

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.

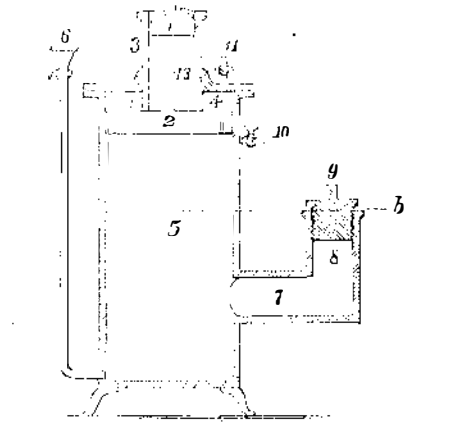
J. H. S.—The tar enclosed is a hydrocarbon of the nature of liquid bitumen, and the substance from which it has been obtained is probably (judging from the mineral enclosed) a limestone impregnated with bitumen. The mineral is limestone, containing a small quantity of iron pyrites. From the indications 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.

A correspondent sends us the following problem: 1 is a piston, 6 25 square inches in area, moving airtight in cylinder 3. 2 is a piston, 12 56 square inches in area, moving airtight in cylinder 5. 3 3 is a cylinder 6 25 square inches in area and of at least 3 inches stroke. 4 is an annular space 1 inch deep between the head of the cylinder, 5, and the piston, 2. 5 is a cylinder 12 56 square inches in area and 12 inches long. 6 is a funnel with cock and pipe, through which 5 may be filled with



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 airtight. 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. Farclot; 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. Thielens; 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. Cragston; 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. Wiltmore; 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 from Dec 15 to Dec 17, 1873. Includes items like J. H. Smith, Arlington Square; Edward Gurney, Toronto; J. L. Thurston, Douro township; A. A. Herriman, Greensborough; G. M. Stevens, Portland; U. S. Improvement in mitering machines; F. Jessop, York; N. Phaneuf, Montreal; D. E. Rice and A. W. Mitchell, Detroit; M. T. Boulton, Battle Creek; M. Stephens, Brooklyn; S. W. Palmer, Cleveland; U. S. Improvements on portfolios; M. Stephens, Brooklyn; J. H. Thorp, Chicago; I. Erb, Buffalo; Jas. Foley, Montreal; O. Meijh and H. Voelter, Paris.

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