

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion, about eight words to a line.

Mechanical Working Drawings a Specialty. Pemberton & Scott, Draughtsmen, 37 Park Row, room 30. Assays of Ores, Analyses of Minerals, Waters, Commercial Articles, etc. Technical formulæ and processes. Laboratory, 33 Park Row, N. Y. Fuller & Stillman.

Vertical Scientific Grain Mills. A. W. Straub & Co., Phila. Wanted.—Several Carpenters and a Blacksmith. Steady work. Address Industrial Home Co., Ionia, Fairfax Co., Va.

Fast Boat Engine Castings of the type of the celebrated Steam Launch Flirt, for sale. Price, with working drawings, \$25; the same finished, \$150; larger sizes at proportional rates. Send for description. H. S. Maxim, M.E., room 74, Coal and Iron Exchange, or P. O. Box 1849, N. Y.

Wrenches.—The Lipsey "Reliable" is strongest and best. Six inch sample by mail 60 cents. Roper Caloric Engine Manufacturing Co., 91 Washington St., N. Y.

Forney's "Catechism of the Locomotive," a book of 625 pages, 250 engravings; answers practical questions about a locomotive. Price \$2.50. Published and for sale by the Railroad Gazette, 71 Broadway, N. Y.

Agents wanted in every county to sell our new Machine to File all kinds of Saws. Every one that uses a Saw will buy one. Price \$2.50. Illustrated Circulars, etc., free. E. Roth & Bro., New Oxford, Pa.

A gentleman, experienced in manufacturing Cane and Beet Sugars, desires a situation. Is a good analyzer. Speaks four languages. P. O. Box 4182, N. Y.

Telephone parts for 25 c.; works 1/2 mile. T. E. L., New Haven, Conn.

Artificial Human Eyes \$10 each; assortment by express to select from. Dr. Walker, 94 State St., Rochester, N. Y.

Scroll Saw Designs. Send for new illustrated sheet and price list. A. W. Morton, 104 John St., N. Y.

Union Eyelet Company, Providence, R. I., Manufacturers of Patented Novelties.

Entire outfit of Nail Mill, 4, 6, 8, and 10 p., costing over \$3,000, we offer for \$650 to close an account. Apply quick, must be sold. Forsyth & Co., Manchester, N. H.

Improved Wood-working Machinery made by Walker Bros., 73 and 75 Laurel St., Philadelphia, Pa.

Bolt Forging Machine & Power Hammers a specialty. Send for circulars. Forsyth & Co., Manchester, N. H.

For Town and Village use, comb'd Hand Fire Engine & Horse Carriage, \$350. Forsyth & Co., Manchester, N. H.

The Cameron Steam Pump mounted in Phosphor Bronze is an indestructible machine. See ad. back page.

Friction Clutches warranted to drive Circular Log Saws direct on the arbor; Upright Mill Spindles, which can be stopp'd instantly; Safety Elevators, and Hoisting Machinery. D. Frisbie & Co., New Haven, Conn.

Sperm Oil, Pure. Wm. F. Nye, New Bedford, Mass.

For Solid Wrought Iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

John T. Noye & Son, Buffalo, N. Y., are Manufacturers of Burr Mill Stones and Flour Mill Machinery of all kinds, and dealers in Dufour & Co.'s Bolting Cloth. Send for large illustrated catalogue.

Power & Foot Presses, Ferracuta Co., Bridgeton, N. J.

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, N. Y.

1,000 2d hand machines for sale. Send stamp for descriptive price list. Forsyth & Co., Manchester, N. H. Steel Castings from one lb. to five thousand lbs. Invaluable for strength and durability. Circulars free. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

For Best Presses, Dies, and Fruit Can Tools, Bliss & Williams, cor. of Plymouth and Jay Sts., Brooklyn, N. Y.

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing metals. E. Lyon & Co., 470 Grand St., N. Y.

Wanted.—Second-hand Gun Stocking, and other Gun Machinery. Address V. A. King, Lock Box 81, New Haven, Conn.

Manufacturers should try the pure natural Lubricating oil. Produced and prepared by Geo. Allen, 13th street, Franklin, Pa. It does not gum or chill in cold weather, and wears as well as lard oil. Price by the barrel 30 cents per gallon. Packages of 10 gallons sent on receipt of \$3.75.

For Boul't's Paneling, Moulding, and Dovetailing Machine, and other wood-working machinery, address B. C. Machinery Co., Battle Creek, Mich.

Patent Scroll and Band Saws. Best and cheapest in use. Cordesman, Egan & Co., Cincinnati, O.

Chester Steel Castings Co. make castings for heavy gearing, and Hydraulic Cylinders where great strength is required. See their advertisement, page 222.

Machine Diamonds, J. Dickinson, 64 Nassau St., N. Y.

Silver Solder and small Tubing. John Holland, Cincinnati, Manufacturer of Gold Pens and Pencil Cases.

Weldless Cold-drawn Steel Boiler and Hydraulic Tubes. Leng & Ogden, 212 Pearl St., N. Y.

For Best Insulated Telegraph Wire, Telephone Wire, and Flexible Cordage, Eugene F. Phillips, 67 Stewart St., Providence, R. I.

The Turbine Wheel made by Risdon & Co., Mt. Holly, N. J., gave the best results at Centennial test.

Vertical & Yacht Engines. N. W. Twiss, New Haven, Ct.

NEW BOOKS AND PUBLICATIONS.

REPORTS OF JUDGES OF GROUPS 2, 5, 6, 7, AND 8, CENTENNIAL EXPOSITION. J. B. Lippincott & Co., Publishers, Philadelphia.

The above-named reports relate respectively to pottery, glass, etc.; timber; fish and fish products; furniture, and fabrics. Abstracts of the reports of individual judges on each exhibit are given, and several longer papers are included, reviewing various classes of machines, products, etc., embodying much useful and interesting information.

Notes & Queries

A. L. B.—Consult Pepper's "Play Book of Chemistry" and "Chemical Magic," which you may obtain through publishers advertising in our columns.

—W. H. H.—We do not give addresses in this department, but you will see that the "Business and Personal" column can be used to obtain such information. As to freight rates you should apply to the agent. The United States laws require that all steamers should be managed by licensed officers.—W. C. B.—As we understand the arrangement, it would be better to place the pipe within an evaporator large enough to inclose it. You can use a pipe 1/2 to 3/4 inch in diameter.—F. C. R.—Altitude is determined by barometric observations.

For calculations of latitude, longitude, and eclipses, consult a practical work on astronomy.—F. & Co.—Consult Normandy's "Commercial Handbook of Chemical Analysis" (edition of 1875).—E. B.—See answer No. 10, p. 123, current volume.—L. G.—See answer No. 28, p. 140, current volume.—T. L. H.—You should describe the arrangement of the apparatus.—E. C. H.—You will find the matter fully treated in Auchincloss on "Link and Valve Motion."—G. M. M.—See SCIENTIFIC AMERICAN, October 21, 1876, p. 265.—H. E. C.—See SCIENTIFIC AMERICAN, May 1, 1875.—A. J. McK.—A windmill will answer very well. Consult advertising columns for addresses of engine builders, or insert notice under head of "Business and Personal."—W. H. G.—There are a number of suitable devices in the market.—W. C. S. and E. S. J. are referred to answer No. 19, p. 155, SCIENTIFIC AMERICAN of March 9, 1878.—L. B.—We think you can get better results with one of the semi-steels, such as Bessemer or Siemens-Martin.—C. E. G.—Use two 2 x 3 inch cylinders; two screws, 12 to 15 inches in diameter, and 2 feet pitch; boiler, 2 feet in diameter and 4 feet high. The screws should be three-bladed, and set at an incline, so as to be submerged.—L. A. W.—Full instructions on tempering spiral springs are contained in SUPPLEMENT No. 20. You should make tests under the actual working conditions until you obtain satisfactory results.—J. D.—See SCIENTIFIC AMERICAN, March 30, 1878, p. 203.—A. F. G.—We think the plan described by you will answer.—G. S.—If the temperature of the air is constant, the pressure varies inversely as the volume. The formulæ to be used when the temperature varies are given in SCIENTIFIC AMERICAN, August 21, 1875, answer No. 14.—Z. S. R.—See SCIENTIFIC AMERICAN, May 1, 1875.—B. K.—The investors should consult a good engineer. We doubt whether any but an experienced workman could dye the fur as you wish. For addresses of manufacturers, insert a notice in "Business and Personal" column.—A. W. M.—Notwithstanding all the stories about the value of divining rods, the evidence of facts, as well as the opinion of scientific men, is decidedly against them.—H. C. D.—Use sheathing paper.—F. R. Consult Osborn's "Metallurgy of Iron and Steel;" Crookes & Rohrig's "Treatise on Metallurgy;" Overman's "Manufacture of Iron;" Percy's "Metallurgy," and other standard works, which you may obtain through dealers advertising in our columns.—A. S.—See answer to D. C. L., this page, and p. 91, vol. 30.

(1) F. T. P. asks: What will cure stammering? A. Try speaking slowly.

(2) F. B. H. asks: With what acid, or other means, can nickel be stripped from a piece of Britannia ware without injuring the surface of the latter? A. Nickel cannot readily be stripped from such an alloy cleanly. You may try a bath composed of a strong hot solution of an alkaline nitrate acidified with oil of vitriol. Dip, and rinse well in water; repeat if necessary. Experience may suggest some improvement.

(3) W. W. asks: How is etching on zinc done? A. Heat the metal and cover it uniformly with a film of wax. Through this to the surface of the metal etch with a fine graver, then expose to dilute sulphuric or hydrochloric acid for a few minutes.

(4) J. A. L. asks: How can I refill the porous cells of a Leclanché battery? A. Hold the top of the porous cup in a gas flame until the pitch with which it is sealed is softened, then draw out the carbon plate, and refill the cup with black oxide of manganese and pieces of gas coke, in about the proportion of five parts of the oxide of manganese to one of gas coke.

How can I solder a copper wire to a zinc plate? A. Have the surfaces of the metals scraped and thoroughly clean; moisten them with solution of zinc chloride, then lay on the joint a small piece of soft solder, and then melt with a blowpipe flame or heated sad iron.

(5) N. W. H. asks: 1. Would an upright boiler, 50 square feet heating surface, rated at 5 horse power, be large enough to furnish steam for an engine 5 x 7, cutting off at two thirds, and 175 revolutions per minute? A. The boiler is rather small. 2. Is there any means except by the indicator to determine the actual horse power of small engines and boilers? A. You will find some notes on testing small engines and boilers in the SCIENTIFIC AMERICAN for October 31, 1874.

(6) E. A. S. asks: What bath and battery do you recommend for nickel plating? A. Use a bath containing 3/4 lb. ammonio-nickel sulphate to each gallon of water. The nickel anodes should expose a somewhat larger surface in the bath than the work. Use a Smee battery (carbon negative), exposing zinc having a surface equal to that of the work in the bath, and an intensity equal to two or three couples of Smee. Clean (by scouring and acid dip) the work thoroughly, and place it in the bath, connected with the zinc of the battery—the nickel anodes being in connection with the carbon pole. The bath should be kept neutral with ammonia. See also page 209, this issue.

(7) R. & T. ask for a recipe for a cement to be used for repairing glass, leather, etc. A. 1. Dissolve fine glue in strong hot acetic acid to form a thin paste. 2. Soften fine glue or isinglass by soaking in cold water, and dissolve it in the smallest possible quantity of proof spirits by aid of gentle heat over a

water bath; in 2 ozs. of this mixture dissolve 10 grains of gum ammoniac, and while still liquid add 1/2 drachm of mastic dissolved in 3 drachms of rectified spirit, and stir the mixture. Keep in stoppered bottle. For use melt by standing the bottle in warm water. 3. A fused mixture of pure asphaltum and gutta percha in about equal parts.

(8) D. C. L. asks: What is the rule for calculating the power of a rotary engine? A. Multiply the area of the piston in square inches by the effective pressure in pounds per square inch, and by the speed of the center of the piston in feet per minute, and divide the product by 33,000.

(9) B. F. W. asks: Will you be kind enough to inform me how I can calculate the distance at which the ball of a safety valve should be placed to blow off at any given pressure? A. Multiply the weight of the lever by the horizontal distance of its center of gravity from the fulcrum; the weight of the valve by its horizontal distance from the fulcrum; the area of the valve by the steam pressure and horizontal distance of the valve from the fulcrum. Add together the first two products, subtract their sum from the third product, and divide the difference by the weight of the ball.

(10) J. P. D. asks: What is the greatest velocity ever attained by a ball from any sized gun? A. About 1,800 feet per second.

(11) G. W. H. writes: I wish to bring water to my house from a street main, 650 feet distant. The pressure will be that due to a head of 125 feet. I would like to be able to throw a 1/2 or 3/4 inch stream 30 to 40 feet. Would it do to lay 2 inch wrought iron pipe one third the distance, 1 1/2 inch pipe one third, and 1 inch the remaining distance, or would a smaller pipe answer? A. It would not be well to use any smaller pipes.

(12) D. H. S. asks: 1. What is the weight of a large passenger locomotive? A. About 34 tons. 2. What is the weight of a locomotive boiler, as compared with that of a Cornish engine, both having the same heating surface? A. The locomotive boiler weighs much less per square foot of heating surface.

(13) O. A. B. asks: About what width of face is required for a cast iron gear to transmit 12 horse power, one wheel large, and the other having 12 teeth, the cogs to be of 2 inches pitch, and have a speed of 260 feet per minute? A. From 3 to 4 inches will answer.

(14) R. B. asks: 1. When the Great Eastern broke her rudder at sea, some years ago, was the rudder itself carried away, or did the rudder post twist off and leave a short stub? A. The rudder post twisted off. 2. How was it temporarily fixed? A. By wrapping a chain around the collar bearing to control the rudder. The arrangement was described and illustrated in the SCIENTIFIC AMERICAN for October 26, 1861.

(15) W. E. C. asks: Are owners of steam yachts liable to a penalty for not having a licensed engineer and pilot? A. The penalty is \$500 for each offense.

(16) W. C. F. asks: What weight of hard coal would be required to heat 1,000 lbs. of wrought iron to 500° Fah., without allowance for waste of heat; and what percentage of the heat can be utilized in a well constructed furnace? A. In a perfect furnace this would require between 4 and 5 lbs. of coal. In practice you might realize from 40 to 50 per cent of the theoretical effect; but it is our impression that few small furnaces do as well as this.

(17) F. J. S. asks: Is there any telephone which can be used without a battery? A. No battery is required to operate the telephone described in SCIENTIFIC AMERICAN, No. 14, vol. 37, and on p. 155, answer No. 19, of SCIENTIFIC AMERICAN of March 9, 1878.

(18) G. L. writes: This is written with ink made precisely as directed in recipe given to G. F. (February 2.) It is rather pale when first applied, but will probably be a jet black when you receive it. [It is.] Now I would like to know (1) if there is anything I can add to it that will make it jet black as soon as written with, without thickening or destroying any of its requisites as a good ink. A. Add a little extract of logwood. 2. What will prevent thickening and evaporating? A. Keep it from the air. 3. Is there anything with a more pleasant odor than creosote, or without odor, that will prevent moulding? A. Oil of cloves is often employed.

(19) B. M. and others ask for a recipe for ebonying wood. A. Apple, pear, and walnut, if fine grained, may be ebonyed by the following process: Boil in a glazed or enameled iron vessel with water, 4 ozs. of ground gallnuts, 1 oz. of logwood chips, and 1/2 oz. each of green vitriol and crystals of verdigris. Filter while warm, and brush the wood over with this repeatedly. Dry and brush over with strong cold solution of acetate of iron and dry. Repeat this several times, and finally dry in an oven at a moderate temperature, and oil or varnish.

(20) S. H. P. asks: Which will haul the harder, a railroad car with journals 3 inches in diameter and 4 1/2 inches long, or the same car with journals 3 1/2 x 5 1/2 inches, weight of car supposed to be the same? A. This matter can only be settled definitely by experiment. With very moderate pressure the small journal might require less power than the other, while by increasing the weight the result might be reversed.

Which way will water run the faster, through a tunnel into large end and out of small, or into small end and out of large end? A. We imagine that the difference, if any, may be slightly in favor of the latter course.

How much does 1 cubic foot of mercury weigh, at varying temperatures? A. At 32° Fah. 849 lbs., at 60° 846 lbs., at 212° 836 lbs.

What degree of heat Fah. does it require to ignite common burning gas, kerosene oil, and common lard oil? A. The gas and oil ignite at red heat, and kerosene at almost any temperature, according to its quality. The temperature of ignition of different substances can be greatly lowered by special conditions.

What is the difference between a block 1 inch square

and a 1 inch cube? As the terms are frequently used, there is no difference; but, speaking precisely, a block 1 inch square is a block with only two dimensions, or a plane surface.

(21) L. H. J. asks: 1. What are the proper diameters for the supply and exhaust pipes, piston rod, and crank pin of a 2 x 4 inch horizontal engine, running at 500 revolutions per minute, with 80 lbs. pressure? A. Supply pipe, 1/2 inch; exhaust, 3/4 inch; piston rod, 1/2 inch; crank pin, 3/4 inch. 2. What will be the best way to pack the piston? A. Light cast iron rings will answer very well.

(22) E. A. M. asks how to remove scale from iron and steel. A. The articles to be cleaned may be left for a few hours in a bath of sulphuric acid and water, and then scoured with sand.

(23) F. O. S. asks: 1. What horse power (I mean the measure so termed, not the equivalent strength of horses) does a yoke of oxen exert, and what proportional increase would be gained by connecting 2, 4, or 8 couples? A. In ordinary practice, 1 yoke of good oxen may exert 1 1/2 horse power per day of 8 hours, and if they could be made to work together, each successive yoke would add the same amount of work. 2. Are portable engines made of a power equal to 8 yoke of oxen? A. Yes.

(24) J. T. L. asks: 1. Given the value of a first water diamond of 1 carat, what is the rule for computing the price of similar stones of greater size? A. The common rule is to multiply the weight of the diamond by itself, and the product by the price of a single carat stone of the same grade. In practice, however, this and other rules do not hold absolutely good. Much depends upon the cutting and other characteristics, even of stones of apparently the same quality, and the fixed rules are always more or less deviated from. 2. What does it cost to have a diamond cut? A. The price is determined, on inspection, by the cutter. It varies greatly. 3. What did the Koh-i-noor, belonging to the crown of England, cost? A. It was presented by the East India Company. Its value is supposed to be about £2,000,000.

(25) O. B. asks: 1. Which is the more powerful explosive, gun cotton or gunpowder? A. The former. 2. Is gun cotton liable to explode on concussion or by friction? A. Yes. 3. Is fine grained powder more powerful than coarse? A. It depends upon the use and mode of application. The size of the grains determines the rate of combustion; and, while the total effect may be the same, it may be applied through a longer or shorter space of time.

(26) J. T. T. asks: 1. Is there any metallic or other hard substance to which clay made into mortar—as for bricks or stiffer—will not adhere when subjected to pressure? A. Possibly very smooth and hard metallic surfaces may answer. 2. What is understood by a horse power as compared with the power of men worked similarly? In other words, how many men does a one horse power equal? A. Between 10 and 15, according to the character of work and men.

(27) "Guitarist" asks: Is there any means of making the tone of a guitar louder than is usually the case? A. It can be done by improving the sounding board.

(28) W. S. C. asks: How many horse power are required to grind and bolt 12 bushels of wheat per hour, and how many to grind 12 bushels of corn per hour, without bolting? A. We think 6 and 5 horse power, respectively, would be ample.

(29) F. D. D. asks: What size of propeller will be advisable, for speed, with a 6 1/2 x 6 1/2 inch engine, in water 4 to 8 feet deep? A. Make a propeller about 3 feet in diameter, and 4 1/2 feet pitch.

(30) W. M. S. asks how to prevent a boat from water soaking. A. Use white lead mixed in linseed oil.

(31) G. H. A. asks: What is the comparative cost of heating private and public buildings by furnaces and hot air, or steam pipes; also the comparative healthfulness of the two methods for schools, etc.? A. There is not much difference, as far as healthfulness is concerned, between steam and furnace heat, with well designed apparatus and good ventilation. For heating large buildings, steam heaters are frequently more economical than furnaces.

(32) H. E. F. asks: 1. Will two engines work on one shaft if the engines run at different speed? A. They can be made to work by proper connections. 2. How fast should a 19 inch fan run to blow a fire under a boiler? A. Run it at the speed recommended by the maker. 3. Should it blow into the smoke stack or into the fire? A. It makes no great difference into which place it discharges.

(33) J. V. C. asks: At what horse power is an engine working with cylinder 10 x 20, boiler pressure 70 lbs., and 125 revolutions per minute? A. Multiply effective pressure on piston, by area of piston, in square inches, and by speed of piston in feet per minute, and divide the product by 33,000.

(34) E. H. asks: Would an engine of 2 horse power be large enough to run a steam launch 28 feet over all, 25 feet between uprights, 6 feet beam? What would be the speed, supposing the boat to be well modeled? A. With such an engine you might realize a speed of 3 or 4 miles an hour.

(35) A. A. R. asks: What is the shortest reliable rule for calculating the capacity of circular cisterns? A. Multiply the square of the diameter in feet by 0.7854 times the height in feet. The product is the capacity in cubic feet.

(36) J. F. W. asks: How can I remove scale from sheet steel? A. By an emery wheel, or by a bath of dilute sulphuric acid.

How can I tin malleable iron, so that it will be smooth and bright? A. The articles must first be thoroughly annealed while excluded from the air, and when cold submitted to a hot but dilute pickle of sulphuric acid. After the oxide is removed they should be cleaned in water. When dry, plunge them in a bath of hot palm oil, and when heated to the temperature of the oil

(about 300° Fah.), immerse quickly in a bath of melted tin. Remove, and drain. To obtain a thicker coat of tin submerge again in the tin bath, heated but little above the melting point.

(37) H. W. makes this suggestion with regard to leaky skylights, in response to the inquiry of B. P. L.: My practice has been to put on a good stiff coat of paint and sand it. The paint should set hard on the glass and the sand be thoroughly dry. I sometimes have to repeat it, but not often. However, a second coat of paint and sand renders it much more durable.

(38) E. C. H. writes: I wish to increase the draught of my engine. If I introduce the exhaust a foot or two from the top of the chimney, will it be likely to injure the chimney, and will it increase the draught? The chimney is 22 feet high, brick, square, and 2 feet in clear. A. We think the exhaust will not injure the chimney, and will increase the draught.

Will you please give me number of threads per inch of a 3/4 inch pipe tap? A. Eighteen.

(39) W. H. T. asks: What is the best and cheapest method of annealing small castings? A. Heat them for 6 hours inclosed in a box and surrounded with lime, and allow them five or six hours to cool, by covering the box (after extraction from the fire) with sand.

(40) I. K. asks: What is the pulling or pushing force of the average locomotive? A. About one sixth of the weight on its driving wheels.

Will a single lens, double convex, answer for a camera to view landscapes, etc.? A. Such a lens will answer.

Will a boiler of the following dimensions furnish steam sufficient for a 3 horse engine; height 48 inches, diameter 22 inches, with 30 tubes 2 inches in diameter and 36 inches long? A. It probably will, if the engine is well designed.

(41) W. T. R. writes: Can you suggest any way of preventing brass stencil plates from affecting the color of the paint used? A. Lacquering the plates may answer, but nickel plating would doubtless be preferable. Varnish would probably soon wear off.

(42) "Inquirer" writes: Please give me a recipe for making mucilage. A. Dissolve gum dextrin in hot water with the addition of a little acetic acid.

What will keep washing blue from settling? A. Agitate the water.

(43) R. E. B. asks for a recipe for a ladies' shoe polish? A. Borax, 1 part; shellac, 4 parts; dissolve by continued boiling in a small quantity of water, and color with soluble aniline black or black ink.

(44) G. W. & Sons write: We are troubled a great deal with organic matter in water used in our brewery. Could we remedy it by first precipitating the organic matter and clayey parts of the water with potassium permanganate and alum, and then filter through sand and bone charcoal? We think that the filter would require less cleaning by first precipitating the organic matter and clay. A. Yes; but sulphate of alumina is preferable to alum. Dr. Crookes recommends the following mixture: Calcium permanganate, 1 part; aluminum sulphate, 10 parts; fine clay, 30 parts. The potassium permanganate may be used in place of the lime salt. He finds that one part of this mixture will purify almost instantly 5,000 parts of foul ditch water or sewage; it settles quickly, and the supernatant liquid may after fifteen minutes be drawn off without filtration.

(45) S. B. asks: How much will a well seasoned stick of timber (Southern pine or oak), 50 feet long, vary in length by a change in the temperature of 100° Fah.? A. There is no absolute formula for such cases, the change in dimensions depending upon a variety of elements, such as the grain of the wood, the nature of seasoning, etc. Not timber is absolutely dry, and will consequently continue to shrink irregularly as further portions of moisture are evaporated; while the same stick changes character from day to day as the humidity of the air varies. Alterations in shape are therefore rather due to hygroscopic than thermal variations, and hence wood cannot be classed, in regard to expansion and contraction, with substances which, like the metals, have a definite coefficient of expansion. The change in length will be usually less than one third the alteration in cross section. In practice it is disregarded.

(46) A. B. asks: How may pencil marks be removed? A. We believe that rubber or a steel eraser are the only means.

(47) L. D. asks how to purify impure well water. A. Reduce separately to fine powder and mix thoroughly 30 parts fine clay, 10 parts sulphate of alumina, and 1 part of permanganate of lime. Add this to the impure water in the proportion of 10 to 30 grains to the gallon (depending of course upon its impurity), agitate, and allow to settle for half an hour. Less must be used if detected in the taste or color of the water after settling. Permanganate of soda or potassa may be used if the lime salt cannot be obtained.

(48) E. S. wishes to know the number of pounds of chloride of calcium required to bring a cubic foot of water to a density of 30° Baumé. A. About 23 lbs., under ordinary conditions.

(49) J. T. asks: What will restore hard rubber goods when tarnished? A. Sometimes repolishing; often nothing.

(50) G. S. asks: What was the fastest run of the Jarrett & Palmer "Centennial" train? A. Ninety miles in 99 minutes, Jersey City to West Philadelphia, without stop.

(51) E. D. R. wishes to know whether isinglass is identical with mica. A. Isinglass is the name given to a gelatin properly prepared from the sounds or air bladders of fish. The name was also applied by Hill, in 1771, in his work on "Fossils," to large sheets or plates of muscovite (the most common of the mica group) to distinguish it from the small particles constituting mica schist. The name is, however, properly restricted to fish gelatin.

(52) F. J. O. writes: I have been experimenting in transferring printing and lithographs on wood for engraving. I find certain kinds of hard varnish printing and lithograph inks I can make no impression on. I have used strong solutions of caustic potash and alcohol, strong potash lye, glycerin, all to no purpose. Can you give a recipe for a solution that will loosen these hard inks and yet not destroy the picture? A. Try the following: carbon disulphide, 95 parts; absolute alcohol, 5 parts.

(53) E. L. B. asks for a recipe for a preparation to put on plow castings after they are polished, so as to retain the polish and keep the metal from rusting. A. Cover with a mixture of white lead and tallow when not in use.

(54) F. A. S. writes: Having learned by experience what a nuisance a leaky stovepipe, like that of A. H. J. (p. 75, current volume), may become, let me prescribe a remedy which I have found successful. In the first elbow from the stove I cut out a strip of the iron 2 1/2 x 4 inches, and had a sliding cover for the opening. I open it some every day, and always at bedtime, and leave it till morning. The pipe has never dripped since I began this treatment, and is as clear and dry as when put up.

(55) H. A. F. writes: I have a gold pen which has too coarse a nib. Is there any way in which I can sharpen it without sending to a manufacturer? A. We doubt whether you can alter it successfully, if you have no experience.

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

R. H.—It is an excellent quality of asbestos.—E. P. B.—It is zinc blende—zinc sulphide. Of some value.—Mrs. S. C.—It appears to be the dried bark of the black willow (salix nigra).—A. R. C.—Brick clay is not quoted in the market; it could be bought at about \$2 or \$3 per ton; fire clay, \$5 to \$7 a ton. J. F. H. & Bro.—It is a ferruginous shale—composed principally of silicate of alumina or clay and silicious sand, colored by sesquioxide of iron.—S. J.—The sample is an excellent guano. An analysis would determine its value.—L. G.—The platinum sand is of value. The clayey asbestos might be used by paper makers. Sample of diamond earth not received.—D. V.—It is a ferro-cupric sulphide in quartz gangue.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges with much pleasure the receipt of original papers and contributions on the following subjects: The Phonograph. By J. C. D. Velocipede Travel. By T. B. and W. E. G. "Mulum in Parvo." By L. S. B. The Orohelograph. By G. B. S. Mechanical Adjustment by Mirrors. By A. S. C. An Astronomical Myth. By W. I. L. The Rail Puzzle. By H. G. U., D. J. C., and "Vulcan." Electrical Phenomena. By A. E. H. A New Motor. By H. S. M. The Safety Valve. By T. J. L. Snake Cannibalism. By F. N. P. Mind Reading. By J. L. Gravitation. By G. V.

HINTS TO CORRESPONDENTS.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

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 writers should always be given.

Inquiries 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.

OFFICIAL.

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending February 26, 1878,

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 such as Ale or beer measure, Anchor, Spedden & Stafford, Ax machine, C. L. Jeffords, Axle, car, G. W. Millington, Axle, car, G. W. Millington, Baby jumper and carriage, M. P. Gillen, Bale tie, F. Cook, Bale tie, Cook & Shaw, Bale tie, A. E. Kimberley, Bale tie, J. C. Riethmuller, Bale tie, Shaw & Cook, Bale tie, N. W. Speers, Barometer, R. M. Lowne, Barrel trussing machine, H. W. King, Bending machine, sheet metal, C. Brombacher, Bending tubular sockets, J. H. Alker, Binder, J. F. Tapley, Bit brace, H. L. Pratt, Boat knee, D. True, Boat, portable folding, N. A. Osgood, Bobbin and spool, R. C. Fay, Bottlers, domestic, T. & T. L. James, Book and cover, J. W. H. Reisinger, Bookbinder's beveling machine, H. W. Rokker, Book shelf, S. A. Smith.

Table listing various inventions such as Boot and shoe holder, N. Lyon, Bottle stopper fastener, G. F. Outten, Bracket, R. B. Sanderson, Bracket for book shelves, S. A. Smith, Brake, car, W. L. Card, Breweries, washing shavings in, F. Hinckel, Broiler, J. McConnell, Brush for scrubbing, G. W. Lee, Buggy top, I. Z. Merriam, Bustle and pannier, S. Dixon, Button fastener, H. Burtley, Candlestick, J. McCarthy, Cans, casing for, A. F. Tripp, Car coupling, W. N. Patteson, Car, dumping, M. Van Wormer, Car, stock, W. H. Hayes, Chain making machine, J. J. White, Chair, rocking, Willershausen & Rhoner, Charcoal kilns, operating, W. A. Miles, Clasp and buckle, J. R. Judd, Clasp for garments, W. B. Walker, Clay machine, G. D. Goodrich, Clock case manufacture, N. Allen, Cloth, gigger for napping, Woelfel & Massey, Coal, purifying, P. F. Morey, Coffee and spice mill, T. Strobbridge, Collar and hames, J. R. Gorby, Copper sheet manufacture, A. O'Neill, Cornice mould, etc., device, Glenn & Fern, Corset clasp, T. C. Candlish, Cotton cleaner, W. Herrmann, Cotton gin, A. L. Stietenroth, Cradle, J. Sprengard, Cultivator, S. L. Allen, Cup and other vessels, H. Berry, Dental plate mould, G. F. Reese, Door plate, B. A. Wilson, Draught equalizer, J. A. Stephens, Draught equalizer for horse powers, L. Dodge, Drill, rock, C. Burleigh, Egg carrier, C. E. Dutrow, Electric machine, E. Weston, Enameling sheet iron, F. G. & W. N. Niedringhaus, Engine, gas motor, N. A. Otto et al, Engine, reciprocating steam, C. Hunter, Fan, automatic, I. Zettli, Fence, E. Densmore, Fence barb, L. T. L. Wing, Fifth wheel for carriages, W. W. Grier, File, bill, S. Thompson, Filter, J. Foley, Fire alarm, A. S. Hickey, Firearm, A. Ball, Firearm, O. Jones, Firearms, rearsight for, A. Roda, Fire escape, H. J. Bowman, Fire escape, T. F. Carpenter, Fire escape, D. Ottinger, Fire extinguisher, T. E. Connelly, Fireman's hat, J. M. De Celis, Flour manufacture, C. S. Marple, Freezing water, mould for, W. R. Close, Fruit basket, L. W. Beecher, Furnace, steam blast, E. R. Stege, Gas lighter and extinguisher, G. S. Dunbar, Gas works, by-pass for, H. G. Morris, Gate, R. Gray, Gate, J. D. Hagaman, Gun, accelerating, A. S. Lyman, Halter, A. Henkell, Hammers, power mechanism for, B. Murphy, Harrow, rotary, S. Hartman, Harvester, R. Emerson, Harvester reel, McCormick & Baker, Hat and bonnet box, A. B. Rice, Hat holder, J. M. Castillo, Hides and skins, drench wheel for, I. Wells, Hinge, W. Hull, Horses, administering medicine to, H. Hartman, Horses, driving, E. Wilder, Horses, hitching, E. Repp, Horses, toe weight for, H. Satterwhite, Hub attaching device, F. C. Lee, Hub for carriage wheels, J. Raddin, Hydrant sewer trap, W. C. Amish, Injector, G. H. Little, Instep holder, J. H. Woodbury, Iron from refuse, separating, O. D. Woodruff, Ironing table, P. Dunbar, Ironing table, M. S. Prescott, Jibs, reefing, E. Rowell, Keyboard, C. A. Agren, Label holder, C. M. Bright, Lamp burner, A. T. Nord, Latch, T. P. W. Magruder, Lead, manufacture of white, G. L. Irwin, Leather skiving machine, C. Amazeen, Liftingjack, N. Hill, Lime bin, C. A. Lawton, Lock, sliding door, J. W. Schoonmaker, Lock, combination, R. Beachman, Loom shuttle, G. C. Mills, Lubricator, J. T. Meyer, Manure distributor, Jordan & Barron, Manure from night soil, manuf. of, C. M. Kimball, Match safe, G. R. Taylor, Meat and vegetable cutter, W. H. Goodchild, Metal plates, securing, W. G. Hyndman, Mill, grinding, D. Hess, Motor, water, J. S. Williams, Name plate, E. A. Webster, Ore mill, J. W. Foules, Ore separator, Wetmore & Rice, Oven, M. Nichols, Padlock, King & Pierce, Paper bag machine, A. B. Glover, Paper collar, S. Bates, Peg cutter, C. A. Corman, Photograph frame, A. Griffin, Piano forte sound board, G. W. Lyon, Pie turner, N. P. Macdocks, Planter, cotton seed, Nix, Stone, & Anderson, Planters, self dropper for, J. Butterfield, Plow, Knoblock & Bissell, Plow, W. J. Pirkle, Plow clevis, D. A. Kennedy, Plow, corn, P. Brannan, Plow, sulky, N. Elmer, Plowshare and point, C. M. French, Pocket book clasp, L. Messer, Potato digger, C. O. Seamans, Press, cotton, Ivens & Dorand, Printing apparatus, K. Gray, Printing, autographic, J. Pumphrey, Pump, J. M. Willis, Pump reel, sand, Brawley & Morris, Radiator, W. H. Brown, Railway track, G. Lehlback, Recarburetor, Hunt & Wendel, Refrigerator, J. L. Alberger, Refrigerator, S. P. Miller, Register, Bendor & Pond, Rolling blanks for axle clips, Clapp & Van Patten, Saw frame, buck, A. Holbrook, Sawing machine, T. F. Osburn, Scales, spring, J. A. & J. S. George, Scales, platform, S. J. Austin, Scales, spring, W. B. & J. S. Ross, Scissors, forceps, etc., L. A. Pichon, Screw driver, R. Munroe, Seeding machine sweeper, M. Barbour, Sewing machine shuttle, P. Diehl, Sewing machines, marking in, H. W. Fuller, Shaft, reverse motion counter, Guild & Clark, Shoe exhibitor, T. E. Lewis, Shoulder brace and suspenders, A. P. Fuller, Sirup, flavored, Walker & Patterson, Spoke tenoning machine, Barnes & Miller, Spoke tenoning machine, R. W. Eaton, Spoon and ladle, J. Scheider, Spring, car, H. Gardiner, Square, try, H. Owen, Stamp, postage, J. Dewe, Staples, inserting and clinching, D. M. Somers, Stove, cooking, G. G. Wolfe, Stove door, cooking, B. F. Clement, Stove, gasoline cooking, H. Wellington, Stove, oil, Shields & Liddle, Stove, safety, C. J. Smith, Stove, self extinguishing, W. F. Condon, Stove, culinary attachment, Dwyer et al, Tailor's measuring tool, E. O. Thompson, Telegraph relay, Allan & Brown, Telephone, J. Trobridge, Tether, W. B. Mathews, Thill coupling, H. Howell, Tile or brick kiln, R. G. McCullough, Tire setting machine, J. B. West, Tobacco curing, D. V. Davis, Toy carriage, H. Groth, Transom lifter, A. F. Pfeifer, Truck, car, J. G. Divoll, Tug link, W. P. Riley, Tug, spring draught, A. T. Nichols, Umbrella runner, H. S. Frost, Valve, check, J. F. Whitney, Valve for steam engines, G. A. Haworth, Valve gear for steam engines, G. W. Ziegler, Valve, rotary, D. W. Jones, Vegetable cutter, J. F. Rote, Vehicles, clip for, D. Kirk, Vessels, cleaning hulls of, H. J. Cole, Vessels, pin rail for, T. W. Hyde, Wagon box fastening, C. G. Conkling, Wagon gearing, etc., C. Baumgaertner, Washing machine, W. H. Nicholson, Washing machine, J. F. Pond, Washing machine, T. C. Welch, Watch balances, gauge for, J. Kinehan, Water meter, T. Walsh, Whip socket, A. Searls, Window cleaning device, E. P. Hall, Window hanging and fastening, J. Q. Ingham, Yoke fastener, A. W. Comstock.



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