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 This is for our information and not for publication.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.

(4940) H. L. L.—We would not advise you to try the experiment of driving your boat with a primary battery. You might do it with storage batteries, but we think you would get more satisfaction out of steam than from anything else. For 2 horse power you will want 16 large cells of plunge battery. These would be very troublesome and somewhat expensive to maintain. It will cost you probably not less than $3 a day in addition to the labor required to take care of them.

(4941) A. C. F., Cal., writes: With a water pressure of 20 pounds per square inch, what is the horse power of a water wheel whose diameter is 12 inches, two jets being used whose outlets measure three-sixteenths inch respectively? Please give rule for finding horse power of this wheel. If above wheel were 18 inches in diameter, would it have more power? Will above wheel, with pressure named, run hand dynamo illustrated in SCIENTIFIC AMERICAN SUPPLEMENT, No. 161, at the rate of 2,400 revolutions per minute (I mean 12 inch wheel)? A. The 12 inch wheel with good buckets, like the Pelton wheel, with the pressure named, should run 500 revolutions per minute and be equal to four-tenths of a horse power, consuming 6 cubic feet of water per minute, and will run the dynamo. The 18 inch wheel will run 340 revolutions per minute and give you three-fourths horse power, using 10 cubic feet of water per minute. The 18 inch wheel will have no more power than the 12 inch with the same amount of water. Address the Pelton Water Wheel Company, San Francisco, for their catalogue of water wheels, from which you may obtain the power value under the varying conditions. The rule requires more explanation than we can give in Notes and Queries.

(4942) C. W. M. asks: Can you tell me how I can drill holes in glass, common window glass? A. The drilling of glass can be done with a hard drill and spirits of turpentine. A diamond drill is much better and cheaper, if there are many holes to drill.

(4943) M. B. B. asks: If a ball be dropped into a hole that passes clear through the earth, would it stop when it reaches the center or pass by it? I hold that the ball would stop, and I wish to settle an argument. A. The ball would have a hard rub in getting down to the center at all. Its circumferential velocity, derived from the earth's motion on its axis, would keep it against the east side of the hole, unless the hole was through the polar axis of the earth, when it might bob back and forth for a time until friction settled it at the center.

(4944) F. S. asks: 1. Is there any heat produced by the friction or motion of water? Is the temperature the same at the foot of Niagara Falls as in the river above? A. The agitation of water produces heat by friction, as demonstrated by Rumford and by experiments with screw propellers in a tank of water. Theoretically, the water in the pool should be slightly warmer than above the falls by friction, probably not within the means of observation. 2. Is there a reasonable probability that aluminum, in the near future, can be produced so cheaply as to come into practical use for roofing and other building purposes? A. There is no reasonable probability of aluminum becoming as cheap as tinned iron, zinc, or even copper for ordinary uses for some time yet, although its lightness now makes it about twice the price of copper per bulk.

(4945) W. B. H. asks: Will you please give me the processes for preparing chemically pure zinc and lead from the ordinary commercial metals? A. Zinc can be purified by simple distillation. This will remove most of the impurities. For the production of chemically pure lead the following process is given. As it is very complicated, probably your best plan will be to buy test lead as provided for assayers. This is almost chemically pure. Heat solution of lead acetate in a lead vessel with sheet lead at from 40° to 50° C. Filter and precipitate with dilute sulphuric acid. Treat the lead sulphate with a solution of ammonium carbonate and ammonia; this gives lead carbonate. A portion of the carbonate is heated in a platinum vessel just enough to give lead oxide. To the rest add dilute nitric acid, enough to dissolve part of the carbonate. To the boiling solution of lead nitrate thus produced the oxide is added, and the filtered solution is poured into a solution of pure ammonium carbonate. Fuse the precipitated carbonate with potassium cyanide, and fuse the metal thus produced again with potassium cyanide.

(4946) M. V. C. writes: Please inform how and what I will use to recast (scrap) Britannia metal so that it will have the same qualities as it has originally. That is its color and other properties. A. There is considerable variation in the composition of Britannia for various uses, and for the various parts of the same article. The alloy mostly used is composed of tin 15 pounds, antimony 1 pound, copper 3-10 of a pound. The solder on the work may be pure tin or a mixture of tin, lead or bismuth. Melt the metal in a kettle covered with pulverized charcoal. Add from 5 to 10 per cent of tin to make the metal cast clear.

(4947) G. S. asks how are guitars finished or varnished? What kind of varnish is used? A. The wood of guitars is finished as finely as possible with the finest sand paper; then rubbed with varnish on a piece of white woolen cloth, to fill the pores, leaving as little varnish on the surface as possible. When dry, rub down the surface to smoothness with the old sand paper that had been used; then varnish with a thin coat, using a flat camel's hair brush. Make the varnish with gum mastic 1 ounce, gum sandarac ½ ounce, gum camphor ¼ ounce, 95 per cent alcohol 2 fluid ounces; place in a clean bottle and dissolve, occasionally shaking up, then let it settle and decant for use. See next query also.

(4948) L. C. R. says: Please give me a recipe for varnish used on violins. A. The famous Italian violin makers used, it is said, the following sort of varnish on their instruments: Rectified alcohol ½ gallon, 6 ounces gum sandarac, 3 ounces gum mastic and ½ pint turpentine varnish. The above ingredients are put into a tin can by the stove and frequently shaken until the whole is well dissolved. It is finally strained and kept for use. If upon application it is seen to be too thick, thin with an addition of more turpentine varnish. The wood should be stained before applying the varnish. For a red stain use camwood, logwood, or aniline.

(4949) W. T. M. asks: What is the H. P. of the electric motors used on street cars? And how can you figure the pressure of a boiler with common arithmetic? *E. g.* you put 1 cubic foot of water in a tube and evaporate it; the volume of the tube being 5 cubic feet, what will be the pressure of the steam in the tube; and if the volume of the cylinder of the engine is 30 cubic inches, 200 revolutions, how many additional cubic inches of water must be evaporated per hour to sustain this pressure? A. Street cars require from 7 to 10 horse power for driving them. The volume of a cubic foot of water at 39° converted into vapor is 1641 cubic feet at atmospheric pressure. One cubic foot of water converted into steam in a tube or boiler containing 5 cubic feet of space from 39° of temperature will have a pressure of about 5,000 pounds per square inch and temperature of about 750° or a low red heat. The water required to run the engine under the condition stated will be 1,440,000 cubic inches per hour.

(4950) F. N. A. asks: 1. To what distance will the Bell telephone serve as a transmitter? A. Four or five miles on a good clear line. 2. Will a telephone work enough better to pay for using two wires? A. Yes. 3. What good transmitters are on the market now, for long distance, and where attainable? A. None are for sale so far as we know.

(4951) L. J. asks: 1. Can you tell me the composition used in making the wax cylinders of the Edison phonograph? How many threads to the inch is used as a feed for same? What is the diameter of the brass drum for holding cylinders? A. The composition of the wax cylinders of the phonograph is a secret. We know of no way to procure the formula for you. We believe the number of threads to the inch on the Edison phonograph is 100. The brass drum is about 2 inches in diameter.

(4952) E. H. O. writes: The water supply for a village is obtained from an "infiltration well" located close by the banks of a tidal river. There is an abundance of excellent water from the well for ordinary daily domestic consumption. We desire to have an auxiliary supply in case of fire, by running a pipe direct to the river and pumping therefrom. We have consulted hydraulic engineers, and they differ in opinion. Now I would like to ask you, if we run this pipe from the bottom of the well to low water mark in the river, will the water flow into the well from the river, or will the reverse be the result and we lose our present supply by the water flowing from the well into the river? It is upon this point that the engineers differ. A. If the water in the well at ordinary height is higher than the water in the river, it will flow to the river; if lower, the river will flow to the well. It requires but little engineering to ascertain the exact conditions. Better make a direct connection from the river to the pump, with valves to control the suction from both directions.

(4953) W. H. H. asks: How is the beautiful polish produced on the stocks of high grade guns? A. The stocks after finishing with the finest sand paper are varnished with pure shellac dissolved in 95 per cent alcohol, dried, and rubbed down fine with the old sand paper. Another coat of shellac is given. Then rub with French polish or shellac and mastic equal parts in alcohol with woolen cloth until the desired polish is obtained.

(4954) H. M. asks: Can you inform me through your valuable paper how to make a hard black cement or filling, something that will bake or dry hard, and not be affected by the heat generated in polishing the metal in which it is used? A. Use fine iron borings and sulphur, made into a putty, hot. Press it hard into the hole. 2. What substitute is there for nitric acid in the process of dipping brass work that will produce the same effect without raising fumes? I know there is something, and would like to find out what it is. A. Oxalic acid acts similarly to nitric acid, but is not as active.

(4955) H. B. asks: How many horse power would a constant stream of water of 2,000 gallons per minute produce with 40 feet fall through standpipe by means of a horizontal (or later style) turbine? A. The total value of the power as stated is 20 horse power, from which a net 17 horse power may be utilized.

(4956) W. F. B. writes: I desire to make inquiry of you as to the best method of restoring the tone of a large bell which is cracked. The dimensions of the bell are as follows: Height 2 feet, diameter at base 2 feet 11 inches, thickness 2½ inches. The bell is hung in the first Methodist church of this place, and was cracked by a crowbar or some other instrument falling on it from above. The crack is about 11 inches long, beginning 4½ inches from the base and one inch from place where clapper strikes, running diagonally up the side, upper end of crack being 13 inches from base of bell. I wish to know the best method of sawing out the crack and what width the edges of it would have to be separated to prevent their coming in contact by the vibration. A. Drill a half inch hole at each end of the crack and saw out the crack between the holes with a narrow stiff hack saw three thirty-seconds of an inch thick. A frame may be made of iron spanning the bottom of the bell, to hold the hack saw and keep it from kinking. The position of clapper stroke should be changed as far as possible away from the crack. If a swinging bell, it should be turned around. The clapper should also be made lighter to save an extension of the crack by excessive vibration.

(4957) J. S. T. asks: 1. What are the liquid products of oak wood and what is the best method of extracting them? What are they used for and what are their market values? What is the condition of the wood when the liquids are removed? Is it susceptible of receiving other liquids by boiling or pressure, if so, what is the best process? A. The products of oak wood are acetic acid, wood naphtha and charcoal. All the liquid products are marketed through the chemical trade. Charcoal finds a home market. Cannot quote price. The wood may be saturated with tar products for preservation. See Spon's "Encyclopedia," parts 1, 2, 3, on the distillation of wood, 75 cents each, mailed.

(4958) J. A. G., Quebec, writes: In your Notes and Queries, No. 4760, it is asked if aluminum could be tempered. A Canadian named F. Allard, of Levis, has discovered a process to temper that metal like steel.

(4959) S. D. L. writes: I am using for a sciopticon an oxygen gas bag made of rubber and canvas; the gas is made from chlorate of potash and black oxide of manganese. Suppose I fill the bag full and use only a portion of it. Is there any objection in any way to leaving the remaining gas in the bag, to be used at some future time? Does it injure the bag, or does the gas deteriorate? A. The gas bag is not liable to deteriorate to any appreciable extent, and the gas will keep well in the bag with a very small percentage of loss.

(4960) A. F. writes: Will you kindly inform me what head or fall of water is required to raise water with a ram say fifty feet over a distance of twelve hundred feet, water supply unlimited? A. Rams work at any fall from two to eight feet. They give the best results at the latter height.

(4961) D. E., Jr., writes: 1. Is there a telephone that can be bought outright which would be reliable for 1 or 2 miles? A. The electric telephone is not sold, but rented. 2. Would it be practicable to support a light wire for a vibrating telephone, from a heavier wire over it, by loops of light wire at proper distances? I had a very satisfactory vibrating telephone, but used a light iron wire, which when rusted would not bear the strain of taking the sag out. A traveling man put it up and put the poles too far apart. I thought I might run a heavier steel wire, and hang a light copper wire under it. A. Yes; with loops of elastic material. 3. What size wire would you suggest? A. Use galvanized telegraph wire for the main wire. 4. What is the best type of steam engine for use in a creamery where there will be no regular engineer? A. A vertical engine and vertical boiler on separate foundations. If not used constantly, a gasoline or petroleum engine will be perfectly safe and easy of management. See advertisements in SCIENTIFIC AMERICAN. 5. Also, the safest and most economical fuel. A. Coal is the safest and most economical fuel. 6. What is your opinion of an upright boiler and fast and slow speed engines? A. For small powers a vertical is preferred, with a medium speed engine. 7. What are the advantages of having a large boiler capacity? A. Easy firing and economy in fuel. 8. Has it any disadvantages in the matter of fuel, etc.? A. None. 9. Which is more economical of power, belting or gearing? A. There is very little difference; if any, in favor of belting. 10. What would be the difference in the saving of power in two cases as follows? 1. Belting, a chopping bar directly to an engine. 2. Belting to a line of shafting 75 feet long, and then to an engine. A. Power is saved with the least running gear, *i. e.*, directly from the motive power. 11. What would be the best method of communicating power from an engine, say 10 horse power, with perpendicular band wheel? If you would advise a belt, would there be any loss of power or other disadvantage as compared with both wheels in the same plane? A. We recommend belts for small power in all cases unless absolutely necessary to use gearing by short distances of centers. The use of a secondary shaft may be made for transmitting power to a distance to advantage.

(4962) Mason writes: Please state the most practical manner of removing a white incrustation which has formed on the surfaces of hard red brick used in the front of a building. Can it be rubbed off with a soft brick? Can an acid be used? What would be the effect of painting? The owners of the building wish this incrustation removed, supposing that, if once removed, it would not appear again; would it? And if it would, about what length of time before it would be seen again? A. The white substance encrusting the face of brick walls may be either carbonate of soda or sulphate of magnesia. They are derived from the lime containing soda salts or magnesia salts; pure lime makes no incrustating efflorescence. The usual method is to scrub the surface with a steel brush, then rub the surface with a soft brick; dry and oil with linseed oil. Weak hydrochloric acid will remove some stains. We do not recommend it, as it is very inconvenient to handle and care for on building fronts. When once cleaned as above described it will not give trouble for some time. After the oiling, a coat of paint will stop the efflorescence.

(4963) J. W. R. writes: I have built the eight-light dynamo which you illustrated and gave detailed drawings and specifications of some years ago. And I can say that I am only too proud of it, as it is a "dandy." It neither gets warm nor sparks, and gives a nice, fine, steady, brilliant light. And as this was my first experience in constructing dynamo-electric machinery, and I had such good success, I feel that I can construct a storage battery if I had a few more pointers in regard to the one you gave a cut of last month. What I propose to do is this: Charge the battery with my surplus current from 7 P. M. until 10 P. M.; then my machine shuts down and I want to run about 15 or 20 16-candle power lamps 110 volts the remainder of the night. My machine is a United States Weston system 300 ampere 110 volt continuous current shunt-wound dynamo. Now what I want to know is this: 1. What thickness should the sheet lead be, also the dimensions of same for 15 or 20 lamps? A. The thickness of the lead plates should not be less than one-sixteenth of an inch. 2. How many lead sheets shall I need? A. You should use about 15 plates per cell. For 50 volt lamps you will require 25 cells, for 110 volt lamps you will require 56 cells. The 50 volt lamps are generally used in connection with storage batteries. 3. How shall I connect in circuit in series, or same as my lamps are in parallel? A. Connect your cells in series and your lamps in parallel. 4. What can I substitute for glass for the cells? Something I could mould or cast myself, also how many shall I need? A. We know of no perfect substitute for a glass cell, but sometimes wooden cells coated with pitch are used. Such cells thoroughly soaked in paraffine have also been used. 5. If I charge from 110 volt current, could I use 50 volt lamps? Would the battery charge last longer for the same number of hours than if I used 110 volt lamps? A. The battery charge undoubtedly lasts longer when used in connection with high voltage lamps. 6. Could I charge the battery with my little eight-light dynamo 50 volts, provided I ran it long enough through the daytime? A. Yes.

(4964) A. B. C. asks how to make court plaster. A. Isinglass (best, genuine), 1 ounce; water, ½ pint. Dissolve by heating them together in a covered vessel, strain the solution, and when only lukewarm add to it gradually, but quickly, a mixture formed of rectified alcohol 2 fluid ounces, tincture of benzoin 2 fluid ounces. Apply this composition (still warm) by means of a flat camel hair brush, or any appropriate "spreader," to the surface of silk, or sarcenet, stretched in a frame, repeating the application as soon as the preceding coating is dry, and again as often as necessary (six to twelve times). Lastly, when quite dry and hard, give the prepared surface a "finishing coat" with a solution of Chio turpentine, 1 ounce; dissolved in tincture of benzoin, 2 fluid ounces. Tincture of balsam of Peru, or of styrax, may be substituted for the tincture of benzoin, and a few drops of essence of ambergris or of musk may be added to increase the fragrance of the compound. Some parties simply employ one or other of the above tinctures for the finishing coat, and others apply it to the unprepared side of the silk, by which the plaster is rendered partially waterproof, but the appearance of its exposed surface injured. Care should be taken that the first two or three applications of the gelatine composition do not sink into the silk, so as to appear on the right side, which will not be the case if it be only sufficiently warm to remain liquid, and be applied very thinly and rapidly, and with a light stroke of the brush or spreader. Use various colored silks, if desired. From the "Scientific American Cyclopedia of Receipts, Notes and Queries."

(4965) W. M. says: 1. Suppose a quantity of air be compressed to obtain a pressure of 1,000 pounds per square inch; what amount of heat will be generated also at 2,000 pounds? A. Air suddenly compressed to a thousand pounds pressure becomes red hot and sets fire to combustibles within the cylinder. This is the principle of the compressed air igniter. The ordinary method of compression to 1,000 to 2,000 pounds is by stages, with cool devices between the stages to keep down the heat. 2. What thickness of cast iron or copper will be necessary to safely confine the air at such