Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion.

Notes & Queries

(1) J. H. asks: Can you give us a rule to measure the height of a tree or other standing object near enough for practical purposes? A. Place a small mirror in a level position on the ground, at a little distance from the tree, and then step backward until you see the top of the tree reflected in the center of the mirror. Height of tree =

$$\frac{\text{Your height} \times \text{distance of tree from mirror.}}{\text{Your distance from mirror.}}$$

(2) F. C. H. says: 1. I have a boiler that has 22 square feet of heating surface, contains 20 gallons water up to water gauge, will evaporate 20 gallons of water per hour, with ordinary firing. What horse power is it? A. As we have frequently explained, there is no standard for measuring the power of the boiler, that is generally accepted. 2. I have seen men working in a foundry pass their finger through the melted iron as it ran from the cupola without receiving any burn whatever. Can you explain the phllosophy of this experiment? A. The moisture on the skin is converted into vapor, which forms a protective covering. 3. How can the ordinary bars of cast iron (pig iron) be broken so as to be melted in a crucible or small cupola? How are very heavy masses of cast iron broken, snch as cannons, heavy machinery, etc., to be remelted? A. Cast iron can be broken with blows from a heavy hammer. Dynamite has sometimes been used for large masses.

(3) J. A. M. asks: What is the method of setting the valves of the Corliss engine, and regulating the cut-off? A. Advance the eccentric until the valve has the proper lead, and then adjust the tripping arrangement by trial.

(4) A. W. asks: What is the best thing for making a person grow? A. Good food and good habits.

(5) L. M. C. asks: 1. What is steam packing? How is it constructed and used in the pistons of steam engines? A. It ordinarily consists of metallic rings, which are set out by the pressure of steam. 2. What course would you advise a young man twenty years of age to pursue in order to learn to be a competent steam engineer? A. He should pursue a course of instruction such as is given in our best technical schools.

(6) J. W. S. asks: 1. How much advantage has the best automatic governor cut-off engines over the best throttling engines? A. You will find some notes on the subject on p. 321, vol. 30, of the SCIENTIFIC AMERICAN. 2. Is a valve which cuts off and admits the steam better than two valves for doing the same, one riding on the back of the other? A. Generally the clearance will be somewhat less in the case of the former arrangement, and there will be less mechanism and fewer wearing parts.

(7) P. G. asks: Is there any tool giving the exact length of a circle, in drawing that circle? Would such a tool be of any practical use? A. We do not know of any such instrument. It would be of some use if simple and cheap.

(8) T. J. R. asks: 1. Would it not be a better plan if, in reducing the area of grate bars in burning screenings with a blower, instead of bricking up the sides of the furnace to reduce the center over the grate bars? A. This idea is practically carried out in the dead plates or coking plates that are usually fitted. 2. What is the rule for finding the flow of steam through a pipe into the atmosphere? A. You will find rules in the SCIENTIFIC AMERICAN, p. 113, vol. 29.

(9) A. G. says: I have a 5 horse power engine and a horizontal boiler about 4½ feet long. The boiler does not make steam fast enough. I want to burn coal dust to save fuel. Please tell me what is best to increase the draught, a blower, or shall I turn the exhaust in the firebox above the flues? Also what is best to keep the boiler from rusting? A. Try exhausting into the stack. Paint your boiler to prevent rusting. There is a black varnish made from mineral oil that is largely used.

(10) F. C. J. says: I have a boat 16 feet long and 4 feet beam with an engine which has a 4 inch stroke and 2 inch bore. What sized boiler will I require and how many tubes? What is the greatest rate of speed I can make? A. Boiler 2 feet in diameter, 3 feet high, with from 50 to 60 square feet of heating surface. Probable speed, 5 miles an hour in smooth water.

(11) R. C. says: I have a 5 foot wheel that runs on the end of a shaft that is 18 inches long and 1½ thick; it runs a belt over a 10 inch pulley. I run the large wheel by hand. Can I gain speed and save labor by putting a small cogwheel on the shaft with a larger one over it with a crank to run it? What will be the size of cogwheels that I will have to have? A. We think the present arrangement is likely to be more effective than the one proposed. If you wish to have greater speed change the pulleys.

(12) E. I. O. Co. says: We have a 11 inch high pressure engine with about 2 feet stroke. In winter time we have great trouble in separating the sand, being so mixed up with the frost. If we could get warm water in our hutches it would be a great benefit to us? Can we condense the steam of the engine in our hutches and will it interfere with the power of the engine, and to what extent? A. By carrying the exhaust pipe into the water, and letting the steam escape through numerous small perforations, you can heat the water without producing back pressure, that is, if there is constant circulation. You can put the pipe as far down as you please by arranging the discharge as indicated.

(13) R. R. R. asks: How is the Atlantic cable repaired when broken in mid ocean, and how do they find the place where the break occurs? A. The calculation is based on the principle that a current of electricity, having two or more courses open to it, will divide itself; and the current on each course will be in exact proportion to the resistance of that course as compared with the others. When the cable is laid, the resistance of the entire length is measured, and from this is calculated the average resistance per mile. Now if a break occurs, the current will escape through the water, and the resistance of the cable will be again measured and compared with its previous resistance; this gives the figures of a proportion from which the distance, in miles, is calculated; this calculation is made at Newfoundland, and at "Heart's Content," and a mean of the two results is taken. Two vessels furnished with grapples sail over the place indicated until the two ends are found, when they are drawn up and well spliced.

(14) S. H. K. says: I have found a vegetable color for the hair which makes a very natural brown or black. As I have it, it is not a fast color. When applied to the hair it can be washed off, but will not rub off. What can be combined with it to make it a fast color, or what could be applied to the hair, after the color is on, to set it? A. This can only be determined by experiment. You may try solution of chloride of tin, tannin, sumac decoction, acetate of iron, and alumina, cream of tartar, etc., applied before or after, or mixed with the dyestuff.

(15) W. J. C. says: I have a telegraph line ½ mile long, stovepipe wire, with ground plates 30x36 inches; one in a well and the other buried in moist earth with its upper edge flush with the surface. How many cells gravity, 4½ x 4½ inches, will give a fair sound, using two common office sounders? A. Your ground connection is not sufficient, and will require about ten cup cells, unless the magnet wire on your sounders is very fine. Connect your ground wire at each end with the gas or water pipes.

(16) L. H. McF. says: I have seen bottles of oil and phosphorus prepared in such a way that when the cork is removed, admitting air, the contents of the bottle become luminous. Please inform me what kind of oil and phosphorus, and how to incorporate them to use? A. Heat the oil (olive oil) to about the temperature of boiling water (212° Fah.) and drop in the phosphorus in small pellets. Ordinary stick phosphorus is used—it dissolves in the hot oil.

(17) M. R. asks: What fulminating material is used in small cartridges? A. The fulminate of mercury is generally used. To prepare it, 1 oz. of mercury is dissolved by a gentle heat in 8¼ measured ozs. of nitric acid (of specific gravity 1·4), and the solution is poured into 10 measured ozs. of alcohol (specific gravity ·830); action soon ensues with the evolution of copious white fumes, and the fulminate is deposited in white crystalline grains, which are washed with cold water, and dried at a gentle heat. It explodes at a temperature of 390° Fah. by friction, percussion, and by contact with strong acids. For percussion caps and cartridge a little chlorate of potash, or more commonly niter, is added to the fulminate.

(18) I. F. D. asks: What metal will heat and cool the quickest? A. Pure cobalt, nickel and iron have the lowest specific heats.

Will ammonia act corrosively on copper or iron? A. On copper, yes; on iron, no.

Will a fluid continue to increase in pressure if confined in a vessel and kept at a degree or two above the boiling point? A. The pressure will remain constant as long as a uniform temperature is maintained.

(19) J. R. S. says: In order to remove sulphurous acid from an aqueous solution of gum, I find nothing available but carb. baryta, which is expensive. What is the cheapest method of removing the sulphurous acid from the solution? A. Use marble dust, as free as possible from magnesia carbonate.

(20) F. C. says: I have a pump in my well with lead pipe 16 feet long. Sometimes the water has a sweet metallic taste. How can I test the water in the well as to whether the lead is poisoning it? Will cistern water drawn through lead pipe be affected by the pipe? A. The water is very probably contaminated. To test this pass sulphuretted hydrogen gas through a sample of the recently drawn water for some time, and observe if a black precipitate is formed; if so, lead is present, and the water should not be used for drinking or cooking purposes. To make the sulphuretted hydrogen, place in a large bottle a few small pieces of protosulphide of iron, and cover them with sulphuric acid previously diluted with two parts of water. Perforate the stopper with a bent glass tube to conduct the gas as it is formed. Lead pipe is not suitable for the conduits of well or cistern water—tubes of wood or enameled iron pipes may be used instead.

(21) W. B. S. asks how to clean iron rust off window glass? A. Mix muriatic acid with an equal quantity of water, and apply this with a small cloth cushion to the spots.

(22) C. F. P. asks how to make and apply a black japan to small iron castings that will dry soon and become very hard and durable at a small cost? A. Apply a ground of asphaltum, 3 ozs.; boiled oil, 4 quarts; burnt umber, 3 ozs. Mix by heat and when cooling thin with turpentine. Lay on three coats, and between each dry the article in an oven heated from 250° to 300°. Lay on several coats of varnish, drying in an oven between each, then polish with powdered pumice and rub with oil.

How many and what numbers of SCIENTIFIC AMERICAN SUPPLEMENT contain the lessons on mechanical drawing? A. Professor MacCord's lessons on mechanical drawing are now published in collected book form. Price $2.50 in paper covers. Sent postpaid by Munn & Co.

(23) H. K. O. asks: What is the varnish composed of which is used upon brasswork to prevent its tarnishing? A. Mix equal quantities of Canada balsam with very clear spirits of turpentine until the whole is of the consistence of ordinary varnish. Apply in the usual way.

(24) W. G. asks for (1) a recipe for gilding brass by dipping in acids? A. The gold bath is composed of distilled water, 17 pints; pyrophosphate of soda, 28 ozs.; hydrocyanic acid of ⅛ prussic acid, ⅛ of an oz.; crystallized perchloride of gold, ⅜ oz. The pyrophosphate is dissolved in 16 pints of water, heated, filtered, and cooled. The filtered solution of the gold chloride is added, and then the hydrocyanic acid, when the whole is raised nearly to the boiling point for use. Before entering the bath the articles should be passed through a solution of water 2½ gallons; nitrate of binoxide of mercury, ⅛ oz.; sulphuric acid, ⅜ oz. 2. And for the best lye in which to soak brass articles before dipping? A. Caustic potash dissolved in 10 times its weight of water.

(25) M. V. asks for a process of nickel plating without a battery? A. Into the plating vessel place a concentrated solution of zinc chloride. Dilute it with from 1 to 2 volumes of water and heat to boiling. Redissolve any precipitate with a few drops of hydrochloric acid. As much powdered zinc as can be taken on the point of a knife is then thrown in. Add nickel salt (chloride or sulphate) until the liquid is distinctly green. Then put in the articles previously well cleaned with some zinc fragments. Boil for 15 minutes when the nickel coating is finished.

(26) J. B. U. asks for a rule for calculating the number of bricks that it will take to construct a wall? A. Allow 7½ bricks per square foot to every 4 inches of thickness of wall. Thus a 14 inch thick wall will require 26¼ bricks per square foot.

(27) P. S. asks for the proper composition of fusible plugs, attached to crown sheets of steam boilers. Working pressure 70 lbs. per square inch. A. Equal parts of antimony, tin, and bismuth, melted and well mixed, make a very good safety plug. The melting point of this proportion is about 300° Fah., and this is about the temperature of steam at 70 lbs. per square inch. If you wish to carry a higher pressure, increase the proportion of tin.

(28) J. T. asks for a durable black ink to be made with nutgalls and copperas? A. Bruise 12 lbs. Aleppo nutgalls, boil in 6 gallons of soft water for 1 hour, adding water to replace that evaporated. Strain and boil the galls again in 4 gallons of water for ½ hour; strain and boil with 2½ gallons more water. Strain and mix the liquors. Add 4½ lbs. coarsely powdered copperas and 4 lbs. gum arabic in small pieces. Agitate until dissolved and filter through hair sieve. This will give about 12 gallons of fine durable ink.

(29) J. R. M., Jr., asks how gold and silver bronze powders are made? A. Gold bronze powder is made by melting together in a crucible over a clear fire equal parts of sulphur and white oxide of tin. Stir until they become a yellow flaky powder. Silver bronze powder is made by melting together 2 lbs. each of tin and bismuth, and adding 1 lb. of quicksilver. Pound all together into a powder.

(30) C. W. P. asks how to granulate copper in fine grain? A. Ladle the refined copper from the furnace into cold water.

(31) M. G. L. asks: How can I harden a wooden pulley? A. Boil for about 8 minutes in olive oil and allow it to dry.

(32) E. G. asks (1) for a silver bronze powder? A. Melt together 1 oz. each of bismuth and tin, then add 1 oz. quicksilver, cool and powder. 2. How can I make blue bronze on copper? A. Clean the metal, polish, and cover the surface with a fluid obtained by dissolving vermilion in a warm solution of soda, to which some caustic potash has been added.

(33) F. T. C. asks: What is the so-called 'flash" used for coloring spirits? A. It consists of burnt sugar caramel, to which is added enough capsicum extract or essence of cayenne to give the liquor a fiery taste. It is commonly used in flavoring vile whiskey.

(34) M. T. L. asks for a recipe for liquid glue? A. Dissolve (with heat) 2 lbs. of glue in 1 quart of water, add 7 ozs. of nitric acid, and when cold, bottle. This is an excellent preparation to sell.

(35) E. P. asks for a varnish to smooth moulding patterns? A. Alcohol, 1 gallon; shellac, 1 lb., lamp or ivory black sufficient to color it.

(36) F. G. inquires how to make japanner's gold size? A. Melt 1 lb. of gum ammoniac, add 8 ozs. of boiled oil, and then 12 ozs. spirits of turpentine.

(37) P. T. asks for a good sizing for linen? A. Crystallized carbonate of soda, 1 part; white wax, 4 to 6 parts; stearine, 4 to 6 parts; pure white soap, 4 to 6 parts; Paris white, 20 parts; potato starch, 40 parts; wheat starch, 160 parts. Boil with sufficient water to form 1,600 parts altogether, adding if desired some ultramarine to counteract the yellow tint of the linen.

(38) J. A. B. asks: 1. What kind of a preparation do watch repairers use to give that fine polished appearance to the brass movements of a watch? A. For brass, Spanish whiting is mixed with clear rain water in the proportion of 2 lbs. to the gallon. Stir and let stand for a few minutes to allow the gritty portion to settle; decant off the water into another vessel and again allow it to stand. The settlings in the second vessel are mixed with jeweller's rouge and used for polishing. 2. What kind to the steel portions? A. Take a flat burnishing file, warm it and coat it lightly with beeswax. When cold wipe off as much of the wax as can readily be removed, and with the file polish the metal. This is said to be equal to the finest buff polish.

(39) C. J. A. asks for a recipe for a lacquer for polished or burnished copper, that will prevent it from tarnishing when handled? A. 1 gallon methylated spirits of wine, 5 ozs. of shellac, 4 ozs. of gum sandarac, and 1 oz. of gum elemi. Mix in a tin flask and expose to a gentle heat for a day or two, then strain off