

Business and Personal.

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Reliable information given on all subjects relating to Mechanics, Hydraulics, Pneumatics, Steam Engines, and Boilers, by A. F. Nagle, M. E., Providence, R. I.

Notes & Queries

J. R. will find a recipe for stove blacking on p. 41, No. 3.—For information on rubber stamps, A. A. R., D. R., and others may consult No. 6, p. 91 (33).—A. B. C., G. H. J., J. B. B. and others are referred to No. 7, p. 100, for information on curving a base ball.—W. S. P. will find information concerning the preservation of flowers on p. 98, vol. 35.—J. M. will find directions for making the American flag on p. 12 (29).—R. L. asks how to prepare sumach leaves for insect powder. The leaves must be thoroughly dried, ground very fine, sifted, and kept dry.—W. B. S. must see reply to W. T. for instructions for etching metals with acids.—T. C. is informed that wood is a conductor of electricity. Glass is a non-conductor.

(1) L. R. asks: How is nitro-glycerin made? A. Nitro-glycerin is produced by treating ordinary glycerin with a mixture of equal parts strongest nitric and sulphuric acids, and then washing the heavy, oil-like product with plenty of cold water. See p. 407, vol. 35, also vol. 34 of the SCIENTIFIC AMERICAN. Nitro-glycerin, when pure, is free from acids. It is a compound in which part of the hydrogen of the glycerin is replaced by nitric acid.

(2) F. W. S. says: I want something that in quantity of only about an inch square will burn with a small flame for about 10 hours? A. We know of no substance a cubic inch of which would be capable of maintaining a notable flame during 10 hours, excepting, perhaps, a quantity of heavy oil controlled in a diminutive lamp.

(3) J. C. D. asks: What kind of mineral do the stone piers of the East River bridge rest on for a foundation? One person claims they stand on clay, or what is called a hard pan, while I claim they stand on solid rock or stone. Is either of us right, if so, which one? A. The piers rest on solid rock in some places, and on gravel or boulders in others.

(4) J. A. says: Would you reproduce the description of the magneto-electric machine given on p. 195, vol. 34? A. No.

(5) J. A.—For the information of C. R. B., in reference to the fluid contained in a storm glass, says: "The mixture is made as follows: Place in a long narrow bottle or test tube, camphor gum 2½ dms, spirits of wine 11 dms. When the camphor is dissolved add the following mixture: Water 9 dms, saltpeter 38 grains, sal ammoniac 38 grains. Dissolve these salts in 9 drachms of water before mixing with the camphorated spirits, then shake the whole together. Cork up tight, and seal with wax, then make a small hole through the cork with a red hot needle, so as to have a small clean hole. Heavy atmosphere will cause the salts to rise; a light atmosphere to fall. Cost of mixture, 10 or 15 cents.

(6) H. M. N. asks for the best method for cooling water without the use of ice, being situated in a place where ice cannot be obtained. A. See "A self-cooling goblet," p. 72, No. 5. We shall soon publish another method of cooling water and liquids.

(7) P. R. asks how the ends of the single wires are joined together to form the strand for the East River bridge cables? A. Short thimbles are made with a right hand thread cut in one end and a left hand thread in the other. Corresponding threads are cut in the ends of the wires to be joined, which are received in the thimbles.

(8) O. B. says: Suppose I suspend two weights from line 50 feet long, say 200 feet apart at the point of suspension. Now it seems to me that, by carefully measuring, the distance from weights would not be quite 200 feet, as both tend to the center of the earth. I think therefore that in this way I might be able to find the radius of the earth by simply measuring the distances between the weights, make calculations where they would finally meet. Am I right or wrong? A. The theory is correct. You may find it difficult to apply under the circumstances.

(9) S. J. S. asks: 1. Would not steam power be more economical or take less steam and wood to pump in air with the steam? A. There would probably be some economy in the arrangement. 2. Are the petroleum engines a success? A. There are some forms that are favorably spoken of. 3. What does the crude oil cost? A. The price is variable, about 9 cents a gallon at present. 4. Does water in boilers protect no thicker iron than ¾ all over burn out or away? A. It is not usual to make fire surfaces thicker than this. 5. If cast iron boilers are covered with sheet iron, does that do away with the objection to them or make them as safe as wrought iron boilers? A. We think not. Your other questions would require quite a treatise for their proper consideration, and if you will consult the back files of our paper, you will find that they have all been referred to. 6. How much cheaper is water power than steam, say for the length of time that an engine or boiler would last, or in the long run? A. Experiment can alone decide.

(10) A. B. asks how to make sizing for walls? A. Size to make paper stick to walls is made by adding 8 ozs. of dissolved glue to a pail full of hot water. Apply the preparation to the wall with a white-wash brush. Be particular to touch every part of the wall, especially the top and bottom. Allow the size to dry a little, and hang the paper with paste as usual.

(11) E. F. S. says: Will you tell me how to clean guns? A. Remove the barrels, wash with hot water to remove the residuum of the powder, wipe dry and oil lightly with oil that contains neither salt nor acid. Keep the locks dry and do not get water into them.

(12) F. M. Y. says: In procuring alkalies from barks by boiling in dilute muriatic acid, find great difficulty in separating them from the tannic acid. How can I precipitate the alkaloids moderately pure? A. Heat the solution with a solution of lead acetate (Goulard's solution) as long as a precipitate forms, and then remove the excess of lead by cautious addition of ammonia or by hydrosulphuric acid (sulphuretted hydrogen). Evaporate and crystallize from the filtered solution.

(13) M. L. T. asks: What is the process and appliances used for extracting oils from herbs? A. The volatile oils are generally obtained by distilling in a deep narrow retort the articles along with an equal weight of water; but some substances that give out their oil with difficulty are first soaked for 24 hours in twice their weight of water, to each gallon of which 1 lb. of common salt has been added, by which its boiling point is raised, and consequently the oil comes over more readily. The distillate separates into two layers, the water being drawn off and returned to the retort, and this is repeated until distilled water ceases to come over mixed with oil. The rectification of the oil is performed without water, by the careful application of heat just sufficient to cause them to flow over pretty rapidly, so that they may be kept heated for as short a time as possible.

(14) J. G. S. asks how to clarify neat's foot oil? A. The oil is usually agitated by means of injected steam, first with solution of tannin (hot infusion of oak bark), next with water and chloride of lime, and then with dilute oil of vitriol. Solution of blue vitriol (copper sulphate) and salt is also sometimes used, and the oil filtered through dried and powdered fuller's earth or charcoal in large bags of Canton flannel.

(15) S. L. E. asks: What is the best method of making black and violet ink that will dry immediately? Also what will take such ink stains from hands and clothing? A. The purple ink made from aniline violet solution with a little gum is among the best of its kind. A purple or violet ink may also be made by triturating 6 parts of finest Prussian blue and 1 part of oxalic acid into a smooth paste with a little water, and after standing 24 hours, diluting with sufficient quantity of water

and enough extract of Brazil wood to strike the desired color. A little alum solution and an ounce of gum to the gallon should then be added. For other ink recipes and methods for removing ink stains see p. 76 (54) vol. 37, pp. 155 (30), and 315 (26), vol. 36, and pp. 101 and 297, vol. 35 of SCIENTIFIC AMERICAN.

(16) W. G. says: How can I save apple and pear trees attacked by the blight? A. A good lime wash is recommended, with the addition of a little soot or lampblack to neutralize the glare if this is objectionable. This wash destroys the eggs of insects and germs of fungi, and keeps the bark free to swell as the cells grow. Some farmers have used strong hot solutions of common soap applied with a swab, also linseed oil where the white scales abound.

How can I separate nickel from a solution of nickel coins dissolved in nitric acid (HNO₃)? A. Heat the solution gently, slightly acidified with dilute sulphuric acid, and pass a slow current of sulphuretted hydrogen through it until a filtered drop of the solution no longer gives the copper reaction when brought into contact with a drop of potassium ferrocyanide solution. Filter, cautiously add a little potassium chlorate, heat to boiling, and precipitate as oxalate (with oxalic acid). The dried oxalate heated in a closed crucible will yield pure nickel.

(17) W. E. S. asks: What is the quickest way to make vinegar? A. What is known as the German process is the most rapid method of making a good vinegar. In this, dilute alcoholic liquor to which a part of honey or extract of malt has been added is caused to trickle down through a mass of beechwood shavings previously steeped in vinegar and contained in a vessel called a vinegar generator (*essigbiller*). It may consist of a large oak hoghead or barrel furnished with a loose lid or cover, a few inches below which is fitted a perforated shelf, having a number of small holes loosely filled with packthread about 6 inches long, knotted at the upper end to prevent their falling through. Several small glass tubes long enough to project slightly above and below the shelf are also fitted in perforations in the shelf to serve as air vents. The vessel at the lower part is pierced with eight or ten holes equally distributed around the sides at about six inches above the bottom, to admit of the entrance of air. A small siphon tube, the upper curve of which is an inch below the air holes, serves to carry off the liquid as fast as it accumulates at the bottom. The alcoholic liquid at a temperature of 75°—83° Fah. is run in on the shelf, and slowly trickles down through the holes by means of the packthread, diffuses itself over the shavings, slowly collects at the bottom, and runs off by the siphon exit. The air enters by the lower holes, passes freely through the shavings, and escapes by the glass tubes. The temperature within the apparatus soon rises to about 100° Fah., and remains stationary at this point while the action goes on favorably. The liquid generally requires to be passed three or four times through the cask before its aceticification is complete.

(18) C. says: I have used the following recipe for making hard soap: 7 lbs. common yellow soap, 4 lbs. sal soda, 1 oz. hartshorn, 2 oz. borax, ¼ lb. rosin, to be dissolved in 22 quarts water, and boiled about 20 minutes. It hardens sufficient on cooling to be cut in bars, but after a short time it becomes greasy, with particles of soda appearing in it. A. Use a larger proportion of sal soda and boil with the rosin and borax some time before adding the soap. It should be kept in a dry place for a time after cutting.

(19) H. R. says: I wish a preparation to coat paper moulds so that a mixture of glue and molasses will not adhere to the paper? A. Dip the moulds in melted paraffin, and when cold cover them uniformly with a thick oil.

(20) A. B., and others who ask how to make marine glue: Dissolve 1 lb. best caoutchouc (gum rubber) in 4 gallons of pure gas naphtha, with frequent agitation. After ten or twelve days add 2½ lbs. of shellac, in finest powder, and allow to stand for about a week in a well stoppered flask. The mixture must then be carefully heated in an iron vessel having a discharge pipe at the bottom, and when the whole has become liquid, drawn out upon large metal slabs to cool. When required for use it should be heated to 25° Fah. (best in an oil bath), and applied with a brush. It forms, when properly prepared, one of the strongest and most insoluble cements known.

(21) T. J. S. asks: What ethers will mix with naphtha or gasoline of 62° without danger of explosion? A. As we understand you, most of the common ethers are miscible with the oils mentioned, and the vapors are explosive only when mixed with air and ignited.

(22) L. H. asks how to make ozone in large quantity? A. Ozone may be formed in large amount by electrifying air or oxygen. It is by this process that it is usually made when required in large amount and in very concentrated form. You should consult some standard work on inorganic chemistry.

(23) W. C. R. says: 1. I made some fulminate of mercury, and instead of exploding with a loud report, it only made a puffing noise and very bright blaze. A. The detonation of the fulminate in small quantities is not very violent unless it occurs in a confined place. 2. Will you tell me how to explode torpedoes made of chlorate of potassa and sulphur? A. The ingredients must be reduced separately to the finest powder and intimately mixed; the mixture explodes either by concussion or ignition.

(24) L. A. L. asks: What action will lager beer have on elastic rubber, when in constant contact with it? A. It will probably soften it considerably after a time.

(25) G. H. E. asks: 1. What is the difference between pot and pearl ashes, and how made? A. The crude carbonate of potash of commerce is obtained by lixiviating the ashes of plants with water, and boiling down the liquid to dryness in iron pots. The dark-colored residue is called potashes, and this when calcined in a furnace so as to burn off most of the coloring impurities, affords the impure carbonate known as pearl ash. 2. Who uses ashes, and for what purpose are they used? A. These find extensive use in technical operations, such as soap-making, glass making, dyeing,

metallurgical and chemical operations, and are the source of nearly all the potassium preparations and salts in use.

(26) A. P. asks: How can I prevent souring and putrefaction of flour paste? A. A small quantity of solution of corrosive sublimate or chloride of zinc will prevent the souring and putrefaction of the composition. These antiseptics are poisonous when taken into the system.

(27) D. F. asks how to prepare chewing tobacco? A. Chewing tobacco is prepared by some unprincipled persons from the leaf by soaking in cheap rum and molasses, with the addition of ammonia and niter, and pressing; but it is, we believe, a common practice to first soak it in urine and then in molasses water, etc. See p. 68 present volume of the SCIENTIFIC AMERICAN. Common smoking tobacco is prepared from the wet pressed leaf, the waste of cigar making, and stems similarly treated, dried, and broken, or cut. It is usually thought proper to improve (?) it with various quantities of safflower, rhu-barb, potato, cabbage, coltsfoot, dock-leaves, sawdust, malt combings, medicinals, and sand.

(28) E. D. asks how to construct a Leclanché battery? A. The Leclanché battery consists of a plate of zinc placed in a solution of ordinary commercial sal ammoniac (chloride of ammonium). The porous cup should hold a plate or prism of carbon surrounded with a dry mixture of manganese black oxide and powdered gas carbon. The contents of the cup is usually sealed at the top with a layer of asphaltum, through which the end of the carbon plate projects for connection. See (40), p. 60, present volume of SCIENTIFIC AMERICAN. 2. Is the Leclanché battery durable and strong by always leaving it together? I like to have a very strong and durable galvanic battery, preventing the use of acids and vitriols if it can be helped. A. On open circuit it lasts a long time, and, at the moment of closing circuit, has an electromotive force greater than the Daniell's or gravity form of battery, if in good order.

(29) J. H. C. asks for a simple way of purifying coal gas? A. Hydrated oxide of iron or coke dust saturated with a strong alkaline solution will answer; but for large quantities of gas, lime or lime water is the cheapest. Washing with water will not completely purify it.

(30) I. M. asks: Can scent of coal oil be removed without injuring its qualities? A. A great part of the disagreeable odor may be removed by treating the oil with milk of chloride of lime (bleaching powder) at a temperature of 138° Fah. for some time, decanting from the sediment, agitating with a few per cent of soda solution, and washing well with water.

(31) H. W. S. asks if there are any compounds or liquids that will explode or ignite when brought in contact with each other? A. Hydrogen phosphide ignites explosively on contact with air or oxygen. On contact of calcium phosphide with water, hydrogen phosphide is formed, and inflames immediately in contact with air. Iodine inflames phosphorus (vitreous) by contact. A mixture of potassium chlorate with fine sugar or ether is ignited by a drop of oil of vitriol. Pure hydrogen and chlorine (gases) combine explosively by contact in strong sunlight. The ozone liberated by the action of a little strong sulphuric acid on dry, powdered potassium permanganate directly ignites co-gas, cotton, oil, or other combustible substance brought in contact with the generating mixture. Other similar reactions might be cited.

(32) W. T. asks how to etch on steel? A. The clean plate must be covered with an even film of wax, either applied while the plate is uniformly heated, or dissolved in alcohol and flowed on the warm plate. The etching fluid may be made as follows: Pyroigneous acid 4 ozs., alcohol 1 oz., nitric acid 1 oz.; by measure, Or use iodine 1 oz., iron filings ¼ drachm, water 4 ozs. The lines are cut through the wax with a fine steel point, so as to leave the metal surface bare under the lines. The etching fluid is then poured on, and removed as soon as the metal is sufficiently etched.

(33) F. H. asks how to obtain the color of the "liqueur absinthe"? A. The substances used by the French to color their liqueurs are, for blue, sulphate of indigo neutralized with chalk, or the juice of blueberries; fawn and brandy color, burnt sugar; green, spinage and parsley leaves digested in spirit, also by mixing blue and yellow; red, powdered cochineal, either alone or mixed with a little alum; violet, litmus; yellow, an aqueous infusion of safflowers or French berries, or a spirituous solution of turmeric.

(34) A. E. G. asks: 1. What solid substance is most sensitive to changes of temperature, or has the greatest coefficient of expansion? A. Zinc, we believe, suffers the greatest change. 2. What substance is most sensitive in lengthening and shortening for changes in humidity? A. Porous bodies, such as light wood, are most notably affected.

(35) C. E. F. asks for some liquid of a volatile nature that will reduce sawdust and scrap white paper to a pulp? A. Ammonio-cupric oxide and aluminous chloride dissolve and soften woody fiber and paper.

(36) J. D. S. asks how to make the putty used by carriage painters? A. Takedry white lead and mix with 1 part brown Japan and 1 part carriage rubbing varnish. A common wagon putty is made by using whitening in the place of dry white lead and adding a small quantity of white lead in oil, from the keg. This putty should be kept in water when not in use, to prevent drying.

(37) E. D. asks: 1. Can I leave a sulphate of copper battery together without the blue vitriol eating the copper? A. You can let the battery stand, but after a short time the copper solution will get to the zinc and coat it with copper. If the solution does not contain a free acid the copper will not be corroded to any extent. A little sulphate of zinc solution is better than salt water as the zinc fluid. 2. Is it unhealthy to leave the filled battery uncovered in a bedroom over night, where the windows are open? A. If the chemicals are pure, no. 3. Are the solutions very dangerous? A. They are only dangerous when taken into the system; they are not volatile.