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 This is for our information, and not for publication.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 Information requests on matters of personal rather than general interest, and requests for **Prompt Answers by Letter,** should be accompanied with remittance of $1 to $5, according to the subject, as we cannot be expected to perform such service without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Minerals sent for examination should be distinctly marked or labeled.

(1) C. W., Jr., asks: 1. What kind of clay is used in clay modeling, and where could it be obtained? A. The clay used for this purpose is specially prepared, and can be obtained from dealers in artists' materials. 2. How are those papier mache ornaments made? That is, what is the process they go through? A. The substance of the paper, *i. e.*, the paper pulp, is suitably mixed and then pressed into moulds. The articles are then varnished or polished. See Spon's Workshop Receipts, 1st series, under title "Papier Mache." 3. What would be the price of a pair of homing pigeons, used for breeding purposes only? A. About $1.50 per pair. 4. In taking tintypes, do you have to develop them immediately after exposing them in the camera, or could you wait for some time? How long could you wait? A. The developing must be done immediately.

(2) C. W. G. asks the best receipt for toothache and neuralgia. A. Cocaine hydrochloride, as a local anæsthetic is frequently used for the complaints mentioned; its effect is of course but temporary.

(3) W. T. asks: Can you give me the process of oxidizing silver? A. Add four or five thousandths of ammonium sulphide or potassium sulphide to water, at a temperature of 160° to 180° Fah. When the articles are dipped into this solution, an iridescent coating of silver sulphide is produced, which after a few seconds turns blue black if allowed to remain in the liquid. Remove, rinse, scratch brush, and burnish when desired.

(4) S. A. C. asks (1) how the liquid preparation for silver plating that is sold by street men is made, and if it has any value for the purpose of plating small articles? A. Dissolve 1 ounce crystals of silver nitrate in 12 ounces soft water. Then dissolve in the water 2 ounces potassium cyanide. Shake the whole together, and let it stand until it becomes clear. Have ready some half ounce vials, and fill them half full of Paris white or fine whiting, and then fill up the bottles with the liquid, and it is ready for use. The silver coating is not as tenacious to the article as when electrolytically deposited.

(5) J. L. M. asks what the wheel is made of, and how made, that turns up the iron rollers true, or the new iron flouring mills. A. The rollers are turned in a lathe to the desired size, and then planed in their centers in a planing machine that has a device for turning the roller as much as required for the spiral groove, while the planing tool cuts lengthwise of the roller. The turning device has a division feed motion to equalize the grooves. For chilled rollers an emery wheel is used for the cutter, the other device being the same as for ordinary rollers.

(6) J. E. M. asks for a good quick-hardening cement for screwing wrought iron pipes together for ammonia gas. A. Rubber cement mixed with boiled linseed oil and plumbago. Rub the linseed oil and plumbago into a paste, and then mix the rubber cement, about equal parts. Thin, if required, with a little benzine.

(7) J. G. M.—The classification of the magnitudes of stars is not definite, but rather arbitrary, as there are no two stars, especially of the larger magnitudes, that are exactly alike. There are assigned by astronomers about 14 of the brightest stars to the 1st magnitude, 48 to the 2d magnitude, 152 to the 3d magnitude, etc.; all of which vary greatly in brightness within the limit of their grades. A problematic planet beyond Neptune is receiving attention from astronomers.

(8) C. W. C.—We cannot give the percentage of gain of composition tubes over iron. It is very small and subject to great variation by the condition of cleanliness. They are very little used in stationary boilers. They are more liable to leak than iron tubes. We cannot recommend them.

(9) C. M. asks a rule for ascertaining diameter of any shaft required to transmit a given horse power, revolutions being known. A. Diameter of shafts for transmitting a given horse power. For prime movers:

$$\sqrt[3]{\frac{100\times \text{H. P.}}{\text{Revolutions}}} = \text{diameter in inches.}$$

For secondary or transmitters:

$$\sqrt[3]{\frac{50\times \text{H. P.}}{\text{Revolutions}}} = \text{diameter in inches.}$$

(10) M T. asks: 1. If I exhaust the air from a cylinder with an air tight piston, thereby creating a vacuum, and then release the piston so that it flies back by means of atmospheric pressure, will it strike with greater force in proportion to the distance it falls, as in case of falling bodies under influence of gravity? A. Yes. 2. If so, how shall I calculate the force of the blow? A. Multiply the weight in pounds by the velocity in feet per second, which will give the momentum in foot pounds. You cannot make use of gravity in the computation of the fall of the piston, as a vacuum acts as a force which accelerates the fall by gravitation.

(11) J. H.—Canceled postage stamps are valueless, except in limited quantities to dealers in postage stamps for collections.

(12) T. J. W. asks how egg shells are engraved upon. A. The eggs are first dyed any suitable color, and then the desired figures are produced by an etching needle or any sharp pointed instrument producing the design in white on a colored background.

(13) H. S. H. desires (1) a recipe for the mucilage which is used on postage stamps. A. Take of:

Gum dextrine	2 parts.
Acetic acid	1 "
Water	5 "

Dissolve in a water bath and add alcohol 1 part. 2. Is there any way to keep a rifle barrel from rusting on the inside? A. After using, clean with benzine, then coat with a little armor oil, just sufficient to form a thin film on the barrel.

(14) M. E. R. asks how to get rid of nests of black ants. A. Boil four ounces quassia chips in 1 gallon water, for 10 minutes, and add 4 ounces soft soap. This is said to be excellent for the destruction of black ants. Pulverized borax sprinkled over places infested by these vermin is said to disperse them. A few leaves of green wormwood, scattered among the haunts of these troublesome insects, is recommended as effectual in dislodging them.

(15) J. H. asks how to put a bright gloss on pearl, such as knife handles and other mother of pearl articles. A. Go over it with pumice stone finely powdered, washed to separate the impurities and dirt, with which polish very smooth; then apply putty powder and water by a rubber, which will produce a fine gloss and good color. We understand that Vienna lime is likewise used, but the finish is produced by experienced skill rather than any special ingredients.

(16) C. A. B. desires a good recipe for cement for cementing glass to wood. The wood has an oil finish. The cement is expected to stand the weather. A. Melt resin and stir in calcined plaster until reduced to a paste, to which add boiled oil, a sufficient quantity to bring it to the consistence of honey; apply warm. Or, dissolve glue in boiling water to the consistence of cabinet maker's glue, then stir in sufficient wood ashes to produce a varnish-like mixture. While hot, the surfaces to be united must be covered with this compound and pressed together.

(17) E. H. writes: The granite base to our soldiers' monument is badly stained by the coloring matter from black cambric cloth which was used as drapery on the occasion of General Grant's death? Is there anything known which will remove the stain readily? A. We would recommend you to try the following: Mix one part by weight of American pearl ash with three parts quickstone lime, by slaking the lime in water and then adding the pearl ash, making the mixture of about the consistence of paint. Lay the above over the whole of the work required to be cleaned, let it remain 14 to 16 hours, when the coloring can easily be scaped off. Either of the caustic alkalies might be found to act very satisfactorily. Their efficiency would be increased by using them hot.

(18) J. H. F. asks: 1. What will take match stains out of marble? A. Spots from sulphur and phosphorus caused by lucifer matches can be extracted from marble by carbon disulphide; or take 2 parts of common soda, 1 part of pumicestone and 1 part of finely powdered chalk; sift it through a fine sieve and mix it with water; then rub it well all over the marble and the stains will be removed, then wash the marble over with soap and water, and it will be as clean as it was at first. 2. Recipe for making the so-called gloss paint (white paint having a smooth and glossy surface). A. This paint consists of French zinc oxide ground in dammar varnish.

(19) C. F. S. asks (1) the composition of a liquid for mixing bronze, one that will dry quickly and leave the work bright. A. The so-called gold liquid, which can readily be purchased from dealers in paints, etc., consists of wax dissolved in benzine or of a mixture of japan in turpentine. Both are used. 2. Also the process of applying smalt to signs to give them the sanded appearance? A. Any desirable pigment of proper color is mixed with boiled oil, applied to the surface, and before it dries completely the smalt is sanded on by means of a pepperbox-like vessel. 3. What is used by manufacturers of ready mixed paints to give the fine gloss which most of them possess? A. Various varnishes are used.

(20) J. G.—The word "pitch" has many applications, and is not only used to denote the distance between threads of screws and teeth of wheels, but also the distance a screw travels without regard to its relations with any other thread, and in this sense is applied to screw propellers, the measure of which is counted along the axis of the screw. The designation of multiple thread screws should be, in all cases, exactly specified, as ⅛ inch pitch double or triple, or, as in machine shop phrase, 8 thread single, double or triple thread. In your case the master was right.

(21) W. A. H. asks what the red material is that is put on the electro-magnets of large machines, and what its use is. A. It is shellac varnish colored with vermilion. The varnish is applied to improve the insulation; the vermilion is simply to impart color.

(22) W. A. P. asks: I am making the dynamo described in SUPPLEMENT, No. 161, and I would like to know what difference it would make if I should wind the electro-magnet with No. 19 wire instead of No. 16? What number wire should I use on the armature, if No. 19 was put on the magnets. A. The finer wire would increase the resistance of the magnet, so that the current generated by the armature must necessarily have a higher electromotive force. To secure this, the armature should be wound with finer wire, say No. 20 or 22.

(23) Electro writes: I am engaged in dark electro bronzing. I want to give it a green background, something that will not wash out and will not turn with heat. The articles that I speak of are grate fronts, the designs are deeply engraved, the raised part to be left bronzed, background green, so as to have two colors. A. It is difficult to suggest anything that will fulfill all the conditions. Try a paint composed of fine green smalt and water glass.

(24) J. L. asks: 1. I should like to know if the electro-magnet described in SUPPLEMENT, No. 161, should be soft or common cast iron? A. Soft cast iron is preferable. 2. What sort of iron should the armature be cast from? A. Soft gray iron. 3. If a machine of this kind would be good for electroplating; if not, for what reason? A. Yes, if wound with coarser wire, say Nos. 12 and 14 instead of 16 and 18. 4. What is vulcanite, or how could I find out how it is made? If I cannot get it, what is the next best thing to use? A. Vulcanite is hard rubber. It can be purchased from any dealer in electrical supplies. Hard wood will answer the purpose.

(25) W. A. P. writes: I am making the dynamo described in SUPPLEMENT, No. 161, and would like to know how many feet of wire I will need for magnets and for armature? A. For the magnet, about 500 feet; for the armature, about 40 feet. 2. Could such a dynamo be driven by a weight and a clock movement? If so, how would it be best to regulate the speed? A. It could be driven in that way, but it would be impracticable. The weight would have to be large, and would require frequent winding. A governor, such as is used on a chronograph, would regulate the speed.

(26) F. A. R. asks how an electric wind dial can be constructed to show the direction of the wind, and placed in an office for instance. A. It can be done by providing a circular row of contacts to be touched by an arm carried by the vane. The contacts will be connected each with one of a circular row of electro-magnets arranged to act on an armature carried by the spindle of the index in the office. The remaining terminals of the magnets are connected by a wire with one pole of a suitable battery, the other pole of the battery being electrically connected with the spindle of the vane. It would be better, if the arrangement of your office will permit, to extend the spindle of the vane to your office, and apply the index to that.

(27) W. A. M. writes: 1. Some time ago I bought of a New York optician a crown glass object glass, for a telescope, 8 inches in diameter, and of 72 inches focus. I had a metal tube made and squared at both ends, and the object glass I had mounted, and bought me an eye piece of the same firm that made the object glass. After setting up the telescope, I failed to get any view. It (in looking at the moon) seemed blurred, and I could not make out anything. What is the trouble. Where have I gone wrong? I thought the trouble was in the length of focus, but I have tried every way. Help me if you can, as I do not want to give it up, after going this far. A. Although you should get an image with your object glass, you should not expect first class results from a non-achromatic objective. The eye piece should be of rather low power, and you would probably gain considerably in definition by reducing the aperture. Possibly you may have omitted to blacken the inner surface of your tube; any reflection from the inner surface of the tube would impair the efficiency of the instrument. 2. What is the best exterminator for cockroaches? A. Persian insect powder blown into the crevices around the range and sink, if persisted in, will exterminate them. Phosphoric paste is also efficient. They may be trapped in an ordinary cuspidor, by placing some molasses in it, and providing some sort of an approach by which they can climb to the top. They readily get in, but cannot escape, as they are unable to walk over the smooth inclined surface of the cuspidor. 3. The keys of my piano have all turned brown. What can I use to make them bright again? A. Rub them down with fine pumicestone and water, then apply a thin paste of chloride of lime, finally exposing the keys to the sunlight for several days or weeks.

(28) W. H. writes: 1. I have a small electro-magnetic battery; its cell is composed of a carbon cup an inch and a half diameter by three-quarters of an inch high, and about one-eighth inch in thickness, inside of which is a cast zinc ring one inch diameter by seven-sixteenths inch high, and one-eighth of an inch thick. Fluid used is bisulphate of mercury and water. This makes a very fair sort of a current, that lasts half an hour or so, but is not as strong as I would like. Would a Leclanche battery connected by wires to the proper posts give a more powerful current, and how long should or could it be run at a time? If the Leclanche would not do, is there any form of cheap battery that would? A The Leclanche battery is not adapted to continued use. Three or four cells of some constant battery, the gravity or Daniell, for example, would answer better. You could, if desirable, place such a battery in your cellar. 2. Would zincs, such as are used in the Leclanche, do for the battery mentioned in the SCIENTIFIC AMERICAN of April 11, 1885, page 230? A. Yes, but plates an inch or so wide would be better. 3. How many of these batteries would it take to run a ten candle power incandescent light? A. It depends altogether on the resistance of the lamp—25 to 40 cells. The battery referred to would be useful for experiments only in electric lighting. 4. Are there any railroads that run into New York that take young men to learn to fire, as it is called? I have tried a long while to get a place on the New York, New Haven, and Hartford, but without success. A. We have not this information at hand. Better write the officers of some of the roads.

(29) W. B. R. writes: Would you please inform me how to make a gas bag for oxygen, for calcium light purpose? Could I make it like an ordinary bellows of leather or rubber, and tacked around the board as the large bellows are? Also, what would be a good cement to bind the seams together? I would like it to hold about 35 or 40 gallons, and what size would I have to make it? A. We would not advise the use of board sides for your gas bag. Better use rubber cloth throughout. Make the bag wedge-shape, about 10 inches thick at the thicker end and 2½ by 3 feet square. Cement the sides and top and bottom together with rubber cement, such as may be purchased at any rubber store. You can make the cement by dissolving pure rubber in bisulphide of carbon or in naphtha. You will probably find it both cheaper and better to purchase a bag suited to your purpose.

(30) A. E. C. asks (1) how to make a small sized, high tensioned, and constant battery, one that the elements will not have to be removed from fluid when current is broken. The above must be a one cell affair, to be used to light a ½ or ¼ power incandescent lamp. A. One cell of battery is insufficient to produce an electric light of any value. By means of a chloride of silver cell, or a Grove or Bunsen, you would be able to render a short piece of fine platinum wire incandescent, but it would yield very little light. 2. How are decalcomanie or transfer pictures made? A. They are printed on paper heavily coated with a soluble sizing. 3. What is the meaning of the character after these figures, 3²1 ± ? A. It indicates that the number to which it is affixed may have either of the signs + or —. It signifies ambiguity. 4. What is the Japanese shaku? A. Probably you mention a local name for something we do not know by that designation. 5. Who is right in the following argument? B and I were arguing upon the origin of cobwebs. B contended that they were the work of spiders, and I that they were not, as it is seldom one will see a spider in or about them. A. B is right. 6. How to make a vest pocket size battery for scarf pin lamps, one that the elements do not have to be removed when current is shut off? A. Consult back numbers of the SUPPLEMENT. 7. Can one obtain a patent for an electric bell, lamp, or anything, whatsoever it is, and invent a new use for same? Could I obtain a patent upon that new use? A. If by the new application a new and important result is secured, it is possible in many cases to secure a patent.

(31) R. M. F. asks how to make a magic lantern out of a photographic camera. A. In the back of the camera, supported by a frame, insert a 5 inch double convex condenser. In the front remove the lens board, and in a special box made to fit closely over the camera front, secure the lens. At the back of this box arrange a frame to support the lantern slides, directly in front of the opening for the lens board. In a tin biscuit box at the rear of the camera insert a "Leader" kerosene lamp, with the edge of the flame toward the condenser. The box must have openings to admit air and places at the top to allow the free escape of heat, and should be fixed to slip over the back of the camera. By closing the camera bellows the condenser will be brought close to the front and adjacent to the lantern slide, where it should be. Other details to complete the lantern will be apparent to whoever wishes to try it.

(32) Enquirer asks (1) how photographic paper is made which will give black lines on a white ground at one operation. A. The paper is first coated with a solution of perchloride of iron and tartaric acid, dried and exposed in the usual way behind the tracing. The light reduces the perchloride of iron to the proto-chloride. The print is then immersed in a solution of gallic acid, which turns the coating of perchloride of iron, not acted upon by light, black, but does not affect the portions reduced by the light, hence, as the light cannot go through the black lines of the tracing, the sensitized surface under them blackens under the gallic acid. Lastly, the print is washed and dried. Owing to the powerful action of the gallic acid, it is difficult to obtain clear whites. 2. What is best mode of keeping leather of boots and shoes soft and pliable? Can a substance be mixed with the blacking for this purpose? A. In all tanned leathers, anything of the nature of currier's dubbing—or best cod oil and tallow, with perhaps a little resin—makes the best dressing for the leather to keep it pliable and help its lasting qualities. Blackings which have much grease cannot give a good polish, so it is best occasionally to thoroughly sponge off old blacking and rub the dressing well into the leather, when the surface will again polish after a few trials.

(33) H. W. H. asks how to make a small portable photographic apparatus. A. The simplest apparatus is to take a small sized starch box with sliding cover, and see that it is perfectly light tight. In one end make a hole one-eighth of an inch in diameter, over the outside of the hole glue a piece of brass as thin as a sheet of paper, then puncture as small a hole through the sheet of brass as possible, with a fine steel needle, twirling it to have the hole smooth. In the dark room insert the sensitive plate at the rear of the box, clamping it against the back by a small metal spring button. The cover is now closed, and a cloth thrown over the front to keep the light from striking the pin hole. The box can rest upon a chair or table, and pointed to the object; the cloth is lifted, and the exposure of 5, 10, to 20 seconds made according to the light. Development will follow as successfully as if an expensive lens had been used.

(34) W. C. B. asks: What is the formula for toning with chloride of platinum? A. Make a solution of 1 grain of bichloride of platinum to 10 ounces of water. The solution should be neutralized with carbonate of soda, and then slightly acidified with nitric acid. Immerse the prints in this solution, and tone as with chloride of gold. The results are not superior, and in many cases are not equal, to those obtained with ordinary gold toning solutions.

(35) J. C. B. asks: 1. How many feet of heating surface is in a tube of a vertical radiator 30 inches high? A. Iron pipe radiators with pipes from 30 to 31 inches long are rated at 1 square foot to a pipe. 2. How many feet of heating surface are required to heat 100 cubic feet of air, with thermometer at zero and room to be heated to 70°? A. One square foot or 1 radiator pipe; if the room is favorably situated, 10 to 20 per cent less. 3. A good work published on steam heating? A. Baldwin on Steam Heating, which we can mail for $2.50.

(36) T. H. P.—There appears to be no definite rule among engineers for the size of steam pipes to engines. Iron pipe being of certain definite sizes, the practice for engines of small size, 20 horse power and under, is, area of steam pipe should equal ⅙ indicated horse power. Larger engine, area of steam pipe one-seventh indicated horse power; 60 h. p. and upward, one-sixth indicated horse power. Areas to be in square inches. For long distances, as 2,000 feet, if well protected, one size larger may be safely used.

(37) J. E. H. asks (1) how to make the solution for a bichromate battery (one gallon size) using two carbon, and one zinc (carbons 2½x4½ inches). A. Dissolve bichromate of potash in warm water to saturation. Pour the solution, while warm, into a vessel capable of resisting acids, and allow it to cool. Add sulphuric acid slowly to this solution until one pound of acid has been added for every pound of the solution, and finally add a small quantity of bisulphate of mercury, say one drachm to the pound of solution. 2. How to connect two or more such batteries together? A. If you want a "quantity" current, arrange the cells in parallel circuit, *i. e.*, connect all of the zincs with one conductor and all of the carbons with the other conductor. If you want an "intensity" current, arrange the cells in series, *i. e.*, connect the zinc of one cell with the carbon of the next, and so on; the zinc of the first cell and the carbon of the last cell being connected with the circuit wires. 3. How many volts would one (gallon size) battery be? A. About 1¾. 4. Would two or more such batteries double the number of volts in one? A. If connected in series, the electromotive force would be very nearly doubled. 5. How many such cells would I need for an Edison incandescent lamp, 6 candle power? A. Five or six.

(38) W. H. S. H. writes: 1. I want to put horseradish in bottles, in its pure state. Is anything put in to keep it, such as vinegar? A. The preparation is best made as follows: 6 tablespoonfuls scraped or grated horseradish, 1 tablespoonful white sugar, 1 quart vinegar. Scald the vinegar; pour boiling hot over the horseradish. Steep a week, strain, and bottle. Exposure to the air will discolor. 2. Is there such a thing as making inks by machinery? A. No. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 157. 3. How is bluing made by the barrel, 30 gallons, for the trade? A. Bluing in liquid form may consist of a mixture made up as follows: Take 4 ounces of soft Prussian blue, powder it, and put in a convenient vessel with one gallon of clear rain water, and add 1 ounce of oxalic acid. A teaspoonful of this mixture is sufficient for a large washing. 4. Give me a powder for horses and cattle. A. The following condition powder may be what you desire: Resin and niter each 2 ounces, levigated antimony 1 ounce; mix for 8 or 10 doses, and give one night and morning. When it is given to cattle, add 1 pound Glauber's salts.

(39) C. J. P. writes: We have a pear tree which has small sweet pears; it is also an early pear, but for several years they have black spots, become cracked and hard, and some are so very small. Can you tell me what to do with the tree, that it may bear better fruit? A. Enrich the ground round the outer roots of the tree with a liberal dressing of unbleached wood ashes.

(40) J. H. M. asks for a fireproof paint. A. Take a quantity of the best quicklime, and slake with water in a covered vessel; when the slaking is complete, water or skim milk, or a mixture of both, should be added to the lime, and mixed up to the consistency of cream; then there must be added at the rate of 20 pounds alum, 15 pounds of potash, and 1 bushel salt to every 100 gallons of creamy liquid. If the paint is required to be white, 6 pounds plaster of Paris or the same quantity of fine white clay is to be added to the above proportions of the other ingredients. All these ingredients being mingled, the mixture must be strained through a fine sieve and afterward ground in a color mill. When roofs are to be covered, or when crumbling brick walls are to be coated, fine white sand is mixed with the paint, in the proportion of 1 pound sand to 10 gallons of paint; this addition being made with a view of giving the ingredients a binding or petrifying quality. This paint should always be applied in a hot state, and in very cold weather precautions are necessary to keep it from freezing. Three coats of this paint are deemed, in most cases, sufficient. Any color may be obtained by adding the usual pigments to the composition.

(41) N. B. P. writes: I have a 2 inch tubular flowing well, 140 feet deep, which discharges 6 gallons of water per minute: and by attaching a pipe to the top of tube in well, I find that the water will rise 8 feet above the top of the well. I wish to convey a portion of the water to higher ground, 100 feet distant and 25 feet higher. Can I attach hydraulic ram directly to the top of the tube in well, and have it do good work, or will it be necessary to set rams on a lower level? If so, how much lower, and what distance from well? A. You can attach the ram directly to a reservoir at a distance above the ground that will insure a sufficient flow from the pipe, setting the ram as low as will admit of draining the waste water off; and in this way obtain 5 or 6 feet fall from the reservoir to the ram with a length of from 15 to 20 feet of pipe in a straight line. With this device and a flow into your cistern of 6 gallons per minute you may expect to discharge one gallon per minute into a reservoir 25 feet high. You cannot make the well pipe act as a ram pipe or feed. First find how much water will flow at a height something less than the height that it rises in the pipe above the ground, or level at which you can drain the water away.

(42) R. asks the reason that cast iron water pipes on being tested will burst at a low pressure when they contain air, whereas the same pipes will stand a very much higher pressure if all the air is allowed to escape from them before the pressure is applied. A. Pipes of iron or any other material will stand the pressure of water, air and water, or air alone, to the same extent, provided there is no disturbance to produce a water ram or hammer, which alone is the cause of the cracking of cast iron or other brittle pipes under low pressure. Letting water into pipes quickly generates waves along the pipe that has been known to crack cast iron pipes of large size without any pressure.

(43) J. N. H. asks the proper proportions and materials for a good fireproof cement, which when hard shall be solid and firm and not liable to crush easily. A. To 4 or 5 parts of clay, thoroughly dried and pulverized, add 2 parts of fine iron filings free from oxide, 1 part manganese dioxide, ½ part of sea salt, and ½ part of borax. Mingle these thoroughly and render them as fine as possible, then reduce them to a thick paste with the necessary quantity of water, mixing thoroughly well. It must be used immediately. After application it should be exposed to a heat gradually increasing to almost a white heat. This cement is very hard, and presents complete resistance to a red heat and boiling water.

(44) A. A.—Stenciling is done on glass in the same manner as on window shades and for fresco figures on ceilings. Cut the patterns in oiled paper or bookbinders' press boards. Lay the pattern on the work, holding it firmly, and with a medium stiff brush fill in the spaces with the desired colors.

(45) T. W. B. writes: I have 59 tubes to portable boiler. To-day they all leak, to-morrow only a few, and in the course of two or three days they all stop, or nearly so. Then they commence leaking, say two or three, at bottom; then change to one side, where several will leak for two or three days, and then cease leaking on that side, and change once to the other side of furnace. Can you explain this? It is an enigma to me. After expanding tubes, should the bedding be reset to flue sheet? What is the distance between centers of 5 foot 6 inch and 2 foot pulleys for 80 foot belt? A. The tubes that leak are not tight in the head, which allows a slight movement of the tube in its socket by pressure in raising steam, and also by variation of pressure in boiler during the day. The sediment in the boiler tends to stop the leaks by percolation. Getting up steam the next day will again spring the head and start some of the loose tubes leaking. The fact of their leaking on alternate sides we think accidental; much depends on the kind of expander that is used. A roller expander should have the ends of the tubes beaded over to insure stability of the head under pressure. Distance between centers or pulleys should be 34 feet 1 inch.

(46) W. L. T.—It is a very difficult process for an amateur to make good japan varnish. Better buy the red japan from a varnish maker, and thin it with turpentine to the proper consistency for dipping. It will do for wood, but requires two coats, as the first coat dries in and will not give a gloss. The hard japans require 260° for baking. There are japans that are not so tough, that dry at 212° upward, and others that are called air-drying japans.

(47) J. N.—Fresh brewer's yeast will cause bread to rise in 2 to 4 hours' time. The following recipe is used for aerated bread: Divide 3 pounds flour into two portions; mix up the first with water, holding in solution 2 ounces bicarbonate of soda, then mix the second portion of flour with water, to which 1 ounce of muriatic acid has been added; knead each mass of the dough thoroughly. When this is done, mix both portions together as rapidly and perfectly as possible, form the mass into loaves, and bake immediately. This bread contains no yeast, and is very wholesome. You can, if you prefer, use a baking powder such as the following:

Powdered cream tartar	30 ounces.
Bicarbonate of soda	15 "
Flour	6 "

All well dried; mix thoroughly and keep dry.

(48) T. W. writes: I have an opera glass with achromatic objective 1 5/8 inches in diameter and 4½ inches focus. Can I use it for making stereoscopic views with camera? A. You can, but with a limited field; it needs two sets for a proper arrangement for a stereoscopic lantern.

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