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Fire Hose, Rubber Linen and Cotton, Finest quality. Eureka Fire Hose Co., 13 Barclay St., N. Y. D. Frisbie & Co. manufacture the Friction Pulley—Captain—best in the World. New Haven, Conn. Power and Foot Presses, Ferracute Co., Bridgeton, N. J. Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing metals. E. Lyon, 470 Grand St., N. Y. Lansell's Patent Steam Syphons—Lansell & Leng's Lever and Cam Valve. Leng & Ogdin, 212 Pearl St., N. Y. Magic Lanterns, Stereopticons, and Pictures for Parlor Entertainments and Public Exhibitions. Pays well on small capital. 74 Page Illustrated Catalogue free. Centennial Medal and Diploma awarded. McAllister, Mfg Optician, 49 Nassau St., New York. Best Bolter for Sawing Handles, Furniture Stuff, Wagon Stuff, Fence Boards, &c. Send for Circulars. Richard W. Montross, Galien, Mich. Solid Emery Vulcanite Wheels—The Solid Original Emery Wheel—Other kinds imitations and inferior. Caution—Our name is stamped in full on all our best Standard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Packing Company, 37 and 38 Park Row, New York. Steel Castings from one lb. to five thousand lbs. Invaluable for strength and durability. Circulars free. Pittsburgh Steel Casting Co., Pittsburgh, Pa. M. Shaw, Manufacturer of Insulated Wire for galvanic and telegraph purposes, &c., 259 W. 27th St., N. Y. Shingle, Heading, and Stave Machine. See advertisement of Trevor & Co., Lockport, N. Y. For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc. Boiler Shop—now running, for rent low, to a competent man. Address Machinist, Baltimore, Md. Improved Hat Holder. Patent for Sale; either State, County, or City Rights. Address B. F. Grayson, Jr., Luray, Page County, Va. R. H. Norris & Co., Paterson, N. J., Steam Gauge Manufacturers; also Steam and Hydraulic Gauges of any make or pattern repaired. Foundrymen, letter your patterns with Metallic Letters made by H. W. Knight, Seneca Falls, N. Y. Abram Dilley, of German Valley, N. J., has patented a Heel Evener for boots and shoes. See advertisement in another column. Articles in Light Metal Work, Fine Castings in Brass, Malleable Iron, &c., Japanning, Tinning, Galvanizing. Welles Specialty Works, Chicago, Ill. The "Triumph" is the Best Scroll Saw for Amateurs. Send stamp for Circular to A. W. Morton, 22 Platt St., N. Y. For Pure Natural Lubricating Oil, suitable for Paper Mills, Iron Works, Cotton and Woolen Mills, Flour Mills, Planing Mills, Street Railways, &c., send direct to Geo. Allen, Franklin, Pa. Price per bbl., 30c. per gal.; half bbl., \$7.50; 10 gals., \$3.75. Manufacturers of Hydraulic Oil Presses, send circulars and price list to E. N. Hoffman, Waxahachia, Texas. For Sale—Letters Patent for a Portable Fire Escape. Address H. R. Houghton, P. O. Box 1421, New York city. Wanted—Situation as Foreman in Plow Shop. Address J. A. Morsman, Sparta, Randolph Co., Ill. Box 121. Twenty inch Propeller Castings, \$5. Goss Bros., Barnstable, Mass. Pump Patent for Sale.—A strong, durable, lift and force pump, no leathers or packing of any kind except for the stuffing box of pump rod. Address, E. J. Delaney, San Jose, California. For Sale.—Patent Combined Hose Carriage, Automatic Winding Reel and Irrigator, will sell State Rights, or on royalty. Address E. J. Delaney, San Jose, California. Wanted a Man that thoroughly understands the Galvanizing of sheet iron, etc. None but first class men need apply. Address with references, P. O. Box 909, Montreal, Canada. For Sale at a bargain, One Corliss Engine. Cylinder 20x48. Kelly & Ludwig, Machinery Agents, 720 Filbert Street Philadelphia, Pa. Blake's Crusher Wanted.—10x4, second hand. Send location and price. J. E. Mitchell, York Avenue, Phil. Boosey's Cheap Music and Music Books. Full Catalogues free by mail. Boosey & Co., 32 East 14th St., New York. Canadian Patent for Sale, on a pocket article, combining in one, three useful articles, carried by every one. Just out in U. S., and having an extensive sale. Would make arrangements with parties for other foreign patents. I. C. Cowles, 3 Granger block, Syracuse, N. Y. See Notices to Inventors on back page, by Patent, Box 60.

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(1) R. N. says, in reply to E S., who requests a formula for finding the diameter of a pipe from its sectional area, that is, from the area of a circle to find its diameter. For all such calculations, I once devised a formula which is very convenient to carry in one's head; that is, add to the area $\frac{273}{100}$ of itself, and the square root of the sum will be accurate within $\frac{1}{1000}$. The convenience lies in this, that $273=3+90 \times 3$, so that 3 and 9 are the only numbers to be remembered. Thus, to find the diameter corresponding to the area 78539816; multiply by 3, setting the product beneath and three places to the right; then multiply this product by 9, setting the new product beneath the former, but one place to the left; add up, and find the square root, which is less than $\frac{1}{1000}$ of 1 (the true value of the diameter). Thus:

Area..... 078539816
× 3..... 235619448
× 9..... 2120575032
..... 099981185768
..... 0999906
A similar formula for the diameter of a sphere of given contents is even more accurate. From double the contents subtract $\frac{1}{100}$ of said contents; the cube root of the remainder will show the diameter of the sphere within less than $\frac{1}{40000}$ th. Thus:

Contents..... 523598775
Doubled..... 1047197550
× $\frac{1}{100}$ 4712388975
..... 100007366025
..... 1000024
..... 0000024
Cube root.....
Error.....

(2) B. F. H. asks: Will an instrument that will work on 500 feet wire work on shorter distances without addition of wire? A. Yes, on the shortest lengths.
(3) R. C. C. says: I have a glass jar (1 gallon) and a zinc cylinder, a porous cup, and a carbon cylinder. Please inform me with what materials shall I charge them to make a battery? A. Put nitric acid in the porous cell with the carbon, and 1 part sulphuric to 20 water in the glass jar.

(4) E. R. B. asks: What is the best plan to put on a tin roof? Do you recommend the standing or flat seam? A. The flat clinched and soldered seam is the best. If the tin is brought down over the edge of the roof or gutter and carefully nailed, with the nails rather close, the wind will not get under it to blow it off. Every plate of the tin should be nailed to the roof, also, in laying it.

(5) A. E. G. asks: 1. Is it any advantage, in the construction of a refrigerator, to fill the space between the inner and outer box with some non-conducting materials? A. Great advantage. 2. Does not a confined stratum of air prove a perfect non-conductor? A. It is an excellent non-conductor. 3. Is there anything better for filling as above than cork chips? A. They answer well. Any non-conducting body containing in its pores large quantities of air, answers well, as charcoal, mineral wool, cork, etc.

(6) S. M. J. says, in reply to J. O. G., who says that you state that an English fire engine lifted water 32 feet in a perpendicular line, and inquires if it is possible for a fire engine with its many joints and imperfections to raise a column of water to that height, 32 feet, without the intervention of a foot valve in the suction. I am in charge of an English fire engine that has four lengths of suction, each 8 feet long, and a screen 1 foot 6 inches long, in all 33 feet 6 inches. I have stood on the bank of a river with the suction pipe perpendicular, with the exception of less than a quarter circle at the engine; and the suction pipe would not stay under water until I put a man to hold it under, after which I had no trouble whatever in raising water and working a fire not less than 600 feet from the engine.

(7) I. V. asks: How can I make the ink used with stencils? The kind I have reference to is in hard cakes and makes a plain and clear mark. A. It consists principally of lampblack, boneblack, sulphate of indigo, and dextrine or gum arabic, mixed well together, moistened, pressed into cakes and dried thoroughly. Another marking ink consists of lampblack and soap.

(8) L. P. C. says: Please state if oxygen can be made from saltpeter? A. Oxygen can be obtained readily from saltpeter by treating the salt above 660° Fah. in a glass vessel. The proportion of the gas, however, is much less in quantity than is obtainable from the chlorate of potassa, besides being contaminated by nitrites, free nitrous and nitric acid and nitrogen, which corrode the connections and render the gas from this source objectionable for many purposes.

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

J. N. C.—It is infusorial earth. See p. 240, vol. 35.—W. D. M.—No. 1 is black mica. No. 2 contains sesquioxide of iron, free sulphur, and clay (silicate of alumina). No. 3 is felspar containing crystals of red hematite (sesquioxide of iron). No. 4 is clay containing carbonaceous matter. No. 5 might be used as a polishing powder and in glass manufacture.—G. W. D. B.—Your sample of peat does not contain tannic acid; but like all bodies containing woody fiber, when subjected to distillation in close vessels or incomplete combustion in the air, pyroigneous acid may be found with the products, the substance may be made to yield a considerable quantity of illuminating gas, pyroigneous acid, etc., by proper distillation.—J. S.—Both of these are very fine granites. Granites consist of intimate admixtures of quartz, felspar, or orthoclase, and mica. Most of them contain here and there, especially after having been exposed to the weather, blemishes of carbonate of lime, traprock, greenstone, pyrites, large crystals of quartz, etc. There is no granite that we are aware of which is wholly free from these. Consult some good work on geology.

P. S. K. asks: How can I make a piano-forte sounding board, of wood, the four edge lines being one plane, and the middle rounded like the belly of a violin, without cutting or scraping the wood?—A. A. A. asks: 1. In making violins, what kind of wood is the top made of, and how is it stained or colored? 2. What is the best way of finishing violins, with shellac or other varnishes?—W. E. T. asks: 1. Please give me a good recipe for putting up spiced salmon and trout? 2. What is the proper mode of canning fresh mackerel?—A. C. W. asks: In playing a game of whist, my opponent on my right cut me the ace of spades three times running. What are the chances of such an occurrence?—E. A. H. asks: How is Indian corn hulled to prepare it for hominy?—S. W. G. asks: What is the best material for japanning or putting an enamel finish on stove plate?

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:
On the First Steamboat on the Mississippi. By F. L. J.
On Boiler Explosions. By E. G. A.
On Aeronautics. By C. E. D.
On Bridges in Pennsylvania. By M. B. S.
On American Silk Manufactures. By L. L.
On Constructing Theaters. By S.
On the Keely Motor. By M. C.
On a Grain Dryer. By J. O'C., by R. S. E. and by S. S. S.
On a Flying Machine. By C. S. A.
On Weight on and in the Earth. By S. A. C.
Also inquiries and answers from the following:
J. M. A.—L. J. C.—J. F. W.—L. V. H.—S.—F. L. S.—W. C. T.—C. F. S.—W. O. L.—J. D. H.—J. M.—F. C.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given. Enquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who sells white litharge? Who sells convex glass, made to size? What is the cost of the finest glass per ton? Who sells chromate of lime? Who sells American cigarette or rice paper? Who sells old, straight-grained mahogany, suitable for stove patterns? All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH Letters Patent of the United States were Granted in the week Ending November 21, 1876. AND EACH BEARING THAT DATE. [Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, will be furnished from this office for one dollar. In ordering, please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city.

Table listing various inventions and their patent numbers, including items like Air and water bed, Air exhaust, Air pump, Alloy as a back for mirrors, Animal tether, Anvil and vise, Arch bridge, Automatic brake, Automatic musical instrument, Axle grease, Baking alter bread, Bale tie, Bale tie, Baling press, Baling press, Barbed fence wire, Base for wooden columns, Batten roof or wall, Bedstead, Beer pump, Belt fastener, Blind adjuster, Book binder's cloth, Book rest for lecture chairs, Bottle filling apparatus, Bottles, manufacture of, Breech loading fire arm, Brush, Brushes, making metallic, Buckle, Burglar alarm, Bustle, Barkshire & Davis, Butter package, Butter package, Car axle box, Car axle box, Car brake, Car brake, Car brake, Carpet sweeper, Carriage pole head, Cartridge box, Cement for stove putty, Churn, Cider mill, Cider press, Circular knitting machine, Cloth-measuring machine, Clothes pounder, Coffee and spice mill, Commode cover, Conductor's punch, Convertible chair, Copy holder, Corn husker and sheller, Corn planter, Coupon nipper and punch, Cracker machine, Crupper fastening, Cultivator, Current water wheel, Curtain cord tightener, Die for making hoes, Dish drainer, Door lock, Double plow, Draft attachment, Earth-boring apparatus, Electric light buoy, Electromagnetic alarm, Electromagnetic motor, Electro vapor bath, Ellipso pantograph, Endless rope railway, Envelope, Expansion engine, Extension table, Extension table slide, Fare box, Fare register, Farm fence, Feathering paddle wheel, Feeding air to furnaces, Fence, Fence, Fence, Fence, Fence, File, Fires, extinguishing, Flange joints, Flexible blackboard, Flour bolt, Folding chair, Folding table, Food from desiccated eggs, Foot rest for chairs, Force pump, Freight car, Frictional electric machine, Fringing machine, Fruit box, Fruit jar, Fruit picker, Furnace door, Gauge, Gauge, Gang plow, Gas, indicating power of, Gas binder, Gas cock, Gas oven or summer range, Gas regulator, Gate, R. E. Stephens.



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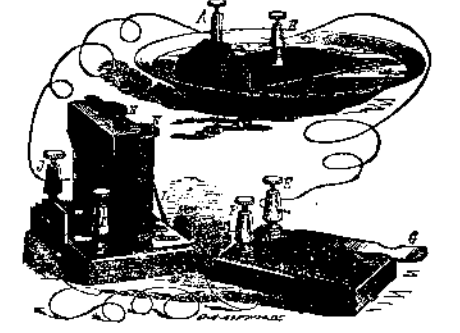
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