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 This is for our information and not for publication.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.
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.

(4859) G. F. O.—We give three formulas for marine glue from our new Cyclopedia of Receipts: 1. Caoutchouc, 1 ounce, genuine asphaltum, 2 ounces, benzole or naphtha, q. s. The caoutchouc is first dissolved by digestion and occasional agitation, and the asphaltum is gradually added. The solution should have about the consistency of molasses. 2. Take of coal naphtha, 1 pint; pure (not vulcanized) rubber, 1 ounce; cut in shreds, and macerate for ten or twelve days, and then rub smooth with a spatula on a slab, add, at heat enough to melt, 2 parts shellac by weight to 1 part of this solution. To use it, melt at a temperature of about 248° Fah. 3. Elastic Marine Glue.—Dissolve unvulcanized rubber in chloroform, benzole or bisulphide of carbon. Ropes or other material exposed to the action of air and water are coated with this glue. Whiting or fine sand may be added.

(4860) S. B. L. asks: 1. A mother obtains a divorce and marries again. Is this husband the stepfather of her children, although their father be still living? In other words, have they both a father and a stepfather? A. According to the "Century Dictionary," and assuming the validity of the second marriage and possession of the children by the mother, they would be stepchildren of the new husband. 2. In using a solution of hydrosulphate of sodium in the laboratory as a substitute for sulphureted hydrogen, are the results in all cases identical with those produced when the latter is used, and are the precipitates of the same composition? If not, does the composition vary by any fixed rule? If so, please give same. A. The precipitates as far as produced would be the same. But as sulphureted hydrogen is used to precipitate acid solutions, the other could not conveniently be used as a substitute, as a large addition of acid would be required for the H_2S group of bases. 3. What is the chemical formula for hydrosulphate sodium? A. NaHS.

(4861) E. H. N. asks: 1. How many cubic feet of gas will one gallon kerosene oil give off when heated under the best conditions? Sp. gr. of oil 0·78, test 160° Fah., and normal barometer; and what is the probable temperature of the gas burning as it escapes from the vent holes in a coil of heated pipes? This coil is kept hot by the burning of this gas. The oil is converted into gas in this coil. A. If simply vaporized, you should get at the boiling point of the oil about 24 cubic feet of vapor. The temperature cannot be given, as it will depend on the conditions of combustion. 2. What chemical will wash off the red ink used by book dealers on rubber marking stamps in marking books? It must not injure the paper or printing. A. The ink is practically ineradicable. 3 In a semicircle why does not the center of gravity come on the versed sine at the intersection of line dividing the area equally and not $\frac{2r}{\pi}$ from the diameter? A. This is not a question of areas only, but of moments and areas. The product of the area on one side of the center of gravity by the distance of its own center of gravity from the main center of gravity is its moment. The moments on both sides must be equal.

(4862) F. H. asks: 1. How can I prevent chemical action in a Bunsen pile on an open circuit, the zinc being amalgamated? A. There is no way of preventing it except by removing the zincs from the solution. The Bunsen battery is not adapted for open circuit use, as the two solutions diffuse and gradually mix. 2. How can I prevent the deposit of zinc sulphate on the amalgamated zinc plate of a Bunsen pile, and at the same time prevent chemical action on an open circuit? A. You let your solution get too concentrated. You probably have run your solution until exhaustion. Renew your solution more frequently. Thorough amalgamation and the use of a little mercuric nitrate in your solution will help to protect the zinc. 3. Please give me (in millimeters) the length and thickness of a platinum wire, by which, using 4 Bunsen piles, I may boil 300 cu. cm. of water, and what length of time will it take for the water to boil? A. This question cannot be specifically answered. Three centimeters of wire 0·26 millimeter diameter in the open air would be heated to about 200° C. above the atmosphere. It seems doubtful if you could boil the water with such a battery.

(4863) G. F. A. writes: I would like to know what diseases are caused by sewer gas. Have alternating currents ever been used for killing disease microbes? How can I make a direct current converter for lowering the voltage of 120 volt current? What is the cause of sparking on the commutators of motors, and what substance is it that is used for covering and filling the spaces between the coils of wire on armature, and how can I make it? Also please tell me of a good polish for black walnut. I want to polish on the lathe. A. Sewer gas is apt to produce malaria, diphtheria and fevers. We do not know that alternating currents have been used for killing disease microbes. You can convert only by means of a motor dynamo to reduce the voltage of a current. Sparking is due to an overload or to bad adjustment. For polish for black walnut use alcoholic shellac varnish 2 parts, boiled oil 1 part, shake well and apply with a cloth.

(4864) E. O. S. asks: How fast would the simple motor described in Hopkins' "Experimental Science," run a boat 12 feet long and 28 inches wide? What should be the size of the propeller? A. A great deal depends upon the model of the boat. If it is well proportioned, the motor might be made to run it at the rate of three or four miles an hour. The propeller should be a two-bladed one, 6 or 7 inches in diameter. 2. I noticed in the issue of January 23, 1892, page 59, query No. 3925, that you state that two storage batteries would run the motor. How long would they run it? A. The storage battery ought to run the motor for 4 or 5 hours. 3. What kind of storage batteries could I use? Could I use batteries having an electromotive force of 2·3 volts and a capacity of 20 ampere hours per cell? A. Probably two such batteries would answer your purpose.

(4865) E. S. B. asks if a generator (such as used in telephone sets) can be wound so as to serve as a motor. Would it have to be demagnetized, and about what size wire would the field require? Same as is on the armature? A. The magneto will answer as a motor. It is not necessary to demagnetize the magnets, but unless you use a very high electromotive force, it would be advisable to rewind the armature with coarse wire and provide a commutator. For use with a Bunsen or plunge battery probably. No. 18 wire would be about right.

(4866) H. D. asks: What battery is best suited to run the simple electric motor described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 641, and how many cells would it take to run the motor to its full capacity? A. Use 7 or 8 cells of bichromate battery, with zinc and carbon plates 6 x 8 inches. 2. Also do you know of any acid-proof varnish that could be used to varnish battery boxes made of wood? A. You might saturate your wooden boxes with paraffine.

(4867) R. W. S. asks: What is the voltage and the amperage of a cell of gravity battery? How many cells will be required to run a motor requiring four volts and six amperes? If the motor is run day and night, how long before I will have to recharge the battery? A. A gravity battery has an electromotive force of nearly 1 volt. The amperage, of course, depends upon the resistance. If the battery has an average resistance of 3 ohms, it would only have a current of one-third of an ampere. A battery of this kind is not suitable for running a motor. Better use the Bunsen battery.

(4868) H. M. H. says: Please tell me in Notes and Queries how I can incorporate tin and phosphorus to make phosphor tin. A. Phosphor tin is made by mixing phosphide of tin with the melted tin. The whole process of making the phosphide of tin and phosphide of copper for the phosphor bronzes, and also for the alloys of phosphor bronze and phosphor tin, is described in "Metallic Alloys," by Brannt, pages 204 to 207.

(4869) O. F. E. asks for a simple method to test adulterated vinegar. A. Place some white sugar on a saucer, moisten thoroughly with the vinegar, place the saucer over a kettle or saucepan containing water, and evaporate to dryness by boiling the water. A blackening of the sugar indicates the presence of sulphuric acid.

(4870) J. C. C. asks what sandever is. A. It is a polishing material made by collecting undecomposed salts which rise to the top of melted glass in the glass house.

(4871) J. McK. asks: In the manufacture of permanent magnets, what is the best material for the magnet, and to what depth should they be wound as compared with the thickness of the bar? A, Any good steel that will harden will answer for permanent magnets. The steel should be hardened and the temper drawn to a purple. The depth of the wire surrounding the arms of the magnet should not exceed the diameter of the arms.

(4872) E. D. asks for a cement for cracks in wood. A. Put a suitable quantity of fine sawdust of the same kind of wood into an earthen pan, and pour boiling water on it; stir it well, and let it remain for a week or ten days, occasionally stirring it; then boil it for some time, and it will be of the consistence of pulp or paste; put it into a coarse cloth and squeeze all the moisture from it. Keep for use, and, when wanted, mix a sufficient quantity of thin glue to make it into a paste; rub it well into the cracks, or fill up the holes in your work with it. When quite hard and dry, clean the work off, and, if carefully done, you will scarcely discern the imperfection. From the Scientific American Cyclopedia of Receipts, Notes and Queries.

(4873) H. D. says: I wish to insert some cogs in a cast gear wheel of 2 inch face. Dovetailing is not sufficient to hold them, as rim of wheel is too thin to get deep cut. Can you tell me of some means of soldering or brazing that will be of use in addition to dovetailing? Cogs to be of wrought iron. Also please give best method of mending broken castings, with plain directions for use. A. You can not solder or braze a tooth to your cog wheel that will stand any strain. Broken casting may sometimes be mended by splicing pieces. For instructions in all kinds of brazing and soldering, see the "Metal Worker's Handy Book," by Brannt, $2.50 mailed.

(4874) A. E. F. writes: A telephone is connected between two towns, say from A to B, a battery being in use at A and also one at B. When I speak into the transmitter at A, which battery transmits my speech and which battery causes my speech to be received? And why? A. The battery connected with the transmitter is the one which produces the current that transmits the message. A little study of the theory of the telephone will furnish you with an answer to your query and the whys and wherefores as far as they can be known.

(4875) W. M. L. asks the best process for coppering cast iron. A. The castings should be first pickled in a sulphuric acid bath, 1 part acid, 2 parts water, to remove all scale; scoured with clean sand and brush; wash quickly, and dip in a bath of sulphate of copper in water saturated, when the articles will become covered with copper, then wash in hot water. Small castings may be tumbled in sawdust saturated with the sulphate of copper solution.

(4876) E. D. H. asks: Would a live electric light wire have any influence over a telephone wire about 100 feet distant, wires running parallel? During the day, when the current is shut off in the electric light wire, the telephone works all right; but at night, by placing the ear to the receiver, a buzzing sound can be heard. Can you tell me the cause of this? A. Your telephone line undoubtedly suffers from induction from the electric light wire. The only remedy for this is to use a metallic circuit.

(4877) E. Y. asks: 1. Does the supply of practical electricians exceed the demand? In your judgment, will it be possible for electricity to supplant steam in railroading? A. The supply of first class electricians does not exceed the demand, and probably never will; but there are thousands of so-called electricians who scarcely know the first principles of electrical science. It is supplanting or competing with steam to some extent already. 2. Does Edison's low potential non-insulated railroad give promise of success? A. We believe Mr. Edison has not yet completed his experiments with the low potential railroad.

(4878) F. C. asks: If an electro-magnet be wound with two wires instead of one, wound side by side at the same time as one wire, so that each shall have the same number of ampere turns; and the wires carefully insulated from each other; if a current be sent through one coil, then a current of the same strength be sent through the other coil, but the second current sent around the core in the opposite direction from the first; the first trying to polarize the core north and south; the second working for an opposite effect; will not the result be, that as the two forces in opposition are equal, the one will neutralize the other, and the coil fail to be polarized either way? If not, what will be the result? A. If the current is switched from one wire to the other at perceptible intervals, the polarity of the magnet will be reversed at every change in the direction of the current; but if the changes are of very high frequency, the magnetic effect will be practically nothing.

(4879) A. H. writes: A and B are partners and have a small planer that requires four horse power to drive it at the speed of 2,500 revolutions per minute. C offers A and B choice of two engines. No. 1 is 4 × 5 inch cylinder and has 18 inch pulley. No. 2 is 4 × 6 inch cylinder and 24 inch pulley. Both run at 200 revolutions per minute. A says that both have the same power, that the extra inch in No. 2 stroke is to make up for the large pulley. B says that No. 2 has the most power. Which is right, A or B? A. B is right; the 4 × 6 has the most power. The larger pulley gives the greater belt speed.

(4880) R. A. C. asks: Is the current generated in the secondary coil of an ordinary transformer alternating or continuous? A. The secondary current of the transformer is alternating.

(4881) F. L. G. asks: 1. How many storage cells with six lead plates, one foot square each, coated with red lead solution, would it take to develop enough power to run two or three sewing machines, using motor described in "Experimental Science"? A. It will require from four to six such cells to run the motor referred to. 2. Could I use four gravity cells to charge two storage cells by charging one at a time? A. Yes. 3. How long does it take to charge them? A. From five to seven hours.

(4882) E. L. S. asks: 1. Have you ever published description and construction of a motor suitable for running a sewing machine or small lathe? If so, what number contains it? A. SUPPLEMENT 641 contains a description of a motor for running sewing machines. We also refer you to SUPPLEMENT 759. 2. Will an incandescent circuit furnish sufficient power to run it? A. Yes; but the motor must be wound to adapt it to the circuit upon which it is to be used. 3. Please give me a rule for figuring what weight a beam will support if supported at both ends and weight in middle, if the tensile strength of the material is known. A. Haswell gives the following formula: $\frac{1^3\ W}{24^b\ d^3\ C} = D$ and $\frac{24^b\ d^3\ C\ D}{1^3} = W$. 1 representing length; b breadth, and d depth, all in inches; W, weight or stress in pounds or tons; C, a constant; and D, deflection in inches. 4. Has Thomas A. Edison ever invented a machine so a person in one place can see another person, miles off, by the aid of an electric wire? A. Edison is reported to have worked upon something of the kind; but the details of his experiments have not been made public. 5. If an incandescent lamp has a certain resistance and a resistance equal be placed in the circuit, will it extinguish the lamp? A. Yes, practically, if the lamps are put in series.

(4883) H. McK. asks: 1. Suppose the ground freezes 3 feet deep before much snow falls, then there comes 2 feet of snow. After a month's time will the frost be as deep as it was before the snow came, or not? A. There is a slight tendency to lessen the depth of the frost when deeply frozen earth is covered by deep snow, from the warmth of the earth below. 2. Do you know of any cheap silver plating outfit that will plate small articles like watch cases that will do fair work? If so, where can I get one? A. A simple galvanic battery and a silver solution is all that is needed for plating small articles.

(4884) W. L. C. says: I am a moulder in a brass foundry, and the fumes or smoke from the molten brass make me sick. Do you know of a remedy for allaying such fumes? A. The fumes arising from a brass melting pot are oxide of zinc and are injurious. There is no remedy, but you can keep it from your lungs, while pouring the metal, by covering your nose and mouth with a thin handkerchief folded cornerwise and tied around your neck, so that it will loosely hang over the lower part of the face like a close veil.

(4885) J. W. S. asks: Is it possible to build a cigar-shaped balloon of aluminum of sufficient strength to resist the pressure of the atmosphere, after exhausting the air from the inside, and yet be of such specific gravity as to float in the atmosphere like an ordinary balloon filled with gas? If so, what dimensions should such a balloon have to lift 1,000 pounds over and above its own weight? A. We think it is impracticable to build a balloon to float in the air, with the internal air exhausted, or in other words a vacuum balloon, as you suggest.

(4886) R. R. S. writes: 1. A drilled well here, 400 to 500 feet deep, furnishes water which in 1887 contained 7½ grains dissolved solids to the gallon, in 1889 13½ grains, and in 1891 still more. Is it very unusual for a permanent water supply to increase each year the amount of solids it dissolves? And if so, has such a thing been known before? A. Deep bored wells are supposed in most cases to draw their water supply from a distance, receiving its mineral constituents possibly from several kinds of rock and from gravel beds of varying mineral elements. When such wells are drawn upon for a long time the water coming from a distance or from several directions may be impregnated with mineral matter of varying kinds and quantity. This has been often observed. 2. A party claims that a current of electricity passed from the ground up a tree, to a height of five feet, then went from the tree to a house close by, passing thence into the clouds. I told him I thought the current must have passed downward to the earth, as the earth is negative while the clouds are positive. He then asserted that authorities say the earth is sometimes positive at certain points, and in such cases the current may go upward from it. Please give us some light as to the truth in the case. A. The upstroke or return shock of atmospheric electric discharge is well known, and has been observed as producing severe effects, as the killing of persons and animals. It is supposed to be caused by the inductive action of a thundercloud upon bodies placed within the sphere of its action. These bodies are then, like the ground, charged with the opposite electricity to that of the cloud, but when the latter is discharged, it is far less violent than the direct shock.

(4887) F. L. M. says: Please give directions for repairing mirrors, where the amalgam or silvering has been scratched. A. It is done by transferring the silvering from some old broken mirror to the mirror that is to be mended. Proceed as follows: Remove the silvering from the glass around the scratch, so that the clear space will be about a quarter of an inch wide. Thoroughly clean the clear space with a clean cloth and alcohol. Near the edge of a broken piece of looking glass mark out a piece of silvering a little larger than the clear space on the mirror to be repaired. Now place a very minute drop of mercury on the center of the patch and allow it to remain for a few minutes, clear away the silvering around the patch, and slide the latter from the glass. Place it over the clear spot on the mirror, and gently press it down with a tuft of cotton. This is a difficult operation, and we would advise a little practice before trying it on a large mirror. From the Scien-