(39) A. K. asks: What is the best temperature of water for scalding purposes (hogs, poultry, etc.)? A. From 180° to 212° Fah. is generally recommended.

Describe the method of extracting beeswax with bisulphide of carbon? A. Use a sufficient quantity of the sulphide (free from dissolved sulphur) to cover the body containing the wax; after a short time the wax will have been completely dissolved. Strain the solution into a suitable retort, provided with an ordinary condensing worm, and distill off the volatile sulphide by steam heat or hot water bath. The residue of wax should be fused to expel the last traces of the sulphide.

(40) F. de C. asks: Has any astronomer investigated or explained why planets describe ellipses and not circles around their central sun? A. Yes; Newton (*Princip.* i. 17, i. 75) demonstrated that, under the influence of an attractive force mutually urging two spherical gravitating bodies toward each other, they will each, when moving in each other's neighborhood, be deflected into an orbit concave toward the other, and describe, one about the other regarded as fixed, or both round their common center of gravity, curves whose forms are limited to those figures known in geometry by the general name of conic sections. He has shown that, in any assigned case, it will depend upon the particular circumstances of velocity, distance, and direction, which of these curves shall be described—whether an ellipse, a circle, a parabola, or a hyperbola; but one or the other it must be; and any one of any deg ee of eccentricity it may be, according to the circumstances of the case.

(41) R. M. B. asks how "Pepper's ghost" is produced? A. By the reflection on a sheet of clear glass in a dark room of an object strongly illuminated, and so placed as to be out of sight of the spectators.

(42) D. M. S. asks: Is there any power gained by taking a belt from the main shaft (on engine), on which is a 3 feet pulley, to an 8 feet band wheel (on a countershaft); then another belt from a 4 feet pulley on this countershaft to a 10 feet band wheel—this latter to be the motive power? Which is the better way, the above arrangement or to take belt direct from engine (3 feet pulley) to a 10 feet band wheel? A. The latter arrangement is preferable.

(43) B.—If your cylinder is 4 inches bore, 2¾ inch stroke, and you use a two-bladed screw, 16 inches diameter and 24 inches pitch, and carry a high pressure, you can run a 21 feet boat at about 7 miles per hour.

(44) W. R. inquires: 1. Why is the slide to which a locomotive engine reverse lever clutches or fastens made with irregular notches, that is, why is the reverse lever not always thrown clear over? A. The object of the intermediate notches is to allow the link to be placed in such a position that the steam can be worked expansively. 2. Is there any other reversing device than the link motion considered perfect? A. There are other arrangements for reversing, but there are no serious objections to the link motion when well designed.

(45) G. W. K. writes: I have a 30-inch corn burr which runs from 300 to 400 revolutions per minute. I am troubled with corn coming out at the top of the eye of the stone. The eye is 7 inches in diameter, feeding with a shoe; corn led well down into the stone by a 4 inch tin tube. What is the matter? A. From your account we imagine that you feed too fast or allow the stones to become too dull.

(46) C. H. writes: If a bullet be shot upward in the air from a rifle or other gun, will the bullet when it returns to the point from whence it was shot have as much force or velocity as it had when shot from the gun? A. No.

(47) E. & S. write: What is a horse power? We understand the rules for calculating the horse power of engines, use the 33,000 lbs., etc., but do not understand from what the latter is derived? A. The number 33,000 represents the number of lbs. that could be raised 1 foot high in a minute by a good horse in the time of James Watt, according to his observation. It is more than a horse does, on an average, in regular daily work.

(48) J. A. O. asks: Will two inter-friction pulleys run and do good work when of different size—say one 3 feet and the other 9 feet? A. Plain friction pulleys arranged in this manner are not very efficient.

(49) I. B. M. writes: What do you think of the practicability of supplying a 2 x 4 inch cylinder, with 75 lbs. of steam, with a boiler constructed by coiling a 2 inch iron pipe spirally with an outside diameter of 1½ feet and a height of 2½ feet? I propose also enveloping it in ⅛ inch sheet iron, outside of which will be a perpendicular pipe connecting the ends of the coil and also the middle. In this perpendicular pipe I propose placing my injector, as I presume the downward current to be naturally in this pipe. The fire is to be built in the center of the coil and in direct contact with it. Of course the water will have to be right above the fire surface, and a steam dome surmounting the whole will undoubtedly be necessary. A. The weak point about this boiler would probably be the casing, which might require frequent renewal if the boiler were forced. With a steam dome arranged for superheating, your boiler will not differ materially from some that are in use at present.

(50) H. & T. write: Referring to the answer in your number of January 12, about arching boilers completely with brick, will not the soot accumulate over the top of the boiler and burn off, and thus injure the quality of the iron, especially if soft coal is burned? A. We have not heard of such a thing happening, and do not believe it likely to happen. In the mounting of stationary boilers, whether upright or horizontal, the principle of distributing the heat from the furnace so that the boiler is almost entirely surrounded by an atmosphere of heat, will, if judiciously carried out, give good results, both as regards economy of fuel, production of dry steam, and durability of the boiler, as compared with boilers mounted in such a manner that only a portion of their surface is acted upon by heat. In any style of boiler mounting arrangement should of course be made for convenience of inspection as required by law, and by a proper arrangement of doors it will be easy to prevent accumulations of soot or ashes.

(51) C. S. B. asks (1) whether a steam siphon pump will operate by the use of compressed air, the same as steam, and draw air through the suction pipes in the place of water? A. Yes. 2. Would funnel shaped suction pipes be the best for air? A. Yes.

(52) T. R. C. writes: The driving wheel on an engine is belted to a pulley 6 feet diameter on a shaft, and another pulley 5 feet diameter on the same shaft is belted to the machine. If I use pulleys half as large and run them twice as fast, can I use a smaller shaft? A. Yes.

(53) H. S. S. asks: If a cannon loaded with a charge that will expel a ball at the rate of 60 miles per hour is placed on a train running at 60 miles per hour, and discharged in the opposite direction, will the gun leave the ball and the ball drop to the ground, or at what speed will the ball leave the gun, and how far will it go from the spot where it is fired from? I claim the powder simply stops the momentum of the ball and the gun runs away from it, and the ball will drop. Some say that the ball will part with the gun at the rate of 120 miles. A. See p. 273, vol. 32, SCIENTIFIC AMERICAN.

(54) C. B. asks: What is the best method of burning coal slack or screenings for fuel? A. Use grate bars with narrow openings, and have a strong draught.

(55) T. F. W. asks: 1. What kind of barometers are used to record automatically? A. Mercurial, generally. 2. How is the recording effected? A. The general idea is to have a chart moved regularly by clockwork, on which a pen or pencil connected with the mercurial column traces a line in accordance with the variation in height.

What can be depended upon to stick labels onto glass test tubes permanently? The label can go clear around the tubes and lap sufficiently to stick to itself. A. A mucilage of gum tragacanth answers very well.

(56) J. D. B. asks: Are there any books on starch manufacturing? A. Consult Wagner's "Chemical Technology," Muspratt's "New Chemistry," Johnson's and Appleton's "New Cyclopedia," Patent Office Reports.

(57) J. E. B., in answer to A. H. S., sends the following on making printers' rollers, which he states has given good results: Take of best glue any known quantity, say 1 lb.; soak from 12 to 24 hours in cold water until the whole is fully swollen, then weigh it and add as much heavy glycerin as the glue has absorbed water; then dissolve in a water bath and evaporate all the water the glue absorbed, which can be told by weighing. I clean my roller with spirits of turpentine.

(58) G. P. says: I would like to know which is the cheapest to burn in my boiler, pine wood at three dollars a cord, or hard coal at six dollars a ton? A. The wood, at the price named, is a little the cheapest. One ton of anthracite is considered equal to 1·75 cord of pine wood.

(59) W. S. O. B. writes: 1. If the magnetism of an electro-magnet is contained in the core, I would like you to explain how the electricity affects the core when it is first covered with paper, and then wrapped with insulated wire. As the electricity cannot escape through insulated wire, I fail to see how it comes in contact with the core. A. It is an effect called induction, which is not thoroughly understood, but is nevertheless caused by the continuous passage of currents of electricity through a conductor in the neighborhood of, but insulated from, the iron core. 2. Take a core 2 inches long, ¼ inch in diameter, and wrap it with uncovered copper wire—why will it not make an electro-magnet? A. It will, but as the electric current chooses the course of least resistance, it will pass directly through the mass of copper wire, and the magnetic effect will be as if only one short piece of wire were used as a conductor. 3. What is the reason that the finer the wire used in a magnet the more resistance it has? A. It may be explained by supposing electricity to be a vibration of the molecules of a conductor.

(60) G. M. S. asks whether wrought iron drillings are of any value? A. They may be worked up as scrap iron.

(61) L. H. asks: What way of filing a circular saw will enable me to cut 2-inch pine plank into ⅛ inch strips smoothly, so as to dispense with planing afterward? A. A circular saw will not cut smoothly enough to dispense with planing if a smooth surface is required.

(62) W. W. asks: How can I black wrought iron or steel rifle barrels? A. Colored varnish is often used. For a permanent color, apply a mixture of chloride of antimony and olive oil, polish, and coat with shellac varnish.

(63) J. W. W. writes: A discussion in regard to the formation of ice having taken place, and various theories and reasons having been given, I would ask your opinion upon the subject. On the Hudson river, after the ice forms, does it increase in thickness from the bottom of the ice or from the top of the ice? A. From the bottom.

(64) D. W. P. asks: Is there any test, besides lime water, for carbonic di-oxide when mixed with oxygen or air? A. Solution of barium hydrate, when agitated in an atmosphere containing any considerable amount of carbonic acid, becomes clouded by separation of barium carbonate; blue litmus solution under similar circumstances becomes wine red. Minute quantities, as occurring in atmospheric air, are best determined by the increase in weight of absorption tubes (soda-lime or potash bulbs) by aspiration of large quantities of the dried gas.

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

W. G. W.—It is nodular pyrites (iron sulphide), not meteoric.—N. A. R.—Impure kaolin.

HINTS TO CORRESPONDENTS.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

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.

Inquiries 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.

WANTS AND BUSINESS INQUIRIES.

Almost any desired information, and that of a business nature especially, can be expeditiously obtained by advertising in the column of "Business and Personal," which is set apart for that purpose, subject to the charge mentioned at its head.

We have received this week the following inquiries—particulars, etc., regarding which can probably be elicited from the writers by the insertion of a small advertisement in the column specified, by parties able to supply their wants:

Who deal in aluminum?

Who make and sell caloric engines, and of what power and at what price?

Who constructs steam heating apparatus for hothouses?

Who makes a machine for filling a boiler without an injector or force pump?

OFFICIAL.

INDEX OF INVENTIONS

FOR WHICH

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

January 8, 1878,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, will be furnished from this office for one dollar. In ordering, please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city.

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