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 This is for our information and not for publication.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.

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.

(4274) C. M. P. asks: 1. In using iron rings in the construction of simple motor, 641, would you use the same size as in dynamo, 600? How many would you use? What would be the length of the wood core of armature? A. In the construction of the simple motor you should not depart from the instructions. If you desire to use iron rings in the armature, make them of a suitable width and diameter to form an armature of the size given. 2. Am winding cast iron field magnet with No. 20 single-covered wire, 40 convolutions to layer, 5 layers to coil. Now, how much wire by weight, and what number, must I use on armature? In other words, can I follow the instructions for dynamo 600, only using a less number of iron rings? A. If you intend to use your motor as a shunt machine, wind the armature with No. 18 as directed. It will probably require about half a pound. If you desire to make a drum armature, you can follow the instructions given in SUPPLEMENT, No. 600. 3. Would it be any advantage were I to shellac each layer of field magnet and armature as I wound them? Am I correct in my winding of field magnet as in question 2? A. It would be an advantage to shellac the layers as suggested, but a wrapping of thin paper would answer just as well, and you save the time required for drying.

(4275) W. B. writes: 1. I am making an armature for simple motor in "Experimental Science" and would like to know if an armature made of cast iron and annealed would prove satisfactory? A. Cast iron does not answer well for the core of an armature; better use sheet iron or iron wire. 2. How can I make say 5 gallons of oxygen and 5 gallons of hydrogen on a simple scale? A. You can make oxygen by heating chlorate of potash and black oxide of manganese in a retort, conveying the gas through a wash bottle to the gas bag. In making oxygen, to avoid explosion, you should take care to secure pure materials, and also to guard against the entrance of water from the wash bottle into the retort. You can make hydrogen by placing scraps of sheet zinc in dilute sulphuric acid—acid one part, water ten parts. You can convey the hydrogen from the generator to a bag or pneumatic trough. The hydrogen should be washed in the wash bottle as in the case of the oxygen.

(4276) J. H. R. says: A reservoir to contain thirty cubic feet of air is first filled at atmospheric pressure; could it be compressed to fifty pounds pressure with an ordinary hand force pump in a reasonable time? Also how long would said reservoir run a six horse power engine, the pressure kept uniform throughout? A. You can compress air into the reservoir by hand, but it will take a long time to put 50 pounds pressure upon it by hand. It will run a 6 horse power engine for a few minutes only. You will have to put 15 horse power of work into the compressed air in order to get 6 horse power of work ont of it through an engine.

(4277) W. J. B. says: A cannon is fired perpendicularly from a train moving 60 miles an hour. Where will the ball drop, or will it drop in the place the cannon was at the time of firing? A. The ball has the same forward motion that the cannon has at the instant of firing, and its line fire will travel forward the same as the gun, less the friction of the air, and will return near the gun. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 830, on this subject.

(4278) C. R. Co. asks: 1. I have a 0·75 kilo-watt dynamo of the Edison type which has an E. M.F. of 125 volts. Could storage battery described on the 418th page of "Experimental Science" be charged and then be made to light 40 volt lamps? A. Yes. 2. Would 22 cells of this battery be sufficient? A. Yes. 3. Would the full voltage of the dynamo be too great to charge? A. No. 4. Could you have a box partitioned into about five parts, with mortised joints to make tight, and then lined with asphalt, and use it instead of glass jars? A. Yes, or you can soak the wood in paraffin or beeswax.

(4279) Electric asks: 1. What are the relative advantages in using silk and cotton covered and single and double wound magnet wire? A. Silk is superior to cotton as an insulator. Single covered wire, either cotton or silk, is liable to become bare in spots and thus to become short-circuited or crossed. 2. What are the best kinds of oil for high insulation purposes? Please name some. A. Probably paraffine oil or heavy hydrocarbon oils are the best insulators. 3. What is the chemical composition of vaseline? A. Vaseline is a heavy hydrocarbon.

(4280) K. H. asks how much wire, and what size, is used on the primary and secondary coils of Blake transmitter induction coil? A. Use four layers of No. 24 wire for your primary coil, and 12 or 15 layers of No. 36 silk-covered wire for your secondary. Make the core of a bundle of soft iron wires 2½ inches long and ⅜ of an inch in diameter.

(4281) A. W. T. asks for an explanation of the principle of a simple lightning arrester for a telegraph line. A. A simple lightning arrester for telegraph lines consists of a pair of serrated plates, one being connected with the line, the other with the ground, the teeth of the plates being placed very near each other but not in contact.

(4282) Subscriber asks: 1 Please state what solution is put in cup of a Leclanche battery. A. A nearly saturated solution of sal ammoniac in water. 2. Will one large cell of said battery operate one bell? A. Yes.

(4283) H. W. P. asks: 1. What does phosphorus contain to make it visible in darkness? A. Slow combustion is the cause; the phosphorus combines with the oxygen of the air. 2. Can you give a menstruum that will corrode iron very fast? A. There is none better than acids, such as hydrochloric. 3. Would the solvent have any effect on rubber? If so, how to prevent it? A. None. 4. How long would it take to go through six inches of iron or steel? A. With constant renewal it would take many hours. 5. Place a dime on your tongue, and a piece of zinc between your lips and teeth, leave space between your teeth for the two to connect. What do you experience? A. The slight electric current may decompose the fluids of the saliva. Ordinarily it is attributed to the current, and this may have a part in it. The zinc is attacked, and may contribute to the taste.

(4284) A. S. T. asks (1) for dimensions for a spark coil used in electric gas lighting. A. Use a core consisting of a ¾ inch bundle of soft iron wires 18 inches long. Upon this wind 12 to 18 layers of No. 18 magnet wire. 2. Amount and size of wire for the electromagnets (about the usual size) for a bell to be rung over a line of 1,000 to 1,200 feet of galvanized iron wire by five cells of Leclanche battery. A. For a bell to be operated over the line described use about 300 feet No. 24 wire on the bell magnet.

(4285) G. W. W. writes: I want to make an illustration by having some perfectly clear liquid to begin with, then add something that will make it dark or muddy, then again add another liquid which will make it perfectly clear again in a few seconds. What chemicals and how much of each will be required? A. Use very dilute solution of copper sulphate or iron chloride. Add dilute solution of caustic soda. This gives a precipitate. Add hydrochloric acid, and the mixture clears.

(4286) E. C. S. asks (1) of what silicate of soda is composed and how it is made. A. Of silicic acid and sodium oxide. It is made by dissolving silica in caustic soda solution. 2. How long has it been in use? A. For many years. 3. What chemical will change its appearance without destroying its adhesive qualities? A. None, except as regards coloring it. Aniline dyes and cochineal will do this.

(4287) R. H. of Japan asks: 1. What would be the best means to prevent the steel rails used in the copper wire from corroding in the water saturated with the copper salts? A. You cannot prevent it, except by excluding the water. 2. To what distance will the voice tube be effective? A. About 500 feet. 3. Or what would be the cheap method of sending message to a distance within a mile? A. Bell or acoustic telephone.

(4288) E. W. asks: Have hydrogen, air, oxygen, etc., the same mechanical and expansive properties as steam, when compressed? A. The properties are the same, but differ in degree. Gases all vary more or less, especially when near their liquefying points.

(4289) C. H. S. asks: 1. Is the calcium light for magic lanterns, in which ether is used instead of hydrogen, a success? Is ether as good as coal gas? A. Ether answers very well for the purpose, but we think gasoline is preferable. Neither of them answers as well as coal gas. 2. Please describe how to make an ether saturator for this purpose. A. The gasoline or other fluid is placed in a double-necked bottle containing pieces of sponge or shreds of cloth, or any porous material that will absorb the liquid. The air to be charged is contained in a bag, which is weighted and connected with one of the necks of the double-necked bottle, the other neck being connected with the burner. An annular burner is preferable for this arrangement. 3. What kind of colors are used in coloring lantern slides, and how applied? I would be obliged for references to any books or articles in the volumes of the SCIENTIFIC AMERICAN on the principles and management of the magic lantern and the making and coloring of slides. A. Transparent oil colors, such as are used by artists, are commonly employed for painting lantern slides. Only transparent colors can be used for this purpose. They are mixed with varnish and applied quickly to the slide, so as to allow the colors to flow and become smooth. We recommend the following books on the lantern: Wright's "Projection," price $3; Howorth's "Book of the Lantern," price $2; and "Experimental Science," price $4.

(4290) H. W. writes: 1. I have an induction coil which gives ½ inch spark with 1 large cell, Grenet; how many cells will it take to make a spark ¼ and ½ inch, and will it charge a Leyden jar? A. If the capacity of your induction coil is a one-eighth inch spark, you cannot increase it much by the addition of more battery cells. The coil will charge a small Leyden jar. To do this, connect one terminal of the secondary wire with the inside coating of the jar and the other with the outside, placing the jar on an insulating support. 2. Will you give me a prescription of a paint to put inside of boxes and use them instead of battery jars? A. Saturate the boxes with paraffine to render them acid proof. 3. If I make a dynamo as large again as the original, using double the amount of the same size wire as is on the machine, will it have 8 times the capacity and light 8 times the number of lamps? A. You should increase the diameter of the wire in the same ratio in the rest of the machine. By so doing, the machine will have eight times the capacity. 4. Will you please tell me how to make a magneto, or is there a SUPPLEMENT in which one is described? A. You will find one form of magneto described in SUPPLEMENT, No. 162, under the head of telephone calls. 5. How can I tell platinum from silver, German silver, etc.? A. Test it with nitric acid or by heat; platinum is not affected by nitric acid. Silver and German silver will melt in an ordinary flame, while platinum will not. 6. How many amperes does a cell of Grenet give, the carbons (2) being 9 inches by 2 inches by ¼ inch, and 1 zinc, 2¼ inches by 4 inches by ⅜ inch? A. The E.M.F. of the battery is practically 2 volts per cell. By dividing this by the resistance of the battery and circuit you will have the current in amperes. For instance, if you have two cells connected in series you will have an E.M.F. of 4 volts. Now, if the resistance of your battery and circuit is 1 ohm, you will have 4 amperes of current; if it is 2 ohms, you will have 2 amperes; if it is 4 ohms, you will have 1 ampere, and so on.

(4291) H. L. M. asks: 1. What other acid, except sulphuric acid, could be used in constructing a voltaic cell? A. Nitric acid is used in the Grove cell, and chromic acid in the Bunsen cell. 2. What kind of battery should be used for a small electric bell? A. For an open circuit, the Leclanche battery in some of its modifications, or the Fuller battery. 3. What ought to be the price of a battery to be used for the same bell? A. The price of batteries for bells ranges from 75 cents upward. 4. Which is the most precious metal? A. It is difficult to say which is the most precious metal, owing to the variability of prices. Vanadium is $22 per gramme, lithium $15 per gramme, thorium $20 per gramme, rubidium $20 per gramme.

(4292) J. K. asks how lantern slides, which have the subject produced on them by means of photography, may be colored, and what are the best colors to be used? A. There are several different methods of coloring lantern slides. Probably the most satisfactory for the amateur is to use transparent oil colors for the broad surfaces, applying them to the glass side of the slide, afterward varnishing the slide to give the colors greater transparency. Another method is to use the liquid colors commonly employed in coloring photographs. These may be applied to the film side of the slide. Where very broad surfaces are to be covered with bright colors, colored lacquers applied to the glass side of the slide answer very well.

(4293) T. S. S. writes: I have about ¾ pound of No. 32 (B. & S.) cotton-covered copper wire which I would like to use in making an induction coil. I have also a Crowfoot gravity battery of 4 cells (line size 5 inches by 8 inches) which I wish to use for the primary current. To get the best results with the above, will you please let me know what size wire to use for the primary, how many layers to wind, how long and of what diameter the core should be? A. Make the core of your coil of a bundle of soft iron wires ⅝ of an inch in diameter and 6 inches long; insert this in a thin spool, and on the spool wind two layers of No. 18 wire for the primary, and on the primary place three or four layers of strong paper, which should be coated with shellac varnish. Upon the paper wind your No. 32 wire; there should be at least 10 or 12 layers of this wire. For particulars as to condensers and other accessories consult SUPPLEMENT, No. 160.

(4294) B. S. E. L. Co. writes: Please explain the three-wire system of incandescent lighting. A. In the three-wire system the two dynamos are connected in series and the neutral wire is attached to the connection between the dynamos. In the normal working of the apparatus the lamps are arranged practically in series of two, and the current, flowing from the positive of one dynamo to the negative of the other, passes through a number of these series arranged in parallel, so that while the voltage is double that of the two-wire system, each lamp has practically the same current as in the two-wire system. So long as the lamps on opposite sides of the neutral wire are in balance, the neutral wire conveys no current whatever, but when the balance is disturbed on either side of the neutral wire, it returns the surplus of current.

(4295) J. B. B. writes: Parker's philosophy, 1858, page 302, says magnetic and electric power is confined wholly to the surface of bodies, and is independent of its mass. If that is a fact, would not hollow wire be a better conductor for electricity, diameter being equal, than a solid wire, and a tube make a stronger magnet than a solid bar, on account of the greater surface? I never saw tubes recommended for those purposes. A. In the case of frictional electricity and high tension alternating currents, the outer surfaces of bodies seem to convey the greater portion of the current, but in all other cases it is found that the conductivity of a body is in proportion to its sectional area. Tubes have been used for conductors, but there is no particular advantage in their use.

(4296) L. E. J. asks: 1. If a wheel of a given diameter made of copper or any other metal capable of withstanding the strain be revolved at the highest possible speed, would a dry atmosphere surrounding such a wheel become heated or would the velocity of the wheel cause a cooling of the same? Is there any limit to the number of revolutions that can be produced in a solid wheel or shaft? A. Air by excessive friction as you describe is supposed to increase in temperature. We have no data at hand on this subject. The speed of revolving wheels is only limited by mechanical possibilities; 50,000 revolutions per minute has been claimed for small wheels; 20,000 revolutions is claimed for the driving wheel of the new momentum torpedo.

(4297) S. O. S. writes: I am making the simple motor described in "Experimental Science," and would like to know if the shaft can run on oiled wood, and can I make the armature ring out of iron? A. You can use wood for your journal boxes if you prefer to do so. Use the end of the grain for bearing purposes and have it thoroughly saturated with oil. The motor will operate with a ring of solid iron, but it will not be nearly as efficient as it would be if laminated or made of iron wire.

(4298) C. W. Y. asks how to connect the terminals of the winding on a three armed motor armature. A. You can connect each pair of adjacent terminals with a commutator bar, the commutator having three bars. Connected in this manner, the current will flow as in a Gramme ring, or you can connect one set of terminals together at one end of the armature and connect the other set with a commutator having three bars.

(4299) G. P. K. wants a toning solution and the amount necessary for 2½ by 4 prints (silver paper). A.

Water	3 oz.
Bicarbonate of soda	1 gr.
Common salt	2 "
Chloride of gold	1 "

(4300) W. P. D. writes: 1. I have an air pump, the receiver of which is stuck to the brass plate. When last used some four or five years ago, the edge of the glass was smeared with oil to insure contact. Do not know what kind of oil. Ether or benzine will not start it. How can I get it off? A. We think kerosene oil applied to a joint will soften the hard oil, if allowed to stand two or three days. If you do not succeed with the kerosene, you might try a solution of caustic potash or soda in water. If this fails, possibly you may be able to accomplish the desired result by heating the plate slowly and carefully until the oil is softened. 2. Repairing a battery in which the carbon plates are held in position by soldering to metal plates. How can I tin or plate with metal the carbons to hold the solder? A. You should paraffine the ends of the carbon plates to which you desire to apply the connections, by heating the ends and rubbing on paraffine, allowing it to soak in. Care should be taken to not allow the paraffine to extend to the part which is to be immersed in the battery solution. The paraffined ends you can electroplate with copper, and to the copper plate you can solder your connections, or if you desire a simpler method you can cast lead upon the paraffined ends. In this case care should be taken to pour the lead as cool as possible.

(4301) J. H. J. C. writes: How to ascertain if water that flows and stands in galvanized iron pipes contains a solution of zinc. A. Concentrate by evaporation, add a slight excess sodium hydrate, filter if necessary, and pass sulphureted hydrogen through it. A white precipitate indicates the presence of zinc.

(4302) N. L. asks: The way in which to put a canvas razor strop in the best condition? A. Oxide of tin or the putty powder of the shops mixed with sweet oil to a thick paste and spread thinly on the strop makes an excellent dressing.

(4303) C. C. L. says: Will you inform me through Notes and Queries as to what is the cause of the popping of corn? A. The popping of corn is supposed to be caused by the generation of steam from the water combined with the starch and gluten, which by its pressure ruptures the cells.