

Size has no connection with voltage. 2. What is the E. M. F. of an ordinary phonograph cell? A. Two kinds of primary battery are used. One is the bichromate cell, giving 1.75 to 2 volts. The other is the Lalande-Edison cell, giving 0.5 to 0.75 volt. 3. Will you name a treatment for tartar on the teeth? A. Let a dentist clean them once a year. Use best quality of tooth powder. It is an excellent practice to rub the teeth with a stick of wood the end of which has been chewed to a brush.

(4687) L. G. asks: What changes will be necessary in the 8 light dynamo described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 600, to change it to a motor of at least 1/4 horse power, to run on a 110 volt circuit? How are spherical armatures wound? Have you a SUPPLEMENT describing same? A. We think the dynamo to which you refer is too small for 1/4 horse power. In the construction of a machine to run on a 110 volt circuit, we advise you to consult SUPPLEMENT, No. 844, containing a description of the small Edison dynamo and motor. We believe spherical armatures are wound on the open circuit plan. Nearly all the books on electric winding describe this winding.

(4688) W. E. P. & A. F. K. ask: Do rivers which flow toward the equator, by reason of the centrifugal force, of a necessity flow up hill? Why the Nile runs north and the Mississippi runs south? A. All rivers run down hill by the force of gravity. The spheroidal form of the earth is due to gravity, modified by its centrifugal force, and of which the surface of the ocean is the fixed datum or level. All streams, whether running north or south, that are above the datum of the sea level run by virtue of these two forces to a lower level. The fact of streams running farther from the earth's center is no paradox, when the true relations of the forces that hold the earth's surface to its spheroidal form are considered. The conditions of gravity and centrifugal force apply equally to running water and to the general form of the solid surface of the earth.

(4689) L. B. says: I wish to put a stern paddle wheel in a flat bottom boat, 15 feet long, 3 1/2 wide, for shallow water. I have a 50 pound fly wheel, 30 inches diameter. How many paddles, what size, what diameter of wheel, and how many revolutions per minute would be best? What is limit of speed in such a boat, power same manner as in bicycle? A. Make your wheel 2 feet wide, 4 feet diameter, 12 buckets 6 inches wide, 50 revolutions per minute. Will give you a speed of about 5 miles per hour. Doubtful if you can get this speed in the way you propose to work the wheel.

(4690) F. T. R. asks: What would probably be the result if a channel were cut into the crater of Vesuvius below sea level and the water allowed to flow into it? A. Probably it would become an extinct volcano if the quantity of water were sufficient.

(4691) E. A.—For information on electroplating machines we refer you to the SCIENTIFIC AMERICAN SUPPLEMENT. Glass after being ground to a smooth surface is polished by means of rouge or putty powder. Coffee grows on bushes to a height of from 9 to 15 feet.

(4692) C. S. J.—Tabby is a shell concrete, made of equal parts of lime, broken shells and sand. The old tabby buildings along the Southern coast derive their strength from good work and age. Have no literature on this subject.

(4693) J. G. asks: Was the subject, "The Human Body as a Magnet," ever discussed in the SCIENTIFIC AMERICAN? A. We do not call to mind any scientific articles on the human body as a magnet. We do not think magnetism was ever discovered in the human body.

(4694) R. L.—You can use four cells of Crowfoot battery to each cell of storage battery for charging. Gravity batteries, which are not expensive, can be purchased from any of the dealers in this city.

(4695) P. & D. ask: Does the upper part of a wheel move faster than the lower in rotating? A. The upper part of a carriage wheel in traveling on the ground moves much faster than the lower part of the wheels. It has several times been explained in SCIENTIFIC AMERICAN.

(4696) S. A. C.—The best single book for the study of armature winding is Thompson's "Dynamo Electric Machinery," which we can furnish by mail for \$9.

(4697) M. J. K. writes: My brother is going to start a brass foundry. What I wish to know is, what height and width (or area) will the stack or chimney require to be for two or three fires for melting brass. We have the furnace for small crucibles which has a grate surface of 14x14 inches=196 inches or 1 1/4 square feet nearly. We want the other fires to be larger, say 2 feet square for large crucibles. If you can furnish or give paper on the same would be very thankful. A. You will seldom run more than two furnaces at once, which will indicate a good sized business. A chimney 16 inches square inside and 50 feet high should give ample draught for your furnaces. We have no paper on brass foundry plant, but have an excellent book, "Brass Founders' Manual," by Graham, \$1 mailed. Larkin's "Brass and Iron Founders' Guide," \$2.25 mailed.

(4698) W. C. M. writes: Kindly tell me of a preparation that I can use, not to be costly, that I can form or press in a plaster flask like accompanying sample. Also tell me if you know of any attempts to make locomotive boilers return tubular and what was the objection to them. About what is the difference in saving of fuel between a straight flue boiler and a triple return tube? Would not half the number of flues that are in a locomotive boiler be sufficient to carry off the smoke and gases? A. The sample appears to be blotting paper saturated with a composition of tallow, beeswax, and a little oil to soften the mixture. We know of nothing cheaper that has the properties you require. The area of the tubes of a locomotive is not large enough in the present construction to allow the gases of combustion to move slow enough to have their heat absorbed. There will be no gain by returning the tubes unless the shell is made larger.

(4699) C. C. P. asks: Can very hot air be pumped into a boiler with an air compressor so as to

do one-third of the work? Will it not all be condensed? If it can be done, is there any economy in using air with steam? Is it safe to use air mixed with steam? Is it practical? A. Air, hot or cold, can be pumped into a steam boiler for useful work. There is no danger nor is there any profit. It condenses according to the pressure and does not give out as much work as it costs to put it in the boiler.

(4700) H. A. G. asks how to temper twist drills uniformly, that is to temper the whole drill at once. A. Twist drills should be packed in sand in an iron box and heated slowly to a cherry red, then dipped vertically in water. Brighten the surface and heat the drills evenly till an orange brown color appears on the bright surface.

(4701) H. H. B. asks: 1. Is a coil of a magnet the same resistance as the wire before it is wound on the coil? A. The resistance of the wire after it has been coiled on the magnet is slightly greater than it is in the original coil, on account of the hardening of the wire by bending. The difference however is very small and is negligible. 2. Would it release a building from danger of being struck by lightning if it were well insulated from the earth? A. No. 3. What can you put in sorghum so that it won't melt down in warm weather? The taffy is for making popcorn balls. A. Boil it for a longer time. Do not put in anything additional.

(4702) D. B. says: The purpose for which the answer is required is for a system of water works, distance from inlet to outlet of pipe 6 and 10 miles respectively; height or fall from inlet to outlet 100 and 125 feet respectively; size of pipe 4 and 6 inches. Question: Number of gallons that would flow through the outlet of a 4 inch pipe with a fall of 100 feet? Also from a 6 inch pipe with a fall of 125 feet? A. The 4 inch pipe, 6 miles, 100 feet head, will deliver 63 gallons per minute. The 6 inch pipe, 10 miles, 125 feet head, will deliver 151 gallons per minute.

(4703) C. E. H.—Aluminum weighs 163 pounds per cubic foot, pure, casting. Much that is called pure weighs 165 to 170 pounds per cubic foot.

(4704) L. C. asks: 1. What is the proper oil to use in coloring hard pine floors? A. Use boiled linseed oil for floors. 2. Is there any coloring matter which you can put in the oil which will make them darker? A. A little burnt umber in the oil for darker shade. 3. What is the best method to apply the oil? A. Apply by rubbing the oil stain on the floor with a coarse woolen cloth. As little excess of oil as possible, so that it will dry quickly. For a new pine floor nothing is better than shellac varnish.

(4705) Constant Reader.—For a general description of the process of zinc etching, see SUPPLEMENT, No. 656. For fuller information, see Schraubstadter's "Photo Engraving," price \$3. We can also supply Wood's "Modern Methods of Illustrating Books," by mail for \$1.50.

(4706) H. P. R. asks: Why are coil pipes used on some steam gauges and not on others? A. Every steam gauge should have an inverted siphon in the connecting pipe to prevent the steam reaching the interior of the gauge to its injury. This may be a small coil or the pipe may drop enough to prevent the water returning to the boiler and the steam from reaching the gauge.

TO INVENTORS.

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AND EACH BEARING THAT DATE.

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