Business and Personal.

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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 This is for our information and not for publication.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.

(5214) W. C. A. says: I have in my possession some old medals which I wish to duplicate in some cheap metal. How can I make a mould, and what metals nearest resemble silver? I have tried plaster of Paris, but it always blurs, and is not clear in the center. The figures on the medals are very clear, although they are very old. A. There should be no difficulty in making good plaster casts and running type metal or fusible alloy into the casts. Casts may also be taken in a mixture of beeswax and plumbago and an electro deposit of copper made to represent the medal. Casts of medals are also made in fusible alloy and the medal reproduced by electrical deposit of copper. The various processes of duplicating medals by plaster casts are described, with the method of electro deposit, in SCIENTIFIC AMERICAN SUPPLEMENT, No. 310.

(5215) A. B. C. asks how to obtain the smoothest finish with Portland cement. How will I proceed to put half-round grooves, three-sixteenths inch wide and one-sixteenth inch deep, on this surface. Shall I let the cement harden, or proceed while still soft? This is to be used for a revolving sliming table in a concentrator. A. Use a hard polished steel trowel on the surface just before it sets, and for polished grooves a polished steel plate with ribs at one edge, also of polished steel, of the form of the grooves.

(5216) L. L. C. writes: The water in which we wet sole leather for cutting becomes offensive in two or three days' use. Is there any cheap disinfectant we could introduce to correct this without injury to the leather? A. We suggest the addition to the water of a little salicylic acid. Renewal of the water would seem more practical.

(5217) W. D. L. asks: When steam in any proportion mixed with air is used for the combustion of petroleum vapor, is there gain or loss in heating power of flame produced? If a gain, what is right proportion, and what formula would express reaction between steam and vapor? What should be the temperature of flame from petroleum vapor and air regenerated to 600° Fah.? A. The only apparent value of the steam in an aero-steam-petroleum blast is for the power it gives in injecting the blast into the furnace. In experiments made with a steam-petroleum vapor blast, a temperature of a cherry red heat, about 1,400° Fah., only could be obtained, while a compressed air and petroleum vapor blast produced a welding heat, about 2,000° Fah. We infer that although a small portion of the steam may be decomposed into its elements, and thereby contribute to intensity of combustion, the larger portion necessary for the blast power contributes nothing toward combustion, and by its displacement and absorption of heat from the other elements of combustion, retards the intensity of the heat. A compressed air jet superheated to 600° feeding a furnace with petroleum vapor, properly proportioned for the most perfect combustion, should give a furnace temperature sufficient to melt iron. We have no exact data of proportions, which are usually regulated by valves to give the best effect.

(5218) H. H. Q. says: Having had some trouble in my occupation, in the way of my boiler warping over the fire and leaking, would like to know if there is any other cause for this besides banking fires too near it or oil in the exhaust water going into it. A. The caking in your boiler is the cause of the warping or bulging of the fire sheets. If the exhaust is condensed or dripped into the water used for feeding the boiler, there will be a gradual accumulation of the cylinder oil in the boiler. This gathers the scum, dirt, and scale into cakes, which finally lodge on the bottom of the boiler, and when the lodgment takes place over a fire sheet, there is great danger of destruction to life as well as the boiler. The bulging cannot take place unless the spot is red hot, which shows that the cake is thick enough to prevent the water reaching the plate. Under the boiler pressure the hot iron sags, and if not immediately arrested by cleaning out, will soon make a rupture that will pass for a boiler explosion. The only remedy for this evil is to use clean water only, heated in a heater that keeps the exhaust separate, or use one of the separators and filtering heaters that are on the market.

(5219) C. H. A. asks: How much more power does it take to run an engine and train of six cars 120 miles an hour than same train 30 miles per hour? A. The increase of speed at the wide margin of 30 to 120 miles is as yet a very uncertain power problem, as a speed of 112 miles per hour has been at short spurts only, and the conditions involved in wind resistance and friction of rolling parts are only known at the ordinary car speeds in use. The air resistance increases nearly as the square of the speed. The resistance of oscillation and concussion also increases in a like ratio, with a small decrease with loaded cars, owing to increased weight for equal resistances, as the measure usually used is expressed in pounds of resistance per gross ton of weight. The experiments on resistance at ordinary speeds indicate that the square of the relative increase in velocity in miles per hour is equal to the relative tota resistance at the two speeds. This may also be subject to modification for unknown factors. Approximately the increase of power would be sevenfold from a 30 mile speed to a 120 mile speed.

(5220) G. F. asks: Which is the stronger of two locomotive engines alike in every respect except one has 24 inches and the other 12 inches stroke, the steam pressure being the same? If a difference, what causes it? A. For its ability to pull a train, the locomotive with the long cylinder is the stronger by the difference in the lengths of their cylinders, for although the total pressure on the pistons is the same in both engines, and in this sense the strength may be said to be equal, the greater length of crank of the longer cylinder gives a greater or twice the wheel pull that is obtained from the short crank and cylinder. Again, the long cylinder requires twice as much steam to do twice the work of the short cylinder with equal pressures, and again with equal weights of steam the long cylinder locomotive will not be stronger than the short cylinder one.

(5221) K. asks: 1. What is the best battery for decomposing water and the voltage of same? A. To decompose water on the large scale a low potential heavy current dynamo is the best. Two volts is ample potential difference. 2. With such a battery, how long would it take to collect 50 cubic feet of hydrogen? A. One coulomb of electricity corresponds to 0·00016 grain of hydrogen gas, 50 cubic feet of hydrogen weigh 1·848 grains, corresponding to 11,500,000 coulombs. A 100 ampere current would give this quantity of hydrogen in about 32 hours. 3. Could copper electrodes be used? If not, what would be the best substitute for platinum electrodes? A. Copper or iron electrodes can be used in caustic soda solution. We have described with full illustrations the construction of electroplating dynamos in our SUPPLEMENT, Nos. 720 and 798.

(5222) M. P. asks: Please let me know if I can burn bricks thoroughly in six days. Also let me know if I can burn bricks thoroughly by the sides of the walls, and is there a book referring to the subject? Also do I need a solid wal or only serving to burn the brick hard, and do you cover the top of your kiln with clay? A. Bricks can be burned in six days in small kilns aad strong firing. The chances of making good brick are not insured by quick firing and short time, as the moisture should be discharged slowly in order to keep the brick in good shape. The brick next the outer wall are the last to heat, and make soft brick, so that a good outside wall and serving pays in making good brick at the outside. The top is gradually covered as the burning is finished. See an excellent work on "Brick Making and Burning" by Creary, $2.50 mailed.

(5223) J. A. W. says: Given the length of keel, length over all, beam and depth of hold, what is the rule for determining the weight of ballast a boat will sustain if she is capsized or filled with water? I am in doubt as to whether there is such a rule or not. A. There is no rule applicable to the amount of metallic ballast a yacht or sailing boat will carry and float in case of filling with water. It depends upon the actual quantity of wood and the specific gravity of the various kinds used in construction, offset by the relative quantity and specific gravity of the metals used, to determine the flotation of the boat when waterlogged. Many yachts with loaded keels will go the bottom if waterlogged. Some have watertight compartments or air vessels on board to counteract the weight of the ballast in case of accident. As a rule the best practice is to put in watertight compartments to just compensate for the weight of the ballast in the weight of water that the compartments will hold.

(5224) I. B. asks: A ditch is cut in a tunnel with sides and bottom rough, three feet wide at the top, one foot wide at the bottom and one foot deep, and has a pitch of four inches in one hundred feet. How many gallons of water will it discharge per minute and at what velocity will it flow? Please give rule. A. The ditch will discharge 40·658 gallons per minute and will have a velocity of $2\sqrt{r}$ + feet per minute. The formula is cubic feet per second $= CA\sqrt{rs}$, in which C is the coefficient of flow, which for rough rock ditch is 40. A = area of section = 2 sq. ft., r = hydraulic radius, which $= \frac{\text{area}}{\text{wet perimeter}} = \frac{2}{3·82} = 0·5235$. S = slope $\frac{4}{12} \times 100 = \frac{1}{300}$ or 0·00333. Then $40 \times 2 \times \sqrt{·5235 \times 0·00333} \times 60$ seconds $= 200\frac{18}{100}$ cubic feet per minute and $\frac{200}{2} = 100$ feet per minute velocity. Discharging 1,501 gallons per minute.

(5225) H. B. C., Ceylon, writes: I want to polish two brick pillars (in a church) that have been plastered 1 inch thick with lime mortar. I did succeed in getting a polish on them with the use of white of eggs and a rubbing with soapstone, but the polish went off in a month. Can you give me a recipe for a permanent polish, so that the pillars may look like a marble polish? A. It will be necessary in your climate to use paint and finish with a thin varnish. The white of egg and soapstone already on the columns will make a good foundation for a coat of paint of any desired color.

(5226) P. W. C. says: In your SUPPLEMENT, vol. 35, No. 909, you describe an engine governor called the "kratostate," designed to regulate both speed and power. Will you kindly tell me wherein the old form of centrifugal pendula are insufficient for the purpose, and what particular value an appliance for regulating the power more faithfully would have? A. The centrifugal governors for marine purposes do not act uniformly in a rolling ship. The most successful governors for vessels in a rough sea have for a long time been constructed on the principle of air resistance, as is also the "kratostate." The same principle is also applicable to land engines and is largely used for small governors on a large class of machinery where light-running governors are needed.

(5227) G. H. asks: Can a petroleum and gasoline engine be made smaller than one horse power? If not, why? What is the tensile strength of good cast iron? A. Gasoline engines have been made as small as half horse power. There is no reason why smaller powers may not be made for both petroleum and gasoline engines if there was a market for them. Good cast iron should have a tensile strength of not less than 17,000 pounds per square inch. The best, used in guns, has a tensile strength of about 20,000 pounds.

(5228) C. H. B. asks: Will you kindly inform me of one of the best, cheapest, and most effective disinfectants? Please give me a prescription giving the different ingredients and quantity to use to make one gallon liquid. A. Probably the most effective disinfectant is chloride of lime mixed with water, about half a pound to a gallon of water. The dry chloride is also a most efficacious disinfectant when placed in shallow basins and exposed to infection air in confined places, as under sinks and water closets. It is exceedingly penetrating and will destroy or drive out ve in.

(5229) W. C. F. writes: I am experimenting on storage batteries and am in a difficulty, and would deem it a favor if you will give me some assistance. I want to find out the way to make the composition or filling that is used in filling the perforated lead plates in making storage batteries (4 volt). A. For a paste for the filling of your battery plates use red lead mixed into a thick putty or paste with a 10 per cent solution of sulphuric acid (acid 1 part, water 9 parts). 2. The solution I am using is 5 parts water to 1 part common sulphuric acid. A. We think your solution is too strong.

(5230) J. S. says: A rope one inch thick is wound around a pole 50 feet high, 6 feet in circumference at the bottom, and 3 feet in circumference at top. Rope is wound around pole from bottom to top so as to cover the entire surface. How far must an eagle tied to the top end of the rope fly in order to unravel the entire rope? The problem is to ascertain the distance of a spiral. Is there any rule or method by which this can be obtained accurately or even approximately? A. The problems may be worked out by adding the half diameter of the rope multiplied by 3·1416 to the circumference of each end and laying out a right-angled triangle for each inch in length of the pole, in which the short leg is 1 inch. The long leg equals the circumference, and the hypotenuse by computation will equal the diagonal lay of the rope. The unwinding of the rope will make a progressive spiral whose length by computation is worthy of the time of anybody who has nothing else to do.

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AND EACH BEARING THAT DATE.

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