

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.



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

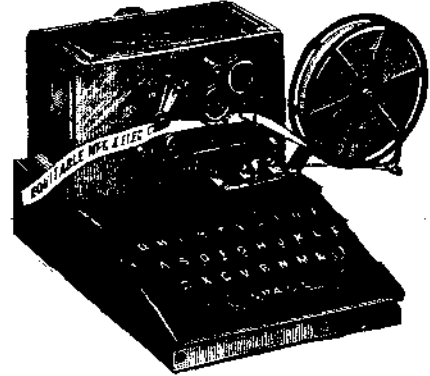
"Spur Pointed" Wood Screws.



Patented May 10, July 19, 1887; Oct. 29, 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.



Printing Telegraphs
FOR EVERY PURPOSE.

Messages printed in plain type. Can be operated by any one. No skilled labor required. Quick communication, with absolute certainty of receipt of message. Portable machines, wires, and batteries for temporary connections. Wires of any length fitted out, from a few feet to a thousand miles.

THE EQUITABLE MFG. & ELECTRIC CO.
44 BROADWAY, NEW YORK.

A modern instance

of fine brains and fine machinery getting together to produce the unexpected--is found in the new, quick-winding Waterbury, a watch with the best features of a high-cost timepiece, yet at only a fraction of the price.

It has a remarkably close adjustment and jeweled bearings--which make it an accurate time-keeper; while taste, elegance and genuineness are combined in its outward appearance.

It is handsome enough for Sunday and cheap enough for weekdays. May save banging your Sunday watch. Any jeweler will show you many styles of the new, quick-winding Waterbury. \$4 to \$15.

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 specialized 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, Patent Building near 7th Street, Washington, D. C.



THE GRIFFIN MILL

A perfect pulverizer of all refractory substances by either the wet or dry process. It works better and at less expense than any other Mill, and is conceded to be the only perfect pulverizing Mill manufactured.

For FREE Illustrated Pamphlet address
BRADLEY FERTILIZER CO., 92 STATE ST., BOSTON.

DRILL CHUCKS.

Write "THE PRATT CHUCK CO." Clayville, N. Y., U. S. A., for free illustrated catalogue of POSITIVE DRIVING DRILL CHUCKS, showing the only perfect system ever devised for holding and driving drills.
Foreign Agencies: Ph. Rouzet Cle, 54 Boulevard du Temple, Paris, France. E. Sonenthal, Jr., Nueu Promenade, No. 5, Berlin, Germany. Selig, Sonenthal & Co., 85 Queen Victoria Street, London, E. C., England.

THE WILMOT & HOBBS MFG. COMPANY

Specialties: HOT ROLLED BAND, STRIP AND PLATE STEEL. GOLD ROLLED SHEET AND STRIP STEEL. LARGE CONTRACTS SOLICITED FOR AUTOMATIC, HEAVY & DIFFICULT SHEET METAL BLANKING, STAMPING & DRAWN WORK, TUBES & NICKEL & BRASS PLATING, TINNING, JAPANNING & DIE MAKING. BRIDGEPORT, CONN.

THE Motor of 19th Century

Can be used Any Place, to do Any Work, and by Any One. No Boiler! No Fire! No Steam! No Ashes! No Gauges! No Engineer! A perfectly safe Motor for all places and purposes. Cost of operation about one cent an hour to each indicated horse power. For circulars, etc., address
Economy, Reliability, Simplicity, Safety.
CHARTER GAS ENGINE CO.
P. O. Box 148, Sterling, Ill.

MECHANICS' TOOLS.

If you are interested in Tools as a manufacturer or amateur, you should have a copy of our new catalogue. Our 1892 edition is a very elaborate and complete book of 704 pages, handsomely bound in cloth. The book will be sent to any part of the world, prepaid, on receipt of \$1.00, and the money thus paid will be refunded with the first purchase amounting to \$10.00 or over. Every manufacturer and amateur should have this catalogue, even if they do not intend buying their Tools and Supplies of us.
MONTGOMERY & CO., Fine Tools,
105 Fulton Street, New York City, N. Y.

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.

No one ever wrote 1000 Letters an Hour, that is, unless they first wrote one and then copied the rest on an EDISON MIMEOGRAPH
Invented by THOS. A. Edison. For Daily Office Use in duplicating both handwriting and typewriting. Anybody can operate it. Simple--Compact--Cleanly--Cheap. Endured by over 90,000 users. Catalogues and Samples of work sent free upon application. Manufactured only by the A. B. DICK CO., 154 E. Lake St. Chicago. Branch Office, 47 Nassau St., N. Y. City, 117 So. Fifth St., Phila.

DON'T TWIST YOUR WRIST
HOWARD-ALLARD SPIRAL CLUTCH
TRIPLE BIT SCREW DRIVER.
Price, \$1.50, by mail.
The Howard-Allard Original Patent Spiral Screw Driver makes work but mere play. Perfect work can only be done with Perfect Tools. Here it is, two sizes, packed in strong box, three bits, a screw, the Spiral action. Get it of your Jobber. Full circular and prices by addressing the Sole Agents, THE ALFORD & HERKLE CO., 77 Chambers Street, NEW YORK.

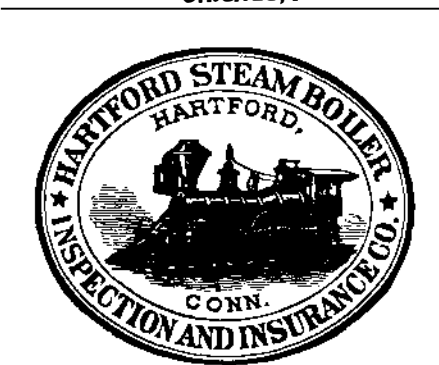
THE AMERICAN BELL TELEPHONE CO.
95 MILK ST., BOSTON, MASS.

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 Arch Street, Philadelphia, Pa.
24 West Fourth Street, Cincinnati, O.
First Building, Atlanta, Ga.
15 First Street, San Francisco, Cal.
620 Atlantic Avenue, Boston, Mass.
519 Arch Street, Philadelphia, Pa.
401-407 Sibley Street, St. Paul, Minn.
1333 F Street N. W., Washington, D. C.
Masonic Temple, Denver, Colo.
All business outside the United States transacted by Thomson-Houston International Co., 44 Broad St., New York.

H.W. JOHNS' ASBESTOS STEAM PACKING
Boiler Coverings, Millboard, Roofing, Building Felt, Liquid Paints, Etc. DESCRIPTIVE PRICE LIST AND SAMPLES SENT FREE.
H. W. JOHNS MFG. CO., 87 Maiden Lane, N. Y.

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



"IMPROVEMENT THE ORDER OF THE AGE."
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.

The AUTOGRAPHIC REGISTER.
A Labor-Saving Business System. Enforcing Honesty and Accuracy.
Chicago Autographic Register Co.
150 E. Monroe Street, CHICAGO, ILL.
Send for catalogue & price list.

WATER POWER TO RENT. -- Day use of 1000 ft. of water, second best power in Michigan. Owned by city. Night use reserved for electric lighting. Good manufacturing interests seeking cheap water power, investigate. ELECTRIC LIGHT COMMISSIONERS, Marshall, Mich.

The Circuit Company
Leading Lithographers
Chicago.

THE COPYING PAD--HOW TO MAKE and how to use, with an engraving. Practical directions how to prepare the gelatine 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. 438. Price 10 cents. For sale at this office and by all newsdealers in all parts of the country.

FOOT POWER LATHES
For Electrical and Experimental Work.
For Gunsmiths & Tool Makers. For General Machine Shop Work.
High Grade Tools; elegant in design, superior in construction. The best foot power lathes made, and quality considered the cheapest. Send for catalogue and prices.
W. F. & JOHN BARNES CO., 1999 Ruby St., Rockford, Ill.

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

SAWS
Wanted 50,000 Sawyers and Lumbermen to send us their full address for a copy of Emerson's Book of SAWS, new 1892 edition. We are first to introduce NATURAL GAS for heating and tempering Saws with wonderful effect upon improving their quality and toughness, enabling us to reduce prices. Address EMERSON, SMITH & CO. (Limited), Beaver Falls, Pa.

ACCOUNTANTS
who use the Comptometer
have no trouble with their trial balance. Has it ever occurred to you that by getting one you might save lots of time, avoid mistakes and not ruin your nerves?
Write for Pamphlet.
FELT & TARRANT MFG CO.
62-56 ILLINOIS ST., CHICAGO.

Columbian Half Dollars
are not worth a dollar--Columbia bicycles are worth their price--no more--we don't build bicycles for fun--we give you your money's worth--beware of the man who says he gives more--our beautiful book about Columbias is yours free at Columbia agencies--by mail for two two cent stamps--Pope Mfg. Co., Boston, New York, Chicago, Hartford.

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.

MILLER & VAN WINKLE
STEEL WIRE AND STEEL SPRINGS
A SPECIALTY
OFFICE & WORKS 18 to 24 BRIDGE ST. BROOKLYN, N. Y.

LIFE SAVING DEVICES. -- A collection of suggestions of devices for communicating between the shore and stranded vessels, offered to the London Daily Graphic by various correspondents. With 100 illustrations. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 874 and 884. Price 10 cents each, or \$1.30 for the series. To be had at this office and from all newsdealers.

THE ARMSTRONG MACHINES,
For Cutting Off and Threading Pipe.
For Hand or Power.
No. 1 cuts off and threads 1 to 3 inch.
No. 2 cuts off and threads 1 to 4 inch.
No. 3 cuts off and threads 1 to 6 inch.
Our aim is to make these machines as good as our Stocks and Dies, which are universally acknowledged to be THE BEST. Send for catalogue.
THE ARMSTRONG MFG. CO., Bridgeport, Ct.

A GENTLEMAN'S LAUNCH
YOUR OWN ENGINEER.
Launches 19 to 60 feet in length, with automatic machinery. No Smoke. No Engineer. No Danger. No Dirt.
PADDLE YOUR OWN CANOE.
Canoes, Family Row and Sail Boats. Fishing and Hunting Boats. Manufactured by
THOMAS KANE & CO., Chicago, Ill.
Send for catalogue specifying line desired.

The Shimer Cutter Heads
45,000 SOLD.
To work Car Siding, Flooring Ceiling and Ship Lap; to Mould Doors, Sash and Blinds. Cope Heads to match.
Send J. Shimer & Sons, Centre St., Milt n, Pa.

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