

Business and Personal.

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To Clean Boiler Tubes—Use National Steel Tube Cleaner, tempered and strong. Chalmers Spence Co., N. Y.

Notes & Queries

It has been our custom for thirty years past to devote a considerable space to the answering of questions by correspondents; so useful have these labors proved that the SCIENTIFIC AMERICAN office has become the factotum, or headquarters, to which everybody sends, who wants special information upon any particular subject. So large is the number of our correspondents, so wide the range of their inquiries, so desirous are we to meet their wants and supply correct information, that we are obliged to employ the constant assistance of a considerable staff of experienced writers, who have the requisite knowledge or access to the latest and best sources of information. For example, questions relating to steam engines, boilers, boats, locomotives, railways, etc., are considered and answered by a professional engineer of distinguished ability and extensive practical experience. Inquiries relating to electricity are answered by one of the most able and prominent practical electricians in this country. Astronomical queries by a practical astronomer. Chemical enquiries by one of our most eminent and experienced professors of chemistry; and so on through all the various departments. In this way we are enabled to answer the thousands of questions and furnish the large mass of information which these correspondence columns present. The large number of questions sent—they pour in upon us from all parts of the world—renders it impossible for us to publish all. The editor selects from the mass those that he thinks most likely to be of general interest to the readers of the SCIENTIFIC AMERICAN. These, with the replies, are printed; the remainder go into the waste basket. Many of the rejected questions are of a primitive or personal nature, which should be answered by mail; in fact, hundreds of correspondents desire a special reply by post, but very few of them are thoughtful enough to inclose so much as a postage stamp. We could in many cases send a brief reply by mail if the writer were to inclose a small fee, a dollar or more, according to the nature or importance of the case. When we cannot furnish the information, the money is promptly returned to the sender.

J. O'K. should read our directions for kal-somming on p. 133, vol. 34.—J. P. H. and F. M. S. will find some excellent directions for polishing wood on p. 315, vol. 30. For French polish, see p. 11, vol. 32.—A. E. R. will find a description of a calorific engine on p. 66, vol. 34. For cutting glass bottles, see p. 36, vol. 36.—E. J. and W. P. H. will find something on cleaning wool on p. 114, vol. 36.—R. R. will find directions for depositing silver on metals on p. 299, vol. 31.—J. C. should read Auchincloss on "Link and Valve Motions," to be obtained of D. Van Nostrand, 23 Murray street, New York city.—E. B. will find directions for making printer's rollers on p. 283, vol. 31.—M. E. G. will find a recipe for a bronze dip on p. 8, vol. 36. For a varnish for bronzed work, see p. 65, vol. 32.—N. will find directions for making hydrogen on p. 341, vol. 27.—L. W. V. D. will find on p. 204, vol. 28, directions for preserving natural flowers.—J. L. S. is informed that the garden box is the well known tree from which boxwood is obtained.—L. G. will find the definition of a horse power on p. 33, vol. 33.—W. B. E. will find directions for making a calcium light on p. 219, vol. 30.—A. F. B. will find something on bronzing door knobs on p. 283, vol. 31.—H. H. should apprentice himself in a good machine shop.—J. S. M. will find something on decalcomanie on p. 275, vol. 34.—S. J. T. will find directions for making impression paper on p. 333, vol. 31.—E. N. T.'s idea of light is the correct one. See p. 308, vol. 30.—J. F. F. will find a recipe for a writing fluid on p. 106, vol. 27.—W. A. M. will find a recipe for a rosewood stain on p. 154, vol. 30.—J. H. W. will find an article on refitting leaky cocks and plugs on p. 182, vol. 1, SCIENTIFIC AMERICAN SUPPLEMENT.—S. H. will find directions for making malleable cast iron on p. 138, vol. 29.—T. W. P. will find instructions for chasing a doublethread off 1 inch pitch on p. 21, vol. 31.—J. C. G. can fasten ivory to wood with glue.—S. R. S. will find a recipe for copal varnish on p. 298, vol. 26. Fine gun stocks are French polished; see p. 11, vol. 32.—O. W. M. will find directions for silver plating without a battery on p. 299, vol. 31. For nickel plating, see p. 186, vol. 34.—T. H. will find directions for transforming cider into vinegar on p. 106, vol. 32.—C. H. B. can silver plate brass without a battery by following the directions on p. 299, vol. 31. For a gilding process, see p. 116, vol. 32.—P. J. will find directions for bronzing on brass on p. 51, vol. 33.—E. D. H. will find directions for preparing skeletons on p. 75, vol. 28.—B. E. C., A. J., W. C. F., R. B., S. J., F. H., C. A. K., R. T. W., E. W. H., and others, who ask us to recommend books on industrial and scientific subjects, should address the booksellers who advertise in our columns, all of whom are trustworthy firms, for catalogues.

(1) M. S. T. says: We have a pump with 2 inches bore, 12 inches stroke. She has a 2 inch suction pipe discharging into a 4 inch discharge pipe and raises the water 60 feet before it empties. Are there not 2 inches more weight or 2 inches more water working in her discharge valves than she ought to have? A. No. The large pipe is an advantage, as it diminishes the resistance due to friction.

(2) L. C. F. says: Is there a varnish, and what is it, by which a bright copper kitchen boiler can be kept bright? A. Use a solution of light-colored gum anime and Venice turpentine in spirits of turpentine.

(3) A. M. C. asks: What preparation will take out the yellow stains in linen, caused by water running down a smoke stack where soft coal is burned? A. Rub well with a cloth moistened with oxalic acid and a little dilute hydrochloric acid, and rinse thoroughly in cold water.

(4) T. J. asks: How can I proportion silicate of alumina and silicate of potash to paint on brick or stone? How can I put a polish on them? A. Boil for one hour 1 part of water glass (silicate of soda or potassa) in 6 or 7 parts of water, decant the liquid and mix it thoroughly with 2 parts of kaolin. The coating of this substance does not require polishing.

(5) W. H. T. says: Having seen several inquiries as to what would keep petroleum or kerosene from penetrating leather, etc., perhaps the following may be worth publishing: Mix glycerin and common glue, and apply to the leather by soaking or otherwise before the petroleum, etc., has been in contact with the leather. Before adding the glycerin, prepare the glue as usual with carpenters, and add glycerin as flexibility, etc., may demand.

(6) F. F. says: It is clear that the effects of cold on iron are not generally understood; otherwise, no one would build bridges out of solid metal. I have noticed that, in winter, when I dropped a heavy solid wrench, it would break in two like glass; but a wrench made of pipe would never break, no matter how cold it might be. If bridges were made of pipes, and had, for extra security, a wire rope on the bottom to stay them, they would be light, elastic, and durable, and much cheaper than the present ones.

(7) R. O. W. asks: Why does the wheel of a gyroscope while in rapid motion resist a force which tends to move its center in any direction other than in a straight line, except when moved in the plane of its revolution? Can you tell where an explanation may be found? A. The theory of the gyroscope has been admirably illustrated by analysis; but though many popular articles have been written to explain it, we have seen very few that give the reader much idea of the matter. One of the most recent, however (in the second volume of Johnson's "Cyclopædia"), is so simple and complete as to leave little to be desired. We could not easily give a synopsis of the explanation in these columns, and refer you to the work above quoted, where we think you will find satisfactory information in regard to your queries. See also p. 91, vol. 31.

(8) H. R. G. asks: A few days ago, a man drew a Derringer pistol of No. 44 caliber and shot another. They were, at the time of the shooting, about one foot apart. The pistol ball only penetrated the man's heavy overcoat, and fell to the ground, having only severely bruised the man. Does a pistol ball gain in velocity and force within a certain distance from the muzzle of the pistol, and then begin to lose its motion, or does it begin to lose its motive power the very instant it leaves the muzzle? A. It loses power from the instant it leaves the muzzle.

(9) J. L. asks: In the Gramme electric machine, what should be the diameter of the iron of which the ring, 5 1/4 inches in diameter, is made? A. About 5/8 inch.

(10) J. S. M. asks: How will a journal box for a lathe, of Babbitt metal instead of brass, work? A. It would not work so well as a brass box, but would answer.

What is the best substance for grinding glass for lenses? A. See p. 363, vol. 31.

(11) T. T. R. says: I wish to know if malleable cast iron will answer for electro-magnets when it is desired to excite and destroy the magnetic force very rapidly. A. Wrought iron is preferable, but cast iron can be made to answer very well in small magnets.

(12) A. D. C. & Co. say: We wish to encase some hams in cloth. Please inform us how to paint the cloth. A. Many cover the hams with clean white cotton cloth, and use no paint; but the cloth is oftener coated with a lime whitewash, sometimes colored with a little turmeric. In large packing establishments, the cloth is simply passed through crude pyroligneous acid (wood vinegar), and the ham sewed in before the cloth is quite dry.

(13) W. B. E. says: 1. I desire to make an oxyacetylene light, as powerful as that used at the late Centennial. Can I use alcohol for the flame? If so, what size and shape must the flame be? A. The so-called oxyacetylene lamp cannot be made to yield as brilliant a light as the oxyhydrogen under any conditions. In the oxyacetylene lamp, the wick may be contained in a round or flat tube placed close to the lime, and the jet of oxygen is made to pass through the flame in the same manner as with an ordinary blowpipe. 2. What must be the diameter of the outlet of the oxygen pipe? A. The orifice of the oxygen jet is about 1/16 to 1/8 of an inch diameter. 3. Of what kind and how large must the reflector be? A. Use a hemispherical reflector of silver plated copper, about 18 inches in diameter.

(14) N. A. W. says: I read as follows: "The reason that salted meats cause scurvy is that the salt abstracts the potash; and if potash is sprinkled on the food as one sprinkles salt, the difficulty is averted." Does chemistry substantiate this? A. As to the true cause of the malady, the opinions of authorities seem to differ widely. It has not been demonstrated that salt meat is the immediate cause of scurvy, nor that scurvy is even attributable to the disproportionate quantity of soda over potash salts in such meat. There are communities that subsist almost exclusively on salt meat, and yet are free from scurvy. It is claimed by some authorities that the disease is due to the absence of fresh vegetables. This, in the main, would seem to be the true solution; but it is well known that in North Wales there are communities where epidemics of scurvy are not rare, the people living altogether on vegetable diet. The later writers on this subject assume that the disorder is due to the joint action of exposure and to general want of nutritious food in greater variety. Lime juice has been heretofore considered a specific for this disease; but the reports of the late polar expedition do not substantiate this assertion.

(15) J. W. W. says: 1. I have tried without success to make liquid indigo blue (sulphate of indigo). It looks all right when it is first made; but soon the indigo precipitates, leaving the liquid as clear as spring water. Can you give me a recipe for the above which will hold its color? A. You should have stated how you prepared the sulphindigotic acid. Heat the indigo in a suitable glass vessel with a quantity of strongest oil of vitriol for an hour or so. Then allow to cool, and dissolve in hot water and neutralize the excess of sulphuric acid with carbonate of ammonium. The indigo should be added to the acid in excess before heating. The stronger the acid employed, the lower is the temperature required for the reaction. Fuming (Nordhausen) sulphuric acid will accomplish the result without the application of heat. 2. Are the various aniline dyes poisonous in such quantities as are necessary to color liquors, such as peppermint, etc.? A. These dyes are not all poisonous.

(16) W. C. T. asks: 1. I want a metal that I could melt in an iron ladle, that will be a little harder than pewter. I took some thin sheet brass, lead, and tin, and put them together in the ladle. They all melted, but when they got mixed, the alloy began to burn with a blue flame and burnt away, leaving a white powder. Please explain. A. Both tin and lead when exposed while at a high temperature in contact with the air rapidly oxidize; and if the conditions last long enough, the whole of both metals will become converted into oxides. When lead is oxidized or burned in this way it always colors the flame blue: this is a characteristic reaction of the metal. Copper under the same conditions tinges the flame a lively green. You should not expose your alloy at so high a temperature. Cover the surface of the molten metal with some sal ammoniac. 2. What is the best parting sand for small patterns? A. Use the best plumbago (graphite).

(17) J. D., Jr., asks: Is there any metal or combination of metals that will expand in cooling, that can be made as hard, say, as Babbitt metal? A. Yes. The alloys of bismuth and antimony with lead and tin expand to some extent at the moment of solidification. This is owing to the crystalline arrangement of the molecules that takes place in these metals under such conditions. Within certain limits, all the metals expand by increment of heat and contract by loss of heat. Try the following: Antimony 1 part, bismuth 2 parts, lead 1 part, tin 4 parts.

(18) H. B. S. says: 1. Please tell me how to limit the deposit of copper in electrotyping impressions of seals, etc.? After the face of the seal is well covered, the metal begins to pile up on the edges in hard round masses. A. Varnish such parts of the casts as are not to be deposited on, and use moderate battery power. 2. Is there any simple manual I can buy giving information on such points? A. Sprague's "Electricity: its Theory, Sources, and Applications," is one of the best.

(19) J. A. asks: How can I cement rubber to earthenware? A. Melt together equal parts of asphalt and gutta percha, and stir well together. It is used

hot. The cement, when set, is very strong, is waterproof, and resists the action of corrosive fluids.

(20) D. S. asks: How can I keep the worm out of hickory timber? A. Sprinkle or (better) wash the wood with pyroligneous acid (crude wood vinegar) containing creosote. This will destroy the insects, and preserve the wood, in a great measure, from decay in damp air.

(21) B. B. T. asks: Are there any animalcules in ordinary spring and well water? A. Most spring and well waters contain some form of animal life, but not all. It is difficult, however, to find a sample of water that is wholly destitute of life or the undeveloped germs.

(22) S. E. S. asks: Is there any substance, not poisonous, that can be put into a thick gum arabic paste to keep it from shrinking in size, and yet not get harder than india rubber, still to get sufficiently dry in one day to handle and cut the next, the gum being cast in moulds? A. There is nothing that will accomplish this.

How can I get a solution of subnitrate of mercury? A. Pour 1 part of nitric acid of specific gravity 1.2 on 1 part of mercury, in a porcelain dish, and let the vessel stand for 24 hours in a cool place; separate the crystals formed from the excess of mercury and mother-liquor, and dissolve them in water mixed with one-sixteenth part of nitric acid, by trituration, in a mortar. Filter the solution and keep the filtrate in a bottle with metallic mercury covering the bottom of the same.

Will an ink from bichromate of potash attack steel pens? A. Not to any extent.

(23) J. S. asks: Is there any method or process for casting india rubber without using a vulcanizer, so that when taken from the moulds the rubber will be hard but elastic, and appear white? A. No.

(24) C. A. H. asks: What ingredients besides cast iron cuttings do you use in making miniature volcanoes? A. Gunpowder, charcoal (in powder), nitrate of potash, sulphide of antimony, sulphur, and sometimes nitrate of strontium, which gives a crimson glow to the flame.

(25) B. M. S. asks: Can asbestos be applied on an ordinary blanket so as to make it fireproof, and still leave the blanket pliable? A. Yes, but it might be unpleasant to use a blanket so prepared as bed clothing. It would not be difficult to produce a blanket, the warp or weft of which should consist of asbestos fiber. Asbestos ground in oil and other vehicles is employed as a fireproof varnish, or paint.

(26) W. H. C. asks: With what preparation can I harden an alloy of equal parts of tin and zinc to any degree of hardness without injuring its casting qualities? A. This is not feasible.

(27) W. H. R. says: I want to bore a hole of 1/8 of an inch caliber; what sized drill, in 16ths, 32ds, or 64ths must I ask for to do this with? A. You cannot get a drill of the size you want that will be measurable in the denominations you name. The nearest you can get will be a 1/4 inch, which will be 1/8 inch too small. Since, however, the hole is always larger than the drill, it may answer.

(28) C. R. asks: Please inform me if an oscillating engine of the same proportions as a slide valve engine, working at a similar pressure, will have as much power? A. Everything else being equal, yes.

(29) E. A. V. asks: How can I face cast iron with cast steel? A. The steel is placed in the mould, and the molten cast iron is let run through until it gets the steam hot enough to weld, when the outflow of the cast iron is stopped, and the inflow is continued to fill the mould.

(30) W. C. D. says: 1. I am fitting up a 5 inch center foot lathe without back gear, and I want the mandril (which runs in boxes) to project about 1 inch outside the boxes on the left hand end of head stock, to mount small pulleys on to drive overhead apparatus. By what means can I keep the mandril up to its work with the least friction? A. Make the end of the spindle flat, and provide a flat-ended adjusting screw, putting a disk of leather between the two.

(31) S. A. H. says: 1. I frequently make small brass castings to be used in experiments, and am unable to make the brass run freely, and the castings are honeycombed, the metal appearing to have been oxidized. I melt the brass in a crucible in a stove, with bituminous coal. Should I put any flux on the metal? A. Your difficulty probably arises from not letting the air out of the mould. Add the zinc after the other metals are melted, and use broken glass as a flux. 2. Brass articles, such as cheap telescope mountings, etc., seem to have a good finish which is not ground and polished. Are they simply burnished after making smooth as possible with the chisel? A. Files and emery paper will answer this purpose. 3. How shall I make the best lacquer for brass mountings? A. See p. 242, vol. 34.

(32) J. S. asks: 1. How can I forge a hand hammer? What is the best shape for the steel before punching, to make a nice eye? A. Punch the eye the first thing, and do the forging afterwards. 2. Which is the best way to lay planer knives with cast steel? A. Use borax to facilitate the welding.

(33) R. G. asks: Would a valve gear that would open and close the ports with a much quicker movement than the ordinary eccentric, and throw precisely alike during the inner and outer strokes of the engine, be valuable? It will cut off at any point of stroke desired, or it will wire-draw; and it is reversible? A. Yes, if it is simple in construction.

(34) H. M. S. asks: How can I properly temper the face of an anvil that has had the temper taken out by being in a burning building? A. Heat the face, and harden in a copious supply of water.

(35) S. H. asks: Is there anything I can mix with the sand that comes near the casting in moulding that will give the casting a hard surface and not weaken it? A. We know of nothing for this purpose.

(36) W. J. McG. asks: 1. What is the eccentricity of the moon, and of the primary planets? A. The following is the eccentricity in miles: Mercury