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Notes & Queries

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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 This is for our information and not for publication.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.

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(5041) W. D. writes: You will oblige me by giving an explanation of the phenomenon described below. It was observed on the 16th of March, at a point on the eastern slope of the Blue Ridge, about half a mile from the base of the mountain. There were no well defined clouds over the sky, and no appearance of rain showers; but the sky was covered only with a light film of haze, not enough to obscure its blue color. The phenomenon was an arc of rainbow-like spectrum, distinctly green to yellow, but faintly defined as to the other colors of the rainbow. Its length was apparently 45°. Its position was between the zenith and the sun, apparently 10° from the zenith, and 45° from the sun. It was convex toward the sun, the zenith being its apparent center. The phenomenon was first seen about 4 o'clock P. M., and lasted at least an hour. The above description agrees with the observation of more than twenty persons. A. The phenomenon described is a solar halo occasionally seen during peculiar conditions of the atmosphere and generally preceding a change of weather. They are supposed to be caused by the refraction and reflection of sunlight by flakes of snow in the upper atmosphere, the various forms of snow flakes producing the variation in the form of the halos. They are described in Kaemtz "Meteorology."

(5042) A. H. P. asks: 1. Why is the water on small bodies of land surrounded by salt water, fresh. And where does it come from? A. The water on islands surrounded by salt water is derived from the rain falling upon the island, except in some peculiar localities, in which it is derived from subterranean communication with the main land through deep gravel beds. 2. Does the fair weather wind blow from the north and the foul from the south in all regions? Why is it thus? A. Fair weather winds blow from both north and south in most regions where special conditions of climate do not prevail, as in the eastern United States. There are many localities where south and southwest winds are storm breeders, while the northeastern wind in the Eastern States is usually a storm wind. West of the Rocky Mountains the conditions are somewhat different, owing to the different direc-

tion of the coast line and the great mountain ranges from the coast line and mountain ranges of the Eastern States. The elevated plateau between the Rocky Mountains and Sierras also influence and localize the direction of storm winds. The story of storm winds is a long one for Notes and Queries. It is well illustrated and described in Hinman's "Eclectic Physical Geography."

(5043) C. E. E. asks (1) for some scale for sizes of wire in making electromagnets. What size wire for magnets for door bells, etc. A. The winding of the bell magnets is generally arranged with reference to the electromotive force of the battery and its resistance. The common rule is to make the resistance of the battery equal to the magnet and line wire. 2. I would like to know the size of wire for magnet for a 3 and 4 inch bell, and how large wire, and how large size should a magnet be for a quarter inch core? A. For a bell of the size named the cores of your magnet should be 7-16 of an inch in diameter, 2 inches long, and the depth of the winding should be equal to the diameter of the core. The rule in regard to the depth of the winding applies to your 1/4 inch core.

(5044) A. S. writes: I desire to protect safe in office, which is 1/2 mile from residence, against burglars, by electric bells, by means of circuit breakers on office doors and windows. If an open circuit is used wire might be cut, if closed circuit it might be grounded. Is it possible to use one line wire for both open and closed circuit system by alternately making the line at intervals of 30 minutes an open and then a closed system through the agency of a clock or clocks or other mechanism, and thereby detect trouble within 30 minutes, if the line has been either cut or grounded. If it is impossible to do so, please state if it must take two lines, one open and the other closed system, and take the chances of burglars cutting the wrong or grounding the wrong wire and thereby give the alarm? A. Without doubt your best plan is to use both the open and closed circuit systems as you propose.

(5045) J. S. K. asks how to mould common sheet zinc into rods the size of electric light carbon pencils for use in electric batteries, and whether it would be necessary to clean the sheet zinc, or if when it is melted he could remove the foreign substance from the top. How can the mould be made and the moulding carried on in a cheap, simple manner? A. You can make a sand mould for your zinc castings and melt and pour the zinc as you would brass or any other metal. 2. Please state the price of mercury for amalgamation purposes. A. Metallic mercury is quoted at 82 cents per pound.

(5046) J. B., New York, asks: What is the largest boat I can build without requiring the service of a pilot? A. Sail boats and yachts do not require the service of a licensed pilot, nor a license.

(5047) B. W. R. asks: Do the propellers on a twin screw steamship run same way, or right and left? A. The twin propellers run right and left.

(5048) H. C. T. writes: Can you explain where and how the terms "up north" and "down south" arose? Is it due to the inclination of the axis to the plane of the ecliptic, or purely a conventional term? A. The terms "up north" and "down south" probably originated in the Eastern States, and may have been suggested by the course of the rivers, which run in a southerly direction. The position of the pole star may also have had its influence in designating the north as "up north," and of course its opposite would be "down south."

(5049) A. H. says: The awning deck of my steam launch was covered with oilcloth. The oilcloth all cracked up, no doubt from the sun shining on it. Will you please inform me with what I can paint the oilcloth, so that it will not crack? I thought that probably a coat of boiled linseed oil would preserve it. The awning deck is stationary and the oilcloth is tacked on; therefore the paint put on the oilcloth need not be pliable when dry. A. Oilcloth cannot be saved from cracking when exposed to the sun. Any desired color in ground paint mixed with boiled linseed oil will renew the surface when worn or cracked.

(5050) J. H. asks: Will there be any difference in the hydraulic pressure of a pipe say one mile long, 10 inches diameter, one end 20 feet lower than the other, with both ends closed, and pressure applied by a steam pump at the center of pipe or any other point? A. There will be no difference in pressure due to the place of the pump connection; but the lower end will have about 8 1/2 pounds more pressure per square inch than the upper end, due to gravity or the hydrostatic weight of the water.

(5051) E. W. asks: Was not the discovery of the moons of Mars indicated by some astronomical knowledge before it really came to pass? I read in "Gulliver's Travels" a very accurate description of the two satellites, that seems to be too close to the facts to be merely a coincidence. A. The discovery of the moons of Mars was accidental, and not from any known physical condition or perturbation of the planet, although the absence of a satellite and its possibilities has been long discussed. The Gulliver story was only a romance that accidentally turned into a coincidence.

(5052) H. C. M. asks whether it is possible to build a storage battery to be supplied from a common incandescent electric light plant that would "store" sufficient electricity to operate a one horse power motor some two or three hours per day. A. You will find a storage battery that will answer your purpose described in "Experimental Science," also in the SCIENTIFIC AMERICAN, vol. 61, page 22; but we advise you to purchase your battery from a reputable maker.

(5053) E. F. B. asks: 1. How large should the plates of a storage battery, such as is described by C. L. Woolley, be to light three 16 candle power 20 volt lamps for about four or five hours? A. The plate should be 6 x 8 inches, and you will require 11 cells of battery. 2. Please explain the difference, if there is any, between putting all the plates of a storage battery in one cell and placing them only two in a cell. A. By placing all the plates of each cell together the resistance of the battery is diminished and its amperage is increased.

(5054) G. R. W. asks: 1. Is it possible to magnetize a piece of steel about one-fourth of an inch square, and how shall I proceed to do it? A. Harden the piece of steel at the ends only, and draw the temper to a purplish brown. Apply the steel to the poles of a strong magnet, or stroke the steel with one pole of the magnet from the center to the end, and with the other pole of the magnet from the center to the opposite end. 2. Could I revolve a piece of tin, about 1 inch in circumference, by the aid of this magnet? Which would be the best way to work the same? A. There is no way of doing this with the magnet alone.

(5055) S. H. writes: 1. If you have a number of the SCIENTIFIC AMERICAN containing explanation of difference between a universal focus lens (for a photo. camera) and one which requires focusing, will you kindly send it to above address? A. There can be no such thing as a universal focus lens. The lens known by that name is simply a wide-angled lens, the back focus of which is comparatively short. With such a lens a very slight movement of the plate or lens throws the image into or out of focus, and when it is adjusted at what might be called an average focus, the picture is likely to be as sharp as it would be if the focusing were done for each view. 2. What shape, diameter, and focus lens should I use in making a camera with universal focus, to cover a 3 1/4 x 4 1/4 plate? A. It is best to buy a wide-angled short focus lens from a reputable maker. The focus might be about 3 1/4 inches. You can get single lenses for about \$3, and you can purchase a very good rectilinear lens for \$12 or \$15.

(5056) L. A. T. asks: 1. Have gasoline engines ever been used for thrashing purposes? If so, with what results? A. Gasoline engines have been used for agricultural purposes. We do not know that they have been applied to thrashing. 2. What advantage would they have over a steam engine? A. They would probably be lighter than a steam engine and boiler of the same power. 3. Why have they not been used more extensively? Successful engines are of practically recent date. 4. How many inches does the mercurial column fall for 1,000 feet of ascension? A. 1.117 inches.

(5057) B. M. C. asks how to cover pulleys with paper. A. Scratch the face of the pulley with a rough file thoroughly, so that there are no bright or smooth places. Then swab the surface with a solution of nitric acid 1 part, water 4 parts, for 15 minutes; then wash with boiling hot water. Having prepared a pot of the best tough glue that you can get, stir into the glue a half ounce of a strong solution tannic acid, oak bark, or gall nuts, as convenient to obtain, to a quart of thick glue; stir quickly while hot and apply to the paper or pulley as convenient, and draw the paper as tightly as possible to the pulley, overlapping as many folds as may be required. By a little management and moistening of the paper, it will bind very hard on the pulley when dry, and will not come off or get loose until it is worn out. Use strong hardware wrapping paper.—From the "Scientific American Cyclopaedia of Receipts, Notes, and Queries."

(5058) L. C. D. says: Will you please give me a formula for mayonnaise suitable for an article to be placed upon the market? A.

Powdered turmeric	1 oz.
Powdered tragacanth	1 oz.
Olive oil	8 oz.
Eggs	8 oz.
Water	5 1/4 pt.
Ground mustard	1 1/2 oz.
Salt	8 oz.
Acetic acid (glacial)	2 oz.
Tincture of capsicum	1/2 oz.
(Or according to taste)	
Sugar	1 lb.

Mix the first three ingredients in a mortar capable of holding one gallon, then add the eggs, which have been whipped previously, and incorporate thoroughly until an emulsion is formed; next mix separately the mustard and water, allow to stand ten or fifteen minutes, or until the flavor is fully developed, then add the last four ingredients, mix, and add the liquid gradually to the contents of the mortar. It should make a smooth, uniform emulsion; finally, strain through cheese cloth. This is a seasonable preparation, and may serve not only for the delectation of the pharmacist himself, but would furnish an article of sale as well.—*Pharm. Era.*

(5059) C. N. asks: How is artificial malachite made? A. Artificial malachite, which is susceptible of a fine polish, is made by precipitating a solution of sulphate of copper in the cold by carbonate of soda or of potash. The precipitate, which is voluminous, should be washed and dried and made into a paste with plaster of Paris and water; allow the composition to harden.

(5060) H. S. S. asks for the best method of preserving eggs. A. Cold storage is probably the best method, but the following is largely used: In the common "liming" process a tight barrel is half filled with cold water, into which is stirred slaked lime and salt in the proportion of about one-half pound each for every pail or bucket of water. Some dealers use no salt, and others add a small quantity of niter—one-fourth pound to the half barrel of pickle. Into this the eggs, which must be perfectly fresh and sound, are let down with a dish, when they settle to the bottom, small end down. The eggs displace the liquid, so that when the barrel is full of eggs it is also full of the pickle. Eggs thus pickled, if kept in a cool place, will ordinarily keep good for several months. Long storage in this liquid, however, is apt to make the shells brittle and impart a limy taste to their contents. This may be in a great measure avoided by anointing the egg all over with lard before putting in the pickle. Eggs thus prepared are said to keep perfectly for six months or more when stored in a cool cellar.

(5061) G. M. S. asks: What causes fish to die in a small quantity of water in a vessel, if the water is not changed at short intervals? Is oxygen the life-sustaining substance, the same as in mammalia, or, if not, what is it? And can the substance consumed by the fish in the water be replaced artificially, or the deleterious matter removed which causes the death of the fish, so as to prolong life say 24 or 48 hours? A. Fish depend upon the oxygen dissolved in the water. As soon as the oxy-

gen is exhausted the fish die. You can keep up the supply of oxygen by continually aerating the water, but it will be more practical to continually renew the water.

(5062) J. S. G. says: Please inform me of the best, strongest, and most durable disinfectant for household purposes. A. Various disinfectants are used for different purposes. 1. Roll sulphur, brimstone, for fumigation. 2. Sulphate of iron, copperas, dissolved in water in the proportion of 1 1/2 pounds to the gallon, for soil pipes, sewers, etc. 3. Sulphate of zinc and common salt, dissolved together in water in the proportions of 4 ounces sulphate and 2 ounces salt to the gallon, for clothing, bed linen, etc. Zinc sulphate is a strong poison.

(5063) W. A. C.—I noticed in your number March 25, 1892, a description of the process of using old tin cans. Can you give me any information about utilizing scraps of tin? 1st. Can the tin be separated from the iron by simply heating and melting it off in a reverberatory furnace? 2d. If acid is used to dissolve the tin, how are the iron products separated from the tin products? 3d. How is the tin salt then made commercially available? A. The tin cannot be separated from the iron by heat. The tin scrap is boiled in weak hydrochloric acid until the tin is dissolved. The tin solution is made into perchloride or tin salt, as used by dyers, and into oxide for polishing. Any form of tin salt is salable in the chemical trade.

(5064) A. P. G., writing from Meridian, Miss., says: One of the firms of this city, in connection with their business, run a small gasoline engine, the boiler of which is made of heavy sheet copper, and is 18 inches long by 9 inches in diameter. The water was all blown out of the boiler night before last and left dry. Yesterday morning their helper lit the gas as usual, not knowing the boiler was dry. The gas had burned some little time before he noticed that he had no water. He started the pump by hand, and the boiler immediately collapsed. The center puckered and lapped and contracted to 1 1/4 inches hollow, while the boiler was dented and warped all over. What caused it? A. The water could not have been entirely blown out of the boiler, enough being in to fill it with steam, which condensed when the cold water was pumped in, producing a vacuum, and the inward pressure of the atmosphere, nearly 15 pounds to the square inch, caused the collapse of the boiler.

(5065) C. L. writes: 1. I take the liberty of asking for information in regard to a set of storage cells made by myself. My cells consist of lead plates, 5 inches x 6 inches, placed in round jars, 6 x 8, such as used for the ordinary gravity cell. The plates are three-sixteenths inch in thickness, having about 50 one-half inch holes drilled in regular order. I have filled these holes and covered the surface of the plates with a thick paste of red lead and dilute sulphuric acid for the negative and litharge and acid for the positive plates. Is this proper, or should red lead be used for all the plates? The first cell consisted of three negatives and two positives. This cell was charged with the current from four gravity cells, and would run a Porter motor No. 2, requiring two volts E. M. F. and two amperes, about one hour. I have since constructed two more cells, using in one cell four negatives and four positives, and for want of sufficient plates used four negatives and three positives for the second cell. After charging these cells and adding the first mentioned cell, they still will only run the motor the same time—one hour. Any one of the cells will run the motor one hour. Please explain why the three do no more work than one. Is it necessary to only fill the holes in plates or also coat the plates? A. Your arrangement of cells is not favorable to the most economical working of the motor. The voltage of one cell is sufficient for the motor; by increasing the voltage you only facilitate the exhaustion of the battery. If you connect your cells in parallel, 3 cells of battery will probably run the motor three times as long as the single cell, as you will still have only two volts. 2. Does the thickness of the plate have anything to do with the successful operation of the cell, and how many amperes ought the above cell to supply? To charge the three cells, I use twelve 6 x 8 gravity cells. After filling holes and coating plates, I placed thin sheets of cardboard, the same size as the plates, between them, holding the paste in position until hardened, which took about 24 hours. I then removed cardboard and separated the plates by means of fiber strips about one-eighth inch square and bound all together with heavy rubber bands. A. The thickness of the plate is favorable to the durability of the battery; otherwise there is no advantage in having a thick plate. Your battery should yield from 4 to 12 amperes.

(5066) T. S. H. S. asks: Is it possible to get sufficient heat from steam to bake the enamel on bicycles in a reasonable time? If so, is it used extensively? What is the best method to apply steam to heat an oven, say 6 feet x 6 feet x 4 feet? The temperature should be no higher than 300° F. If a lower temperature (say 250°) is used, how long will it take to properly bake enamel on bicycles? Would it be more economical than gas? Any information as to what has or is being done in this line will be very acceptable. A. Steam heat is in general use for baking japanned or enameled ware. For the hard japans for bicycles a temperature of 275° should be used, and higher steam pressure than usual is required to control the heat, as there is considerable margin between the heat of the steam in the boiler and the heat delivered from the pipes in the oven. With 85 pounds boiler pressure and a short distance between boiler and oven, you can obtain the desired temperature in a close oven, as you describe, with a gridiron or flat coil on the floor of 150 feet 3/4 inch pipe and 75 feet 3/4 inch pipe on the three sides, near the bottom, the fourth side being for the door. Each coat of japan should be baked for six hours, although the time depends much upon the quality of the japan. It may not be more economical than gas, but is far more, if not absolutely, safe. To make gas heat perfectly safe from setting fire to the japan vapor is expensive.

(5067) J. W. N. again writes: On April 15, J. W. N., No. 4888, you were good enough to answer an inquiry I made concerning hollow walls. I would like now to ask, should not a brick wall of say 8 to 12 inches, with two thicknesses of heavy tarred felt nailed on the inside immediately to the brick, then furred with 2 inch