUS, NEW YORK. Also Patent Oilers and Lubricators. Send for Catalogue.

UPRIGHT DRILLS SEND FOR CIRCULAR H. BICKFORD Cincinnati

LATEST and Best Books on Steam Engineering. Send stamp for catalogue. F. KEPFY, Bridgeport, Conn.

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

WROUGHT IRON BEAMS & GIRDERS THE UNION IRON MILLS, Pittsburgh, Pa., Manufacturers of improved wrought iron Beams and Girders (patented).

The great fall which has taken place in the prices of iron and especially in Beams used in the construction of FIRE PROOF BUILDINGS, induces us to call the special attention of Engineers, Architects, and Builders to the undoubted advantages of now erecting Fire Proof structures; and by reference to pages 52 & 54 of our Book of Sections--which will be sent on application to those contemplating the erection of fire proof buildings--THE COST CAN BE ACCURATELY CALCULATED, the cost of insurance avoided, and the serious losses and interruption to business caused by fire; these and like considerations fully justify any additional first cost. It is believed, that were owners fully aware of the small difference which now exists between the use of Wood and Iron, in many cases the latter would be adopted. We shall be pleased to furnish estimates for all the Beams complete, for any specific structure, so that the difference in cost may at once be ascertained. Address CARNEGIE, BROS. & CO., Pittsburgh, Pa.

MACHINISTS' TOOLS. NEW AND IMPROVED PATTE NS. Send for new illustrated catalogue. Lathes, Planers, Drills, &c. NEW HAVEN MANUFACTURING CO., New Haven, Conn.

WATSON'S NON-CHANGEABLE GAP LATHE HAS GREAT FACILITIES FOR LARGE OR MEDIUM SIZE WORK. JAMES WATSON MANUFACTURER, 1508 FRONT ST. PHILA.

BOSTON ELASTIC FABRIC CO., MANUFACTURERS OF INDIA RUBBER GOODS.

INDIA RUBBER BELTING (Patent Stretched), CONDUCTING, HYDRANT, ENGINE, TANK, SUCTION AND STEAM HOSE (Rubber Lined), COTTON AND LINEN HOSE (Rubber Lined), INDIA RUBBER STEAM PACKING, INDIA RUBBER VALVES for Cold, Hot Water, GASKETS, RINGS, &c., including all kinds of Rubber Goods for Mechanical and Manufacturing uses. Our goods are warranted in all cases. CHAS. McBURNEY & CO., Agents, 175 Devonshire St., Boston, 102 Chambers St., New York.

ICE AT \$1.00 PER TON. The PICTET ARTIFICIAL ICE CO., LIMITED, Room 51, Coal and Iron Exchange, P. O. Box 3083, N. Y.

SHEPARD'S CELEBRATED \$50 Screw Cutting Foot Lathe. Foot and Power Lathes, Drill Presses, Scroll, Circle 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., 88, 90 & 92 Elm St., Cincinnati, Ohio.

Pond's Tools, Engine Lathes, Planers, Drills, &c. Send for Catalogue. DAVID W. POND, Successor to LUCIUS W. POND, Worcester, Mass.

LEFFEL WATER WHEELS. With recent improvements. Prices Greatly Reduced. 7000 in successful operation. FINE NEW PAMPHLET FOR 1877. Sent free to those interested. James Leffel & Co., Springfield, O. 109 Liberty St., N. Y. City.

BOGARDUS' PATENT UNIVERSAL ECCENTRIC MILLS. For grinding Bones, Ores, Sand, Old Crucibles, Fire Clay, Gunpowder, Oil Cake, Feed, Corn, Corn and Cob, Tobacco, Smut, Sugar, Salts, Roots, Spices, Coffee, Coconut, Flaxseed, Asbestos, Mica, etc., and whatever cannot be ground by other mills. Also for Paints, Printers' Inks, Paste Blacking, etc. JOHN W. THOMSON, successor to JAMES BOGARDUS, corner of White and Elm Sts., New York.

Steel Castings, From 1/2 to 10,000 lbs. weight, true to pattern, sound and so 16, of unequalled strength, toughness and durability. An invaluable substitute for forgings or cast-iron requiring three-fold strength. Send for circular & price list. CHESTER STEEL CASTINGS CO., EVELINA ST., PHILA., PA.

Steam Engines, Boilers AND CIRCULAR SAW MILLS. Special inducements on Boilers to Engine Builders. All sizes from 10 to 50 H. P. carried in stock. Prompt shipments a specialty. Send for catalogue. Erie City Iron Works, ERIE, PA. and 45 Courtlandt St., N. Y.

Pyrometers. For showing heat of Ovens, Hot Blast Pipes, Boiler Flues, Superheated Steam, Oil Stills, etc. HENRY W. BULKLEY, Sole Manufacturer, 149 Broadway, N. Y.

PERFECT NEWSPAPER FILE The Koch Patent File, for preserving newspapers, magazines, and pamphlets, has been recently improved and price reduced. Subscribers to the SCIENTIFIC AMERICAN and 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 gilt. Necessary for every one who wishes to preserve the paper. Address MUNN & CO., Publishers SCIENTIFIC AMERICAN.

THE TANITE CO., STROUDSBURG, PA. EMERY WHEELS AND GRINDERS. GEO. PLACE, 121 Chambers St., New York Agent.

ROCK DRILLING MACHINES AND AIR COMPRESSORS. MANUFACTURED BY BURLEIGH ROCK DRILL CO. FITCHBURG MASS. SEND FOR PAMPHLET

ESTABLISHED 1844. JOSEPH C. TODD, ENGINEER and MACHINIST. Flax, Hemp, Jute, Rope, Oakum and Bagging Machinery, Steam Engines, Boilers, etc. Also manufacture Barker's New Portable Engine of 1877. Can be seen in operation at my store. A one horse-power portable engine, complete, \$125; two horse-power, \$225; two and a half horse-power, \$250; three horse-power, \$275. Manufactured exclusively by J. C. TODD, 10 Barclay St., New York, or Paterson, N. J.

BAXTER \$100 1 HORSE ENGINE OF 1877. For State Rights to manufacture above, apply to A. VAN WINKLE, Newark, N. J.

Wood-Working Machinery, Such as Woodworth Planing, Tonguing, and Grooving Machines, Daniel's Planers, Richardson's Patent Improved Tenon Machines, Mortising, Moulding, and Re-Saw Machines, and Wood-Working Machinery generally. Manufactured by WITHERBY, RUGG & RICHARDSON, 25 Salisbury Street, Worcester, Mass. (Shop formerly occupied by H. BAILL & CO.)

60 Chromo and Perfumed Cards (no 3 alike), Name in Gold and Jet, 10c. CLINTON BROS., Clintonville, Ct.

TELEPHONES For Business Purposes, ours excel all others in clearness and volume of tone. Illus. circular and testimonials for 3 cts. Address J. R. HOLCOMB, Maliet Creek, Ohio.

HAND SAW MILL, SAVES THREE MEN'S LABOR. S. C. HILL, 78 Chambers St., N. Y.

Woodward Steam Pumps and Fire Engines. G. M. WOODWARD, 76 and 78 Centre Street, New York. Send for catalogue and price list.

ELEVATORS HAND POWER AND HYDRAULIC FREIGHT & PASSENGER SHAFTING PULLEYS & HANGERS L. S. GRAVES & SON ROCHESTER N.Y.

PATENTS 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 unequalled 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 Regulations, 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 rule, 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 specifications. 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 handsome 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.

THE "Scientific American" is printed with CHAS. ENEU JOHNSON & CO.'S INK. Tenth and Lombard Sts., Philadelphia, and 50 Gold St., New York.