

(18) L. T. G. writes: I have four cells of carbon battery; the solutions are bichromate of potash and sulphuric acid. Also three cells of the Smee: sulphuric acid one part, to ten of water; and the four cells of the carbon battery are not sufficient to run my small electro-magnetic engine for more than two or three minutes. I wish to know if it would be injurious to either one of the batteries if I should unite them both in one circuit, to run the engine for about one or two hours at a time. A. The batteries will not be injured, but they will not work well together. Better increase the number of carbon elements. 2. Will either of the above batteries freeze in winter, or will cold weather affect their working? A. They will not freeze, but it is better to keep them at a temperature above freezing. 3. Is it always best to use the largest wire in connecting batteries with any instrument, say, above No. 11 or No. 12 wire, as the larger the wire the less the resistance, thereby getting nearly the full power of the battery? A. Yes. 4. What purposes are quantity and intensity of electricity best suited for respectively? A. Batteries are arranged for quantity or intensity according to the work to be done. The maximum effect is obtained when the battery elements are combined, so that the total resistance in the elements is equal to the resistance of the rest of the circuit.

(19) J. H. asks: Which would be the strongest, two 2-inch by 4-inch joists nailed together, or one 4-inch by 4-inch joist? A. One 4-inch by 4-inch.

(20) J. K. B. writes: I suppose every experimenter who uses a carbon battery has been troubled by the uncertainty of the carbon connection. The makers of the Grenet battery seem to have solved the problem. Can you tell us through your correspondence column what solder they use, and how they make it stick? A. The carbon is coated with copper by electro-deposition; this coating is readily soldered to the carbon support with common soft solder.

(21) M. D. M. asks: 1. Is there a difference in a steam engine between the boiler pressure and the pressure on the piston when the piston is moving 400 feet per minute? A. Yes. 2. About what difference? A. From 2 to 8 lb., depending upon size and length of steam pipe. 3. Does the difference between them vary with a difference in the motion of the piston in the same engine? A. Not appreciably within usual limits of speed.

(22) F. writes: We have just closed up our steam stone works for this season, and we wish to know what is best to coat the inside of our steam boilers to keep them from rusting. Some say black oil, and others common tallow; which do you recommend as the best? A. We think the black oil quite as good and cheaper than tallow. Have the surfaces thoroughly cleaned before applying the oil.

(23) C. H. asks for a cheap and easy way of amalgamating battery zincs. A. It depends on the kind of battery. In the Fuller the mercury is placed in the porous cell with the zinc. In bichromate batteries all that is necessary is to dip the zinc in the bichromate solution and then pour on a drop or two of mercury. It soon spreads over the entire surface of the zinc. Another method is to dip the zincs in dilute sulphuric acid and then pour on a little mercury, but these methods, except in the case of the Fuller battery, are wasteful of mercury. It is better to apply an amalgamating solution with a brush. This solution is made by dissolving one part (by weight) of mercury in five parts of nitromuriatic acid (nitric acid one part, muriatic acid three parts), heating the solution moderately to quicken the action; and, after complete solution, add five parts more of nitro-muriatic acid.

(24) G. W. asks: 1. Would a perfectly round ball of the same specific gravity throughout lie still on a level surface? A. Yes. 2. Can a mechanic's square be made so true that a four-inch block may be made exactly square by such an instrument? A. Yes.

(25) W. H. asks: 1. What is the weight of a boiler 24 feet long, 44 inches diameter, 1/2 inch thick? A. With two flues, 16 inches diameter, 6,900 lb. 2. What is the contents (in gallons) of a tank 15 feet deep, 10 feet in diameter, top and bottom diameters being equal? Please give me a formula. A. Area of 10 feet diameter = 78.54 x 15 feet deep = 1,178 cubic feet, and, allowing 7 1/2 gallons per cubic foot = 1,178 x 7.5 = 8,835 gallons.

(26) C. L. W. writes: I have constructed a small induction coil to be used for giving shocks. It is 3 inches long. The primary coil is wound with 3 layers of No. 18 cotton covered wire, and the secondary consists of about 12 layers of No. 38 silk covered. 1. How many cells and what kind of battery shall I use to get the best results? A. For temporary use one cell of Grenet battery would answer, but for continued use some form of sulphate of copper battery is to be preferred. 2. Is it necessary that the spring and screw in the interrupter should be coated with platinum? A. Yes; otherwise they would soon burn out.

(27) H. C. P. writes: In the SCIENTIFIC AMERICAN of September 18, Mr. E. Y. D., query 26, asks whether a sun dial, made for latitude 48° 15', can be utilized in latitude 38° 50' for showing correct time. To make his dial available in the lower latitudes, he has only to lift the south side, so as to give the face a slope to the north, equal to the difference of the latitude, in this case 9° 25'. For then the plane of the gnomon being in the plane of the meridian, the edge of the gnomon casting the shadow will be parallel with the earth's axis; and the face of the dial will be parallel with the horizon of the latitude for which the dial was made, and the graduation will show the time required; that is, on the supposition that it was correctly made, and for a horizontal dial.

(28) C. M. M. asks for a cheap process of plating steel case knives with tin. A. Clean the metal thoroughly by boiling in strong potash water, rinsing, pickling in dilute sulphuric acid, and scouring with a stiff brush and fine sand. Pass through strong aqueous ammoniac solution, then plunge in hot oil (palm or tallow). When thoroughly heated remove and dip in a pot of fused tin (grain tin) covered with tallow. When tinned, drain in oil pot and rub with a bunch of hemp. Clean and polish in hot sawdust.

(29) V. R. P. writes: I have an aquarium which contains 4 1/2 gallons of water. How many fish must I have in it—average length of fish 1 1/2 to 2 inches, to insure the health of the fish? At present, I refill the aquarium semi-weekly. Please tell me a process by which I can lengthen the time. A. Put in three fish, 1 1/2 inches in length, to one gallon of water, one small bunch of fresh water plants to one gallon of water. Tadpoles (after they have cast their branchia organs), newts, and rock fish can be used to the extent of six to the gallon. The aquatic plants will supply the fish with sufficient oxygen, so that the water will seldom require changing.

(30) A. S. writes: I am about to construct an aqueduct 1,200 feet in length, the water level differing 40 feet. By placing a forcing pump in the valley I could then raise the water to a height of 40 feet, and having erected a tank at that height and connected it by means of pipes with another tank 1,200 feet distant, but on the same level, the water according to a law of nature would travel over the distance of 1,200 feet. But finding it very difficult to erect tank 40 feet high, I would prefer to construct the whole on the incline. Will the forcing pump having just power enough to raise the water 40 feet perpendicularly into the tank have sufficient power to force it into a tank of the same elevation through 1,200 feet of pipe running on the incline, or must I have more power, and how much more? A. The forcing pump must have enough more power to overcome its own additional friction and the friction of water in the long inclined pipe. Allow 20 per cent more power at least.

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

Box marked C. H. (no letter).—1 and 2. Garnetiferous quartz rock. 3 and 4. Micaceous quartz rock. 5. Granite. 6. Basalt with traces of calcopyrite.—L. C. G.—They are fossil sharks' teeth, common in marl beds.—J. E. C.—1. Iron sulphide and lead sulphide. 2. Quartzite, with traces of galena and molybdenic sulphide. 3 and 4. Dolomite. 5. Fossiliferous argillaceous limestone, containing traces of lead sulphide. 6. Lead sulphide in argillite.—C. T. M.—1. A silicious kaolin. 2. Similar to No. 1. Useful if mixed with finer clay for white ware. 3. Silicious carbonate of lime—some of this would probably make fair cement. 4. Brick—the clay from which this was made would probably be useful to potters. 5 and 6 are very silicious clays.

COMMUNICATIONS RECEIVED.

Liniment. By J. L. T. Seen and Tangible and the Unseen and Intangible. By J. L. T. On Cheap Railroads. By R. P. N. On a Meteor. By W. E. C.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

November 16, 1880,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, 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. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications not being printed, must be copied by hand.

Table listing various inventions and their patent numbers, including items like Alloy for coating metals, Axle box, Bag holder, Baling press, Band cutting and removing apparatus, Basket splints, Belt shifting mechanism, Belt slipper, Bias cutter, Bit brace, Bit stock, Book case, Book holder, Book and shoe heel, Boot and shoe sole, Boot and shoe sole, Borer and excavator, Bottle wrapper, Bridle front, Buckle, Buckle, harness, Button worker, Button and stud, Buttonhole for cuffs, Can, Can opener, Car brake, Car brake, Car brake, Car coupling, Car door fastener, Car railway, Car starter, Car stock, Car wheel, Cars, shield for railway, Caster, Chain, Chains, device for making, Chair, Chandeller, Cheese curd sifter, Churn, Clock, traveling, Clock winding, combined, Clothes wringer, Coal fork, Coin, device for holding, counting, and delivering, Collar and cuff folding machine, Confectioners' forms, Corn husks, apparatus for cutting, Corn husks, disintegrating, Corset, Cotton picker, Cotton press, Cradle and carriage, Crank movements, Crimping pin, Cuff fastener, Cultivator and seeder, Current and tide water wheel, Currycomb, Curtain fixture, Draught equalizer, Drawer lock, Drilling machine, Drip pan for oil barrels, Electric light burner, Electric lights or motors, automatic cut-out apparatus, Electric machines, rotating armature for dynamo, Electrical switch board, Embroidering machines, Jacquard attachment for, End board, wagon, Excelsior machine, Explosive compound, Eyeglasses, Faucet attachment, Feed bag, Fenich post wire, Ferric oxide and cupric chloride, manufacture of, Filter, coffee and tea, Filter, reversible, Firearm, breech-loading, Fire escape, Quintavalle and Lindberg, Fires, process of and apparatus for extinguishing, Foot, artificial, Fruit drier, Fuel burning apparatus, Galvanic battery, Gas making apparatus, Gas pressure regulator, Gas, process of and apparatus for manufacturing illuminating, Gate, L. 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DESIGNS.

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