

proper place, so that it may gather the steam with equal facility from both ends of the boiler. When there are three sections, the middle one should receive the dome, although there are exceptions to this in practice. With two sections the usual practice, and we think the proper one, is to put the dome on the front section.

(4391) G. T. R. asks: 1. Where do balloonists get the hydrogen to inflate the balloons, or how do they produce it? A. Street gas is generally used. Hydrogen can be made by passing steam over white-hot iron borings and scrap. 2. When petroleum is burned there is great smoke. Is there any material containing oxygen which, if burned with it, would result in consuming this smoke (or unconsumed carbon) or how could it be prevented? A. No such substance is known. Proper burners, atomizing, and strong draught are the proper lines to work on for smoke-consuming. 3. Would black manganese, if heated, evolve oxygen? A. Yes, if heated high enough.

(4392) L. H. D. asks: If a sheet iron armature core be used for simple motor, as in SUPPLEMENT, No. 641, would it give satisfactory results? A. Yes, if made of sheet iron disks or rings.

(4393) E. J. K. asks: 1. What is the exciting fluid used in the Crowfoot gravity battery with zinc and copper elements? A. The exciting fluid is saturated solution of copper sulphate. 2. I am making two cells of storage battery, each cell containing two lead plates 6x8 inches; can I form the cells and afterward charge them with Crowfoot gravity batteries? If not, could it be done by covering them with red lead paste? A. You can form your secondary plates and charge them with the gravity batteries. It is advantageous to apply to lead plates a paste of red lead. 3. Will the two cells run motor in SUPPLEMENT, No. 641? If not, how many will it take? A. The two cells of battery described by you will have a very small capacity, owing to the small number of plates. You should have 7 or 9 plates in each cell.

(4394) H. L. asks: 1. Is plaster of Paris, after being moulded and dried, porous, so as to allow air to penetrate it? A. Plaster of Paris is quite porous. 2. Is there a mixture (the nature of plaster of Paris) that after being dried no air can penetrate it? If there is, what is it? A. Probably the oxychloride of zinc cement would be very nearly if not absolutely impervious to air, but you can saturate the plaster with gelatine, shellac varnish or paraffine, thus rendering it non-porous. 3. Is a note collectible which reads: Ten days after death I promise to pay, etc., provided after death the estate is valued at or above the amount called for by the note? A. Yes.

(4395) J. T. D. writes: Please explain the action of the Bourdon tube, used by Trouve in his aviator, illustrated on page 105, current volume of the SCIENTIFIC AMERICAN. I cannot understand why its branches recede from or approach each other as the pressure of the contained gas is increased or decreased. A. The Bourdon tube has an elliptical cross section, so that pressure exerted within the tube causes it to tend to approach a figure of circular cross section; in so doing, the inner surface of the tube is forced inwardly toward the center of curvature. As the inner wall of the tube is confined in the direction of its length by the outer wall, the pressure which renders the inner wall more convex in a transverse direction reduces its convexity or curvature in a longitudinal direction and thus tends to straighten the tube.

(4396) G. M. V. asks: How many volts, amperes, and ohms an eight inch French Grenet battery has? A. The E. M. F. of a Grenet battery is 2 volts. Its resistance depends upon the solution and the condition of the battery, from 1/4 of an ohm upward. The current depends upon the resistance of the battery and of the external circuit. It is calculated according to Ohm's law, which is E = C R.

(4397) Amateur asks for directions for making a dry battery, and how to charge same, or if chemicals charge it. A. For information in regard to Gassner's dry battery we refer you to SUPPLEMENT, No. 792.

(4398) C. L. asks: Is it a fact that lightning rods have the power, to any extent, of protecting houses from injury by lightning? A. A lightning rod properly put up and grounded is undoubtedly a protection against lightning.

(4399) M. T. asks: If a surveyor was running an old line, that the call was north, and the time had been long enough to require two degrees variation here in Southwestern Virginia which should he run N. 2 W. or N. 2 E. to hit the old line? Out here in this portion of Virginia does the needle of a compass vary to the east or west, and about how many years would it take to make one degree variation? Where does the line of no variation, as it is called, run, and does the end of needle pointing north, if it is east of said line of no variation, tend to travel to the west, and if west of it does it tend to the east? A. The variation of the magnetic needle in Scott Co., Va., was about 2° east in 1870, and has been decreasing at the rate of about 3 minutes per annum since that time. The predicted variation for 1892 for your county was four-tenths of a degree east. As the variation of the needle travels west, the amount of variation known since a former line was run must be added to the east reading and subtracted from the west reading from the north end of the needle for tracing the old line on northern courses, and the reverse for southern courses. The north end of the needle always travels to the west by the amount of variation, whether you are to the west or east of the line of no variation, which is now in or near your county, its amount there being somewhat uncertain from local influence due to mountain regions.

(4400) G. F. C., Plaquemine, La., asks: What is meant by the figures, the river is 35 feet, a rise of 0.2 of a foot, and stands 1.7 feet below the flood line of 1890, or the gauge reads 16.6 feet, or the rise is 0.15 of a foot? I read this daily in the river news columns of our newspapers, and will be very glad if you will explain how it reads in parts of feet or inches, as there is

a dispute about it. A. The datum of river gauges is at low-water mark. The published readings of the height of water are in feet and tenths above low-water mark. The variations are also in tenths or hundredths of a foot. Thus: 0.2 is 2 inches and 4 tenths of an inch, and 1.7 is 1 foot 8 1/2 inches. Also 0.15 is 1 inch and 1/2 of an inch.

(4401) O. F. H. asks: 1. Which will do the most work according to weight, the steam engine or the electric motor, including with both all accessories? A. As the electric motor is not a prime motor, you will be obliged to include the weight of the prime mover in making your estimate. This being the case, of course a steam engine would weigh less than the electric motor with its prime mover. If the prime mover is disregarded, the electric motor would weigh much less than a steam engine of the same power. 2. Which will produce the most power in a given short time according to weight—the primary or the secondary battery? A. The secondary battery.

R. Bros. & Co. ask how to make ambergris extract.—C. T. L. asks for a receipt for rice soap.—R. N. C. wants to know the antidotes for the principal poisons.—H. W. J. asks how hair washes are made.—P. W. S. wants to know how to bend glass tubes.—E. C. W. asks how to make the powders for a gasogene.—B. D. L. asks how to renovate oil cloths.—F. U. G. asks how to make gelatine sheets.—J. C. O'Brien wants to know how to repair books.—C. H. H. asks how to make the composition for carton pierre ornaments.—E. W. S. wants to know how to make resin for violin bows.—A. E. N. asks how to filter water for drinking purposes.—G. G. H. asks for information on core sand.—B. C. S. asks how sand blast engraving is done.

Answers to all of the above queries will be found in the "Scientific American Cyclopaedia of Receipts, Notes and Queries," to which our correspondents are referred. The advertisement of this book is printed in another column.

TO INVENTORS.

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INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted May 24, 1892. AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Table listing inventions with names and dates, including: Acids, solidifying liquid, W. White; Advertising card rack, D. S. Foote; Alarm, See Heat alarm; Amalgamator, J. M. Thompson; Andiron, E. F. Paschal; Aquarium, picture, E. Toliner; Arch, floor, R. L. Stone; Arm or plates, manufacture of, T. J. Tresgider; Atomizing or spraying liquids, device for, E. R. Keen; Autographic register, S. D. Cochran; Bank, trick savings, W. H. Johnson; Baseball apparatus, W. C. Blades; Battery, See Diffusion battery; Bearing, adjustable, F. Hart; Bed, folding, W. P. Griffith; Beer cooler, W. W. Ferguson; Bicycle lamp, F. Westland; Bicycle safety, E. J. Edwards; Binder, shrub, H. O. Thomas; Binders, etc., grain conveyer for, G. Schubert; Bit, See Check bit; Blacking case, E. G. Cameron; Block, See Plug; Blower or engine, rotary, G. Growell; Blowers or engines, cylinder for rotary, G. Crowell; Board, See Drawing board; Game board; Wash board; Boiler, See Heating boiler; Steam boiler; Boiler furnace, G. S. Strong; Bolt heading machine, W. H. Betts; Bolt holes, device for tapping stay, J. T. Connelly; Book, check, G. M. Breinig; Book rack, S. G. A. L. Sargent; Boot or shoe shaping device, J. E. Drake; Bottle alarm, J. A. Trotter; Bottle and stopper cap for the same, J. Gilberts; Bottle packing and shipping box, P. C. Lelidich; Bottle stopper, J. A. Stuker; Box, See Bottle packing and shipping box; Letter box; Box covering machine, Lafean & Devlin; Boxes, machine for stripping paste or straw brick, J. Godfrey; Brick kiln, Boehncke & McLean; Broom holder, A. E. Johnson; Buckle, suspender, S. E. Cook; Burner, See Oil burner; Button die, C. Wagenföhr; Cabinet for holding postage stamps, etc., M. P. Eklund; Cable grip, G. F. Elliott; Cable hanger, J. J. Nates; Calendar, W. C. Hawkins; Can, See Ice can; Tin can; Can testing machines, can holding frame for use with, C. H. Emery; Candle moulding machine, A. A. Royau; Car coupling, E. F. Eastwick, Jr.; Car coupling, J. Krehbiel; Car coupling, J. W. Latta; Car coupling, A. Mailman; Car coupling, W. A. Mayhall; Car coupling, S. Q. Saunders; Car coupling, Scott & Brasfield; Car door, grain, R. O. Hixson; Car door, grain, W. S. Schroeder; Car door, sliding, C. H. Dunham; Car draught guard, G. F. C. Rosenthal; Car electric motor, G. H. Patton; Car lighting apparatus, electric, J. F. McElroy; Car loading apparatus, Campbell & Whigham; Car safety catch, mining, C. R. Trew; Car signal, street, C. H. Smith; Car ventilator, H. A. Dirkes; Carpet sweeper, C. K. Stinson; Carrier, See Log carrier; Cart, self-loading, C. O. Hayes; Case, See Blacking case; Cash register and indicator, R. Mills; Casting machine, type, H. S. Popp; Casting mould, F. J. Wooster; Chain link, drive, A. J. Reynolds; Chair, See Rocking chair; Change receiver, D. B. Conway; Check bit, L. C. Swift; Churn, Rolland & Francois; Clear press and bundling machine, J. Broda; Cigarette machine, J. B. Pollard; Clamp, See Grapevine clamp; Clay reducer, W. Burkman; Cleaner, See Flue cleaner.

Table listing inventions with names and dates, including: Cleaning and scouring compound, Peterson & Ruge; Clothes line, D. F. Covert; Coal and wood cabinet, J. R. Egan; Cock or analogous valve, stop, P. Zimmermann; Coin control apparatus, G. F. W. Schultze; Coin handling facilitator, J. O. Boggs; Coin holder, H. E. Howe; Coin mailing grip, M. Hazard; Collar, horse, C. F. Allen; Collar, horse, C. A. Pettie; Comminator brush, C. L. Coffin; Composition of matter and producing the same, C. C. Carroll; Compound engine, single cylinder, E. J. Woolf; Concrete, mortar, etc., mixing machine for, J. Skinner; Cooking apparatus, combined steam and hot air, C. H. Dexter; Cooking utensil, steam, C. F. Burnap; Cooler, See Beer cooler; Corn popper, Clark; Corset, J. Oberly; Corset boning implement, J. A. House; Coupling, See Car coupling; Hose coupling; Thrill coupling; Creamer, milk, V. W. Blanchard; Crupper strap fastener, F. L. 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Searing; Farm, See Wool fabric; Farm gate, C. H. Holter; Fastening device, C. Liebe; Fence wire, J. B. Cleveland; Fence stay, wire, J. H. Brower; Fish wheel, Robinson & Egan; Firing apparatus for use with coal dust, C. W. Senger; Flue cleaner, McNutt & Grimmesey; Flue cleaners, elastic scraper for, P. S. Kingsland; Fluid meter, proportional, D. McDonald; Fruit grader, G. A. & C. W. Fleming; Furnace, See Boiler furnace; Metallurgical furnace; Smelting furnace; Furnace, R. F. Egan; Furnace door opener, C. H. Oliver; Furnace for iron working, W. Heckert et al.; Furnaces, hydrocarbon oil burner for, J. Wilson; Gag runner, Felsberg & Dill; Gauge, See Track gauge; Game apparatus, G. L. Hood; Game apparatus, G. L. Reynolds; Game apparatus, C. Zimmerling; Game board, G. Stackhouse; Garments, adjusting strap for, J. A. Phillips; Gas apparatus for charging magazines with liquefied, F. Ghiffi; Gas engine, carbureted by dropper, Blake & Sackett; Gas retorts, apparatus for discharging, A. 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