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 This is for our information and not for publication.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

(5189) C. F. W. asks: 1. Would it be practical to run a one horse power motor by storage batteries, charged by cell batteries of some kind, if the motor only has to run about five hours per week? A. Yes. 2. Does it take more cells of battery (storage battery) to run a motor a day than it does an hour? A. Yes. One set of cells will run a motor for about 6 hours; for 12 hours you would need two series of cells. 3. Will it take more cells of battery to charge the storage battery when the motor runs all day than when it runs only about one hour a day? A. It would hardly be feasible to charge a storage battery for all day running by means of primary batteries, but it would be practicable to do so for a run of from one to six hours. 4. Is the armature stationary in a "multiphase" motor? A. Yes. 5. What is a "three-pole" motor? It is a machine having an armature provided with three radial poles. 6. What is the oil to lubricate printing presses and such machinery? A. Machinery oil of good quality.

(5190) M. T. B. asks: 1. Is there any substance suitable for a small mirror which is flexible? A. Flexible mirrors of glass have been made. 2. What is the explosive force of an ordinary 45 × 70 405 grs. cartridge in the chamber of a rifle to the square inch. Is there more force backward than sidewise? Also, how much more will the same bullet drop in a thousand yards shooting over water than land, also how much higher will it shoot in an altitude of 8,000 ft. than at sea level? A. The explosive force of good rifle powder is about 30,000 lb. per square inch in every direction. We have no data as to any difference in the trajectory of a bullet over land and water, or at high altitudes. 3. How many times stronger is gun cotton than F. F. G. black rifle powder? A. The explosive force of gun cotton is from 40 to 60 per cent greater than rifle powder for equal weights.

(5191) H. E. C. writes: 1. I am making commutator for a simple motor out of segments. Will iron or brass do for flanged sleeve. If not, what is best? A. Brass will do for the flanged sleeves, but copper is preferable. 2. I have made a motor with cast fields and wrought iron rings for armature core; what metal must be used for mortised studs for holding brushes? A. Brass is commonly used for this purpose. 3. Is there nothing I can substitute for rubber lining in plunge battery cells? A. Try coal tar pitch. 4. Will one cell start motor? A. Yes. 5. Would 10 cells with plates 3 × 5 have any more E. M. F. and volts than a battery of 4 or 6 cells of 6 × 10? A. The E. M. F. of the bichromate cell is about 2 volts, whatever the size of the cell. Larger plates yield more current. 6. Is it necessary to solder joints in winding magnets? I filed wires and spliced and put tape around; will that do? A. It is advisable to solder all joints of conductors on either field magnet or armature of dynamos and motors.

(5192) J. J. C. writes: 1. What seemed to me to be a very curious occurrence last Wednesday night, being a very heavy storm, the lightning struck the electric light wires leading into our church. The sexton, a young man, going down in the cellar next morning, was about to turn on the light, but as soon as he touched the key, he was knocked across the cellar and almost stunned; but the strange part of it is you cannot touch the lights to turn them on ever since. I tried it Sunday night, but I got a shock which made me leave them alone. The electrician of the company was there, he touched one with a piece of wood, and he also got a heavy shock; now what do you think was the cause of all this? A. Possibly the lightning destroyed some of the insulation, so that the electric light current reached the key. The wires could not retain the charge of lightning for more than an instant. 2. In the steel-melting shop where I work, we have considerable trouble with the bottoms in the moulds; you know the steel is poured from crucibles into moulds, which are made out of cast iron, and also the bottoms; the weight of the steel striking the bottom in the moulds eats the bottom away, so they only last a few heats, which makes them very costly. We have tried a great many different devices, but all about alike; now what do you think would remedy this defect? A. Try inclining the ingot mould so that the steel will strike the bottom with less force.

(5193) A. S. J. writes: Lightning committed a freak here to-day. At 10 o'clock during a very heavy rain there was one flash of lightning. The bolt struck a fine in the kitchen of W. W. Baird's residence, followed it down to the stove pipe, down that to the stove, demolishing everything as it went. The matched board hard pine floor is not marked in the least, and there is no sign about the room where the bolt passed out, but directly under where the stove stood the ground is torn up, leaving a hole in which could be placed a barrel. The flue ran from the ceiling of the room through the roof, not from the ground up. How did the lightning get through the floor without leaving a mark? A. Possibly the lightning followed a nail through the floor, or the disturbance in the ground may have been caused by a branch discharge or another bolt.

(5194) H. D. R says: 1. In two guns, bore 1 inch and 1¼ inch, please state the maximum amount of gunpowder that can be burned in each. A. Muc depends upon the strength and length of the gun, and also upon the strength of the powder. As to the maximum charge, possibly a quarter pound for the 1 inch gun and 6 onnces for the 1¼ inch gun is as much as can be used effectively. 2. How is the above computed? The computation involves all the conditions of composition of the powder and the strength and length of the gun.

(5195) J. H. S. asks: 1. How to gild the edges of books? A. The edges of books are gilded by sponging with white of egg and laying on gold leaf; when dry, burnish with an agate burnisher. 2. The general principles of combination locks? A. The principles involved in combination locks is a very intricate one to answer in a letter or Note and Queries. 3. How to stop leaks around the fittings of steam pipes where it is impossible to take them down? A. Clamp and rubber packing is the usual practice for stopping leaks as you describe.

(5196) A. M. says: Having built an engine with 3 cylinders (steam one way only), cylinders are 1 inch by 3½ stroke, and makes about 250 revolutions with 71 lb. steam per minute, how much horse power will it have with 50 lb. of steam, and how many revolutions will it make there being no dead center? A. Your engine as described is about ¼ horse power; 3 cylinders 2 inch diameter, 5 inch stroke, will be the size for 2 horse power. 2. What size cylinders will be necessary for a 2 horse power engine, *i. e.*, using 3 cylinders, also please give dimensions of a tubular boiler for the same? See SCIENTIFIC AMERICAN SUPPLEMENT No. 702 for types of small boilers 1½ to 2 horse power.

(5197) A. H. says: The propeller on my steam launch is a four-bladed one. It is 18 inches in diameter, and the blades at the circumference are set at an angle of 45 degrees. Will you please inform me the pitch of the propeller, and what percent the slip is generally allowed in still water? A. The propeller is 4½ feet pitch. The slip will be governed by the size of the boat and its model, which is the measure of resistance; about 20 to 25 per cent slip should be allowed.

(5198) S. J. R. asks how much approximately a brass rod 50 feet long will expand with an increase of ten degrees in temperature, and what weight would it lift? A. The brass rod will expand 0·063 of an inch for the length and change of temperature named. Its lifting weight will depend upon its size and bracing to keep it from buckling.

(5199) E. W. asks: Will a Bunsen 1 gal. battery run a motor 20 to 30 hours with load? A. A Bunsen cell will run a motor for the time named, provided the resistances of the motor and battery are proportionate.

(5200) A. C. W. asks: Is it possible to run a storage battery, charged with closed circuit batteries, so that it can be used at any moment for lighting purposes, so arranged by switches that the closed circuit battery is cut out from the storage battery and storage battery turned on to the light? If so, what is the effect on each battery, if any? How long will each battery last? A. You can arrange storage batteries in connection with primary batteries in the manner suggested. A storage battery of good make will last almost indefinitely, and gravity cells used for charging will run a year with little attention.

(5201) H. V. H. asks: 1. Would the magnetic key described on page 478 of "Experimental Science," and the simple polarized bell, page 486, work well as a call for the simple telephone, page 577? A. Yes. 2. Would it be better or cheaper than a bell operated by a battery? The telephone line is to be about half a mile long? A. Probably it would; but we think a magneto call would be preferable to either. 3. What size of spools and wire would be required for the polarized bell? What weight of wire would be required for the telephone? The key? The bell? What should the wire cost? A. Use No. 36 wire for the magnet of the bell, and make the resistance of the magnet 200 ohms. This will require about 500 feet of wire. The resistance of the key should be about the same. We believe the wire costs about 75 cents an ounce.

(5202) W. J. B. says: I have a ¾ inch water pipe, with 35 to 40 pounds pressure per square inch. Now I would like to know what size water wheel and what size jet I would have to use to drive the hand power dynamo (SUPPLEMENT 161). I have removed the copper plating from electric light carbons with nitric acid. The acid has seemed to have soaked into the carbon. Will this do any harm if used in the battery, or what will take it out if not? How many gravity cells would it take to run an induction coil, size 6 inches long and 1½ inches in diameter? A. You will require a 12 inch water motor, with a half inch nozzle, to drive the dynamo; about one-eighth horse power. The nitric acid absorbed by the carbons will do no harm in the battery. Four gravity cells for the induction coil.

(5203) W. A. F. asks: 1. Would like to know if it is possible for me to recharge the exhausted cells of the chloride of silver dry cell Faradic battery? If so, state how and what wanted. A. A chloride of silver cell can be charged by removing the reduced silver and replacing it with a cylinder of fused silver chloride. The solution is made by dissolving pure chloride of ammonium in water or, in lieu thereof, common salt. 2. Is it possible to make a chemical battery strong enough to run a phonograph and not be larger than 12 inches square? If so, what material is required to construct same? And what ingredients are required to run the ordinary length of time? A. A good sized Grenet battery will run a phonograph. The solution for the Grenet battery is made by dissolving bichromate of soda in water to saturation and adding slowly one-fifth its bulk of commercial sulphuric acid.

(5204) L. B. asks: 1. Can the field magnets of an alternating current dynamo be excited by storage batteries capable of supplying continuous circulation? A. Yes. 2. Can an Edison dynamo be changed from manufactured state to alternating current dynamo by simply having a ring commutator? A. No. 3. Are electric incandescent lights commonly used run by alternating current? And if so, could they be run by continuous and interrupted currents, and what will be the result of each system? A. Incandescent lamps are run in both ways. The difference in the results is not noticeable.

(5205) F. H. asks: 1. What kind of battery to use to ring a 2½ inch electric bell continuously? A. Probably the Fuller battery would answer your purpose. 2. Will a disk Leclanche answer? A. We think this battery would polarize in a short time. 3. How long would a disk Leclanche ring it? A. This battery will usually polarize so as to be inoperative with about an hour's use.

(5206) W. H. F. writes: I have made the telephone described in SUPPLEMENT 142, and it works fine. But how in the world can I give a signal on the same? It can't be done by tapping on the diaphragm. It don't produce noise enough to call up. A. Place a switch at each end of your line and use a magneto call, or a battery, push button and electric bell.

(5207) S. C. K. asks: 1. What should be the proper surface speed at which the wax or tinfoil cylinder of a phonograph should run? A. Its peripheral speed should be about 50 feet per minute. Also what is the area in circular mills of a copper wire to carry one ampere of current? A. 642·47. 3. Is the carrying capacity in direct proportion to the sectional area? A. Yes. 4. What is the resistance of Grenet battery solution? A. The resistance of a Grenet battery of one-half gallon size is about one-half ohm.

(5208) F. H. asks: Which will leak through the smallest opening, water or steam, the pressure and temperature being the same, say 70 pounds and 320 degrees Fahrenheit? The claim has been made that water will. A. It is generally conceded that steam will pass through holes or spongy material that is impervious to water under the same pressure. Its issue is not as readily observed as with water.

(5209) A. G. F. asks: Does it in any way reduce the pressure on a station pump, lifting water 300 feet vertical, by tapping water column 10 feet above discharge valves and allowing the full of a 2 inch pipe to return to the sump, provided the main water column is always full to point of discharge? Is not the pressure the same at discharge valves, less the friction of escaping water through the 2 inch pipe? A. The discharge pipe from the main will lessen the work of the pump in the proportion of water diverted from the main pipe, and only lessen the pressure on the pump valves by the amount of the friction head due to the decreased velocity of the water in the main pipe. It is not an economical device.

(5210) A. M. asks: Give the proportion of a small brass cannon with a one-half inch hole, so as to be perfectly safe. A. For one-half inch bore make the cannon 6½ inches long, 1½ inch diameter at muzzle, 2½ diameter at breech.

(5211) F. X. S. asks how to make Gurley's Norwegian dipping compass, how long to make the needle, and if the jewel bearings out of a watch will do for the bearing. A. The needles of dipping compasses are made from 2 to 4 inches in length. You may use jewels as you propose, or you may employ fine knife-edge bearings, such as are used in fine scales.

(5212) L. B. writes: Have seen a statement in Gage's "Element of Physics," that sometimes telegraph instruments are worked without any battery in circuit, but merely connected with the earth. If electricity can be taken in that way, please explain how, and if not, what is meant by this statement. A. It is only under peculiar electrical conditions that telegraph instruments can be worked by earth currents. It is not possible, at any time and at any place, to take sufficient current from the earth to operate a telegraph instrument.

(5213) G. B.—You will find a complete rule for finding the day of the week for 6,000 years, including the full centuries, in SCIENTIFIC AMERICAN SUPPLEMENT, No. 879.

INDEX OF INVENTIONS

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July 11, 1893,

AND EACH BEARING THAT DATE.

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