

Advertisements.

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

Best Tempered Cast Steel. Retail Price, 9 Cents per lb. WARRANTED. Send for Circular.

A. S. CAMERON'S PATENT "SPECIAL" Steam Pump Is the Standard of Excellence at home and abroad.

Table with 5 columns: Number, PRICE, Steam Cyl., Pump Cyl., Stroke. Rows 0-12.

Illustrated Catalogue sent free, on application to the Inventor and Sole Manufacturer in the United States, A. S. CAMERON, Works, Foot of East 23d St. NEW YORK CITY.

GUARDIOLA'S COFFEE & SUGAR MACHINERY Coffee, Malt, Corn, Cocoa, and Grain-Drying Machine. Coffee-Hulling and Polishing Machine. Helix Sugar Evaporator.

\$50.00 SCREW-CUTTING FOOT LATHES. Foot Drill Presses. Send for Circular to H. L. SHEPARD, Cincinnati, O.



[ESTABLISHED 1846.]

Munn & Co.'s Patent Offices.

The Oldest Agency for eliciting Patents in the United States.

THIRTY YEARS' EXPERIENCE.

MORE PATENTS have been secured through this agency, at home and abroad, than through any other in the world.

They employ as their assistants a corps of the most experienced men as examiners, specification writers, and draughtsmen, that can be found, many of whom have been selected from the ranks of the Patent Office.

SIXTY THOUSAND inventors have availed themselves of Munn & Co.'s services in examining their inventions and procuring their patents.

MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN, continue to examine inventions, confer with inventors, prepare drawings, specifications, and assignments, attend to filing applications in the Patent Office, paying the Government fees, and watch each case, step by step, while pending before the examiner.

A special notice is made in the SCIENTIFIC AMERICAN of all inventions patented through this agency, with the name and residence of the patentee. Patents are often sold, in part or whole, to persons attracted to the invention by such notice.

Patents obtained in Canada, England, France, Belgium, Germany, Russia, Prussia, Spain, Portugal, the British Colonies, and all other countries where patents are granted, at prices greatly reduced from former rates.

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 handsomely bound Reference Book, gilt edges, contains 140 pages and many engravings and tables important to every patentee and mechanic, and is a useful handbook of reference for everybody. Price 25 cents, mailed free.

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

EMERSON'S PATENT

Nearly 1,000 in operation, and 1,000,000 extra bits sold per year. I use ten Bits in my saw at one time (filling the other spaces with blanks), and have cut 15,000 feet of one-inch oak lumber with ten bits.

Excelsior Printing. Save money! Do your own printing. Excelsior Presses. \$3 for cards, labels, envelopes, etc.

MACHINISTS' TOOLS. NEW AND IMPROVED PATTERNS. Lathes, Planers, Drills, &c. NEW HAVEN MANUFACTURING CO., New Haven, Conn.

HARTFORD STEAM BOILER Inspection & Insurance COMPANY. W. B. FRANKLIN, V. PRES. J. M. ALLEN, PRES. J. B. PIERCE, Sec'y.

ROCK DRILLING MACHINES AND AIR COMPRESSORS. MANUFACTURED BY BURLINGHAM ROCK DRILL CO., FITCHBURG, MASS.

Niagara Steam Pump Works. ESTABLISHED 1826. CHARLES B. HARDICK, No. 23 Adams Street, BROOKLYN, N. Y.

NON-COMBUSTIBLE STEAM BOILER AND PIPE COVERING. WITH "AIR SPACE" IMPROVEMENT. S. CHALMERS SPENCE CO., Foot E. 9th St. N. Y.; 132 N. 2d St., St. Louis, Mo.

PATENT COLD ROLLED SHAFTING. The fact that this shafting has 75 per cent. greater strength, a finer finish, and is truer to gauge, than any other in use, renders it undoubtedly the most economical.

KNOWLES' STEAM PUMP WORKS, 92 & 94 Liberty St., New York. Great reduction in prices. Send for catalogue. The "Knowles" has always been the best steam pump made.

PUNCHING PRESSES. Drop Hammers and Dies, for working Metals, &c. THE STILES & PARKER PRESS CO., Middletown, Conn.

MACHINERY OF IMPROVED STYLES FOR MAKING SHINGLES, LIDDING and STAVES; also GIUGE LATHES for TURNING HANDLES. Sole makers of Law's Pat. Shingle and Heading Sawing Machine. Address TREVOR & CO., Lockport, N. Y.

PERFECT NEWSPAPER FILE. The Koch Patent File, for preserving newspapers, magazines, and pamphlets, has been recently improved and price reduced.

MUNN & CO., Publishers SCIENTIFIC AMERICAN. STUDIES OF MATTER AND LIFE.—By Prof. Henry J. Slack, F.R.S. A most interesting and valuable paper, explaining the latest scientific theories, researches and calculations, concerning the various Modes of Motion, the Ether of Space, the Transmission of Wave Forces, the Limits of Vision, the Size of Atoms, Motion and Force of Atoms, Grouping of Atoms, Phenomena of Reproduction, Mental Phenomena.

Boul's Patent Reverse Motion Paneling, Variety Moulding, and Dovetailing Machine. Improved Solid Steel Cutters for all kinds of Variety Moulders made to order, and warranted by the B. C. MACHINERY CO., BATTLE CREEK, MICH.



READ! READ!! READ!!!

NOYE'S MILL FURNISHING WORKS are the largest in the United States. They make Burr Millstones, Portable Mills, Smut Machines, Packers, Mill Picks, Water Wheels, Pulleys and Gearing, specially adapted to flour mills.

IMPORTANT FOR ALL CORPORATIONS AND MANUFACTURERS.—Buerk's Watchman's Time Detector, capable of accurately controlling the motion of a watchman or patrolman at the different stations of his beat. Send for circular.

WANTED.—SITUATION BY AN EXPERIENCED machinist. Can forge. 7 years' reference. Distance no object. Address LOCUM TENENS, Plainville, Ct.

MANUFACTURE OF ARTIFICIAL BUTTER.—By Prof. Henry A. Mott, Jr., E.M. With six engravings.—Being a History of the Artificial Butter Manufacture, Descriptions of the Principal Processes now in use, Details of Latest Improvements, Plan of an Artificial Butter Factory, Engravings of the Machinery required, Chemical Analyses of Butter and of Artificial Butter, Details of the Costs of setting up an Artificial Butter Factory, the Capital required, the materials and quantities consumed, Cost of manufacture per pound, the Daily Profit, etc.

ESTABLISHED 1844. JOSEPH C. TODD, (Formerly of Todd & Rafferty), ENGINEER and MACHINIST. Plans, Erects, Repairs, and Bagging Machinery, Steam Engines, Boilers, etc.

P. BLAISDELL & CO., Worcester, Mass., Manufacturers of the Blaisdell Patent Upright Drills and other first-class Machinists' Tools.

Blake's Patent Stone & Ore Crusher. NEW PATTERNS, with important improvements, and abundant strength. This is the only machine used by the principal MUNICIPAL, RAILROAD and MINING CORPORATIONS and CONTRACTORS in the United States and foreign countries, for breaking hard and brittle substances to ANY SIZE.

BRADFORD MILL CO. Successors to Jas. Bradford & Co. MANUFACTURERS OF French Burr Millstones, Portable Corn & Flour Mills, Smut Machines, etc.

PATENTEES or makers of useful and saleable articles should send me samples. I advertise direct to 25,000 Agents and Dealers. Articles retailing for 25 cents or less preferred. DAVID C. COOK, 46 Madison St., Chicago, Ills.

The HOADLEY PORTABLE STEAM ENGINE WITH AUTOMATIC CUT-OFF REGULATOR AND BALANCED VALVE. THE BEST & MOST ECONOMICAL ENGINE MADE SEND FOR CIRCULAR. The J.C. HOADLEY CO., LAWRENCE, MASS. STATE WHERE YOU SAW THIS.

CIVIL ENGINEER and EXPERT. HENRY A. ST JOHN, 31 & 33 Broad St., Room 3, New York City. Examinations, Surveys and Appraisals made. Specifications, Maps and Estimates furnished on all Railway or Public Works and Private Properties.

BOLT CUTTERS. Dies open and close and Bolt thrown out automatically. One pattern, holds finished bolts on centres and threads them with greater accuracy and uniformity and ten times as fast as a chaser in a Lathe. Highest award of American Institute, 1869 & 1874. Wood & Light Machine Co., Worcester, Mass. make all kinds of Iron Working Machinery. Also, Shafting, Pulleys, &c.

Incombustible Mineral Wool. The best and cheapest insulator of heat or cold. Send for circulars, 26 1/2 Broadway, New York. ALEXANDER D. ELLERS, P. O. Box 446L, Agent for the Patentee.

Machines AND Wheels Guaranteed. LEHIGH VALLEY EMERY WHEEL CO. Send for Illustrated Circular. Weissport, PA.

JOS. G. ROGERS & CO., Madison, Ind., wish to place a consignment of their Tannate of Soda BOILER SCALE PREVENTIVE in all important towns in the United States, to be sold on commission. Applications solicited. Send for book on Boiler Incrustation.

STILWELL'S PATENT Lime Extracting Heater and Filter. Indispensable to economy in use of steam. PRICES GREATLY REDUCED. Catalogue on application to the manufacturers, STILWELL & BIERCE MFG CO., Dayton, Ohio.

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

BOLT CUTTERS Schlenker's New Machine Revolving-Die. Send for Catalogue, giving prices and full description. HOWARD IRON WORKS, BUFFALO, N. Y.

\$5 to \$20 per day at home. Samples worth \$5 free. STINSON & CO., Portland, Me.

EAGLE FOOT LATHES, With Scroll and Circular Saw Attachments, Side Rest, Tools, &c.; also Small Engine Lathes, Metal Hand Planers, &c. Neatest designs, superior finish. LOW PRICES. Our new Catalogue describes these and every tool necessary for the Amateur or Artisan. Send for it. WM. L. CHASE & CO., 95 & 97 Liberty St. New York.

Pyrometers, For showing heat of Ovens, Hot Blast Pipes, Boiler Flues, Super-Heated Steam, Oil Still, &c. HENRY W. BULKLEY, Sole Manufacturer, 149 Broadway, New York.

S. GUTERMAN, EXPORT AND COMMISSION MERCHANT, No. 4a Lawrence lane, Cheapside, London. New York office, Gutermaen Brothers, 454 Broadway. Best of attention to introduce Merchandise, Patents, etc., in any part of Europe.

FOOT POWER TENONING MACHINES FOR SALE By S. C. HILLS, 78 Chambers St., New York.

IT PAYS to sell our Rubber Hand Printing Stamps. Terms free. G. A. HARPER & BRO., Cleveland, O.

THE BEST AND MOST ECONOMICAL

Boiler Feeder

FRIEDMANN'S INJECTOR, MANUFACTURED BY NATHAN & DREYFUS, New York. 108 Liberty St. Send for Circular.

Prospectus

SCIENTIFIC AMERICAN For 1877, THE MOST POPULAR SCIENTIFIC PAPER IN THE WORLD. THIRTY-SECOND YEAR. VOLUME XXXVI.—NEW SERIES.

The publishers of the SCIENTIFIC AMERICAN beg to announce that on the sixth day of January, 1877, a new volume was commenced. It will continue to be the aim of the publishers to render the contents of the new volume more attractive and useful than any of its predecessors.

To the Mechanic and Manufacturer. No person engaged in any of the mechanical pursuits should think of doing without the SCIENTIFIC AMERICAN. Every number contains from six to ten engravings of new machines and inventions which cannot be found in any other publication.

TERMS OF SUBSCRIPTION. One copy of the SCIENTIFIC AMERICAN will be sent for one year, 52 numbers, POSTAGE PREPAID, to any subscriber in the United States or Canada, on receipt of three dollars and twenty cents by the publishers.

The Scientific American Supplement. A weekly paper, uniform in size with the SCIENTIFIC AMERICAN, but a distinct publication. It contains working drawings of engineering works, and elaborate treatises on every branch of Science and Mechanics, by eminent writers, at home and abroad.

MUNN & CO., 37 PARK ROW, NEW YORK. THE "Scientific American" is printed with CHAS. TENEU JOHNSON & CO. S INK. Tenth and Lombard Sts., Philadelphia, and 50 S INK, New York.