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Notes & Queries

(1) E. N. asks: 1. Can old work be re-kalsomined? A. Yes, unless too much smoked; in which case it will be necessary to wash the wall first. 2. How can a new patch of plastering in old work be kalsomined so the old and new wall will look uniform? A. Make the kalsomine somewhat thicker than usual, and if necessary apply several coats. Ceilings should be painted.

(2) J. W. G. writes: I want to make some photo-chromos. Will you tell me through your valuable columns what will make the paper transparent? A. Allow the photograph to remain in water until thoroughly soaked, then place it between blotting paper, and let it remain until just damp enough to be pliable. Then coat the face of the picture with good starch paste and lay, face down, on the glass. Commence in the center of the picture and rub outward toward the edges to dispel all air and excess of paste, care being observed not to get paste on the back of the print. While rubbing keep the paper damp with a sponge. When dry lay on a heavy coat of castor oil, and after a time rub off the excess of oil with cloth. After standing a day or two it may be colored. Cover the back with a thin plate of glass, and bind the edges.

(3) F. H. B. asks: How can I make or obtain a clay or other suitable substance for modelling, which will not crack on drying? A. Try adding a little glycerine to the clay paste.

(4) C. N. asks for a recipe for destroying vermin on trees and plants? A. The solution obtained by agitating together a quantity of water and recently slaked lime, and permitting the mixture to stand for a few hours in a covered vessel, is said to be excellent for this purpose, and very cheap. It may be sprayed on and around the twigs, using a small syringe with a finely perforated rose nozzle. A decoction of the dried leaves of the sumac tree is also said to preserve vines and plants from the attacks of insects. The application must be repeated occasionally. Besides these, sulphur, alkaline sulphides, calcium sulpho-carbonate, etc., are used with satisfactory results.

(5) P. E. T. asks what the solution is which is used for crystallizing grasses, bouquets, etc.? A. Use strong solution of gum arabic, white sugar, and salt.

(6) E. T. H. writes: What can I do to keep my hair from turning red? A short time ago it was of a black color, but it is now fading into a reddish tinge. A. The red color may have been caused by free alkalies in the oil or pomatum used, or the excessive use of these in washing. Apply occasionally cologne water mixed with a little vinegar of cantharides, and keep the scalp clean by the use of a stiff brush.

(7) C. C. asks: How can a trace of sewage be detected in well water without going to a costly analysis? What is the nearest distance a cesspool should be to a well 50 feet deep? A. Add to a sample of the recently drawn water enough solution of potassium permanganate to impart to it a faint pinkish tinge. If the coloration disappears immediately, or within half an hour, the water may generally be considered unfit for drinking and cooking purposes. One grain of the permanganate will distinctly color 1 1/4 gallons of pure water. Make a saturated solution (in cold water) add 1 fluid oz. of this to 6 fluid ozs. of the water to be tested, and set it aside for 24 hours; a turbidity or curdy precipitate indicates the presence in the water of organic impurities. See p. 296, vol. 36, SCIENTIFIC AMERICAN. Evaporate a quantity of the water to dryness and heat the residue slowly to redness, noting at the time the character of the residue and odors. It is not safe to trust the water from wells located within 200 feet of a cesspool.

(8) L. F. says: Parties here are selling an article for cleaning windows, etc., which resembles whiting. It is made into balls and colored. Can whiting be pressed into balls, and how is it done? A. We have not seen the preparation referred to. Whiting can be pressed into balls by moistening it with thin gum water.

(9) Onyx asks for a good flavor for cigars? A. Try cascarrilla bark or vanilla bean.

(10) T. E. asks for a recipe for making a cheap sealing wax? A. Resin 4 lbs., shellac 2 lbs., Venice turpentine and red lead, each, 1 1/2 lbs. Mix and melt.

(11) O. W. O. writes: The water we are using for domestic purposes comes from a river on which are several woodworking establishments, and our wood pulp mill is above the locality whence the water supply is taken. The water is drawn from a wooden tank containing three feet of coarse gravel, the supply coming in under the gravel, and the suction pipe of a common double plunger pump being inserted above the gravel or filter (capacity of pump 12 1/2 gallons for each revolution or complete out and return stroke of both plungers). From this pump the water is distributed. This arrangement has been going over a year without the gravel in the filter ever having been changed. Recently the water was drawn off and the gravel washed, since which time the water has had a very milky appearance at times. What is the cause? A. The milky appearance of the water is most likely owing to the imperfect washing and cleaning of the gravel, and the disturbance of the salts or "brack" that after so long an exposure probably coated every grain of the sand. It would have been much better to have provided fresh gravel, well washed, from the bank; and if the water is used for culinary purposes, this had better be done now.

(12) H. L. C., who sent us a photograph of a curiously marked stone, is informed that the corrugations in the stone were doubtless the work of small rills of water on the yielding surface of a fine deposit of clayey soil, deposited behind some dam in a shallow muddy stream. On drying, cracks were formed, and

these subsequently filled with crystalline carbonate of lime, or other substance.

(13) D. H. D. says: How can I set a 21 inch turbine water wheel in a quicksand bottom to a depth of say 2 feet into the quicksand? If I once get the box down and the wheel set, how can I hold it down? The fluid sand pushes it up just as water pushes up an empty barrel. A. You must weight the box sufficiently to keep it down.

(14) D. F. H. asks: How can I construct an electric apparatus for blasting purposes? A. Arrange two pieces of copper wire about 3 inches long, and rather stout, say No. 16 gauge, side by side, and parallel, but separated, and insulated by a strip of wood similar in size and shape to an ordinary lucifer match; bind them firmly by wrapping with cotton thread, and to the two upper ends solder a shred of platinum, or piece of fine platinum wire, so that it will be in circuit between the two copper wires; this constitutes the "fuse," and, when the insulated copper wires, called leading wires, are connected with its two lower ends, it is placed in the cartridge and surrounded with powder; all that is necessary to fire is simply to connect the two ends of the leading wires with a galvanic battery, composed of one or more cells of Grove's battery, when the platinum shred immediately becomes white hot, and ignites the powder.

(15) G. McN. asks for a recipe for making plaster of Paris ornaments? A. They are made of good glue dissolved in hot water containing from five to fifteen per cent of glycerine. Glue thus made, on cooling, gelatinizes, but does not dry or harden.

(16) J. F. T. says: I have a 120 ton schooner. It is necessary for me to go into many small harbors, where I have great difficulty in getting out on account of light winds. Could I have a small steam engine put in, which would not take up much room, that would drive my vessel about 4 or 5 miles per hour? A. You could have auxiliary steam power, with a screw that could either be hoisted or disconnected from the engine. By inserting a notice in our "Business and Personal" column, you will doubtless obtain estimates from reliable builders—or you can entrust the matter to an expert.

(17) C. D. W. writes: I want to make a compound magnet of five on six, and I have some bars of very good spring steel. Will it do, or must I use cast steel? A. Spring steel, after it has been hardened in water, will magnetize very well.

(18) J. W. R. asks: 1. Which is the better positive pole for a single acid battery, a carbon plate or a platinized silver plate? A. A platinized silver plate. 2. Which gives the better results, a bichromate of potash solution or sulphuric acid solution? A. That will depend on the style of battery in which the solution is used: bichromate of potash, or chromic acid, in a weak solution of sulphuric acid, is best for the Grenet battery, whereas a weak solution of sulphuric acid is better for the Smee battery. 3. How can I platinize copper? A. Have it silver plated, then roughen with platinum black.

(19) J. D. S. asks how to determine the slip of side wheels in steamers? A. If you know the distance the vessel runs for a certain number of revolutions of the engine, the difference between the distance passed over by the center of pressure of the wheel and the above is the slip.

(20) J. W. and M. H. ask for opinions on the following assertions: 1. It is not actually necessary in long stroke expansive engines to open the exhaust valve before the stroke is completed. A. It is usually desirable. 2. It is more necessary to close the exhaust valve a trifle before the stroke is completed in order to cushion the piston. A. A certain amount of cushion is generally desirable. 3. It is customary in Corliss engines to open the exhaust valves late in order to make them close early. A. You are wrong.

(21) H. H. C. asks: What is the proper solution for a battery composed of carbon and zinc without the use of the porous cup usually used therewith? A. In a battery composed of a plate of zinc, faced by one or more plates of carbon, a solution of the sulphate of mercury in the proportion of ten grains of the sulphate to the ounce of water may be used; or a weak solution of bichromate of potash or chromic acid in water, to which is added one twentieth of its weight of sulphuric acid.

(22) C. R. P. says: I have a steamboat 53 feet long, 10 feet beam, draught 17 inches. It has side wheels each 6 feet 6 inches diameter; paddles 3 feet long. How wide should the paddles be, and how deep in the water should they run to get the best speed? There are two engines 6 x 18 inches geared to run two and one third revolutions to the wheel's one. A. Make the paddles from 6 to 8 inches wide, and immerse them from 12 to 14 inches.

(23) J. A. K. asks how to remove ink stains from clothing? A. Wash first with pure water, then with soapy water, and lastly with lemon juice, but if old use oxalic acid and wash well afterwards.

(24) D. P. asks: Do you think that the use of petroleum as a preventive of scale is likely to cause foaming in the boiler? A. No.

(25) G. M. asks for a cheap way to build a furnace to melt cast iron; one large enough for 100 lbs. of metal? A. You will find a good description of a blast furnace in the SCIENTIFIC AMERICAN SUPPLEMENT for December 8, 1877.

(26) F. J. S. asks: Can I make my main driving belt run well by carrying from the main wheel (9 feet diameter) to a vertical shaft having a 4 1/2 feet pulley? Distance from center to center of shafts or pulleys about 25 feet, main belt 14 inches wide and 70 feet long. My idea is to do away with gearing and use belting, so that I can ship and unship my mills without stopping. A. You can make this change without any difficulty if the belt is of sufficient size to transmit the power.

(27) E. A. writes: 1. Please describe the nature and workings of the electric pen? A. It is sim-

ply a tube used as a pen, having in it a very fine needle, whose point has a very rapid motion (of 1/2 of an inch) in and out the tube or pen; the needle receives its motion from a little electric engine mounted on the upper end of the tube, and having attached to it two flexible conducting cords, that conduct the current of electricity from the battery that drives it. You simply write with it (as you would with pencil), on waterproof paper, having the needle point against the paper; and the writing consists of an immense number of perforations very close together, caused by the rapid motion of the needle piercing the paper; this motion is so rapid that it does not interfere with the movement of the point over the paper. Now all that is necessary is to moisten one side of this waterproof paper with some fluid color, and enough of the color will strike through the perforations to print one sheet after another of ordinary paper placed under it, and then pressed in a common letter press. 2. Was the enclosed specimen made by its means? A. No.

(28) H. R. & Co. write: Could you please inform us by what plan we could remove the lime from our water which we feed our steam boiler with, as there is considerable deposit of it each time we clean the boiler out? A. The best way to cure this evil is to use water that is free from lime; but as this cannot always be obtained, the only remedy left is to free the water from the lime; and one convenient way to do this is to run the water through two boilers; the first, in which the water is heated to boiling point, serves as a trap for the lime, and the water is pumped from this to the other boiler, which furnishes steam. Can you not collect sufficient rain water to feed your boiler?

(29) C. W. D. asks: In making a pony telegraph sounder or relay, the bobbins or arms of the magnet to be 3/8 inch long and 3/8 or 1/2 inch diameter, what diameter should the iron arms be, and what number wire, and how many courses, must I use to give strong clicks? A. The iron arms of the magnet are called cores, and if the spools are 3/8 inch long and 1/2 inch diameter, they should each be made of a piece of soft round iron, 1 inch long and 1/4 inch diameter; and the spools should be formed of six or eight layers of No. 30 copper wire, either silk or cotton insulation, for a sounder, and of from twelve to fourteen layers of No. 36 copper wire (silk insulation), for a relay.

(30) J. A. C. writes: 1. Will you please inform me what number of copper wire I should use to form the outdoor line connecting two telephones, about 200 feet apart, the helix formed of No. 36 insulated wire wound on (3/8" x 4") round steel magnets? A. Use No. 16 Brown and Sharpe's gauge, of either iron or copper wire. 2. Also if the copper wire outdoor should be insulated or not? A. Naked wire, on glass insulators, will answer. 3. Also, should I use two wires or ground connections? A. Use ground connections, if they consist of either gas or water pipes; if not, use two main lines.

(31) J. W. N. asks (1) for a simple method of treating or tanning sheep skins intended for glove leather? A. The skins are first soaked in water and handled, and are then hung up in a close warm room to putrefy. The exudation is afterwards scraped off, and the skins are steeped in milk of lime for a month or six weeks, after which they are smoothed on the fleshy side by a sharp knife. They are now to be steeped in a bath of bran and water, where they undergo partial fermentation and become thinner in substance. Immersion and agitation follow in a bath composed of 3 lbs. alum and 4 lbs. salt, dissolved in water, per 100 skins. Another washing in another bran and water bath succeeds, and the skins are then trodden in a wooden tub with a solution of eggs in water, previously well beaten up to give them a gloss. The pelts are then drained, dried, and then smoothed with hand irons. 2. Also, how to color the same? A. Stretch the skins and brush them with any strong liquid dye of the proper color, used for cloth dyeing.

(32) W. W. asks for the particulars as to the process that is adopted in New York for bending the plumber's seamless lead traps, that are made from 2 inch and 4 inch lead soil pipe? A. A new apparatus has been devised for bending pipes, which is probably used in the instances you refer to. The pipe is filled with water under heavy pressure, and the tube is then bent without its trickling or becoming otherwise injured.

(33) D. F. asks how to make mercurial soap? A. Beat into a homogeneous mass in a mortar Castile soap, 1 lb.; protochloride of mercury, 1/4 oz., dissolved in 4 ozs. of alcohol.

(34) M. B. asks how to remove yellow iron stains from linen? A. Use hydrochloric acid or hot solution of oxalic acid, washing well in warm water afterwards.

(35) C. L. says: 1. Will you please tell me what is meant in note 4, p. 251, of SCIENTIFIC AMERICAN of October 20, 1877? In describing how to make an induction coil, it says, "use for secondary coil enough wire to bring outside of coil 2 inches from cover." What is meant by the outside of the coil, and what by cover? A. You should read core, not cover. 2. About what number of feet will it take, proportionally, to make an induction coil (for primary No. 16, secondary No. 32)? A. The proportion of primary to secondary wires depends upon the size of core used and the strength of battery employed. For small coils it may be as 1 foot of primary to 15 feet of secondary wire.

(36) E. H. L. asks: 1. What battery power, kind, and number of cells is necessary to run an ordinary sewing machine? A. Twenty cups of gravity battery. 2. How can the power be most conveniently applied? A. Through an electric engine. 3. Please state size and length of core and wire for the electro-magnets? A. That will depend on the style of engine.

(37) H. asks: What is the best length to have my rifle barrel, caliber 1/4", to shoot accurately from 200 to 300 yards? What is the shortest barrel I can use, for that distance, to do good shooting? Which is the best ammunition, metallic cartridge or P. B. for muzzle loader? How short can I have a shot barrel breech loader, 1/4 to 3/4 inch bore, to do good shooting?

A. Barrel 26 to 32 inches for the rifle. The recent international match demonstrated the superiority of the metallic shell (for breech loaders) provided the loading is done by the individual. Factory cartridges are not reliable. For general use for a 12 gauge gun, 28 or 30 inches is the best length; but for a 10 or 8 bore duck gun, 32 inches is a good length for the barrel.

(38) C. A. T. asks how to stereotype ordinary sized letter heads; has tried plaster of Paris and paper, but the metal will not go down in the impression. A. Paper makes an excellent matrix if rightly applied. Oil the form and place on it first a sheet of tissue paper, then a sheet of soft printing paper, which must be pressed evenly on the tissue. Cover with a damprag and beat the paper evenly in upon the type with a stiff brush. Then paste on a piece of blotting paper and repeat the beating, after which three more pieces of soft tenacious paper must be pasted on and used in a similar way. Finally back up with cartridge paper and dry under moderate heat.

(39) A. G. asks: What is mixed with the white of eggs for size in gilding edges of books? A. The edges of the leaves are gilded while in the hydraulic press. The composition applied is 4 parts Armenian bole and 1 of candied sugar ground together with water and laid on with the white of egg with a brush.

(40) C. H. D. asks how to lay out steam ports in trunnions of oscillating cylinders of two inch bore? A. The ports should be proportioned in a similar manner to those for other engines, that is, they should have such an area that the velocity of the steam shall not exceed 100 feet per second.

(41) T. R. & Co. ask (1) how fast a lathe should run to grind skates? A. It depends on the kind of emery wheel used, the speed varying between 3,000 and 5,000 circumferential feet per minute. 2. What is the size and grade of emery wheel best adapted to the purpose? A. The size of emery wheel depends upon the amount of concave you want; we should say about 4 inches for edge and about 15 inches for sides of blade. Grade number, 50 for roughing and 120 for finishing.

(42) W. B. writes: Will you tell me of a simple plan to construct a galvanic battery? A. Into an ordinary glass tumbler drop a few crystals of sulphate of copper until the bottom is just covered, and on this lay a disk of thin sheet copper, having metallic contact with an insulated copper wire, running up and over the edge of the tumbler and forming the positive terminal, or pole, of the battery. Sprinkle a few more crystals of the sulphate of copper on the disk, until its surface is covered; and about one inch above this, suspend a disk of ordinary stove zinc, similar in size and shape to the copper disk below it; and suspended by a strip of zinc running up and over the edge of the tumbler: this strip forms the negative pole of the battery; the zinc disk with its strip can be cut at once from a sheet, so as to save joining the strip to the disk. Now pour in clean cold water until the zinc disk is covered; it is in fact a miniature gravity battery, and will give quite a good and steady current in about one or two hours.

(43) C. H. B. writes (1) for a list of the different conductors and non-conductors. A. We have not room to mention all, but as conductors, silver, copper, gold, all the metals, then the acid and salt solutions. As non-conductors or insulators, hard glass, silk, hard rubber, shellac, etc.; for a more complete list, see "Parker's Philosophy." 2. A so, is there any non-conductor that would do for the cylinder and other parts of a little electrical engine that I am making that have to be non-conductors? A. Hard rubber is the material most generally used as an insulator, in any form of electric engine.

(44) L. I. F. asks: How can I make a small battery suitable for plating, out of a stone jar and earthen pot? A. Place within the jar a porous cup of earthenware containing a strip or roll of zinc; fill up the space between the cups with a strong solution of copper sulphate (blue vitriol) in water, and immerse in this a sheet of copper bent around the cup. Fill up the inner cup with water containing about 10 per cent of zinc sulphate in solution. The current will pass from the copper to the zinc through a wire and other conductors joining them.

(45) L. R. asks: What length should the wire in the coil of a Bell's telephone be? A. That will depend on the gauge of the wire? See previous answer in this column.

(46) W. writes: I wish to build an electro-medical machine of such power that, when a man of ordinary strength takes hold of the handle and the full force of the battery is turned on, it will knock him down. I wish to know: 1. What number of wire shall I use (22, 32, 44, etc.) and how many lbs. of that number shall I use? Will the machine exert more power if I wind my wire into a long thin coil, or vice versa? A. 15 lbs. of No. 44 silk-covered; wind in three short coils, whose aggregate length shall be 8 inches. 2. How much battery power shall I have to use, and what kind of battery is best for my purpose? A. Three cups of Grove.

(47) I. R. B. asks: Is eating thirty quail in thirty days, one bird each day, a difficult task to accomplish, and why? A. The eater becomes greatly nauseated, the flesh probably having some medicinal action. It has been accomplished, and accounts can be found in our back numbers.

(48) J. M. asks for a recipe for syrup for popcorn balls, that will stay sticky when cool? A. Use molasses, or boil the syrup but slightly.

(49) W. T. asks in regard to the telephone: 1. How much copper wire is needed for a pair? A. About 4 ozs. 2. Is it necessary the copper wire should come in direct contact with permanent magnet? A. No, it must not. 3. Is it necessary permanent magnet should move endways to be adjusted, as in a relay? A. No. 4. What are the collars made of that hold the copper wire in position? A. Either wood or hard rubber. 5. Is copper wire wound on haphazard or in layers? A. The same as a spool of cotton is wound. 6. How can I make the iron rod become a permanent magnet? A. You cannot; it is a rod of hardened steel, and

can be magnetized by drawing it in one direction over one pole of a permanent horseshoe magnet; or by placing it in a helix and then connecting the helix with a battery and breaking the connection before removing the steel from the helix.

(50) W. S. H. asks how the bluish white color is given to gun locks and mounting? They have a grayish white frosted appearance. A. The colors appear from the casehardening process, which consists of heating the articles sealed in a box containing bone dust and charcoal to a red heat, maintained for two or three hours, and then dipping them in water.

(51) R. W. S. asks: 1. What kind of a stove or heater, and how should I arrange the pipe and heater, to warm a poultry house 100 feet long, 10 feet high, and 10 feet wide? A. Use a hot water apparatus, such as are provided for grapevines and greenhouses. There are some that are very simple, consisting of a stove and large cast iron circulating pipe, that give a continuous but low degree of temperature. 2. Also, what can be used instead of blacking? A. An application of asphalt might answer the purpose. Pipe of galvanized iron does not rust so easily as the common pipe.

(52) L. E. asks how blue vitriol can be dissolved for electrical purposes? A. In either hot or cold water.

1. It is said that if kerosene oil be allowed to run through a hot tube it will turn into gas. Is it true? A. Yes. 2. If so, what is the name of it? A. It is one form of carburetted hydrogen. 3. Will it burn? A. Yes, in the presence of air or oxygen. 4. Is it explosive? A. Yes, when it is mixed with certain proportions of either air or oxygen.

(53) A. S. says that his plow castings were recently rusted by the flood in Richmond, Va., and asks how to clean them? A. Retumble them in broken glass.

(54) P. S. asks: 1. Is the hissing sound made by steam escaping from a boiler through say a 4 inch valve that is one turn open, a certainty that the steam is perfectly dry? Will not any steam, wet or dry, escaping through a small opening into so large a pipe and being constantly consumed before it has time to fill the said pipe, will it not make the same hissing sound? A. Either wet or dry steam, escaping through a small orifice, will produce sound; but the sound produced by dry steam will be of a higher note than when it is produced by wet steam. 2. Are the Harrison boilers, which are made of cast iron and are put together in globe-shaped sections, a first class boiler as regards economy, safety from explosion, and for making the best, that is the driest, steam for running machinery? A. They are a very good boiler, as far as safety is concerned, but we believe they will not furnish as dry steam as the ordinary tubular boiler.

(55) W. A. B. asks how to make a wire of a gradual taper? A. You might try passing the wire under tension through a bath of heated lead or through some gas or other flame, reducing the speed gradually to increase the taper.

(56) W. S. asks how to harden a piece of steel 9 inches long by 3/4 inch square, so that it will not warp in hardening? A. Heat it in red hot lead, dip it endwise and vertically, and hold it quite still in the water.

(57) C. M. F. H. asks: What would prevent a steel plate from corroding, and cause it to retain its high polish? A. A thin coat of Canada balsam varnish, or possibly warming the plate and applying a little paraffin, rubbing the wax well in, would answer.

Is it possible to make asbestos, mixed or saturated with silicate of soda, pliable, when pressed or rolled out, it being thoroughly dry? A. This can best be determined by experimenting.

(58) W. J. G. asks for the composition of the white lead mixture applied to bright metal work to keep it from rusting? A. Mix white lead, tallow, and linseed oil to a thick paint.

(59) Mack asks for the degrees of expansion and contraction by heat of the different metals? A. The length of a bar at 32° Fah. being 1, its length at 212° would be as follows: Bismuth, 1-00139; brass, 1-00190; cast iron, 1-00111; wrought iron, 1-00125; steel, 1-00118; platinum, 1-00095; silver, 1-00201; tin, 1-002; zinc, 1-00294; copper, 1-00174; gold, 1-00149; lead, 1-00284.

(60) Dr. T. D. offers the following suggestion for opinion: To so attach the water spouts to side walls as to insure always complete isolation by glass rings or other device of non-conductor, as in the manner of lightning rods proper. As now arranged our water spouts attract toward the interior of the houses the electricity, whereas they might act as protectors (by extending upper and lower ends) always quite as well and at less outlay than by the rods. A. The interposition of glass or other non-conductor, to insulate lightning conductors, is not only useless, but undesirable—the discharge from a large induction coil easily pierces blocks of glass several inches in thickness, and the tension of atmospheric electricity during a thunderstorm is vastly greater than that from the coil. Metal leaders seldom have adequate connection with the earth, and are therefore not only incapable of properly diverting the charge, but are in many cases sources of danger in the absence of a good rod. If the leader is used as a lightning conductor, it must terminate in moist earth, with an exposure of surface not less than 100 square feet, and must be joined, by means of stout copper wire, with the gas and water pipes, and other metal work of the building. This arrangement may afford protection, but it would be safer to provide the rod also.

(61) O. F. asks for rules for making a cone pulley (or pair of pulleys) so that a belt will be equally tight on the different sides of the cone? A. First assume the radii of one driving pulley and the corresponding driven pulley, measure the distance between their centers, and find the length of belt required. Then assume values for the radii of the successive pulleys on the driving cone, and calculate the values of the

corresponding radii on the driven cone by the following rules: I. Having assumed the value of one radius, it is first necessary to ascertain whether the one to be calculated is greater or smaller: (1) Multiply the assumed radius by 3/4146 and increase the product by the distance between the centers of the pulleys. (2) If the quantity obtained by (1) is greater than half the length of the belt, the assumed radius is greater than the one to be determined. (3) If the quantity obtained by (1) is less than half the length of the belt, the assumed radius is less than the one determined. II. When the assumed radius is greater of the two, to find the other one. The distance between the centers, and the length of the belt are supposed to be given. (1). Multiply the assumed radius by 6-2832; subtract this product from the length of the belt, and divide the remainder by the distance between centers. (2). Add the quantity obtained by (1) to the number 0-4674 and extract the square root of the sum. (3). Subtract the quantity obtained by (2) from the number 1-5708, and multiply the difference by the distance between centers. (4). Subtract the quantity obtained by (3) from the assumed radius and the remainder will be the required radius. III. When the assumed radius is the smaller of the two, to find the other one. (1). Same as (1) of preceding rule. (2). Same as (2) of preceding rule. (3). Subtract the number 1-5708 from the quantity obtained by (2) and multiply the difference by the distance between centers. (4). Add the quantity obtained by (3) to the assumed radius; the sum will be the required radius. These rules apply to an open belt passing over any two stepped cones.

(62) S. S. B. asks: What is the so-called "madstone," supposed to be a cure for hydrophobia, and what are its virtues? A. The madstone of the Southern States is an aluminous mineral, and its charm lies in its power of absorption. The Ceylon madstone or "pombokalo" is a black highly polished substance which, when applied to an open wound, rapidly imbibes the blood, and with it the poison. Faraday analyzed it and found it to be a bit of charred bone. The Mexican madstone is charred deer horn. The efficacy of the remedy resides simply in the stone being porous and withdrawing the blood. Sucking the wound would accomplish the same result.

(63) C. H. M. says: In your "Notes and Queries" you frequently refer to back numbers or to the SUPPLEMENT. Can you furnish these, and at what price? A. In most cases we can. By referring to our advertising columns you will see that an unusual opportunity now exists for purchasing a large number of bound back volumes of the SCIENTIFIC AMERICAN at about the cost of the binding. We can supply all the back numbers of the SUPPLEMENT, bound or unbound.

What is the chemical called "colgate"? A. We know of no such substance. Send us a specimen for examination.

(64) A. W. asks if there is any way of making autograph letters other than by lithography? A. The electric pen furnishes a simple means of obtaining any number of copies. The letter is written with the pen which forms the characters by minute perforations, so that the sheet serves as a stencil plate over which an inked roller is passed, the ink marking through the holes upon a sheet of paper placed beneath.

(65) A. G. C. asks how to cut stencil plates otherwise than by chisels. I have coated my brass with wax, scratched through to the metal, covered the letters with sulphuric, nitric, and muriatic acid, but neither of the acids named will cut through the plate. A. There must be something wrong with your acid. Generally nitric acid diluted with 3/4 water is used. The best plan is to etch the plate as much as possible with the acid, and then clear the cutting with the graver. To obtain clean cuts the back of the plate should be smeared with oil.

(66) H. L. C. writes: 1. I am making a new electric engine in which I have three pairs of electro-magnets wound with 1/4 lb. of No. 16 cotton insulated copper wire to each pair; it will be necessary to have all three pairs in the same circuit at one time. Now if they are all set in a brass plate that makes connection with the cores of all the magnets—but not with the wire direct—will such connection carry the current across from one to the other of the outside magnets, so as to affect the strength of the middle magnet? A. No. 2. Would iron be better than brass? Wood is not strong enough. A. Brass is the best metal to use in this case.

(67) W. T. K. asks if there is a locality on the globe where the sun jumps a day; where at high twelve Sunday, noon ceases, and instantly Monday meridian begins, or where Sunday comes into a man's house on the eastern side, and becomes Monday by the time it passes his western door? A. The sun does not jump a day anywhere. Navigators in sailing around the world, provided they use the time of any given locality, gain or lose a day in their reckoning, and by common custom it is usual when not already done to adjust time pieces for this error on passing the meridian of Manilla. But as a rule clocks are adjusted aboard ship daily, the local time being determined by observation.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

T. A. A.—It is lignite in a gangue of ferric sulphide—marcasite—and sandstone. The mineral is of no practical value, but if obtainable in larger samples might be of some interest to the mineralogist.—B. B.—They are fine specimens of what are known as claystones—concretions formed by the tendency of matter to collect about a center. They are usually flattened, and at the center there is most commonly some foreign object, a fossil, shell, twig, or the like, which was the nucleus of the crystallization.—E. A. J.—It is a banded agate. It is composed of silicic acid. The colors are caused by traces of organic matter, oxides of iron and manganese, and by the difference of density of the siliceous rings. As regards your other question, there must exist some outlet for surplus water, if the measurements were properly made.—A. W.—It is not brown coal, but a slaty shale.—The color is due to oxide of iron.—W. P. McC.—The siliceous clay does not contain coloring matter other than a little oxide and silicate of iron—

it is not valuable.—We have received an unlabeled sample of ore rich in zinc and lead—probably from Connecticut.—Will M. S. send other samples of his ore?

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges with much pleasure, the receipt of original papers and contributions upon the following subjects:

On the Theory of Universal Gravitation. By J. McC. On Algebraic Equations. By J. T.

HINTS TO CORRESPONDENTS.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Inquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

WANTS AND BUSINESS INQUIRIES.

Almost any desired information, and that of a business nature especially, can be expeditiously obtained by advertising in the column of "Business and Personal," which is set apart for that purpose subject to the charge mentioned at its head.

We have received this week the following inquiries, particulars, etc., regarding which can probably be elicited from the writers by the insertion of a small advertisement in the column specified, by parties able to supply the wants:

Who manufactures soap-making machinery, and where can the plan of a soap factory be obtained?

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