

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) For wrought iron: Torsional strength in lbs. = 15,000 x S^2 x s^2 / (sqrt(S^2 + s^2) x L) The constants given are average values.

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 blue paper (green coppers) 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.

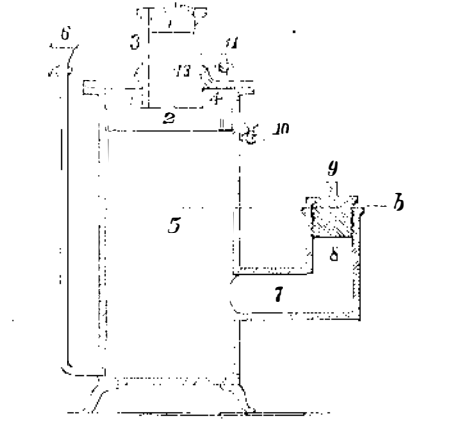
J. H. S.—The tar enclosed is a hydrocarbon of the nature of liquid bitumen, and the substance from which it has been obtained is probably (judging from the mineral enclosed) a limestone impregnated with bitumen. The mineral is limestone, containing a small quantity of iron pyrites. From the indications 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 steamstill 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. The table has two columns: the name of the inventor and the patent number. The list includes items such as Alarm, burglar, H. L. Brown (145,332), Axle, carriage, S. S. Cook (145,290), Bale tie, cotton, G. N. Beard (145,273), and many others, ending with Furnace, zinc, E. H. and F. G. Richter (145,460).

Table listing inventions granted in the week ending December 9, 1873. The table has two columns: the name of the inventor and the patent number. The list includes items such as Furnaces, etc., Mining, A. E. Bates (145,352), Game apparatus, R. E. Bean (145,385), Game board, A. F. R. Arndt (145,271), and many others, ending with Zinc, apparatus for granulating, E. H. Richter (145,419).

Table listing inventions granted in the week ending December 9, 1873. The table has two columns: the name of the inventor and the patent number. The list includes items such as 27,438.—BLACKWASHING MOLD.—W. Ferguson et al. Feb. 25, 27,447.—TIMBER BENDING CHAIN.—L. Heywood. Feb. 25, 27,478.—TURNING LATHE.—W. Sellers. Feb. 25, 27,483.—LANTERN.—A. Tufts. Feb. 25, 27,515.—FITTING SINKS.—J. Ingram. March 4, 27,591.—SEWING MACHINE.—L. V. Langdon. March 4, 27,655.—HORSESHOE NAIL MACHINE.—W. Tallman. Mar. 11.

EXTENSIONS GRANTED.

Table listing extensions granted. The table has two columns: the patent number and the name of the inventor. The list includes items such as 26,408.—FIRE KINDLER.—E. Bellinger, 26,410.—SEED PLANTER.—W. Blessing, 26,451.—RAILROAD SWITCHES.—W. Wharton, Jr.

DISCLAIMER.

Table listing disclaimers. The table has two columns: the patent number and the name of the inventor. The list includes item 28,244.—RUFFLE.—G. B. Arnold.

DESIGNS PATENTED.

Table listing designs patented. The table has two columns: the design number and the name of the inventor. The list includes items such as 7,018.—BUTT HINGE.—W. Gorman, New Britain, Conn., 7,019.—DOOR KNOB ROSE.—W. Gorman, New Britain, Conn., 7,020.—DOOR KNOBS.—W. Gorman, New Britain, Conn., 7,021.—ESCUTCHEON.—W. Gorman, New Britain, Conn., 7,022.—GRINDING MILL FRAME.—J. G. Lane et al., Millbrook, N. Y., 7,023.—LAMP SHADE.—W. L. Libbey, Boston, Mass., 7,024.—FLY WHEEL.—J. G. Baker, Philadelphia, Pa., 7,025 to 7,033.—CARPETS.—H. Horan, East Orange, N. J., 7,034.—CARPET.—H. Knight, Philadelphia, Pa., 7,035 to 7,037.—FLOOR OIL CLOTHS AND CARPETS.—C. T. Meyer et al., Bergen, N. J., 7,038 to 7,043.—CARPETS.—E. J. Ney, New York city, 7,044 to 7,045.—CARPETS.—H. Nordman, New York city, 7,046.—BADGE.—J. Seymour, Syracuse, N. Y., 7,047.—SHOW CASE CORNER.—T. Vaughan, Boston, Mass., 7,048.—COOK STOVE.—N. S. Vedder, et al., Troy, N. Y.

TRADE MARKS REGISTERED.

Table listing trade marks registered. The table has two columns: the trade mark number and the name of the owner. The list includes items such as 1,565.—SOAP.—R. M. Bishop & Co., Cincinnati, Ohio, 1,566.—CURED MEATS.—W. H. Davis & Co., Cincinnati, O., 1,567.—CORSET SPRINGS.—F. L. Egbert, Waterbury, Conn., 1,568.—WHISKY.—E. A. Fargo & Co., San Francisco, Cal., 1,569.—FERTILIZER.—J. M. Rhodes & Co., Baltimore, Md., 1,570.—COTTON GIN.—Brown Gin Co., N. London, Conn., 1,571.—CARPETS.—J. Dornan, Philadelphia, Pa., 1,572.—WHISKY.—E. Howe, New York city, 1,573.—OYSTERS.—O. W. Miller & Co., Baltimore, Md.

SCHEDULE OF PATENT FEES.

Table listing patent fees. The table has two columns: the fee description and the amount. The list includes items such as 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 December 15 to December 17, 1873. The table has two columns: the patent number and the name of the inventor. The list includes items such as 2,938.—J. H. Smith, Arlington Square, Middlesex county, Eng. Improvements in shuttle sewing machines, called "Smith's Combination Sewing Machine." Dec. 15, 1873, 2,934.—Edward Gurney, Toronto, Ontario. Improvements on heating stoves, called "Gurney's Improved Base Burner." Dec. 15, 1873, 2,935.—J. L. Thurston, Douro township, Peterborough county, Ontario. Improvement on corsets, called "Thurston's Improved Elastic Corsets." Dec. 15, 1873, 2,936.—A. A. Herriman, Greensborough, Guilford county N. C., U. S. Improvements on turbine water wheels called "Herriman's Acme Turbine Water Wheel." Dec. 15, 1873, 2,937.—G. M. Stevens, Portland, Cumberland county, Me., U. S. Improvement in mitering machines, called "Stevens' Mitering Machine." Dec. 15, 1873, 2,938.—F. Jessop, York, York county, Pa., U. S. Improvement in rotary steam motors, called "Jessop's Rotary Steam Motor." Dec. 15, 1873, 2,939.—N. Phaneuf, Montreal, P. Q. Machine a presser et a polir les talons des chaussures, called "Une Rose Brun-tessoir." Machine for pressing and polishing heels of boots and shoes. Dec. 15, 1873, 2,940.—D. E. Rice and A. W. Mitchell, Detroit, Mich., U. S. Improvements on water gages for steam boilers, called "Rice's Boiler Gage." Dec. 15, 1873, 2,941.—M. T. Boulton, Battle Creek city, Calhoun county, Mich., U. S. Improvements on wood working machines, called "Boulton's Wood Working Machine." Dec. 15, 1873, 2,942.—C. W. Palmer, Cleveland, Cuyohoga county, O., U. S. Improvements on portfolios, called "Palmer's Novelty Music Rest and Portfolio." Dec. 15, 1873, 2,943.—M. Stephens, Brooklyn, Kings county, N. Y., U. S. Improvements in cement lined metal pipes, called "Stephens' Cement Lined Pipes." Dec. 15, 1873, 2,944.—J. H. Thorp, Chicago, U. S. Improvements on portable burglar alarms, called "Thorp's Portable Burglar Alarm." Dec. 15, 1873, 2,945.—I. Erb, Buffalo, Erie county, N. Y., U. S. Improvement on washing machines, called "Erb's Improved Washer." Dec. 15, 1873, 2,946.—Jas. Foley, Montreal, P. Q. Extension of a provincial patent, being No. 2,614, old law, for the manufacture of the extract from hemlock, oak and other barks, for tanning purposes and as a mordant for printers' and dyers' use, called "The Non-Atmospheric Process." Dec. 17, 1873, 2,947.—O. Meijh and H. Voelter, Paris, France. Process of preparing wood or other ligneous or vegetable matter for the manufacture of paper, card board and other analogous products, called "Meijh and Voelter's Process for Preparing Wood for the Manufacture of Paper, etc." Dec. 17, 1873, 2,948.—G. Lowden, Brooklyn, Kings county, N. Y., U. S. Improvement on portable gas apparatus, called "Lowden's Portable Gas Apparatus." Dec. 17, 1873, 2,949.—C. K. Knowlton, Rockland, Me., U. S. Improvements in car couplings, called "Knowlton's Car Coupling." Dec. 17, 1873.

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

APPLICATIONS FOR EXTENSIONS. Applications have been duly filed and are now pending for the extension of the following Letters Patent. Hearings upon the respective applications are appointed for the days hereinafter mentioned: