

Advertisements.

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

USE ADAMANT WALL PLASTER

It is Hard, Dense, and Adhesive. Does not check or crack. It is impervious to wind, water, and disease germs. It dries in a few hours. It can be applied in any kind of weather. It is in general use. Licenses granted for the making, using, and selling. Address ADAMANT MFG. CO. 309 E. Genesee St., Syracuse, N. Y.

STEREOTYPING, THE PLASTER AND Paper Processes.—Composition and preparation of the mould, the best alloys of metal, proper degree of heat, trimming and mending the plate, etc. A minute description of both processes, with numerous illustrations. A paper of great interest to every printer. By Thomas Hols, F.R.S., F.L.C. SCIENTIFIC AMERICAN SUPPLEMENT, 773 and 774. 10 cents each.

Lathe advertisement with image of a lathe and text: 'Star' Foot Lathe Swings 24 1/2 in. \$75. Seneca Falls Mfg. Co., 695 Water St., Seneca Falls, N. Y.

The Sebastian-May Co. Improved Screw Cutting Foot & Power LATHES \$60. Drill Presses, Chucks, Drills, Dies, and Machinists' and Amateurs' Outfits. Lathes on trial. Catalogues mailed on application. 165 to 167 Highland Ave., SIDNEY, OHIO.

TALCOTT'S COMBINATION PATENT BELT HOOKS, W. O. TALCOTT, Providence, R. I.

\$3 PRINTING PRESS. Do all your own printing. Save money. Catalogue for two stamps. Kelsey & Co., Meriden, Conn.

Fine Taps, Dies, Reamers, Etc.

Lighting and Green River Screw Plates, Bolt Cutters, Hand and Power Drilling Machines, Punching Presses, Tire Benders, Tire Upsetters, and other Labor Saving Tools. Send for Price List. WILEY & RUSSELL MFG. CO., Greenfield, Mass. New York Office, 126 Liberty Street.

OUR "ELECTRIC PLANT" PRICE, \$5.00. Consists of an Electric Motor, Electric Battery, and Family Medical Apparatus. Entirely New. A child can handle it with perfect safety. An Electrical Educator, and the most scientific invention of the age. Send for circulars. The Nowotny Electric Co., 32 East 5th Street, Cincinnati, Ohio.

ICE HOUSE AND REFRIGERATOR. Directions and Dimensions for construction, with one illustration of cold house for preserving fruit from season to season. The air is kept dry and pure throughout the year at a temperature of from 34° to 38°. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 116. Price 10 cents. To be had at this office and from all new dealers.

THE DAIMLER MOTOR THE DAIMLER MOTOR CO. is prepared to furnish 1, 2, and 4 Horse Power GAS or PETROLEUM MOTORS for all Industrial Purposes. Fully illustrated catalogue and price list on application. Motors in operation at Works, Steinway, Long Island City. Office, 111 East 14th Street, New York City.

INVENTIONS WORKED OUT. Drawings and Models made. Perfect safety to inventors assured. All kinds first-class lathe, planer, and bench work. Particular attention to special machinery, tools, dies, and press work. Safety Construction Co., 143 & 145 Elm St., N.Y.

NICKEL AND ELECTRO-PLATING APPARATUS & MATERIAL. HANSON & VAN WINKLE CO. NEWARK, N. J. 81 LIBERTY ST. N. Y. 23 E. CANAL ST. CHICAGO. NICKEL CASTINGS FOR ALL PURPOSES.

PATENTS! 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 forty-five 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, Copy rights for Books, Labels, Reissues, Assignments, and Reports on Infringements of Patents. All business entrusted to them is done with special care and promptness, on very reasonable terms. A pamphlet sent free of charge, on application, containing full information about Patents and how to procure them; directions concerning Labels, Copyrights, Designs, Patents, Appeals, Reissues, Infringements, Assignments, Rejected Cases. Hints on the sale of Patents, etc. 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. MUNN & CO., Solicitors of Patents, 361 Broadway, New York. BRANCH OFFICES.—No. 62 and 64 F Street, Pacific Building, near 7th Street, Washington, D. C.

AUTOMATIC IN FUEL AND WATER SUPPLY. The Shipman Automatic Steam Engine STATIONARY AND MARINE. Petroleum, Kerosene Oil, and Natural Gas Fuel. 1, 2, 4, 6, and 8 Horse Power, Single. S and 22 Horse Power, Compound For Elevating Water, Creameries, and all Manufacturing Purposes. SHIPMAN ENGINE CO., 210 Summer St., BOSTON

SPECIAL NOTICE! Two handsome photo-engraved display sheets entitled, "Recent Improvements in Air Compressors," "Recent Improvements in Rock Drills," mailed free to any one who will cut out this advertisement and mail it to us with his name and address. INGERSOLL-SERGEANT DRILL CO. No. 10 Park Place, New York, U. S. A.

ROCK DRILLS AIR COMPRESSORS & GENERAL MACHINERY FOR MINING, TUNNELING, QUARRY & RAILROAD WORK. RAND DRILL CO. 23 PARK PLACE NEW YORK

The EUREKA INCUBATOR will run for 3 weeks and not vary 2 degrees. New regulator. Catalogue 5 cents. J. L. Campbell, West Elizabeth, Pa.

"Improvement the order of the age." THE SMITH PREMIER TYPEWRITER

Important Improvements. All the Essential Features greatly perfected. The Most Durable in Alignment. Easiest Running and Most Silent. All type cleaned in 10 seconds without soiling the hands. The Smith Premier Typewriter Co., Syracuse, N. Y., U. S. A. Send for Catalogue.

PATENTED NOVELTIES OF MERIT sold for the manufacturer or inventor. H. B. HARFORD & SON, 124 Van Buren St., Chicago, Ill.

ATMOSPHERIC DUST.—BY WILLIAM MARCET, F.R.S. An address delivered to the Royal Meteorological Society. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 755. Price 10 cents. To be had at this office and from all new dealers.

MOSS ENGRAVING COMPANY 355 PEARL ST. N. Y. OUR PROCESSES: PHOTO ENGRAVING, ZINC ETCHING. WE DO FINE PRESS WORK. Engravings direct from photographs and other copy. Our circular "N" shows specimens. Fine printing a specialty.

Scientific Book Catalogue RECENTLY PUBLISHED. Our new catalogue containing over 100 pages, including works on more than fifty different subjects. Will be mailed free to any address on application. MUNN & CO., Publishers Scientific American, 361 Broadway, New York.

The most Successful Lubricator for Loose Pulleys in use. VAN DUZEN'S PATENT LOOSE PULLEY OILER. Highly recommended by those who have used them for the past four years. Prices very reasonable. Every user of machinery should have our "Catalogue No. 56," sent free. Mention this paper. VAN DUZEN & TIFT, Cincinnati, Ohio.

CHUCK AND MICROMETER STOP for Amateurs.—By C. D. Parkhurst. Description of a simple and easily constructed chuck for use with a dividing machine, and the micrometer stop that is used to regulate the depth of the cut in the graduation of circles, etc. With 9 figures. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 772. Price 10 cents. To be had at this office and from all new dealers.

BARNES' New Friction Disk Drill. FOR LIGHT WORK. Has these Great Advantages: The speed can be instantly changed from 0 to 1600 without stopping or shifting belts. Power applied can be graduated to drive, with equal safety, the smallest or largest drills within its range—a wonderful economy in time and great saving in drill breakage. Send for catalogue. W. F. & JNO. BARNES CO., 1999 Ruby St., Rockford, Ill.

GUSHMAN CHUCKS Complete line for all uses shown in new illustrated catalogue, free to all. Gushman Chuck Co., Hartford, Conn.

Barrel, Keg, Hogshead AND STAVE MACHINERY. Over 50 varieties manufactured by E. & B. HOLMES, BUFFALO, N. Y. Also a full line of Wood Working Machinery. Chamfering, Howelling, and Crozing.

GYMNASTICS FOR GIRLS.—AN interesting account of the course of instruction given at the Berkeley Athletic Club for Ladies. With 18 illustrations. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 753. Price 10 cents. To be had at this office and from all new dealers.

PORTER AUTOMATIC ENGINE. (CENTER CRANK) ECONOMY PERFECT REGULATION OF SPEED. ABSENCE OF ALL PARTS REQUIRING FREQUENT ATTENTION. BUILDERS OF AUTOMATIC AND PLAIN SLIDE VALVE ENGINES. ALSO CONSTRUCTORS OF FINE STAND PIPES, BOILERS AND STOM CRUSHERS. SPECIFICATIONS SOLICITED. ESTIMATES GIVEN.

CATALOGUES FREE TO ANY ADDRESS. GEARS AND PARTS OF MODELS. GODDOW & WIGHTMAN BOSTON

UNION MANUFACTURING & PLATING CO. 236-238-240 Carroll Ave., Chicago, Manufacturers of METAL SPECIALTIES FOR INVENTORS. ALL KINDS OF PLATING. Estimates furnished. Correspondence invited.

Steam! Steam! Quality Higher, Price Lower. For Strictly Cash, Complete Fixtures except Stack.

2-Horse Eureka Boiler and Engine, - \$145 4- " " " " " " - 225 Other sizes at low prices. Before you buy get our prices. B. W. PAYNE & SONS, Drawer 56, ELMIRA, N. Y.

GATES ROCK & ORE BREAKER Capacity up to 200 tons per hour. Has produced more ballast, road metal, and broken more ore than all other Breakers combined. Builders of High Grade Mining Machinery. Send for Catalogues. GATES IRON WORKS, 50 C So. Clinton St., Chicago 215 Franklin St., Boston, Mass.

THE STEAM ENGINE; ITS PRINCIPLES, its development, its future and perfection.—A paper by E. N. Dickerson, giving an outline of the history of the steam engine, and discussing the principles upon which it operates and which limit its capacity. With 2 figures. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 686. Price 10 cents. To be had at this office and from all new dealers.

PHOTOGRAPHY! Our Latest Novelties for the Amateur are KNACK CAMERAS, MASCOT CAMERAS, TRIAD CAMERAS, Waterbury Detective Cameras, Irving View Cameras, and Magazine Cameras for Films. THE SCOVILL & ADAMS CO., 423 Broome Street, New York.

NEW YORK TRADE SCHOOLS.—Description of the New York Trade Schools which were established nine years ago for the purpose of giving instructions to young men in certain trades, and to enable young men already in such trades to improve themselves. With 10 illustrations. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 781. Price 10 cents. To be had at this office and from all new dealers.

STEEL TYPE FOR TYPEWRITERS. Stencils, Steel Stamps, Rubber and Metal Type Wheels, Dies, etc. Model and Experimental Work Small Machinery, Novelties, etc., manufactured by special contract. New York Stencil Works, 100 Nassau St., N.Y.

Mariner & Hoskins, Assayers & Chemists WATER for Boiler Purposes analyzed. ALLOYS, their composition determined. ORES, all kinds assayed. ANYTHING, the composition of which it may be desirable to know. 81 S. Clark Street, (Top Floor) Chicago

THE EAGLE THE EASIEST RUNNING BICYCLE IN THE WORLD. 45 Speed, Comfort and Safety. AGENTS WANTED. Large Illustrated Catalogue sent Free to any Address. THE EAGLE BICYCLE MFG. CO., STAMFORD, CONN.

2nd MACHINERY N. Y. Mach'y Depot, Bridge Store 16, Frankfort St., N. Y.

Mechanical Help for Inventors. There is nothing like a first-class machine shop, organized for and adapted to miscellaneous jobs, to carry out an inventor's ideas and make the most of them. Primer to send. THE JONES BROTHERS ELECTRIC CO. CINCINNATI, O.

Shepard's New \$60 Screw-Cutting Foot Lathe Foot and Power Lathes, Drill Presses, Scroll Saw, Attachment, Chucks, Mandrels, Twist Drills, Dies, Calipers, etc. Lathes on trial. Lathes on payment. Send for catalogue of Outfits for Amateurs or Artisans. Address H. L. SHEPARD, AGENT, 134 East 2d Street, Cincinnati, Ohio.

ELECTRICAL!

Agents wanted for Fine Electrical Supplies of every description. New plate catalogue and price list on receipt of 25 cents. Discounts to the trade. NOVELTY ELECTRIC CO., 54 North 4th St., Phila., Pa.

THE MONTAUK CAMERA. Is compact and neat, covered with seal leather, supplied with double rapid rectilinear lens. Takes snap shots, interiors, exteriors, houses, groups, etc. Size of picture, 4 x 5 inches. Sample pictures and instruction books furnished for 10 cents. For circulars address G. GENNERT, 56 East 10th St., New York.

WOODEN TANKS FOR RAILROADS, MILLS, FARMS & COMPLETE STOCK OF LUMBER. WE CALDWELL & CO. SPECIFICATIONS FURNISHED FOR FOUNDATIONS AND TANKS. No. 217 E. MAIN ST. LOUISVILLE KY.

ELECTRO MOTOR. SIMPLE. HOW TO make. By G. M. Hopkins.—Description of a small electro motor devised and constructed with a view to assisting amateurs to make a motor which might be driven with advantage by a current derived from a battery, and which would have sufficient power to operate a foot lathe or any machine requiring not over one man power. With 11 figures. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 641. Price 10 cents. To be had at this office and from all new dealers.

LIGHTNING WELL-SINKING MACHINERY MANUFACTURERS. Hydraulic, Jetting, Revolving, Artesian, Diamond Prospecting Tools, Engines, Boilers, Wind Mills, Pumps, Encyclopedias, 1,000 engravings, Earth's Strata, Determination of water, etc. The American Well Works, Aurora, Ill. 11 & 13 S. Canal Chicago, Ill. Dallas, Texas

ICE-HOUSE AND COLD ROOM.—BY R. G. Hatfield, with directions for construction. Four engravings. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 774. Price 10 cents. To be had at this office and from all new dealers.

OIL WELL SUPPLY CO. 91 & 92 WATER STREET, Pittsburgh, Pa. Manufacturers of everything needed for ARTESIAN WELLS for either Gas, Oil, Water, or Mineral Tests, Boilers, Engines, Pipe, Cordage, Drilling Tools, etc. Illustrated catalogue, price lists and discount sheets on request.

STEREOTYPING.—A VALUABLE series of lectures by Thomas Hols, discussing the most recent methods in this branch of typography. With 23 illustrations. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 773 and 774. Price 10 cents each. To be had at this office and from all new dealers.

ARTESIAN Wells, Oil and Gas Wells, drilled by contract to any depth, from 60 to 500 feet. We also manufacture and furnish everything required to drill and complete same. Portable Horse Power and Mounted Steam Drilling Machines for 100 to 600 ft. Send for circulars illustrating catalogue. Pierce, Artesian and Oil Well Supply Co., 80 Beaver Street, New York.

INVENTIONS PRACTICALLY DEVELOPED Drawings, Pattern Making, Experimental and Fine Machine Work of all kinds. MILLIKEN & YAMOUR, 521 1/2 Cedar Street, near West Street, New York.

A BOON TO THE DEAF! Osgood's No. 1 Hearing Horn is the only instrument that will help the deaf. Made from best bell metal, and will last for years. Carried in the pocket and used in public without attracting attention. Price \$5. Sent C. O. D. May be returned after 2 weeks trial if not found satisfactory. Address OSGOOD BROS., Cor. 7th St. & Broadway, Oakland, Cal.

FREE SITES TO SUBSTANTIAL MANUFACTURING ENTERPRISES In the rapidly growing towns of Virginia and West Virginia, possessing CHEAP IRON, CHEAP LUMBER, CHEAP FUEL, and RAILROAD FACILITIES, address J. H. DINGEE, 330 Walnut Street, Philadelphia, Pa., President and General Manager of numerous Land Companies situated along the lines of the Norfolk & Western Railroad.

OUR MAGIC LANTERNS WITH OIL LAMPS HAVE NO EQUAL. VIEWS OF ALL SUBJECTS. EASTERN PRICES GUARANTEED. L. MANASSE 88 MADISON ST. CHICAGO ILL.

The Scientific American PUBLICATIONS FOR 1891.

The prices of the different publications in the United States, Canada, and Mexico are as follows: RATES BY MAIL. The Scientific American (weekly), one year - \$3.00 The Scientific American Supplement (weekly), one year, - 5.00 The Scientific American, Spanish Edition (monthly), one year, - 3.00 The Scientific American Architects and Builders Edition (monthly), one year, - 2.50 COMBINED RATES. The Scientific American and Supplement, - \$7.00 The Scientific American and Architects and Builders Edition, - 5.00 The Scientific American, Supplement, and Architects and Builders Edition, - 9.00 Proportionate Rates for Six Months. This includes postage, which we pay. Remit by postal or express money order, or draft to order of MUNN & CO., 361 Broadway, New York.