Movertisements.

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 bead advertisements 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.



athes Automatic

...cutting

9 and 11-inch Swing. Newand Original Features Send for Catalogue B. Seneca Falls Mfg. Company, 695 Water St., Seneca Falls. N. Y.

POWER & FOOT SHAPERS, PLANERS, DRILLS, ATHES, MACHINE SHOP OUTFITS TOOLS AND SUPPLIES. CATALOGUE FREE SEBASTIAN, LATHE, CO. 120 CULVERT ST. CINGINNAT I. O.

BOYS! Moll! "Strike while the Iron's Hot."
Complete and ThorOugh Instruction

ADVANCE YOUR SCHOOLS OF
THE HOME SCHOOLS OF
Mechanical Electrical Steam City.

THE HOME SCHOOLS OF
Mechanical, Electrical, Steam, Civil, and Sanitary Engineering,
Architecture, Metal Working, Pattern Making.
To encourage youto start now, we
furnish \$II mechanical drawing outfit free. Small Fees. Advance or
Installments. Send for beautifully
illus. 100 page S. A. catal. postpaid.
United Correspondence Schools.
154 to 158 5th Ave., New York, N. Y.
F. W. EWALD, Gen. Mgr.



Price List on application to WALWORTH MFG. CO., 20 Oliver St., BOSTON, MASS.



SAVE ¼ YOUR FUEL By using our (stove pipe) RADIATOR.

With its 120 Cross Tubes, ONE stove or furnace does the work of TWO. Drop postal for proofs from

TO INTRODUCE OUR RADIATOR. the first order from each neighborhood filled at WHOLESALE price, and secures an agency. Write at once.

ROCHESTER RADIATOR COMPANY, 82 Furnace St., ROCHESTER, N. Y.

STEAM A mill for crushing ores. Equal in efficiency to a five stamp battery, and at the prospector and mining apitalist. Send for station capitalist. Send for catalogue.
GATES IRON WORKS, Dept. C,
650 Elston Ave., Chicago, U, S. A.



Water Emery Tool Grinder

Has no pumps, no valves. No piping required to supply it with water. Always ready for use. Simplest in construction, most efficient in operation.

F Send for catalogue and prices
W. F. & JNO. BARNES CO. 1999 Ruby St., Rockford, III.

eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee FOR BICYCLE USE. We now make for our Adjustable Jaw Cut-Nipper Jaws specially shaped to cut wire in bicycle rims. Same price as other er styles, \$200. Catalogue of Fine Tools free. L.S. STARRETT CO:, Athol, MASS.

THE COBURN PATENT TROLLEY TRACK



HOUSE DOOR HANGERS_

The first made with adjustable track. The track can be put up in 30 minutes.

Send for Book.

The Coburn Trolley Track Mfg. Co., Holyoke, Mass.

ROCK DRILLS AIR COMPRESSORS SIMPLEST, MOST EFFICIENT and DURABLE.

RAND DRILL CO.

Send for Catalogue

100 Broadway, New York.



Physical and School Apparatus THE THERMOPHONE

A new instrument for Measuring Temperatures Will take temperature of anything at any range or distance.

Efficiency Circular free. E. S. RITCHIE & SONS,

BROOKLINE, MASS.

Fodder shredder, J. K. Wilder
Forge tire holder, J. B. Farrar
Fork for holding ears of corn, W. H. White...
Form and press, garment, L. M. Marble...
Formaldehyde generator, F. C. Robinson...
Furnace door, H. C. Talbot...
Galvanic battery, H. J. Brewer
Game and discount apparatus, coin operated, L.
Canda...
Canda...
Game counter, Carsen & Glenn...
Garbage crematory, C. B. Bodine.
Gas engine, F. W. Spacke...
Gas generating apparatus, acetylene, C. H. Bellany...
Gas generator, acetylene, Raymond & Lemley...

Gas generating apparatus, acetylene, C. H. Bellamy.

Gas generator, acetylene, Raymond & Lemley.

Gas generator, acetylene, Raymond & Lemley.

593,122
Gas of ilmotor engine, F. W. Lanchester.

592,794
Gate, P. F. Glassbrenner.

Gate, P. F. Glassbrenner.

Gate, W. R. White.

Gate operating and locking device, C. B. Jehnson

593,156
Gate operating mechanism, sliding, A. R. Oliver
Generator. See Electric generator. Formalde

hyde generator. Gas generator. Steam generator.

Griders, etc., means for supporting ends of, A.

Westwood.

Glass objects, apparatus for manufacturing, B.

B. Hough.

592,784
Glass setting, plate, J. & J. P. Leve.

503,116

Girders, etc., means for supporting ends of, A. Westwood, apparatus for manufacturing, B. B. Hough. 592,784
Glass objects, apparatus for manufacturing, B. B. Hough. 592,784
Glass setting, plate, J. & J. P. L. ve. 593,110
Glassware reheating apparatus, Lazure & Denning. 593,108
Gruin griess, W. Munch. 593,108
Grain moving apparatus, pneumatic, F. J. Weber 592,916
Grain moving apparatus, pneumatic, F. J. Weber 592,768
Graphophone attachment, E. E. Bardsley. 592,538
Grate, J. W. Wolfe. 593,008
Granding mill, E. Reynolds. 592,828
Gunpowder, C. W. Volney. 592,828
Gunpowder, C. W. Volney. 592,829
Gun sight, telescopic, E. L. Zalinski. 592,828
Harmonica, C. Welss, Jr. 592,834
Harnonica, C. Welss, Jr. 592,834
Hose coupling, G. N. Wilson, 592,834
Hose supporter, A. S. Smith, 593,131
Hose coupling, G. N. Wilson, 592,834
Hose supporter, A. S. Smith, 593,131
Hose coupling, G. N. Wilson, 592,834
Hose supporter, A. S. Smith, 593,131
Hose coupling, G. N. Wilson, 592,834
Hose supporter, A. S. Smith, 593,131
Hose supporter, A. S. Smith, 593,132
Hose coupling, G. N. Wilson, 592,834
Hose supporter, A. S. Smith, 593,132
Hose coupling, G. N. Wilson, 592,834
Hose supporter, A. S. Smith, 592,834
Hose coupling, G. N. Wilson, 592,834
Hose coupling, G. N. Wils

Lamips, regulating socket for electric, C. A. Chutte.

Lanterns, automatic cutoff for magic, James & Barrows.

Lasting machine, A. F. Preston.

Latch, J. D. Woodbury.

Latch, J. D. Woodbury.

Lathe, automatic, C. P. Ball et al.

Lathe feed mechanism, engine, H. L. Flather.

Level, plumb, W. O. Sanders.

Light transmitter, G. K. Cunmings.

Liquid cooler, M. Hertwig.

Liquid eveator and conveyor, compressed air, L. A. Zobe.

Liquids, pasteurizing bottled. P. Van de Weste.

593,151 A. Zone...
Liquids, pasteurizing bottled, P. Van de Weste-laken...

Locking keeper, coin controlled key, W. B. Allen.
Loom brake mechanism, J. H. Northrop.
Lubricator. See Axle lubricator.
Lubricator. W. Grimes.
Mail box. A. C. Bruseau.
Measuring instrument. L. E. Howland.
Mill. See Grinding mill.
Mirror construction, H. E. Miller.
Miter box, J. A. Maxson.
Motor. See Churn motor. Rotary motor.
Mucilage pot, H. W. Scattergood.
Multiple drill, J. I. Warman.
Musical box winding device, C. A. Roepke.
Musical instrument pick, H. Ackermann.
Musical instrument stringing device, E. P. Newman.

Pliers, Effinger & Clutz. 592,908
Pliers, Effinger & Clutz. 592,766
Plow attachment, M. H. Dauhs. 592,766
Plow point, C. Anderson 592,558
Plow, wheel, W. L. Casaday 592,568
Plow, wheel, W. L. Casaday 592,568
Plom, Wheel, W. L. Casaday 592,568
Plom to the company of the compan

Press. See Baling press. Gluing press. Printing press. Printing and dyeing fabrics, apparatus for, F. Schreurs. Schreibung machine sheet feeding mechanism, G. F. Reads. F. A. Pulhemus. S93,163 Printing press, S. N. Svendsen. S93,169 Printing press, S. N. Svendsen. S93,169 Puller. See Stopper puller. Pulverizer, clod, Adel & Leih. Schreibung press, S. N. Svendsen. S93,169 Puller. See Stopper puller. Pulverizer, clod, Adel & Leih. S93,169 Pump and mechanism for operating same, C. P. Holst. Pulverizer, clod, Adel & Leih. S92,899 Pump. Vacuum or suction, A. Shiels. S92,898 Pumpling mechanism, Lehr & Moore. S93,178 Pumpkin powder, W. B. Gere. S92,896 Pumpling mechanism, Lehr & Moore. S93,178 Pumpkin powder, W. B. Gere. S92,896 Rail way leetric, R. M. Hunter. S93,167 Railway rail, J. P. Richardson. S92,878 Railway system, electric, W. Robinson. S92,878 Railway system, electric, W. Robinson. S92,878 Railway system, electric, H. P. Wellman. S93,164 Railway track structure, E. Samuel. S93,165 Reaming or cutting tool, A. A. Bartlett. S93,154 Reaming or cutting tool, A. A. Bartlett. S92,979

(Continued on page 318)



THE ECONOMY ADJUSTABLE FIRE-BOX PARTITION

FOR STOVES AND RANGES.

Patented in the United States and all foreign countries

This device divides the fire-box in the middle, thereby confining the fire to one-half the space usually occupied, and SAVES 50 PER CENT OF THE FUEL.

It can be easily adjusted to all cook stoves or ranges, having fire-box of any width or length and either perpendicular or angliry walls. It can be quickly inserted or withdrawn, even when the five is burning. Additional bottom draft is provided for the fire, thus insuring perfect combustion.

insuring perfect compusion.

TERRITORIAL RIGHTS for the exclusive sale of this useful invention for sale at reasonable rates. A sample partition sent for \$2.00 by expressprepaid to any part of the United States.

For circulars and information address

CARLETON CILBERT, P. O. Box 2490, - - NEW YORK, N. Y.

"It ~ Cells ~ About ~ Cools"



Every Mechanic, Metal Worker, or person interested in Machinery Supplies should have our new 1897 Tool Catalogue. It contains 70 pages, size 10½27½, and is an exhaustive and instructive list of all tools that may be required. Handsomely bound in cloth, express paid on receipt of \$1. Money paid for book will be refunded with first order amounting to \$10 or over. Send stamps or money order.

MONTGOMERY & CO. MAKERS AND JOBBERS IN

FINE TOOLS 105 Fulton Street, New York City

SYNCHRONOGRAPH.—A NEW METHod of rapidly transmitting intelligence by the alternating current. A full description of the interesting apparatus of Crebore and Squier. 13 illustrations. SCIENTIFIC AMERICAN SUPPLEMENTS 1114 and 1115. Price 10 cents each. For sale by Munn & Co. and all newsdealers. Send for new catalogue.

THE IMPROVED GAS ENGINE.

Two cylinders in one casting. Occupies less space and weighs less for its power than any engine made. Can be used wherever pow-er is required. Either sta-tionaryor marine. No fire. No heat. No smoke. Noli-censed engineer required. Send for catalogue. SINTZ GAS ENGINE CO.,

Grand Rapids, Mich., U. S. A.

THE OBER LATHES



For Turning Axe, Adze, Pick, Sledge, Hatchet, Hammer, Auger, File, Knife and Chisel Handles, Whiffletrees, Yokes, Spokes, Porch Spindles. Stair Balvatary dles, Whiffletrees, Yokes, Spunes, Porch Spindles, Stair Balusters, Table and Chair Legs and other irregular work.

Patented.

Send for Circular A.

The Ober Lathe Co., Chagrin Falls, O., U.S. A.

THE "INDUSTRIAL"

OXY-HYDROGEN COMPOUND JET.
Capacity. 1000 candle power. Highly finished and nickel plated. Price \$10.00. This let can be fitted to almost any good magic lantern, etc., and will produce a very powerful and white light.
Write to Peters, Mantz & Co. (many years with the late Chas. Beseler), Makers and Patentees of High Grade "Industrial" Stereopticons, Magic Lanterns, and Accessories of every description used for Lantern Projection. 125 and 127 Worth Street, New York Ci n Projection. t, New York City. ery description used for Lantern I 125 and 127 Worth Street,

TIGHT

GRIP. The SKINNER PAT-ENT DRILL CHUCK is simple, strong, and accurate. The jaws are of hardened tool theel. Stands severest tests. Is self-centering, self-tightening, most durable. Holds straight or taper shank drills. Sendier catallense.

SKINNER CHUCK CO., Church St., New Britain, Conn.

Phonographs, Graphophones, Projectoscopes, Kinetoscopes,

RECORDS, FILMS, ETC.

36 page illustrated catalogue sent free on receipt of 2-cent stamp. The Edison Phonograph Co.,427 Vine St., Cincinnati, O.

50 YEARS' EXPERIENCE TRADE MARKS COPYRIGHTS &C.

Anyone sending a sketch and description may quickly ascertain our opinion free whether an invention is probably patentable. Communications strictly confidential. Handbook on Patents sent free. Oldest agency for securing patents. Patents taken through Munn & Co. receive special notice, without charge, in the

Scientific American.

A handsomely illustrated weekly. Largest cir-culation of any scientific journal. Terms, \$3 a year; four months, \$1. Sold by all newsdealers.

MUNN & Co. 361 Broadway, New York och Office, 625 F St., Washington, D. C





This beats Wind, Steam, or Horse Power. We oder the WEBSTER 2½ actual horse power

GAS ENGINE
for \$150, less 18% 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 300 pounds.
Made for Gas of Gasoline.

EFF Write for Special Catalogue.

WEBSTER M'F'G CO., 1074 West 15th Street, CHICAGO.

OLDS Garofine ENGINE

Has no moving parts in mixing device. No gears or levers. The two poppet valves are operated in straight line by plain eccentric from main shaft. Mechanically correct. Indorsed by economists.

Does not balk in either warm or cold weather. 1

P. F. Olds & Son Engine Works. Bo

1 to 50 horse power P. F. Olds & Son Engine Works, Box 418, Lansing, Mich

PIERCE 2 ACTUAL H. P.

PRICE, Complete, \$135.00. Made for Gas or Gasoline. MARINE ENGINES TO 4 H. P. 16, 18 and 21 foot Launch Outfits complete. All sizes Stationary to 25 h. p. Send for Circular of size wanted.

PIERCE ENGINE CO.
17 N. 17th St., Racine, Wis.

THE MACHINERY OF A NAPHTHA Launch.—A detailed description of the motive power of a Modern Naphtha Launch, with sectional views showing all the parts of the boiler and engine. A most valuable paper. 4 illustrations. Contained in SUPPLE-MENT 1104. Price 10 cents. For sale by Munn & Co. and all newsdealers.



Motor controlled from bow. Valve movement, 12 to 1, 16 to 60 ft. Launches. Twin Screws a specialty. 1, 2, 3.5, 7, 12, 14 and 20 h. p. No licensed engineer or pilot required. Speed and Safety guaranteed. No dangerous Naphtha or Gasoline used. No disagreeable vibration.

Esend Ten Cents in Stamps for 1897 Catalogue.
Marine Vapor Engine Co., ft. Jersey Av., Jersey City, N.J.



NICKEL

Electro-Plating Apparatus and Material. Hanson & Van Winkle Co., Newark, N. J. 136 Liberty St., N. Y. 35 & 37 S. Canal St., Chicago.

EDGE TOOLS-• are often nearly ruined by using a grind-stone not adapted to the work. Our quarries produce a large variety of grits suitable for grinding any tool.

If May we send you our Catalogue, which will give you some information?

GRAFTON STONE COMPANY, No. 80 River Street,

Grafton, Ohio

Works Lilko
Perfect satisfaction is experienced by those who have used our No. 5, 6 or 9 Hand Pipe Threading and Cutting Machines. Portable, crank or ratchet power. Gears housed from dust. Chasers set by graduation to any size, can be released from threading while in motion, opened to permit pipe being cut, and instantly, closed. Will cut any pitch of thread. Send for free catalogue to The Merrell Manufacturing Co., 501 Curtiss St., Toledo, Ohio.



EACH

Send for free catalogue to The Merrell Manufac-turing Co., 501 Curtiss St., Toledo, Ohio. PERPETUAL MOTION.—A VALUABLE series of papers giving all the classic forms of perpetual motion apparatus. The literature on this subject is so very limited, the only book being entirely out of print, so that this series will be important to all inventors. 30 illustrations. Scientific American Supplement, Nos. 1130. 1131, 1133, 1135, 1136. 1137. 1138. Price, 10 cents each. For sale by Munn & Co. and all newsdealers. Send for new catalogue.

THE INGERSOLL DOLLAR WATCH

Nowhousehold words. 2,000 000
Sold in 2 Years under an ABSQIUTE GUARANTEE printed below has
made them so. We have demonstrated that a 6000 Watch for a
Dollar is possible. The sales are
now over 3,000 per day. You
want one—either for yourself,
your Boy or your "Bike."
As good as any Watch made
for ordinary every-day use.
Keeps Accurate Time.
(Guaranteed as below.) Has lever escapement, quick train; second hand; good nickel
case; Keyless Wind and
Set; 18 size. Buy this
Watch to use and a



\$50.00 one for SHOW. Sent post-paid for ONE OGLLAR. Attach-ments for Bicycle 25c. extra