

a core $\frac{3}{8}$ inch in diameter and 8 inches long? I have put 4 layers on to a core of that size, intending to put on about 20, but the result, so far, does not encourage me to proceed. My object was to run a good sized core, with a very small quantity battery. A. Two to four layers of No. 16 or 18 copper-covered wire will answer your purpose better. No. 30 is used only when the resistance of the circuit, exclusive of the magnet coils, is comparatively great. 4. Why is platinum used for vibrating tongues? I have some of brass and copper that work very well. A. Because it is less oxidizable than most other metals. 5. How is sheet brass toughened? A. By rolling or hammering. 6. How is iron softened for electro-magnets? A. By heating it red hot and then allowing it to cool very slowly.

(23) J. M. M. asks: What metal will expand and contract the most by heated air? How much would a bar of metal 10 feet long and $\frac{1}{2}$ inch square expand for each degree of heat? A. Lead, zinc, and tin are among the most expansible solids, their coefficients of linear expansion per Fah. degree being about as follows: Lead 0.00016, zinc 0.00017, tin 0.00015.

(24) E. S. says: In answer to your correspondent P. J. S., who having read "that the seed of sunflower is the most healthy feed that can be given to horses in winter and spring, half a pint a day keeps them in health and spirits, with sleek coats, and more animated than any other feed. It prevents heaves and some other disease," and he inquires if there is any truth in it. I have a large number of horses under my care, and had the above feed recommended to me. I gave it a trial, and found it to do good, it bringing horses into a good condition in a short time. The seed contains an oil which the horse seems to relish, when the seed is mixed with other food; and given in half pint doses, it aids digestion and acts as a mild laxative, and as such may prevent some cutaneous diseases and other disorders arising through constipation. I have never used it as a preventive of heaves, but know it to give relief to horses afflicted with them. I have also used it with good results on a horse whose lungs had been left impaired by a severe attack of pneumonia, and whose respiration was difficult and laborious, and it afforded considerable relief. The following is also a very good food for horses, and may be used for the same purposes as the above: It is composed of 2 quarts oats, 1 bran, and $\frac{1}{2}$ pint flaxseed. The oats are first placed in the stable bucket, over which is placed the flaxseed. Add boiling water, then the bran (do not mix), covering the mixture with an old rug, and allowing it to thus rest for 5 hours, when it is mixed and ready for use. The bran absorbs while retaining the vapor, and the flaxseed binds the oats and bran together. A greater quantity of flaxseed would make the preparation too oily and less relished. One feed per day is sufficient; it is easily digestible and is especially adapted for young animals. It also tends to fatten.

(25) H. F. B. asks: Can I return the condensed water of a coil of pipe into the boiler without the use of a pump? A. With properly designed heaters, you may possibly be able to return the water; but it will be better to use a trap specially constructed for the purpose.

(26) O. O. M. says: I have a model side-wheel boat 45 feet long by 12 feet beam; it draws 14 inches of water. I want to put two direct connecting engines in it. What size will I need? What size single engine will I need? What size wheel should I use? A. Diameter of wheels, 8 to 10 feet. For engines, 7 to 8 inches diameter, 1 to 18 inches stroke, or a single engine with same cross section of cylinder.

(27) D. B. T. says: In the open air, water boils at 212°. In a boiler having an air pressure of six atmospheres, it will not boil at less than 320°. What would occur in a steam boiler having a pressure of six atmospheres of steam, if we turn air of seven atmospheres pressure into it, without allowing the temperature to rise? Would all the steam be condensed or would the air be diffused through the steam according to Dalton's law of the diffusion of gases? If so, why? A. If the temperature of the air was not raised, none of the steam would be condensed, and the mixture would follow Dalton and Gay Lussac's laws. This follows from the definition of a perfect gas. You will find a good discussion of this subject in Rankine's "Treatise on the Steam Engine."

(28) T. S. S. says: I wish to build a governor, the arms of which, from the centers of motion, shall measure 6 inches, the balls to be 2 lbs. weight each. How many revolutions per minute will be required to raise the arms to a horizontal position? A. You cannot raise the arms to a horizontal position, at any rate of speed, but you may approximate the position quite closely. A full explanation is given on p. 389, vol. 31.

(29) H. H. H. asks: I have a horizontal bar suspended from two wire ropes and guyed to the floor with four more; it however turns with the hands. How should the suspension rope and guys be fixed to the bar so that it will not turn, and will be perfectly stationary? A. The manner in which the bar is set up by professional gymnasts is probably as good as any. The bar is secured to two uprights, so that it cannot turn. These uprights rest on the floor, and the guys are attached to them.

(30) J. B. asks: Why is it that the low pressure cylinder of a compound engine is made larger in diameter than the high pressure? Would not the effect be the same if the terminal pressure in the high pressure cylinder acted upon a piston of the same size, instead of a reduced pressure (due to larger space occupied) acting upon a larger piston? A. One of the objects of the compound engine is to obtain a high grade of expansion; another is to employ a comparatively low temperature in the cylinder which is exposed to the cooling action of the condenser; and it is also desirable, generally, to have the equivalent mean pressure the same in each cylinder. We think these are the principal reasons for making one cylinder larger than the other, when only two cylinders are used.

(31) C. J. A. says: I have two low pressure boilers, 18 feet long and 40 inches in diameter, with

two flues each. They have a two foot brick wall between them and are not connected together. I heat 125 large rooms with them, that do not have regular heaters in and only have a large quantity of piping hung on the walls in a zigzag form. The steam passes directly through about 280 or 300 feet of piping before reaching my return pipe in every room. Those that are close to the boilers get the most steam and return steam or foam into my boilers; while those at a distance retain the water so that the lower part of the pipes have water in them all the time. I have no pump, and have to depend on my condensed steam for supply of water. Is it safe to set boilers without having a pump, injector, or other reliable way of supplying them, or can I safely depend on condensation for supply? A. Without knowing the size of rooms and character of building, we could not form a very definite opinion as to the economy. We think it would be well for you to attach a trap of the kind that is made for returning the condensed water from heating coils. 2. In starting steam in the morning, there is a continual cracking and thumping noise until I have a complete circulation. I have about 35 drip cocks to assist in letting the air out, besides two main air cocks. A. To get rid of the cracking and thumping noise, it will be necessary to re-arrange your heating apparatus, so as to secure better circulation.

(32) J. J. says: 1. A reservoir $\frac{1}{2}$ mile square in surface, 20 feet deep, 2 miles from town, and 200 feet above the level of town, has 2 pipes, of the same size and length. One is inserted at foot of reservoir, the other is inserted 19 feet above the first, or as near the surface as practicable without admitting air. Both pipes are brought to the same level in town. Would there be any difference in the pressure or amount of water discharged? If so, why? A. As long as the proper level was maintained in the reservoir, there would not necessarily be any difference in the action of the two pipes beyond what would be due to their difference in length and shape. 2. What would be the effect if the last mentioned pipe was fed from a box three feet square, the water being kept at the same height as the reservoir? A. The box, under the conditions named, would answer just as well as the reservoir for the connection.

(33) H. S. P. says: 1. I have a small copper boiler 12 inches high and 8 inches in diameter; it has a funnel inside, 8 inches in diameter at the bottom and 1 $\frac{1}{2}$ inches at the top. The copper is $\frac{5}{16}$ of an inch thick. How much pressure will it stand? 2. How can I carry a pressure of 20 lbs. per square inch. A. You can carry a pressure of 20 lbs. per square inch. A. Make one 1 x $\frac{1}{2}$ inches.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the result stated:

H. A. S.—Your precipitate consists principally of organic matter and sulphur, together with a small quantity of silicic acid. J. D. R.—It is galena, sulphide of lead, and contains, in 100 parts, lead 87, sulphur 13 parts (by weight). M. T. D.—No. 1 is a silicate of alumina and lime, together with carbonate and sulphate of lime, blende, and sulphide of lead. No. 2 is jamesonite (3 Pb S + 2 Pb S₂), and contains in 100 parts, lead 43.6, sulphur, 56.4 parts.—G. S. M.—Nos. 1, 2, 3, 7 and 8 are impure clays (silicate of alumina) containing considerable quantities of lime and sesquioxide of iron. They might be employed as material for the manufacture of bricks. No. 4 might be called a low grade of potter's clay. No. 5 is clay slate, of no particular value. No. 6 is clay, containing a large quantity of carbonaceous matter, etc. No. 9 is red hematite (sesquioxide of iron). If in large quantities, it is valuable as an ore of iron.—W. H. J.—The substance consists of carbonate of lime, a little magnesia and iron, some fine sand, and a considerable quantity of alumina and silicate of alumina, or clay. The greater part of the alumina, clay, and sand may be removed from the water by slow filtration through gravel, and the iron and bicarbonate of lime by the addition of the proper quantity of clear lime water. The quantity of lime water requisite may be determined by experiment with known volumes of the water and reagent.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On Transporting Ships Overland. By E. R.
On Brushing the Teeth, etc. By S. M. A.
On Nature and Life. By E. S. N.
On the Coast of France. By P. G.
On a Cave in Pennsylvania. By P. M.
On the Geographical Distribution of Animals, etc. By G. D.
On the Flight of Birds. By F. B.
On the Diagonal and the Side of a Square. By T. F.
Also inquiries and answers from the following:

G. W. E.—J. B.—J. W.—P. T. C.—M. M.—J. G. G.—G. M. W.—J. J.—E. F. Y.—R. A. J.—E. M. E.—G. K.—L. A. S.—C. F. P.—M. M. C.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Inquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "What will a suit of sails for a schooner cost? Who sells lithographic stone, and what is the price per lb? Who sells barometers? Who sells screw propellers, suitable for small boats? Who sells a machine for making fishnets?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

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