TANTED-Men to solicit orders for our goods.

Permanent Employment, go d salary. Travelling expenses paid by company. UNION INDUSTRIAL WORKS, Cincinnati

VINECAR. How made in 10 hours Sorghum without using drugs. Name paper and ad-dress F. I. SAGE, Springfield Mass.

AGENTS. 64 page Illustrated Catalogue, Free Boston Novelty Co., Boston, Mass.

### 15' Machinery. OTIS BROS. & CO., No. 348 Broadway, New York.

ENGINES, BOILERS, MACHINERY, Theroughly overhauled and equal to new. Descriptive Lists with prices on application. E. E. ROBERTS, Engineer and Contractor, 118 Liberty St., New York.

# IIII THU WROUGHT IRON BEAMS & GIRDERS

THE UNION IRON MILLS, Pittsburgh, Pa., Manufacturers of improved wrought iron Beams and Girders (patented). The great fall which has taken place in the prices of Iron and aspecially in Beams used in the construction of KIRL PROVIDE HULLDINGS, induces us to call the special attention of Engineers, Architects, and Builders to the undoubted advantages of now exclude the Provide Constitution of Engineers, Architects, and Builders to state the control of the provided advantages of now exclude the Provided Constitution of Engineers, Architects, and Builders to the undoubted advantages of now exclude the Provided Constitution of Engineers, Architects, and Builders to the Constitution of Engineers of the Provided Constitution of Engineers of the Provided Constitution of Engineers of the Provided Constitution of the Provided

ARSENIC IN THE ARTS.—A Lecture before the Medical Association of Central New York By S. A. Lattimore, LLD., Professor of Chemistry in the Rochester University. A popular and important paper. Scientific American Supplement No. 29 Price, Ecentral To be had at this office and of all newsdealers.

NEW DEPARTURE. TRAVELING men wanted. STAPLE GOODS. NO PEDDLING Salary #15 a month. Hotel and traveling appeness paid. A. GRANT & CO. manufacture for CEVELUPES and PAPER. 9, 4,6, and 6 Home St., CINCINNATI, OHIO

\$66 a Week in your own town. Terms and \$5 outfit free. 11. HALLETT & CO., Portland, Maine

Steel Castings, From 1-4 to 10,000 lbs. Weight. An invaluable substitute for expensive forgings, or for malleable iron castings re-quiring great strength. Send for circular and price list to CHESTER STREEL CASTING COMPANY, EVE-LINA STREET, PHILADELPHIA, PA.

# GEORGE C. HICKS & CO., Baltimore, Md. CLAY RETORTS, TILES, FIRE BRICKS, &c.

Cheapest Rotary Hand Cornsheller in the U.S. Guaranteed to be the simplest, cheapest, most durable, effective and the best. Buy it. Try it and be convinced samples \$1.00. Large profits to agents. Address Harrisburgh Pa., Family Cornsheller Co. Lock Box 9.

MESSRS. B. DAMBACHER & CO., Hamburg, Germany, dealers in American Wood-Working Machinery and Tools of all kinds. Messrt. D. & Co., soliett consignments from American manufacturers. Catalogues and descriptive circulars desired, by mail.

### MACHINERY

OF EVERY DESCRIPTION, COLD ROLLED SHAFTING, HANGERS, PULI EYS, COUPLINGS, BELTING, TANITE EMERY WHEELS AND GRINDERS, IN STOCK.

GEORGE PLACE,
121 Chambers & 103 Reade Sts., New York City.

\$10 TO \$500 INVESTED IN WALL ST.
Often leads to wealth. A 72 page book explaining everything, and a copy of the Wall Street Review, sent free.

JOHN HICKLING & CO.,
Bankers and Brokers 72 Broadway, New York

in FINE JET BLACK every variety of turned wood work parts of machinery, castings, lin-ware and other metal rork. ENAMELED JET GOOS, in wood or metal, made to order american enemclogil wannen StpBovidence. B

A GIFT By an arrangement with er of this Paper a sample package of Transfer Pictures free, Send Sc. stamp for postage. They are highly colored, beaut-ful, and easily transfer of to any object. Agents wanted, J. L. PATTEN & CO., 182 William St., New York.



#### SHAFTS.PULLEYS.HANGERS COUPLINGS ETC.

In Stock, and for Sale by

Philadelphia and 79 Liberty St., New York Price lists and pamphlets on application.

\$57.60 AGENT'S PROFITS per week. Will prove ented. Samples sent free to all. Address W. H. CHIDESTER 218 Fulton St., New York.

WANTED Salesmen to sell light hardware to Dealers. No PEDDLING. Salary, \$1,200 paid. Address DEFIANCE MFG CO., Chicago, Ill.

EAGLE FOOT LATHES.



With Scroll and Circular Saw Attachments, Slide Rest, Trols. &c.; also Small Engine Lathes, Metal Hand Planers, &c. Neatest designs, superior finish. Low Pricew. Our new Catalogue describes these and every tool necessary for the Amateur or Artisan. Send for it.

WM. I., CHASE & CO., 95 & F Liberty St. New York.

# Pond's

Send for Catalogue. DAVID W. POND, Successor to LUCIUS W. POND, Worcester, Mass.

L. SMITH HOBART, JOHN C. MOSS, D. I. CARSON,



RELIEF PLATES IN HARD TYPE METAL, For Printing

## ALL KINDS OF PICTORIAL ILLUSTRATIONS In Books, Newspapers, and Catalogues.

These plates are an excellent substitute for woodcuts, being used in precisely the same way, giving equally good results for much less money.

ELECTROTYPES AND STEREOTYPES

are made from them in the usual manner. We offer special advantages to

#### MANUFACTURERS AND INVENTORS,

as our mechanical work is of the best quality and rapidly executed.

Our plates are used satisfactorily in the SCIENTIFIC AMERICAN and the SCIENTIFIC AMERICAN SUPPLEMENT, and by Manufacturers and Publishers in all parts of

#### "COPY."

We work direct only from Prints or properly prepared Pen and Ink Drawings. Any other copy may be furnished, such as Photographs, Pencil Sketches, or the articles themselves, in which cases we have drawings made in the best manner by our own trained draughtsmen. Photographs, taken in the ordinary way, are suitable, and they may be of any size. We make the plates larger or smaller, as desired.

We are glad to have customers prepare their own Pen Drawings, and append one or two

#### **DIRECTIONS TO ARTISTS:**

The most important requisite in Drawings for our use is that every line shall be perfectly black.

The paper or drawing board must be white and smooth.

For fine work drawings should be made double the scale of the plate desired.

Carefully observing these main points, the artist has the utmost freedom in his choice of

styles of drawing.

For further information and fine samples of our work, send stamp for current number of our illustrated Quarterly Circular.



Please say where you saw this.

LIST OF ENGRAVINGS.

- 1. THE LETTER WRITER.
- 2. THE CROSSING SWEEPER.
- 3. THE ROYAL PRINCESSES
- 4. THE SKEIN WINDER.
- 5. THE SPANISH SISTERS.
- 6. A REST ON THE HILL.
- 7. THE FAIR CORRESPONDENT.
- 8. BARTHRAM'S DIRGE.
- 9. GOING TO SCHOOL.
- 10. PEEP O'DAY BOY'S CABIN.
- 11. THE SCANTY MEAL. 12. THE AMAZON.
- Printed on heavy toned plate paper, 12x15
- inches.

Liberal discount to the trade. Sent postpaid on receipt of price.

PHOTO-ENGRAVING CO., 67 Park Place, New York.

# HOISTING ENCINE FORALL PURPOSES.

Cheap, simple, durable and effective. 41 LIDGER WOOD M'F'G CO. 165 Pearl St., N. Y.

CHAMPION

# **ELEVATORS**

HAS PAT. FRICTION PULLEYS, AN AUTOMATIC STOP, A STRONG IRON FRAME, A SAFETY PLATFORM, AND IS MADE IN A FIRST CLASS MANNER, AT VERY LOW RATES, BY D. FRISBIE & CO., NEW HAVEN, CONN

#### NEW BOOKS.

Heat.—A Practical Treatise on Heat as applied to the Useful Arts. For the use of Engineers, Architects, etc. By Thomas Box. Second Edition, revised and en-larged. Crown 8vo, cloth, \$5.00.

Hydraulics.—The New Formula for Mean Velocity of Discharge of Rivers and Canals. By W. R. Kutter. Translated from articles in the Cutur-Inquieur. By Lowis D'A. Jackson, A. I. C. E. 8vo, cloth, \$5.00. Algebra—Self-Taught. By W. P. Higgs. Crown Svo, cloth, \$1.00.

Graphic Statics—The Elements of. By Karl Von Ott. Translated from the German by Geo. Clarke. Crown 8vo, cloth, 82.00.

Cleaning and Scouring.—A Manual for Dyers and Laundresses, and for Domestic Use. By S. Christopher. 8vo, paper, 20 cents.

Turbines.—Principles of Construction and Efficiency of Water-Wheels. By Wm. Donaldson. Svo, deth, \$2.00.

Fires in Theaters.—By Eyre M. Shaw. 8vo, paper, 50 cents. Steam Towing on Rivers and Canals, by means of a Submerged Cable. With a description of their Cable System, by the patentees, F. J. Meyer and W. Wernigh. Plates, Svo., cloth, \$2.00.

Mining Machinery.—A Descriptive Treatise on the Machinery, Tools, and other Appliances used in Mining. By G. G. Andre, F. G. S. In tweive monthly parts, royal to, uniform with the Author's Treatise on Coal Mining. When complete, will contain about 150 plates, accurately drawn to stale, with descriptive text. Parts 1 and 2 now ready. Price, \$2.00 each.

E. & F. N. SPON, 446 Broome St., New York.

\$12 a day at home. Agents wanted. Outfit and terms free. TRUE & CO., Augusta, Maine.

### ESTABLISHED 1844.

JOSEPH C. TODD,

(Formerly of Todd & Raffert y) ENGINEER and MACHININT. Flax, Hemp, Jute, Rue, Oakum, and Ragging
Muchinery, Steam Engines, Bollers, etc. Also Agontfor
the celebrated and improved Rawson & Rittinger Hoisting Engine, I will furnish specifications and estimates for
all kinds of machinery send for descriptive circular
and price. Address and prine. Address

J. C. TODD,

10 Barclay St., New York, or Paterson, N. J.



[ESTABLISHED 1846.]

## Munn & Co.'s Patent Offices,

The Oldest Agency for oliciting Patents in the United States.

THIRTY YEARS' EXPERIENCE.

MORE PATENTS have been secured through this agency, at home and abroad, than through any other in the world.

They employ as their assistants a corps of the most ex-perienced men as examiners, specification writers, and draughtsmen, that can be found, many of whom have been selected from the ranks of the Patent Office.

SIX TY THO USA ND inventors have availed them-selves of Munn & Co.'s services in examining their in-

ventions and procuring their patents.

MUNN & CO., in connection with the publication of
the SCIENTIFIC AMERICAN, continue to examine inventions, confer with inventors, prepare drawings, specifications, and assignments, attend to filing applications in the Patent Office, paying the Government fees, and watch each case, step by step, while pending before the examiner. This is done through their oranch office, corner F and 7th Sts., Washington. They also prepare and file caveats, procure design patents, trade marks, and reissues, attend to rejected cases (prepared by the inventor or other attorneys), procure copyrights, attend to inter-ferences, give written opinions on matters of infringement, furnish copies of patents, and, in fact, attend to every branch of patent business, both in this and inforeign countries.

A special notice is made in the SCIENTIFIC AMER-A special notice is made in the SCIENTIFIC AMER-ICAN of all inventions patented through this agency, with the name and residence of the patentee. Patents are often sold, in part or whole, to persons attracted to the invention by such notice. Patents obtained in Canada, England, France, Belgium,

Germany, Russia, Prussia, Spain, Portugal, the British Colonies, and all other countries where patents are granted, at prices greatly reduced from former rates. Send for pamphlet pertaining specially to foreign pat-ents, which states the cost, time granted, and the requirements for each country.

#### Copies of Patents.

Persons desiring any patent issued from 1836 to November 26, 1867, can be supplied with official copies at rea sonable cost, the price depending upon the extent of drawings and length of specifications.

Any patent issued since November 27, 1867, at which time the Patent Office commenced printing the draw and specifications, may be had by remitting to this of-

A copy of the claims of any patent issued since 1638 will be furnished for \$1.

When ordering copies, please to remit for the same as above, and state name of patentee, title of invention,

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 handbook of reference for everybody. Price 25 cents, mailed free

MUNN & CO.,

Publishers SCIENTIFIC AMERICAN, 37 Park Row, N. Y. BRANCH OFFICE-Corner of F and 7th Streets,