Advertisements.

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.

### YOUNG MICROSCOPISTS

can get 10 odd numbers of Journal of Microscopy, post free, for 25 cents. Contain as much s mple, practical in-formation as can be had elsewhere for \$2. Address Box 4875, New York.



THIS INVENTION saves fuel, utilizes slack, increases and gives steady supply of steam, rendering opening of fre doors un necessary, abates smoke nuisance, the power to drive is but little, and is the best known appliance for insuring perfect combustion. Address

U. S. Automatic Stoker Co., No. 2 Chestnut St., Philadelphia.

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

NOMENCIATURE OF BUILDING Stones and Stone Masonry. By J JAMES R. CROES, WILCIAM E. MERRICIC, and EDGAR H. VAN WINKLE. A paper read before the American Society of Civil Engineers. An exhausive article on Stone Cutting and Masonry, various Methods of Dressing, and Tools employed, with 34 illustrations. 19 Tools, illustrated, with limensions and How to Make. Squared, Quarry-faced, Pitched-face, and Drafted Stones, Rubble, Cut, Pointed, and Crandalled Stones, etc. Axed or Fean Hammered and Patent Hammered Stones. Bush Hammered and Rubbed Stones. Diamond Panels. Rubble, Squared Stone, Range, Random, and Ashlar Masonry. 34 illustrations in all, with practical insteadions. Contained in Scientific American Stipple. Mext No. 113, Price 10 cents. To be had at this office and of all newscealers.

Pyrometers, For showing heat of Ovens, Rot Blast Pipes, Boiler Flues, Superheated Steam, Oil Stills, &c.
11ENRY W. BULKLEY, Sole Manufacturer,
149 Broadway, 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 Scarfs. How the Japanese Print on
Cloth, Japanese Process for Silk Ornamentation. Japan-Cloth, Japanese Process for Silk Ornamentation. Japanese weaving. How Fine Japanese Fans are made. Japanese Method of Making Moulds for Ornamental Castings for Vessels, Bronzes, etc. Japanese Lacquer Manufacture. Curious Method of Decorating Lacquer Work. The Love and Pursuit of the Beautiful in Japan. A very entertaining, instructive, and comprehensive paper. Contained in SCIENTIFIC AMERICAN SUPPLEMENT NO. 115. Price 10 cents. To be had at this office and of all newsdealers.

IMPROVED SOLID EMERY WHEELS. For grinding Iron and Brass Castings, Tools, etc. Manufactured by
AM, TWIST DRILL CO., Woonsocket, R. I.



# **Bound Volumes**

# Scientific American.

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

OLD SERIES.	NEW SERIES.		NEW SERIES.		
Vol. 73 Copies. " 115 " 134	" 26 " 38	"	Vol.	. 15 7 ( 16 8 28 8	44
" 141 "	" 46 " 83	"	44	3216	"
Vols. of the Old Series contain one vear's numbers.	" 10 9 " 11 2	: 1			
year's numbers, and the New Se- ries six months.	" 13 9 " 14 7	11 :			

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

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



Barnes' FOOT POWER MA-D CHINERY.

Different machines with which lintiders. Cabinet Makers, Wagon Makers, and Jobers in miscellaneous work can compete as to QUALITY AND PRICE will steam power manufacturing; also Amateurs' supplies.

MacHINES SENT ON TRIAL.

Say where you read this, and send for catalogue and prices.

W. F. & JOHN BARNES, Rockford, Winnebago Co., Ill.

A DAY to Agents canvassing for the Fire-side Visitor. Terms and Outfit Free. Ad-dress P.O. VICKERY, Augusta, Maine.

MILITARY AND SPORTING GUNS. Breech Lo ders and Repeating Righes, with horizontal and vertical chamber motions, Sporting Guns, with rotary arrangement for firing either ball or shot, and Revolvers, with side motion of barrel, are manufactured by N. V. DREYSE'S GUN WORKS, Price lists sent gratis.

## TO INVENTORS AND MANUFACTURERS

FOLLOWS & BATE, Manchester, England, Hardware and Machinery Merchants, are prepared to buy American Goods for Cash, and to act as Sole Wholesale Agents.

### SPANISH CEDAR CIGAR-BOX LUMBER!

Finished Ready for Use.

First Quality at 34c. Second Quality at 24c. POPLAR—1st Quality at \$15 per M. Feet; 2d Quality at \$13.50 per M. Feet.

BUNDLING AND CARTAGE ADDITIONAL.

Above prices will remain until advised. No order received for less than 1,000 feet. GEO. W. READ & CO.,

186 to 200 Lewis St., New York.

FIRE & BURGLAR

ERATFORM GON & CK

MARVIN SAFE & SCALE CO. 265 BROADWAY, N.Y.

ESTABLISHED 1844.

### JOSEPH C. TODD

Formerly of Todd & Rafferty, Engineer and Machines. Flax, Hemp, Jute, Rope, Oakum, and Bagging Machinery, Steam Engines, Boilers, etc. 1 also manufacture Baxter's New Portable Engine of 1877, of one horse power, complete for \$125; can be seen in operation at my store. 1 will furnish specifications and estimates for all kinds of machinery. Send for descriptive circular and price. Address.

J. C. TODD,



Liquid Paints, Roofing, Steam Pipe and Boiler overings, Steam Proking, Sheathing, Fire, Acid, and Waterprot Conding, Cements, etc. Send for MURRILL & REIZER, 4 HOLLIDAY ST., BALTIMORE, amples, Illustrated Catalogues, Frice Lists, etc.

H. W. JOHNS M'f'g Co.,

87 MAIDEN LANE, N. Y

PUNCHING DROP HAMMERS AND DIES, FOR working Metals, &c.
The STILES & PARKER PRESS CO.
Middletown, 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.

MANUFACTURE OF BESSEMER STEEL MANUFAUTURE OF BESSEMER STEEL and Steel Rails as pursued at the works of Messrs. Brown, Bayley & Dixon, Sheffield. By C. B. HOLLAYD. A valuable and instructive paper. Read before the Iron and 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 bad at this office and of all newsdealers.

Machines for Electro-plating, Electrotyping, Electric Light, etc., in addition to testimonials in our Catalogue of Jan. I. We beg to refer to the fellowing houses: MERIDEN BRITANNIA CO.; RUSSELL & ERWIN M'F'G CO.; REED & BARTON; HALL, ELTON & CO.; RICHARDSON, BOYNTON & CO.; WM. H. JACESON & CO.; STANLEY WORKS; ROGERS CUTLERY CO.; CHAS. ROGERS BROS.; EDWARD MILLER CO.; MITCHELL, VANCE & CO.; NORWALK LOCK CO.; HAYDEN, GERE & CO.; DOMESTIC SEWINGMACHINE CO.; EBERHARD FABER; JOS. DIXON CRECKEDE CO.; MURCHARD & HAYDEN, GERE & CO.; DOMESTIC SEWINGMACHINE CO.; EBERHARD FABER; JOS. DIXON CRECKEDE CO. \*\*MURCHARD & HAYSON, \*\*FAGAN & SON SEWINGMACHINE CO.; EBERHARD FABER; JOS. DIAJON CRUCEBLE CO.; MUMFORD & HANSON; FAGAN & SON, and over 200 others. Outfits for NICKEL, SILVER, BRONZE, Plating, etc. The two highest CENTENNIAL AWARDS, and the CENTENNIAL GOLD MEDAL Of American Institute. Prices from \$125 to \$500.

### CONDIT, HANSON & VAN WINKLE

The best in the world. 5 sizes, adapted perfectly for Crushing and Grinding Mnerals and all hardsubstances. Grinding surfaces quickly and cheaply renewed. Send for descriptive pamphlet.

BAUGH & SONS. PHILADELPHIA, PA.

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 Plates. The probable great utility of the Phonograph in Letter-writing, Business Correspondence and Dictation; Literature; Education; Law; Music; Oratory, etc. Application to Musical Boxes, 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 inspection of the Phonograph in Supplement, No. 121. Price ID cents. To be had at this office and of all newsdealers.

B. W. Payne & Sons, Corning, N. Y.



Eureka Safety Power. h.p. cyl. ht. space, wt. price.
2 | 33/8/4 | 48 in. | 40/25 | 900 | \$150 |
4 | 4x6 | 56 | 46/30 | 1600 | 250 |
6 | 5x7 | 72 | 72x42 | 2700 | 400 |

Also, SPARE ARRESTING PORT-BLES, and Stationary Engines for Plantations. Send for Circulars.

Publishers SCIENTIFIC AMERICAN.

PERFECT

### **NEWSPAPER FILE**

The Koch Patent File, for preserving newspapers, magazines, and paniphlets, has been recently improved and price reduced. Fubscribers 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 gilt. Necessary for every one who wishes to preserve the paper. every one Address

MUNN & CO.

## PORTLAND CEMENT,

IAN & REENE'S. For Walks, Cisterns. Foundas, Stables, Cellars, Bridges, Reservoirs, Breweries, etc. demit 10 cents for Practical Treatise on Cements. S. L. MERCHANT & CO., 53 Broadway, New York.

# TO ADVERTISERS! We will see

do any newspaper advertising, the THIRD EDITION OF AYER & SON'S MANUAL FOR ADVERTISERS, 160 Evo pp. More complete than any which Lave preceded it. Cives the names, circulation, and advertising rates of several thousand newspapers in the United States and Canada, and contains more information 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.

AHEAD OF ALL COMPETITION. RIHADEIDHIA 🕶 LAWN MOWER

Seven Sizes for Hand Use. Weighing from 32 to 51 lbs. Three Sizes for Horse Power. to 31 lbs. Three Sizes 197 110180 FOWER.

These Machines did an amount of work on the Centennial Grounds equal to 10 years of ordinary use, without loss of time for sharpening or repairs—completely distancing all competitors in that celebrated trial of 6 months duration. GRAHAM, EMLEN & PASSMORE, Patentees and Manufacture's, 631 Market St., Phila., Pa.

Address JOHN A. ROEBLING'S SONS, Manufacturers, Trenton, N. J., or 117 Liberty Street, New York.
Wheels and Rope for conveying power long distances.
Sendfor circular.



ICE AT \$1.00 PER TON. The PICTET ARTIFICIAL ICE CO., LIMITED. Room 51, Com and Iron Exchange, P.O. Box 5083, N.Y.

# MACHINISTS' TOOLS. NEW AND IMPROVED PATTERNS. Send for new illustrated catalogue.

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



THE GEOLOGICAL ANTIQUITY OF Flowers and Insects. By J. E. TAYLOR, P.G.S. A plain comprehensive review of the subject, bringing forward many instructive facts; with six illustrations. The invariable correlation between insects and flowers. How they are fossilized. Fossil botany, Geological Evidences of E olution. Correspondence in the succession of Animal and Vegetable life. Flowers necessary to Insects, and Insects necessary to Flowers insects and Plants in the Devonian, the Switzerland Lias, the English Stonesfield Slate, the Tertiary Strata, the Coal Measures, a Greenland, and other formations. A Pecular Aspect of Evolution. Contained in SCIENTIFIC AMERICAN SUPPLEMENT NO. 126. Price 10 cents. To be had at this office and of all newsdealers.

### Ithaca Calendar Clock.



ITHACA CALENDAR CLOCK CO. MPING, Rider Compression Engine. No steam, noise, ban residences. Pumps 2,000 to 200,000 gallons

CAMMEYER & SAYER, 93 Liberty St., N. Y.

## HOLLOW SPINDLE LATHE. Two sizes: 15 in., 1% in. hole; B in., 1½ in. hole. Besides the most approved features of modern New England Tools, it has many new points of value, making it the best lathe ever offered for general use. ILL, CLARKE & CO., Machinery, Boston

New and improved, for special work. Boring Machines, Turning Lathes, Saw Arbors, Saw Benches, Scroll Saws, Panel Raisers, and other Wood Tools. We build the only patented Panel Raiser, with vertical spindles, all others being infringements on our patents of July II and October 31, 1871

WOOD-WORKING MACHINERY

WALKER BROS. 73 and 75 Laurel St., Phila.

Cut Brass Gears, list free. Grant, 94 Beverly St., Boston. THE TANITE CO..

STROUDSBURG, PA.
EMERY WHEELS AND CRINDERS.
GEO. PLACE, 121 Chambers St., New York Agent.

# ROCK DRILLING MACHINES AND AIR COMPRESSORS, MANUFACTURED BY BURLEICHROCK DRILL CO. SEND FOR PAMPHLET. 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. Send for catalogue.

J. T. NOYE & SON, Buffalo, N. Y.

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 Engines 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.

### Working Models

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

ICROSCOPES At Reduced Prices. Opera Glasses, Spec a-cles, Telescopes, Thermometers. Send for Illustrated Catalogue. R. & J. BECK, 921 Chestnut St., Philadelphia.



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 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

We send free of charge, on application, a pamphlet containing further information about Patents and how to procure them; directions concerning Trade Marks,

containing further information about Patents and how to procure them; directions concerning Trade Marks, Indicates perpetually the hour of the day, the day of the month, the month of the year. Indispensable 1 nevery bu siness office. A necessity in every business office. A necessity in every house. Manufactured in fifteen (15) different styles, to suit, from the most common house to the most elaborate banking or counting house, prices ranging from ten (10) to fifty (50) dollars.

Calendars printed in English, Spanish, Portuguese. French, and Germanlanguages. Catalogues, price lists mailed and logurines answered promptly on application.

For sale by all leading jewelers in United States and Canada. Manufactory at Ithaca, N. Y.

ITHACA

CALENDAR

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 inven tion, 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 'th Streets, Washington, D. C.

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