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Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

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(6402) W. C. McC. writes: 1. I am about to wind an induction coil for a medical battery. In what way would you wind the wire, so that it will give three currents—primary, secondary, and primary and secondary combined? I am going to have three binding screws; how will the connections be made? Also which way would you advise to regulate the current? With a tube sliding over the core or over the whole coil? How does the tube in either way affect the current as to weakening and strengthening it? A. For medical induction coil we refer you to our SUPPLEMENT, No. 569. For primary connections connect wires from handles to each side of the make and break contact mechanism. For combined place primary and secondary in series. Arrange regulating tube as shown in SUPPLEMENT above referred to. When tube is pushed in so as to cover the core, it weakens the effect of the coil. 2. How many volts are there in two Mesco dry batteries? A. Allow 3 volts.

(6403) S. M. M. asks: Will you please let me know by letter what the resistance of ordinary fresh water is, hot and cold, and through what resistance will an ordinary gravity battery, say a bluestone, ring a vibrating bell. A. Water is of almost infinite resistance, except when the potential is high enough to electrolyze it, and then it needs some salt, acid or other compound to give it electrolytic conduction. A single gravity battery will not electrolyze it, and hence cannot maintain a current through it. By using large iron electrodes in the caustic soda solution, two or three cells would ring a bell.

(6404) O. J. asks: 1. Which is the best for the core of an induction coil—a solid core or one built up of wires? A. A wire core. 2. Which is the best way to have the brass tube regulator of an induction coil—between the primary and secondary coil or between core and primary coil? A. It matters very little; place as most convenient. 3. Should there be any special ratio between the amount of wire on primary and secondary coil? A. No. 4. Which is the best solution for a bichromate of potash battery—solution of bichromate of potash or of chromic acid? A. Chromic acid or sodium bichromate. 5. I can only get chemically pure chromic acid here at 60 cents an ounce. Could I use that in a battery, and if so, will you please give me a formula? A. Use the bichromate. 6. In calculating the length of wire in a certain weight of wire, about how much or what per cent should I deduct for weight of insulation? A. It depends on the kind of insulation. For cotton-covered wires it is very trifling.

(6405) H. E. asks: 1. Can electricity be created or formed in a closed box or vessel in which there is a pressure of three or four atmospheres of air, as well as in open or one atmosphere of air? A. Yes. 2. What propelling power or part of horse power has a wind of 15 miles rapidity per hour on a sail of twenty-five square feet? A. The pressure of wind at 15 miles per hour is 1·125 pounds per square foot on a stationary plane or sail, and on 25 square feet would be 28 pounds. If the sail should be moving before the wind, the pressure would be somewhat less, or equal to the loss due to the progress of the sail. So that if the sail were moving at the rate of 5 miles per hour, the pressure would be 1 pound per square foot, or 25 pounds for the sail as above stated. The speed per minute in feet multiplied by the pressure will equal foot pounds of power, 440 feet×25 = 11,000 / 33,000 = ⅓ of a horse power.

(6406) R. K. B. writes: I have in my office an electric bell communicating by wire and knob with my private room. The bell has been in operation for six months, and for the first four months worked properly. For the past two months I have been unable to make the bell work by pushing the button (after it has remained unused for a few hours) without five or six successive pushes. I have had a new knob attached and an extra battery, but this does not help the matter. A. Clean your binding posts and connections and the contact points of the bell.

(6407) T. R. says: In a cylinder boiler 36 inches in diameter lying horizontal, filled with water, it was found necessary to take out one-fourth the water. What would be the perpendicular distance from top of boiler to the level of the water? Take an equilateral triangle and suspend weights of 5, 10, and 15 pounds respectively on each point. How to find the central point on center of gravity in this triangle. Please give formulas for the above questions, avoiding algebra, if possible. Please give your opinion of cylinder boilers, 30 feet long and 45 feet long, 34 inches diameter, both working under similar conditions in every respect, which will produce the most steam in a given time and which is the more economical? A. The distance from water to top of boiler will be 10·72 inches. Rule—Divide area of circle by the square of its diameter, and with the quotient find in the table of "areas of segments of a circle," in Haswell's "Engineer's Pocket Book," the proportional versed sine of the diameter, and with this multiply the diameter for the required distance. As in your case area 36 inches = $\frac{1017{\cdot}87}{4}$ square inch = area of segment = 254·49 square inches and $\frac{254{\cdot}49}{36\times36}$ = 0·1963, and opposite 0·1963 in the segment table will be found 0·298×36 = 10·72 in the answer. For the center of gravity of an equilateral triangle, bisect each side inversely in the ratio of the weights respectively and draw a line from each angle to its opposite point of bisection; the point of crossing of these lines will be the center of gravity of the triangle as loaded; the triangle itself not considered. The boiler having the largest fire surface will produce the most steam with equal amounts of fuel, and is the most economical.

(6408) R. L. E. writes: I would like to submit the following. With water pressure 100 pounds to the square inch, how large a nozzle must I have to drive a Pelton water wheel directly attached to a 200 light dynamo? Also which is the best type of incandescent dynamo, 110 volts, for such a purpose? Also how large a diameter of Pelton wheel to get the right number of revolutions? A. You will require about 22 horse power for 210 12-candle power lamps. At 100 pounds pressure, a 1¼ inch nozzle on a 24 inch Pelton wheel will give the required power at 580 revolutions per minute, using 56 cubic feet of water per minute. As the dynamo must run at a speed of 1,200 to 1,400 per minute, pulleys and belt must be used to bring up the speed. For a direct connected dynamo a pair of 12 inch wheels may be used with 2⅞ inch nozzles, using the same amount of water with a speed of 1,160 revolutions per minute. A four-phase dynamo requires less speed than the two-phase, and is the best form of dynamo for economy in the application of power.

(6409) H. K. asks: 1. What size wire shall I require to make a helix like the one illustrated in "Experimental Science," on page 577, Fig. 6, if the dynamo on page 488 is employed to work it? A. The helix will answer for the dynamo in question. 2. When a permanent steel magnet loses its magnetism, is it necessary to retemper it before remagnetizing it? A. No. 3. In what manner are teeth painlessly extracted by means of electricity? Is the operation really painless? A. The induction coil discharge has been applied to deaden or conceal the pain. 4. Please give scientific explanation why it is that the brass tube which slides over the iron core of a medical induction coil affects the primary and secondary currents? A. The brass tube has developed it in local currents, thus absorbing lines of force which otherwise would go to excite the secondary. 5. Can you give me a receipt of a depilatory which when once or twice applied would permanently destroy the roots of the hair, and thus do away with shaving? A. No. 6. In experimenting with a Jablochkoff candle (on an arc circuit of 2,500 volts, 10 amperes and carbons separated by plaster of Paris one-sixteenth inch) I noticed that when the current was turned off after the lamp had burned about 20 minutes that the points of the carbons emitted a peculiar odor. Something like the unconsumed gases that sometimes issue from a locomotive (using hard coal) when it is fired up with fresh coal. What is the odor due to, and do all forms of arc lamps give the same peculiar smell? A. It is hard to say just what the odor is due to. Possibly it was ozone, which is liable to be produced in all electric discharges. Your other query cannot well be answered from the data given.

(6410) C. M. A. writes: Some few days ago one of the rubbers in one of the ball gauge try cocks on Erie City boiler water column blew out, causing a small jet of steam to escape from it, and while replacing with new rubber I received rather a heavy shock, and upon investigation found that one of our boilers seemed to be charged with electricity. Holding a knife or any metallic tool near it caused a bright spark at point of contact. During such times I was standing on a ladder placed upon a dry floor. Is there any reason or cause to believe that the electricity was generated by the friction of the escaping steam? If so, why can it not be found in any boiler at any time under steam pressure, and never occurring before nor since? A. Very powerful electric excitation is produced by escaping steam. A number of conditions are essential. Sometimes quite severe shocks have been received from boilers. Undoubtedly the setting of your boiler contributes to the result in effecting a more or less complete insulation from the earth.

(6411) W. W. F. writes: 1. What effect has tension on the molecular vibrations in metal? If a hot wire were made to sustain a heavy weight, would this shorten the swing of its atoms or lessen their rapidity, or, in other words, would the tension cause the metal to cool and contract more rapidly than it otherwise would? A. Simple tension has no effect as such. But as the wire is lengthened by the tension, its temperature is increased. 2. If a heated wire, sustaining a weight, were inclosed in a tube of cold water, would the heat given off by the cooling wire elevate the temperature of the water to the same extent that it would if there were no weight attached? A. Yes; there would be no difference.

(6412) L. R. C. asks: 1. Would it be practical to run a dynamo with a water motor? The motor is 10 horse power, with an unlimited supply of water at 102 pounds pressure per square inch. A. Yes. 2. If practical, how many 16 candle power lamps could be used, also what size dynamo should be used? A. About 80 with an 80 light dynamo. 3. If power is not steady enough, could a storage battery be used to make the current steady? A. Yes; but it is preferable to use the power directly.

(6413) F. P. C. writes: Is differential or integral calculus used in the work of electrical engineering? If so, to what extent, i. e., in the calculations necessary in above mentioned profession? A. Very little, except in deducing laws and working formulas. For original work the calculus is most useful.

(6414) M. S. P. writes: Is asbestos paper a good material to use between the plates of a storage battery? If not, what can be used? A. It is better to omit all such material if possible. The trouble with asbestos will be its going to pieces in the solution.

(6415) E. W. A. asks how to make an inexpensive paste that will do to stick a paper label on tin. I have tried several different kinds of paste and glue, but after becoming dry the label peels off every time. A. 1. 4 parts shellac, 2 parts borax; water, 30 parts; boil until the shellac is dissolved. 2. Add 4 ounces dammar varnish to 1 pound of tragacanth mucilage. 3. Balsam of fir, 1 part; turpentine, 3 parts; use only for varnished labels. 4. Butter of antimony is good to prepare the tin for the label. 5. Venice turpentine added to good starch paste makes an excellent mounting medium.

(6416) M. C. C. says: Will you kindly inform me through your columns if there is anything to put on windows to keep them from frosting, and what its composition is? A. A thin coat of pure glycerine applied to both sides of the glass will prevent any moisture forming thereon, and will stay until it collects so much dust that it cannot be seen through. Surveyors can use it to advantage on their instruments in foggy weather. In fact, it can be used anywhere to prevent moisture from forming on anything, and locomotive engineers will find it particularly useful in preventing the accumulation of steam as well as frost on their windows during the cold weather.

(6417) E A. G. writes: Please give rule for figuring the power derived from balance wheels. A. There is no power derived or generated by the motion of balance wheels. They only transmit power that is imparted to them when augmenting their motion. Their usual office is to equalize speed by their momentum, through which they transfer the force received at the maximum to the minimum sections of the crank revolution. When a balance wheel is running free, it gives out power while in motion. Its weight in pounds multiplied by its rim velocity in feet per minute is its momentum in foot pounds, and this product divided by 33,000 is its horse power for any moment.

(6418) W. H. Van A. writes: 1. Does it ever snow when the thermometer is at zero or below? A. There is no place on our earth where it is too cold to snow. Blizzard snow storms have been experienced by the winter sojourners within the Arctic circle. 2. Is it ever too cold for snow—if so, why? A. As a general rule, the snows during very cold weather are light, for the reason that the quantity of watery vapor that the atmosphere can hold at low temperatures is very small in proportion to the volume just above the freezing point, which accounts for our heaviest falls of snow occurring when the thermometer is between 20° and 30° Fahr. 3. Some persons entertain the idea that it is sometimes too cold to snow. Is that not a popular delusion? If not, please explain why it snows in climates where it is intensely cold? A. The popular saying that it is too cold to snow is only comparative, and not strictly true for any zone, and may be derived from the comparative dryness of very cold air. The atmosphere when saturated, and ready for snow fall, contains but one-half as much water at zero as it does under like conditions at 20°, and but one-third as much as at 32°, and this is about the average volume of snow storms at these temperatures, although special conditions sometimes produce extreme snow falls.

(6419) G. T. asks: 1. One part of diastase can convert 2,000 parts of starch into dextrine and then into grape sugar, at a temperature of 150° Fah. How much longer would it take if the temperature were 100° Fah.? A. It will not operate at a low temperature. 2. Has diastase any converting power over cellulose or gum of a starchy nature? A. Not over cellulose. 3. Does atmospheric oxygen take an active part in the conversion? A. It takes no part. 4. Does diastase convert starch into sugar by abstracting the element of water? A. No; by fixation of water. 5. How is cellulose converted into glucose? A. By treating it with perfectly cold oil of vitriol, and after standing rubbing it up with water, and boiling the mixture thus diluted for three or four hours with replacement of the water. 6. Where can diastase (commercial) be procured? A. Address Queen & Co., Philadelphia, Pa.

(6420) G. A. writes: 1. How many gravity cells 6×8 will it take to maintain a chloride accumulator, giving a current of 6 volts, 250 ampere hours, used from two to four hours per week, running ¼ horse power motor? A. 32 cells—eight in series, four in parallel. 2. How long (about) will it take to charge said accumulator for same amount of work, with a dynamo having a current of 25 volts and about 8 amperes? A. Five hours. 3. What power (about) will I get out of a 500 pound weight hung in a chain on a sprocket about 10 inches diameter, geared from 1 to 1,000, having 3 gears, 1 to 10 each, the small gear being brass, with an escapement as governor? A. The arrangement will involve a very large loss by friction, and as you do not give the rate of descent of the weight, the query cannot be answered.

(6421) L. W. C. asks how to figure the lines of force in a magnet, that is, how many ampere turns should I wind a magnet in order to get 10,000 lines to the square centimeter. A. For magnetic circuit calculations, see Sloane's "Arithmetic of Electricity," $1 by mail. The rules are not accurate except for full iron or steel circuits, owing to leakage of lines of force.

(6422) C. B. V. asks: 1. What size and how many turns and layers of wire to use in the primary of an induction coil where the secondary is 60,000 turns of No. 30, wound in 68 layers? A. Use 4 or 5 layers No. 20 wire. 2. Would double cotton covered wire do in the secondary? A. Yes. 3. Can you tell me where I can get information about induction coils and experiments with them? A. See our SUPPLEMENT, Nos. 160, 166. 4. About what length of spark would this coil give with 8 cells of Bunsen battery? A. One-eighth to one-quarter of an inch.

(6423) A. L. C. asks: 1. Is it considered safe to have the disks of a dynamo armature in electrical connection with the shaft? A. Yes. 2. Is the black oxide of iron on the disks sufficient to insulate them from one another? A. Hardly; it is better to use thin paper. 3. Can you give me some practical rule by which I can determine, approximately, the number of ampere turns necessary to produce a certain intensity of magnetic force per square inch of area. A. See Sloane's "Arithmetic of Electricity," or Thompson's works on the electro-magnet. The rules are not accurate, owing to magnetic leakage.

(6424) T. H. M. asks what size wire to use in the circuit of the sixty light dynamo described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 865, the circuit to be about two miles long. A. For full current use No. 7 wire; as branches are taken off, proportion the size to the amperage.

(6425) W. B. P. asks: How many and what size cells of Edison-Lalande type will run the motor described in SUPPLEMENT, No. 641? A. Ten cells type W.

(6426) E. A. T. asks: 1. Will a simple atomizing burner be suitable for a small forge? A. Yes, if properly constructed. 2. How many volts and amperes are necessary to run motor described in SUPPLEMENT, No. 767, ten inch fan? A. Twelve volts, two amperes. 3. Is the motor efficient? A. Its efficiency is not very high. 4. What is the average expense per hour to operate with plunge battery? A. This has not been determined. 5. In calculating the capacity of storage batteries, do you consider both sides of the plate (positive)? No; allow 5 to 6 amperes per square foot of immersed positive plate. 6. Are sal ammoniac batteries with carbon negative equal to the Leclanche with carbon and manganese? A. They have had extensive use, but the Leclanche is probably preferable. 7. Do dry batteries generally have more or less internal resistance than liquid batteries? A. More resistance than chromic acid batteries.

(6427) G. J. W. writes: How can I fix the skins of some small animals so they may be used for furs? A. Skins, to Preserve (as a Mole Skin).—Supposing the skins are dry, they should be softened throughout by soaking in pure water; soft water is best, but any ordinarily pure water may be used, and care must be taken that the skins are thus soaked only a sufficient time to soften them. Then clean off any bits of flesh that may remain on the flesh side, rinse all well, shake off the loose water, and gently stretch out and tack on a board, flesh side up. Then sprinkle with a mixture of powdered alum and salt, about two-thirds alum and one-third salt, enough to just cover every part. As the skin dries, it takes up the mixture, but if any be left on the surface the second day, sprinkle on a little more water, otherwise put on more alum and salt, and sprinkle. Two to three days should be sufficient for such small skins, the idea being to give the skin all of the alum and salt it will take up while in a moist condition. This tawing process makes the hair firm, a gentle rubbing and beating softens the flesh side, and it is preserved from decay, although tawed skins are never calculated to stand much wetting. This process is well adapted for all small skins, although those which are heavier require more time, and the flesh sides are sometimes folded together, and the skins rolled up. When the skins are freshly taken off, no soaking is needed, but more care is then called for in thoroughly washing off and cleaning them, and the first application of salt and alum should be in proportions of one-half each. It requires the judgment of a tanner to deal with skins in a dry state which may have become partly damaged before drying, and it requires special knowledge also to tell whether a dry skin is so damaged.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

February 12, 1895,

AND EACH BEARING THAT DATE.

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

Adding and daily receipts registering mechanism, cash, J. H. Voss 534,184
Aerating beer or ale, device for, M. H. Hart 533,890
Air compressor, J. F. Blake 534,192
Air purifying device, C. Peters 534,243