

(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 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 patent numbers. Includes: Addressing machine, J. H. Williston 187,335; Advertising device, W. A. Brice 187,252; Air and steam blower, B. Hershey 187,381; Bag holder, B. J. C. Howe 187,277; Bale hook, E. F. Hauschildt 187,272; Bale tie, G. F. Jones 187,284; Barbed wire, twisting, E. P. Peacock 187,306; Bed, air, Macintosh & Boggett 187,397; Bed bottom, spring, A. W. Kendrick 187,229; Beer cooler, L. M. Davis 187,219; Bessemer steel, making, Hunt & Wendel 187,386; Binder, temporary, G. W. Emerson 187,367; Blacking box, S. W. Valentine 187,434; Bolt heading machine, G. R. Moore 187,294; Book support, J. & R. Lamb 187,383; Boots, etc., making, D. A. Sutherland (r) 7,510; Bracket, adjustable, G. P. Davis 187,361; Breech-loading fire arm, A. J. Hudson 187,280; Breech-loading fire arm, H. Rowell 187,319; Brick kiln, E. W. Bingham (r) 7,504; Brick kiln, W. S. Colwell 187,217; Brick machine, T. J. Davis 187,359; Broom, T. R. Evans 187,368; Broom and brush, S. M. Barrett 187,346; Buckle, F. W. Schafer 187,237; Burglar alarm, W. D. Wright 187,445; Butter mould, F. Hirst 187,275; Button, S. W. Shorey 187,325; Button or stud, H. S. Wing 187,442; Can, sheet metal, G. H. Chinnock 187,216; Can, sheet metal, J. S. Field 187,260; Capstan, reverse power, T. W. Hyde 187,282; Car axle box, C. E. Candee 187,352; Car starter, R. R. Carpenter 187,355; Car, steam street, L. Ransom 187,314; Car wheel chime, W. Wilmington 187,441; Carbureting air, apparatus for, A. C. Rand 187,415; Carpet stretcher, G. C. Banta 187,345; Carpet sweeper, W. S. Hall 187,374; Carriage seat, turn over, C. W. Patten 187,304; Caulterizing apparatus, C. Paquelin 187,301; Chair, P. Kamerer 187,389; Chuck, J. H. Westcott 187,438; Churn, G. W. Knapp 187,285; Cider press, R. C. Quinn 187,312; Circuit closer, electric, Rousseau & Smith 187,318; Clasp for suspenders, G. B. Gurley 187,269; Cloth cutting machine, M. L. Hodson 187,383; Clothes pin, W. N. Lockwood 187,291; Coal scuttle, W. Richards 187,315; Coffee filter, M. O'Connor 187,407; Cold, artificial, R. P. Pictet 187,418; Corn harrow, E. Martin 187,398; Corn stalk cutter, W. Gans 187,371; Corset clasp, W. S. Phye 187,308; Corset dummy, J. J. Wilson 187,336; Cradle, C. O. Sobinski 187,426; Crank, compensating, R. D. Milne 187,402; Croquet stand, A. Erlebach 187,259; Cultivator, R. B. Robbins 187,235; Cultivator, hand, J. W. Dowler 187,222; Curtain fixture, H. Seehausen 187,422; Desk and chest of drawers, G. S. Sykes 187,429; Deodorizing closets, A. Hanel 187,270; Door sill, A. Saur 187,419; Draft attachment, Otto & Simon 187,410; Draft equalizer, S. H. Pierce 187,309; Drafting scales, J. Lyman 187,290; Drawers, G. W. Walgrove 187,332; Dress protector, D. R. Harder 187,377; Drop light, C. Henry 187,380; Earth auger, G. Watson 187,241; Egg beater, M. C. Russell 187,417; Engine, rotary, P. D. M. Carmichael 187,215; Engine, rotary, R. W. Skirrow 187,326; Engines, mounting portable, R. M. Beck 187,348; Envelope, J. J. Hayden 187,379; Excavating apparatus, A. W. Johnson 187,283; Fats, process of treating, A. Springer 187,327; Feathering paddle wheel, W. Webster 187,436; Fence, J. W. Webster 187,334; Fence post, Wing & Thompson 187,337; File, W. T. Nicholson 187,238; Fire arms, etc., sight for, C. A. L. Totten 187,432; Fire kindler, S. W. Mather 187,309; Fire shield, L. W. Wright 187,340; Flour and meal sifter, C. O. Peck 187,307; Flue cleaner, G. W. Clough 187,235; Fork for green corn, etc., table, F. M. Dixon 187,363; Fruit drier, R. B. Blower 187,349; Fruit jar, J. A. Nichols 187,406; Furnace for brickkilns, H. W. Adams, Jr. 187,243; Furnace bridge wall, T. King, Jr. 187,391; Furniture top, J. T. Bailey 187,344; Gas burner, S. C. Salisbury 187,418; Gas burner, self-lighting, R. R. Moffatt 187,403; Gate, tilting, I. Brokaw 187,253; Gelatin capsules, cutting off, F. A. Hubel 187,279; Glass door block, W. Beck 187,246; Grain binder, C. B. Withington 187,443; Grain drier, J. Guardiola 187,268; Grinding awl blanks, J. G. Dimond 187,257; Hame fastener, J. C. Moore 187,295; Harrow, D. W. Baird 187,447; Harrow cultivator, C. La Dow 187,392; Harrow, revolving, O. P. Fisher 187,370; Harvester, E. D. Stewart 187,328; Harvester rake, J. H. Myers 187,296; Hay press, P. K. Dederick 187,220; Heater, friction, W. Wells 187,242; Heating curs, C. C. Converse (r) 7,506; Hedge trimmer, J. A. McMarlin 187,401; Hoe, J. R. Hood 187,228; Hoisting machine, H. Snowden 187,425; Hoop skirt, E. K. Bullock 187,250; Horse blanket attachment, J. C. Ayres 187,242; Horse power, J. H. Elward 187,366; Hose coupling, E. A. Leland 187,395; Ice creeper, Bartlett & Lewis 187,347; Ice creeper, J. D. Porter 187,234; Insect destroyer, G. B. Drum 187,258; Ironing table, E. H. Caylor 187,254; Jacket, C. B. Moulton 187,405; Knitting machine needle, F. Burns (r) 7,505; Label holder, J. B. Gathright 187,372; Ladder, extension, O. Sherwood, Jr. 187,324; Lamp, Arnold & Blackman (r) 7,502; Lamp, S. S. Newton 187,409; Lamp shade and globe, F. S. Shirley 187,423; Lamp shade holder, C. Votti (r) 7,511; Lath-making machine, Shaw & Kennedy 187,323; Lathes, rest for metal, T. F. Carver 187,363; Leather, dressing, A. Shaw (r) 7,509; Loom shuttle box, J. Hyde 187,281; Loom, shuttle, narrowware, Fischer, Kek, & Sharp 187,369; Lubricator, D. Jenkins 187,387; Lubricator, W. Schindler, et al. 7,508; Malt extract, making, H. R. Randall 187,318; Malt syrup, making, Boomer & Randall 187,250; Milk cooler, W. V. Walker 187,333; Mineral water, making of, E. Cornelis 187,357; Mining machine, C. M. Hall 187,225; Miter box, H. L. McClain 187,293; Miter machine, J. P. Tierney 187,431; Moth proof safe, A. H. Clark 187,356; Motor spring, C. H. Slicer 187,424; Napkin holder, E. C. Bickford 187,247; Napkin holder, F. W. Campbell 187,247; Nut lock, K. C. Naylor (r) 7,507; Organ pipe, C. Fogelberg 187,261; Paint, making metallic, D. D. Parmelee 187,303; Paper, wood grinder for, G. H. Mallary 187,292; Parallel ruler, E. J. Towne 187,330; Pen holder, D. M. Somers 187,238; Pipe coupling, W. H. Bailey 187,243; Pipe coupling, E. A. Leland 187,394; Pipe tongs, A. E. Gay 187,264; Plaiting machine, Nickerson & Blanchard 187,229; Plow, G. Black 187,249; Plow, J. Buch 187,320; Plow, ditching, D. N. Maxwell 187,400; Press, double acting, L. Frahar 187,311; Pump, J. W. Rider 187,416; Pump valve, W. Painter 187,411; Railroad tracks, raising, G. Schwartz 187,421; Railway, pneumatic, W. H. Bailey (r) 7,503; Refrigerating apparatus, Carre & Julien 187,254; Re-rolling old rails, H. Greer 187,224; Revolving fire arm, Ayres & Whittaker 187,244; Rope, stand or reel for, D. M. Haight 187,271; Rowlock, R. W. Hathaway 187,227; Sash fastener, M. Foster 187,263; Sash fastener, D. S. Roberts 187,318; Sawing and grinding, B. C. Tilghman 187,240; Sawing stone, E. A. Tilghman 187,239; School desk, H. R. Fry 187,263; Screw cutting die, Bishop & Johnson 187,243; Seal, metallic, E. A. Locke 187,286; Seed dropper, W. H. Pennal 187,421; Seed planter, J. R. Sample 187,321; Sewing machine thread cutter, J. Doyle 187,365; Shackle, H. W. Dilg 187,362; Shawl strap bar, extensible, L. Lewine 187,299; Sheep shears, W. George 187,266; Sitter, N. W. Starr 187,427; Signal lantern, R. J. Hamilton 187,378; Sink guard and cover, A. S. Hodges 187,276; Sizing, composition for, N. Crabtree 187,218; Sled coupling, bob, T. Bruner 187,218; Sleigh and shoe, D. J. Hendrickson 187,278; Soap composition, J. W. Bartlett 187,245; Soda water apparatus, O. Zwietusch 187,446; Spittoon, L. H. Wooden 187,444; Steak tenderer, A. J. Davis 187,360; Steam boiler furnace door, W. W. Hubbell 187,394; Steam boiler tube, fastening, D. Hess 187,392; Steam trap and boiler feeder, Vandecar & Harper 187,331; Stone and ore crusher, C. E. Hall 187,375; Stone and ore crusher, A. Pollok 187,414; Stone, artificial, J. L. Wray 187,338; Stove pipe shelf, W. L. Hess 187,274; Stove pipe elbow, A. C. Hogen 187,385; Stove polish, L. C. Harvey 187,378; Straw cutter, E. Wagoner (r) 7,512; Table stand, iron, Osborn & Drayton 187,300; Ticket book, P. Deuser, Jr. 187,221; Tooth picks, making, J. L. Duryee 187,223; Torch, J. A. McPherson 187,232; Toy puzzle block, F. P. Schmitthenner 187,420; Toy, sectional, L. Schmetzer 187,322; Trap for preventing inflow, W. F. Downey 187,364; Tree shield, self-adjusting, A. Roff 187,317; Triturating metal powders, etc., D. D. Parmelee 187,302; Trunk clamps, making, Gould & Feick 187,267; Truss, J. W. Sutton 187,428; Tube brush, A. W. Abrams 187,341; Type machine, A. M. Howard 187,278; Undergarment, C. C. Curtis 187,368; Valve, stop, W. F. Thacher 187,229; Valve, straightway, D. Kennedy 187,280; Valve, throttle and check, Goodwin & Essex 187,373; Vapor burner, E. F. Rogers 187,236; Vehicle spring, L. A. Fogg 187,262; Ventilating faucet, O. H. Larson 187,286; Ventilating railway cars, H. King 187,390; Ventilator, G. A. Unkrich 187,433; Ventilator and alarm, W. F. J. Thiers 187,430; Voltaic plaster, W. B. Potter 187,310; Wagon brake, D. C. Montgomery 187,404; Wardrobe, W. H. Harris 187,226; Watch, repeating, A. L. Junod-Pattus 187,305; Water closet, J. E. Boyle 187,251; Water closet, ventilated, H. Ogden 187,408; Water closets, etc., seat for, J. J. Weeks 187,437; Water elevator, A. Wright 187,339; Water meter, W. Park 187,233; Windmill, D. Bull 187,251; Windmill, E. A. Dana 187,256; Windmill, W. D. Nichols 187,297; Windmill, J. G. Watson 187,435; Windmill, L. H. Wheeler, Jr. 187,440; Windmill, W. H. Wheeler 187,439; Wood boring machine, B. F. Joslyn 187,388; Wrench, E. A. Leland 187,287; Wrench, ratchet, E. A. Leland 187,288

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.]