Notes and 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 This is for our information and not for publication.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 this department, each must take his turn.

Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.

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.

(9903) J. L. A. asks: I would like to get some information looking to the making of a good dry battery for gas engine ignition, one that is up to date. I have an instruction book on the subject, but there are two or three things I would like to know before making any of the cells. Is the ordinary sheet zinc, as used for lining baths and such uses, suitable for the making of dry cells, and can it be used at once as bought, or should it be put through any process, such as amalgamating it? May gas carbon, as procured at the gas works, be used for the powdered carbon, and to what degree should it be powdered, and should the finer particles be sifted out? May old battery carbons be used? To what degree of fineness should the black manganese be brought, and should this be free of very fine portions? Is this latter likely to be impure, and how can one test it for purity? Should the blotting paper be of a very porous nature, or just the ordinary white blotting paper? Would there be any advantage in using a felt for the absorbent material? Will the ordinary gas carbon be the best material for the carbon element, and what proportion in diameter should it bear to the diameter of the cell? I understand a round carbon is the best. Is this so? A. The ordinary sheet zinc is suitable for the cases of dry cells, made up as it comes. We should wash out the inside with dilute hydrochloric acid before packing in the materials, since this will bring a pure zinc surface to contact with the active materials of the cell. It cannot be amalgamated, since the mercury will cut its way through sheet zinc in a very few minutes, and it will crumble to pieces. It matters little whether the gas carbon comes from gas works as coke, or from old battery plates or electric light carbons pounded to pieces; any of these are all right. If it had been essential to use a particular form, your instructions in the book would have stated the form to be used. Use the manganese dioxide as it comes from the dealer. It may be a powder, not necessary to sift it. If you buy chemically pure manganese dioxide, the cost is greatly increased. The ordinary commercial article will serve all purposes. Only the oxygen of the dioxide is used in the battery. Any porous material will answer to be saturated with the solution. If only thin blotters are to be had, take two layers of the paper. It is not necessary to use felt or paper. You can make a dry cell in almost any way in which active material comes into contact with zinc, and get your result, although one arrangement is by no means as good as another may be. A cylindrical carbon is to be preferred, since it has a larger surface, and all its exterior surface is near the zinc on the outside, so that the internal resistance is much lower than if a flat plate of carbon is used. We have published in our Supplement, Nos. 1383 and 1387, full and very plain instructions as to making dry cells. We send these for ten cents each, and you would do well to have them to refer to or to follow, since they give plans and dimensions of all parts. A "semi-dry" cell is one from which if upset liquid will not run out. Some absorbent material is used—even sawdust has been used—to retain the liquid.

(9904) H. E. B. says: What will remove tarnish from gold? What chemical fumes will tarnish gold? The bows of my gold glasses have become tarnished, and the only thing it might have come from that I think of is from some of the fumes in the chemical laboratory. Is the percentage of injuries from railroad accidents in the United States a quarter or less proportionately to those in England? In starting a shunt motor, why should there be a resistance in series with the armature? A. Silver polish will probably remove the tarnish from the gold rims of your spectacles. If these are plated, it may not be the gold which has been tarnished. Show them to your professor, and he can doubtless tell you the cause of the discoloration. Many more people are injured in railway accidents in America than in England. A resistance is put in series with the armature of a shunt-wound motor upon starting it, because the resistance of the armature is so low that an undue amount of current would rush through the armature were the current turned upon it while it is at rest. As it picks up speed the counter E. M. F. cuts down the current in the armature. Hence the resistance is turned off.

(9905) W. J. S. asks: 1. How can I construct a coherer that will receive impulses from a transmitter situated about fifteen hundred miles distant? I would also like to know at what altitude I am to place the aerial conductor in order to get the best service from the above-mentioned coherer. A. The coherer consists of a small glass tube filled with metal filings. It may or may not be sealed, but if sealed by fusing the wires in at the ends, it is usually exhausted to a high vacuum so as to prolong the life of the filings. The details of making a coherer, which cannot well be given in a letter, may be found in an article in our Supplement, No. 1361, which we send for 10 cents. 2. Is it possible to "step up" a very low voltage to one of infinity in the following manner of transformation? Place a small cell of battery in series with the primary coil of the Ruhmkorff type, connect the secondary terminal of this coil with the primary of an induction coil of greater capacity, and continue this mode of procedure until a sufficient number of coils are used to get the required voltage. Would this method, if practicable, be better than using a strong battery and one high-capacity induction coil? A. It is not possible to use a small cell on a small coil and have the secondary of this act upon the primary of a larger coil, and so on until an "infinite voltage" is reached. You get out of the second coil no more than the small cell can put into the first, less losses, and if this is stepped up the amperes become smaller until there is only an infinitesimal current, and hence no effect at all.

(9906) W. H. R. asks: While the question of lubricating the sides and bottom of a ship by forcing air under the ship is being discussed, permit me to describe an experiment I made in this line a few years ago. When this idea of air lubrication first came to me I thought perhaps I had made a great discovery, and would have to build a small ship to prove it, but I soon found an easier and cheaper way of proving the value of air lubrication. I made a hollow pendulum, having a hollow stem, and small holes in the bottom of the pendulum disk; then I fastened a rubber tube on the end of the stem, and swung the disk in a dish of water. The pendulum was set in vibration, and the time noted that it took to come to a complete standstill. Then it was again set in vibration while air was being blown through the tube into the disk, and bubbling out through the small holes in the bottom of the disk, and the time was noted that it took for the pendulum to come to rest. The apparatus was very crude, but the result of the experiment did not show any marked advantage of air lubrication. In fact, as well as I remember, the pendulum would stay in motion just as long without air lubrication as with it; at any rate, the difference was so slight that one could not detect it without a timepiece, and I did not think it would warrant me in going to the expense of building an experimental ship, especially when the extra power consumed in forcing air under water was considered. I wish someone who has a laboratory would perform this experiment with every scientific precaution, and let your readers know the exact value of air lubrication. There is also another experiment I would like some scientist to perform. Let him make a searchlight that can be revolved very rapidly, and then determine the candle-power it would produce in all horizontal directions when revolved at various velocities compared with its original candle-power in one direction, when not revolving; also the amount of power consumed in revolving it at the various velocities. An impression of light is said to remain in the eye one-eighth of a second, and therefore if the searchlight turns fast enough, its light would seem continuous, and have a certain definite candle-power. I have made some experiments with a whirling card disk, having a perforation in it through which the sunlight passed. The area illuminated through the perforation was not as bright as the area illuminated by continuous sunlight, and for this reason I do not know whether or not it would be possible to increase the candle-power of a lamp by putting its energy in the form of a rapidly-revolving searchlight. If these experiments have not already been performed, I hope someone will try them, and publish the results. If they have been performed, and results published, will the Scientific American kindly advise as to where such information can be found? A. We are doubtful whether air lubrication of a vessel moving through the water on a small scale would furnish any data of value regarding its use on a large scale. Nor do we think air lubrication would prove beneficial enough to pay for its cost. The principal resistance to the motion of a ship through the water is not the friction of the water, but is the work required to move a weight of water equal to that of the ship out of the path every time the ship moves its own length. As to the measurement of the candle-power of electric lamps, many photometers are constructed to measure while the lamp is in rotation, as our correspondent proposes. The candle-power can be measured at any angle desired, and thus the mean spherical candle-power be determined. We do not know any special publication of such measurements, since they are in common use in lamp factories for the rating of incandescent lamps. Arc lamps are rated better by the watts consumed than by candle-power.

(9907) C. J. A. asks: I have several sal-ammoniac batteries which I charged according to the directions. After doing so I began using them after a reasonable length of time, which I allowed for the sal-ammoniac to dissolve. They were not used very much, so I know I did not use all their strength. They gradually became weaker and weaker. I took them and stirred them up, and they were as strong as ever. What had I best do with them to keep the sal-ammoniac from settling and not dissolving as it ought to? A. You should not have any undissolved sal-ammoniac in your cell. Dissolve nearly all the water can hold, and fill the cell with this liquid. The cell will then run its best. This cell, we presume you are aware, should not be used for continuous service. It is only to be used for interrupted service, such as ringing bells, telephone work, etc. It will not run a motor for any length of time. When crystals form on the zincs, these are not sal-ammoniac at all.

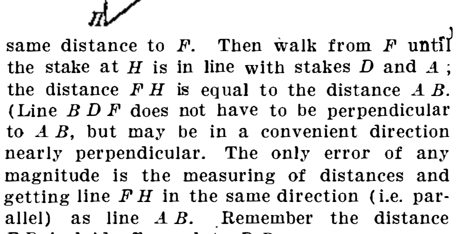
(9908) J. B. asks: 1. Would you let me know through your paper the formula of a solution acting upon carbon and zinc, which will produce about four volts to a cell? Also what will be the amperes of the current? A. No zinc-carbon cell can give four volts. The best to be had give about two volts. These are the chromic acid cells. See Supplement 792, price 10 cents. 2. The name and price of a book which gives different formulas and the method of determining the volts and amperes of a cell, by ordinary arithmetic, for beginners. A. Cooper's "Primary Batteries," price $4, is very full upon the subject.

(9909) H. asks: Can you explain to me simply and in a few words why the trade winds in the northern hemisphere are deflected toward the west, while the prevailing westerlies are deflected toward the east? A. It is by no means easy to explain in a few words why the winds of the earth blow as they do. The subject occupies much space in the physical geographies, to which we would refer you. It may be said that the trade wind is a constant flow of air from north to south, because of the heat of the equatorial regions. As this air is passing from a region of slower to a region of more rapid rotation of the earth, it follows that the air has a slower eastward motion in the place to which it has come than the surface of the earth beneath it has. This causes the air to seem to come from the northeast. Similar reasoning applies to the prevailing westerlies, since these are return currents from the northeast trades. The air is moving from south to north, and has thus a more rapid easterly motion than the earth under it, which causes the air to seem to come from a more westerly direction than it actually is flowing.

(9910) E. H. W. asks: 1. What are specifications for winding 20-ohm Morse sounders? Is cotton or silk single or double covered wire used? A. A 20-ohm sounder is usually wound with No. 25 B. & S. single silk-covered wire, 14 layers to 67 convolutions to each layer. See Maver's "American Telegraphy," page 69, price $2. 2. How could a Eureka sounder (5 ohms) be rewound to 20 ohms resistance, having about 1,880 convolutions of wire? A. A Eureka sounder, 5 ohms, can be rewound to 20 ohms as in last question. 3. What kind and how many open-circuit cells (not Fuller) should be used on a telegraph line with two 20-ohm sounders, and a line resistance of 16 ohms? How many gravity cells should be used on a line of the same proportions? A. To separate a sounder to give a good, audible click, about one-quarter ampere is found necessary. Your line has 56 ohms, to which the battery resistance must be added. Calculation shows 16 gravity cells to be needed, although a smaller number may work the lines with sufficient strength or audibility. The gravity cell is the most satisfactory for such uses. Of open-circuit cells some form of the Léclanché type is formed, and of these ten cells will furnish you the necessary current, when they are in good condition.

(9911) M. F. C. asks: 1. I have a small induction coil, the condenser of which is 26 sheets of tinfoil, sixe 2 x 4 in. These are the words of Avery's "Elements of Natural Philosophy": "One object of the condenser is to prevent the spark otherwise produced at the break-piece of the primary circuit." My coil sparks heavily at the break-piece, which is a file and a piece of steel. Is my condenser too small? A. We think your condenser is too small. Try making it twice as large. One who is building a coil should have a book to go by. Norrie's "Induction Coils" is a reliable book, which we send for $1. 2. Can a Leyden jar be charged from an induction coil giving a ⅛ to ¼ inch spark? If so, how? A. Small Leyden jars can be charged with a small coil. Connect the outside of the jar to one pole of the coil, and hold the discharging rod tipped with a small brass ball near the ball of the jar. Sparks will jump across, showing the charging of the jar. 3. Can a jar be charged from an electrophorus giving a ½-inch spark of negative electricity? A. It would be very slow and tiresome work to charge a Leyden jar with an electrophorus. It is perhaps possible, but not profitable. You will find our Supplements 278, 279, 282, price ten cents each, very valuable upon these matters.

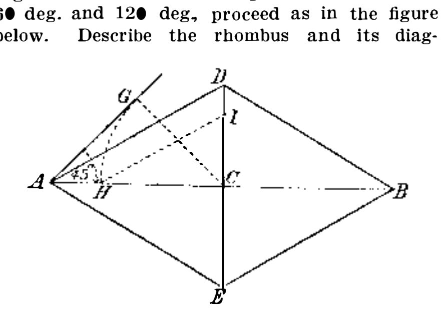
(9912) C. R. S. says: You give a method of measuring the width of a river without use of any instrument except measuring tape. Let me give you a better method. I refer to 9850, page 491. It requires a geometrician to remember your rule, while mine can be easily remembered, is more exact, and can even be used without the use of a measuring tape if one can step off distances with a fair degree of accuracy. Rule: Select a tree on the opposite bank as at A, and place a stake on the near bank as B. From B measure off a distance in a line perpendicular to the line AB, say a distance of one hundred steps or one hundred feet, and place a stake at this point D, then continue in same direction for



same distance to F. Then walk from F until the stake at H is in line with stakes D and A; the distance FH is equal to the distance AB. (Line BDF does not have to be perpendicular to AB, but may be in a convenient direction nearly perpendicular. The only error of any magnitude is the measuring of distances and getting line FH in the same direction (i.e. parallel) as line AB. Remember the distance FD is laid off equal to DB.

[Editorial Note: The rule which you give for estimating the width of a river is exceedingly simple and is correct. The only difficulty with this rule is the possibility of error caused by not getting the lines AB and FH exactly parallel. The rule which we previously gave is somewhat more complicated, but it is also more accurate, as it does not involve this source of error.]

(9913) T. W. McK. asks: Please show, in your Notes and Queries, by a figure and explanation, how to inscribe an ellipse in a rhombus whose angles are 60 deg. and 120 deg. A. To inscribe an ellipse in a rhombus of 60 deg. and 120 deg, proceed as in the figure below. Describe the rhombus and its diagonals.



Draw AG, making an angle of 45 deg. with AB, and let fall the perpendicular from C upon CG. With CG as a radius, describe the arc GH. CH is the semi-major axis of the ellipse. Draw HI parallel to AD, and IC is the semi-minor axis of the ellipse. From these the ellipse may be constructed.

(9914) J. W. C. asks: Is it a fact that when a ship at sea appears "hull down" to the naked eye, all of the ship can be brought into view, if a telescope is used? A. It is not a fact, although many believe it to be, that a ship, hull down, may be wholly seen through a telescope, that is, hull up again. We have often watched ships sailing hull down when at sea with a glass, and say from personal knowledge that a ship disappears below the horizon as if over a round earth, as it really is. What then is the basis for the other notion? For such an idea could not be established unless there were some reason behind it. It would seem to be this, as we surmise: The telescope makes distinctly visible the edge of the water and the details of the hull of the ship near the water, which are not distinctly seen by the unaided eye at such a distance, several miles at least. Thus it seems as if one were seeing farther down the hull than when looking without the aid of a glass.

(9915) P. H. W. asks: Kindly state why the months of the year are numbered, some with 31 days and some with 30, February with only 28? A. The arrangement of the days of our months is due to two Roman emperors, Julius and Augustus Cæsar. Julius Cæsar revised the calendar, making the common year to have 365 days, and every fourth year to have 366 days. The days of the year were distributed among the months, so that the odd months, beginning with January, had 31 days, and the even months had thirty days, except February, which had 29 days in common years and in leap years had 30 days. He also gave his name to the month of July. The months following were named from numerals. Augustus Cæsar followed Julius, and gave his name to the sixth month, August, and in order to get 31 days for it, so that it should be as long as July, named for Julius, he took a day from February and placed it in August. This brought three months with 31 days together. To remedy this Augustus changed September and November to 30 days and October and December to 31 days. Thus our peculiar arrangement of days in the months is because of the vanity of Augustus Cæsar.

(9916) I. A. R. asks: Will you please account for the universal idea among seafaring men that ice sinks? I can find no theory to substantiate the opinion, but two out of every three people will declare that they have seen ice sink. Many intelligent men have voiced this same opinion—men who know that ice is lighter than water. Any information you may give will be greatly appreciated by myself and others who are interested in the discussion. A. We can not suggest any reason for the idea that ice disappears by sinking, which is prevalent among sailors.