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 This is for our information and not for publication.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 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.

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.

(5448) E. E. S. says: I send you herewith a piece cut from an ash tree, together with an insect found on the same. The entire tree is covered with a similar incrustation and is apparently dying. Please tell me through Notes and Queries what the insect is and the remedy, if any. A. Reply by Professor C. V. Riley.—The section of ash limb sent is densely incrusted with the scales of the oyster shell bark louse, a well-known pest of the apple tree, which also infests a great variety of other trees and shrubs. The larger insect referred to is an immature plant bug belonging to the family Pentatomidæ, carnivorous in habit, but having no connection whatever with the bark louse except that it might occasionally feed upon it, though normally foraging on larger insects, such as the larvæ of Lepidoptera. A more thorough infestation by this scale, which seems to have covered the limb to a depth of several layers, is not often seen, and it can easily be imagined that the injury resulting from the attacks of myriads of the insects would be very considerable. This scale receives its common designation from its general resemblance to an oyster shell, and covers a soft-bodied, almost organless, insect which, beneath this protective covering, extracts the juices of the plant tissue by means of a long sucking tube. All the other organs, feet, eyes, mouth parts, antennæ, etc., have disappeared, leaving it practically a segmented bag with a sucking tube. This scale, in common with all others of its kind, is not always in this degraded, helpless condition, but in the larval stage is provided with six legs and other appurtenances of insects, and runs rapidly about until it finds a suitable location, where it fixes itself and begins the exudation from the surface of its body of a waxy powder which, by constant accretions, forms the waxy scale of the mature insect. In the meantime, in the first moult, all the members of the body except the proboscis are shed and abandoned, and the insect thereafter merely increases in size without other change. On reaching full growth the female becomes filled with eggs, which ultimately give birth to the new generation. The history of the male scale is widely different from the above. Starting out in a similar way, it does not, however, attain the size of the scale of the female, and after the second moult it enters into the pupa state, and later emerges with delicate wings, resembling very much a minute gnat, and then soars about in quest of its mate. The history outlined above is practically the same for all the scale insects, the number of generations in a season depending very largely on the latitude. In the warmer sections of the country one generation follows another without a break, while in more northern States perhaps but a single generation is produced annually. In a case of infestation so bad as that of the ash tree in question, the chances are that it will have been so weakened that it will be useless to adopt any remedial measures, and it will in all probability be far better to cut down and burn the tree. The application of kerosene emulsion to the plant is the best remedy known, care being taken to wet thoroughly all the affected portions. If the application is made during the growing season, a dilution of one part of the emulsion with 15 of water is desirable. It is often advantageous, however, to apply a much stronger solution during the dormant season, at which time a dilution of one part of emulsion in 5 parts of water will do no injury to ordinary deciduous trees, and will be much more effective against the scales. If a careful watch is kept on the trees in early spring, the period when the eggs hatch will be noted by the emergence of the young and their spread to other parts of the tree. The application of the insecticide at this time will be especially effective on account of the unprotected condition of the young lice.

(5449) E. F. F. asks: What is the velocity of steam through a 1 inch pipe at 100 pounds pressure, and if a 4 inch pipe would be four times as much or more? A. The velocity of steam flowing into the air through an orifice or from the end of a short tube is 898 feet per second at 100 pounds pressure, varying but very little for differences of pressure; but the absolute quantity in pounds varies very greatly, being 39 pounds of steam per minute at 30 pounds pressure and 98 pounds per minute at 100 pounds pressure for each square inch of orifice. The increase in the size of the orifice gives only an imperceptible increased velocity, due to proportional decrease of friction on the edge of the orifice. It is the quantity that is increased by the larger orifice and in the ratio of its area.

(5450) G. P. N. says: Please give me the formulas for making sympathetic ink which require the aid of chemicals to produce the writing, also that require heat to bring out the writing. A. 1. Inks appearing through reagents. Characters written with a very weak solution of chloride of gold will become dark brown upon pouring a solution of perchloride of tin over them. Or characters written with a solution of gallic acid in water will become black through a solution of sulphate of iron, and brown through the alkalies. 2. Ink appearing by the application of heat. Write upon rose-colored paper with a solution of chloride of cobalt. The invisible writing will become blue through heat and will disappear on cooling.

(5451) S. F. says: 1. Will you please let me know what will remove fruit stains from linen? A. Most fruits yield juices which, owing to the acid they contain, permanently injure the tone of the dye, in colored goods, but the greater part may be removed without leaving a stain, if the spot be rinsed in cold water in which a few drops of aqua ammonia have been placed before the spot has dried. Wine or fruit stains on white materials may be removed by rinsing with cold water, applying locally weak solution chloride of lime, and again rinsing in an abundance of water. Some fruit stains yield only to soaping with the hand, followed by fumigation with sulphurous acid, but the latter process is inadmissible with certain colored stuffs. If delicate colors are injured by soapy or alkaline matters, the stains must be treated with colorless vinegar of moderate strength. 2. Also medicine stains in which iron and iodine were the principal ingredients. A. Try dilute hydrochloric acid, followed by ammonia. It is probable the iodine has rotted the goods so that any attempts to remove the stain will end in failure.

(5452) R. H. C. writes: Will you kindly give me a receipt or any suggestion how to remove fly specks from wall paper? I have a room papered with expensive paper, badly stained this past summer with fly dirt, and would like to learn of some remedy to remove them. A. Bread crumb not too fresh will answer to clean wall papers. Grease spots may be removed in some cases by using ether.

(5453) R. W. G. asks: What solution is used in tempering tools for granite cutting? What for marble? A. A tool that is of the best temper for granite is also the best for marble. It should be hard and tough for any use. More care in the heating and drawing the tools, so as not to burn the steel, is required than is generally given. A half pint of salt to one gallon of water is the best chilling bath. Dip endwise, and draw to the desired color for toughness.

(5454) V. L. W. asks: 1. Will you receive a shock by touching one wire or one pole on an alternating dynamo of 2,000 volts or more, being perfectly insulated from the other wire or pole? A. A comparatively slight shock may thus be received, owing to charge and discharge of the body. 2. Will you get a shock from one wire of an alternating dynamo of 2,000 volts or more through the insulation one inch thick, one wire grounded? A. Practically none if the insulation is of ordinarily good quality. 3. Is there any dynamo or any electrical machine that requires only one wire to convey the current, no ground being used? A. A true current requires a circuit. In Tesla's high frequency experiments, the luminous and incandescing effects of currents are produced without return circuits. See Tesla's "Experiments with Alternate Currents," $1 by mail.

(5455) F. T. writes: In your issue of September 9, you give a list of metric equivalents, one of which is, to convert gallons to liters, multiply by 3·8. Is this right? Should it not be 4·543? A. The factor 3·8 applies to the United States gallon of 231 cubic inches; the factor 4·543 to the imperial gallon of 277·27+ cubic inches.

(5456) F. M. W. writes: 1. I have a solution for copper plating made according to the first receipt in SUPPLEMENT, No. 310, except that by mistake I added a large excess of cyanide of potassium. Articles in circuit in it receive no deposit. Would the excess of cyanide cause this? If not, what would? If so, can I do anything to set things right or is my solution useless? A. Too much cyanide will tend to prevent precipitation. To rectify it add more copper sulphate and dilute in proportion. 2. In replating articles should all the old plating be removed in all cases? A. It is decidedly better to completely strip before replating. You also gain a certain amount of silver thereby. 3. How much prussic acid (dilute) does it take to precipitate 21 drachms of nitrate of silver? Would an excess of water in the nitrate solution use up more acid? A. This cannot be answered, as you do not tell how dilute your solution is. One part by weight of pure prussic acid combines with the silver contained in six and three-tenths parts silver nitrate. More water does not require more acid. 4. I have 1 Bunsen cell (2 quarts). Now if I expose the zinc surface equal to the surface of work in electroplating bath, will it be all right? Are the battery and solutions well balanced? A. No such general rule can be given. Your battery surface may exceed the anode surface in the bath. Regulate by different immersion of the anode, not by changing the battery surface. Do not use too strong a current, *i. e.*, too large an anode. 5. Is there any United States standard of screw threads under ¼ inch? If so, please give table. A. There is no United States standard for screw threads under ¼ inch. Manufacturers have adopted standards of their own nearly corresponding with English practice.

(5457) J. J. L. says: I read the SCIENTIFIC AMERICAN, but cannot quite catch on to one question—the cost of transmitting electric power. I had better give a supposed case. I have a 70 horse power water power turbine wheel. It will cost me $5,000 to run a canal from the dam two miles and put in a turbine at the end of the canal. What will it cost to transmit that 70 horse power or 80 per cent, or say ½—35 horse power—two miles, and apply it to the machinery there? What does it cost to carry 30 horse power two miles by wire and apply it at that distance from the water power? I know there must be a dynamo at the starting point and there must be a motor where the power is applied. What cost say of 30 horse power dynamo and motor, or any horse power, say 10, 15, 20? Next, is it practical, say to carry a saw mill or ore mill or mine lift into a mountain and use water power two miles away to run it? A. If your turbine has an actual output of 70 horse power, you should be able to realize 50 horse power at 2 miles without difficulty by electric transmission, by running a 70 horse power dynamo at the location of power, and any required number of electric motors up to a total of 50 horse power at various points two miles distant, at a total cost somewhat more than you quote for a canal. The 70 horse power dynamo will cost about $2,000, and as much more for the motors, including regulators. The wiring will foot up another thousand dollars. Shafting and belting with a house must be also provided. The care of such a power plant is much greater than by the canal system, needing the constant attention of at least one man. If 30 horse power only is required, $5,000 will cover the whole cost. A 10 horse power motor will cost $500, 20 horse power $800. The transmission of power is perfectly practicable and is largely in use in mining and for mechanical purposes.

(5458) J. E. E. asks: 1. Is it possible to light a kitchen fire with the current of one or two ordinary cells? A. It is possible to kindle a fire by such agency? 2. Kindly describe method. A. Carry the wires to the grate and connect them by an incandescing fuse. This may be made of a very short piece of thin iron wire stretched over some sulphur on a block or piece of kindling wood and partly embedded in the sulphur. When the current is turned on, the wire will become hot and will ignite the sulphur. This will ignite the wood. A few fuse must be used for each lighting. 3. Describe a fusion valve. A. A poppet valve may have its poppet held down by a strip of fusible alloy stretched across the opening. If a fire occurs, the strip melts and the pressure drives the poppet away. 4. How many horse power does it take to run the dynamo of SCIENTIFIC AMERICAN SUPPLEMENT, No. 865? A. Six to eight horse power.

(5459) M. F. writes: 1. We have an electric light system here which runs lights until about midnight. Can I use the current supplying incandescent lamps, of 110 volts, to charge a storage cell to furnish current for a lamp for the balance of the night? A. Yes. For charging use a current of proper amperage, using a resistance coil to determine its strength. The battery is made to be charged by a definite current, and on this account you must have your resistance. Use wire large enough not to get too hot. 2. What size storage cell would be needed, and how many candle power would be practical for the lamp? A. The capacity of the cell answers this with one proviso. You cannot use less than thirty cells in series to get good voltage. It is far better to use special low resistance lamps for your battery service.

(5460) T. L. C., G. L., and others ask how to mount photographs on glass. A. Take 4 ounces gelatine and soak half an hour in 16 ounces of water, put the jar in a large dish of warm water and dissolve the gelatine. When dissolved, pour into a shallow tray. Have your prints rolled on a roller, albumen side out, take the print by the corners and pass rapidly through the gelatine, taking great care to avoid air bubbles. Hang up with clips to dry; when dry, squeeze carefully on to the glass. The better the quality of glass, the finer the effect. G. L. also asks how to keep fish glue in a liquid state. A. Use 16 parts by weight of nitric acid to each 100 parts of glue and 250 parts of water.

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October 24, 1893,

AND EACH BEARING THAT DATE.

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