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and a piece of copper sulphate as big as a walnut, boil together a few minutes and spread hot over the marble, leave for 24 hours, then wash off and polish with flannel or a piece of felt.

(3082) J. S. asks for a recipe for taking indelible ink out of linen. A. A solution of bichloride of mercury (corrosive sublimate) is about the best material for the purpose.

(3083) C. L. F. asks (1) how to make a a good cheap brass solution. A. Cyanide of potassium 1 pound, cyanide of copper 2 ounces, cyanide of zinc 1 ounce, rain water 1 gallon. Add finally sal ammoniac 2 ounces. Use at 160° F. The color is affected by relative sizes of anode and cathode. Use brass anode. 2. How is fire gilding done ? A. Make an amalgam of gold 1 part, mercury 3 parts. Rub it over the perfectly clean surface of the object until coated, expose to a very low red heat, cool, clean with a brush and cream of tartar. A little muriatic acid may be needed in connection with the first application of the amalgam.

(3084) A. H. asks whether melting aluminum in a common cast iron ladle has a bad effect on the aluminum, and what it is. A. Plumbago crucibles are recommended. See the SCIENTIFIC AMERICAN vol. 62, No. 26, for details on manipulation of alumi num.

(3085) H. F. D. asks: 1. The upturned edges of rubber soles in tennis shoes peel off from the upper cloth. Please give the proper cement or process for repairing it. A. For treatment of rubberin general bitrary, from 11/2 to twice the diameter of cylinder. The see "Rubber Hand Stamps and the Manipulation of Rubber," \$1 by mail. A good job cannot be made after manufacture. The soles should be vulcanized in place. 2. Who was the first discoverer of America-Columbus or Leif Erikson ? A. The discoveries of Leif Erikson antedated Columbus' voyages by nearly four centuries.

(3086) W. H. writes : I want to make a wooden box and divide it into compartments, by means of sheet lead partitions. Required something to line the box, adhering to it and to the edges of the partitions, so as to make each compartment independently acid proof (for a 20 per cent solution of sulphuric acid). It must be an insulator. Should be melted and used hot or as a paste which will harden. Please give me a recipe which does not require special apparatus. A. There are several recipes. One reads thus: Burgundy pitch 150 parts, gutta percha in shreds 25 parts, ground pumice stone 75 parts. Apply hot and melt in with a hot iron. Another reads : Resin 4 parts, gutta percha 1 part. and a little boiled oil. Before applying either composition the cells should be absolutely dry.

(3087) J. J. McL. asks for (1) a receipt for making extract of lemon. A. Expose 4 ounces lemon rind to the air until partially dry, rub up in a porcelain or glass mortar, agitate with 2 quarts deodorized alcohol until the color is extracted, add 6 ounces freshly made oil of lemons. Let it stand for two days and filter if necessary. The oil is made by distilling water from the rinds: the oil distills over with the steam. 2. One on extract of vanilla. A. Cut 1 ounce vanilla into small pieces, rub up with 2 ounces sugar in a mortar, percolate with 1 pint alcohol, add 1 pint simple sirup. Artificial vanillin is now largely used instead of vanilla beans

(3088) F. T. asks how to make phosphate, such as is used for drinking purposes, in soda water which comes from the fountain on the counter. A. Use 2 drachms phosphoric acid to 1 gallon of simple sirup.

(3089) M. S. S. asks how to make a furniture polish that will make a fine gloss and dry in the shortest possible time. A. Dissolve 4 ounces beeswax in 1 pint turpentine, color with alkanet root if desired. There are many other formulæ; the above is given for its simplicity.

(3090) W. L. C.-Calcined gypsum or plaster of Paris is used in the Gassner dry battery.

(3091) J. A. B. asks what preparation to use for removing finger spots and other soiled marks from a banjo head without necessitating its removal from the banjo while applying. A. Try bread crumbs, India rubber, or a very smooth piece of pumice stone for bad spots.

(3092) A, G. asks: 1. What is infusorial earth? A. Siliceous skeletons of diatoms. These represented a low form of animal life, and infusorial earth is made up of remains of their microscopic skeletons. 2. What are its uses? A. Principally as a polishing agent, as an absorbent for explosives, and in brick and tile and stoneware making, 3. What is its commercial value ? A. About \$5 per ton. 4. Can sulphate of aluminum be easily and cheaply reduced to merchantable metal ? A. No; but it should be of value for the manufacture of alum. 5. Is the Cowles method applicable in reduction of same ? A. No.

(3093) W. H. says: Here is my receipt for ingrowing toe nails : Soak the foot in rm water for ten or fifteen minutes, then take a medium sized file (a new one, so it is very sharp) and file off the top of nail down as thin as you please; once a week is often enough. I have tried every other known remedy, but this, used for a year, beats them all.

(3096) W. P. B.-The mottling of small steel work, gun work, etc., is described in Notes and Queries, No. 6, SCIENTIFIC AMERICAN, September 24, 1887.

(3097) C. O. S. asks for a good and cheap way for refining lard, so as to get it quite white and able to stand hot climates. A. Cleanliness is the great point in treating lard. The fat is freed from all adhering fleshy or discolored matter by cutting. It is then cut up into small pieces and washed until the water runs off clear. It is next melted by direct fire or steam coil until it becomes perfectly clear. It is run through close linen filters into the barrels, in which it is stirred until white and opaque, but only thickly fiuld. The great point is when to cease stirring. It is then cooled and tightly covered. Air makes it rancid. In Brannt's "Animal and Vegetable Fats and Oils," \$7.59, and in the same author's "Manufacture of Soap and Candles." \$7.50, there is some information on this and allied subjects.

(3098) R. D.-For the indicated horse power of a proposed engine: Multiply the proposed horse power by 33,000; divide this product by the mean engine pressure multiplied by the speed of the pistor (assigned) in feet per minute; this gives the area of the cylinder in square inches. The mean engine pressure must be assumed from the value of the cut-off, and may be obtained from the steam tables in engineering books The piston speed may be assumed at any figure between 300 and 400 feet per minute. The length of stroke is arknot is 1.157 miles. Fastest trains about 60 miles per hour. Driving wheels 6 feet 6 inches diameter. Special locomotives may have driving wheels larger. A rate of 80 to 90 miles an hour is probably the maximum velocity a locomotive could run.

(3099) B. C. writes: I have a guitar that has got some grease or oil spots of a dark color on the face of the instrument. Can you tell me what and how to remove them without injuring the sound or tone of the guitar? A. Fuller's earth mixed to a cream with benzine and placed in a thick layer over the spots, and allowed to dry, may draw out some of the grease. But there will be danger of injuring your instrument by the benzine acting on the varnish.

(3100) S. D. asks : 1. How can we purify natural gas so as to use it for lighting ? It burns with a blue blaze with great heat, but does not give much light. A. Carbureting with gasoline will effect your purpose; no purifying is needed. Possibly passing through slaked lime would help it. 2. Will natural gas run a gas engine as well as coal gas ? A. Not generally, and in your case certainly not. 3. Our gas well has a steady flow, but the gas will not burn at all times. What is the cause ? A. Your gas evidently varies in composition. When it will not burn, it is because it contains probably too much nitrogen.

(3101) H. V. asks: 1, Can the smoke from zinc ore roasting furnaces profitably be worked up for sulphuric acid? A. There is no reason why it should not, except that the percentage of sulphur is low, and if the roasting is effected with fuel there will be too much organic matter in the fumes to make it profitable. 2. What effect will the smoke of 50 such furnaces in a city of 10,000 inhabitants in the course of time have on health? You know that it kills all vegetation fo quite a distance. A. We should not anticipate much, if any, injury to health.

(3102) E. asks: What chemicals or acids united to phosphorus will produce a constant glow in an air-tight bottle ? A. The nearest approach to what you ask is Balmain's luminous paint, described in ou SUPPLEMENT in several places. A solution of phos phorus in olive oil will glow after exposure to the air.

(3103) W. McC.-Gun barrels and other parts are properly blued by finishing of an even or polish grain, and heating until the proper color is obtained For amateur work a brown stain may be made on the clean and polished barrel by brushing with a mixture of protochloride of antimony 1 part, nitric acid 1 part, hydrochloric acid 2 parts. Add the hydrochloric acid very slowly to prevent ebullition. Apply to the surface of the metal with a woolen rag and rub the surface with green young oak wood until the desired brown color is obtained. Wash with warm water, dry, and wipe with boiled linseed oil.

(3104) S. E. B. asks: Can you give me a receipt for treating oak and giving it a 16th century finish? Also a receipt for treating iron, such as grates, fenders, etc., giving the same ap old iron finish? A. Oak may be given the appearance of age by sponging with sulphuric acid and water equal parts, or what is preferable staining with umber in thin shellac vamish. Iron work may be treated with a wash of sulphate of soda and heating over a fire, or by brushing a solution of flour sulphur in 10 parts of turpentine, dissolved by heating, over the irons, then holding them over an alcohol n: heat until the black **poli**

the stack is large enough and draught strong enough to overcome the choking by the volume of steam, it is practicable, if convenient, for iron chimneys. Brick chimneys should be kept free from steam under all circumstances

(3108) A. K. F.—The frying sound in the telephone is caused by induction from other lines. earth currents and static discharges. To increase the volume of sound in a magneto telephone, use a carbon transmitter.

(3109) J. C. P. asks for latest method of determining by simple process, suitable for high school laboratory, the presence of arsenic in wall papers, etc. A. By simple burning the garlic-like odor of arsenic can be detected if arsenic is present in large quantities. If chemically pure zincand sulphuric acid are obtainable, Marsh's test is best. It is given in all analytical chemistries, such as Shepard's "Inorganic Chemistry," \$1 50.

(3110) H. H. asks : Where is the Hennepin Canal ? A. In Illinois. It extends from the Illinois River at the town of Hennepin to the Mississippi River near Rock Island. It forms part of the waterway intended to connect Lake Michigan with the Father of Waters,

(3111) E. G. W. asks : What do you consider the highest surface speed (with reference to fric-tion) infect per minute at which iron forged shafting may safely run in babbitt boxes without danger of melting the babbitt, provided the best known lubricating oil is used ? A. We have no information as to the extreme limit of friction or speed necessary to melt babbitt metal, both the lubricant and babbitt metal being of uncertain value. The severest trial of frictional value is on a fast railroad train, where a journal speed of 800 feet a minute has been attained on short runs. In ordinary machinery 400 to 500 feet per minute can be obtained with safety from overheating. As a general rule the percentage of friction due to load decreases with an increase of velocity. See chapters on friction in Trautwine's "Engineer's Pocket Book," \$5 mailed.

(3112) W. S. S. asks: Kindly give the weighs for cord of granite, lime, and sandstone. A. No definite weight can be given. Each kind of stone varies in different localities. If you mean broken stone, an approximate answer only can be given, granite 2,700 pounds, lunestone 2,600 pounds, sandstone 2,400 pounds per cord. These figures will vary from 100 to 200 pounds, according to locality and condition.

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INDEX OF INVENTIONS For which Letters Patent of the United States were Granted

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AND EACH BEARING THAT DATE.

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(3094) P. J. L. asks (1) how to deodorize kerosene. A. It cannot be completely deodorized. Treatment with concentrated sulphuric acid and bichromate of potash, mixed, may do something, but complete deodorization is not likely to be attained. 2 How to make camphorated oil ? A. Dissolve 20 parts camphor in 80 parts cottou seed oil. In China an oil is drained off from the crude camphor, which is termed camphoroil. 3. How to make vaseline. A. By decolorization of petroleum residue with sulphuric acid and bichromate of potash and digestion with bone charcoal

(3095) H. B. asks: Is there any difference in the two saccharometers (used in this country for beer worts), Kaiser and Balling, as to degrees? A. They are identical except as regards range. The Kaiser goes up to 40 per cent, the Balling stops at about 10 per cent Fah.), and the readings correspond to percentages of cane sugar

appears

Book Book Book (3105) F. D. S. savs: I wish to use the power of a fall of 30 feet of water delivered through an iron pipe 2 feet in diameter and 70 feet long. a. What size turbine should I use ? b. How much useful power would I obtain ? c. What would be the rate of flow Boot from the end ? A. If you have a full supply at the head Boots Bottl Bottl of your pipe, it will deliver over 8,000 cubic feet of water at the mouth per minute. If you are sure that you have Bottl Box. this quantity of water supply, you may realize 225 horse power with a 48 inch turbine of good make, or equal to Box, (Brake Brake Bridle the Leffel wheels.

(3106) W. H. S.-To polish rubber, the hard rubber should be turned as smooth as possible. Then finish with the finest sand paper or flour emery paper. Then polish with a paste of oxide of tin (putty powder) and water on a cloth.

(3107) W. McL. asks if it is practicable to exhaust steam from engine and heaters into smoke stack. A. If there is a necessity for a stronger draught than the natural draught of the stack, a well arranged jet exhaust is practical and advantageous. The lower. The reading temperature is 14° Reaumur (631/4 outlet or nozzle of the exhaust should be about four diameters of the stack below the top and in the center for best effect. If not needed for draught, and

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