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. 107, 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 lithographing 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 hasp 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 sparkling? 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 nice 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 is, 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 tube 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 24 inches stroke, and runs at 75 revolutions. It is filled with two main slide valves; and a cut-off slide valve works on back of main valve, cutting off at ⅓ stroke. The travel of the main valve is 2¼ inches. No. 1 valve has ⅛ inch lead on steam and ¼ inch lead on exhaust, with ¼ inch lap on steam and no lap on exhaust end. No. 2 has no lead on steam and ½ inch lead on exhaust, with ⅜ inch lap on steam and ⅛ inch negative lap on exhaust, or both exhaust ports are open ⅛ 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 1½ 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 formulæ 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 1,388 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 1½ inches diameter? A. You will find rules in Weisbach'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 13 miles.

(29) E. P. R. & Co. ask: Would it be practicable to take steam from a boiler 550 feet distant to run a 10 horse engine, the boilers (of course doing other work) being of 160 horse power? A. The plan is perfectly practicable, and often adopted. If the pipe is properly protected and trapped, the loss will be trifling.

(30) L. G. D. says: I wish to draw strips of common steel one fourth of an inch thick and four inches wide to a tolerable cutting edge. This is done by hammering when hot and drawing to an edge. Would it be possible to do it by passing the steel between two steel rollers, made tapering so as to draw the steel plate to an edge? Could one man thus sharpen a strip of steel by turning a crank connected with one of the rollers? Can common soft steel ¼ inch thick be brought to an edge in this way when cold? A. We do not think you could get a very good edge in this way; and if the machine were worked by one man, the operation would be very slow.

(31) J. H. says, in commenting on our answer to A. B. & C., who asked if water can be raised by a siphon above 34 feet: You answer "No." I differ in opinion from the above answer. I say that the atmospheric pressure has nothing to do with the movement of the water through the siphon, the pressure being the same at either end; and I am fully satisfied that, if the long leg of the siphon contains sufficient weight or volume more than the short leg, water can be raised to any required hight. A. Your theory would answer very well if the column of water were connected together after the manner of a rope; as it is, we prefer to hold to the original explanation. Should you doubt it, however, you can readily make the experiment.

(32) U. Z. L. asks: What is the best method of removing rust from iron and steel? A. Use an emery block, with oil; such blocks are supplied by the makers of emery wheels.

(33) A. Z. L. says: 1. I am building a steamboat 27 feet long, with 6 feet beam and about 32 or 33 inches draft. Are these last dimensions in proportion to the length? A. They will answer very well. 2. I have a four horse power boiler and 2 one horse power engines which I propose to connect to a propeller shaft. What should be the size and pitch of the propeller? A. Try 30 inches diameter, 3½ feet pitch. 3. At what rate would the above engine propel the boat? A. 5 or 6 miles an hour. 4. Can I attain a speed of 18 knots an hour with a boat of the above dimensions? A. So small a boat could hardly carry the machinery for such a speed.

(34) W. H. B. asks: Can a barrel that has had vinegar in it be cleaned for keeping beef in? A. Yes, by using a strong potassa lye, and then thoroughly cleansing with water.

(35) N. S. asks: 1. How can I make a good silver-plating fluid? A. Dissolve 1 oz. nitrate of silver in 3 pints distilled water. Add strong solution of cyanide of potassium until no further precipitation takes place. If too much cyanide is added, it will redissolve the precipitate. Pour off the supernatant liquid, and wash the precipitate carefully. Now add strong solution of cyanide to dissolve the precipitate. Make one gallon with distilled water. The solution should have a moderate excess of cyanide, and it must be filtered before using. 2. What is a good simple way of plating with a battery? A. See pp. 75 and 133, vol. 30.

(36) C. says: In No. 9, current volume, you give the specific heat of carbonic acid as 0·21630, water being unity. What is the specific heat of carbonic acid gas? If one pound of this gas were placed in a tight tin vessel at a temperature of 120° Fah., immersed in another vessel containing one pound of water at 70° Fah., and allowed to remain until cooled by the water, at what degree would the two temperatures meet, no allowance being made for loss of heat? A. The number given is the specific heat of the gas. Let x = number of degrees which the 1 lb. of carbonic acid gas must lose: then $120° - x = 70° + 0{\cdot}216x$. $1{\cdot}216\ x = 50$, or $x = 41{\cdot}12$. And $120° - x = 78{\cdot}88°$, $70° + 0{\cdot}216\ x = 78{\cdot}88°$, which is the point at which the temperatures would meet.

(37) A. D. B. asks: How can I prepare chemical paper for telegraphic purposes? A. We believe the fluid used is a solution of ferrocyanide of potassium. 2. Can the solution be used as a writing fluid, with a pen, so that the paper would only be sensitive where covered with the writing? A. It may be used with a pen, but not a steel pen. 3. Where paper is a non-conductor, does the solution render it a conductor? A. Yes.

(38) A. H. Y. asks: 1. What property is there in some well water which destroys the lead pipe of a pump? A. Lead is corroded by pure water when it is exposed to the united action of the air and water. The water dissolves the oxide of lead. In case the water contains certain mineral matters in solution, its corrosive action on the lead is increased; other mineral salts diminish its corrosive action. A chemical analysis of the waters of your well would show exactly to what ingredient this corrosive action upon the lead was due. 2. Why does a lead pipe in a manure vault crumble to pieces? A. The manure in decomposing forms nitrates, nitrites, and certain ammoniacal salts, all of which exert a corrosive action upon the lead. 3. I often find that some water will act very quickly upon block tin pipe, filling it with little holes from which a fine dust is procured. What is the cause of this, and what is the dust? A. The white body is an oxide or other compound of tin, resulting from the causes above described. 4. Is block tin pipe poisonous to water, like lead? A. No.

(39) F. O. asks: How can I dye feathers to a red color which will be waterproof, to be used on fish hooks? A. Take 1 oz. Brazil wood in powder, ½ oz. alum, ¼ oz. vermilion, and 1 pint of vinegar; boil them up to a moderate thickness, and dip the feathers (they having been previously steeped in hot water) into the said mixture. As to your other question, address Seth Green, Esq., Rochester, N. Y.

(40) C. S. T. asks: Is oleomargarin the proper name for butter manufactured from beef suet? A. It is a proper name, being derived from two of its principal constituents. 2. Is there any difference between the oil of beef suet (when it is separated from the stearin) and butter oil? A. If we clearly understand your meaning, the olein is the same in both substances. The olein found in butter was considered by Bromeis to be of a peculiar kind, which he termed butyrolein; but Gottlieb has shown that the difference in properties between the oleic acid obtained by Bromeis from butter and that obtained from ordinary olein depended simply upon the oxidation which it had undergone during the process adopted in preparing it.

(41) J. L. asks: How can I make an æolian harp? A. See p. 330, vol. 26. The strings should be drawn tight.

(42) T. G. G. asks: What are the characteristics of asbestos or amianthus? A. Asbestos is a variety of hornblende or amphibole, which is a silicate and aluminate of magnesia, lime, and protoxide of iron, with a variable proportion of fluorides of calcium and potassium. It is soluble in a mixture of certain proportions of hydrofluoric and sulphuric acids.

(43) N. N. B. asks: At what parallel of longitude does each day begin and close? A. At 180° east or west of Greenwich.

(44) R. C. D. and others ask: Is there any way of bleaching beeswax without going through the long and tedious process of sun bleaching? A. It may be done by means of nitric acid; but chlorine, though it destroys the color, cannot be employed for this purpose with advantage, for it was observed by Gay Lussac that a substitution of chlorine for a portion of the hydrogen occurs under these circumstances. When candles made from such wax are burned, irritating vapors of hydrochloric acid are evolved.

(45) A. D. L. asks: To find the coefficient of friction in a moving body, do you divide the weight required to move the body by the weight of the body? A. Yes. As to your pendulum query, consult a work on analytical mechanics.

(46) J. K. B. asks: 1. What is the most accurate method of finding the throw of the eccentric for any travel of valve? A. The throw of eccentric must be the width of the steam port added to the amount of lap on the valve; hence the travel of the valve or (what is the same thing) the stroke of the eccentric must be twice the width of the steam port added to twice the amount of lap on one side. 2. What is the most accurate method of proportioning slide valves for any width of ports? A. A slide valve should always have at least ¼ inch lap, so as to give a free exhaust, the width of the exhaust port of the valve being 1-16 or 1-32 less than the width between the steam ports of the cylinder face. Additional lap must be added if working expansively is desired. 3. What is the most accurate rule for calculating the pressure on slide valves? A. If the faces of the valve and seat are fitted steamtight, the entire pressure will be the product of the entire area of bearing surface and ports in inches multiplied into the pressure per square inch maintained in the steam chest. This, multiplied into the coefficient of friction between the two surfaces, will give the force required to move the valve under such pressure when unbalanced. But as there are few valves which remain accurately fitted, any method of balancing slide valves should provide for experimental adjustment.

(47) C. M. A. says: I am about to build a small cottage building, which I wish to construct as economically as possible, and at the same time to introduce some modern conveniences. Among other things I propose to place my cistern on the second floor, so as to take the water over the house. Now a cistern of the requisite capacity, say 75 barrels, if lined with sheet lead or similar material, would be quite expensive. I propose to make a rectangular box of plank, of the requisite dimensions, to lath it inside across the grain of the plank, and then to apply a good coat of water lime cement. The cistern is to be located over an unfinished room, so that in case of possible slight leakage no harm would be done before the leak could be stopped. To guard against freezing, I will put at least 1 foot of dry sawdust over the whole thing. Can this be done effectively? A. We have no confidence in the kind of tank that you propose; the swelling and shrinking of the plank would cause the cement to crack. A better plan would be to construct a circular tank of 2 inch plank in staves, largest at bottom, and secured with strong iron hoops that may be driven down upon it if the wood shrinks. A tank like this can be made tight without a lead lining. If your house is tight, the water will not freeze more than ¼ inch thick on the top, and you will not require any special protection for this.

My rooms will most of them be as small as to make stoves inconvenient. I propose, in place of a furnace, to place one of the largest sized cast and sheet iron cylindrical stoves in the cellar, and to enclose this with a brick wall distant 1 foot all around, and make connection with this space by pipes to the open air on one hand, and to the rooms above on the other. The space to be heated will be about 14,500 cubic feet. What is your opinion as to the practicability of this? A. Your stove enclosed in brick is a proper heating furnace, but the number of cubic feet of air heated will be in proportion to the number of square feet of heating surface provided, and the latter may be increased in your case by introducing, by means of elbows, two or three joints of smoke pipe within the air chamber.

(48) C. G. asks: Cannot the poke root plant, which grows in such great profusion throughout the South and West, be made to subserve some useful purpose, rather than be treated as a troublesome weed? As all know who are acquainted with it, the berries have an abundance of juice of a beautiful deep red color and thousands of gallons could be obtained annually. It makes a beautiful ink, but it fades after a little time. I have tried putting in copperas, alum, etc., but they only precipitate the coloring matter. How can this beautiful color be utilized? A. The poke root (*phytolacca decandra*) is an indigenous plant, with a very large perennial root, and is used in medicine. "The root abounds most in the active principles of the plant. It should be dug up late in November, cut into thin transverse slices, and dried with a moderate heat. As its virtues are diminished by keeping, a new supply should be obtained every year. The berries should be collected when perfectly ripe, and the leaves about the middle of summer, when the foot stalks begin to redden. The berries contain a succulent pulp, and yield upon pressure a large quantity of fine purplish red juice. They have a sweetish, nauseous, slightly acid taste, with little odor. The coloring principle of their juice is evanescent, and cannot be applied to useful purposes in dyeing, from the difficulty of fixing it. Alkalies render it yellow; but the original color is restored by acids. The juice contains saccharine matter, and after fermenting yields alcohol by distillation. The dried root is of a light yellowish-brown color externally, very much wrinkled, and, when in transverse slices, exhibits on the cut surface numerous concentric rings, formed from the projecting ends of fiber, between which the intervening matter has shrunk in the drying process. There is no smell; the taste is slightly sweetish, and at first mild, but followed by a sense of acrimony. The active matter is imparted to boiling water and alcohol. From the analysis of Mr. Edward Donelly, the root appears to contain tannic acid, starch, gum, sugar, resin, fixed oil, and lignin, besides various inorganic principles. It is emetic, purgative, and somewhat narcotic. As an emetic it is very slow in its operation, frequently not beginning to vomit in less than one or two hours after it has been taken, and then continuing to act for a long time upon both stomach and bowels. The vomiting produced by it is said not to be attended with much pain or spasm, but narcotic effects have been observed by some physicians, such as drowsiness, vertigo, and dimness of vision. In overdoses it produces excessive vomiting and purging, attended with great prostration of strength, and sometimes with convulsions. It has been proposed as a substitute for ipecacuanha, but the slowness and long continuance of its action wholly unfit it for the purposes which that emetic is calculated to fulfil. In small doses it acts as an alterative, and has been highly recommended in the treatment of chronic rheumatism. The dose of the powdered root, as an emetic, is from 10 to 30 grains; as an alterative, from 1 to 5 grains. A saturated tincture of the berries prepared with diluted alcohol may be given in rheumatic cases, in the dose of a fluid drachm three times a day. An ointment, prepared by mixing a drachm of the powdered root or leaves with an ounce of lard, has been used to advantage in *psoratinea capitis* and some other forms of cutaneous disease. It occasions at first a sense of heat and smarting in the part to which it is applied. An extract made by evaporating the expressed juice of the recent leaves has been used for the same purposes, and acquired at one time considerable repute as a remedy in cancer."—*U. S. Dispensatory.*

(49) O. C. asks: Is there any waterproof varnish by which paper can be fastened to glass so as to let gaslight penetrate through and show printed figures on the paper? A. Ordinary dammar varnish will doubtless answer your purpose.

(50) W. H. S. asks: How can I make muriatic salts of nickel? How can I make the solution of the salt? A. Chloride or muriate of nickel is formed by dissolving the oxide of nickel in hydrochloric (muriatic) acid. On evaporation it yields green hydrated crystals; by heat it may be obtained as a yellowish-brown anhydrous mass. It is soluble in distilled water.

(51) X. U. S. asks: How can I dissolve glass, and harden it? A. Ordinary glass is converted into a semi-fluid mass at high temperature. When heated with a quantity of carbonate of soda or potassa, it is converted into a soluble form, known as water glass. It cannot be re-hardened in the way you desire. We do not understand your other question.

(52) E. R. M. & P. W. ask: Is there any compound or solution (except iron or steel) that will act as an insulator between a permanent magnet and a piece of iron or steel? A. A short interval of space.

(53) G. A. M. says: A thermometer was sent to me a long distance by rail, and I find that the mercury in the tube is separated into three portions. I think air is in the tube. Please tell me how to get the mercury together. A. If you cannot do it by shaking or jarring the mercury together, open the upper end of the tube, form around the opening a small funnel with clean wax or paraffin. Gently heat the bulb with a spirit lamp, which will force a portion of the air out of the tube, then allow the tube to cool; repeat the operation several times, or until the mercury is together. The mercury is then heated to boiling, the vapor of which soon expels the remaining air and moisture. The tube, being now full of expanded mercury and mercurial vapor, should be hermetically sealed.

(54) W. W. asks: Can common family soap do any harm in the cylinder of an engine? Being out of grease some time ago, I used some chunks of common soap as a lubricator. I found it much superior to any grease I have used; but I am told by some that it leaves a residue behind, and blocks up the cylinder passages, etc. A. We cannot recommend the use of soap for this purpose.

Where can I get tables of the decimals of an inch, or how can I reckon them? A. Decimals decrease by tens; common fractions are expressed in decimals as follows: thus $\frac{1}{2} = 0{\cdot}5$; $\frac{1}{4} = 0{\cdot}25$; $\frac{1}{8} = 0{\cdot}125$; $\frac{1}{12} = 0{\cdot}0833$; $\frac{1}{16} = 0{\cdot}0625$; $\frac{1}{32} = 0{\cdot}03125$, etc. To reduce decimals to common fractions, use the figures as a numerator, and put 1 for the decimal point and as many ciphers as there are figures for the denominator. Thus $0{\cdot}25 = \frac{25}{100}$, $0{\cdot}03125 = \frac{3125}{100000}$, etc.

(55) M. S. P. C. says: In shops where they cut glass there is a powder used for polishing, made by burning tin until it is nothing but dross. This dross is heavier than the tin was originally. If you take 120 lbs. of tin, it will weigh (after burning) 126 lbs. How do you account for it? A. In burning, the tin is converted into the oxide, or, in other words, it absorbs a certain amount of oxygen from the air. The same is true with all metals when burned in contact with the air.

(56) J. W. P. asks: 1. About how long a time will 3 Leclanché cells last on an open circuit of 70 feet, where the circuit is closed only a second at a time 15 or 20 times a day? It is used to ring a tapping bell. A. From 6 to 12 months. These cells are in use in our office, and work six or seven bells or sounders. The cells have not been touched, we believe, for ten months past. 2. About how long a time will a Leclanché cell last on a closed circuit? A. This depends a great deal upon the resistance of the line and the sounders, etc. 3. Is there any loss of electricity at the press knobs where the metal touches the wood, or at any other place where the wire may happen to touch wood only? A. The loss would be imperceptible on a short line. 4. If two cells can do the required work, will the battery last a longer time if I use three cells? A. No. 5. For telegraph wire, will lead water pipes, running into a well, make a good ground circuit? A. No.

(57) W. H. D. asks: How can I make copper gas cylinders for the oxygen and hydrogen gases, so as to dispense with the use of bags and pressure boards, in using lanterns? A. There are several varieties of these cylinders; one consists of a cylindrical tank about 2 feet in diameter and 3 feet in hight. Into this is placed in an inverted position a similar vessel, of a few inches smaller in diameter. The apparatus is filled through connections in the upper head of the inner vessel, by displacement of water. Another form is that of a cylinder, constructed of very strong boiler iron, containing only one small opening for connections in the upper head, which is governed by a screw valve. The gas is forced into the tank by means of an air pump, until the pressure per square inch is not less than 200 lbs. The latter are very convenient.

(58) J. P. G. asks: How can I silver the surface of several panes of fine glass, so that they may appear white and brilliant? A. See p. 203, vol. 30.

What is the process of canning fish? A. One process consists in placing the fish, after being cleaned, in open vessels, which are then set in a steam chest, and the contents subjected to the action of steam at 212° Fah., for five hours, after which the fish are removed, drained, cooled, and packed with oil in metal boxes of marketable size, which are then closed and soldered, after which the closed boxes are heated by steam from 217° to 220° Fah. for five hours, according to the size of fish. By this method the fish may be preserved without vinegar or spices.

(59) J. C. H. asks: 1. Is the mind located in the brain? A. The mental operations are carried on by corresponding actions in the brain. 2. Can the mind be located at all? Some physiologists hold to the doctrine that the mind is separate and distinct from the soul, while others say the mind is a power with which the soul is endowed. Which is correct? A. These are metaphysical subtleties, not recognized in the treatment of the subject as a part of positive experimental science. 3. When a person is deranged, is it the mind of that person which is impaired, or are the channels through which the mind operates, to receive knowledge from external things, injured? A. Both the centers and avenues of mental impressions and sensations are essential to that healthy and harmonious operation of the mental faculties which characterize a state of mental vigor.

(60) H. J. F. asks: Why do the legs on the bottom of the old fashioned fireplace kettles burn in the middle? A. In order that iron may burn, it is not only necessary that it should be brought to a high temperature, but also that it should come into contact with the oxygen of the air at the same time, and these conditions are only realized in the middle of the leg.

(61) I. W. F. S. asks: Can you inform me of any way of causing fermentation, suitable for baker's yeast, without using stock from previous making? A. Fownes states that if wheat flour is mixed with water into a thick paste, which is to be slightly covered in a moderately warm place, it begins, about the third day, to emit a little gas and a disagreeably sour odor; about the sixth or seventh day the smel changes, much gas is evolved, accompanied by a distinct and agreeable vinous odor; and it is then in a state to excite vinous or panary fermentation, and may be at once used for that purpose, or formed into cakes, dried, and preserved for future use. Wort fermented with it forms a large quantity of yeast.

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

A. C. S.—It is iron ore, containing a notable quantity of titanium. It cannot at present be smelted with pecuniary advantage.—G. A. F.—A qualitativs analysis made upon 100 grains of this pyrrhotine, which closely resembles the niccoliferous pyrrhotine of the Gap Nickel Mine, did not demonstrate the presence of nickel. It should be properly analyzed. A large quantity might show a valuable percentage of nickel.—W. H. McC.—It is a variety of kaolinite; it might be used perhaps, in the manufacture of pottery.—H. L.—It is magnetic pyrites.—G. F. B.—They are tourmaline, muscovite in quartzite, and biotite.—M. W. H.—No. 1 is neither gold nor iron pyrites; it is mica. No. 2 contains 80 per cent of lead.—H. S.—No. 1 is galena and blende. No. 2 and No. 3 are galena. No. 4 is calcite or carbonate of lime. No. 5 is ferruginous quartz. No. 6 is marcasite.—G. L. L.—It is iron pyrites.

E. D. K. asks: How can I dye morocco leather white, and how is the gloss given to morocco and other leather?—S. R. S. asks: How can I pare fruit by heating?—G. W. S. asks: How are broomsticks painted, striped, and waved?—H. K. asks: What preparation is used to put a hard and glossy finish on ax handles?

COMMUNICATIONS RECEIVED.

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

On Automatic Cow Milkers. By J. E. G.
On Scorpions. By D. E. R.
On the American Institute Fair. By L. H. R.
On the Retrogression of the Sun. By C. H. B., and by H. B.
On the late Charles M. Keller. By A. M.
On Steam Engines. By W. P. P.
On Cooking Oatmeal. By W.
On a Calculating Machine. By E. K. W.
On Railroad Employees and their Pay. By B. G. G. J.
On the Phylloxera. By L. W. G.
On a Boiler Explosion. By S. H. H.

Also enquiries and answers from the following:

Q.—W. M. S.—E. B.—G. T.—N. M. L.—R. S, T.—F. U. M—N. T. D.—R. W.—T. P.

HINTS TO CORRESPONDENTS.

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.

Enquiries 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.

Hundreds of enquiries analogous to the following are sent: "Who sells the best stove for heating a workshop? Who manufactures knives, and gold and silver trinkets? Who makes steam indicators? Who publishes a book on making glass? Who makes carbon plates for batteries? Who sells a book on wax fruit and flowers?" All such personal enquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.