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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 This is for our information and not for publication.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 r asonable 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.

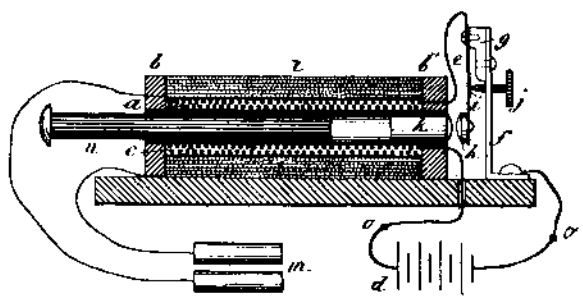
Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(5438) W. M. McV. says: On page 339, "Scientific American Cyclopedia of Receipts," it says to put a small quantity boracic acid in milk to keep it from souring. What quantity per quart would you use, also is it injurious to the health? If not, is it beneficial to the health? A. Two-thirds of drachm of boracic acid to one gallon of milk. If boracic acid is not obtainable, then one and one-sixth drachms of borax to one gallon of milk. Adding one drachm of salt per gallon with the above improves the keeping of milk. This treatment of the milk required to be kept for a few days is not injurious. We do not know that it is beneficial to health.

(5439) J. M. S. and others write: I wish to make a medical induction coil. Will you tell me how to make one? A. The annexed engraving shows the essential features of an ordinary medical coil about one-half actual size, linear. The exact dimensions are immaterial and the direction of the winding of either primary or secondary wire is also immaterial. The spool, *a*, may be made entirely of wood, or of a thin tube of hard rubber with wooden or rubber ends, *b b'*. On the spool is wound the primary coil, *c*, consisting of two layers of No. 20 cotton-covered magnet wire (American wire gauge). The ends of the primary wire pass through the end, *b'*, of the spool. One end is connected with one pole of the battery, *d*, the other end is connected with the fixed end of the spring, *e*, which is supported by the standard, *f*. A block, *g*, of insulating material (hard rubber or wood) is placed between the standard and spring, and is fastened to each by means of a screw. The spring, *e*, is provided at its lower end with a soft iron button, *h*, which serves as an armature. At or near the middle of the free part of the spring is soldered a small plate of platinum, *i*, and in the standard, *f*, is inserted a platinum-pointed contact screw, *j*. The standard, *f*, is connected with the remaining pole of the battery, *d*. In the end of the spool adjoining the armature, *h*, is inserted a short piece, *k*, of well annealed iron rod, which reaches into the spool far enough to be surrounded by several convolutions of the primary wire. The primary coil is wrapped with two or three thicknesses of writing paper, and upon this is wound the secondary coil, *l*, consisting of 10 or 12 layers of No. 36 silk-covered magnet wire. Before beginning the winding of the secondary wire a piece of flexible conducting cord should be inserted in the head of the spool, and the inner end of the fine wire should be attached to it. The outer terminal of the secondary coil should also terminate in a piece of flexible cord. These flexible cords may be connected with binding posts or attached directly to the electrode, *m*. In the coil is inserted a bundle, *n*, of soft iron wires (Nos. 20 to 24). These wires may be fastened together by a wrapping of firm, stout thread, varnished, or it may consist of tinned iron wires, which may be soldered together. A brass-headed nail may be inserted in the bundle in lieu of a part of the central wire, to form a finish for the end of the bundle. Two cells of Leclanche or dry battery in series will run the coil, or a single small cell of plunging bichromate battery may be used. This coil may be mounted as elaborately as the maker may desire, or it may be made plain, as shown in the engraving. If it is desired to make use of the extra current of the primary coil, flexible cords with handles may be connected at *o o'*. The strength of the induced current is varied by moving the core, *n*, in or out. As the action of this coil is like most of those now in use, it is unnecessary to describe it.



(5440) B. V. C. says: I am building a 27 foot launch, 5 foot 6 inch beam, draws about 21 inches water loaded, and would ask what size engine furnished with 200 pounds steam would be suitable for boat to make at least 10 miles per hour, and would a compound engine be best, and what size 3-bladed wheel should I use? A. Engine cylinder should be 4½ inches diameter, 5 inches stroke, making 350 revolutions per minute. The boat should have the keel drop at stern to take a 24-inch 3-blade wheel, 3½ feet pitch. We do not recommend a compound engine for your boat. Complication and outboard condenser more than compensate for the gain in fuel and size of boiler.

(5441) P. P. K. asks: 1. Of what is Portland cement made, and how is it made? A. We refer you to our SUPPLEMENT, Nos. 231, 386, 620, and 752, for excellent papers on the subject. 2. I have a Daniell battery that works well, but the zinc is eating away too fast. I use common salt in the clay cup. What shall I do to remedy it? The battery is worked on an open circuit. A. Paraffin the lower half of the cup. It must be perfectly dry, and the paraffin must be melted in by heat. The battery is not suited to open circuit work.

(5442) A. W. says: I have a steamboat 22 feet long on water line, 4 feet 8 inches beam, 16 inches in water, including 4 inches keel, and of good model, propelled by a 1 horse power Shipman engine, 400 revolutions at 100 pounds steam. Please inform me in Notes and Queries what size and pitch of screw I should use to get the best speed? A. A 14 inch wheel is the proper size for your boat, pitch 26 inches. The one horse power Shipman engine is rather small for the boat and its proper size wheel. You will probably obtain no more than 300 revolutions per minute, with possibly 6 miles per hour.

(5443) C. A. B., of Virginia, asks: What is the simplest remedy to keep ticks off one's person? When I spend my summer in the country, I cannot take a walk without returning almost covered with these little pests. Is there anything than can be applied to the clothing which will make it offensive to them? A. Reply by Professor Riley.—It is doubtful whether our correspondent really means ticks or mites. The true ticks are of a considerable size and do very little harm to human beings. The mites or "red bugs" or "jiggers," as they are called in different parts of the South, are in reality the larval forms of the true harvest mites. The false genus Leptus was formerly based upon these larval mites and I have described two species, *Leptus irritans* and *L. Americanus*, both found in the Southern States. I judge that the correspondent refers to these so-called "red bugs," which are very abundant in the South upon the grasses and low-growing vegetation in the country and the cause of great annoyance during the summer months. There is, unfortunately, no substance which may be applied to the skin or to the clothing which will prove offensive and deterrent to the mites and which will not at the same time be offensive to the human olfactory organs. Oil of tar, for instance, a not very sweet-smelling material, if applied here and there to the clothing or rubbed on the skin, will keep off the mites. It is very heating to the skin, however, and is disagreeable on that account. In localities where these insects are particularly abundant we have anointed the skin with kerosene, which also acts as a deterrent, but this is not agreeable for reasons which will be readily understood, and, therefore, cannot be recommended as a satisfactory practice, so that, after all, the best thing which can be done is to change one's clothing after coming in from a walk and perhaps jump into the bath.

(5444) C. F. K. asks: How much air is needed to burn one pound of coal in one second? A. One hundred and fifty cubic feet of air, varying slightly with the carbon and hydrogen element in the coal, for the combustion of 1 pound of coal, without reference to time. 2. How would you calculate the size and weight of a fly wheel on a certain horse power engine? A. The size and weight of fly wheels varies very much with the kind of engine and work to be done. The diameter varies in practice from three to five times the stroke of engine. A single engine requires a larger and heavier fly wheel than a double engine. Approximately for engines of the Corliss type 80 pounds to the indicated horse power, for 100 horse power and under, dropping to 60 and 50 pounds per indicated horse power up to 1,000 horse power.

(5445) A. W. G. writes: 1. In making the pipe coil boiler mentioned in SUPPLEMENT, No. 702, could I not connect the valve C with a tank placed at a level with valve, and in that way receive a steady feed? A. A tank may be used in place of feeding by the funnel, but a constant or open feed cannot be used in this way or by gravity, as in this case the steam pressure would blow back and with no pressure the boiler would fill solid. A check valve would prevent blowing out, but would not prevent filling too full. With the arrangement as illustrated in No. 702, the filling should be done under supervision and stopped at the proper height of the water in the boiler. 2. Instead of the armature core, for the motor described in SUPPLEMENT, No. 641, b ing made of wire, could I not use sheet iron blanks, 3 inches diameter, making the core 2 inches thick, adopting Siemens winding, using 3 pounds of wire? A. Yes, sheet iron disks may be used as stated. 3. Also, how many storage battery cells would it take to run above motor? A. Two to four storage battery cells will run the motor, according to the power to be developed.

(5446) A. J. H. asks: 1. I have an 8 light 16 candle power dynamo, I built from drawings of SUPPLEMENT, No. 600, and is shunt wound, and find it works very well, and lights the 8 lamps. Now I have a foot lathe and desire to run the same by a motor, and wish to know if I can change the above machine so that it will work with such a battery as described in "Experimental Science," page 401, figure 394, 8 cell plunge, as recommended for running motor. such as described in the above work. I wish if possible to get power enough out of my dynamo to run the lathe, as I have no use for it as a light machine. A. Connect the magnet windings in parallel so as to get low resistance. Keep it shunt wound. The battery will not run it very long. 2. It says that the above named battery has the disadvantage of running down or becoming exhausted in a few hours. I should feel obliged if you would tell me what gives out about it, if it is the zinc or carbon, or does the bichromate solution become exhausted? A. The solution becomes exhausted. 3. Could you inform me where I could obtain the carbon and zinc plates for such a battery, and about what would be the cost of a set for such a battery, and how long they would last by using the battery one or two hours a day? A. Address some of our advertisers who deal in electrical goods. The zincs will last a good while—the carbons indefinitely. It will not be cheap power. 4. Will the dynamo I have, by cutting out half the wire on fields and armature, work as a motor with half the power it would take if all the wire was in connection? A. No. 5. Could you tell me where I could get castings for a half or 1 horse power petroleum or gasoline engine, or if I might be successful in making one myself, being a mechanic and having worked on steam engines for some time? What I would like to learn is, how does the oil go into the cylinder, and what would be the proportion of oil and air for a single charge for a 1 horse power engine? I have thought of constructing one if I cannot get the necessary power from my dynamo. A. For gas engine we refer you to Robinson's "Gas and Petroleum Engines," $5.50 by mail.

(5447) S. G. M. writes: There is in the head of my bedstead one of those bugs that keeps up at times a continuous, very annoying knocking and ticking. I have tried to locate him and then to destroy him, but never succeeded as to the former. Could you tell how to find out his location, and if it would be possible to destroy him in the wood? A. Reply by Professor C. V. Riley.—The insect complained of by your correspondent is either one of the Ptinid beetles (the so-called "death watch") or, what is more probable, the larva of a longicorn beetle. Such insects are known to live for years in the dry wood of furniture before they emerge or die. It is of course a very difficult matter to locate exactly the insect working in the wood. In some instances the presence of little piles of sawdust lying beneath the place where the insect works will help to locate the enemy. If the latter does not eject any sawdust, it has sometimes been located by moving a lighted candle along and close to the suspected parts of the wood. The proximity of the light will cause the larva to "knock" and it can then be cut out with a knife. If the burrows of the insect are close to the surface of the wood, they can be detected by taking soundings with a stout steel needle, and if the burrows are found, the killing of the larva is easily accomplished by boring a small hole in the gallery and injecting therein a sufficient amount of bisulphide of carbon by means of a small syringe.

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