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T. A. B. and others, who ask as to books on the locomotive engine, should read Forney's "Catechism of the Locomotive." -D. W. P. will find formulæ on the strength of boilers on p. 186vol 32.—J. C. W. will find full instructions for pol ishing lenses on p. 363, vol. 31. Consult Prechtl's Dioptrik," if you can read German .- J. H. R. should use the Léclanché battery. See p. 362, vol. 31.-P. H. G. will find directions for polishing shirt bosoms on p. 203, vol. 31.-H. H. T. will find partir culars as to the invention of the screw propelle- | cany, and is abundant in the Chilian Andes.

on pp. 151, 241, vol. 30.-E. R. J. will find a descrip tion of the method of preparing bone charcoal on p.54, vol. 28.—J. L. H. will find a recipe for cemen for glass and brass on p. 117, vol. 32.-F. B. S. will find a description of an electric engine on p. 241 vol. 33.-A. K. will find full directions for mounting maps, etc., on p. 91, vol. 31.-R. W. will find that painting on zinc is described on p. 116, Science Record for 1874.—W. N. C. will find directions for bluing steel work on p. 123, yol. 31.—W. A. will find directions for hardening needles on p. 347, vol. 31.-J. C. R. will find the dimensions of the Great Eastern steamship on p. 346, vol. 31.—J. C., of Moscow, Russia, will find a description of a wood-splitting machine on p. 79, vol. 28.

(1) S. L. S. asks: Please to inform me how can dissolve aniline green, or how to prepare it for coloring purposes. A. We are acquainted with two varieties of this color, namely, aldehyde green and iodine green. The former is soluble in 2 parts of sulphuric acid, and from 50 to 70 parts of alcohol. The latter dissolves readily in equal parts of alcohol and water.

(2) W. M. J. asks: 1. Why would it not answer as well to place the coils of a magnet $\frac{1}{16}$ of an inch apart instead of putting them the thickness of a fine silk thread apart? What would be the result provided the same length of wire be used? A. It would not answer so well, because the same number of convolutions could not be contained in the space occupied by the wire when the latter is covered with a thin layer of silk only. 2. What is the theory of a current of electricity passing around a piece of soft iron, magnetizing the same? A. Ampère's theory assumes that each individual molecule of a magnetic substance is traversed by a closed electric current. It is further assumed that these molecular currents are free to move about their center of gravity. The coercive force, however, tends to keep them in any position in which they may happen to be. When a current of electricity is passed around the substance, its tendency is to place all of the molecular currents in a parallel direction; by this means the action of the latter on external matter becomes apparent. 3. Is the magnetic influence derived from the passage of a current of electricity? A. Yes. 4. Would it not do as well, if practicable, to replace electricity with heat? A. Yes. It is not practicable, however, until the heat is first transformed into electricity.

(3) J. R. C. asks: If the two disks of an achromatic object glass are $5\frac{3}{16}$ inches in diameter, the bi-convex and the contact side of flint glass being ground to 31 inches radius, what should be the curvature of the posterior side of the flint glass? If the disks be 41/4 inches in diameter, and the three curves (as above) are ground to 24 inches ra dius, what should be the posterior or correction curve? The lenses are of French glass. A. As suming the glass to be of medium quality, in the first instance, the posterior curve should be concave, of 146 inches radius. The latter should also be concave, of 113 inches radius.

(4) J. E asks: How can I make glycerin soap? A. It is made by incorporating, with any mild toilet soap, $\frac{1}{25}$ or $\frac{1}{20}$ by weight of pure glycerin, while in the melted state. It is generally tinged of a red or rose color with a little tincture of orchil or of dragon's blood, or orange yellow with a little annatto. It is variously scented; but oil of bergamot or rose geranium (ginger grass) support ed with a little oil of cassia, or oil of cassia sup-ported with essential oil of almonds, appears to be the favorite perfume. The greater portion of the so-called glycerin soaps contain not a particle of glycerin.

(5) J. F. P. says: I propose to build a fruit house with ice house overhead. I propose a triple brick wall, with two air spaces of two inches each, with cut-off at every two feet in hight. Would it be better to fill one or both spaces with non-conducting material, like sawdust, on the them as dead air spaces? A. In this case with would

(6) J. O. P. asks: How can I make vinegar in 10 hours, from pure cider? A. The best ferment is vinegar. An old cask in which vinegar has been kept is the best to ferment in. Other ferments are used, such as bread soaked in yeast, sour dough, dough of wheat, or rye bread soaked in cream of tartar and vinegar. All these are used in small quantities, a few ozs, to the barrel. Vin egar made with them is more apt to spoil. The more ferment there is present, the quicker will be the process. The cider is put into the cask, which is best painted black outside to absorb the sun' rays when the weather is cool; the bung is left out, the bung hole is covered with a piece of slate. and in about four weeks the rectification is comnlete. The lower the temperature is the s will be the change.

(7) G. J. asks: In what position is the compass placed on board iron steamers, so as not to be affected by the metal of which the ship is constructed? A. It is mounted on an elevated standard, sufficiently high to be out of the sphere of the ship's attraction.

(8) J. C. R. asks: Where is native sulphur found, outside of Sicily? A. The great de positories of sulphur are either beds of gypsum and the associate rocks, or the regions of active or extinct volcanoes. In the valleys of Noto and Mozzaro, in Sicily, at Couil, near Cadiz in Spain, at Bexin Switzerland, at Cracow in Poland, it oc curs in the former situation. Near Bologna, Italy it is found in fine crystals, imbedded in bitumen Sicily and the neighboring volcanic isles, Solfa tara near Naples, and the volcanoes of the Pacific Ocean, etc., are localities of the latter kind. It is also deposited from the hot springs of Iceland; and in Savoy, Switzerland, Hanover, and other countries, it is met with in certain metallic veins. Near Cracow and in Upper Egypt there are large deposits. A fiberous variety is found near Slenna, in Tus-

(9) G. M. says: I wish to know something of the nature and properties of phosphorus. A. Consultsome elementary work on chemistry.

1. Does lodestone possess the same properties, in every respect, as an artificial magnet? A. Yes. 2. Which is the most powerful? A. Artificial magnets are much the more powerful. 3. Where is lodestone found? A. Lodestone occurs in large quantities in the northern parts of New York State. 4. In a horseshoe magnet, made of a bar of steel 8 inches in length, how far apart should the ends be to secure the greatest power? A. About ⅓ inch apart.

(10) W. T. G. asks: 1. What are the qualications necessary to become a midshipman in the United States navy? A.A fair English education. good physical development, and age between 14 and 18 years. 2. Who would be the proper person to apply to for a position in the lake squadron A. There is no lake squadron. To become a midshipman requires recommendation to the Secretary of the Navy by the member of Congress of your district. 3. Which offers the best chance for study and advancement, the United States navy or the merchant marine? A. In the navy, you are sure to be advanced if you live long enough. In the merchant service, the case is the same as in any private pursuit; individual merit and ability

(11) S. H. L. says: I have an ornamental piece of white ivory, in the shape of a cylinder, which has lately cracked. Do you know of any plastic material with which I could fill the crack, to conceal the defect, and not in any way affect the ivory? A. Place a small quantity of pure gelatin in a strong solution of alumina. When entirely penetrated by thealumina, remove from the solution, and use immediately. When dry, it may be readily polished.

(12) J. R. says: I am interested in a quartz mine, which assays from \$40 to \$80 per tun of gold: but the sulphuret of iron is so abundant that the quartz mill men claim that they cannot amalgamate the gold. Can you inform me of some cheap method of destroying the sulphuret of iron? A. Pulverize the ore, and roast it at a high tempera-ture in a current of air. This will expel the sulphur as sulphurous acid gas, leaving the iron behind as an oxide.

(13) O. C. says: You say that the earth received its motion at the creation, and that motion keeps up from the fact that there is no resistance. As the moon draws after it a great tidal wave, extending nearly from pole to pole, the land must feel this draft; is not this an enormous resistances and would it not of itself bring the earth and moon to a standstill, if there were not some great and perpetual force keeping them in motion? $oldsymbol{A}$. Mayer has demonstrated that the tidal wave due to the moon exerts a retarding influence on the rotation of the earth; but that, at the present period of its existence, the retardation is exactly sounterbalanced by the acceleration due to its contraction in size by cooling. He holds that there will come a time when the cooling has proceeded o far that no more contraction will take place, and that then the retardation by the moon's action will commence, and go on until, in the course of ges, the earth will always turn the same side to the moon. He holds also that the moon has gone through this process.

(14) J.C. R. asks: 1. Are there any sulphur mines in the United States? A.Sulphur is found in this country near the sulphur springs of New York, Virginia, etc., sparingly,in many coal deposits and elsewhere, where sulphide of iron is undergoing decomposition, and in microscopic crystals at some of the gold mines of Virginia and North Carolina; as a powder and in crystals in the western lead regions: in cavities in the limestone, in minute crystals on cleavage surfaces of galena; and the beds of California afford large quantities of sulphur for commerce. 2. Excepting for SO₃, gunpowder, and friction matches, is there any considerable use or demand for sulphur? A. Yes, it is used in large quantities for sulphurizing hops and vines; as a preventive against some diseases of these plants, the quantity of sulphur used annually for this purpose in France, Spain, and Italy amounts to about 45,000 tuns. It is further employed in the production of sulphites and hydrosulphites, sulphide of carbon, cinnabar, mosaic gold or bisul-phide of tin and other metallic sulphurets, ultramarine, various cements, and for vulcanizing and ebonizing india rubber and gutta percha.

(15) O. C. says: Suppose the continents led east and west, and the oceans extended around the globe in the same direction, with no land to check the tidal wave, what would be the result? Wide. The entire width of valve seat is 7 inches, would not the tidal motion of the sea constantly and the width between outside margins of steam increase, rushing like a cataract over land of an ports is 4% inches, and between inside edges, 2% ordinary hight, and carrying everything before it? . Undoubtedly some straits have been made, or at least their formation largely assisted, by the tidal waves. If there were no land to check the tidal wave, it would go round from east to west, and not be deviated in various directions as is now the case. In some narrow straits it might rush, as is now the case, but not reach such a hight as to carry everything before it, the hight of the tides being due to the balanced attractions of earth, sun, and moon.

How far are the seven stars of the Pleia des

supposed to be from each other? A. The mutual distance of the starsis on an average equal to their distance from us: there are, however, spots in the heavens where stars are fewer, and where this distance is greater; and inversely, there are some star groups where the distance is much smaller: such a group is the Pleiades, their material distance varying from one fiftieth to a five hundredth part of the distances from us. The telescope reveals clusters where the stars are still closer together, hundreds of them throwing a glow around like that of a furnace.

(16) J. J. asks: Do you know of any means whereby the law of gravitation can be suspended? A. This law is so universal and inherent in matter that there is absolutely no means of the kind.

(17) W. H. says: We have a reservoir on a hill which we wish to make use of for fire purposes in our mill, situated at the foot. It would be costly and inconvenient to tunnel through the side of the hill in order to lay pipe from the bottom of the reservoir to the mill, the top of which is 60 feet below the bottom of the reservoir. Could a siphon be used with advantage and certainty, so as to give us command of all the water in the reservoir in case of fire? The siphon could be sunk in the bank a few feet below the level of the water surface. If a siphon be practicable, how deep below the surface ought it be laid? The reservoir is 20 feet deep. A. The reservoir being 20 feet deep, and the highest part of the bend being a few feet below the surface of the water in the reservoir, there can be no doubt of a siphon's working well. The shortest leg of a siphon ought not to be more than 30 feet lorg, as the weight of the atmosphere counterbalances only from 32 to 36 feet of a column of water; but in this case your shortestieg will be not more than, say, 18 feet. The pipe should be so laid as to prevent freezing; for this purpose four feet below the surface will be deep enough; it should be also sunk in the bank down the side of the reservoir to guard against the same difficulty in case of low water. Take iron pipe and cover it with tar. 2. Is there a possibility of boring through the side of the hill to the bottom of the reservoir? A. In boring through the side of the bill, there would be danger of leakage to your reservoir, through which you migh lose all of the water.

(18) C.G. W. asks: Is there any chemica. that will assist a diamond in drilling hardened steel? A. Moisten the steel with a little turpentine or benzole. The latter is the better of the

(19) R. H. B. says: I have a tin roof put in with whattinners call standing seams. In a high wind it rumbles a good deal. Is that an ill omen? A. Tin plates for roofing are sometimes put together in the shop in rolls, taken to the building, and laid upon the roof, extending from the ridge to the eaves; the edges of the rolls are brought together, secured to the roof by railing a cleat of tin between them, and the two edges and cleat are made into a standing joint, bent over at the top, one within the other, into what is called a double lock. By this style of roofing, the tin has quite a limited nailing to the roof boards; and should the edges become loose at any place to admit the entrance of the wind, it could very easily be stripped off by that means. This danger, provided the rolls are wide, more than compensates for any advantage itmay possess in respect to its yielding, without injury, to expansion and contraction. The usual mode of laying the tin, plate by plate upon theroof, where every plate is securely nailed, as generally, we think, met every re expectation in regard to durability, and is to be much preferred to the former method.

(20) S. L. T. asks: I am about building a sawmill in which I wish to run a muley saw or a 36 inch buzz saw. There are two engines in view; one has a cylinder 5 x 10 inches with a 30 inch balance wheel, the other has a cylinder 6 x 8 inches with an 8 inch balance wheel. Which in your opinion is the best for me? A. The 6 x 8 engine.

(21) W. O. P. asks: Is it practicable to melt east iron on an ordinary blacksmith's forge, in sufficient quantity to make a casting of 15 or 20 lbs. weight? A. No.

(22) L. L. H. asks: The wild cane growing throughout many parts of our country can be utilized for making pipes for conveying water and other liquids. Some of them attain a diameter of several inches. With an iron rod heated to redness, the joints may be entirely cleaned out; and by means of large corks bored with smooth holes, they can be united in any length. By coating them with coal tar they will remain serviceable for years. Is there a way by which they may be curved or bent (and remain so) so as to A. Try steaming suit a change of direction? them, as is done for wood bending.

(23) J. A. G., of Manchester, England, asks: Can bright steel goods be hardened and tempered without affecting the polish on them? A. No.

(24) O. F. says: 1. We have a 10 by 16 inches single valve engine, of which the valve is 10¼ inches long and 5½ inches wide, with a recess in it for steam exhaust 9 inches long by 25% inches inches, the ports being consequently each 1 inch wide. The exhaust port is 1% inches wide, and all are 9 inches long. The throw of the valve is all are 9 inches long. 2¼ inches, the eccentric being set so as to begin to admit steam as the piston reverses its motion. Thefeed pipe is 21/2 inches and the exhaust pipe 3 inches diameter. The engine runs at 120 revolutions per minute. Are the ports, valves, and other portions rightly proportioned? A. The cylinder exhaust port is a little too narrow, and the valve travels too little. 2. The piston does not come to within an inch of the cylinder heads. Can anything be done to economize steam and improve the working capacity of the engine? A. There is, too much clearance at the ends of the stroke, to remedy which increase the thickness of the piston head or the cylinder heads. 3. Thepresent boiler is 10 feet long and 3 feet in dia m ter, with 26 three inch tubes, supplemented by heater. How much boiler room would be r quired to run the engine at 200 revolutions pe minute, and maintain 60 lbs. pressure in boiles A. Your boiler pressure, if increased by nearly on third, will maintain 200 revolutions.

(25) C. G. asks: What is the proper way of packing the stuffing box around a steam engine piston rod? A. Use the ordinary small sized prepared packing, and a small packing tool.

26) Y. I. asks: 1. When my engine is run ning very light, I flad that, before it is necessary to replenish the furnace with fuel, it is so far burn down that part of the fuel falls through the grates, and is thus lost. What should be done to prevent this? A. To prevent the waste of fuel referred to, put a damper to the ash pit and in the chimney. 2. Is it right, in such a case, to open the flue doors? A. Sudden drafts of cold air are injurious to the boiler. 3. Do you not think that all boilers should have a damper in the stack to regulate the draft with? A. Yes, or over the mouth of the ashpit. 4. Isit injurious to a boiler to open the fire doors in case of too much steam? A. Yes, slightly. 5. How are leaky engine cocks such as cylinder and blow-off cocks, ground? A The unground shoulder should be eased off with a file, and the plug ground as directed in "Wrinkles and Recipes." 6 Are hand force numps ever used for cleaning boilers? A.Yes, but a boiler cannot be thoroughly cleaned by a force pump. 7. Does it in jure a boiler to blow it out, and immediately wash it out by means of a pump with cold or luke-warm water? A. Yes. 8. When twin boilers are connected by a mud drum laid under them, into which the feed water is also forced, should the connecting pipes be large? A. Yes, the larger the better.

(27) J. E. W. says: I wish to build a foot lathe for turning ordinary light work. Of what size should the drive pulley and the small pulley be, to get the fastest metion with the least power A. Make the treadle pulley about 30 inches, and the lathe pulley about 6 inches. 2. What should be the stroke or length of the crank? A. About 4

(28) A. M. H. asks: What will be the difference in time between two clocks having pendulums of the same length, one vibrating in an sure of 10°, the other in 11°? Both are supposed to rua for 24 hours. Is there a rule for arcs of any number of degrees? A. If the vibration is less than 10°, and the pendulum is free, that is, if it has no work to do, the difference in time for different vibrations is so small that it need not be taken into account. It is advisable to have the vibration as small as possible; then the barometric change in the atmosphere has less effect upon it.

(29) F. D. and others ask as to the best pos sible method of arranging saw mill gearing: The method which obtains the desired speed on the saw, with the least number of gears, shafts, bearings, or pulleys, is always the best. Always get the speed as direct from the driver as possible. Every additional piece entails a loss of power in the ex cessive friction.-J. E. E., of Pa.

(30) B. P. F. asks: 1. Can you give me the dimensions for a drying house for lumber? A The size of your house should conform to the dimensions and quantity of the lumber you propose to season; perhaps 20 by 35 feet and 15 feet high mightanswer in the absence of any particular re quirements. 2. At what point or points should the steam be allowed to enter and escape? A. The steam should circulate through a coil of I n ch iron pipe to the extent of, say, one superficial foot of heating surface to every 50 cubic feet of air in the house. Place the pipe in stacks about 25 feet long, one pipe over another, connected at the ends andgraded to discharge the drip water from the top to the bottom; let the pipe from the boiler connect at the top, and another pipe return to the boiler from the bottom, of the stack; and this will keep up the circulation and return the drip water to the boiler. Provide ventilation as described in answer to G. J. P., No.43, in this issue. 3. Howlong should the lumber remain in the house? A. The lumber should dry in from four to six days.

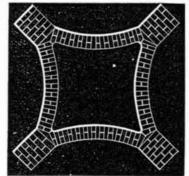
(31) J. B. Jr. asks: What shall I put on pine knots so that they will not show through, after painting the boards? A. Shellac varnish.

(32) A. S. asks: 1. Which is the best of the following two plans for heating the rooms in factories, putting the steam pipes round the rooms below the windows, or overhead, hung from the ceiling? A.Below the windows. 2. Would it take more steam to heat the rooms with the pipes hung from the ceiling than with them below the windows? A. Yes. 3. Which of these ways would be most liable to cause fire? A. Over the windows. 4. Would 2 six inch cast iron pipes heat a room with less steam than 6 one inch wrought iron pipe3,00 the same conditions as mentioned in question 1? A. Provide one superficial foot of heating surface in your pipes for every 70 cubic feet of air contained in your room; the one inch wrought friction in the smaller power mill and other obvi-iron pipe is the best; let the steam enter at the ous causes.—J. E. E., of Pa. highest point and return at the lowest, and set the pipe in a continuously descending grade between those points, that the pipes may not be trapped with water.

(33) S. A. T. says: We have a paper mill built on a light bottom of quicksand, and within 200 feet of a hill or bluff 100 feet high. In the mill are two large tubular boilers for generating steam, using an iron stack or chimney, which is very expensive on account of its short life, and a brick chimney is out of the question on account of our sandy foundation. It occurred to us to dig a trench or ditch of suitable size from the boilers to the top of the bluff, and there build a brick chimney of proper hight, the whole to act as chimpey to our boilers. Could we get a good draft in that way, and would dampness of earth affect it? A. Such a construction would be practicable, especially if lined with brick. In starting the fires, it might be necessary to build a temporary fire at the foot of the vertical portion.

(34) T. A. W. asks: Is there any means of revivifying the common bydraulic cement when once damaged? A. Yes; reburning it.

(35) J. L. C. savs: I wish to build a cistern which, on account of the nature of the soil, must be built nearly all above ground. My experience is that the ordinary square walled cisterns, if aboveground, are not to be depended on, and generally leak. It is not convenient for me to build a round eistern, and I have planned one, shown in the diagram, which I think will be very strong and will suit my case exactly. It is constructed on the principle of the arch, and the pressure of the wa-



ter strengthens rather than weakens the walls provided the four corners, which are supplied with buttresses, are made to bear the strain. This being so, I can save material and make the cistern walls 9 inches instead of 14, inches thick. Please give me your opinion. A. The principle is a correct one. A good foundation would be required for the whole of it, to prevent settling, which would cause cracks. Greater strength could be obtained by anchors extending diagonally from one buttress to the opposite one; these could be made of iron pipe covered with tar, and secured by means of nuts over plate washers.

(36) E. C. H. says: 1. I have some photoraphic lenses, double convex, of good quality : one is 21/4 in ches in diameter and of 8 inches focus; the other is 1 inchin diameter and of 5 inches focus. Can I construct a telescope with them, by the addition of other glasses, if necessary? A. You cannot construct a telescope with lenses intended for photography. The simplest possible telescope consists of an object lens of very long focus, say from 20 to 40 inches, and an eye piece, which is one small lens or is compounded of two or more small lenses of very short focus, say 1 inch or less. 2. How shall I arrange them, and what other lenses would require? A. We refer you to the first number of the SCIENTIFIC AMERICAN SUPPLEMENT, where the construction of telescopes is fully described and illustrated. 3. Can a magic lantern be made with these lenses, and how should I arrange them? A. You can make a magic lantern with them; photographic lenses are excellent for that purpose but then you want so-called bullseye condensers between the picture to be enlarged and the light. These bullseye lenses must be some 3 or 5 inches in diameter, and have a focus of about 6 inches.

(37) F.E.D. B. asks: How many chair rockers of a common rocking chair can be sawn in an hour with a band saw? We have a man here who sayshe can saw 400 inan hour. Is it possible? A. The man claims that he can saw 6% pieces per second. The average length of a rocker is 2 feet, to be sawn on both edges, equal to having 13% feet (lineal)per second. Probably several would be sawn through at each cut; and in most cuts, the concave part of one and the convex of the other would be made at same cut. Thisrenders such a feat possible, and it seems no more difficult than for one circular saw to cut 9 boards 24 inches in width, 1 inch thick, and 16 feet long in one minute. This I have seen done. At this rate of sawing the incredible amount of 172,800 feet of lumber would be sawn in 10 hours,-J. E. E., of Pa.

(38) W. H. s. ys: We want to convey about 12 horse power into a building 37 feet distant. Is there any way of making cotton rope impervious to the weather, so as to make it serve the above pose? A. We would recommend a rubber belt.

(39) I. A. M. says: 1. Of what diameter hould a circular saw be for general use, more particularly on oak logs? A. From 50 to 60 inches. 2. How many horse power would be necessary to run it? A. From 15 to 30 horse power. These answers, however, depend in each case on the average size of the timber, and amount of work to be performed. As a rule, each horse power, well applied, wid saw one thousand feet of lumber with a circular saw; this varies slightly with the hardness of the timber and power used. For example, it is easier to make 30,000 feet of lumber with 30 horse power than 5,000 with 5 horse power, partly owing to the greater proportionate amount of

(40) J. E. J. says: 1. Would an achromatic spyglass of 50 power be of any use for astronomical purposes? Would it show the globular form of the planets, and Jupiter's moons and Saturn's rings? A. Yes, if it is a good one. 2. How far could a man be seen with such a glass on a clear bright day? A. Fifteen or twenty miles.

Would it besafe for a person never having seen course of chemical experiments to attempt to perform those given in elementary chemistry without the aid of an instructor? A. Yes, in most eases, if done with proper care.

(41) C. L asks: In building a telescope, the bjective of which is 5 inches in diameter, how ought the lenses to be set? Focus of object glass s 72 inches. How many, and of what sizes, should the remaining lenses be? A. The object glass should be made of two lenses placed in contact. The outside lens is a double convex; the outer curve may be 49.3 inches radius, the inside curve 16 inches. The inside lens is a concavo-convex flint with the concave side fitting the crown, also of 16 inches radius, and the exterior curve of 78.4 inches radius. The eye piece may be made of two plano-

convex lenses, of equal focal lengths, with their convex sides toward each other. Their distance apart should be two thirds the focal length of either. The lens toward the objective should be 34 inch, the other 1/2 inch in diameter.

(42) J. T. H. says: I have been troubled for three months with heating of a sawmill mandrel, and would like to know the cause. A. See article in Scientific American Supplement, No. 3, on the heating of journals.

(43) G. J. P. asks: We have 2 drying houses, 18x32 feet, with 6 lines of 4 inch cast iron pipe 25 feet long. One party says that ventilation is required, so he has cut 3 holes 18 inches square in the roof, and put a square box pipe up through the 3 holes, and then cut a hole in the end 2 feet square; but he does not think it best to make the buildings tight. I tell him he ought, in order to keep his houses warm, to keep them as tight as possible. Which is right? A. There should be some ventilation, and it had better be under control. Provide a box shaft about 16 inches square, at one end of the building, extending from near the floor to 2 feet above the roof, covered at top and with openings on the sides above the roof; at the other end of building, provide a like shaft, but short, horizontal, passing through the side of the building near the floor; in each shaftplace a board valve or damper working on centers, and by means of these you can have as much or as little ventilation as the circumstances may require.

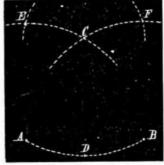
(44) F. J. F. says: In reply to a correspon ent who stated that he had a boat 50 feet long by 18 feet wide and 31/2 feet deep, you told him to asc 2 engines of 7 inches bore by 12 inches stroke, If he puts 2 such engines in the boat, he might as well have no boat at all. I had a boat of 14 feet beam by 60 feet long; and I used 2 high pressure engines of 7 inches bore and 24 inches stroke, and all she would make up stream was 2½ or 3 milesper hour. A. Our advice to our correspondent was pased upon examples of successful practice. Of course the model of the boat may affect the power required to a very great extent, as well as too mall a boiler, a wasteful engine, or the like.

(45) E. H. R. says, in reply to A. E. R.'s query as to closing the drip cocks of steam heaters: If the air is out of the pipes, in either case the heat will be just the same whether the water only is run through the drip cocks or whether steam goes with the water. The pressure of steam in the pipes should be no more in either case if the back pressure valve is all right.

(46) H. L. P. says: In reply to N. W., who asked for your theory concerning the motion of the earth, you replied that "it persisted in its motion by the absence of resisting obstructions." Is not the air which presses on the surface an obstruction? A.The air which surrounds the earth is no more obstruction to its motion than is the water in the ocean, as both belong to the earth and move with it. Remember that the diameter of the earth is 8,000 miles, and the hight of the dense atmosphere only a few miles, while at the hight of 30 or 40 miles scarcely a trace is left. The earth moves with the atmosphere through the practically empty space beyond.

(47) W. P. H. says, in answer to J. D. H., who asks how to thicken his stove patterns, so as to take a heavier set of castings from them: Prepare the mold as usual, and then insert something between the top and bottom of the flask, which will separate them sufficiently for the additional thickness desired. The cavity is small, and can usually be filled by sprinkling sand on the face of the flask when open. An ingenious man can also vary the additional thickness as he desires.

(48) W. S. D. says, in reply to the question, how to construct a perfect square, with dividers or compasses only, without the aid of scale, pencil, ruler, or straight edge, or any other instru-ment, on a given base or a line drawn between two given points: Let A B be the given poirts. From



EC; then with B as a center, describe the arc, FC; with Cas a center, describe the arc. A D B: then again, with C as a center and a radius=A 146 A B.measured on the arc) describe the arcs at E and F; then will the points, A, B, E, F, form a erfect square.

(49) E. H. R. says, in reply to H. F. K.'s query as to boiler capacity for a steam heater; Provide one fifth as much boiler surface 'in square feet) as you have of radiating surface in the steam pipes, and you will heat your building with economy.

(50) M. R. C. says, in reply to I. O. A., who complains of the fatigue of the eyes: The trouble arises from partial paralysis of the retina or ner-vous coat of the eye, caused by bright white light; and it may be obviated by decomposing the rays from the lamp by means of a tinted shade. White porcelain is very good, or thin tissue paper (white, traw-colored, or such), hung between the light and the operator so as to shade the white wood. will do. If the person be short-sighted he may require a concave glass to suit the sight. If he be long-sighted from advancing years, weak lenses may be required. If the glasses are suitable for

the sight, and the fatigue continue, rest should be enjoined. Strengthen the general health; sea bathing or bathing with sea salt and water is good.

(51) S. says, in reply to A.'s query as to how to get a good color on casehardened goods: Use leather scraps for the purpose. The leather should be charred sufficiently to pulverize easily, and then be pounded, not too fine, say about the size of peas. The articles should be imbedded in this in an iron box, luted with clay, and heated red hot for from 1 to 6 or more hours, as they are to be hardened to a greater or less depth, and then dumped into cold water and dried off before they rust.

(52) M. R. C. S. says, in reply to J. H. I. The splitting of the nails may be due to dry heat, as of a stove during cold weather. Keepthenails cut short; do not scrape or file the surfaces; moisten with a little glycerin or almond oil to which a little liquor potassæ has been added. The nails becoming concave is not, I believe, due to debility always, as I have seen it in one case where the person was well nourished.

(53) A. W. C. says, in reply to R. I. S., who asks how to settle rain water: The best plan that has as yet been found in Canada is to put about 2 ozs, powdered alum and 2 ozs. borax into a twenty barrel cistern of black rain water: in a few nours the water will be purified, and comparatively waste water may thus be made fit for cooking purposes. This mixture has the same effect on lime water, precipitating the offensive particles to the bottom of the receptacle.

(54) A. W. C. says, in answer to T. B., who asks as to using potatoes for manufacturing purposes: Desiccated potatoes have long been used as an article of diet by the naval and mercantile marine of Great Britain; and they were the staple diet of the explorers of the northwest passage under McClintock.

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

Dr. T .- It contains 85 per cent lead and a trace of silver, but no gold.—J. M. McW.—It is kaolin clav.-R. T. W.-No. 1 is mud shale, containing pyrites. No. 2 is hardened blue clay.

COMMUNICATIONS RECEIVED.

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

On Drawbridges. By C. V. W. On the Tails of Comets By E. B. On a New Wash Bottle. By W. K.

On a New Motor. By T. H. On a Double Channel Theory. By W. T. C.

On a Boiler Explosion. By G. H. K. On Working Men at the Centennial. By W.P.E. On a Meteor. By E. S.

On Bored Wells. By R. A. R.

On Cleansing Water Mains. By H. O. A. On Penguins. By W. E. D. Also inquiries and answers from the following:

H. D.-G. R. -J. T. B.-J. W. P.-W. T. C.-E. G.B. -H. V. M.-E. T. H.-W. M.-J. C.-G. C.-J. C. D. -J. S.-C. S.-J. G. A.-R. M.-J. C. W.-W. D.-F.O.J.-N. P.-W. B. W.

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 lways 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 takepleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who sells miniature locomotive engines? Who makes the best steam pumps? Who sells mica lamp chimneys? Who makes paper barrels? Who sells millstones? Whose is the best glue? Why do not makers of electric telegraph apparatus advertise in the SCIENTIFIC AMERICAN? All such personal inquiries are printed as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, sublect to the charge mentioned at the head of that column. Almost any desired information can in his way be expeditiously obtained.

[OFFICIAL.]

INDEX OF INVENTIONS

Letters Patent of the United States were Granted in the Week Ending

January 18, 1876, and each bearing that date. [Those marked (r) are reissued patents.]

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