

(64) E. W. W. asks: How can holes be readily pierced, or small holes enlarged, in rubber corks for the fitting of glass tubing? A. Force the stopper into the neck of a flask or large glass tube which will just fit into, and use a well sharpened cork borer with gentle pressure and even turning. If you desire to enlarge a former hole, first plug it tightly with a piece of glass rod and proceed as before.

Is there any table published of relative chemical affinities by which one may get at the amount of force necessary to dissociate the elements in certain compounds? B. We know of no such table.

(85) W. A. H. says: I have a relay of the box pattern, containing a magnet of about 40 ohms. There is a certain peculiarity I notice, which I would like to have you explain. I notice that whenever the current is broken by opening of the key, a peculiar jump is heard, a kind of kick or hammering. At first I thought the magnet was loose; but after making it as tight as possible, it acted in the same manner. A. The noise is occasioned by a change in the molecular condition of the iron core when magnetized and demagnetized.

(86) S. I. asks: 1. What length and size of insulated wire is required to wind the magnets of a relay, such as is used on ordinary telegraph lines? A. About 1,000 feet of No. 32. 2. What would be the proper dimensions? A. The core can be 1/4 inch long and about 3/8 inch in diameter.

(87) H. L. J. says: Makers of telegraph apparatus use a kind of lacquer or varnish on their brass work which prevents tarnishing, while it is so thin as to avoid muffling the sound. What is it, and how is it prepared? A. Shellac and alcohol are the principal ingredients, colored by gamboge, saffron, turmeric, etc. About 2 gallons alcohol to 1 lb. shellac is the proportion.

(88) G. W. H. says: 1. I am making an induction coil to throw 1/4 inches spark, to light gas. Of what diameter and length shall I turn my bobbin? A. Use about 2 miles of No. 36 wire for the secondary. 2. What size of wire shall I use? A. Make the core 3/4 inch or an inch in diameter and about 8 inches long. 3. I have some tinfoil 5 inches wide to make a condenser with; how much in length will it take? A. One hundred feet of the foil will probably be enough.

(89) C. C. S. asks: Can I conduct the smoke and exhaust from a 4 or 6 horsepower farm engine through tile laid underground (on a constantly ascending grade; to a stack 100 or 125 feet distant? A. This is frequently done.

(90) A. V. V. says: Two boilers, one 8 feet in diameter and the other 6, each containing the same number of flues and each having a steam gauge indicating apparently the same number of lbs. of steam; which boiler has the most steam in it? A. If the larger boiler has the most steam room, it contains, of course, the greatest weight of steam.

(91) W. H. L. asks: Why is it objectionable to raise the safety valve of a boiler in case of low water and danger of explosion? A. It is not desirable to do anything that may cause the water to rise and come in contact with overheated iron.

(92) R. M. asks: How can I raise a valve by change of temperature? A. There are numerous devices of this kind in common use. By inserting a notice in the "Business and Personal" column, you can probably gain full information.

(93) A. B. says: Please give me the scientific definition of the word "inertia?" A. Brande says "This term is used to denote the principle or law of the material world, that all bodies are absolutely passive or indifferent to a state of rest or motion, and would continue for ever at rest, or persevere in the same uniform and rectilinear motion, unless disturbed by the action of some extrinsic force."

(94) A. B. S. asks: Will a pump draw water any easier by having the pipe to the well larger than the connection to the pump, and will an injector lift the water any easier by having the suction pipe in the well larger than the pipe to the boiler? A. By using a larger pipe, the friction is diminished.

(95) J. D. S. asks: What is the best manner of determining when a millstone is in wind? A. Use a red staff, or straight edge covered with red paint, which will show all the high spots.

(96) E. M. P. asks: What are the best methods of reversing motion? A force is used to accumulate or store up a certain amount of power, then that stored-up power is desired to produce or exert its force. By what mechanism can this be effected? A. Sometimes a flywheel is used, a spring may be compressed, a weight may be lifted, or a reservoir may be filled with water. Flywheels, springs, and weights are among the most common means employed.

(97) C. W. asks: What would be a safe steam pressure to carry in a cast iron cylindrical shell of 10 inches inside diameter and 1/2 inch thick, with heads 3/4 inch thick? A. You can carry 200 lbs. if the casting is sound; but cast iron boilers frequently have points of weakness that render theoretical calculation of their strength of little value.

(98) W. L. M. says: Astronomers tell us that it has been calculated, from the rapidity of the rotation of the earth, that, if the earth were suddenly intercepted in its motion, sufficient heat would be generated to melt the earth instantaneously. What would be the generator of this heat? A. According to the modern theory of heat, a unit of heat and 772 foot lbs. of work are mutually convertible, motion being the generator of heat.

(99) T. A. asks: Can a turbine or other water wheel be considered an hydraulic power? A. It can, in a general sense, just as much as a steam engine may be spoken of as steam power. Strictly, the term applies to the power furnished by the motor.

(100) Y. M. asks: 1. What is the meaning of the mass of a body, when the weight is divided by the gravity to find it? A. It is a measure of the quantity of matter, and in order to give the same results with the

same body at all places in the earth's surface. 2. What is a circular inch? A. It is the area of a circle having a diameter of 1 inch. 3. What is a cylindrical inch? A. It is the volume of a right cylinder with circular base, diameter of base 1 inch, altitude 1 inch.

(101) C. F. says: When the water in my boiler stands between the two gauges (about 3 inches above top flues) and I start the engine, the water will instantly rise from 6 to 8 inches or nearly up to the dry pipe. As soon as I stop the engine, the water drops back to its original position. We know it is not foaming, as we have blown off the boiler several times, and it is perfectly clean. We use soft water. A. The rise of the water is probably due to insufficient steam room, or possibly because the fire is forced too much. We judge, from your account, that no injurious action takes place. There are several other reasons that might be effective in causing the water to rise, but those given above are the most probable.

(102) I. W. L. says: 1. I have been told that I can make a battery for gold and silver plating as follows: Take a piece of copper 1 1/2 inches in diameter and 1/2 inch thick, and a piece of zinc of the same size. Attach a copper wire to each in a glass vessel full with a piece of bluestone. The zinc is to be on the top. These wires are to go to the bath. Is this right? A. The plates should be much larger to give good results, and the copper need not be so thick. 2. How can I make the bath? A. Make a solution by dissolving cyanide of gold in cyanide of potassium, about 1/2 oz. of gold per gallon. Connect the article to be plated to the zinc of your battery. 3. How long should the articles be in the bath? A. Until the deposit is of the desired thickness.

(103) W. S. W. says, in answer to M. P., who asks for watch oil: Put 1 oz. pure olive oil in a tumbler, add 2 ozs. of 96 per cent alcohol, stirring well; set it away in a dark place for 24 hours or more, well covered, then pour into a clean bottle containing 10 ozs. distilled or clean rain water. Shake violently for 5 minutes, allow the mixture to stand 1/2 hour or so, then freeze with salt and ice. You will find a good article of fine limpid watch oil, perfectly fluid, at top. Draw off with a siphon.

(104) L. G. says: A string or cord being attached to a piston rod directly, the engine being of one horse power, what weight must I put on the cord to test the strength of the engine? A. This depends upon the speed of the piston. The measure of a horse power is the work of lifting 1 lb. 33,000 feet high in a minute, or 33,000 foot pounds per minute; so that if you divide 33,000 by the speed of the piston in feet per minute, the quotient will be the required weight.

(105) H. E. W. asks: 1. Why do nearly all manufacturers of electric annunciators and indicators for burglar alarms wind the magnets with wire of No. 28, and finer? Why not use No. 20 to 26? A. In many cases, Nos. 20 or 26 wire would be preferable; but with finer wire the battery does not require so much attention as might be necessary if coarser wire were used. 2. Will cotton covered answer as well as silk covered? A. Any kind of insulation will answer. Silk is better than cotton, as ordinarily put on, as it takes up less room. 3. What size of cores, and how many feet of wire on each core will give the best results? A. Cores are usually made about 1/4 inches long and 3/8 inch thick for annunciators; 250 feet of wire will answer for both cores. 4. Will an electro-magnet ever lose its power or become useless? A. Not with proper care, except that everything wears out with age.

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

G. M. P.—No. 1 is hauerite, sulphide of manganese. No. 2 is idocrase, a silicate of lime, alumina, and iron. No. 3 is tremolite, a silicate of lime and magnesia.—D. A. C.—S is a clay ironstone, containing much sulphide of iron (pyrites). G is graphite mixed with much clay. D appears to contain a small amount of sulphide of lead in a granitic matrix. Your letters were insufficiently stamped to the amount of 24 cents.

R. K. says: A friend tells me that a single, a double, a triple, and quadruple thread, either right or left hand, can be cut by one and the same pair of ordinary stocks and dies. Can this possibly be true?—G. S. W. asks: Is there any rule for dividing a circle into 3, 4, or more equal parts by parallel lines?—G. E. C. asks: How can I bend the sides of a guitar? Should they be steamed?—W. H. B. asks: Can you tell me how to bisect a triangle by a straight line passing through any given point within the triangle?

COMMUNICATIONS RECEIVED.

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

- On Friction of Slide Valves. By F. G.
On Force. By —
On Cleopatra's Needle. By J. W. P.
On an Old Problem. By B. B.
Also inquiries and answers from the following:
J. P. B.—T. H. C.—W. C. Y.—R. F.—E. P.—T. S. P.—C. W.—J. B. B.—J. K.—T. H. G.

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.

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.

Hundreds of inquiries analogous to the following are sent: "Who sells blue glass lamp chimneys? Who sells machines for stitching magazines, etc., with wire? Who sells working models of steam engines? Who makes iron chain? Who makes the best medical electric apparatus?" All such personal inquiries are printed, as will be ob-

served, 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

February 13, 1877,

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 inventions with names and numbers, including: Addressing machine, J. H. Williston; Advertising device, W. A. Brice; Air and steam blower, B. Hershey; Bag holder, B. J. C. Howe; Bale hook, E. F. Hauschildt; Bale tie, G. F. Jones; Barbed wire, twisting, E. P. Peacock; Bed, air, Macintosh & Boggett; Bed bottom, spring, A. W. Kendrick; Beer cooler, L. M. Davis; Bessemer steel, making, Hunt & Wendel; Binder, temporary, G. W. Emerson; Blacking box, S. W. Valentine; Bolt heading machine, G. R. Moore; Book support, J. & R. Lamb; Boots, etc., making, D. A. Sutherland (r); Bracket, adjustable, G. P. Davis; Breech-loading fire arm, A. J. Hudson; Breech-loading fire arm, H. Rowell; Brick kiln, E. W. Bingham (r); Brick kiln, W. S. Colwell; Brick machine, T. J. Davis; Broom, T. R. Evans; Broom and brush, S. M. Barrett; Buckle, F. W. Schafer; Burglar alarm, W. D. Wright; Butter mould, F. Hirst; Button, S. W. Shorey; Button or stud, H. S. Wing; Can, sheet metal, G. H. Chinnock; Can, sheet metal, J. S. Field; Capstan, reverse power, T. W. Hyde; Car axle box, C. E. Candee; Car starter, R. R. Carpenter; Car, steam street, L. Ransom; Car wheel chime, W. Wilmington; Carbureting air, apparatus for, A. C. Rand; Carpet stretcher, G. C. Banta; Carpet sweeper, W. S. Hall; Carriage seat, turn over, C. W. Patten; Caulterizing apparatus, C. Paquelin; Chair, P. Kamerer; Chuck, J. H. Westcott; Churn, G. W. Knapp; Cider press, R. C. Quinn; Circuit closer, electric, Rousseau & Smith; Clasp for suspenders, G. B. Gurley; Cloth cutting machine, M. L. Hodson; Clothes pin, W. N. Lockwood; Coal scuttle, W. Richards; Coffee filter, M. O'Connor; Cold, artificial, R. P. Pictet; Corn harrow, E. Martin; Corn stalk cutter, W. Gans; Corset clasp, W. S. Phye; Corset dummy, J. J. Wilson; Cradle, C. O. Sobinski; Crank, compensating, R. D. Milne; Croquet stand, A. Erlebach; Cultivator, R. B. Robbins; Cultivator, hand, J. W. Dowler; Curtain fixture, H. Seehausen; Desk and chest of drawers, G. S. Sykes; Deodorizing closets, A. Hanel; Door sill, A. Saur; Draft attachment, Otto & Simon; Draft equalizer, S. H. Pierce; Drafting scales, J. Lyman; Drawers, G. W. Walgrove; Dress protector, D. R. Harder; Drop light, C. Henry; Earth auger, G. Watson; Egg beater, M. C. Russell; Engine, rotary, P. D. M. Carmichael; Engine, rotary, R. W. Skirrow; Engines, mounting portable, R. M. Beck; Envelope, J. J. Hayden; Excavating apparatus, A. W. Johnson; Fats, process of treating, A. Springer; Feathering paddle wheel, W. Webster; Fence, J. W. Webster; Fence post, Wing & Thompson; File, W. T. Nicholson; Fire arms, etc., sight for, C. A. L. Totten; Fire kindler, S. W. Mather; Fire shield, L. W. Wright; Flour and meal sifter, C. O. Peck; Flue cleaner, G. W. Clough; Fork for green corn, etc., table, F. M. Dixon; Fruit drier, R. B. Blower; Fruit jar, J. A. Nichols; Furnace for brickkilns, H. W. Adams, Jr.; Furnace bridge wall, T. King, Jr.; Furniture top, J. T. Bailey; Gas burner, S. C. Salisbury; Gas burner, self-lighting, R. R. Moffatt; Gate, tilting, I. Brokaw; Gelatin capsules, cutting off, F. A. Hubel; Glass door block, W. Beck; Grain binder, C. B. Withington; Grain drier, J. Guardiola; Grinding awl blanks, J. G. Dimond; Hame fastener, J. C. Moore; Harrow, D. W. Baird; Harrow cultivator, C. La Dow; Harrow, revolving, O. P. Fisher; Harvester, E. D. Stewart; Harvester rake, J. H. Myers; Hay press, P. K. Dederick; Heater, friction, W. Wells; Heating curs, C. C. Converse (r); Hedge trimmer, J. A. McMarlin; Hoe, J. R. Hood; Hoisting machine, H. Snowden;

Table listing inventions with names and numbers, including: Hoop skirt, E. K. Bullock; Horse blanket attachment, J. C. Ayres; Horse power, J. H. Elward; Hose coupling, E. A. Leland; Ice creeper, Bartlett & Lewis; Ice creeper, J. D. Porter; Insect destroyer, G. B. Drum; Ironing table, E. H. Caylor; Jacket, C. B. Moulton; Knitting machine needle, F. Burns (r); Label holder, J. B. Gathright; Ladder, extension, O. Sherwood, Jr.; Lamp, Arnold & Blackman (r); Lamp, S. S. Newton; Lamp shade and globe, F. S. Shirley; Lamp shade holder, C. Votti (r); Lath-making machine, Shaw & Kennedy; Lathes, rest for metal, T. F. Carver; Leather, dressing, A. Shaw (r); Loom shuttle box, J. Hyde; Loom, shuttle, narrowware, Fischer, Kek, & Sharp; Lubricator, D. Jenkins; Lubricator, W. Schindler, et al.; Malt extract, making, H. R. Randall; Malt syrup, making, Boomer & Randall; Milk cooler, W. V. Walker; Mineral water, making of, E. Cornelis; Mining machine, C. M. Hall; Miter box, H. L. McClain; Miter machine, J. P. Tierney; Moth proof safe, A. H. Clark; Motor spring, C. H. Slicer; Napkin holder, E. C. Bickford; Napkin holder, F. W. Campbell; Nut lock, K. C. Naylor (r); Organ pipe, C. Fogelberg; Paint, making metallic, D. D. Parmelee; Paper, wood grinder for, G. H. Mallary; Parallel ruler, E. J. Towne; Pen holder, D. M. Somers; Pipe coupling, W. H. Bailey; Pipe coupling, E. A. Leland; Pipe tongs, A. E. Gay; Plaiting machine, Nickerson & Blanchard; Plow, G. Black; Plow, J. Buch; Plow, ditching, D. N. Maxwell; Press, double acting, L. Frahar; Pump, J. W. Rider; Pump valve, W. Painter; Railroad tracks, raising, G. Schwartz; Railway, pneumatic, W. H. Bailey (r); Refrigerating apparatus, Carre & Julien; Re-rolling old rails, H. Greer; Revolving fire arm, Ayres & Whittaker; Rope, stand or reel for, D. M. Haight; Rowlock, R. W. Hathaway; Sash fastener, M. Foster; Sash fastener, D. S. Roberts; Sawing and grinding, B. C. Tilghman; Sawing stone, E. A. Tilghman; School desk, H. R. Fry; Screw cutting die, Bishop & Johnson; Seal, metallic, E. A. Locke; Seed dropper, W. H. Pennal; Seed planter, J. R. Sample; Sewing machine thread cutter, J. Doyle; Shackle, H. W. Dilg; Shawl strap bar, extensible, L. Lewine; Sheep shears, W. George; Sitter, N. W. Starr; Signal lantern, R. J. Hamilton; Sink guard and cover, A. S. Hodges; Sizing, composition for, N. Crabtree; Sled coupling, bob, T. Bruner; Sleigh and shoe, D. J. Hendrickson; Soap composition, J. W. Bartlett; Soda water apparatus, O. Zwietusch; Spittoon, L. H. Wooden; Steak tenderer, A. J. Davis; Steam boiler furnace door, W. W. Hubbell; Steam boiler tube, fastening, D. Hess; Steam trap and boiler feeder, Vandecar & Harper; Stone and ore crusher, C. E. Hall; Stone and ore crusher, A. Pollok; Stone, artificial, J. L. Wray; Stove pipe shelf, W. L. Hess; Stove pipe elbow, A. C. Hogen; Stove polish, L. C. Harvey; Straw cutter, E. Wagoner (r); Table stand, iron, Osborn & Drayton; Ticket book, P. Deuser, Jr.; Tooth picks, making, J. L. Duryee; Torch, J. A. McPherson; Toy puzzle block, F. P. Schmitthenner; Toy, sectional, L. Schmetzer; Trap for preventing inflow, W. F. Downey; Tree shield, self-adjusting, A. Roff; Triturating metal powders, etc., D. D. Parmelee; Trunk clamps, making, Gould & Feick; Truss, J. W. Sutton; Tube brush, A. W. Abrams; Type machine, A. M. Howard; Undergarment, C. C. Curtis; Valve, stop, W. F. Thacher; Valve, straightway, D. Kennedy; Valve, throttle and check, Goodwin & Essex; Vapor burner, E. F. Rogers; Vehicle spring, L. A. Fogg; Ventilating faucet, O. H. Larson; Ventilating railway cars, H. King; Ventilator, G. A. Unkrich; Ventilator and alarm, W. F. J. Thiers; Voltaic plaster, W. B. Potter; Wagon brake, D. C. Montgomery; Wardrobe, W. H. Harris; Watch, repeating, A. L. Junod-Pattus; Water closet, J. E. Boyle; Water closet, ventilated, H. Ogden; Water closets, etc., seat for, J. J. Weeks; Water elevator, A. Wright; Water meter, W. Park; Windmill, D. Bull; Windmill, E. A. Dana; Windmill, W. D. Nichols; Windmill, J. G. Watson; Windmill, L. H. Wheeler, Jr.; Windmill, W. H. Wheeler; Wood boring machine, B. F. Joslyn; Wrench, E. A. Leland; Wrench, ratchet, E. A. Leland;

DESIGNS PATENTED.

- 9,739.—PAPER BOXES.—N. D. Bill, Springfield, Mass.
9,740.—EMBROIDERY.—B. Dreyfuss, New York city.
9,741.—LICORICE.—H. T. Jarrett et al., New York city.
9,742.—VAPOR STOVE.—E. F. Rogers, Chelsea, Mass.
9,743.—SCALE BASE.—F. W. Troemner, Philadelphia, Pa.
9,744.—GLASSWARE.—H. P. Pears, Pittsburgh, Pa.

[A copy of any of the above patents may be had by remitting one dollar to MUNN & Co., 37 Park Row, New York city.]