

continued to turn uniformly. 2. The Signal Service will decide the question of aerial tides. 3. We do not know. 4. The "Physical Geography of the Sea" is a superficial work, though interesting.

S. S. asks: How can I calculate the torsional strain, or ultimate resistance to rupture, of a wrenching or twisting force applied to rectangular bars of cast and wrought iron, the length of the lever to which the force is applied being known? A. Let S = one side in inches, s = other side in inches, L = leverage in inches. For cast iron: Torsional strength in lbs. = 12,000 x S^2 x s^2 / (sqrt(S^2 + s^2) x L)

E. A. S. asks: How can I make ink that will write with a "greenish" color, at first, and afterwards change to a deep black? Answer: There are various formulae for making ink. We can recommend this on good authority: Aleppo galls (well bruised) 4 ounces, clean soft water 1 quart; macerate in a clean corked bottle ten days or two weeks, with frequent agitation. Then add gum arabic (dissolved in a wineglass full of water) 1 1/2 ounces, lump sugar 1/2 ounce, mix well and afterwards filter through a fine cloth (greencoppers) crushed fine, 1 1/2 ounces; agitate occasionally for two or three days; then decant for use, but it is better to let the whole digest together two or three weeks. Product one quart, pale at first but soon turning intensely black.

J. E. A. asks: Are tables ever moved in the presence of so-called mediums, without contact with any person or mechanical device whatever? A. Statements to that effect have frequently been made, but we should require stronger evidence than has yet been presented to induce us to credit them.

A. M. S. says: A. H. on page 363, inquires how he can remedy the lack of power in a 25 feet breast wheel. The only remedy is in running it faster, not slower, using as much (and a little more) water in proportion as it runs faster than before. Let him reduce the 8 feet drum so as to give the wheel a little advantage over the present arrangement. He will not get so good a result from the water as formerly, and will consequently need to make a little allowance for that. I should say that if the 8 feet drum was reduced to 7 feet, or if the pulley driven by the 8 feet drum was lagged in proportion, he would be enabled to get speed. There might be a question of supply of water in the latter case.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined with the results stated:

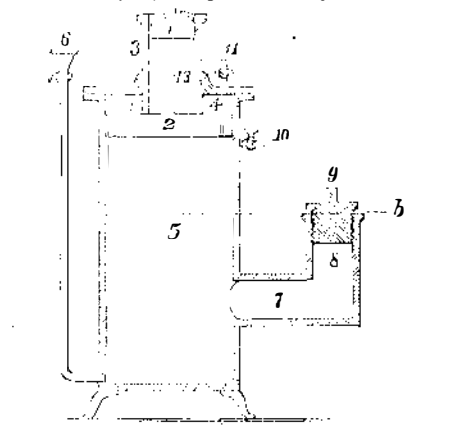
J. R. E.—From our recollection of the small specimen of blue clay sent, it contained no graphite. Although graphite is sometimes contaminated with clay, it generally occurs in quartz, granite, gneiss, or carbon, and of lime. Many clays take a polish from the finger nail; and when dark, as blue clay, the luster is metallic like that of plumbago, although none of the latter be present. Graphite, again, when disseminated in primitive or transition rocks, occurs in minute scales or nodules of different sizes not difficult to distinguish. Should it occur in small masses with clay, it could be separated from the clay by washing and running off the suspended clay, the plumbago sinking to the bottom of the vessel.

J. H. S.—The tar enclosed is a hydrocarbon of the nature of liquid bitumen, and the substance from which it has been obtained is probably (judging from the mineral enclosed) a limestone impregnated with bitumen. The mineral is limestone, containing a small quantity of iron pyrites. From the indications disclosed, and the fact that oil is found floating on the surface of ponds in the vicinity, we should judge that petroleum might be found at a sufficient depth.

J. H.—This ore is micaceous oxide of iron, so called from its being easily broken and reduced to small shining scales like mica. It is often found in connection with common specular iron, and is sometimes associated with the red oxide of iron, but it is rarely in sufficient quantity to be explored by itself. It yields about 70 per cent of good iron.

W. M. L.—Selenite, a pure variety of crystallized sulphate of lime or gypsum.

A. M. B.—Carbonate of iron, or sparry iron, a compound of carbonic acid and iron.



fluid by opening the cock 10 to let air out—filling first by removing plug, 9, and filling up to dotted line b, then replacing plug. 7 and 8 is a bent tube of 6-25 square inches area, attached to cylinder 5. 9 is a plug to stop mouth of 3/4 tight. 10 and 11 are ordinary cocks. 12 and 13 are ordinary piston rods. If 3, 4, 5, 6, 7 and 8, being full of water or mercury and all the cocks closed, pistons being in position shown in the figure, if the plug 9 is removed and weights are so placed as to overcome the friction of the piston, will they fall? If so, with what velocity, and how far? [We think our readers will have no difficulty in solving this question, as it is capable of rigid demonstration, if weights of the moving parts and the liquid are given. We shall be glad to have replies.—Eds.]

F. C. L. asks: How can I make an emery wheel?—S. H. N. asks: Is the superheating attachment placed in the Great Eastern steamer still in use?—C. A. B. asks: Is there published a book of instructions on news-

paper and job printing?—S. A. T. asks: How did the old Romans calculate sums by numeral letters? For example, how did they divide MDCCLXXII by XXIV, or multiply DCCLII by XXIV?—R. C. C. asks: How can I make colored transparent pictures for the magic lantern? I cannot make water colors transparent.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

- On Magic Squares. By G. B. M.
On Sewage. By G. H. T.
On the Diameter of the Earth. By A. F.
On the Percentage of Work. By E. W.
On the Nickel Mines in the United States. By N.
On Coal Tar Products. By J. T. P.
On the Labor Question. By N. A. W.
On Ramming the Mold. By B. W.
On Magnets. By C. H. M.
On Solar Heat. By J. G.

Also enquiries from the following: Q. X. P.—J. M. C.—C. L.—A. L. B.—A. B.—II. & Co.—C. C.—J. H. W.

Correspondents in different parts of the country ask: Who makes the best foot power jig saw? What is the best work on short hand writing? Who sells the best post hole augers? Makers of the above articles will probably promote their interests by advertising, in reply, in the SCIENTIFIC AMERICAN.

Correspondents who write to ask the address of certain manufacturers, or where specified articles are to be had, also those having goods for sale, or who want to find partners, should send with their communications an amount sufficient to cover the cost of publication under the head of "Business and Personal" which is specially devoted to such enquiries.

[OFFICIAL.]

Index of Inventions

FOR WHICH

Letters Patent of the United States WERE GRANTED IN THE WEEK ENDING

December 9, 1873,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

Table listing inventions granted in the week ending December 9, 1873. Includes items like Alarm, burglar, H. L. Brown; Alkaline solutions, re-using, J. H. Dugan; Axle, carriage, S. S. Cook; Bale tie, cotton, G. N. Beard; Bale ties, forming, J. McClean; Bands, making endless, L. Binns; Bed, sofa, E. N. Doring; Bedstead, E. Morris; Bedstead, sofa, J. B. Harlow (r); Bee hive, L. Adams; Belt, endless driving, J. F. Reigart; Billiard cushion, M. Delaney (r); Billiard cushions, mold for, M. Delaney (r); Blowing machine, J. G. Baker; Boiler, wash, W. W. Turtelot; Boot and shoe heel, Blake & Libby; Boot heels, burnishing, R. C. Lambert; Boots, etc., lasting jack for, J. C. Drew; Bottle stand, wire, G. D. Dudley; Boxes, sheet metal, W. J. Gordon; Bracket, metallic, A. D. Judd; Brick machine, J. M. Mitchell; Brick machine, L. Patterson; Bridles, etc., punching, J. B. Gathright; Brush, fountain, R. Lapham; Buckle, harness, J. Allbee; Bureau and wardrobe, H. H. Staugaard; Burner, lamp, R. S. Merrill; Butter worker, D. W. Wake; Camera, stereoscopic, W. Harris; Can, milk, J. F. Cass; Can, paint, J. R. Cole; Can, paint, H. Miller; Can, etc., paint, F. L. Miller; Car axle box, J. G. Johnson; Car brake, J. G. Wiggins; Car coupling, J. Keck; Car coupling, Krapp & Boerckel; Car coupling, H. H. Patter; Car coupling, A. Strain; Car, railway, C. W. Saladee; Car, railway, C. W. Saladee; Car starter, A. Whittemore; Car wheel lubricator, W. A. Bullard; Carriage, child's, J. N. Hazell; Carriage curtain fastening, F. Baumgartner; Carriage spring, J. Bullock; Carriage spring, R. Walker; Cart loading scoop, A. Vreeland; Churn dasher, G. W. Barker; Cigar box, H. Fowler; Cock, gas, E. M. Morris; Coop, folding, E. P. Lawrence; Corn sheller, J. Marshall; Corn shocker, G. E. Johnson; Corpse preserver, C. O. Peck; Cotton opener feed, R. Kitson; Crimping machine, L. P. Lum; Cultivator, wheel, G. Bradley; Curtain fixture, C. C. Moore; Cutter, angle iron, H. McGuffie; Dental filling, C. E. Blake; Dental purposes, metallic foil for, C. E. Blake; Disinfecting compound, Lee & Davis; Drill, rock, W. Roberts, Jr.; Drill, seed, R. H. D. Morrison; Egg carrier, W. A. Laverty; Engine, rotary steam, W. F. Moody; Engine, steam and air, F. J. Crouch; Engine, vapor, W. Wells; Equalizer, draft, Collins & Stiles; Explosive compound, C. Dittmar; Eye and lung protector, G. A. Crofut; Faucet, bung, G. D. Lee; Filter for wine, C. W. Farcloth; Fire brick stove linings, etc., E. H. Richter; Fire extinguisher, W. L. Drake; Fire extinguisher, W. L. Drake; Furnace for reducing iron ores, J. Wilson; Furnace, zinc, E. H. and F. G. Richter.

Table listing inventions granted in the week ending December 9, 1873. Includes items like Furnaces, etc., lining, A. E. Bates; Game apparatus, R. E. Bean; Game board, A. F. R. Arndt; Gas, water, E. J. Jerzmanowski; Gate, M. Loomis; Gate fastener, J. H. Nichols; Generator, steam, E. Goddard; Glue, manufacture of, B. F. Shaw; Grain cleaner and crusher, N. Thiele; Grate, stove, G. R. Moore; Harness loop, F. Hickman; Harvester dropper, A. J. Hodges; Hat linings, label for, T. W. Bracher; Hay loader, C. E. Warner; Heater, water, A. Spence; Hides or skins, sweating, W. M. Mason; Hinge, stop, G. C. Thomas; Hoop bending machine, E. Coapman; Horse power, D. Woodbury; Horses, device for detaching, E. P. Jones; Horseshoe, G. H. Todd; Horseshoe nails, H. D. Cowles; Hose, flexible pipe for, J. Greacen, Jr.; Hydrant, W. H. Graham; Ice creeper, R. H. Earle; Indicator, low water, F. Steele; Ingot mold, N. Churchman; Inkstand, A. D. Judd; Iron and steel, welding, J. Popping; Iron, manufacture of, W. J. Taylor; Iron, manufacture of, W. J. Taylor; Joint, ball and socket, M. W. St. John (r); Journal and bearing, J. Whitaker; Journals, etc., packing, S. Baxendale; Key, door, J. Collins; Knife, shoe, A. J. Hall; Latch, gate, G. N. Sharp; Lathe chuck, sleigh bell, W. E. Barton; Liquid measure, Weyer & Johnson; Lithographic press, B. Huber; Lithographic prints on glass, etc., O. P. Wolf; Lock, H. Steinf; Loom, S. T. Thomas; Lounge, A. Heyer; Lounge and chair, M. P. Robinson; Lubricator for car wheels, W. A. Bullard; Marble, etc., artificial, F. H. Hall; Meat holder, S. Beissel; Mechanical movement, J. S. Crapston; Medical compound, W. F. Staten; Metals, compressing cast, H. W. Barnum; Mill, clay, Vaughn, Camp & Merrill; Mitering machine, C. Loetscher; Mop head, C. B. Clark; Muff stand, L. Bergtold; Nut lock, E. Kaylor; Organ valve, pipe, W. Schulke; Oil cloth, printing, W. E. Worth; Ore washer, R. Sollday; Paper, designer's, A. Akeroyd; Paper cutting machine, G. A. Walker; Peg cutter, A. Whittemore; Pianoforte action, A. K. Hebard; Plane iron, E. Quast; Planing machine shaving conductor, W. Weaver; Planter, corn, J. Case; Plastering machine, Stevens & Watson; Plow, subsoil gang, C. Myers; Press, copying and folding, S. W. Odell; Printer's perforating rule, C. W. Ames; Printing ink apparatus, M. England; Propeller for vessels, J. D. Fraser; Railway rail joint, W. G. Dunn; Railway rail joint, W. Thompson; Railway signal, pneumatic, W. E. Prall; Railway tracks, repairing, Wardell & Elmer; Railway electric signal, F. L. Pope; Refrigerator, R. Thomson; Roller, sand paper, H. W. Brett; Sash balance, R. Faries; Saw gumming machine, H. Baughman; Screw, J. Frearson; Separator, ore, H. P. Miot; Sewing machine, Fanning & Nugent; Sewing machine shuttle, G. W. Hunter; Sheet metal ware, handle for, J. Fallows; Shirt, S. S. Gray; Shutter and window fastener, W. T. Fry; Sifter, flour, F. G. Ford; Signal, pneumatic railway, W. E. Prall; Signal, switch, C. W. Spayd; Skate, C. W. Jenkins; Skirt protector, G. E. King; Sleigh, A. A. Abbott; Smoke stack, T. F. Conklin; Soap cutting machine, J. B. Utch; Spinning machine, C. S. M., & H. M. Williams; Spool stand, W. Harris; Steering apparatus, C. W. Buffington; Stone, artificial, T. Chrimes; Stone cutting machine, West & Fish; Stone, artificial, E. L. Rausome; Stove, cooking, L. E. Clow; Stove, cooking, S. Long; Stove, heating, J. Johnson; Stove, subaqueous gas, S. H. Starr; Sugar, etc., cleansing, A. H. Talt; Table and desk, drawing, J. A. Wilkens; Thill coupling, W. R. Bowman; Ticket case, L. J. Blades; Tobacco package, G. Robinson; Towel rack, C. Schermerhorn; Trap, steam, J. Bishop; Truck, hand, N. Adams; Trunk, J. L. Lowman; Tubing, making metallic, J. Huggins; Umbrella, G. W. Pressey; Umbrella supporter, W. A. Brown, Jr.; Urinal, J. C. Garnsey; Vehicle, Gorman & Thiel; Vessels, construction of, H. Hirsch; Water wheel, M. H. Heylman; Water wheel, J. Taney (r); Weaver's harness, making, J. H. Crowell; Wells, constructing, A. Curtis (r); Wheel, vehicle, A. Buchholz; Wheel, vehicle, B. French; Windmill, M. T. & M. C. Chapman; Wire, G. D. Dudley; Wire stand or holder, G. D. Dudley; Wood bending machine, H. Hanna; Wrench, ratchet, I. C. Colbert; Yokes, bow pin for ox, W. J. Ives; Yoke bow fastener, etc., ox, E. N. Bacon; Zinc, apparatus for granulating, E. H. Richter.

Table listing inventions granted in the week ending December 9, 1873. Includes items like BLACKWASHING MOLD, W. Ferguson; TIMBER BENDING CHAIN, L. Heywood; TURNING LATHE, W. Sellers; LANTERN, A. Tufts; FITTING SINKS, J. Ingram; SEWING MACHINE, L. V. Langdon; HORSESHOE NAIL MACHINE, W. Tallman.

EXTENSIONS GRANTED.

Table listing extensions granted for patents. Includes items like FIRE KINDLER, E. Bellinger; SEED PLANTER, W. Blessing; RAILROAD SWITCHES, W. Wharton, Jr.

DISCLAIMER.

28,244.—RUFFLE.—G. B. Arnold.

DESIGNS PATENTED.

Table listing designs patented. Includes items like BUTT HINGE, W. Gorman; DOOR KNOB ROSE, W. Gorman; DOOR KNOBS, W. Gorman; ESCUTCHEON, W. Gorman; GRINDING MILL FRAME, J. G. Lane; LAMP SHADE, W. L. Libbey; FLY WHEEL, J. G. Baker; CARPETS, H. Horan; CARPET, H. Knight; FLOOR OIL CLOTHS AND CARPETS, C. T. Meyer; CARPETS, E. J. Ney; CARPETS, H. Nordman; BADGE, J. Seymour; SHOW CASE CORNER, T. Vaughan; COOK STOVE, N. S. Vedder.

TRADE MARKS REGISTERED.

Table listing trade marks registered. Includes items like SOAP, R. M. Bishop; CURED MEATS, W. H. Davis; CORSET SPRINGS, F. L. Egbert; WHISKY, E. A. Fargo; FERTILIZER, J. M. Rhodes; COTTON GIN, Brown Gin Co.; CARPETS, J. Dornan; WHISKY, E. Howe; OYSTERS, O. W. Miller.

SCHEDULE OF PATENT FEES.

Table listing patent fees. Includes items like On each caveat, \$10; On each Trade Mark, \$25; On filing each application for a Patent (17 years), \$15; On issuing each original Patent, \$20; On appeal to Examiners-in-Chief, \$10; On appeal to Commissioner of Patents, \$20; On application for Reissue, \$30; On application for Extension of Patent, \$50; On granting the Extension, \$50; On filing a Disclaimer, \$10; On an application for Design (3 1/2 years), \$10; On application for Design (7 years), \$15; On application for Design (14 years), \$30.

[Specially reported for the Scientific American.]

CANADIAN PATENTS.

LIST OF PATENTS GRANTED IN CANADA DECEMBER 15 TO DECEMBER 17, 1873.

Table listing Canadian patents granted. Includes items like J. H. Smith, Arlington Square; Edward Gurney, Toronto; J. L. Thurston, Douro township; A. A. Herriman, Greensborough; G. M. Stevens, Portland; F. Jessop, York; N. Phaneuf, Montreal; D. E. Rice and A. W. Mitchell, Detroit; M. Stephens, Brooklyn; J. H. Thorp, Chicago; I. Erb, Buffalo; Jas. Foley, Montreal; G. Lowden, Brooklyn.

HOW TO OBTAIN Patents and Caveats IN CANADA.

PATENTS are now granted to inventors in Canada, without distinction as to the nationality of the applicant. The proceedings to obtain patents in Canada are nearly the same as in the United States. The applicant is required to fur

lish a model, with specification and drawings in duplicate. It is also necessary for him to sign and make affidavit to the originality of the invention.

The total expense, in ordinary cases, to apply for a Canadian patent, is \$75, U. S. currency. This includes the government fees for the first five years, and also our (Munn & Co.'s) charges for preparing drawings, specifications and papers, and attending to the entire business.

Persons who desire to apply for patents in Canada are requested to send to us (Munn & Co.), by express, a model with a description, in their own language, showing the merits and operation of the invention, remitting also the fees as above for such term for the patent as they may elect.

On filing an application for a Canadian patent, the Commissioner causes an examination as to the novelty and utility of the invention. If found lacking in either of these particulars, the application will be rejected, in which case no portion of the fees paid will be returned to the applicant.

Inventors may temporarily secure their improvements in Canada by filing caveats; expense thereof, \$35 in full.

For further information about Canadian patents, assignments, etc., address

MUNN & CO., 37 Park Row, New York.

Advertisements.

Back Page \$1.00 a line.

Inside Page 75 cents a line.

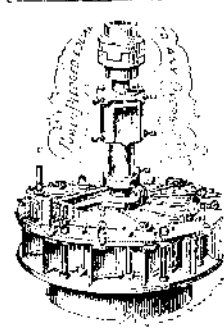
Engravings may head advertisements at the same rate per line, by measurement, as the letter press.

The value of the SCIENTIFIC AMERICAN as an advertising medium cannot be over-estimated. Its circulation is ten times greater than that of any similar journal now published.

BAIRD'S BOOKS FOR PRACTICAL MEN.

My new, revised and enlarged Catalogue of PRACTICAL AND SCIENTIFIC BOOKS—96 pages, 8vo.—will be sent, free of postage, to any one who will favor me with his address.

HENRY CAREY BAIRD, INDUSTRIAL PUBLISHER, 406 WALNUT STREET, Philadelphia.



TURBINE Water Wheels.

More than four times as many of James Leffel's Improved Double Turbine Water Wheels in operation than any other kind.

THE PHRENOLOGICAL JOURNAL. Is a first-class monthly devoted to science, literature, and general intelligence, including physiology, physiognomy, psychology, and to all those progressive measures calculated to improve mankind.

EMPLOYMENT FOR ALL. The Independent.

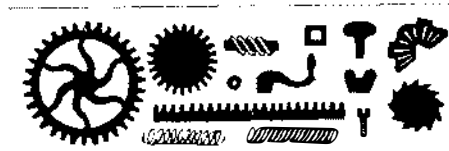
A first-class Family and Religious Journal. From \$100 to \$200 easily made. Each subscriber receives a premium worth more than the subscription price.

WHALEN TURBINE. No risks to purchaser. Pamphlet sent free. SETH WHALEN, Baiton Co., N. Y.

Young America Printing Press. For full particulars of the cheapest, most simple, durable, and effective press ever made, address JOSEPH WATSON, 3 Province Street, Boston; 53 Murray Street, New York.

A NO. 1 IMPROVED GUN OR RIFLE SIGHT, adjustable and convertible; Coarse to fine, five or more sizes combined. For Sale, entire right, or on royalty. Address Inventor, M. W. HARRINGTON, Homestead, Iowa.

The HAWLEY KILN for burning brick, tile, pottery, &c. Produces uniform results, avoids inferior stock, saves fuel, labor and time. European Patents obtained. For privileges at home or abroad, address A. R. MORJAN, 193 Fulton St., New York.



NEW CATALOGUE FREE. Small Tools of all kinds; also GEAR WHEELS, parts of MODELS, and materials of all kinds.

HARD WOODS

IN LOGS, PLANK, BOARDS & VENEERS. The choicest and largest Stock in market. Our own Importation and manufacture. SEASONED MAHOAGANY, WALNUT, HOLLY, RED and SPANISH CEDAR, and all other kinds.

REYNOLDS' Turbine Water Wheels. 30 years' experience enables me to excel in Gearing Mills of all kinds, and furnishing them reliable, economical power.

PATTERN & BRANDING LETTERS—SHARP, Flat or Round Surfaces—Large stock. PAVE-MENT Letters, suitable for ARTIFICIAL STONE-WORK.

GORHAM'S SILVER MARKER for Lunch, Cards, Excursions, &c. Best and complete with case of type for \$1.00. Fully chased and heavily silver plated.

\$1,500,000.

Fourth Grand Gift Concert, FOR THE BENEFIT OF THE PUBLIC LIBRARY of KY. DRAWING DEFERRED TILL 31st of March Next, to complete the sale of tickets and make a FULL DRAWING.

Table with 2 columns: Description of gift and Amount. Includes items like 'ONE GRAND CASH GIFT \$250,000', '10 CASH GIFTS, \$10,000 each', etc.

Total, 12,000 Gifts, all Cash, amounting to \$1,500,000. The concert and distribution of gifts will positively and unequivocally take place on the day now fixed, whether all the tickets are sold or not.

"WHERE TO WINTER"—EAST, West, North or South—for Health and Comfort. THE SCIENCE OF HEALTH for January gives particulars; also, "How to Get Well and Keep Well."

The American Turbine Water Wheel. Recently improved and submitted to thorough scientific tests by James Emerson, showing the following useful effect of the power of the water utilized, being the highest results ever known.

JOSEF OESTERREICHER, VIENNA, has removed his Commission Agency for Machines from Agency St., No. 3, to his own warehouse, Victoria 22, IV district.

P. BLAISDELL & CO., Worcester, Mass., Manufacturers of the Blaisdell Patent Upright Drills, and other first-class Machinists' Tools.

A. S. GEAR, Sole Owner and Manufacturer of the GEAR VARIETY MOULDING MACHINE—Legality of Patent Sustained in U. S. Circuit Courts—Price \$150, \$175, \$300, \$450, \$550—and Manufacturer and Dealer in all kinds of Wood and Iron Working MACHINERY, Steam Engines & Mechanical Supplies, 56 to 62 SUDBURY ST., BOSTON, MASS.

SHINGLE AND BARREL MACHINERY.—Improved Law's Patent Shingle and Heading Machine, simplest and best in use.

1832. SCHEENCK'S PATENT. 1871. WOODWORTH PLANERS. And Re-Sawing Machines, Wood and Iron Working Machinery, Engines, Boilers, etc.

G. E. ILLINGWORTH, Neville St. Fourm dry, Leeds, England, makes a Specialty of his 10-inch Lathes. All parts are interchangeable, being made in duplicate, by patent machinery, thus ensuring Accuracy and Excellence of Workmanship.



OTIS' Machinery. SAFETY HOISTING. OTIS, BROS. & CO., NO. 348 BROADWAY, NEW YORK.

NEW & IMPROVED PATTERNS.—MACHINISTS' TOOLS—all sizes—at low prices. E. GOULD, 97 to 113 N. J. R. Ave., Newark, N. J.

U. S. Piano Co., 810 Broadway, N. Y. You ask WHY we can sell our First Class 7 Octave Pianos for \$290? We answer—It costs a piano \$300 to make any \$600 Piano sold through Agents, all of whom make 100 per cent profit. We have no agents, but direct to families at Factory price, and warrant a Year.

WORKING CLASS Made or Female, \$30 per week, employment at home, day or evening, no capital; instruction & valuable package of goods sent free by mail. Address, with six cent return stamp, M. YOUNG & CO., 173 Greenwich St., N. Y.

PATENT COLD ROLLED SHAFTING. In fact, this shafting is superior to any other shafting, a finer finish, and it is stronger, and other in use, renders it undoubtedly the most economical.

STENCIL DIES For cutting business Stencils, all sizes. Also complete outfits for Clothing Stencils and Key Checks, with which young men are making from \$5 to \$20 a day.

WROUGHT IRON BEAMS & GIRDERS. THE Union Iron Mills, Pittsburgh, Pa. The attention of engineers and Architects is called to our improved Wrought-Iron Beams and Girders (patented), in which the compound welds between the stem and flanges, which have proved so objectionable in the old mode of manufacturing, are entirely avoided.

480 LONG COLUMNS of Splendid Stories, Tales, Sketches, Poetry, Wit, Humor, Exposures of Humbugs, etc., etc. The cheapest and best reading in the world, mailed free for only 35 cts. Address HUNTER & CO., Hindsdale, N. H.

CATECHISM OF THE LOCOMOTIVE. With the first number in 1874, the RAILROAD GAZETTE will begin the publication of a Catechism of the Construction, Operation and Management of American Locomotives, specially intended for the instruction of Firemen and Locomotive Runners, and for all who wish to obtain a general knowledge of the Locomotive.

WOODWORKING MACHINERY. MOLDING, MORTISING TENONING & SHAPING MACHINES, BAND SAWS, SCROLL SAWS, Planing & Matching MACHINES, &c. For RAILROAD, CAR, and AGRICULTURAL SHOPS, &c. Superior to any in use. J. A. FAY & CO., CINCINNATI, Ohio.

\$100 to 250 per month guaranteed sure to Agents everywhere selling our new seven strand White Platina Clothes Lines. Sells readily at every house. Samples free. Address the GIRARD WIRE MILLS Philadelphia, Pa.

Barnes' Foot & Steam Power Scroll Saw. For the entire range of Scroll Sawing, from the Wall to the Cornice Bracket, 3 in. thick. Every Woodworker should have one. Four years in market—thousands using them.

Die Deutsche Section ist in den Händen fähiger deutscher Ingenieure, welche in der Office persönlich mit Erfindern verkehren werden.

Der „Scientific American“ wird in seinen Spalten die bedeutendsten Erfindungen besprechen.

Correspondenz erbeten und prompt beantwortet. Pamphlete in deutscher Sprache werden auf Verlangen franco zugelandt.

Adresse: Munn & Co., „Scientific American“ Patent Agentur, 37 Park Row, New York City.

ORIGINAL SCHAEFFER & BUDENBERG, Magdeburg, Germany. Steam, Blast, Vacuum, and Hydraulic Gauges, and Engine Counters. W. HEUERMAN, 4 Cedar St., N. Y., Sole Depot.

Andrew's Patents. Noiseless, Friction Grooved, or Geared Hoists, suited to every want. Safety Stairs, Elevators, Prevent Accident, if Rope Sinks, and Engine Break.

Centrifugal Pumps, 100 to 100,000 Gallons per minute. Best Pumps in the World, with Mud, Sand, Gravel, Coal, Grain, etc., without injury. All Light, Simple, Durable, and Economical. Send for Circulars.

\$375 A MONTH to Male or Female Agents. PUNCHING AND DROP PRESSES. For the Best and Cheapest Address THE STILES & PARKER PRESS CO., MIDDLEBROWN, CONN.

HAND SAW MILL—Saves the labor of 3 men. S. C. HILLS, 51 Courtlandt St., New York.

\$10 A DAY made by Agents selling our newly patented reednetts. Samples mailed for 25c. Catalogues free. Felton & Co., 119 Nassau St., New York.

SINGLE Subscriptions at Club Rates on leading papers in the Country. Send for prices. Agents wanted. H. S. BINGHAM, Sparta, Wis. Breeder of Pure Light and Dark Brahmas—Eggs in season.

WOODWORKING MACHINERY GENERAL Specialties, Woodworth Planers and Richardson's Patent Improved Turners' Machines. Central, corner Union St., Worcester, Mass. WITHERBY, RICE & RICHARDSON.

Machinery, Wood and Iron Working of every kind. Leather and Rubber Belting, Quarry Wheels, Babbit Metal, &c. GEO. PLACE & CO., 121 Chambers St., N. Y.

Cold Rolled Shafting. Best and most perfect Shafting ever made, constantly on hand in large quantities, furnished in lengths up to 24 ft. Also, Pat. Coupling and Self-rolling adjustable Hangers, pulleys, etc. GEORGE PLACE & CO., 121 Chambers Street, New York.

Sturtevant Blowers. Of every size and description, constantly on hand. GEORGE PLACE & CO., 121 Chambers Street, New York.

RICHARDSON, MERIAM & CO. Manufacturers of the latest improved Patent Planing and Woodworking Machines, Matching, Sash and Molding, Planing, Mortising, Boring, Shaping, Vertical, and Circular Re-sawing Machines, Saw Mills, Saw Arbores, Scroll Saws, Railways, Cut-off, and Rip-saw Machines, Spoke and Wood Turning Lathes, and various other kinds of Wood-working Machinery. Catalogues and price lists sent on application. Manufactory, Worcester, Mass. Warehouse, 107 Liberty St., New York.

WOODBURY'S PATENT Planing and Matching and Molding Machines, Gray & Wood's Planers, Self-rolling Saw Arbors, and other wood working machinery. 91 Liberty Street, New York. Send for Circulars. 167 South Street, Boston.

EAGLE FOOT LATHES, AND AMATEUR TOOLS FOR THE HOLIDAY PRESENTS for the Boys—Sent free—Instructive—Beneficial. W. L. CHASE & CO., 93, 95, & 97 Liberty St., New York.

1873 and 1874 Catalogues Free. Machinists', Blacksmiths', Model Makers', Pattern Makers', Organ, Piano, Makers', and Tools and Supplies for all classes of Mechanics. A. J. WILKINSON & CO., Boston, Mass.

MACHINERY, NEW and 2d-HAND. Send for Circular. CHAS. PLACE & CO., 90 Vesey St., New York.

THE HORTON LATHE CHUCK, from 4 to 36 inches, with the new Patent Jaw. Address THE HORTON & SON CO., Windsor Locks, Ct.

PORTABLE STEAM ENGINES, COMBINING the maximum of efficiency, durability and economy, with the minimum of weight and price. They are widely and favorably known, more than 1,000 being in use. All warranted satisfactory or no sale. Descriptive circulars sent on application. Address THE J. C. ROADLEY CO., Lawrence, Mass. 97 Liberty St., New York.

An deutsche Erfinder. Diese große und thätige Classe unsrer Bevölkerung machen wir besonders darauf aufmerksam, daß unsre Firma durch ihre Verbindung mit Washington und den europäischen Hauptstädten, besondere Vortheile zur Erlangung von in- und ausländischen Patenten bietet.

Jeder Erfinder, gleichviel welcher Nationalität angehörig, ist durch die liberalen Patentgesetze der Vereinigten Staaten zum Patentrecht für Erfindungen berechtigt. Unsre Firma ist bereit, gestützt auf 26jährige Erfahrung, deutsche Erfinder jeder Zeit zu berathen und zu mächtigen Preisen rasch und pünktlich Patente zu erlangen.

Die Deutsche Section ist in den Händen fähiger deutscher Ingenieure, welche in der Office persönlich mit Erfindern verkehren werden.

Der „Scientific American“ wird in seinen Spalten die bedeutendsten Erfindungen besprechen.

Correspondenz erbeten und prompt beantwortet. Pamphlete in deutscher Sprache werden auf Verlangen franco zugelandt.

Adresse: Munn & Co., „Scientific American“ Patent Agentur, 37 Park Row, New York City.