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 This is for our information, and not for publication.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.

(1) Copper asks how to stick copper coins to a plain board. A. Use shellac or sealing wax, applying it to the board and pressing down on it the heated coin. If you refer to the trick, see SUPPLEMENT, No. 279.

(2) T. D. McC. writes: I want to use some electric light carbons in a sal ammoniac battery. Will nitric acid be a good thing to remove the thin coating of copper from the carbon? Or, if not, what will? A. It is the best, and will be very effectual. Do the work out of doors, on account of gas evolved.

(3) J. P. asks: Will you please give receipt in your next issue to make a whit wash that will stand the weather, and also what to color with to make a deep slate color? A. Slake ½ bushel lime, strain, and add a peck of salt dissolved in warm water, 3 pounds ground rice put in boiling water and boiled to a thin paste, ½ pound powdered Spanish whiting, and a pound of clear glue dissolved in warm water. Mix these well together, and let the mixture stand for several days. Keep the wash thus prepared in a kettle or portable furnace, and when used, put it on as hot as possible, with painters' or whitewash brushes. Color to suit by adding sparingly of a dry pigment.

(4) W. F. C. asks how many Leclanche cells it ought to take to ring a bell through about 900 feet of No. 12 galvanized wire with good ground connections at each end. Can I ring a bell with a ground circuit? A. Two Leclanche cells should suffice. You can use a ground connection.

(5) L. V., Sacramento, Cal., asks: 1. Can you tell me a simple, inexpensive way of preparing India ink so that it will keep in a liquid state, without becoming mouldy or losing any of its qualities? A. The addition of a few drops of oil of cloves, oil of almonds, or carbolic acid will prevent its becoming mouldy, and it may thus be kept a long time; there is no good way of keeping it permanently liquid. 2. I have a glass inkstand with a brass hinged cover; by an accident the cover was detached from the stand; can you tell me how to make a paste that will unite them? A. Use plaster of Paris. 3. Can you tell me how to make lather for cleaning windows that is merely rubbed on the glass, and when dry brushed off? A. Mix 1 part of olive oil, 1 part of spirit of sal ammoniac, 2 of lime, and 1 of water to a thick paste. 4. What colors unite to form the color of gold? A. Use a combination of yellow and red until the desired shade is attained; the peculiarity of gold is its metallic luster, which of course cannot be obtained by any combination of tints.

(6) C. G., Baltimore, Md., asks: How can I restore the pliability of gas gum bags that have become hard? A. To a limited extent rubber can be restored by immersion in coal oil.

(7) H. E. B. writes: I have two powder horns that have been hanging in a cupboard for some time. On looking them over recently, I find that there are several holes eaten or bored through them. The holes are about one-eighth inch in diameter, and look like the work of the apple tree borer, but no insect was visible. Can you explain what made the holes? A. Professor Howard, of the Department of Agriculture, Washington, says that objects made of horn are not infrequently subject to the attacks of insects of various orders, and notably of Coleoptera of the families Dermestidæ and Ptinidæ. The latter family (*i. e.*, those species which have been observed to bore in horn) are too small for the size of the holes mentioned, but this size agrees very well with the holes made by species of the genus *Dermestes*, and among the various species of this genus, *D. vulpinus* is most likely to have done the mischief. An accurate determination of the species in question is not possible, however, without seeing the specimens themselves. Frequent handling of objects made of horn, or exposing them to sunlight, will effectually protect them.

(8) Z. R. B. asks the best present method of japanning tin trousers buttons in large quantities. A. Tin buttons to be japanned should first be heated on sheet iron pans just hot enough to oxidize the tin slightly without melting it. This is to make the japan stick, as it is liable to crack off from bright tin. For dip work string the buttons on fine wire stretched across a bow made of larger wire, a hundred or more on a string. Make the bow with a loop to hang by. Heat the strung buttons, in the oven and dip in a long trough of Japan varnish thinned with turpentine to the proper consistency for the work. Hang the bow on a hook in the oven and touch the beads on the buttons with a wire to draw off the excess of Japan varnish. Bake at a temperature suitable for the kind of varnish used, say 250° to 280° Fah. For a finer finish the buttons should have two coats, the first a very thin one and the second a thicker and better varnish. There is a hand way used by placing the buttons on little studs made of wire set in a piece of board or sheet iron, the studs having shoulders to hold the buttons at the top, so that the varnish can be put on with a brush, which enables the use of a stronger varnish thinly laid on. Bake the buttons on the pins.

(9) J. I. B. asks how to get the condensed steam or water that drains from the heating pipes of a factory back into the boiler again by some automatic method. The drain pipes are several feet above the water level of the boiler, and there is a check valve near the boiler, but the water will not go back. A. We fear that you have not given the full pressure of the boiler to the coils, as in a return system of several feet above the water line you should have a perfect circulation through your coils, and the condensed water should flow back to the boiler by gravity. To accomplish this in a satisfactory manner the steam pipe should be large and the valve wide open; the steam connections with the coils should also be proportionately large, and the valves always wide open when steam is required on the coils. Every coil should have an air valve, to avoid frequent blowing out to free the system of air. If your pipe work is defective in its proportions, so that you cannot carry the full pressure into the coils, you may have to consider the cost of enlarging the pipes or of adding a return steam trap near the boiler, which will overcome the difficulty, at a cost of about $150.

(10) J. W. K. writes: I have a great number of articles made of cold rolled steel, about 2 inches or 3 inches long, ¼ inch wide, and varying from a fiftieth to one hundredth of an inch in thickness. The steel is of good quality. I want to harden them tolerably straight. When heated and plunged in water or oil, they are curled and cockled in all shapes. What is also the best method of tempering these articles? A. The hardening of thin pieces of steel of the character described should be done by dipping each piece separately and vertically into the water or oil. No miscellaneous dumping will bring them out straight. A pot of lead at full red or cherry red heat is the best for heating. Dip each piece vertically in the lead, and also vertically to harden. If a sand bath is used for heating, there is much trouble in picking out such thin hot pieces without bending. If the pieces are of such form as to be strung on wires half a dozen at a time, the process becomes less tedious. A method of hardening between cold surfaces of iron for perfectly flat and thin work has been practiced with good results where hardness and flatness are required. If a full spring temper only is required, the pieces may be hammered flat after bluing, as in the saw trade. Possibly, if the pieces are now made from the rolled steel without annealing before heating for hardening, you will find your trouble in regard to curling. We do not think it possible to heat rolled thin steel and harden it without previous annealing by any known method, other than by compression between cold dies.

(11) T. H. B. writes: I am building a launch 20 feet long, 26 inches beam, 6 inches draught, very fine lines, and wish to fit with twin screws. What diameter and pitch would be most suitable, and what speed could I probably obtain with 4 horse power? Could I use two De Bay propellers on above boat with any gain in speed over Thornycroft's or other makes? If so, what diameter, pitch, and speed would be best? What is the highest speed at which 2 and 4 inches diameter cast steel bevel gear wheels can be run with safety and economy, if accurately cut? A. As your boat is of very shallow draught, you will have to immerse the screws below the keel for good effects. Use a pair of 12 inch wheels, right and left blades, 30 inches pitch. You should be able to obtain a speed of 8 miles per hour with 4 horse power, and will need to make 325 turns per minute for this speed. Steel gearing on shafts 3 inches diameter with 5 inches driver, giving the engine 195 turns per minute, will give effective service. We do not recommend the De Bay propeller screw; it is too complex. The Thornycroft is good, but not in use for yacht launches. The plain radial wheel, with 2 or 3 blades, has been most approved in late practice.

(12) C. G. Van B. asks: 1. What is the best method of soldering the ends of fine copper wire together, especially for use in the secondary coil of an induction coil? A. Silver solder with vitrified or melted borax as the flux is the best material. You will find it a very delicate piece of soldering to unite such fine wires. You must use a blowpipe. 2. What are the objections, if any, to using resin as a flux for such purposes? A. Resin is the best ordinary flux for use on apparatus where it will make the solder take hold. Soldering acid should be avoided if possible. The following is recommended as a substitute: Lactic acid 1 ounce, glycerine 11 ounces, water 8 ounces. 3. How to re-tin soldering coppers. A. File them to a clean, even point, filing until no pits or depressions are left in the faces. Heat them to a fair temperature, rather hot, dip for an instant in a solution of sal ammoniac, and then rub on a block of solid sal ammoniac with some solder. Turn the iron around continually. Or for the block of sal ammoniac you may substitute a brick, into which you have made a slight depression and put resin and some solder in it. Rub the point up and down against the depression until tinned.

(13) J. H. B. asks how to increase the strength of a magnetic horseshoe magnet and keep it strong. A. You may preserve its strength by keeping its armature in contact with its poles. This will hardly increase its strength; you will do well if you can preserve it unimpaired.

(14) G. R. T. writes: I have a tennis racket on which the stringing is getting a little loose, but not enough to have it restrung. Please let me know whether there is any varnish I can put on to make them contract, or what I can do to tighten them without taking it apart. A. Oiling the strings with linseed oil is effectual to a certain extent. Restringing is the only good and certain cure.

(15) G. S. writes: I have seen an acid used for cutting steel, for making steel dies deeper, and giving a dead finish to the work. What seemed strange to me was that it would not touch the steel until it was touched with a piece of zinc. A. It is dilute nitric acid, 1 to 10 with water. The zinc is used to establish a galvanic current, which starts the acid into action on the steel. It must be brought for a very short time into contact with the steel and acid.

(16) F. N. D. asks: Why are the years 1800 and 1900 not leap years? A. The true solar year in length is 365 days 5 hrs. 48 min. 46·054 sec. Hence the correction by adding one day in every four years overcorrects it, and the annual excess of 11 min. 13·946 sec. amounts in a century to about eighteen hours, or in four centuries to three days. Therefore, a further correction is introduced by making but one out of four centurial years a leap year. This is so nearly correct that an error of only one day in 3,325 years is introduced. Those centurial years are leap years, the first two digits of whose numbers are divisible by four without a remainder.

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