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 This is for our information and not for publication.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.

(5101) L. S. F. asks: Please let me know how to soften plaster of Paris, to take the collar off a lamp, and why there is an air vessel on the suction pipe of a pump. I have seen one on the pump of the Hone brewery. The pipe runs over a high bank, the air vessel is as high as the bank next to the pump. A. Place the lamp in water with a little soda and boil it, to soften the plaster. Air chambers are put on suction pipes to prevent water hammer.

(5102) A. C. H. asks: Please give me information as to how moss is cured and prepared for use. A. Moss is soaked in water tanks until the bark is rotted, then dried and the bark whipped off in the same manner as flax and hemp.

(5103) L. H. S. asks: What is estimated to be the temperature in a perfect vacuum? Could a body suspended in a vacuum be heated by applying heat to the outside of the vacuum? Could meat be cooked in a vacuum pan? A. A vacuum should have the same temperature as the surrounding walls. Bodies that do not evaporate may be heated in a vacuum by radiation. Meat could be cooked in a vacuum pan. Meat or anything containing water neutralizes a vacuum by vaporizing.

(5104) R. W. H. writes: I would like to know how diamond drills are made and whether they can be made to drill hardened steel. A. Diamond drills are made by setting the borts or small black diamonds in the edge at the end of a brass or steel rod or tube, so that the diamond cuts the hole clear of the metal. They will bore hardened steel.

(5105) A. B. says: Kindly inform us the best means to prolong the life of clarinet reeds. Should they be oiled? A. Soak the reeds in boiled linseed oil and thoroughly dry.

(5106) J. M. writes: We have a boiler 4 feet diameter which we are building. How wide and how deep should our fireplace be immediately above the grates, and how much space should there be behind the grates in depth and width? A. The fire chamber should be 4 feet 2 inches wide, 2 feet from grate to boiler shell for coal. Back chamber 4 feet 2 inches wide and full depth to level of ash pit.

(5107) H. Bros. ask: To settle a dispute please answer in Notes and Queries. Was the Great Eastern iron or wood? Also date of building of first iron vessel. A. The Great Eastern was an iron vessel. The first iron vessel was built in England in 1787. The first iron steamer also in England in 1821. Iron ocean steamers were commenced in England in 1833.

(5108) G. D. — To prevent shrinkage corks may be treated with paraffine. Melt the paraffine and boil the corks therein, kept below the molten mass. Remove the corks, dry on a cloth. In case the cork has a tendency to slip out, rub with powdered chalk. Rubber corks may be used for alcohol, but not for ether and essential oils.

(5109) W. S. C. asks: Will you kindly inform me through your Notes and Queries if it would be advisable to use an H armature in the motor described in "Experimental Science"? A. A drum armature or ring armature is preferable, and one or the other of these should be used when it is possible.

(5110) J. T. McC.—The plant sent for identification is the yellow milkwort, *Polygala lutea, L.*

(5111) F. S. asks if it would be better to make a casting for the field magnet and armature of a small dynamo. A. A field magnet might to advantage be made of cast iron, but it is not well to use cast iron in the core of the armature.

(5112) C. C.—The lowest temperature so far obtained by artificial means is 491° Fah. below freezing. Pictet has succeeded in reaching this wonderful result.

(5113) C. C.—The normal speed of Parsons latest steam turbine is twelve thousand revolutions per minute.

(5114) F. H. asks: 1. How can chemical action be prevented in the Bünsen battery on an open circuit, the zinc being amalgamated? A. It cannot be entirely prevented without removing the zinc from the solution. 2. How can the deposit of zinc sulphate on the amalgamated plate be prevented? A. By renewing the solution frequently. 3. Which would be the best, cheapest, and most durable filling for a Bunsen battery in order to run a Swan lamp of 8 v. 0·8 a., by using four batteries, and still prevent chemical action on an open circuit, as I use the lamp every day for an average of 4 hours a day? A. A solution of chromic acid for the porous cell and dilute sulphuric acid for the jar, with a small percentage of bisulphate of mercury added to keep up the amalgamation. 4. Please give the description, the voltage, amperage, resistance, and durability of the Fuller battery. A. 2 volts, resistance 2 ohms, amperes 1. 5. Could I run an 8 volt 0·8 ampere Swan lamp on an average of 4 hours a day (sometimes even 6 hours) by the following method: I use two 1·6 v. batteries, giving a current of 1·6×2=3·2 v. The batteries are 16 centimeters high; with this I charge for 20 (sometimes 18) hours two storage batteries, each 22×13 centimeters (*i. e.* the size of the jar containing the lead coil), and what battery would be the best for charging? A. For an 8 volt lamp you would require 4 storage cells, and for each storage cell you would require 4 cells of gravity battery for charging.

(5115) J. A. writes: I am making the permanent magnet telephone described in your SUPPLEMENT, No. 142. I have been careful to follow measurements exactly, but succeeded in winding only ½ ounce of 36 covered wire on the spool instead of ¾ ounce. Will this amount do, or must I make a spool larger than your directions and wind upon it full ¾ ounce? Should the binding posts come in contact with diaphragm? A. Probably you could wind three-fourths of an ounce of wire on the spool if you are careful to wind the wire as thread is wound on a spool; however, your telephone should operate fairly well with half an ounce of wire. The binding posts should not touch the diaphragm.

(5116) H. V. F. asks: 1. Will it increase the power or distinctness of the telephone described in SUPPLEMENT, No. 142, Fig. 5, to add a soft iron cap, or a piece of soft iron ⅜ or ½ inch long, same size of magnet, to the coil end of magnet? A. No. 2. What cheap book tells how to make test instruments, as voltmeter, ammeter, resistance coils, etc.? Price? A. "Instrument Making for Amateurs," by S. R. Bottone, price by mail 50 cents, will probably answer your purpose. 3. I wish to make an induction balance similar to the one described in the SCIENTIFIC AMERICAN, issue of August 20, 1892. Please inform me of the size and amount of wire in the primary coils, size and amount of wire in secondary coils, size of primary spool and of hole, size of secondary spool and of hole? Is the primary placed inside of the secondary or beside it? Is the arrangement the same for the movable coils? Is any core needed? If coils are placed side by side, should the core extend through both? A. We have not the precise measurements of the instruments, but we think you will be able to get at the proportions by referring to SUPPLEMENT, Nos. 184, 289, 196, and 429.

(5117) F. W. Q. asks: 1. If I have a manometer tube containing air at a pressure of one atmosphere, and send a half inch spark from a Leyden jar through it, how much would the pressure increase? A. It would depend entirely upon the quality of the spark and the quantity of air contained in the tube. 2. Is there any advantage in reading by sound in cablegraphy, over reading the signals by light? A. There would be an advantage if the Morse code could be used.

(5118) L. M. W. asks: 1. What should be the resistance of a small motor to be run by one cell of Grenet battery? A. 2 or 3 ohms. 2. Can aluminum be used for electric contacts in place of platinum? A. It is not a good substitute for platinum.

(5119) J. W. S. writes: I want to make a small dynamo to light my engine and boiler room. Will you please give me the dimensions for a dynamo to make about 8 or 10 lights? My fly wheel is 13 feet in diameter and 4 inches face. Could I run it with a friction pulley? And about how much power would it take? I have a 360 light Edison dynamo. Could I use the same switchboard for the small dynamo? A. Without doubt you could run your small dynamo by a friction pulley in the manner suggested. It will probably require a little more than one horse power. You can doubtless use your switchboard for the small machine.

(5120) R. C., Iowa.—I send you by this mail a sample of maple wood which is infested with some insect. Will you please let me know what it is, and if it is liable to injure our maple grooves, which are quite useful to us for shelter? All the samples were taken from one tree, about four years old. Answer by Professor Riley.—The maple twigs which Mr. Carithers sends comprise some of last year's growth and some of the season of 1891. The former exhibit longitudinal rows of closely connected punctures, while the latter show simply an old scar, with no indication that the twigs are unhealthy. The punctures have been made by the snowy tree cricket (*Oecanthus niveus*) in laying its eggs. A longitudinal slit through the twig shows the somewhat curved eggs laid side by side, with their axes horizontal to the axis of the limb. Beyond damaging vegetation in this way the snowy tree cricket does little harm, since it is partly predaceous (feeding upon plant lice and other small insects), and does little harm by its other method of feeding, which consists in gnawing the leaves. The specimens of the second year's growth which Mr. Carithers sends are particular interesting, since the woody layer which has grown on the side of the punctures is nearly as thick as that on the opposite side, the former being 3 mm. in thickness and the latter somewhat less than 4 mm. This indicates that with the maple the twigs are not necessarily injured by this oviposition. With blackberry, raspberry, and grape, however, in which the insect more usually lays its eggs, the twigs are frequently killed. The only satisfactory remedy consists in pruning the infested canes during the winter time and burning them with the inclosed eggs.

(5121) F. E. H. writes: I have a spring that furnishes 477 gallons of water per minute. There is a fall of 84 feet in the first 75 yards, then there is a gradual fall of 50 feet in the next 400 yards, to the bed of creek. Please tell me the proper size of pipe to use to keep the pressure the same on a jet water wheel. Please give size of pipe to start with, and the sizes all through. What size nozzle can I use, and about what horse power would there be with a good jet water wheel, with the 134 foot fall? A. It will require an 8 inch pipe the whole distance, with a conical enlargement to 10 inches at the spring. This will cause a friction loss of about 3 feet in the head. A 1½ inch nozzle will discharge the full flow of the spring and give you 12 horse power on a 24 inch Pelton wheel.

(5122) C. R. asks: How much water do ½ and ¼ and ⅛ inch nozzles discharge in one minute? Head 75 feet, no friction. And what horse power will nozzles give with 3 and 4 foot Pelton water wheel, same head? A. ½ inch nozzle will discharge 5·66 cubic feet per minute = $\frac{1}{185}$ of a horse power; ¼ inch nozzle will discharge 1·41 cubic feet per minute = $\frac{1}{740}$ of a horse power; ⅛ inch nozzle will discharge 0·354 cubic foot per minute = $\frac{1}{2960}$ of a horse power. The above size nozzles are only suitable for 12 inch, 8 inch, and 6 inch wheels.

(5123) B. W. C.—A dip for brass is as follows: Strong sulphuric acid, 2 parts; water, 1 part; red fuming nitrous acid, 1 part. These must be mixed in the open air, as the gas evolved on mixing the nitrous acid with the vitriol and water is of a suffocating character; this will pass off in the course of an hour or so, during which time the mixture may be occasionally stirred with a glass rod. The bright, gilded effect produced on the brass by this mixture is so good that any one trying it will not return to the use of nitric acid. The subsequent washing, drying, and lacquering cannot be done too soon after the dipping, as the articles tarnish rapidly if kept unlacquered.

(5124) Secy. Y. M. C. A. says: Our members greatly enjoy your valuable paper, and we have thought you could probably make it more valuable to us if you would kindly give us through its columns recipes for cleaning carpets and wall paper. A. 1. A dusty carpet may be cleaned by dipping the broom in cold water, shaking off all the drops, and sweeping a yard or so at a time. Wash the broom and repeat until the entire carpet has been swept. 2. To take out grease spots, rub the spot with hard soap and wash out with a brush and cold water, and well dry each spot. To clean wall paper: 1. To remove stains or marks where people have rested their heads on wall papers, mix pipe clay with water to the consistency of cream, lay it on the spot, and allow it to remain till the following day, when it may be easily removed with a penknife or brush. 2. Cut off the crust of a loaf of bread and rub the wall with a lump of the bread; this will remove a great deal of the dirt.

(5125) A. E. writes: Kindly mention in your valuable paper what motor power will it require to run a wagon weighing about 400 pounds at the rate of one mile in three minutes? And also how many storage cells (same as described in SCIENTIFIC AMERICAN of March 4), plates size 10 inches × 10, shall I need for above motor? A. It will require three horse power for the 400 pounds wagon alone on a very smooth, level road. To this must be added the weight of the electric motor, storage batteries, and persons driving and riding in the vehicle. A motor for such a rig would weigh about 500 pounds, and the storage cells will weigh about 13 pounds each and require 60 in number, weighing 780 pounds, making the total load about 1,700 pounds. Total five horse power.

(5126) P. J. T. writes: 1. A friend claims the cable is not on the bottom of the ocean, but suspended in the water. He says that the undercurrent is so strong that it would not permit the cable to sink to the bottom. I say the cable is on the bottom, and that it was weighted at certain distances in order to sink it and steady it on the bottom, the weights being put on while the cable was rolled off. Please decide which is right. A. The cable rests on the bottom of the ocean for the greater portion of its length. It may in places be suspended by rocks above the bottom for short distances, but as a general thing it rests upon the ocean bottom. It does not require weights to sink it, as it is heavier than water. 2. I have a 8×10 photographic lens of 10 inch focus. Would it be possible to make the focus longer by getting a new tube and remounting it? Or is there any way of getting a larger picture of a distant object with same lens? A. You might be able to lengthen out the focus of your lens by placing behind it a concave lens of proper focal length. It might, however, interfere with the definition of the lens. 3. What part of the crankshaft of a steamship is the crankpin? A. The part which receives the connecting rod.

(5127) D. W. R. asks: 1. Why conductors on an electric light circuit burn when they some in contact. A. Because the resistance is great at the point of contact and the heat generated is sufficient to melt the wire; or, if the wires are separated, an electric arc is formed, which melts or burns the wires. 2. Can the "field" be unduly excited when the external resistance is low? A. No. 3. How is the regulation effected on a "compound" wound dynamo, and how does it differ from a "shunt" wound? A. It is regulated by the difference in current flowing in the shunt and series winding. 4. How should the lamps be connected? A. Arc lamps should be connected in series, incandescent lamps in parallel. 5. In what direction does a current flow in a dynamo, and how can I ascertain it? A. The positive brush of a dynamo is the one on the side of the commutator which moves toward the positive pole of the field magnet.

(5128) P. A. B. asks: What degree of heat would be produced by condensing the rays of the sun through a lens 3 feet in diameter to a focus 6 inches in diameter? What is the nature of the sun's heat that enables it to pass through clear ice or very cold glass without warming either? And why can we not increase the intensity of the heat from the rays of a very bright hot fire, electric or gas light by using a lens to gather and condense the rays? A. The loss of heat in passing through glass by reflection and absorption is considerable, and the loss by wave interference is still greater; so that the relative areas of lens and image is no criterion as to the amount of heat that may be developed or absorbed by a thermometer at the focus. The condition of the atmosphere is also a large factor, as everybody's experience shows. From 200° to 300° are possible, as you describe. The power of heat to pass through different transparent bodies is very variable. It being of a vibratory nature, the vibrations are retarded or absorbed in different proportions, according to the molecular condition of the bodies transmitting heat. Thus rock salt will transmit 92 per cent, glass 39 per cent, and ice only 6 per cent of heat rays. All bodies absorb more or less heat by transmission. All heat-giving sources can be intensified by condensation through lenses or by reflectors.

(5129) P. B. writes: Let a current of electricity be sent through a coil of wire. That will induce two currents in an adjacent coil—directand reverse. Then use this secondary coil as the primary coil to induce currents in a coil of wire adjacent to it. Would not four currents be induced in this last coil—two by the direct and two by the reverse? Continuing, and using this last coil as a primary, would not eight currents be induced? And so could not currents be multiplied in that manner until they became of the frequency of the vibrations of light? If it were possible to do this, by using fifty coils and breaking and making the first current in all twenty times per second, according to my calculations we would get 1,036,885,070,026,880 currents in the last coil. If this is not possible, why not? A. There is no reason why you could not produce alternating currents of very high frequency in the manner suggested; but unless you had a very large current to start with, a current from the 50th coil would be slight. The reversals of the current in the first coil would dominate all the currents in the other coils, so that you would have a period of the twentieth of a second in your last coil as in your first, so that the series of vibrations would be periodic.

(5130) E. H. J. asks: What is the highest degree of heat ever obtained by man? A. The highest temperature is obtained in the arc light, about 7,232° Fah.

(5131) R. A. C. writes: I want to build a small furnace for melting brass in small crucibles, 3¼ × 2½ inches. Can you please tell me the size to make the chimney and the size of grate surface? A. Any ordinary stove chimney, 8 × 8, will give sufficient draught. Fire-pot and grate, 10 inches diameter.

(5132) W. A. W. asks: 1. What diaphragm is the best for receiving sound waves? A. Edison, in his phonograph, uses a glass diaphragm one two-hundredth of an inch thick. 2. What material should I mix with wax to make it hard? A. The material of which the phonograph cylinders are made is a secret. We do not think you can add anything to wax to make it serve a very good purpose as a phonographic cylinder. You might, however, try some paraffine. 3. How can I insert a needle in the middle of a watch glass? A. It is not easy to do this. You might insert a needle in a piece of metal or wood and cement it to the glass.

(5133) J. W. P. writes: I wish to use three-eighths copper wire for lightning rods, and want to know how to splice or join them. A. You can join the ends of your copper rods by using a brass or copper screw coupling, and to secure a more perfect electrical contact, the joint should be soldered.

(5134) J. J. F. asks: Would lead obtained by melting lead pipe and scraps of lead be suitable for making a storage battery? If so, how can I obtain a smooth sheet? How do you mix and apply litharge and red lead? Is any liquid used in so doing? A. The kind of lead to which you refer will answer for a storage battery. You can cast it in a metal mould. The litharge and red lead are to be mixed with a 10 per cent solution of sulphuric acid in water. You will find a simple storage battery described in "Experimental Science," also in the SCIENTIFIC AMERICAN, p. 134, vol. 68.

(5135) C. W. F. asks: What speed could I expect from a 2 horse power safety vapor engine in a boat 30 feet long by 5 feet, good model for speed? A. You may obtain about 4 miles per hour with your boat as stated.

(5136) C. K. W. asks: How many Leclanche cells will it take to explode the small platinum fuses, such as are used in blasting in quarries, that is to set off the powder or dynamite? Will it be necessary to introduce in the circuit a spark coil? If so, what number wire and what length will it take and how many Leclanche cells? A. Where platinum fuses are used a spark coil is not needed. If you are not too far from the blast, two cells would probably heat the platinum wire sufficiently to set off the blast.