tricity in a coil of wire it is necessary to vary the number of lines of force passing through the coil. If the same number of lines are cut each second, there will be no current produced in the wire.

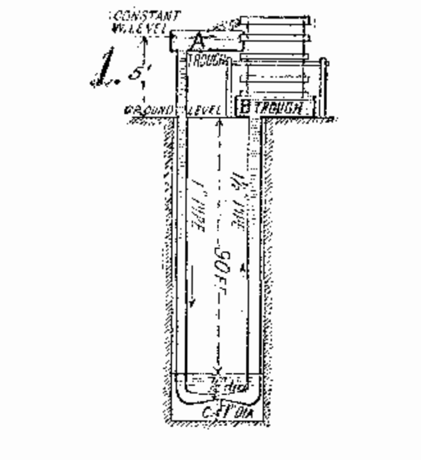
(10236) R. S. D. asks: I have a four-magnet telephone generator which rings through 50,000 ohms, which has been through a fire. Is there any way by which I can charge the magnets over again, and how much wire will I need to wind the armature? A. The Carty bridging bell, which is used for long-distance telephoning, is said to be wound to 1,000 ohms with No. 38 B. & S. wire. This would require nearly three-fourths of a pound of wire. If your magnets are not burned so as to injure the steel, they may be tempered and remagnetized. They will then be as good as they were before.

(10237) R. H. asks: I desire to make a rheostat for use with an arc lamp in my stereopticon. Have you a description in any of your SUPPLEMENTS of such an appliance, with instructions how to make it? A. A very good form of rheostat is shown in SUPPLEMENT 865, price ten cents. This may be adapted for use on a lamp. The slate sides are not needed, but the frame should be of iron insulated by asbestos. A plate of slate should be used for the blocks and swinging arm to vary the resistance. The size of wire depends on the amperes the lamp carries. No. 12 German silver will probably be heavy enough. Subtract forty-five from the voltage of your current and divide the remainder by the amperes the lamp takes. This gives the ohms of resistance required in the rheostat, although it will be well to use about one-fifth more wire. You can allow fifty feet of the wire named above the ohm.

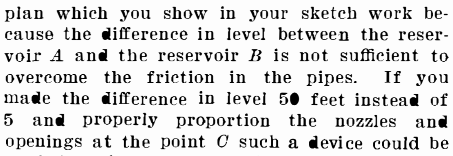
(10238) E. K. E. asks: Would you be kind enough to tell me the exact length of German silver wire of a suitable size for a resistance box which would be required to give a resistance of one ohm, the wire being such as is commonly sold by electric supply houses? A. The length of wire for one ohm depends upon its size. Supply houses keep all or nearly all sizes of German silver wire to correspond to those of copper wire. To find the number of feet in an ohm, divide the number of feet of copper wire in an ohm by 13. The quotient will be the number of feet of German silver wire in an ohm.

(10239) D. A. H. asks: Have scientists generally accepted the theory that the electric current does not flow through a wire, but follows the space around it? A. An electric current flowing with unvarying intensity flows through the material of the wire, flows in the wire, and also sets up a magnetic field around the wire. In this field a magnet is attracted by the lines of magnetic force. When an electric current flows with a varying intensity, either increasing or diminishing in intensity, as, for instance, starting with a sudden rush and as suddenly dying out, then electric waves are thrown off into the space around the wire, it may be with great force, so that they are sent many miles. It is these waves which are used in wireless telegraphy. They are not in the wire. The wire is but a core or center around which the waves whirl with tremendous energy. We are but beginning to learn their power and value, and have not yet harnessed them and broken them into our use and service. 2. Referring to the article entitled "Humidity and Heating Systems" in your SCIENTIFIC AMERICAN, why is it that the humidity of the air in the house heated by artificial means is so much less than that outside? Does the air lose any of its moisture by being drawn into the house and heated? A. The humidity spoken of is not the amount of moisture in the air, but the percentage of moisture as compared with the total amount of moisture which the air could hold at that temperature. Air saturated with moisture is said to have 100 per cent of humidity. The whole name is relative humidity, which expresses the meaning better. It is the moisture relatively to complete saturation. Now, the capacity of the air to hold moisture varies greatly with the temperature. In a summer morning fog may lie thick over the earth, because the air was saturated with moisture, and the excess of water appeared as fog. The sun rises, warms the air and the fog disappears. Why? Not because there is any less moisture in the air than earlier, for the dew and fog will come again at nightfall and last till morning probably; but because at the higher temperature of midday, the air can carry more water in the condition of invisible vapor than it could at the lower temperature of the early morning. Now apply this principle to the heated room. The air inside the room is warmer than the air out of doors; and though it may contain the same number of grains of water vapor to the cubic foot, that amount of water vapor will not bring the relative humidity of the room as high as it will the out-of-door air, because it will take more water to produce the same per cent of humidity in warm than in cold air. The warm air has a greater capacity for water vapor than cold air has. It is for this reason that we should have a water pan in the hot-air box of the furnace and add water vapor to the heated air before it enters the room.

(10240) I. N. A. says: May I ask the following questions of your world-renowned paper? What is a jet pump? Can you refer me to any publication describing such a pump, and recommending the circumstances in which it is most helpful? Is the following idea feasible? Given a deep well, say 90 feet to water surface, and required to pump a small quantity of water for use in building masonry trough A (see sketch 1) connected with a 1-



inch pipe is 5 feet higher than trough B connected with a 1½-inch pipe. Both pipes are connected below well water surface at a point where each has been coned down to ½ inch diameter and at this point a third short pipe of 1 inch diameter C is connected which opens out into the well water 5 feet below water surface. Pipe C is closed and the whole system filled with water from trough A, which of course will flow out from trough B. Suppose then the level in trough A is kept constant by lifting the water from B to A and pipe C is opened. Will a bigger discharge arrive at trough B than that which is poured into trough A owing to well water entering at C, where, due to the coning, the pressure head has been converted into velocity? Rough dimensions have been assumed only for facility of expression. A. A jet pump works on the principle that a stream or jet of liquid at a high velocity will drive or carry along with it the particles of fluid which surround it. We doubt if it would be possible to make the plan which you show in your sketch work because the difference in level between the reservoir A and the reservoir B is not sufficient to overcome the friction in the pipes. If you made the difference in level 50 feet instead of 5 and properly proportion the nozzles and openings at the point C such a device could be used to raise the water from the well. The inclosed sketch (2) shows the general way in



which these nozzles should be proportioned. The end of the supply pipe from the higher reservoir should terminate in a small nozzle A from which the water will flow with great velocity. The openings B B and the contracted diameter of the chamber at B' should be small, so as not too greatly reduce the velocity of the water which issues from the nozzle at A. A large valve should be supplied at D which is used to start the pump. This is opened wide. After the water is flowing through the nozzle with its maximum velocity the valve D is suddenly closed. This will cause sufficient pressure in the chamber above, due to the momentum of the water, to cause it to force the check valve E open. If everything is properly proportioned and if there is sufficient head more water can be forced into the reservoir B than flows from the reservoir A.

(10241) H. L. P. asks: Will you kindly publish in your query column a list of all the different kinds of ether waves, their rate of vibration per second, and their wave lengths, and do they all travel at the rate of 186,000 miles per second? A. The ether waves concerning which you inquire are the vehicle by which the radiations pass from the sun to the earth. These radiations become heat, light, or electro-magnetism, and other forces perhaps, when they strike upon organs which can appropriate them as such. That which strikes the eye becomes light, that which affects other nerves of sensation gives us the sensation of heat. You will find much about these matters in Thompson's "Light, Visible and Invisible." So far as we know, all these waves pass through space with the same velocity, about 186,000 miles per second. We can send you the book named for $2.

(10242) A. S. asks: Would you kindly explain to me, in your query column, why the upper part of a wheel moves much faster and farther than the lower part? A. The upper part of a wheel of a vehicle does not move along the road any faster than the bottom of the wheel. The whole wheel moves together as fast as the vehicle moves. This must be so, or that part of the wheel which moves slower would be left behind on the road. With reference to a point on the earth, that point with which the wheel is in contact with the earth, the part of the wheel which rests on the ground at the moment is at rest. The top of a wheel moves with a lever-like motion with reference to the point in contact with the earth. Probably this is what you have in mind in your question. It is fully discussed in Notes and Queries of Vol. 93, Nos. 16, 20, and 25, to which we would refer you. We send them for ten cents each.

(10243) G. W. B. asks: Why is it that if there is a particle of grease or some other substance on the inside of the glass of a cylinder lubricator, the drop of oil tends to slide away from it, and if there is some substance all the way around the inside of the glass the drop of oil lengthens out and becomes oblong until it passes that substance? A. We presume the phenomenon you have noticed is due to capillarity. The fact that the drop does not wet or come into contact with the side of the tube causes its peculiar motion.

(10244) B. C. J. W. asks: Will you please explain the following questions in Notes and Queries? In Todd's "New Astronomy," page 253, it is stated that even the faintest stars are visible by day and night from the moon. Why is this the case? A. The absence of air from the moon would enable dwellers there to see the stars at all times. The sun would be a blazing star, and its light would not be diffused through space so that it would render other heavenly bodies invisible, as is the case on the earth. Stars may be seen on the earth in the daytime through a telescope, which cuts off the scattered rays of sunlight and allows the rays of the star to come directly to the eye.

(10245) R. W. M. asks: I would like to know through your paper as to how to make the best kind of a storage battery with the following materials: Three lead plates (square) 6 x 6½ x 1/16 inch; nine (round) plates 4 inches diameter x ⅛ inch. A. As good a way as any to make a storage cell from sheet lead is to be found in our SUPPLEMENT 845, price ten cents. A much better cell can be made by following the methods given in SUPPLEMENT 1434, price ten cents.

(10246) J. H. N. asks: What theory or theories are held to explain cyclones? A. Cyclones are large whirlwinds which travel over the earth from west to east. The wind blows into the storm from all sides, so that the whirl of the storm is in a direction opposite to the motion of the hands of a watch in the northern hemisphere, as the storm moves forward. The subject is treated fully in Waldo's "Elementary Meteorology," which we send for $1.75.

NEW BOOKS, ETC.

CONCRETE COUNTRY RESIDENCES. New York: Published by The Atlas Portland Cement Company, 1906. Illustrated; pp. 92.

Rarely does a manufacturing company issue as excellent a book as this one, placed before the public by the Atlas Portland Cement Company. The importance of the subject to the householder doubtless warrants the trouble and expense of publishing as ambitious a work as this. Concrete for residential building purposes is constantly coming into greater utilization, and the many advantages which it possesses are steadily bringing it to the fore for this purpose. A recapitulation of these advantages would be unnecessary in this review. The possibilities of concrete can in no way be better demonstrated than by the numerous examples of residences and country houses illustrated in the book. The diversity of architectural style and construction which is made possible by the employment of concrete is strikingly shown in the various types of buildings. The illustrations—and these really constitute the entire text—are of representative rural concrete residences from all parts of the country. The photographs are supplemented by floor plans showing in detail the construction of the buildings. Every house owner interested in this question should procure a copy of "Concrete Country Residences"; a more striking recommendation for this type of building can hardly be found in the literature of architecture. The book is handsomely printed and bound in heavy paper.

COUNTRY COTTAGES AND WEEK-END HOMES. By J. H. Elder-Duncan. New York: Cassell & Co., Ltd., 1906. 4to., pp. 224. Price, $2.50.

The layman of moderate means will find excellent information regarding country cottages suited alike to his class and to his purse in this handsome book. The illustrations include half-tones from photographs of actual cottages, as well as floor plans showing in detail the internal arrangements of the buildings. The text is written in non-technical form, and it gives much practical data as regards the possible and actual costs of the buildings illustrated, various points which come into consideration, a short chapter on gardens, and general information, among which the schedule of architect's fees will doubtless be of service. However, as the cottages in question are English, and were built under the conditions obtaining in England, the circumstances will probably differ somewhat in this country as regards the actual construction. Nevertheless, from a purely architectural standpoint, the book should prove of great value in this country also.

TEXT-BOOK OF FUNGI. By George Massee. New York: The Macmillan Company, 1906. 12mo.; pp. 427. Price, $2.

As the author explains, the object of the text-book of fungi is to serve in some measure as an introduction to the comparatively new lines of research opened during recent years in the morphological, biological, and physiological study of fungi, and also to indicate the sources whence information of more detailed kind may be obtained. Our knowledge of this subject has been increased remarkably within the past few decades, and the appearance of this book is both timely and necessary, for the usual text-books discussing the questions involved are on the whole extremely technical and academic.

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