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 This is for our information and not for publication.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.

Minera s sent for examination should be distinctly marked or labeled.

(7787) R. E. W. asks: 1. Could a 110 volt direct current be used in the Thompson-Tesla coil described in SUPPLEMENT, No. 1087, by putting on an automatic circuit breaker operated by the magnet of the coil or would it be necessary to change the direct current into an alternating current? A. You can use a 110 volt direct current to run an induction coil, but it should be controlled by a resistance box, so that only perhaps 30 to 60 volts may be broken by the circuit breaker. 2. About how many amperes would it take to run the above coil proper, using a 110 volt direct circuit? A. The amperes will vary with the adjustment of the rheostat. Begin with the resistance all in and turn out resistance till the tube is properly energized. It may require four to ten amperes. An X-ray tube requires more current as the vacuum rises in it. 3. Why is the 2-inch iron pipe slotted? A. To prevent the eddy currents which would circulate around a tube heating it unduly. 4. In the secondary of the high tension transformer, about how many pounds of wire will be required for each of the ten sections? A. About four pounds per coil are required. 5. Could the air gap in the high frequency coils be filled with any substance such as paraffine or sealing wax? A. Yes. Paraffine oil is the best substance to be used. 6. Would you mention one or two SUPPLEMENTS in which I could find articles on an induction coil to be operated by a 110 volt direct current and giving a 3 or 4 inch spark? A. We have no plans for such a coil. Bonney's "Induction Coils," price $1 by mail, will give you the information you need.

(7788) C. H. writes: In many places power is used to run mills in the daytime. Can power be put into the storage battery and used to help out at night to light the streets and dwellings? Can it be done from a direct current 110 volts, and what loss would this be in storing electric power, also the expense of a battery that could be used 5 hours, and what could be got from it on the incandescent lamp? A. The SCIENTIFIC AMERICAN has had a great many articles on this matter. It is easily possible to charge a storage battery by day when a mill is running and use the electricity from it in the night when the mill is shut down. Each installation of this sort differs from others, and we cannot give any instructions so that a man not an expert in electrical work could put the machinery and lamps in place. An engineer should be employed to oversee the work and to determine what shall be done. He will give figures of cost which will differ in different places. The cost will be more than for oil or gas.

(7789) H. P. J. asks: Could you give a formula for something that will really prevent mildew in sails? A. Dissolve 1 pound zinc sulphate in 40 gallons water, and then add 1 pound sal soda. When dissolved, 2 ounces tartaric acid are added. This holds the partially separated zinc carbonate without neutralizing the excess of alkali used. The canvas, etc., should be soaked in this solution for 24 hours, and then dried without wringing.

(7790) C. A. R. asks: Can an ⅛ horse power electric fan be operated by electric bell batteries, and how many batteries will it require? A. The number of cells required to run an eighth horse power electric fan depends upon the voltage for which the motor was wound. This is marked on the motor somewhere. To find the number of cells, divide the voltage by the voltage of one cell. If by electric bell batteries you mean dry cells, it will not be possible to run a fan for any length of time by them.

(7791) R. F. P. writes: In answer to query number 7758, I would say that he may find a description with illustrations and working drawings for the building of a telegraph sounder, as well as several other electrical instruments, in Trevert's "Experimental Electricity," price 85 cents by mail.

(7792) W. H. T. writes: 1. I am about to construct a sectorless Wimshurst machine, and would like to know a few facts about the revolving glass disks, and ask a few questions. Two disks, which are 18 inches in diameter and composed of double thicknesses of window glass, are pierced centrally with a ¼ of an inch hole; would a fixed iron spindle, ¼ of an inch in diameter, be sufficient to support the weight of the glass disks? I intend to have the spindle fixed and at least 12 inches long, the glass disks attached to wooden bosses, which are also pierced centrally with a hole ¼ of an inch in diameter, the pulleys for the rotation of the plates being also attached to bosses. Am I right? A. We should advise a much larger spindle than one-¼ inch in thickness upon which to run the plates of a Wimshurst machine. So thin a rod will vibrate and bend, and the parts which turn upon it will wear much faster than they will upon a larger bearing. You had better make the spindle as thick as ¾ inch. 2. How large in diameter should the bosses be, so as to have enough surface for the cement to act, so as to occasion no danger of the wooden boss and the glass disk separating when revolving at an ordinary speed? A. The bosses may well be 3 inches in diameter. 3. Would it be best to give the glass disks and also the glass supports a coat of thin shellac? Would it increase the efficiency? A. A coat or more of shellac will prevent the wood from absorbing moisture and so benefit it. 4. Would a machine of this size have sufficient length of spark and output to produce the X-rays in a suitable tube? A. A machine with 18-inch plates will energize a small X-ray tube. 5. I have read from some papers—I can't remember the name—that a fluorescent screen for X-ray work can be made by coating a piece of cardboard with glue and then sprinkling white oxide of zinc on it. Is that true? A. No. The fluorescent screen should be made of calcium tungstate. 6. Is there any place where I can procure a vacuum tube similar to the ones used by Mr. D. McFarlane Moore in his system of vacuum tube illumination? A. Dealers in X-ray apparatus can make long vacuum tube for you. You could not probably find these tubes in market. 7. I would like to know the voltage (approximately) of a spark in air under normal atmospheric conditions, 1 inch in length; also, one of 8 inches? A.—

	Volts.
Spark between points, 1 inch	20,000
Spark between points, 8 inches	87,000
Spark between points, ¼ inch spheres, 1 inch	22,000
Spark between points, ¼ inch spheres, 8 inches	95,000
Spark between points, ½ inch spheres, 1 inch	31,000
Spark between points, ½ inch spheres, 8 inches	95,000
Spark between points, 1 inch spheres, 1 inch	44.000
Spark between points, 1 inch spheres, 8 inches	99.000
Spark between points, 2 inch spheres, 1 inch	51,000

These numbers are given from actual measurements by Steinmitz, with an alternator.

(7793) A. F. J. asks: 1. Can I lift an iron weighing 500 pounds from a well 80 feet deep with a magnet on an alternating current? A. You cannot make a lifting magnet with an alternating current. A direct current must be employed. 2. Would an iron ball weighing 1,000 pounds sink to the bottom of the ocean say at a distance of 2 miles? A. A piece of iron of any size or weight will sink to the bottom of the ocean, no matter how deep it is, if it is put into the water.

(7794) J. M. C. writes: Please describe an alternating current, i. e., does an alternating current flow in one direction only, or does it flow alternately in one direction and then in the other? A. The latter. The word "alternating" implies that sort of motion.

(7795) J. R. McC. writes: I started to make the induction coil described in "Experimental Science," but cannot get any No. 36 copper wire. Could I obtain as good results by using No. 24, which is the finest I can obtain here? A. No; you may not use No. 24 wire in place of No. 36 in an induction coil, and get any results worth having. With the larger wire you will have only ⅛ as many turns in the coil as with the finer, and about 3½ inch spark, which is not worth making a coil for.

(7796) A. A. A. asks: 1. How quick and how accurate, and what is the present means of determining ranges of 5 or 6 miles between vessels at sea? I might offer something to ascertain the distance (within a few feet) in less than 15 seconds at distances of from ⅛ to 10 miles. A. Various forms of range-finders are in use. They usually depend upon the solution of a triangle, where base is a base line of known length on the ship, and whose base angles are the angles observed between the line and the distant object. The accuracy will depend upon the distance of the object, being less the greater the distance. 2. Has aluminium ever been used in the place of silk for covering hydrogen gas balloons? Its weight being 2000 times that of air, could it be used as a covering in a balloon of 8-foot diameter which would require aluminium of about 1-100 of an inch thickness, and what would the strength and impermeability be compared to silk? A. The weight would be about 27 pounds, and the aluminium would be more impervious than the silk though not so strong.

(7797) J. L. asks: 1. Can you let me know a scientific way for testing the vitality of wheat? A. Plant the seed to be tested in moist soil in a flower pot to the same depth as in the field. Keep the flower pot at a temperature not exceeding 80°. Under these conditions the wheat will germinate if any vitality remains in it. 2. How deep would I have to go into the earth to reach one degree hotter in the surrounding atmosphere? A. The depth of the stratum of no change of temperature during the year varies with the latitude. At the equator it is only a foot or two below the surface, in middle latitudes it is about 60 feet, and in the Arctic regions it is probably 100 feet below the surface of the earth. At your place you will have to go down probably 70 feet to reach the place where the temperature is the same all the year through. Below this level the temperature rises as one descends at the rate of 1° for a descent of from 30 feet to 90 feet. This difference is due to the material of the earth. If it be a good conductor of heat the distance is greater than if it be a poor conductor of heat. The average distance is 53 feet to produce a rise of 1°.

(7798) A. H. Y. asks: What ought it to cost for running 500 volt ½ horse power motor from electric railway service line, motor running 10½ hours a month with about ¼ horse power resistance or load? Company charges 10 cents per 1,000 watt hours with 5 per cent for cash in limited time after first of month. A. We reply to your inquiry as to what you ought to pay for current for your motor that it is not apparent that you are being overcharged. Motors often take more current than they are supposed to take. We have seen a motor using its full current as rated when it was running with no load. If you put an ammeter in circuit, you can find what current you use and can tell what your bills ought to be.

(7799) M. B. T. writes: I have a primary coil 12 inches long, 2 inches soft iron wire core, 2 layers No. 12 B. & S. wire 260 turns. Could I make about a 4 or 5-inch spark coil with ordinary magnetic interrupter, and what wire would be best for the secondary. Could I make it with No. 34 double cotton covered wire wound with proper insulating precautions, or would some finer wire be more economical? A. We should advise large dimensions for a 5-inch induction coil. You should also use a finer wire than No. 34 for the secondary. Use silk covered wire. You would better get Bonney's Induction Coils, price $1 by mail, and follow its directions with care.

(7800) S. H. L. asks: Is there any shade of color that cannot be detected by the eye that can be seen through colored glasses? Said colors to be on colored paper. A. It is possible that such a colored glass might be found, though we have not seen any reference to any such discovery. There are numerous substances which can be put on paper which will become visible when light of the proper color falls upon the paper. These are fluorescent substances. You will find these described in Wright's Light, price $2.00, and in Wright's Optical Projection, price $2.25.

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