above circuit? About how many revolutions will it make per minute with full load? A. This is uncertain—about one twelfth horse power. Revolutions, about 2,000 per minute. 3. By introducing into the above circuit a rheostat, could not current be used for electroplating? How many volts and how many amperes does it require to run about 50 gallons of plating solution? A. Yes; but at enormous loss in economy. The voltage and amperage for plating depend on size of work and on the metal being deposited. 4. What is the resistance of German silver wire, No. 26 A. W. G., per foot? Would above size carry 110 volts without heating? A. About 542 ohms per 1,000 feet. The voltage required to melt it depends on its length. 5. Do you know of any work on buffing and polishing? If so, where can it be obtained? A. We recommend and can supply Langbein's "Electro-Deposition of Metals," which contains information on buffing and polishing. Price $4.

(5779) W. K. asks: 1. Is it necessary to strip the nickel from old work in order to replate it, and if so how can it be done? A. Stripping is absolutely essential. A bath of two volumes of sulphuric acid to one of nitric acid in one volume of water may be used. Use cold, and remove the article the instant the nickel is gone. This may be in a second or two. Or an old nickel bath may be used, making the article the anode. Remove quickly as the nickel disappears. 2. In the nickel solution which I have, when I added ammonia, a yellow, powder-like substance settled on the bottom of the tank. Will you please let me know what caused that; or is, perhaps, the solution out of order? A. Possibly your bath contained some impurities, such as iron. The bath should be neutral, or a shade acid.

(5780) J. L. L. asks: Can you please tell me how many Fuller cells are required to run a motor, and also what candle power lamp can be run by 5 Fuller batteries? A. Allow two watts utilizable energy for each cell. Thus 5 cells should run a 3 or 4 candle power lamp. For battery required for special motors, address the dealers or agents for same.

(5781) C. K. asks: 1. Which of the following will produce the strongest current: A pile (No. 1) constructed by placing upon a disk of copper a disk of cloth, moistened with acid, and upon this a disk of zinc, and upon this a disk of cloth moistened with acid, repeating this order indefinitely; or a pile (No. 2) where copper and zinc plates are placed together in pairs and cloth, moistened with acid, is put between each pair of plates. I would like to know particularly whether, in this pile, the zinc may be amalgamated on that side which lies directly upon the copper without interference to the current? A. The second method is the proper one. You may amalgamate the zinc plates on both sides. The zinc and copper plates may be soldered or sweated together. 2. What kind of a fluid is best for the cloth disks? A. Dilute sulphuric acid, 1 acid to 10 of water, may be used. The cloth disks should be a little less in diameter than the metal plates, and must have just enough acid. If too much, it will squeeze out and run down the outside of the pile.

(5782) J. R. S. asks: 1. Have you plainly described in any SUPPLEMENT the manufacturing of a dynamo suitable to run three 16 candle power electric lights? A dynamo that I could make from the instructions given, and if so, at what cost could it be made? A water motor, developing three horse power under a pressure of 70 pounds, after the pattern of a revolving lawn sprinkler. I would like to build a dynamo to be run by this motor to light three 16 candle power electric lights. What would the same cost, and what difference in cost between one capable to run three and one to run six of these lights? A. In our SUPPLEMENT, No. 844, a five light dynamo is described. For three lights it should be 92-100 of the size. The cost you can easily calculate from the very full description given. 2. What is the probable amount of water used per hour by this motor? A. This class of motor will require 18,000 gallons per hour for three horse power, at the pressure named. 3. How does a 16 candle power electric light compare with an ordinary kerosene light, with single wick 1¼ inches wide? A. The oil lamp in good condition should give 25 per cent more light.

(5783) L. D. W. asks how far a transmitter will work having a permanent magnet 6 inches long by ⅜ inch in diameter, encircled at one end by a bobbin of wire having 75 ohms resistance, and using a regular iron diaphragm. A. It depends on the resistance and other electric qualities of the circuit. It should operate on a metallic circuit ten miles or more in length.

(5784) J. C. S. asks: 1. How could I make an electric motor capable of running a sewing machine? A. For electric motors of simple construction see our SUPPLEMENT, Nos. 641, 759, 761, 767. 2. How many Leclanche or Grove cells would be necessary to furnish sufficient current? A. Leclanche cells are not suited for the work. Grove cells emit gas. Use a plunge battery, such as described in our SUPPLEMENT, No. 792.

(5785) W. H. McC. writes: 1. Would No. 28 thread be fine enough for winding the No. 36 wire on the induction coil in "Experimental Science"? A. No. 36 wire is $\frac{5}{1000}$ inch in diameter; so your thread would be very coarse for the purpose. 2. I am also building the SCIENTIFIC AMERICAN dynamo, and have fifty-two feet No. 18 double cotton-covered wire (to use on field) instead of the single-covered. Will it not do as well? Will I have to put on more than the twelve layers to make up for the extra insulation? If so, how many more layers? A. Use the same weight of wire as given, or a little more. It is all a question of close winding. 3. Cannot the armature be wound the same as the eight-light machine and give good results? A. We advise you not to depart from the instructions.

(5786) J. J. R. asks: 1. How do opticians produce the beautiful different colors on their brass works of microscopes and other instruments, especially the shining gold color? A. For lacquering and coloring metals, we refer you to the "Scientific American Cyclopedia of Receipts, Notes and Queries," which contains many receipts for the same and directions for applying. Price $5. 2. Is the brass heated when lacquered, and if so, to what heat? A. Yes. The heat is about that of boiling water, and the piece must be absolutely clean. A finger touch before lacquering will injure it. 3 Is it possible to make cables containing 80 to 100 insulated copper wires? How heavy would the cable have to be to secure satisfactory insulation for every wire? A. Yes. Telephone cables about 1½ inches outside diameter are examples. The size of the cable depends on the size of the wires and on the thickness of their insulation.

(5787) V. H. T. asks: 1. How far away could you get effects from an alternating current actuated by about 1,000 volts potential? A. Several miles, if the conditions are good. In this way it is possible to telegraph without wires. Preece, in England, has done some interesting work in this line. See SUPPLEMENT, 926; for other valuable papers on the subject see Nos. 790, 861, and 925, also SCIENTIFIC AMERICAN, No. 3, vol. 66. Voltage has no direct connection with it. The amperage is the operative factor, and this depends on voltage and resistance. 2. What proportion of such current would you get by induction in a circuit 50 feet away? A. A very small portion. You might approximate it by dividing the length of a circle of 50 feet radius by the diameter of the receiving device.

(5788) J. F. D. asks: How much will a steel tape of 500 feet length expand or contract from the change of 1° temperature (Fahrenheit scale at 60°), and how much from the change of 1° temperature (Fahrenheit at 170°)? A. For 1° Fah. at either temperature allow an expansion of $\frac{1}{14366}$ of its length. This will not be accurate, as different samples vary widely. For 500 feet this gives $\frac{6}{140}$ inch.

(5789) T. H. P. asks: 1. Would a gravity battery be the best style for a current to be used to energize an electro-magnet for periods of one second, each at intervals of one second, this interrupted action to be continuous? A. The battery would be excellent as regards its constancy; not so much so as regards strength of current. 2. Can you refer me to some work, article or articles on clocks actuated by electricity (not merely regulated)? A. For information on electric clocks we refer you to "Domestic Electricity for Amateurs," price $2.50 mailed. 3. What is the origin and date of origin of the so-called Hero's fountain? Has any striking example of it been exhibited in modern times? A. It is attributed to Hero of Alexandria, a philosopher who lived in the third century B.C. No very striking example can be cited. See SUPPLEMENT, No. 404.

(5790) W. V. G. asks (1) the address of a storage battery manufactory. Can storage battery be recharged from an Edison-Lalande battery, four cells, both batteries being 300 ampere hours, the storage being 2·5 volts? If so, how long will it take? A. Allowing 0·667 volt for a single cell of Edison-Lalande battery, it would require $\frac{2 \cdot 5}{0 \cdot 667} \times 1\frac{1}{2}$ or about 5 such cells. You do not correctly specify the Lalande cell. The five would give a charging of about 4 amperes requiring about 80 hours to charge one storage cell. 2. What is the best battery to run a phonograph? A. The Edison-Lalande battery type S or the special storage battery supplied for it. 3. What book could you recommend on the subject of storage batteries and small motors? A. "Electric Light Installations and the Management of Accumulators," by Solomon, price $2; Bottone's "Electro Motors," 75 cents. 4. How many common Crowfoot 6×8 batteries would it require to recharge a 300 ampere storage 2·5 volts? A. A prohibitive number. At least three in series and almost any number in parallel; three hundred would not be too many altogether.

(5791) S. H. says: Will you kindly give me a formula for sticky fly paper? A. Cobalt fly paper. Womacka gives the following:

Quassia chips	150 parts.
Chloride of cobalt	10 "
Tartar emetic	2 "
Tincture of long pepper (1 to 4 of proof spirit)	80 "
Water	400 "

2. Powdered black pepper is mixed with sirup to a thick paste, which is spread by means of a broad brush upon coarse blotting paper. Common brown sirup will answer, but sirup made from sugar is preferable, as it dries quicker. For use a piece of this paper is laid upon a plate and dampened with water. The paper may also be made directly at the mill by adding sugar to the pulp and afterward ¼ to ½ of powdered black pepper and rapidly working it into a porous absorbent paper.

(5792) C. E. B. says: I have a 4½ bore and 9 inch stroke engine. My neighbor has two 3½ bore×4 stroke, working on quarter centers. He wants to trade with me. Will I get more power out of his two than my one? Please give me the exact horse power of both rigs with 60 pounds pressure steam, and the rule for calculating the horse power of any engine? A. Assuming that both engines cut off at ½ stroke and make 100 revolutions per minute, the 4½×9 inch engine will indicate $3\frac{8}{10}$ horse power and the two engines 3½×4 will indicate $1\frac{7}{10}$ horse power, and in proportion for other pressures and speeds. The rule is to multiply the area of the piston by the mean engine pressure due to cut-off, and this product by the travel of the piston in feet per minute. Divide the last product by 33,000 for the horse power.

(5793) G. E. asks: 1. What would be the expense to have an electric light (incandescent) connection running in my rooms, incandescent lamps (116 volts) being used about three buildings away? Could not wires be laid from there to my rooms, and what would be the expense to have this done? A. The expense depends on the number of lamps you require and on the drop in potential allowable. Consult the electrician of the concern supplying the light. 2. Is there any chemical fluid (not injurious) which when blown upon by bellows or mouth ignites the gas which is formed by the air blowing over the chemical and passing off? A. No. The "fire eaters" of the museums use gasoline for their performances. They dip a lump of cotton or lamp wick in it, place it in their mouths secretly, and, on blowing, enough gasoline vapor is carried with the breath to ignite. Great care is required in these experiments.

(5794) W. W. P. writes: I have an Edison-Lalande battery; please give the voltage, and current of same. A. The voltage varies. The mean working E. M. F. is given as 0·667 volt. The amperage for type B & X is 1 ampere; for type J, 2 amperes; for type Q, 3 amperes; for type R, 4 amperes; for type S, 6 amperes; for type W, 7 amperes. These are continuous currents; the maximum is from ⅓ to nearly 5 times as great. 2. Can I use the solution of the above battery for any purpose (experimental) after the battery has been exhausted? A. No. 3. Is there any book published that gives the instructions for the amount of iron and wire, etc., for a certain number of watts or output of dynamos and motors? A. See Sloane's "Arithmetic of Electricity," $1 by mail, for dynamo calculations.

(5795) C. S. writes: An engineer claims that if the steam pipe from the boiler to engine is higher at a point near the engine than it is at the boiler, any water that may be carried with the steam will drain back to the boiler. I claim it will not. Who is right? A. You are right. The velocity of the steam in the pipe will carry any water of condensation or priming directly to the cylinder. Even a vertical pipe will not always return water to the boiler.

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