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## Notes & Queries

A. F. K. will find a description of a breech-loading cannon on pp. 149, 402, vol. 27.—A. S. H. will find that galvanizing cast iron is described on p. 59, vol. 24.—D. G. & S. will find directions for annealing steel on p. 107, vol. 29.—A. R. N. can tan buffalo hides with the hair on by the method described on p. 59, vol. 29.

(1) A. R. C. asks: 1. Will copper (such as the bottoms of wash boilers or tea kettles are made of) do for a boiler to run a small engine? I want it to run for 6 hours and be heated by kerosene. A. A boiler to run an engine of this size, and do any work, could not conveniently be heated by a kerosene lamp. It may be made with a central flue, using charcoal as fuel. 2. How low can water be safely in a boiler? A. It is well to set the gage cocks so as to keep the boiler at least half full of water.

(2) A. T. W. asks: 1. What is meant by the pitch of a propeller? A. The pitch of a propeller is the distance it would advance in one revolution, if it turned in an unyielding medium, like a screw in a nut. 2. Is a cylinder 1x2 inches large enough to run a boat three feet long and about the same proportions as the Mab, described in your issue of March 20? A. Yes. 3. Of what dimensions should I make the boiler? A. About 12 inches in diameter and 15 inches high. 4. Could I run a larger boat with the above mentioned diameter? A. Yes, one twice as large.

(3) E. L. asks: How can I remove oil or grease spots from a wooden floor? A. In some cases, it can be washed out with a solution of potash; but generally you must take out the board to take out the stain.

Is the following rule for finding the number of feet of board that can be sawn from a log correct? From diameter in inches deduct 4, multiply the remainder by 1/2 of itself, and multiply that product by the length of the log, and divide by 8. A. There is no rule so far as we know that is applicable to all cases.

(4) J. M. says: 1. My engine cylinder is 1 1/2 x 2 3/4 stroke, steam pressure 25 lbs., speed 150 revolutions per minute. What is its power? A. We suppose the engine is working at about 1/2 of a horse power. 2. Would a boiler of cylindrical form, with 6 flues, and a furnace of 1/2 inch wrought iron, so attached that the heat can pass under the boiler and return through the flues into the stack, do for engine use? A. Such a furnace would be apt to burn out. 3. What is a test tube, and how is it made? A. It is simply a glass tube closed at one end.

(5) J. E. R. asks: What is the most effectual way of keeping chickens clean and free from vermin? A. Rub upon the roosts, once in every 3 weeks, a little coal oil. Never set the hens on nests that have been used much. If the little chicks are affected, a drop of lard upon each head has been highly recommended; or a weak solution of carbolic soap can be used on their heads, which will completely exterminate the pests.

(6) W. H. says: I noticed in the SCIENTIFIC AMERICAN of February 20, 1875, a recipe for giving an oaken color to pine (copperas, dissolved in strong ley). I did not know what kind of ley, so I slaked some lime, taking the water (after it had settled) to dissolve the copper, and applied with a brush. It was a failure. I tried potash, with no better result than to destroy a nice new brush. All this experimenting was on a new table, which my wife used to sprinkle the family washing upon. The result was that wherever a wet spot touched the table it has turned it yellow, and stained the goods with yellow spots. What is the remedy? A. Strong potash ley, or a concentrated solution of potash in water, was what is meant in the recipe. We understand you to say that you attempted to dissolve copper in the ley, whereas the recipe distinctly

said copperas, which is otherwise known as green vitriol or sulphate of iron. The wood should be steeped in the solution; and when the desired color is obtained, it should be thoroughly washed in water, dried, and varnished with shellac in alcohol. If you will send us particulars as to what you used on your table, whether solution of copper or iron, we will endeavor to help you to remove the stains from your linen.

(7) C. W. asks: If a rifle ball be shot into a two inch oak board so as to penetrate it, and the gun reloaded with the same amount of the same sized powder, and fired up into the air perpendicularly, when the ball comes down, would it penetrate a two inch oak board? A. It would not, as the resistance of the air would decrease its velocity.

(8) P. asks: 1. What is the essential difference between the Hirsch and Griffith screw propellers? A. The two screws differ from each other in the form of the blades and the variation of pitch. 2. What pitch should a 5 feet three-bladed wheel have to give the best results? A. A common proportion would be to make the pitch 8 feet. 3. What would be the percentage of slip? A. With a well designed boat, there would probably be from 15 to 20 per cent of slip.

(9) B. W. asks: 1. What is the exact variation of the magnetic needle in the latitude of Wilmington, N. C.? A. We do not know that this information is published; but by writing to some of the officials of Wilmington, you may get your question answered. 2. How can I test the polarity of my compass? A. By finding a true meridian, from observation of the sun or a star. You will find a method explained in another column of this issue.

(10) H. R. W. asks: How much mixed paint will it take to the square of 100 feet surface on outside work? A. According to Trautwein, the first coat of paint will take 6 1/2 lbs. to the square of 100 feet, 3 1/2 lbs. to the second coat, and 2 1/2 lbs. to the third coat and each subsequent coat, the paint being white lead, and weighed before thinning.

(11) H. C. L. asks: If I were riding in a car going in an easterly direction at the rate of 30 miles an hour, and wanted to jump off, which would be the proper direction for jumping? A. We do not think it would make much difference which way you jumped from a car going at that rate of speed.

(12) L. W. J. asks: I have a small engine, of 1 1/2 inches bore, 3 inches stroke. What would be the most appropriate style of boiler to run it with? A. You can make an upright boiler, with a flue in the center. Diameter of shell, 15 inches; diameter of flue, 4 inches; height of boiler, 30 inches.

(13) F. K. says: We have, for the purpose of reducing large lumps of coal into smaller, 3 sets of rolls or cylinders, studded on their peripheries with points or teeth; these have become dull in time and we desire to resharpen them. The cylinders and teeth are made of cast steel, and to chip them is a tedious and imperfect process. Can we not generate a gas, conduct it to the tooth to be sharpened, heat it sufficiently, and hammer out the point? A. We believe that you could effect it better by the use of emery wheels, which could readily be arranged to do the work. If you wish to heat the points, however, we presume you could do it most readily by the use of a blowpipe of proper construction.

(14) J. W. A. asks: In my engine, the area of plate or valve is 12x12 inches, pressure in steam chest is 100 lbs. per square inch. What amount of power is necessary to slide the plate or valve on a blank surface, the two surfaces having been planed and scraped as valves and seats are usually done? The opening under the valve in the valve seat is 1x10 or 10 square inches in area. What is the amount of power necessary to move or slide the valve covering the above opening? Which of the two above mentioned will require the least power to slide it on its respective seat? A. The power will be the same in each case, if, as we understand you to mean, there is no upward pressure on either valve.

(15) W. H. S. asks: 1. What is the value per cubic foot of charcoal, compared with soft bituminous (Iowa) coal, and with hard wood, for firing a steam boiler? A. Coal 1, charcoal 1/2, wood 1/2. 2. I have an engine with a rotary or rock cut-off valve. With 100 lbs. pressure, doing heavy work, I occasionally found the valve to grate immediately after putting on tallow, which grating generally lasted about five minutes. I tried lard oil and castor oil with the same result. I tried sulphur and tallow, when the valve worked very satisfactorily. I worked it about five weeks with sulphur and tallow, and found the cylinder was worn 1/8 of an inch larger at the middle than at the end. Did the sulphur have anything to do with it? The valve seat, cylinder, and rings are very smooth and bright. A. It is more likely that the trouble was caused by some lack of proper adjustment.

(16) C. R. B. asks: Why is it that the yolk of an egg cannot be beaten as stiff as the white? A. It is due to the fact that a large proportion of the yolk is composed of oil.

(17) O. C. B. asks: 1. I have a boiler 20 inches high by 15 inches diameter, with 27 tubes. Boiler is of 3/8 inch cast iron, with heads of 1/2 inch cast iron. How much steam would it be safe to carry? A. We would not advise you to carry a pressure of more than 15 lbs. in such a boiler, and we think it would be much better to build one of wrought iron or copper. 2. How large an engine would it take to run a small lathe, 24 inches long, at 600 revolutions per minute? A. Diameter of cylinder 1 1/2 inches, length of stroke 3 inches.

(18) H. S. M. says: I was recently consulted by a friend who is about to enter into the manufacture of a combined ice chest and refrigerator

in which he intends to substitute mechanical force for the usual daily supply of ice, that is, he intends to form ice in the chest by mechanical action, the motive power being a man operating, through a crank or lever, a small ice machine contained in the chest itself. The machine is to be of the ether type, in which a quantity of some very volatile liquid is made to boil in a partial vacuum. I was asked: How long will it take a moderately strong man to make 10 lbs. of ice from 10 lbs. of water at 70° Fah., providing that the apparatus be as nearly perfect as possible? I computed it as follows, and my client is of opinion that I am wide of the mark: 10 lbs. water will have to be relieved of 38° Fah. of its latent heat to reach the freezing point; and as 1 lb. of water heated 1° constitutes the unit of heat, hence 10x38=380 units of heat which have to be taken out of the water before ice forms at all. Then again, on the water passing from a liquid to a solid form, it will set free 140 units of heat for each pound of ice formed, and at the same time remain at the same temperature itself. Therefore 140x10=1,400, and 1,400+380=1,780 units of heat to be converted into mechanical force and converted back into heat in the condenser of the machine; and as every unit of heat has a mechanical equivalent equal to raising 772 lbs. 1 foot high, we have 772x1,780=1,374,160 foot pounds, which, being divided by 33,000, gives 41'63, or the number of minutes during which 1 horse power is required to raise 1,374,160 lbs. one foot high, or to reduce 10 lbs. of water from 70° Fah. to ice; and as it requires seven men to exert 1 horse power constantly, it will require one man seven times as long; therefore 41'63x7=291'41-60=4'84 hours as the time that one man would be required to work the pump to produce 10 lbs. of ice. To this must be added 25 per cent for friction and absorption of external heat, which brings the sum total up to 6'05 hours. Am I right? A. The calculation is correct for the theoretical time, and is very creditable to you. It is probable, however, that still greater allowance must be made for friction, leakage, radiation, etc., than the one you have estimated.

(19) C. D. asks: By what process can I produce crystallized effects, such as we see on water coolers? A. It can be done by mixing ground mica with collodion, and applying to the surface.

(20) E. S. F. says: 1. We purchased some woodworking machinery which has been standing still for some time, and consequently has become gummed. Will kerosene oil be as good as anything to remove the gum, or had the machines better be taken all apart and cleaned? A. It will be better to take the machinery apart. 2. Will kerosene injure the journals and boxes if put on when we commence running? A. Kerosene oil will not injure the journals, but the dirt and grit on them may if you start up the shafts before cleaning them.

(21) C. F. S. asks: How do you explain the fact that water, being placed in a cellar in an open vessel, will keep vegetables from freezing? It has been done here this winter with success, protecting apples and potatoes from frost. A. If you will give us further particulars we will investigate the matter. We do not think the presence of the water was the preventive.

(22) H. B. says: We are making a quantity of cast iron augers, about 12 inches long and from 4 to 8 inches diameter at the outside of threads. The threads are about 1 1/2 inches apart and of about the same depth. We wish to polish these with an emery belt, having first removed the rough exterior by an emery wheel. Is a leather or rubber belt best? What kind of glue is best? A. Use leather and ordinary glue of good quality.

(23) D. B. C. Jr. says: 1. I wish to build a light boat, 30 feet long by 7 beam, to draw 12 inches water. Please give me the size of boiler, engines (for side wheels), diameter of side wheels, length and depth of buckets. A. Engine 4x6 inches, and boiler 3 feet diameter and 4 feet high. 2. Which would be the best, a side wheeler or a propeller for a stream with a rocky bottom? A. It will be best to have a propeller, or twin screws.

(24) D. W. W. asks: 1. What is the difference between plumbago and black lead? A. None. Is the mineral known as fibrous asbestos good for packing piston and valve rods on steam engines? A. Yes.

How can I make a brown or black enamel or paint, for cylinder heads and steam chests, which will not crack and scale off as common paint does? A. There is a black varnish made from mineral oil that answers very well. Seep. 379, vol. 31.

(25) J. C. Jr. says: I have a steam engine and wish to know if you can inform me why the boiler foams. I fancy that the steam pipe is too small, or possibly the boiler itself may not be large enough for the engine. The builders say that, after she has been two or three months running, she will come all right; but I find she has not improved after an experience of six weeks. A. The trouble is probably caused by dirty water. If so, blow off frequently, and clean the boiler.

(26) H. M. D. asks: Will you please tell me how soot may be used to advantage? A. Wood soot may be used as a fertilizer.

How may I get rid of the grub worm from trees and bushes? A. Dig down about the base of the trunk about 12 inches, and incise it snugly with tarred paper to about one foot above the surface of the ground; then fill in the soil.

What are the ingredients of nitro-glycerin? A. It contains carbon 3 equivalents, hydrogen 5, nitrogen 3, oxygen 9, =C<sub>3</sub>H<sub>5</sub>N<sub>3</sub>O<sub>9</sub>.

(27) I. W. S. asks: If I insert a platinum wire into a U-shaped tube, fill the tube with a mixture of oxygen and hydrogen, place the mouths of the tube in a vessel of water and connect the ends of the wire with the poles of a battery, will