Business and Personal.

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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 inquiries 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.

(1) F. R. asks: How is liquid bluing made? A. The greater part of the laundry blues in the market consist of Prussian blue dissolved in water by the aid of oxalic acid or potassium ferrocyanide (yellow prussiate). The quantities are about 17 per cent dry oxalic acid, or 18 per cent potassium ferrocyanide.

(2) G. L. D. says: Why can a person turn a screw easier with a long screw driver than with a short one? A. Because the long screw driver tips a little and so gives more leverage on the screw than the short screw driver.

(3) G. W. S. asks: 1. Will eosine make a reliable ruling ink that will not fade? A. No. 2. What is used for setting aniline colors, so as not to copy when dampened? A. You will not succeed in making an eosine ink that will not copy more or less when moistened.

(4) W. H. T. asks how to make collodion of dark purple color for the purpose of insulating fine copper wire? A. Collodion may be made by dissolving gun cotton (the low grade) in equal parts of absolute alcohol and ether. It may be colored or tinted to suit by slight additions, to the solvents, of the various coal tar dyes. The drying may be expedited by the use of hot air.

(5) J. S. B. asks: 1. How can I electro-plate with gold and have the deposit have the appearance of 16 and 18 karat gold? A. The following is said to give fine results when properly worked; Make the anode of an alloy composed of 1 part silver, 9 parts copper, and 30 parts gold. Immerse this, connected with the positive pole of a strong battery, in a hot aqueous solution of potassium cyanide contained in a small porous cup, and place the cup in a large vessel of copper. Fill up around the cup with water to which has been added a little ammonium nitrate, connect the copper with the zinc of the battery, and heat the whole to about 110° Fah. on a stove, while the current is passing. When the solution has taken up enough of the alloy (which may be determined by means of an hydrometer, or by weighing the dry plate before and after), remove the solution and plate from it in the usual manner, using the alloyed anode. 2. By what means can I best solder small pieces of steel together? A. Heat the joint sufficiently, flux with acid zinc chloride solution, and use a plumber's solder. 3. How can I best nickel plate on zinc? A. Give the zinc a good coating of copper, using a strong battery, and then plate on the nickel from an ammonio-nickel chloride bath.

(6) S. A. S. asks: Of what dimensions should I make a tank to hold 1,200 gallons, height and width to be the same, length one third longer? A. The proportions (inside measurement) should be 4 feet 9 inches width and depth, and 7 feet 4 inches length.

(7) R. E. M. B. asks: Can you give me a recipe for making a varnish impervious to water, to use on a fishing rod? A. To make it, put gum shellac in a vessel, with alcohol sufficient to cover it, and keep it in a warm place until the gum is dissolved. If too thick, add alcohol until thin enough to flow readily.

(8) A. S. says: I have been trying to solder zinc, but cannot get the solder to adhere. I have used rosin and sal ammoniac, but neither will make it adhere. A. Use as a flux, muriate of zinc. To make it, dissolve zinc in muriatic acid and use after ebullition has ceased.

(9) F. B. H. asks: Would an apparatus constructed of india rubber lose its efficiency (strength and elasticity) if required to work in steam in a boiler, and would it lose this if immersed in water? A. Yes, in time.

(10) J. G. says: I am running a corn mill by water. I notice that at times my leather belt, which runs on a wood pulley at one end and an iron pulley at the other, gives off sparks of electricity. What is the cause? A. Friction of the belt upon the pulleys.

(11) J. J. H. asks: Why is it that the shadows of two objects appear to protrude and meet each other when the objects are moved toward each other, and that the protrusion proceeds from the shortest shadow? A. The effect is produced by the overlapping of the penumbra at the sides of the shadow. The penumbra of the long shadow or the shadow of the object the farthest away is the largest, and reaches the shadow of the nearest object first, making that side more dense, which makes it appear to protrude from that side first.

(12) H. H. asks: Can a spindle be made to run 32,000 revolutions per minute? A. It does not seem impossible.

(13) H. S. W. says: I find in using varnish that numbers of small bubbles rise on the surface of the work and seriously detract from the smooth appearance. What is the cause? A. It may be due to roughness of the surface varnished, presence of moisture in the wood, unevenly cut brush, imperfect fluidity of the varnish, or poor spirit solvent, etc. Use a well cut fitch or fine varnish bristle brush, see that the wood is dry, and do not lay on the coatings too heavy. With shellac varnish, perfect smoothness in the coating is with difficulty obtainable unless the first coat is rubbed down properly with pumice.

(14) W. H. G., Quebec, asks for a recipe for waterproofing cloth? A. In one vessel dissolve 1 lb. of the lead acetate in about a gallon of rain water, and in another dissolve 1 lb. of alum in 3 gallons of water. Pass the cloth first through the lead bath, then through the alum solution, and finally wash in water, and dry. Another common method of waterproofing is the following: Boil 4½ ozs. of white soap in 2½ gallons of water, and separately dissolve 5¾ ozs. of alum in 2½ gallons of water. Heat these two solutions to 190° Fah., and pass the goods once through the soap bath, and afterwards through the alum solution. Lastly, dry it in the open air. The alum causes the precipitation of an insoluble alum soap within the fiber.

(15) I. F. B. asks: Will it be safe to run a six feet fly wheel up to four or five hundred revolutions a minute? The wheel has six arms and an oval-shaped rim about four or five inches wide. A. You do not send sufficient data, but if the wheel is well proportioned, it can be safely run at the higher speed named.

(16) W. G. says: I have a velocipede of the three wheel kind; how is it I cannot make it go advantageously on a good level and solid gravel road? A. If, as we suppose, the trouble in the gravel road is caused by the wheels cutting in too deeply, the remedy is to make them with wider treads.

(17) J. N. J. asks for a recipe for making citrate of magnesia? A. Take carbonate of magnesium 25 parts, citric acid 75 parts, distilled water *q. s.* Mix, reduce to a thick paste, which dry at a temperature of about 75° Fah. To make the effervescing mixture take of the above 14 parts, and mix with bicarbonate of sodium 13 parts, citric acid 6 parts, and powdered white sugar 3 parts. Moisten the mixture with a sufficient quantity of alcohol and pass it through a tinned iron sieve to form a coarse powder. Dry in a moderately warm place and keep in a well closed jar.

(18) L. E. says: Will you give me the best method of case hardening iron? A. Pack the articles to be case hardened in an iron box filled with bone dust or animal charcoal made of burnt leather. For small articles short pieces of gas pipe will do instead of an iron box. The ends must be stopped and luted with clay. The leather may be burnt in a pan or in a stove, and it must be reduced to powder before being packed around the work. Heat the receptacle and the contained work red hot, in a furnace, for a length of time proportionate to the size and thickness of the articles. Thin articles will require to be kept at a red heat only a few minutes, while heavy articles may require half an hour or more. When sufficiently heated, quench the work as soon as possible in cold water.

(19) E. M. asks how malleable iron is made? A. Malleable cast iron is the mode of decarbonizing cast iron by a process of cementation by means of hematite, which imparts a portion of its oxygen to the carbon in the cast iron, forming a chemical union and extracting the carbon from the castings. Scales derived from the process of rolling iron bars are sometimes used. The castings are packed in iron boxes, carefully luted, and kept in a furnace at a red heat for several days.

(20) F. T. M. asks: How can I weld malleable and wrought iron together? A. Try a high heat, and use powdered borax as a welding flux.

(21) G. W. D. asks for a method of separating iron ore in fine grains from common sand, and also asks if the mass can be passed through water resting on a liquid of greater density than the silicate portion, but not too dense to allow the iron particles to pass through? A. Metallic iron and many of its oxides and other combinations may be cleanly separated from sand by means of powerful magnets, preferably grouped into batteries the poles of which form part of the surface of a cylinder. We do not know of a fluid having all the requisite qualities to be of practical value in the way you suggest.

(22) H. V. asks: What is the method of diluting tinctures, etc., that is, what quantity of spirits and water are used in reducing from the tinctures to the 30th and highest dilution? A. The rule is, we believe, to reduce the strength of the tincture one hundred times at every dilution, thus: 1 part (by weight) of standard tincture (=a)+100 parts diluent=a^1; 1 part a^1 +100 parts diluent=a^2, and so on. The diluent is usually either water or a spirit just strong enough to hold the substances in solution.

(23) S. T. asks: Was a post mortem examination ever held on the bodies of the Siamese twins? What was the result of the investigation? A. Yes. The result showed that there was a union at the two ensiform cartilages, which were joined very near the median line of the band. There were three pouches, the lower one being separated from the skin by a very delicate layer of tissue, and passed from the abdomen of Chang and was lost in the duplicature of the suspensory ligament of the liver of Eng. Above this was a similar pouch belonging to Eng, and between this and the under surface of the ensiform conjunction was the third and largest pouch, also prolonged from Chang's abdomen, until it reached the peritoneal cavity of Eng, but was not continuous with it. Thus two of the pouches belonged to Eng. A connecting band was also found between the livers. The two portal circulations were connected and the peritoneal process extended across the ligament.

(24) L. K. says, in answer to E. C. H., No. 7 (22), who asks how to make a good Babbitt box: When the shaft or journal is adjusted to the proper place, sprinkle on some powdered rosin. When the metal is poured in on this rosin it burns, causing the metal to flow, by keeping it hot, into all parts of the box.

(25) Gas, Pittsburgh, asks: What was the process employed for the manufacture of oxygen gas by the company which attempted to introduce it into use in conjunction with the ordinary gas? A. It was produced by the union of a jet of oxygen and a jet of common street gas, the street gas supplying the hydrogen. The oxygen gas was made by subjecting a quantity of manganese, placed in a retort, to a heat of 850° Fah. in combination with a steam jet whereby the oxygen was liberated and carried into a gasometer for use.

(26) W. H. B. asks: Will you give me the name of some good work on optics and lens grinding? A. Consult Lommel's work.

(27) C. H. J. S. asks: Will you give me directions for making putty? A. Glazier's putty is made by working up whiting with drying oil. Polisher's putty, or putty powder, may be made by keeping molten tin exposed to the air at a strong red heat, in an open crucible, till it is converted into a white powder.

How can I make the magic water pens? A. Triturate any of the aniline colors soluble in water with enough thick gum solution to form a paste. Place a little of this in the hollow part of the pen with a tight spring to keep it in place when dry, and to direct the flow of liquid when in use.

(28) C. H. K. asks: 1. How is caustic ammonia used for rheumatism, as recommended in the SCIENTIFIC AMERICAN? A. It should be diluted with about 20 parts of water and applied externally. 2. I am somewhat confused by the different names: "Caustic ammonia," "liquor of ammonia," "aqua ammonia," etc. Are they not different names for the same thing? A. Yes. It is a solution of gaseous ammonia in water. The proper name for it is ammonium hydrate.

(29) A. L. L. asks how far apart to space the holes in a pantagraph, and by what mathematical rule it is figured? A. There is no rule for spacing the holes. Make them as close as consistent with the strength of the instrument. The scales of the drawings are to each other as the distances of the pencil and of the tracing point from the pivot.

(30) D. N. B. C. asks: Is there any simple method by which to determine whether well water, still palatable, is contaminated with sewage or other dangerous material? A. Add to a small sample of the water enough of an aqueous solution of potassium permanganate to impart a slight but perceptible tint. If this disappears shortly, it may be concluded that the water is unfit for drinking purposes. Add to another sample about $\frac{1}{10}$th its volume of a saturated, cold aqueous solution of tannic acid, and allow to stand covered for 24 hours. Any notable quantity of organic matter in the water will be indicated by the formation of a precipitate.

(31) T. R. asks for a preparation that will keep white holly (wood) from getting soiled? A. Use a thin varnish made of bleached shellac dissolved in alcohol.

(32) A. H. W. asks for a recipe for a cement to be used cold, for cementing pieces of glass together without heating the glass? A. Boil isinglass in water, to a creamy consistence, and add a little alcohol. Warm before using.

How can I make the best dark bronze for cast iron? A. Melt together equal quantities of sulphur and white oxide of tin.

(33) Enquiring Reader asks: What is the best and cheapest process for manufacturing table salt from rock salt? A. Ordinarily it is simply washed and ground. All qualities are not sufficiently pure for table use.

(34) W. B. asks: Can I obtain glass that will melt in an iron ladle over a common coal fire as lead is melted? A. Soluble glass, composed of 1 part silica and 2 parts potassium or sodium carbonate, melts at a low temperature.

(35) W. F. R. asks for the number of stars stripes, and arrangement of the American flag? A. The number of stars should be thirty-eight. The number of stripes thirteen. The first stripe at the top red, the next white, then the colors alternately, making the last stripe red. The blue field for the stars is square, of the width of the first seven stripes, namely, four red and three white. The proportions of the flag should be as three to five.

(36) W. S. F. asks: Will you tell me how to galvanize hoop iron? A. Clean and scour the iron, and dip it into a bath of melted zinc covered with a layer of sal ammoniac.

(37) B. A. W. says: I have a quantity of brass chain, and I want to give it the color of gilt or gold that will not tarnish? A. Boil the articles in a dilute solution of terchloride of gold, to which some bicarbonate of soda has been added.

(38) D. R. K. asks: Why is it necessary to have a siphon to a steam gauge? A. The siphon is used for the purpose of keeping water in contact with the gauge.

(39) I. M. B. asks: What is the *modus operandi* of washing brass and copper vessels with lead without a battery? A. You probably refer to what is known as tinning, which is effected by dipping the articles into a tin bath, having first washed them with a solution of sal ammoniac.

(40) P. W. asks: What is the duty required of the fusible plugs placed in the crown sheet of locomotive fireboxes? A. To give the engineer warning. There might be no water in the crown sheet when the plug melted.

(41) E. W. D. asks; How are buggies polished? A. After the varnished surface is fully dried, rub down with rottenstone and a piece of woolen cloth, wet with water. Raise the polish by rubbing with the bare hand on which a few drops of sweet oil have been rubbed.

(42) T. E. B. says: A. contends that by taking a given point as a center and with any radius, describing an arc, you obtain an angle as of 20°, 45°, 90°, and so on until an angle of 360° is reached, when you have described a circumference. B. claims that you obtain arcs and not angles of those degrees, although the angles are measured by the intercepted arcs. B. considering an angle as the space included between any two lines running from a given point. Which is right? A. A. has the correct idea.

(43) W. A. K. says: Can you give me an effectual method of dispatching house crickets? A. Insect powder may be efficacious, but a surer remedy is to stop up all cracks or crevices where they resort.

(44) F. H. asks: Why are the sunset tints colored red and gold? A. Little is known of the causes that produce the brilliant and varied colors assumed by the sky, particularly at sunset. They are unquestionably, however, connected with the aqueous vapor contained in the atmosphere: and the reddish hue, the most common of all, is probably owing to the greater facility with which these rays are transmitted through the watery particles.

(45) C. J. F. asks (1) for the analysis of the springs of Seltzer, Vichy, Carlsbad, Kissingen, and Congress water? A. You will find books at the leading drug stores that will give you an analysis of these waters.