

(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 running very light, I find that, before it is necessary to replenish the furnace with fuel, it is so far burnt 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 ash pit. 4. Is it 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 pumps ever used for cleaning boilers? A. Yes, but a boiler cannot be thoroughly cleaned by a force pump. 7. Does it injure 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 motion 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 inches.

(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 arc of 10°, the other in 11°? Both are supposed to run 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 possible 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 excessive 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 might answer in the absence of any particular requirements. 2. At what point or points should the steam be allowed to enter and escape? A. The steam should circulate through a coil of 1 inch 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 and graded 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. How long should the lumber remain in the house? A. The lumber should dry in from four to six days.

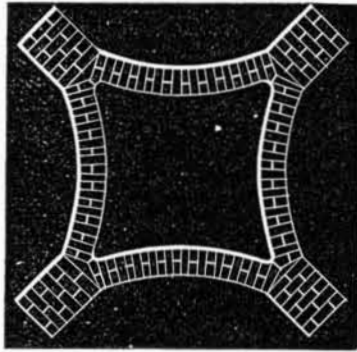
(31) J. B. Jr. asks: What shall I put on pine knots so that they will not show through, after painting the boards? A. Shellac varnish.

(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 pipes, on 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 iron pipe is the best; let the steam enter at the 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 height, the whole to act as chimney 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 hydraulic cement when once damaged? A. Yes; reburning it.

(35) J. L. C. says: 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 above ground, are not to be depended on, and generally leak. It is not convenient for me to build a round cistern, 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 photographic lenses, double convex, of good quality: one is 2 1/2 inches in diameter and of 8 inches focus; the other is 1 inch in 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 I 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 says he can saw 400 in an hour. Is it possible? A. The man claims that he can saw 6 3/4 pieces per second. The average length of a rocker is 2 feet, to be sawn on both edges, equal to having 13 1/2 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. This renders such a feat possible, and it seems no more difficult than for one circular saw to cut 9 boards 2 1/2 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. says: 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 purpose? A. We would recommend a rubber belt.

(39) I. A. M. says: 1. Of what diameter should 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, will 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 friction in the smaller power mill and other obvious causes.—J. E. E., of Pa.

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

(41) C. L. asks: In building a telescope, the objective of which is 5 inches in diameter, how ought the lenses to be set? Focus of object glass is 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 3/4 inch, the other 1/4 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 shaft place 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.

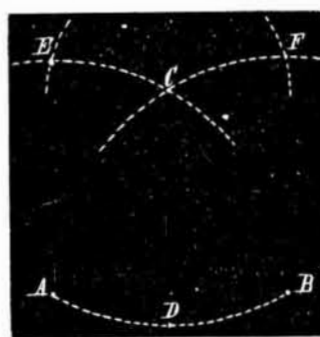
(44) F. J. F. says: In reply to a correspondent who stated that he had a boat 50 feet long by 18 feet wide and 3 1/2 feet deep, you told him to use 2 engines of 7 inches bore by 12 inches stroke. If he puts 2 such engines in the boat, he might as well have no boat at all. I had a boat of 14 feet beam 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 steam was 2 1/2 or 3 miles per hour. A. Our advice to our correspondent was based 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 small 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 height of the dense atmosphere only a few miles, while at the height 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 instrument, on a given base or a line drawn between two given points: Let A B be the given points. From



A as a center, with a radius=A B, describe the arc, E C; then with B as a center, describe the arc, F C; with C as a center, describe the arc, A D B; then again, with C as a center and a radius=A B (1/2 A B, measured on the arc) describe the arcs at E and F; then will the points, A, B, E, F, form a perfect 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 nervous 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, straw-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. Keep the nails 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 hours 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 examined, 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 clay.—R. T. W.—No. 1 is mud shale, containing pyrites. No. 2 is hardened blue clay.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following 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. E.—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 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 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, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

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.]

Table listing various inventions and their patent numbers, including items like Adze eye dies, Alarm signal box, Alarms, fuse for fire, Anchor, Artist's color dish, Axe dies, Axe eyes, Back lash spring, Bale tie, Bale tie, D. H. Mathias, Balling, buckle for cotton, Base ball, Bed bottom, spring, Bed bottom, spring, W. Crich.