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W. B. C. will find directions for painting outdoor work on p. 227, vol. 26.-H. W. C. Jr. cancement wood to glass by following the directions for aquarium cement on p. 90, vol. 30.—A. R. is informed that polishing shirt bosoms is described on p. 27, vol. 30. —Q. V. will find directions for making gold ink on pp. 43, 58, vol. 30.—J. R. will find instructions for repairing rubbergarments on p. 203, vol. 30.-W. B. F. will find the process of japanning castings described on p. 123, vol. 29.-R. E. should apply to a pump manufacturer.-A. F. F. will find simple tests for sirup detailed on p. 171, vol.30. There is little or no foundation for many of the sensational stories about the manufacture of this article.-A. B. D. will find a recipe foraquarium cement on p. 90, vol. 30. As to blowplipe manipulation, see p. 156, vol. 25. — A. H. M. willfinddirections for finishing walnut furniture on p. 218, vol. 26 .- P. J. H. can tin small castings byfollowing the directions on p. 91, vol. 26. J. S. P. will find a description of making lamp black (carbon) on p. 21, vol. 28.-M. can use hard tallow for lubricating his paper cutting knives.

J. K. asks: What is coffee, chemically? Are there not chemicals that could be substituted for coffee, that would have the same taste and be cheaper? A. Raw coffee has been analyzed with the following result, in 100 parts: Woody fiber 34, fat and volatile oil 10 to 13, glucose, dextrin, and vegetable acid 15'5, free caf-fein 0'8, ash 6'7. The caffeic acid, modified by roasting, is supposed by chemists to afford the greater portion of theflavor and peculiar properties of coffee. There are manyso-called substitutes for coffee, but nothing like the genuine article.

J. K. asks: 1. Is there a stone that will draw the poison from the bite of a mad dog, and thus cure or prevent by drophobia? A. No. 2. What is the medicinal virtue of the so-called bloodstone (lapis ha natitis)? A. An unfounded superstition. 3. What are the principal differences between the austral and borea poles of a compass needle, and how can the peculiar properties of each pole be made manifest? A. The principal difference is that they are attracted by the poles of the earth which have the opposite polarities.

E. C. T. asks: 1. How can I construct a bat-tery (Smee's pattern) of zinc and carbon? A. Smee's battery consists of a thin plate of platinised sliver, suspended between two plates, or one plate bent double, of amalgamated zinc, and the whole immersed in dilute sulphuric acid. Bunsen's battery consists of a cylinder of compact coke immersed in strong nitric acid, con-tained in a porous vessel, and another cylinder of amalgamated zinc immersed in dilute subhuric acid, ex agamated into immersed in unite whole contained in astrong glass vessel. 2. Will a 2 inch object glass of 36 inches focus show the colors on the planet Mars? A. It probably would, but you could not use the full aperture unless the glass were achromatic. 3. What are the distances between object glasses and eye pieces from twenty-four inches focus up to eighty inches? A. The distance of the eye piece from the object glass is equal to the sum of the focal distances of the two. 4. What is the value of a pound in English money compared with currency of the United States? A. About \$558. What are the duties on scientific instruments, such as microscopes, etc.? A. It depends upon the materials of which they are constructed.

F. G. N. asks: What is the best kind of varnish for covering the inside of asilver plating vat? A. Use copal varnish dissolved in turpentine

J. W. asks: 1. How are porous cells made? A. Porous cells are made of unglazed carthenware. 2. How is the thing that you pull out of an electric machine for giving shocks, to regulate it.constructed? A. By two rods running to a point at one end and terminated by balls at the other. They slide through holes in brass caps, which are fastened on the tops of insulating columns the caps being provided with clamping screws to fix the rods at any desired distance.

W. H. S. asks: What acids are said to mix with water and linseed oil, so that they will not sepa-rate? A. Probably muriatic and nitric acids. We cannot tell the quantities unless we know for what this mixture is used.

M. S. J. asks: How is carmine made? What is the meaning of the numbers No. 12, No. 20, No. 40. by which the quality is known? Is there any better than No. 40, or poorer than No. 12? Where are they made? A. Carmine is a beautiful red pigment prepared from the cochinesl insect. The insects are found upon the sactuses of Mexico and Africa, and when matured are brushed off the plants and dried by artificial heat. There are many processes for the preparation of carmine, but success principally depends upon the use of the purest materials and the exercise of care, skill, and patience. The following is an English process : Cochineal 1 lb.and carbonate of potash ½ oz. are boiled in 7 gallons of water for 15 minutes. The vessel is then re-moved from the fire and 1 oz. powdered alum added. The liquoris then well agitated and allowed to settle for 15 minutes. The clear liquoris then decanted into a ciean vessel and isinglass % oz. dissolved in water 1 pint (and strained) added. As soon as a coagulum forms on the surface the heat is removed, the liquorstrongly agitated with a bone or sliver spatula, and then allowed to repose for 20 or 30 minutes. The deposited carmine must be drained and dried. Carmine is made in Europe. The numbers refer to the different qualities, from the best or that of the richest and brightest hue to those of inferior shades.

J. E. G. asks: How can I separate very fine float goldfrom quickeliver without using a retort? A. You can remove the mercury after amaigamation by digesting it in an excess of cold ilutenitric acid. The gold will remain unaffected. The mercury, however, will be lost.

N. N. asks: 1. What kinds of wood are used in the manufacture of paper? Can pine, spiuce hemlock, oak, chestnut, and white wood be used? A. All soft woods are used for paper making, such as the trembling poplar, linden, aspen, fir, etc.; the pine is of too resinous a nature to be of much value. 2. What is the process of reducing the wood to pulp? A. See p. 272, vol. 20. 3. Cin it be made into whitepaper? A The finest woods are used for writing paper. 4. If so, what is the process of bleaching? A. A jet of chic. rine water under pressure.

S. H. B. asks: How can a polish be given to Iceland spar or selenite, perfect enough for optice purposes? A. With oxide of the used wet, on a bed of white wax.

C. R. A. says: Is the bismuth of commerce a metal much used? A. It is largely used for type and stereetype metal. Newton's fusible alloy, which is used as a soft solder by pewterers, consists of bismuth 2 parts, lead 1 part, and tin 1 part.

R. J. H. asks: 1. Does electricity occupy space? A. It does not occupy space. 2. is lighting fre produced by electricity, or is it electricity itself? A. It is the particles of the air rendered luminous by the passage of the electric fluid. 3. Does it take a smaller charge of electricity to send a dispatch across the Atlantic cable than it would to send one 25 miles on land? A. No. 4. Would a battery of six guns send the noise any farther than one gun? A. There would be a greater probability of the noise being unquenched by obstacles and disturbing causes in the case of six guns 5. Does the noise travel any faster from the six guns than it does from one? A. No. 6. Will not a too heavy charge of electricity going through the cable generate agas and cause it to burst? A. No. 7. Is electricity a gas, or do vibrations of the wire send the message? A. It is a motion transmitted from particle to particle of the wire.

H.C.H. asks: Can you give me a rule for

S. L. SEVS: I have a few gallons of lubri-cating oil. What can I mix with it to make axle grease? A. Try adding tallow or lard to it, until it thickens sufficiently foruse.

E. T. H. asks: What alkali and acid (used inflate the bags for raising wrecks) is spoken of in "Scientific and Practical Information," in No.16? A. Carbonate of soda and muriatic acid. 2. What is glass etching, and how is it done? A. By mixing powdered fluor spar and strong oil of vitriol to a thick paste in a leaden vessel, and allowing the vapor arising from the mixture to come in contact with the glass where it is left unprotected by a thin coating of bees wax.

C. B. L. asks: 1. What causes the report of agun? One friend says that it is the air rushing back into the gun barrel after the discharge, and another says that, when the gun is fired off, the force of the powder cleaves the air, and, coming together with the great force which it possesses, causes the report. A. Sound being propagated by waves, any cause which puts the airin vibration gives rise to a sound, more or less loud according to the intensity of the disturbing force. The report of a gun is due to concussion, a sudden striking of the air, as it were, and the propagation of sound waves. 2. What causes thunder? A. Thunder is the report from a flash of lightning, and is accounted for in the same way as above. Your specimen seems to be a thin film of oxydized oil or gelatin colored with Prussian blue.

C. K. asks: Is not a car wheel by which the difficulty of running on curves may be obviated a desid eratur? A. If you mean a wheel so constructed that the train will experience no greater resistance on a curve than on a straight track, we answer: Yes.

W. J. E. asks: 1. What is the best method keeping steam boilers clean and preventing scale within the boiler? A. See p. 116, vol. 30. 2. Will the cut-off valve, cutting off the steam at $\frac{1}{3}$ stroke, afford the same power as the flat valve engine, the dimensions of both engines being the same? A. For that point of cut-off, it is hardly necessary to have a separate cut-off valve

H.C. asks: 1. What should be the diame-ter, width of blade, and pitch of a three bladed propel ler for a boat 25 feet long and of 6 feet beam, to get a speed of 6 miles an hour? The engine is of 2 horse power. A. The engine is not large enough for that speed. 2. Can a propeller be made of boller iron? A. Yes.

R. C. M. says: I have a 2 horse power ver-tical boller, of which I want to take out the flues and cleanout the shell; how can I do it without damaging them? A. If you mean without spoiling them for use in the same boiler, we do not think that it can be done.

N. L. asks: 1. Does wood shrink endwise? A friend says that boards on a fence, if put on green, would shrink endwise so as to draw them off the posts. A. The shrinkage, if any, is exceedingly slight. 2. How should a pulley be turned to keep the belt straight, with an angular or a curved face? A. Make the axes of the two pulleys parallel. 3. I lately had occasion to repair a cupola fan with four half diamond paddles. After it was done, we tried it, closed up the holesso that no air could pass out of the fan, gave it the regular speed, and opened the pipes ot hat the fan threw out the wind. To our surprise, the speed decreased nearly one half. Why was it? A. It had more work to do in the latter case.

I. asks: 1.Please give a brief description of the Gunther's scale (2 feet long), and tell the significa-tion of the legends "Lea," "Rum," "Cho," "Sin." "Tan," "etc. A. On one side is a scale of 24 inches, divided into tenths of an inch. Below this, on the left, is a scale of inches and half inches, divided into hun-dredths. On the right are scales for laying out a vessel'strack by departure and distance. They are used with smallquadrants, which can be drawn by the navigator, with a radius of two or three inches. The icales for these quadrants are in the middle. On the left is the scale for the 2 inch quadrant, which has the rhumbs (or chords for the compass divided into parts of 11%° each), chords, sines, tangents, and semi tangents. On the right is a scale for the Sinch quadrant, with leagues (20 to au inch) rhumbs, middle latitudes, and chords. On the other side are logarithmic scales for the sines and tangents of rhumbs; numbers, sines, versed sines, and tan-gents of degrees; and lastly, scales of meridional and evenparts, for a chart on Mercator's projection. The use of the scale is described very fully in Bowditch's "Navigation." 2. In a globc or sphere revolving on its sxis, is there not a line of particles, however minute, that is in itself immovable, while all the other particles revolve around it? A. Yes, if you can conceive the line of particles to have a single dimension. 3. Would a railroad bridge across the Atlantic be possible and practicable? A. It has been proposed by some engi neers. Past experience would not justify a positive opinion for or against the project.

W. F. McD. asks: Should the bed of a ver-tical drill stand perfectly level? If the drill stands at an angle of 15°, will it make as true a hole as if it were level? Doestherule applying to the vertical drillalso apply to the horizontal drill, lathe, and planer? A. If all the moving parts are truly fitted, the tools may stand in any position.

L. D. B. asks: With what sort of tools are crews made on the softer woods? I have no trouble chasing a screw h hand on hor toothed chaser does not do for soft woods. A. Try an ordinary tool and use with high speed.

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C. D. F. asks: Why is it that, to a magnet which has become weakened, weights may be added un tilits full power is reached? A. It is probably due to themolecules becoming more highly polarized under the influence of the directive force.

E. G. A. asks: 1. What is the color of gold dust, as discovered in the sand of a river? A. Yellow. 2. What is the color of plathum when discovered in sand? A. Sliver white. 3. What is the most simple and effectual way of separating gold from sand? A. By washing away the sand and earth in a pau. The fine particles of gold settle at the bottom. 4. Is the valley of the Allegheny river considered as a part of the coal regions of Pennsylvania? A. It is considered as belonging to thelowercoalseries.

C. R. asks: 1. Can the alkali of the great beds of Nevada and California be used as a fertilizer to advantage? A. Some of these deposits might be experimented on with advantage. 2. How can Iget a small quantity forwarded to New York? A. Apply to Agricultarial Bureau, Washington, D. C.

finding the velocity with which water will flow through a hole in a vessel submerged to any given depth? A. See article on "Friction of Water in Pipes," p 48, 101. 29. The effective head will be the difference between the hight of water above the orifice, within and with out the discharging vessel.

P. D. R. asks: 1. What are three or four of the best conductors and non-conductors of heat? Wha metal will transmit heat and cold the quickest? A Silver will conduct most readily, and then gold, copper zinc, iron, and tin, in the order mentioned. Feathers powdered charcoal, sawdust, woolen goods, sulphur are among the best non-conductors. 2. Why is it that aspoon in a glass jar or tumbler prevents its being cracked or broken when hot water is poured therein? A. Any effect it might exert is due to the rapid absort ing and conducting power for heat, which would di minish the amount of heat which could operate upon the containing vessel.

F. asks: How can I clean very hot brass in the brass in the brass pipes (with live steam in them) that have to be polished. What is the best way to clean brass, warm or cold, so that it will keep its polish for sometime? A. It will be difficult to clean the brass work in such a manner that it will continue bright for any length of time, unless it is covered with a lacker.

L. D. H. says: 1. I have heard that salt water will not freeze, and thatice in salt water is perfectly fresh. A. It will freeze if the water is motionless and the cold is sufficiently intense. 2. How does the salt separate? A. In freezing, water crystallizes; and the crystals of ice, in forming, reject the particles of dirtand impurities. As to transmission of power by beits, see p. 389, vol. 28.

D. H. W. asks: 1. Is there any process by which I canplate steel springs without removing the blue coloring? A, 'iry rubbing with weak muristic acid, and then wiping clean with water and drying. 2. What is the best way of taking the coloring off? Is there any way of covering them with copper (without a battery), so that I can plate them with silver? A. Immerse the steel springs, after being freshly cleaned as bove, in a bath of solution of blue vitriol.

D. P. W. asks: Does ice sink in the spring? Pilots on the Mississippi say that it does not break up and float away, but that it sinks out of sight. I think that water forms or fails on the surface of the ice, thus making it appear to sink. A. Your explanation is cac