

Advertisements.

ORDINARY RATES.

Inside Page, each insertion. - 75 cents a line
Back Page, each insertion. - \$1.00 a line
For some classes of Advertisements, Special and Higher rates are required.

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 advertised 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.

Tribune & Bicycle
Tested and True.



The Easiest Running Wheel in the World.

Send for Catalogue.

THE BLACK MFG. CO., ERIE, PA.

BICYCLISTS' TAPERING RUBBER PLUGS

are the ideal tire menders—cannot slip or be punctured anew. Send five 2c. stamps for assorted samples.

ELECTRIC CLOTH clean everything. Send 10 cents for a sample cloth. Agents and canvassers wanted in every town—write for particulars.

BICYCLE APPLIANCE CO. PHILA., PA.

Typewriter Patent

This company owns Letters Patent No. 558,428, issued April 14, 1896, covering broadly all machines in which the cylinder turns up to expose the line of print, or in which a duplex or cross ribbon feed is used. The patent also covers many other features of modern typewriter construction. Infringers will be vigorously prosecuted.

Wyckoff, Seaman & Benedict.
327 Broadway, New York.



ALL ARITHMETICAL PROBLEMS solved rapidly and accurately by the Comptometer. Saves 60 per cent of time and entirely relieves mental and nervous strain. Adapted to all commercial and scientific computation. Why don't you get one? Write for pamphlet.

FELT & TARRANT MFG. CO.
52-56 ILLINOIS ST. CHICAGO.

The American Bell Telephone Company,

125 Milk Street,
Boston, Mass.

This Company owns Letters Patent No. 463,569, granted to Emile Berliner November 17, 1891, for a combined Telegraph and Telephone, covering all forms of Microphone Transmitters or contact Telephones.

THE HARTFORD, No. 2

Has an Automatic Platen Lift
An Automatic Switch for ribbon movement, feeding both ways
Automatic Lever Locks
Alignment that is positively permanent
Compared with the Hartford, no other machine is up-to-date
We solicit cash trade and can give such customers A GAIN OF 50% over what is offered by competing houses in our line



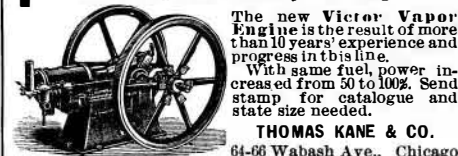
THE HARTFORD TYPEWRITER CO., 1 LAUREL ST., HARTFORD, CONN., U. S. A.

The \$5.00
POCKET KODAK



EASTMAN KODAK CO.,
Sample photo and booklet for two 2-cent stamps.
ROCHESTER, N. Y.

THE VICTOR VAPOR ENGINE
The Twentieth Century Gas Engine.



This beats Wind, Steam, or Horse Power. We offer the **WEBSTER 2 1/2 actual horse power GAS ENGINE** for \$150, less 10% discount for cash. Built on interchangeable plan. Built of best material. Made in lots of 100 therefore we can make the price. Boxed for shipment, weight 800 pounds. Made for Gas or Gasoline.
Write for Special Catalogue.
WEBSTER MFG. CO.
1074 West 15th Street, CHICAGO

BICYCLE REPAIR OUTFITS
for Amateur and Workman.
Send 2c. stamp for List 223.
FRED FRASSE CO.
21 Warren Street, New York

HAVE YOU GOT OUR CATALOGUE L FOR 1896 OF
GAS AND GASOLINE STATIONARY ENGINES
GASOLINE TRACTION ENGINES
COMBINED ENGINES AND PUMPS
GASOLINE PORTABLE ENGINES
USED ANY PLACE BY ANY ONE FOR ANY PURPOSE
CHARTER GAS ENGINE CO., Box 148, Sterling, Ill.

SINTZ GAS ENGINE CO.
GRAND RAPIDS, MICH., U. S. A.
Manufacturers of the Sintz Stationary and Marine Gas and Gasoline Engines. Especially adapted for Boats and Electric Lighting. Runs with manufactured or natural gas—Boats and launches. Prices within the reach of all. Send for Catalogue. Mention this paper.

PREISTMAN SAFETY OIL ENGINE
"A thoroughly successful commercial engine using a Safe Oil."—Franklin Institute
No Extra Insurance, No Steam, No Gas, No Gasoline. Reliable, Safe, Economical, and Convenient. Chosen by Nine Governments. Used for nearly every purpose.
PREISTMAN & CO., Incorp'd.
530 Bourse Bldg., PHILADELPHIA, PA.

"WOLVERINE" GAS AND GASOLINE ENGINES, STATIONARY AND MARINE.
The "Wolverine" is the only reversible Marine Gas Engine on the market. It is the lightest engine for its power. Requires no licensed engineer. Absolutely safe. Manufactured by **WOLVERINE MOTOR WORKS.**
12 Huron Street, GRAND RAPIDS, MICH.

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 nearly fifty 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, Copyrights 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. 622 and 624 F Street, Pacific Building, near 7th Street, WASHINGTON, D. C.

GATES' ROCK AND ORE BREAKERS
LEAD ALL OTHERS IN ECONOMY, DURABILITY, CAPACITY
ESTIMATES furnished for COMPLETE CRUSHING PLANTS
We manufacture **MINING MACHINERY** of every description.
Gates Iron Works, Dept. C. 650 Elston Av. Chicago, Ill

HALF A CENTURY OF CYCLES.—An interesting history of the cycle from its origin up to the present time. The first crank-driven bicycle. The "bone-shaker" and its successors. The tricycle. The modern wheel. Cycle building a science. Points of improvement. The pneumatic tire. A hand and foot cycle. With 8 illustrations. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 1012. Price 10 cents. To be had at this office and from all newsdealers.

WE CAN GET YOU GOLD
BY USE OF OUR **MINING MACHINERY**
OR BY ECONOMY OF FUEL IN DRIVING OUR **RIEDLER PUMPS AND COMPRESSORS**
WHICH WILL SAVE YOU MONEY
FRASER & CHALMERS, CHICAGO, ILL. U.S.A.



ESTABLISHED 1845.
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 Postmasters. 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.**

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, Canada, and Mexico, \$5.00 a year; or one copy of the SCIENTIFIC AMERICAN and one copy of the SUPPLEMENT, both mailed for one year to one address for \$7.00. Single copies, 10 cents. Address and remit by postal order, express money order, or check,
MUNN & CO., 361 Broadway, New York.

Building Edition.

THE SCIENTIFIC AMERICAN BUILDING EDITION is issued monthly. \$2.50 a year. Single copies, 25 cents. Thirty-two large quarto pages forming a large and splendid Magazine of Architecture, richly adorned with elegant plates and other fine engravings; illustrating the most interesting examples of modern Architectural Construction and allied subjects.

A special feature is the presentation in 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 Floor Plans, Descriptions, Locations, Estimated Cost, 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 newsdealers. \$2.50 a year. Remit to **MUNN & CO., 361 Broadway, New York.**

Export Edition

of the SCIENTIFIC AMERICAN, with which is incorporated "LA AMERICA SCIENTIFICA E INDUSTRIAL," or Spanish edition of the SCIENTIFIC AMERICAN is published monthly, and is uniform in size and typography with the SCIENTIFIC AMERICAN. Every number contains about 50 pages, profusely illustrated. It is the finest scientific, industrial export paper published. It circulates throughout Cuba, the West Indies, Mexico, Central and South America, Spain and Spanish possessions—wherever the Spanish language is spoken. THE SCIENTIFIC AMERICAN EXPORT EDITION has a large guaranteed circulation in all commercial places throughout the world. \$3.00 a year, postpaid, to any part of the world. Single copies, 25 cents.

Manufacturers and others who desire to secure foreign trade may have large and handsomely displayed announcements published in this edition at a very moderate cost. Rates upon application.
MUNN & CO., Publishers,
361 Broadway, New York.



At 1/4 Price Bicycles, Watches, Guns, Buggies, Harness, Sewing Machines, Organs, Pianos, Saws, Tools, Scales of all varieties and 1000 other articles. Lists free. CHICAGO SCALE CO. CHICAGO, ILL.

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

APOLLO GALVANIZED IRON.
The worker can't afford to do a job with any other. Some jobs he can't do well, and some he can't do at all, with common iron.
Apollo is perfect and workable; others less perfect and far less workable.
Apollo jobbers carry large stocks and get anything special immediately.
Apollo Iron and Steel Company,
Pittsburgh, Pa.

JESSOP'S STEEL THE VERY BEST
FOR TOOLS, SAWS, ETC.
Wm. JESSOP & SONS, L^{rs} 91 JOHN ST. NEW YORK

FISH You can catch hundreds of FISH if you put PATENT "GILLIS" on your bait. To advertise it, we mail anybody a \$1 size package free for 10c. MARINE SUPPLY CO. PALATKA, ILL. Draw. 49

Columbia Bicycles
LEAD THE WORLD.
You have noted that all bicycles are judged by Columbias. Others are offered as being "just as good." It is the universal acknowledgment of Columbia superiority. Why make experiments when you can have certainty? Ride the Columbia—
Standard of the World.
\$100 TO ALL ALIKE
POPE MFG. CO., Hartford, Conn.
Columbia Art Catalogue free from all branch houses and agents, or will be sent by mail for two 2-cent stamps.