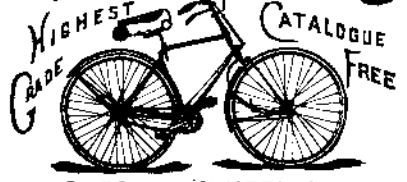


Advertisements.

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.

Victors



HIGHEST GRADE CATALOGUE FREE
OVERMAN WHEEL CO.
BOSTON, WASHINGTON, DENVER, SAN FRANCISCO.
A. G. SPALDING & BROS., Special Agents, CHICAGO, NEW YORK, PHILADELPHIA.

"Spar Pointed" Wood Screws.



Patented May 10, July 19, 1887; Oct. 23, 1889; Aug. 19, Oct. 21, 1890; April 7, May 12, 1891; July 19, 1892.

Its Advantages are:

- 1. Stronger than a common screw.
2. Uniform and wide slot.
3. Requires the use of but one bit in hard wood.
4. Inserted easier.
5. Centralized point.
6. Superior holding power.
7. The screw being Cold Forged, instead of Cut, leaves on its entire surface a metallic skin.

Send for samples to AMERICAN SCREW CO. PROVIDENCE, R. I.

SCIENTIFIC AMERICAN SUPPLEMENT. Any desired back number of the SCIENTIFIC AMERICAN SUPPLEMENT can be had at the office for 10 cents. Also to be had of newdealers in all parts of the country.

THE SIMPLEX TYPEWRITER



GUARANTEED to do as good work as any high priced machine. Specially adapted for use in private correspondence. Sent by mail or express prepaid on receipt of \$20. See Sci. Am., Oct. 1, p. 211.



If you have a gas engine and wish to lubricate same effectively, put on one of Lunkenheimer's Gas Engine Lubricators, a very desirable cup and fully warranted. Our catalogue gives full particulars of this and numerous other specialties. Send for one, and mention the SCIENTIFIC.

THE LUNKENHEIMER COMPANY, Successor to The Lunkenheimer Brass Mfg. Co., CINCINNATI, O., U. S. A.

KODAKS

For Snap-Shots Out-Doors, For Time Exposures In-Doors, For Flash-Lights at Night.

The Junior are the most compact camera made. Perfectly adapted to hand or tripod use. Can be used with roll films or glass plates. Fitted with focusing index and counter for exposures.

\$40 and \$50.

Send For Catalogue. EASTMAN KODAK CO., Rochester, N. Y.

THE COMET CRUSHER THE GREAT BALLAST AND ORE BREAKER FRASER & CHALMERS 133 FULTON ST. W. CHICAGO ILL. & 2 WALL ST. NEW YORK

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.

James Smith Woolen Machinery Co. THE HUB FRICTION GLUTCH. POWER TRANSMISSION MACHINERY.



THE COPYING PAD—HOW TO MAKE and how to use; with an engraving. Practical directions how to prepare the relating pad, and also the aniline ink by which the copies are made, how to apply the written letter to the pad, how to take off copies of the letter. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 434. Price 10 cents. For sale at this office and by all newdealers in all parts of the country.



TO INVENTORS. An American wishes a new invention of merit for Europe. Has over 20 years experience abroad, large acquaintance, highest standing and capital. P. O. Box 2511, Boston, Mass.

STEVENS PATENT IDEAL COMBINED DIVIDER & CALIPER No. 62. Price, per set, all nicked, \$4.00 Packed for transmission by mail. Ideal Surface Gauges, Depth Gauges, Ideal and Leader Spring Dividers and Calipers, and Fine Machinists' Tools. Illustrated catalogue free to all. J. STEVENS ARMS & TOOL CO. P. O. Box 280, Chicopee Falls, Mass.

AGENTS WANTED FOR FINE TOOLS IN EVERY SHOP. C. H. BESLY & CO. CHICAGO, ILL. U.S.A.

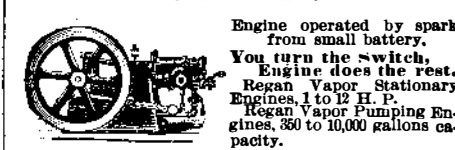


The Smith Premier Typewriter

Embodies the most Progressive Mechanical Principles. All the Essential Features Greatly Perfected. Perfect and Permanent Alignment. Easiest Running, and Nearly Silent. All type cleaned in Ten Seconds without Soiling the Hands. The Smith Premier Typewriter Co., Syracuse, N. Y., U. S. A. We have 20 branch offices in the principal cities throughout the United States.

ELECTRO VAPOR ENGINE. GAS OR GASOLINE FOR FUEL.

NO BOILER. NO FIRE. NO DANGER. NO ENGINEER.



Engine operated by spark from small battery. You turn the Switch. Engine does the rest. Regan Vapor Stationary Engines, 1 to 12 H. P. Regan Vapor Pumping Engines, 500 to 10,000 gallons capacity. MANUFACTURED BY THOMAS KANE & CO., CHICAGO, ILL.

THE AMERICAN BELL TELEPHONE CO.

95 MILK ST., BOSTON, MASS.

This Company owns the Letters Patent granted to Alexander Graham Bell, March 7th, 1876, No. 174,465, and January 30th, 1877, No. 186,787.

The transmission of Speech by all known forms of Electric Speaking Telephones infringes the right secured to this Company by the above patents, and renders each individual user of telephones not furnished by it or its licensees responsible for such unlawful use, and all the consequences thereof, and liable to suit therefor.



THE EDISON INCANDESCENT LAMP IS THE ONLY INCANDESCENT LAMP LAWFULLY MADE.

All others infringe the Edison Patents, and are counterfeits. THE RIGHT OF THE EDISON COMPANY TO AN INJUNCTION AGAINST INFRINGERS HAS BEEN DETERMINED BY THE U. S. CIRCUIT COURT OF APPEALS. COPIES OF DECISIONS SENT ON APPLICATION. GENERAL ELECTRIC COMPANY.

BRANCH OFFICES: 44 Broad Street, New York; 173 and 175 Adams Street, Chicago, Ill.; 234 West Fourth Street, Cincinnati, O.; 61 First Street, Atlanta, Ga.; 15 First Street, San Francisco, Cal.; 620 Atlantic Avenue, Boston, Mass.; 649 Arch Street, Philadelphia, Pa.; 407-409 Sibley Street, St. Paul, Minn.; 133 F Street, N. W., Washington, D. C.; Masonic Temple, Denver, Colo.



ALUMINUM: ITS USES AND APPLICATIONS. A valuable and interesting article by G. L. Addenbrooke. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 853. Price 10 cents. To be had at this office and from all newdealers.

EDISON PHONOGRAPHS FOR SALE.

ADDRESS, North American Phonograph Co. EDISON BUILDING, New York. Masonic Temple Bldg., Chicago.

ON POSTURE AND ITS INDICATIONS.—A paper by T. Lander Brunton, M.D., in which the author endeavors to indicate the common postures that one daily meets with, either in patients or others, and to discover the reason why such postures are assumed. With 11 illustrations. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 867. Price 10 cents. To be had at this office and from all newdealers.

"OTTO" GAS AND GASOLINE ENGINES. 1-10 to 100 horse power. Can be used in cities or in country independent of gas works or gas machines. No Boiler. No Danger. No Engineer. OVER 33,000 SOLD. OTTO GAS ENGINE WORKS, PHILADELPHIA.



ESTABLISHED 1846. The Most Popular Scientific Paper in the World. Only \$3.00 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, representing Engineering Works, Steam Machinery, New Inventions, Novelties in Mechanics, Manufactures, Chemistry, Electricity, Telegraphy, Photography, Architecture, Agriculture, Horticulture, Natural History, etc. Complete list of patents each week. 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, Canada, or Mexico, on receipt of three dollars by the publishers; six months, \$1.50; three months, \$1.00. Clubs.—Special rates for several names, and to Post Masters. Write for particulars. The safest way to remit is by Postal Order, Draft, or Express Money Order. Money carefully placed inside of envelopes, securely sealed, and correctly addressed, seldom goes astray, but is at the sender's risk. Address all letters and make all orders, drafts, etc., payable to MUNN & CO., 361 Broadway, New York.

THE Scientific American Supplement

This is a separate and distinct publication from THE SCIENTIFIC AMERICAN, but is uniform therewith in size, every number containing sixteen large pages full of engravings, many of which are taken from foreign papers and accompanied with translated descriptions. THE SCIENTIFIC AMERICAN SUPPLEMENT is published weekly, and includes a very wide range of contents. It presents the most recent papers by eminent writers in all the principal departments of Science and the Useful Arts, embracing Biology, Geology, Mineralogy, Natural History, Geography, Archaeology, Astronomy, Chemistry, Electricity, Light, Heat, Mechanical Engineering, Steam and Railway Engineering, Mining, Ship Building, Marine Engineering, Photography, Technology, Manufacturing Industries, Sanitary Engineering, Agriculture, Horticulture, Domestic Economy, Biography, Medicine, etc. A vast amount of fresh and valuable information obtainable in no other publication. The most important Engineering Works, Mechanisms, and Manufactures at home and abroad are illustrated and described in the SUPPLEMENT. Price for the SUPPLEMENT for the United States and Canada, \$5.00 a year; or one copy of the SCIENTIFIC AMERICAN and one copy of the SUPPLEMENT, both mailed for one year for \$7.00. Single copies, 10 cents. Address and remit by postal order, express money order, or check.

MUNN & CO., Publishers Scientific American, 361 Broadway, New York.

Building Edition.

THE SCIENTIFIC AMERICAN ARCHITECTS' AND BUILDERS' EDITION is issued monthly. \$2.50 a year. Single copies, 25 cents. Forty large quarto pages, equal to about two hundred ordinary book pages; forming a large and splendid Magazine of Architecture, richly adorned with elegant plates in colors, and with other fine engravings; illustrating the most interesting examples of modern architectural construction and allied subjects. A special feature is the presentation of each number of a variety of the latest and best plans for private residences, city and country, including those of very moderate cost as well as the more expensive. Drawings in perspective and in color are given, together with full Plans Specifications, Sheets of Details, Estimates, etc. The elegance and cheapness of this magnificent work have won for it the Largest Circulation of any Architectural publication in the world. Sold by all newdealers. \$2.50 a year. Remit to MUNN & CO., Publishers, 361 Broadway, New York.

PRINTING INKS.

The SCIENTIFIC AMERICAN is printed with CHAS. ENEU JOHNSON & CO'S INK, Tenth and Lombard Sts., Philadelphia, and 47 Rose St., opp. Duane, New York.