

exercised by a steam engine depends upon the resistance opposed to it and not upon the pressure of steam in the boiler. When your friend is running his small lathe only, the pressure required on the piston is probably less than 10 lb. per square inch; when he adds the planer it may be 15 or 20 lb. per inch; and so with every increase of resistance the pressure on the piston, hence also the power is increased. You will find this clearly explained in "Pambour's Theory of the Steam Engine."

(17) R. F. M. asks: Is there any formula for calculating the power of the "hydraulic ram," if so, what is it? (Ram for lifting water.) A. The manufacturers' rule is: Multiply the quantity supplied by the spring (in gallons per minute) by 65. Multiply the product by the head or number of feet fall, then divide this product by 100 times the height to which the water is to be elevated; the result will be the quantity of water raised per minute.

(18) H. W. asks how to make a fulminate suitable for coating the inside of a toy so that if it is struck with a pointed instrument it will explode. A. Mercury is dissolved in 12 parts of nitric acid of 35° to 40° B., and to the clear solution is gradually added 11 parts of alcohol at 0.86. The crystals of fulminate, which separate after the reaction is completed and the liquid cooled, are washed with cold water, allowed to drain until the mass contains about 20 per cent of water and then cautiously mixed with 3.5ths its weight of niter, by means of a soft wooden muller, to form a paste, in which form it should be applied in the cartridge and allowed to dry. It is an exceedingly dangerous substance to handle on account of its explosibility, and the greatest caution has to be observed to avoid accidents.

(19) J. W. G. asks: 1. What gases escape up the chimney of a furnace burning soft coal? A. Carbonic acid, carbonic oxide, water, and various hydrocarbons, besides sulphurous acid and nitrogen. 2. Has any attempt ever been made to utilize them again as fuel? A. Yes, there have been a number of devices patented, and a few are in successful use. 3. What proportion of the heat in soft coal is converted into force with the best constructed furnace and engine? A. About 11 per cent. 4. What proportion of the loss goes up the chimney? A. The loss is variable.

(20) D. H. writes: I have a steam yacht hull, 32 feet long, 7 feet beam, which draws 3 feet 2 inches. What size engine and screw do I need? A. 4 1/2 inch cylinder by 6 inch stroke. Screw 32 inches diam. 2. What kind of a boiler will be best for salt water? A. Horizontal tubular. 3. Are the coil boilers practical? A. Coil boilers are not good for constant use.

(21) M. E. J. asks for an inexpensive method of oxygenating water. A physician here advertises to treat patients with it, but I believe the process he employs is not patented. He calls his compound "oxygen aqua." A. It is probably a dilute solution of peroxide of hydrogen.

(22) H. J. H. asks for a good receipt for cleaning gilt frames. I am a constant reader. A. Clean with a soft sponge moistened (not too well) with spirit of wine. Allow to dry by evaporation; do not use a cloth, and avoid friction.

(23) J. F. S. asks: What chemicals can be used (in cold or warm water) to soften yarn, which has become hardened by being worked on a knitting machine, without injuring the color of the yarn? A. Probably, try a little ammonia water.

(24) C. A. C. asks for a receipt for solvable glass for using on decorative pottery. A. Mix well together 2 parts fine sand and 6 parts of carbonate of potash (or 3/5 of carbonate of soda) in a crucible capable of holding 4 times as much. Carbonic acid escapes, and the contents fuse together to form a glass. Pour this on an iron plate, and when cold dissolve it in boiling water to form a sirupy liquid.

(25) F. S. writes: 1. I would like to know how to preserve natural flowers without taking the color out. A. See p. 409 (7), Vol. 40, SCIENTIFIC AMERICAN. 2. A cement for bottles? A. See recipe No. 22, p. 2511, No. 158, SCIENTIFIC AMERICAN SUPPLEMENT.

(26) R. A. J. asks: 1. How many primary or simple elements are there in nature? I claim over sixty; a friend of mine says that only four exist, namely, oxygen, nitrogen, hydrogen, and carbon; who is right? A. About 60 elementary bodies have thus far been discovered. 2. Can air be weighed without a vacuum? A. As we understand you, no. 3. I have an old soda fountain, cast of brass and soldered together in the center; would it be safe to use it for a steam boiler for a model engine? A. It would not make a safe boiler.

(27) A. C. F. asks (1) how to make a Grenet battery. A. A Grenet battery consists simply of one or two plates of battery carbon and a plate of amalgamated zinc, plunged in a solution consisting of bichromate of potash 2 parts dissolved in 30 parts of hot water; and sulphuric acid 1 part, to be added after the solution becomes cool. See SUPPLEMENTS, 157, 158, and 159. 2. Why is the wire curled like a spring where it connects the battery? A. To render it more flexible. 3. How can I make a simple armature? A. Any piece of soft wrought iron makes an armature.

(28) H. F. G. asks whether or not the steamers descending the rapids of the St. Lawrence river shut off steam and go by means of the current alone; if so, how do they steer the boat? A. At some of the rapids the pilots do shut off steam partially but not wholly; they still have progress enough through the water to give them steering control.

(29) C. H. H. asks: 1. Is a good locomotive engineer capable of performing the duties of an engineer on our Western river steamers? A. If his experience has been confined to locomotives, no. 2. Does an engineer necessarily have to have an understanding of algebra or geometry, or is a good understanding of arithmetic (higher) sufficient? A. For what is called a running engineer, arithmetic is sufficient, but for the higher grades of engineers, algebra and geometry are almost a necessity.

(30) H. D. asks what proportion the grate surface should bear to the heating surface of a steam boiler. A. 1.95 to 1.90.

(31) C. B. M. writes: 1. I want to make an electro-magnet of 150 ohms; how much No. 30 copper magnet wire will be required? A. Of No. 30 by B. W. G., you will require 1,100 feet. 2. Is there any rule by which I can tell the number of ohms in a magnet, knowing the size and amount of wire in magnet? A. It cannot be accurately determined by rule, as the resistance of different samples of wire varies. The readiest means of obtaining the resistance approximately is to use the tables given in most works on electricity.

(32) J. A. S. asks: 1. What is the best and cheapest piping for conveying a 5 or 6 inch stream of strong salt water, say a distance of 5 or 6 miles, to avoid rusting and corroding? A. Use wooden pipes or enamelled iron tubes. 2. Is there a work published on water systems; if so, where can it be had and what is the cost? A. For such works as you require address publishers who advertise in our columns.

(33) W. M. asks: 1. How much will air expand by heating; for example, force into a boiler 40 lb. of air to the square inch, how many lb. to the square inch will it be when the fire is 212° F? A. Air expands about 1-490 for each degree of increase of temperature.

(34) A. J. B. asks: 1. What is the greatest depth from which sunken vessels have been raised, time it took, cost, and by what means raised? A. Perhaps some of our readers can furnish the information. 2. Please tell me how to make a simple microphone. A. See SUPPLEMENT, No. 163.

(35) E. W. writes: A friend and myself intend to build a small stern wheel steamboat, and wish you to assist us if it is in your power. The dimensions of boat are: 25 feet in length, 7 feet wide at deck, and 4 feet wide at bottom (flat), and 3 1/2 feet deep. What size boiler, tubes, number and size, will be required to propel this boat not less than 8 miles an hour. Would the following proportions do: size of wheel about 5 feet diameter, and 3 feet wide; engines, 2x4 inches; with gearing of 1 to 2, connecting shaft of cog wheel to shaft of driving wheel, by connecting rods, with cranks set at right angles? A. We judge from your letter that you intend a side wheel boat; if so, and one engine geared 2 to 1, it should be at least 3 inches diameter by 6 inch stroke. The wheels need not be more than 24 inches wide. If you have two engines, they may be 2 1/2 inch by 6 inch stroke; work with a power on crank shaft into a spur wheel on wheel shaft. Your boiler should have about 75 to 80 feet surface.

(36) F. DeC. writes: 1. Suppose you have a perfect balance; on one scale you place a cylinder filled with steam, 10 atmospheric pressures; on the other you put a weight equal to this cylinder, so that the equilibrium shall be re-established. Now, by some means you open an aperture one inch square which is at the top of the cylinder, allowing the steam to escape during one second (of course you close the aperture after the second has elapsed). Will the reaction power, of the escaped steam during one second lift the other scale? A. At first instant of time, yes, but very soon the loss of the steam will turn the scale the other way. 2. Could you state what amount of steam has escaped in this one second? A. The amount of steam could be calculated, but full data would be required.

(37) S. G. S. asks for the best way to temper drills for drilling granite rock. A. See directions for tempering mill picks, p. 219, Vol. 39 the same process will apply to your drills.

(38) A. W. P. asks: 1. How much lead should the cut-off valve have on a small engine, 8 horse, cylinder 5x13, cut-off at full stroke, 300 revolutions per minute? A. If a single port cut-off valve, 1-16 inch; if a double port valve, a little less than 1-16 inch. 2. Is an instrument to be had that will assist in finding hidden valuables, such as gold or silver; if so, where to be found? A. No.

(39) W. asks how to make a good quality of shellac-varnish. A. Take shellac, any quantity, put it in a glass jar or tin vessel, and add alcohol to just cover the shellac. Set in a warm place, beside a stove or even in the sunshine, and in two or three days it is fit for use. If too thick add alcohol. It is not necessary to strain, as impurities will settle to the bottom of the vessel. Keep covered to keep out dust. If closely corked, evaporation of the alcohol will be very small. It can be used for wood, brass, iron, paper, etc. Experience will determine the proper thickness of the varnish.

COMMUNICATIONS RECEIVED.

On the Use of Brimstone in Fastening Iron to Foundations. By F. W. B.
On the Classification of the Protista. By H. M. D.
On Jupiter's Spot. By J. A. B.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were
Granted in the Week Ending
September 16, 1879,
AND EACH BEARING THAT DATE.
[Those marked (r) are reissued patents.]

Table with 2 columns: Invention name and number. Includes items like Albumen from fish spawms, Axles, machine for cutting and screw-threading vehicle, A. L. Lincoln, Bake pan, C. Jackson, Bale pressing and sacking device, W. P. Groom, Bale tie, W. Hill, Bale tie, J. W. & J. H. Simmons, Basins, discharge plug for wash, J. S. Gilbert, Beehive, Dixon & Herron, Beer, etc. air pressure apparatus for forcing, Becker & Itis.

Table with 2 columns: Invention name and number. Includes items like Belting, F. H. & J. E. Underwood, Belting, leather, F. H. Underwood et al., Bilge water gauge, J. Sekhoff, Binder for papers, temporary, P. H. Holmes, Binder, temporary, A. M. Graves, Bit brace, J. S. Fray, Bookbinder's combined evening-up and compressing table, J. W. Jones, Book cover, removable, L. P. Allen, Boot sole, rubber, C. H. Beach, Bottle, soda water, B. Hegele, Bottle stopper, C. G. Hutchinson, Box fastener, W. D. Frost, Box fastener, E. McKinney, Box fastener, C. L. Page, Box partition, G. L. Jaeger, Brick machine, C. E. Gregory, Brush and fan, F. J. Young, Brush, shoe, C. Herold, Buildings, bent for frame, Van Riper & Seely, Burial casket, W. S. Hassall, Button, R. Liebmann, Button holes, securing, J. Watters (r), Car propeller and brake, D. Hurley, Car roof, J. C. Wands, Cars, steam motor for propelling street, W. S. Salisbury, Carbureter, M. P. Fleming, Carbureter, W. Morehouse, Carriage top, child's, W. H. Van Dyck, Chairs, settees, car seats, etc. seat and back of, J. K. Mayo, Chandelier, extension, L. Brauer, Check rower, M. J. Barron, Churn, C. M. Sparks, Churn dasher, S. R. Hucker, Cigar mould press, N. Du Brul, Coal breaker, P. H. Sharp, Cock, gauge, H. Poe, Coffin, metallic, C. Mattoni, Colter, rolling plow, N. P. Bowsher, Corn sate, seed, B. Goodyear, Couch, B. F. Dare, Crane, traveling, J. B. C. Gougoul, Cultivator, Gibson & Cowden, Curtain fixture, J. W. Macy, Distillates, process and apparatus for the production of, E. T. Jenkins, Ditcher, W. Stacy, Door bolt and check, W. S. Burnham, Drag, sulky, L. V. & S. R. Sikes, Earth closet, R. W. Riddle, Egg carrier, A. D. Rock, Egg carrier, J. L. Stevens, Electric light, T. A. Edison, Elevator, W. Fellows, Enameling wood, compound for, J. C. Schmidt, End board, wagon, A. G. Woodbury, Farmgate, J. Hagerman, Fastening strip or clasp, J. H. Weaver, Fence panel fastening, portable, L. Whitney, Fence post, R. H. Eddy, Filter, L. Raecke (r), Filter and cut-off, self-adjusting, A. W. Morgan, Fire escape, H. Taylor, Fire extinguisher, Morison & Anker, Flour, apparatus for manufacturing buckwheat, D. D. Brewster et al., Flue cleaner, boiler, C. Castle, Forge, portable, J. F. Holt, Fruit jar top, H. C. Fowler, Furnace grate bar, boiler, J. C. Bobzien, Galvanic battery, D. H. Fitch, Gas generator, J. T. Guthrie, Gate, L. Wilkins, Gem setting, C. F. Quinley, Gems, fastening, J. Schwehr, Glass pattern, J. Hees, Grader, road, J. T. Currier, Grain binder, C. L. Travis, Hair clip, W. F. Beck, Harvester cutting apparatus, T. E. Page, Horseshoe bar, J. Fritz, Horseshoe bar and blanks, roll for, L. G. Claude, Horseshoe machine, Claude & Ball, Horseshoe, supplemental, J. Spencer, Hose or tubing, E. L. Perry, Incrustation preventive, F. Leporin, Jewel casket, W. L. Martin, Jewelry, manufacturing plated stock for, Murray & Bent, Knife, compass, etc., Leimer & Kempf, Knitting machine and tubular knit fabric, R. F. M. Chase, Ladder, extension, O. Marshall, Lamp, E. S. Drake, Lamp, W. Staehlen, Lamp burner, E. B. Regua, Lamp, car, C. Gordon, Lamp chimney, Greenfield & Fry, Jr., Lamp, electric, W. E. Sawyer, Lamp, vapor, J. S. Kellogg, Lantern, H. Iden, Last, J. Morrell, Lath sawing machine, J. Black, Lead washer, white, W. H. Gregg, Lifting jack, Blackburn & Brosius, Lifting jack, J. S. Kirkwood, Liquid outage gauge, G. & T. Koch, Lubricant, J. M. Lippincott (r), Machinery, device for driving, E. F. Landis, Measuring strip for packaged fabrics, A. B. Hayden, Meat preserving, F. Hofmann, Medical compound, G. S. Coleman, Metallurgic gas furnace, W. Swindell, Milk receptacle, M. P. Allen, Motor and apparatus for utilizing it, W. S. Colwell, Mower and reaper, C. N. Pike, Mowing machines, pawl and ratchet mechanism for, H. A. Dean, Nut lock, G. W. Goodwyn, Nut lock, A. C. Vaughan, Nut lock blank, W. Dunn, Oatmeal machine, S. F. Butts, Oils, making lubricating, J. M. Lippincott (r), Ore crusher, A. F. W. Partz (r), Ore furnace, Reamer & Anderson, Ore roasting furnace, M. P. Boss, Ore roasting furnace, W. E. Gifford, Pan wiring machine, R. J. Stirrat.

Table with 2 columns: Invention name and number. Includes items like Paper bay machine, L. C. Crowell (r), Patterns, apparatus for grading, J. J. Breach, Piles, bearing plate for, Carley & Johnson, Pipe elbow machine, F. P. Cady, Pipe wrench, R. R. Piper, Plaiting machine, H. P. Young, Planing and matching machine, Passel & Doan, Planing machine, A. Stevenson, Planter, corn, A. Dick, Planter, hand corn, F. C. Frost, Planters, check rower for cor, W. R. Cunningham, Plow, M. Butler, Plow, J. M. Martin, Jr., Plow comb, P. E. Rudel, Plow, gang, J. Belduke, Plow or cultivator, W. E. Lowrie, Plow, sulky, A. H. Gale, Pocketbook, W. E. Beames, Poke, animal, P. E. Rudel, Polishing machine, Cox & Whitney, Postmarker and canceller, T. Leavitt, Potash and soda, manufacture of chromates of, C. S. Gorman, Pressure gauge, J. Kayser, Pressure regulator, W. D. Dickey, Printing machine, yam, E. Crossley et al., Printing, stencil frame for autographic, E. De Zuccato, Puddling furnace, rotary, W. Swindell, Pulp, making wood, C. B. Carter, Pump, J. Hoover, Pump, breast, W. Kennish, Pump, double-acting force, C. E. Newman, Railway frog, M. Condon, Railway rail splitter, P. & W. B. Hayden, Railway rails to merchantable bars, machinery for reducing old steel, B. P. Brunner, Ramie, etc., process and machine for disintegrating, A. Angell, Rowlock, R. Sniffin, Saddle, riding, J. B. Gathright, Safety hook, H. Blakeman, Saw clamp and filing guide, E. R. Parker, Sawing machine, drag, W. W. Giles, Sewer gas consumer, W. H. Ramson, Sewing machine, A. W. Halbert (r), Sewing machine, R. H. St. John, Sewing machine, boot and shoe, E. Hamm, Sewing machine, burton hole, F. E. Schmidt, Sewing machine for embroidering, Tuttle & Keith, Sewing machine hat bmdr, C. O. Appleby, Sheet metal box, H. F. Miller, Sheet metal can, H. C. Milligan, Shingle sawing machine, M. S. Norton, Shoe sole buffing machine, J. W. Rogers (r), Smoke and cinder conductor for railway trains, S. & D. Rafter, Jr., Smoking pipe, F. Ellery, Snath fastener, Rumsey & Hewitt, Soldering machine, Dillon & Cleary, Sower, hand seed, J. S. Roys, Spinning frame, ring and traveler, J. Birkenhead, Spinning machine fibers, O. Atwood, Spoke setting machine, A. Dilts, Station indicator for railways, F. H. Young, Steel and iron, piles of bars of, W. Eynon, Steering ships by steam, etc., P. R. Voorhees, Stirrup, Updegraff & Comly, Stone, manufacture of hydraulic, J. Dimelow, Stove, oil, A. Burbank, Stove oven shelf, F. H. Root, Straw and hay cutter, G. Van Dyke, Telegraph pole, J. & J. McDermott, Telegraphs, automatic signal box for fire alarm, Crane & Rogers (r), Temperature, electrical apparatus for regulating, R. O. Crowley, Tiles and slabs, manufacture of, J. W. Hartley, Tobacco leaves in drying, separating, G. S. Myers, Torpedo, submarine, W. Giese, Truck, car, W. W. Warwick, Trunk, C. A. Taylor (r), Tube clamp, H. Spindler, Tweezers and finger nail cutter, A. W. Gifford, Valve, balanced slide, E. Robinson, Valve, steam engine, A. F. Kirsten, Valve, steam engine rotary, C. J. McCallum, Vehicle boot, J. W. Hewitt, Vehicle spring, W. Bambridge, Vise, adjustable faced, T. G. Hall, Wagon brake, H. G. Cox, Wagon jack, J. Van Matre, Watch case bezels, manufacture of, T. Mueller, Watch case centers, device for making, T. Mueller, Watch case pendant, C. H. Bisson, Watch pendants, manufacturing, T. Mueller, Water elevating machine, A. J. Walker, Weight motor, H. C. Forney, Wheat heater, B. W. Shaw, Wind wheel, Lowry & Hunt, Windmill, J. D. Graves, Windmill, P. A. Locke, Wire cutter, J. Brady, Yoke, neck, C. C. Keene.

TRADE MARKS.

Table with 2 columns: Trade mark name and number. Includes items like Dental rubber, gold pellets, amalgam, teeth, and cast varnish, L. S. Smith, Fever tonic, Meyer Brothers & Co., Ginger ale, lemonade, soda water, seltzer water, kall water, and sarsaparilla, W. A. Ross & Co., Granulated soap, The Granulated Soap Company, Lime juice sirup, Douglas Brothers, Lubricating oils, Eclipse Lubricating Oil Company, Lubricating oil, Camden Consolidated Oil Company, Medicinal compound or liniment, H. G. Farrell, Shirts, J. C. Duffe & Co., Steam engines and boilers, Skinner & Wood, Whiskies, H. Mueller & Co.

DESIGNS.

Table with 2 columns: Design name and number. Includes items like Badge, G. Wolf, Bracelet, T. G. Brown, Carpet, H. Horan, Pencil cases, Le Roy W. Fairchild.

Table with 2 columns: English Patents Issued to Americans, From September 5 to September 9, 1879, 1 inclusive. Includes items like Berth for ships, T. O. L. Schrader, New York city, Bottle stopper, N. Thompson, Brooklyn, N. Y., Dental burr sharpener, M. A. Richardson, Bridgeport, Ct., Electriclamp, W. E. Sawyer, New York city, Fishways, M. McDonald, Lexington, Va., Mail bags, T. A. Dennis et al., Newark, N. J., Metal tube cleaner, W. C. Allison, Philadelphia, Pa., Spark arrester, Mary E. Walker, New York city, Telegraph recording apparatus, R. K. Boyle, N. Y. city, Telegraph signal, S. W. Francis, Newport, R. I.