

Advertisements.

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

Pyrometers, For showing heat of Ovens, Hot Blast Pipes, Boiler Flues, Super-Heated Steam, Oil Stills, &c.

UPRIGHT DRILLS H. BICKFORD Cincinnati, O.

No Sawdust! No Planing! 50 p. c. of Wood Saved. The lumber, as manufactured by our recently patented Cutting Machine...

WANTED, BY THE MASSACHUSETTS Institute of Cookery, for its Laboratory, now in process of erection, Printed Circulats, etc.

YALE IRON WORKS, New Haven, Conn., Builders of the YALE VERTICAL cutting Machine...

MACHINE TOOLS, Engine Lathes, Iron Planers, BORING AND TURNING MILLS, Radial Drills, etc., etc.

PATENTS CAVEATS, COPYRIGHTS, TRADE MARKS, ETC.

Messrs. Munn & Co., in connection with the publication of the SCIENTIFIC AMERICAN, continue to examine Improvements...

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.

Copies of Patents.—Persons desiring any patent issued from 1836 to November 26, 1867, can be supplied with official copies at reasonable cost...

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...

MUNN & CO., Publishers SCIENTIFIC AMERICAN, 37 Park Row, N. Y.

BRANCH OFFICE—Corner of F and 7th Streets, Washington, D. C.

SAWS. Emerson's Patent Damascus Tempered. GREAT IMPROVEMENT AND REDUCTION IN PRICE. FROM 14,000 MILES AWAY.

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

NEW POCKET FIRE ARM. Smallest and most perfect Revolver in the world. Usual form of Stock, or handle, dispensed with.

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

Saylor's Portland Cement. For sale by all dealers in Building Material. JOHNSON & WILSON, General Agents, 93 Liberty Street, New York.

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

THE BIGELOW Steam Engine. BOTH PORTABLE AND STATIONARY. The CHEAPEST AND BEST in the market. H. B. BIGELOW & CO., New Haven, Conn.

BOGARDUS' PATENT UNIVERSAL ECCENTRIC MILLS.—For grinding Bones, Ores, Sand, Old Crucibles, Fire Clay, Guanos, Oil Cake, Feed, Corn, and Cob, Tobacco, Snuff, Sugar, Salts, Roots, Spices, Coffee, Cocomut, Fickseed, Asbestos, Mica, etc.

Before purchasing Paints or Roofing, send for Samples and REDUCED Price List of

H.W. JOHNS' PATENT ASBESTOS MATERIALS

LIQUID PAINTS.—These Paints are in every respect strictly first-class, and second to no other in the market in purity, richness, and permanency of color, beauty of finish, and durability.

H. W. JOHNS MANUFACTURING CO., 87 MAIDEN LANE, New York.

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

Mill Stones and Corn Mills. We make Burr Millstones, Portable Mills, Smut Machines, Packers, Mill Picks, Water Wheels, Pulleys, and Gearing, specially adapted to Flour Mills.

FOR SALE. Boring and Turning Mill, 9 feet swing, second-hand. Iron Planer, to plane 46 in. wide, 30 feet long, suitable for Bridge Builders, second-hand, strong and powerful.

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

Steel Castings. From 1/4 to 10,000 lbs. weight, true to pattern. An invaluable substitute for forgings, or for malleable iron castings requiring great strength.

GAS FITTERS, ENGINEERS, MACHINISTS and Apprentices, should all read Plumbers' and Gas Fitters' Guide. Illustrated and neatly bound, \$1 per copy.

HARTFORD STEAM BOILER Inspection & Insurance COMPANY. W. B. FRANKLIN, V. Pres't. J. M. ALLEN, Pres't. J. B. PIERCE, Sec'y.

ESTABLISHED 1844. JOSEPH C. TODD, (Formerly of Todd & Rafferty), ENGINEER and MACHINIST. Flax, Hemp, Jute, Rope, Oakum, and Bagging Machinery, Steam Engines, Boilers, etc.

WANTED—CANVASSERS ON A SPLENDID WORK. Best terms ever offered. P. O. Box 2798, Philadelphia.

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

\$3 PRINTING PRESS! Prints cards, envelopes, etc., equal to any press. Larger sizes for large work. Do your own printing and advertising and save money.

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

H. W. JOHNS' PATENT ASBESTOS MATERIALS.

Paints, Roofing, Steam Pipe and Boiler Coverings, Steam Packing, Sheathings, Fire, Acid, and Waterproof Coatings, Cements, etc.

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.

Wood & Light Machine Co., Worcester, Mass., make all kinds of Iron Working Machinery—Also, Shafting, Pulleys, &c.

The Old Reliable Heald & Sisco Pump. Carries off the honors at the CENTENNIAL. The award of the Judges is based on its "SIMPLICITY, compactness, and perfection of WORKMANSHIP."

COMPRESSED AIR STREET RAILWAY Car.—Description, with engravings, dimensions and particulars of the Mekarski Street Cars, now used in Paris, and propelled by compressed air.

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

THE Scientific American.

The Most Popular Scientific Paper in the World. THIRTY-SECOND YEAR. Only \$3.20 a Year including Postage. Weekly. 52 Numbers a Year.

This widely circulated and splendidly illustrated paper is published weekly. Every number contains sixteen pages of useful information, and a large number of original engravings of new inventions and discoveries.

All Classes of Readers find in THE SCIENTIFIC AMERICAN a popular resume of the best scientific information of the day; and it is the aim of the publishers to present it in an attractive form, avoiding as much as possible abstruse terms.

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; six months, \$1.80; three months, \$1.00.

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at \$3.20 each; additional copies at same proportionate rate. Postage prepaid.

One copy of THE SCIENTIFIC AMERICAN and one copy of THE SCIENTIFIC AMERICAN SUPPLEMENT will be sent for one year, postage prepaid, to any subscriber in the United States or Canada, on receipt of seven dollars by the publishers.

The safest way to remit is by Postal Order, Draft, or Express. Money carefully placed inside of envelopes, securely sealed, and correctly addressed, seldom goes astray, but is at the sender's risk.

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 59 Gold St., New York.