Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in the following week's issue

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 This is for our information and not for publication.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.
Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.
Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.
Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Books referred to promptly supplied on receipt of price.
Minerals sent for examination should be distinctly marked or labeled.

(5752) C. E. H. asks: I am annoyed constantly with the odor of gas from the ordinary rubber tubing, such as dentists use in laboratory work. Can you suggest a coating for the tubing which will prevent the leakage? A. Possibly inside and outside treatment with shellac varnish would help it.

(5753) L. R. A. asks: 1. I wish to obtain an ink that will be visible for four or five days and then fade entirely away and cannot be restored in any way to vision. What liquid is a solvent for iodo starch? A. Water. 2. If I take an apparatus used for electrolysis which is constructed of a U tube, the ends of which are sealed, and if this current is kept up, the volume of the gases must of course be contracted, for their volume is much greater than that of the H_2O. Will this pressure interfere with the action of the electricity in any way? A. The gases will continue to accumulate until the apparatus bursts? The pressure will not interfere with the electrolysis.

(5754) S. says: Please inform me what is the meaning of three balls over a pawnbroker's shop. A. Money to let. It is derived from the Lombard merchants who used the three balls as a sign. It was also used by the Medici family in Florence.

(5755) B. W. S. asks: 1. Would there be any material difference in winding the induction coil like a spool of thread, insulating each layer with a brushing of paraffine and covering of bond paper, than there would be in the method described in "Experimental Science"? A. Yes. Disk winding is preferable. 2. As an insulator for static currents is shellac better than paraffine or resin? A. It is better than resin and inferior to paraffine. But their relations are affected by impurities, so that for some samples other relations may obtain. 3. What is the maximum primary current that is safe to use with that coil, considering the heating by Foucault currents and the liability of the paraffine to melt? A. You need not fear Foucault currents with the wire core. 4. Would it be a serious shock to allow the current to pass through one's body, similar to the experiments with a frictional machine? A. The coil gives quite a severe shock.

(5756) R. P. E. asks: What power would a spring of water, flowing 40 gallons per minute, with a a fall of 500 feet at two miles from the spring, give? A. By using a 4 inch pipe you can realize four horse power with an impact wheel of the Pelton type.

(5757) O. H. asks: 1. What is the cost of obtaining a knowledge of electrical engineering? Also civil? A. No estimate of cost can be given. Address Armour Institute, Chicago, or Mass. Institute of Technology, Boston, Mass., Cornell University, Ithaca, N. Y., giving courses in both civil and electrical engineering, for their catalogues. The same education will cost one man thousands of dollars and another man almost nothing beyond his time. 2. How long does it take to complete a course of the study in them? A. The college course alone is three or four years. The preparatory course takes one to three years, and after graduation the study should fill a lifetime. 3. What are the prospects for a first class engineer of either branch? For a first class man the prospects are good; but the professions are overcrowded. Few men are really first class.

(5758) H. E. H. asks how to make a storage battery capable of running four 16 candle power 70 volt lamps one hour; also how many gravity batteries will it take to charge the same? A. The manufacture of a large storage battery is attended with so many difficulties that we do not advise it. One is described in the SCIENTIFIC AMERICAN; also see our SUPPLEMENT, Nos. 838, 845, 931. For each storage cell over two gravity cells in series must be provided, and almost any quantity in parallel. As you need 36 storage cells, several hundred gravity cells would be needed.

(5759) C. L. S. asks: 1. How to make a camera obscura. I want one to copy landscapes with from nature. A. See our SUPPLEMENT, No. 158. 2. Also one to enlarge photographs, both by sunlight and lamplight. A. See our SUPPLEMENT, Nos. 276 and 451. 3. What can I apply to windows that makes beautiful large crystals on it? A. Sodium sulphate in hot solution.

(5760) A. S. asks: Supposing a distillery warehouse, in which whisky or spirits are stored, is heated to a temperature of 100° and kept closed for a period of a few weeks, would there be any danger of an explosion from the consequent evaporation of spirits, should someone strike a match or enter with an uncovered light? What percentage of alcoholic vapor in the atmosphere of a warehouse would be likely to cause an explosion? A. There would be such danger. One part alcoholic vapor to thirty to sixty of air would be explosive.

(5761) L. D. M., P. W. T., and many others, say: Please give me a receipt for making a good ink for rubber stamps. Also one for making a good indelible ink for name stamps. A. The usual rubber stamp inks are prepared with water-soluble aniline colors and glycerine.

1. Blue rubber stamp ink:

Aniline blue, water sol., 1 B.	3 parts.
Distilled water	10 "
Pyroligneous acid	10 "
Alcohol	10 "
Glycerine	70 "

Mix them intimately by trituration in a mortar. [The blue should be well rubbed down with the water, and the glycerine gradually added. When solution is effected, the other ingredients are added.]

Other colors are produced by substituting for the blue any one of the following:

2. Methyl violet, 3 B	3 parts.
3. Diamond fuchsin I.	2 "
4. Methyl green, yellowish	4 "
5. Vesuvin B (brown)	5 "
6. Nigrosin W (blue black)	4 "

7. If a bright red ink is required, 3 parts of eosin BBN are used, but the pyroligneous acid must be omitted, as this would destroy the eosin. Other aniline colors, when used for stamping ink, require to be acidulated. 8. The ordinary stamping ink, made by diluting printing ink (which is made of lampblack and linseed varnish) with boiled linseed oil, stands pretty well, if enough is used, but when poorly stamped, will wash off. Dr. W. Reissig, of Munich, has recently made an ink for stamps which is totally indelible, and the least trace of it can be detected chemically. It consists of 16 parts of boiled linseed oil varnish, 6 parts of the finest lampblack, and 2 to 5 parts of iron perchloride. Diluted with ⅛ the quantity of boiled oil varnish, it can be used for a stamp. Of course it can only be used with rubber stamps, for metallic type would be destroyed by the chlorine in the ink. To avoid this, the perchloride of iron may be dissolved in absolute alcohol, and enough pulverized metallic iron added to reduce it to the protochloride, which is rapidly dried and added to the ink. Instead of the chloride, other salts of protoxide or peroxide of iron can be used. From the "Scientific American Cyclopedia of Receipts, Notes, and Queries."

(5762) H. C. S., Iowa, asks what to put in boilers to prevent the formation of a carbonate of lime scale. The water here contains considerable lime and forms a very hard white scale, which I would like to know some way to prevent. A. You cannot prevent the deposit of scale, except by the use of pure water. It can be softened and removed by the application of a half pound of caustic soda to the feed water once a week, two weeks or a month, according to the amount of scale forming. Boil the caustic in the boiler for the working day, then blow down and clean out the boiler. After once thorough cleaning a little caustic every few days and blowing down two cocks a few times the next day will keep the boilers in good order for two or three months when they should have a thorough cleaning.

(5763) C. H. S. asks: 1. How many watts does it take for a 1 candle power? A. 2½ to 3½ watts in an incandescent lamp. 2. Can you give me the drawings or sketch, so that I can make an outfit to put on cart wheel, so that it will register the number of miles traveled? A. Odometers can be bought of dealers in surveying instruments. Consult our advertising columns. 3. Have you "Dynamo Electricity," by Carl Hering? A. We can supply it by mail for $2.50.

(5764) D. S. C. says: Making an allowance of ⅛ for friction how heavy should a weight be to fall 20 feet and furnish ⅛ horse power for one hour of time? 2. It will require a weight of 139,320 pounds. 2. Respectively, what is the horse power of a 10 foot, also a 12 foot wind wheel in an 18 mile wind?—of course the wheels are to be first class, and are supposed to be held squarely in the wind. A. The 10 foot mill should equal one-fifth of a horse power, 12 foot mill, one-quarter of a horse power, in an 18 mile per hour wind.

(5765) W. McV. writes: 1. What is the resistance of a 6×8 Crowfoot gravity battery? A. About 4 ohms. 2. What is the E. M. F. of a battery with plates of carbon and iron? What is the E. M. F. of a battery with plates of copper and iron? A. It depends on the solution. From ½ to 1 volt perhaps. 3. What is the E. M. F. of a thermo couple composed of iron and copper, also iron and zinc, and copper and zinc for a difference of 100° Fah. in temperature between the ends of the couples? A. The relative differences of potential are iron-copper 6·2, iron-zinc 5, zinc-copper 1·2. We cannot give the exact voltages, and the above can only be considered an approximation. 4. Please mention some good work on thermo-electricity and its cost. A. We can supply Rust's "Thermo-Electricity," 78 cents by mail. 5. Are the natives of the Sandwich Islands negroes, or Indians, or neither? A. Neither. They are of the great Malay race.

(5766) J. N. F. writes: I would like to know the exact number of inches and fraction that a body will fall in still air the first second of time. The philosophy states that a body will fall without resistance 16 feet 1 inch the first second. The encyclopedia states that it will fall 16·1 feet the first second. Which is correct? What does "without resistance" mean, in still air or in a vacuum? A. The distance varies with difference of location. On the equator a body falls a less distance than at the poles. Without resistance means in a vacuum.

(5767) F. M. C. asks: In a ball bearing of a bicycle, which will run the easiest by applying the least power? I mean one with eight five-sixteenths balls or one with eight one-quarter inch balls? What effect would increasing the number of balls have? A. There should be no difference of any amount between the sizes named. A rough surface for the balls to roll upon would make the larger balls superior to the small ones. Increasing the number of balls would have little or no effect.

(5768) G. B. asks: 1. How would electricity compare to gas at $2 per M for cooking purposes in regard to cost? A. 50 watt hours would heat a maximum of 175 pounds of water one degree Fah. This is the most you could do with electricity. In practice it would be much less. Gas would be far cheaper. 2. Is it practicable for cooking in a private house, and would it be an expensive means? A. Yes; it is practicable, but expensive.

(5769) A. M. G.—The following is a receipt for stereotyper's paste. To 1½ gallons water add 2½ pounds of Peter Cooper's glue. Allow to stand overnight, after which place it on the fire and cook slowly for two hours. Take ½ pound of best English Paris white and one pint of flour, packed tight in the measure. Place them together in a basin and add sufficient water to make the mixture the consistency of buttermilk; add this to the glue when cooked as above, and allow the whole to cook for one hour, when it will be ready for use.

(5770) T. P. A. asks: 1. In using the earth as part of an electric circuit, what is the resistance per mile? A. The resistance is zero. There is resistance at the grounding points, varying according to the nature of the soil and area of ground plates or equivalents. 2. Will a straight electro-magnet, wound with very fine wire, operate a bell (only one end of the magnet to be used to attract the armature) through a line one mile, with ground return, and using one sal ammoniac battery? If not, how many batteries would be required? A. A very feeble ring could be thus produced. Five or six cells would not be too many. The resistance of the circuit and quantity of current required to ring the bell determine the cells needed.

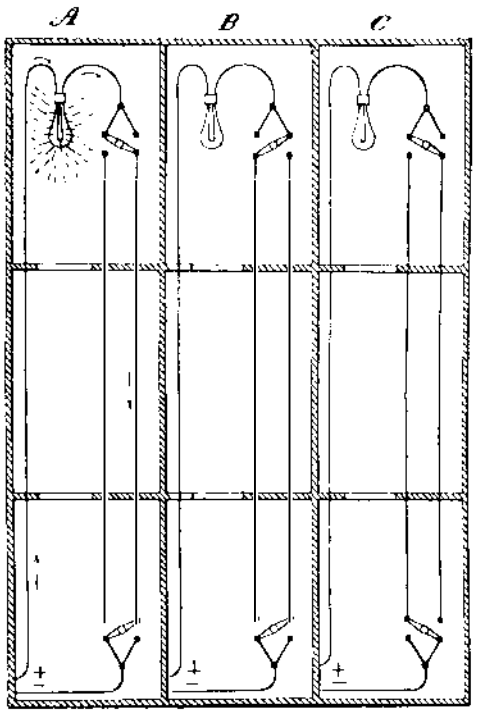
(5771) G. L. R. asks for the best fluid batteries for operating electro-motors under one-eighth horse power. A. The bichromate batteries, Bunsen or plunge type, See SUPPLEMENT, 792, are the best of the primary batteries. Secondary batteries are preferable and are far more economical. See SUPPLEMENT, Nos. 838 and 845.

(5772) A. M. H. asks: Cannot a "coil" be put into a kitchen stove for the purpose of heating another room, on the principle of the article on "Combined Water Heating and Hot Air Furnaces," described in SCIENTIFIC AMERICAN, page 19, January 13, 1894? Could not the pipes used to heat water for kitchen and other purposes be used to heat air for another room? A. The heating of a room above the kitchen can be done by a coil in the stove and a suitable radiator coil in the room, with an expansion tank above, on the same principle as in greenhouse heating. The water from a kitchen boiler can also be circulated in a coil above for heating purposes.

(5773) C. D. asks: 1. What are the elements and exciting acid in a chloride of silver dry cell? A. Metallic silver and zinc are the electrodes, silver chloride the depolarizer, and ammonium chloride solution the exciting fluid. 2. Can such cells be recharged, and how? A. They can be cleaned out and new silver chloride and solution introduced. 3. What is the voltage and amperage of a cell 2 inches long and ¾ inch wide? A. E. M. F. 1·03 volts. The amperage cannot be exactly stated—perhaps ½ ampere at first.

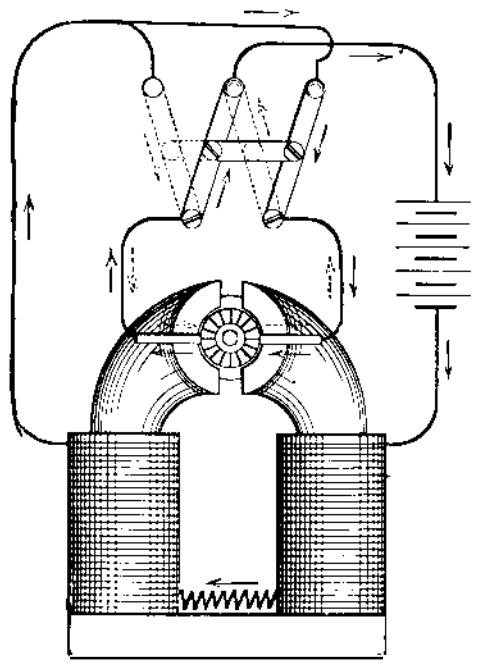
(5774) G. W. C. asks: 1. How many storage batteries will a 25 volt 8 ampere dynamo charge, and how long would it take? A. It depends on the size. It will charge eleven in series, each having 200 square inches area of positive plate. 2. What is the voltage and amperage of simple electric motor used with cast iron fields? A. 7·2 volts and 4 amperes for field. The armature can absorb 5 amperes at 7·2 volts. 3. Will the SCIENTIFIC AMERICAN give me a comprehensive description of the Niagara formation, also of the rocks of the Upper Silurian period? A. The Niagara formation is the first period of the Upper Silurian. It includes the Oneida conglomerate, shaly sandstones of the Medina group, hard sandstones, flags and shales of the Clinton group, and shales and limestones of the Niagara group. The Upper Silurian includes four periods—the Niagara as above, the Salina, Lower Helderberg, and Oriskany. The Salina rocks are sandstones and shales; the Syracuse, N. Y., salt wells derive their brine from rocks of this period. The Lower Helderberg rocks are mostly limestones The Oriskany beds are rough sandstones. The Niagara and Lower Helderberg rocks abound in fossils, radiates, trilobites, brachiapods, and other mollusks. The above refers to the American rocks.

(5775) C. T. V. writes: Can you give me a diagram of a circuit using the multiple system, where, by placing a push switch in hall of first floor, a lamp on second floor can be lighted, and upon arriving at the top the lamp can be extinguished, and then by going down stairs again you can go through the same operation without having made any change? A. The diagrams show how this can be done. In A, the lamp



has been lighted from the lower floor. In B, it has been turned out from the upper floor. In C, it has been turned on below and then turned off above, leaving it out finally. By this arrangement it can be turned on and off from either floor.

(5776) A. C. C. writes: I have use for a reversible electric motor that I could run with two or three gravity batteries. Will you give me some light on this subject? A. Construct exactly as an ordinary motor, but arrange a pole changer so as to be able to change the direction of the current in the armature alone or in the field magnet alone. By changing the direction of current in one of these, only the motor will reverse. Use carbon brushes, pressed end on by springs against the commutator. Make connecting bar of a non-conductor. The cut



gives the connections necessary for a reversing motor. You must let it come to rest before reversing, as otherwise there is great danger of burning out the armature.

(5777) F. H. W. writes: 1. I have constructed the motor of which drawings are given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 641. I wish to construct plunge battery to run same. Will you kindly inform me what size cells to use, how many, and also how to connect them? A. The dimensions of the proper battery are given in the article in SUPPLEMENT, No. 641. For description of a plunge battery, we refer you to our SUPPLEMENT, No. 792. 2. Will the same rules apply in regard to winding for 110 volts? What number of wire on field, and also what number and amount on armature? A. See answer to query 5692. You need not use No. 32 on the armature—No. 29 would be fine enough. Always use a rheostat in starting the motor.

(5778) D. & C. write: 1. We are building simple electro-motor described in SUPPLEMENT, No. 641, to run from a 110 volt incandescent circuit. Should any change be made in winding of fields or armature? A. See query No. 5692. You may use No. 29 wire on armature. 2. What power will said motor develop on

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 $\frac{5}{143}$ 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 $3\frac{6}{10}$ 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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