

ply to the surface to be coated with a fine flat brush. It is better to apply two coatings. 2. What kinds of wood are best for the boards? Good clear white pine, well seasoned.

(44) C. B. asks: 1. What constitutes the calorimeter of a boiler, and how is it measured in connection with the grate and heating surfaces? A. It is the area for the passage of the products of combustion from the furnace to the chimney. In case this area varies throughout the run of the gases, it is usual to take the smallest area for the calorimeter, since this limits the supply of air, and by consequence the rate of combustion. 2. What kind of steel is it that is generally used in making connecting, piston, and valve rods, etc., of steam engines? A. Both cast steel and semi-steel are used.

(45) C. R. P. asks: Can a press be made to work with compressed air instead of water? We are using an hydraulic press. It requires refilling with water quite often on account of rust from the tank getting under the valves. In case an air pump could be made to work, how much longer would it take to run it up with air than it does with water? A. Air could be used, but in the majority of cases that occur in practice water pressure is preferable. The time required to run up the ram would depend upon the dimensions and arrangement of the apparatus.

(46) J. H. asks: Will you give me a rule for finding the latitude and departure of a course when the distance and bearing are given? A. Latitude=length of course x cosine of bearing. Departure=length of course x sine of bearing.

(47) D. McR. says: I have a force pump which works well for a short time when it is primed. Valves seem to be in perfect order and airtight. A. There is probably a leak, either in piston, suction valve, or suction pipe.

(48) E. M. B. asks: Which is the most economical in the use of water in supplying a boiler, an injector or pump, allowing the evaporation to be the same? A. There is not a great deal of difference so far as can be judged from the few comparative experiments that are accessible.

(49) A. H. C. asks: 1. In sea-going steamers, which is the most efficient, a screw propeller or paddle wheels? A. The propeller. 2. How do paddle wheels compare with the screw in smooth water? A. Well designed wheels compare favorably.

(50) P. J. M. asks if the lock gates in any canal are opened by machinery, or some motive power, such as steam? A. The machinery for opening the lock gates of the Des Moines Rapids Canal is operated by hydraulic power.

(51) G. D. asks for a wood filling, for filling the grain of wood to be varnished? A. Mix magnesia with shellac varnish.

(52) Apprentice asks how to cast a joint? A. If it is a pivot joint, cast the socket part first; ream out the socket; wash it with plumbago and fine charcoal, and then run the pin part into it. (If you run the pin half first and run the socket around it, the latter is apt to shrink and split). By working the parts together the wash will be rubbed out.

(53) J. E. T. says: If two steam radiators of equal size and under the same conditions are painted, one black and the other white, which will radiate the most heat? This depends upon the pigment used. A. The radiation from surfaces coated with lampblack and white lead are about the same.

(54) W. H. B. says: I wish to use a core of wood within a steam pipe, leaving an annular space around the same, between core and the walls of the pipe. This space will be filled with steam during about half the year, and air during the other half of the year. What will be the life of the wood? A. Make the core of well seasoned wood, and it will probably last you several years.

(55) P. S. asks: Will it do to have a stream of oxygen gas blow through an alcohol lamp flame, used for melting small glass rods? A. There is no objection to the use of oxygen other than that of expense.

(56) C. D. asks for a recipe for an axle lubricant for heavy vehicles? A. Take 5 parts beef tallow, and 1/2 or 3 parts of graphite, pulverized (black lead of commerce), mix while warm. This is for summer use. For winter, use lard in place of beef tallow.

(57) L. R. asks how to soften brass work? A. Heat it red hot and cool suddenly by plunging in cold water.

(58) R. C. L. says: In using heaters for steam boilers where the water is heated nearly or quite to the boiling point, and the force pump prefers to work, what is the remedy, supposing the pump to be in good order, and would work all right with cold water? A. It is necessary to allow the vapor to escape. For successful working under such circumstances, it is well to deliver the water to the pump under a head somewhat greater than the pressure of the vapor.

(59) J. O'B. asks how large a boiler to make for a small engine with cylinder 1 1/4 by 2 1/4? A. 11 inches diameter, 15 inches high.

(60) W. C. T. asks how to construct a cremation furnace? A. In vol. 30, p. 295, of the SCIENTIFIC AMERICAN is given cut and description of such a furnace.

(61) A. R. C. asks for a finish or polish for sheepskin colored linings? A. Varnish with the white of eggs and finish by rubbing with a burnisher.

(62) J. R. P. asks: 1. If a drop of nitric acid should be dropped on an ounce of nitro-glycerin dynamite, or dualin, would it cause them to explode? A. Probably not. With nitro-glycerin, however, the force of impact of concussion might be such as to cause an explosion. 2. Which of the three named would be the most powerful? A. Nitro-glycerin is the more powerful. 3. Suppose a person should be placed at the extreme height of the atmosphere, how would he be affected? A. Immediate death from rupture of the blood vessels and asphyxia would ensue.

(63) Constant Reader asks what effect inhaling the fumes of naphtha has on persons who use it? A. It attacks and deteriorates the mucous membrane.

(64) J. W. G. asks: What books can I get that will inform me how to construct furnaces for small steel castings and for malleable iron castings? A. You will find information on the subject in standard works on metallurgy.

(65) P. B. asks for a cement for mending harness or other leather? A. Take common glue and American isinglass equal parts. Put in a glue pot, and add water sufficient to cover, and soak about ten hours. Then bring to a boiling heat and add pure tannin until the mass becomes ropy or like the white of eggs. Scrape the leather where it is to be joined, apply the cement warm, rub the surfaces solidly together, and let the work remain undisturbed till dry. The leather must be free from grease or oil.

(66) A. B. C. asks for instructions how to stain marble? A. Apply color in solution to the stone when it is heated sufficient to make the liquid simmer on the surface. For blue, use an alkaline solution of indigo; for brown, tincture of logwood; for crimson, a solution of alkanet root in turpentine; for yellow, tincture of gamboge or turmeric; for red, tincture of dragon's blood, alkanet root or cochineal; for green, a tincture of sap green, or stain first blue, then yellow; for gold color, a mixture of equal parts of white vitriol, sal ammoniac and verdigris, all in fine powder.

(67) A. G. R., of Canada, asks for instructions in raising sumac and preparing the leaves for market? A. The roots may be planted at about six feet apart. It will flourish in either low or upland. The leafy tops are broken off and dried in the shade. When dry they may be beaten with sticks or flails. The gathering of the leaves may commence in July and continue till frost. It may be packed in bags, preparatory for shipment to market. The amount of tannin contained is from fifteen to twenty per cent.

(68) J. B. W. asks for a preparation to mix with black (printer's) ink, to print designs on tin, one that will dry readily? A. First give the plate a very thin coating of light colored copal varnish, and, if necessary, add a little fine Japan dryer to the ink. The printing plates may be of vulcanized rubber.

(69) W. W. W. asks how to make glass fusible? A. By addition of excess of lead oxide and alkalies, glass can be made so as to fuse readily in an ordinary furnace.

(70) Drummer asks how to make parchment for drumheads? A. Remove the wool from sheepskins, steep them in lime, stretch on a wooden frame, and scrape with a knife. If any greasy matter remains steep again in lime. If the surface is uneven or of unequal thickness, rub it down with pumicestone.

(71) T. W. O. asks: Is there a substitute for alcohol in the making of transparent soaps? A. Use methylic alcohol—wood naphtha.

(72) W. F. R. & Co. ask how to re-color green bronze French statuary that has become broken? A. Dissolve 1 oz. sal ammoniac, 3 ozs. cream of tartar, 6 ozs. common salt in 1 pint of hot water; add 2 ozs. copper nitrate in a pint of hot water. Mix well together and apply with a brush to the parts repeatedly.

(73) G. R. asks: 1. What is celluloid and how is it made? A. Celluloid is a kind of solidified collodion. It is composed of some fibrous material, such as cotton, which is dipped in sulphuric and nitric acid. The cotton then possesses the quality of solubility and sudden explosion, and is termed gun cotton or pyroxylin. When this is dissolved in ether and alcohol it is called collodion, and is used in photography. Celluloid is made by using camphor in place of alcohol and ether, in connection with pyroxylin. The pyroxylin is ground to a pulp with water. It is then strained to expel the water, and pressed into a mass. Gum camphor is ground with water and thoroughly incorporated with the pulp, one part, by weight, of camphor being used to two parts of the pulp. The mass is then put in a mould and subjected to powerful pressure, and heated while under this pressure from 150° to 300° Fah. 2. Is this the article used in the manufacture of artificial ivory, billiard balls, etc.? A. Yes. 3. Is not gun cotton, the same as that used by photographers, one of its constituents? A. Yes.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated: C. F. L.—No. 1 is pyrites in trap No. 2 contains clay, oxides of iron, lime and magnesia. No. 3 is a piece of greenstone with adhering clay colored by iron oxide.—G. P.—No. 1 is principally of hornblende schist with some oxide of iron. No. 2 is pyroxene, with oxide of iron and clay.—I. J.—It is quartz rock—it is not of value.—Lyman, London, Eng.—The sample contains copper, iron, antimony, and sulphur. We do not know of a substitute for alcohol in the varnish—wood spirits (crude methylalcohol) might answer.—D. S.—It is asbestos—it is found in nature as a mineral. We do not know that there is any patented method for dressing it.

COMMUNICATIONS RECEIVED. The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects: On the Striped Water Snake. By C. F. S. On Fire Escapes. By J. C. M. On a Simple Sash Button. By H. J. N. On the Skull of the Domestic Fowl. By C. F. S. Also inquiries and answers from the following: D. A. S.—F. C. S.—V. M. M.—J. S. A. B.—E. S. B.

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.

Hundreds of inquiries analogous to the following are sent: "Who deals in wood prepared so as to resist decay? Who makes clay-grinding machines that will grind small stones at the same time the clay is being ground? Who makes machinery for rolling iron? Who manufactures silver card board? Who makes a light spring power suitable for running sewing machines?" 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 August 21, 1877, 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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DESIGNS PATENTED. 10,157 and 10,158.—PATTERN IN SUITINGS.—Nathan Frye, Andover, Mass. 10,159.—BRACELET.—J. Hackenberg, New York city. 10,160, and 10,161.—CENTER PIECE.—S. Kellett, San Francisco, Cal. 10,162.—ADVERTISING BALLS.—Edwin E. Sage, Chicago, Ill. [A copy of any one of the above patents may be had by remitting one dollar to MUNN & Co., 37 Park Row, New York city.]