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Answers to Correspondents

G. W. P.'s description of the double star is too vague to allow us to recognize it.—C. J. K. will find descriptions of some breech-loading cannon on pp. 149, 402, vol. 27.—A. H. will find a recipe for silver-plating solution on p. 170, vol. 30.—W. H. B. will find directions for transferring pictures to glass on p. 43, vol. 30.—J. H. M. will find a recipe for quick-setting glue on p. 33, vol. 31, and for a cement for wood and glass on p. 274, vol. 30.—J. T. will find directions for galvanizing cast iron on p. 59, vol. 24.—C. H. S. will find directions for keeping eggs on p. 378, vol. 30.—T. C. W. will find a recipe for waterproof paper on p. 346, vol. 30.—D. G. & S. are referred to p. 197, vol. 29, for directions for annealing steel.—We do not understand what J. A. F. means by a vacuum cylinder to a steam engine.

(1) C. S. asks: Please tell me how I can photograph on tin. A. The process is the same as that of preparing glass negative plates; the difference is due to the dark background, which reverses the shades and thus renders the picture positive.

How is lithography done? A. The stone used in lithography is a limestone (carbonate of lime) of a very hard and compact texture, admitting of being ground to a fine surface. The stone must have the qualities of imbibing both water and grease or oil, the crayon used in drawing upon it being composed of grease, wax, soap, shellac, and ivory black, which is also the composition of the ink used in printing, with little variation. The stone, having the picture drawn upon its smooth surface with the prepared crayon, is wet with water. While the stone is still wet, an inking roller is passed over its surface. While the wet part of the stone refuses to take the ink, the crayon lines, being of a greasy nature, will take a portion of it from the roller. The stone is then ready for printing.

1. How can I make albumenized paper, and how sensitize it? A. Ammonium chloride 200 grains, water 5 ozs., albumen 15 ozs. The mixture should be well beaten, and the froth that forms skimmed off and placed in a flat vessel to subside. To sensitize the prepared paper, coat one side evenly with a solution of 60 grains of nitrate of silver in 1 oz. of distilled water. This latter operation must be performed in a dark room, or by candle light. 2. With what do photographers fix pictures taken on glass with collodion, before transferring to the paper? Do they remove the collodion that is not acted upon? A. Either solution of hyposulphite of soda or cyanide of potassium. The picture should first be developed by pouring over it a solution of sulphate of iron in water. 3. Does iodine come in a liquid or solid form? A. Solid.

(2) W. C. asks: 1. Will thin sheet lead resist the action of sulphuric acid for an unlimited period, at ordinary temperature, so as to be a safe receptacle? A. It is so used in the lead chambers of a sulphuric acid manufactory. 2. Will it in the same way resist nitric acid? A. No. 3. Can it also be used to contain muriatic acid? A. No.

(3) J. A. H. says: I have read your abstract from Mr. Chase's article on "Fishing by means of Explosives." 1. Will common gunpowder, gun cotton, or dynamite do for such a purpose? A. Yes. The quantity used depends much upon the depth of water. 2. Should the cartridge wrapper be thick metal or will varnished paper do? A. Paper will answer the purpose.

(4) P. M. asks: How can I transfer ordinary engravings to glass? A. Fix the printed surface to the glass with ordinary paste. Etch with liquid hydrofluoric acid of specific gravity 1.14. At the end of 3 or 4 minutes wash off the paper, and the design will be found reproduced upon the glass.

(5) J. S. says: You say that the point of a wagon wheel touching the ground comes to perfect rest, the wheel being in motion. Do you claim that one part of the wheel is going fast, another slow, and another standing still? If so, is it the same with friction pulleys and idle wheels? Can one part of a solid wheel stand still and another part be in motion? A. Each point as it reaches ground is at rest with respect to any fixed point in the earth, but has the same rate of angular motion as the other points in the circumference.

(6) O. M. R. says: I am making hydrogen from sulphuric acid and zinc in a cylinder for oxyhydrogen light. The cylinder is coated with vulcanized rubber. Why cannot I use (in place of the zinc) iron turnings? A. You can use iron. But iron in dissolving in dilute sulphuric acid does so with the formation of froth, and the evolution of certain oily hydrocarbons. The solution, moreover, soon becomes saturated with ferrous sulphate, which soon crystallizes. You will have trouble and will find that it is less satisfactory, except in the matter of cost, than zinc. 2. What quantity of acid will it require to consume 1 lb. of iron, and what volume of gas will be produced? A. It will take 28 ozs. strong oil of vitriol, and 5 cubic feet and 1640 cubic inches of gas will be evolved.

(7) J. C. P. asks: How can I temper No. 16 brass wire, so as to make spiral springs? I have tried hammering and heating, and failed every time. A. There is a brass wire, already tempered, made specially for springs.

(8) B. O. says: I wish to solder a piece of metal about an inch square, to the side of an iron kettle; it is to be a sort of bed piece to which a hap is to be attached, capable of sustaining a weight of 15 or 20 lbs. Is there means by which I can make this attachment? A. Braze it by the ordinary method, using spelter and borax.

Is there any machine for bending or twisting wire, by which I can manufacture wire loops to be soldered to tin vessels? A. Use a solid block of iron, in which put three pegs in the required position, and bend the wire, by hand, alternately round the pegs to form the desired loop.

(9) L. M. S. asks: 1. Can water be electrified so as to be sparking? A. No. 2. Will electricity settle muddy or sooty water? A. No. 3. Would electricity aid in bringing butter quickly in churning? A. No. 4. Would air, forced or pumped into a ice cream freezer while freezing, make ice cream lighter or smoother? A. No.

(10) J. B. asks: 1. Is it possible to cast brass in cast iron or wrought iron molds without heating the latter before the process of casting? I want to obtain a smooth underside of the casting, to render filing and planing unnecessary. A. There are facing sands and compositions for molding smooth castings which answer for the purpose you mention better than any other device. 2. Would plumbago be a non-conductor good enough to prevent explosion if rubbed on the inner sides of the mold, or would a mold, made of plastic graphite, render a very smooth casting without wearing out fast? A. Yes.

(11) P. S. V. asks: Will sulphur water when used in a steam boiler cause a scale of sulphur inside? A. It would not be advisable to use this kind of water. Possibly the sulphur could be removed by some of the feed water heaters in the market.

(12) A. H. asks: Are brass tubes drawn or rolled in grooved rolls? A. They are drawn. 2. Could tubes be rolled by inserting a steel rod (inside of tube) in grooved rolls, the grooves being graduated like holes in a wire draw plate? A. The plan you mention is practicable, and, we think, in use.

(13) A. McG. asks: How can I clean an oil painting that is injured by dust and particles of wrapping paper? A. We can recommend the following: Take the picture out of frame, lay a coarse towel over it for 10 or 14 days; keep it continually wet until it has drawn out all the filthiness from the picture; pass some linseed oil which has been a long time seasoning over it, in the sunlight, to purify it, and the picture will become as lively on the surface as new.

What is best for cleansing and burnishing church plate? A. Try the following recipe: Plunge the article into this solution: Hyposulphite of soda 1 lb., sal ammoniac 8 ozs., solution of ammonia 4 ozs., cyanide of potassium 4 ozs. Let it remain one half hour, wash, and rub with buckskin. The cyanide of potassium is very poisonous. It may be omitted, but then the solution is not so active. No powder is necessary in polishing.

(14) C. S. J. asks: What is a test for arsenic in wall paper? A. Marsh's test is the simplest. Put several small pieces of the suspected paper, with water, in a flask containing small pieces of metallic zinc; make the liquid acid by sulphuric acid. This immediately attacks the zinc, generating hydrogen. Through the cork in the top of the flask, pass a glass tube, drawn to a fine point at the outer end. After the hydrogen has been evolved for a short time, ignite it at the outer end of the glass tube; bring a polished surface of porcelain in contact with the flame of hydrogen, if there be any arsenic present, it will be combined with the hydrogen, and the flame will color the porcelain with the black arsenical mirror.

(15) J. R. M. says: A shopmate says he can make a single tap that will cut 4 different threads, 8, 16, 24, and 32. How is it done? A. A tap cannot be made to cut different threads unless it has removable teeth. It may be used as a tool in the lathe, and thus cut a double or triple thread; but this would only be a curiosity, as a tap used as a tool chaser would be a most unmechanical device. An ordinary tap, used as a tap, will only cut a thread of one definite number to the inch.

(16) O. P. asks: 1. How can I find, on the surface of a revolving cutting iron, the exact shape for striking any given molding? A. Your best plan will be to mark out with compasses, squares, etc., on a piece of sheet tin, the molding required; then cut out the same and use it as a gage. You can make a male and female gage from the sheet tin. 2. If a cutter make a given pattern of molding when revolving on a cutter head 6 inches in diameter, would not the same cutter, if used on a cutter head 6 feet in diameter, produce molding of a different form? A. No.

(17) J. H. L. M. asks: Has a vacuum ever been produced in a steam engine without using the exhaust steam? A. Not to our knowledge.

(18) A. H. asks: How can I prepare the glasses for a camera? A. To make small lenses, prepare a vertical crank arbor with a screw thread for chucks cut on the top, to be worked by a treadle. The frame supports a tub of wet sand through which the arbor rises. Lead-faced chucks are cast of proper curvature, and the lens is held upon the chuck by a wooden handle attached with pitch, while sand and water are applied. Convex lenses may be cemented to the chuck by drops of pitch half an inch apart. When rough ground, they may be finished with a brass or iron grinder, worked with emery alternately on the lens and on another grinder which fits it. Finally apply rouge with pitch polisher, as we have before directed. Flint glass disks may be cemented to a chuck and turned in a lathe with the end of a three cornered file ground to 60°, dipped in water acidulated with sulphuric acid, until the glass touches a brass tool all over. It may then be ground, stuck to a handle with sealing wax, and polished with rouge against a sealing wax polisher revolving in the lathe. The wax is removed with alcohol. For flat surfaces, as of prisms, three brass chucks must be continually worked upon each other while the surface is ground upon one of them. For photographic cameras, any glass will do, as some diffusion of focus is requisite. For telescopes and microscopes, it must be faultless. To photograph at the visual focus of a telescope the object glass lenses may be separated one thirtieth of the focal length; or better, the plateholder may be racked in a marked distance found by trial, or a view tub lens may be placed outside the focus. To photograph the moon, planets, and stars, a nitrate of silver bath, 35 grains to the ounce of water, must be used with a collodion containing iodide of cadmium. For the sun and portraiture, a bromized collodion may be used with a 90 grain silver bath. The plate is dipped into a weaker bath before exposure. The dark room should be well lighted through buff-colored envelope paper. For stars, the plate is lighted a moment by an argand burner 3 feet off, before exposure.

(19) M. W. asks: 1. How is printer's poster ink made? A. A good common ink for this purpose may be made as follows: Take 16 ozs. varnish, 4 ozs. linseed oil well boiled, 4 ozs. clear oil of turpentine, 16 ozs. fine lampblack, 2 ozs. fine Prussian blue, 1 oz. fine indigo. Boil one hour. 2. Are there machines for printing entire flags at one impression? A. Small machines for this purpose are, we believe, in use in this city.

(20) M. H. P. asks: Would it be practicable to draw water a distance of 160 feet length and 18 feet fall, with a suction pump and cement pipe? A. It can be done with a good pump and well laid pipe.

Is a brass kettle injurious for cooking fruit preserves, etc.? A. Not if it is clean and bright at the time of use.

In what way can light cassimere pants be washed? A. Dissolve a little curd soap in water, and mix a little clarified ox gall with it. Rub the mixture on all the spots of grease and dirt, and rub it in with a stiff brush; then brush the garment, and sponge with the same mixture well diluted with warm water. Rinse in clean water, and hang up to dry.

(21) P. M. K. says: 1. An engine has a 12 inch cylinder x 21 inches stroke, and runs at 75 revolutions. It is fitted with two main slide valves; and a cut-off slide valve works on back of main valve, cutting off at 1/4 stroke. The travel of the main valve is 2 1/2 inches. No. 1 valve has 1/2 inch lead on steam and 1/4 inch lead on exhaust, with 1/4 inch lap on steam and no lap on exhaust end. No. 2 has no lead on steam and 1/2 inch lead on exhaust, with 1/2 inch lap on steam and 1/2 inch negative lap on exhaust, or both exhaust ports are open 1/2 inch when the valve is on the mid stroke. Which of the two valves is the best, all other conditions being the same? A. The first. 2. An engine is fitted with ordinary double slide valve (no cut-off attached) which has equal lead; but it will not cut off equally, following 1 1/2 inches further on the out stroke than on the in. How is this? A. It is on account of the angularity of the connecting rod.

(22) N. O. A. asks: 1. Does it preserve a tooth permanently to have it filled, provided it is done well? A. Yes. 2. Is silver as good as gold for filling in every respect? A. No.

(23) M. H. B. asks: What is the best plan of setting up the follower rest, to an engine lathe, for the purpose of turning slender iron rods, of different size? Will one guard do, or will it take a different one for every sized rod? I tried a forked guard, but for some reason it did not work satisfactorily. A. A common plan is to have a plate composed of two forks, which can be adjusted for different sized rods. This holds the work in all directions, the effect of moving the adjusting screws being to make the square opening between the forks larger or smaller.

(24) M. asks: 1. How do you find the mean effective pressure per square inch on the piston of a steam engine? A. From an indicator diagram. 2. What is the most economical speed for a piston? A. This depends on a variety of circumstances, and would require more space for the discussion than we can give in these columns. 3. What book will give me the formulae for the proportion of the parts of a high pressure engine? A. We can recommend Van Buren's work on "The Strength of Iron Parts of Steam Machinery."

What is the reason that, on taking a kettle of boiling water off the stove, one can bear his hand on the bottom for a short time, but after that the heat becomes unbearable? A. On account of the protection afforded by the soot.

Can an imponderable agent have any momentum? A. Yes.

(25) W. T. E. S. asks: How long would a reservoir containing 1,383 cubic feet, filled with air compressed to 300 lbs. to the square inch, last 8 men, who are in an airtight room containing 240 cubic feet of air, supposing that the compressed air is let in as required, and the foul air let out? A. From 4 to 5 hours. We do not think that your plan for a torpedo boat is novel.

(26) C. S. asks: What is the action of steam? I was before an examining board, and that question was put to me and others. A. It is rather difficult to answer a question of this general nature, but the action of steam may be compared to that of a compressed spring.

(27) R. I. asks: What would the pressure of air be to the square inch in forcing 2,500 cubic feet per minute through eight round openings, 4 of 1 inch and 4 of 1 1/2 inches diameter? A. You will find rules in Welsbach's "Mechanics," by which you can make the calculations.

(28) W. S. B. asks: How far will a person have to stand from the roots of a tree 100 feet high that the top may be just visible, the earth being level with the exception of its natural curve? A. About 1 1/2 miles.