ANSWERS TO CORRESPONDENTS

A. R. can copper iron castings by the process described on p. 155, vol. 26 —F. C. M. will find a recipe for black ink on p. 203, vol. 26, and for copying ink on p. 59, vol. 25.—G. S. will find directions for making wax into sheets for flower making on p 50, vol. 30.—W. P. can brown gun barrels by the method described on p. 256, vol. 26.—T. W. W. will find details of a process for steelifying or case-hardening iron on p. 281, vol. 27.

(1) H. L. B. asks: Does the locust, that comes every seventeen years in Pennsylvania, come in the same year all over the world? A. No.

(2) C. D. W. asks: How can I make chloride of copper? A. Chloride of copper ($Cu\,Cl$) may be obtained by the spontaneous combustion of copper in chlorine gas; but it is more advantageously prepared by dissolving the oxide or carbonate in hydrochloric acid, when, on evaporation, it crystalizes in green needles. A concentrated solution of chloride of copper is of a green color, but it becomes blue on dilution; and when the salt is anhydrous, it is liver-colored.

(3) J. Y. asks: What is meant by a microscope which magnifies 10,000 times? How large would a human hair appear under this power? A. Human hair varies considerably in different persons. An ordinary specimen magnified 100 diameters, or 10,000 times in surface, would seem ¼ of an inch in diameter. If magnified 10,000 diameters, it would appear 2 feet in diameter, which no microscope now made could cover. 2. How large would a man appear through a spyglass whose power is 25 times, at a distance of 15 miles? A. As large as he would appear at a distance of ⅔ mile.

(4) J. H. asks: How can I keep protosulphate of iron from oxidizing? I keep it corked, but this is no use. A. Place the protosulphate in a large glass bottle, fit a cork very tightly and seal up with paraffin or sealing wax. In this manner, large quantities are kept in a perfect condition.

Does the light injure canned fruit? A. In some instances it may be injurious. Upon some canned fruits, light does undoubtedly produce slight chemical changes.

1. Would tallow at 8 cents per lb. be a cheap article to make soap with, or would "cracklings" at 4 cents per lb. be cheaper? A. We should think that tallow at 8 cents would be preferable. 2. Please give me a recipe for making hard soap with tallow. A. Take freshly slacked lime, sal soda, and tallow, of each 2 lbs.; dissolve the soda in 1 gallon boiling soft water; now mix in the lime, stirring occasionally for a few hours; after which let it settle, pouring off the clear liquor and boiling the tallow therein until it is all dissolved. Cool it in a flat box or pan, and cut into bars or cakes. It can be scented with sassafras oil by stirring the oil in when the soap is cooling. When any form of soda is used in making soap, it is necessary to use lime to give it causticity, which gives it much greater power upon the grease, by removing the carbonic acid; hence the benefit of putting lime in the bottom of a leach when making soap from common ashes.

(5) A. W. R. asks: How can I get rid of dandruff in hair? A. The most results follow the use of warm baths, taken daily and prolonged for an hour or more, and the subsequent inunction with a soothing and sheathing pomade, such as that of the benzoated ointment of oxide of zinc.

Is there a cure for bunions? A. "When the *bursa* which lies toward the plantar surface of the metatarsal bone of the great toe becomes enlarged, or when a new serous sac is formed upon the inner and posterior aspect of this bone, the disease termed a bunion occurs. In this affection, the enlargement of the *bursa* is usually secondary to an alteration in the shape and position of the great toe, which, in consequence of the pressure of narrow-pointed boots, has been thrown outwards in an oblique direction (that is, towards the little toe), so as to lie over or under some of the contiguous digits; in this way a sharp angle is formed at the junction between the first phalanx and the metatarsal bone of the great toe. This angle, being constantly pressed upon by the boot, becomes irritated, and, for its protection, the *bursa* that is there naturally situated becomes enlarged, or an adventitious one forms. From time to time the *bursa* and the projecting angle become irritated and inflamed, and the morbid action there set up may run to suppuration of a very troublesome kind, a thin, unhealthy pus being formed, which is discharged through an opening that speedily becomes fistulous, and may degenerate into a most troublesome indolent sore. *Treatment:* In the treatment of this affection, the first thing to be done is to change the direction of the toe by wearing properly shaped boots, made with the inner side of the sole straight from the toe to the heel. If accidental inflammation be excited in the part, it must be allayed by the application of leeches, warm foot baths, and poulticing; the cutaneous irritation that is left may best be removed by painting the surface with a strong solution of nitrate of silver. The faulty direction of the toe may best be remedied by using an ingenious contrivance, the action of which consists in drawing the inverted end of the toe inwards by the constant action of a slender steel spring."—*Erichsen.* Should these means fail, consult a surgeon.

What will remove flesh worms? A. The flesh worm (*acarus folliculorum*) is supposed to be caused by a deficiency of expulsory power in the follicles and ducts of the sebiparious glands, by condensation of the secretion, which renders the expulsory power nugatory. For treatment, see p. 251, vol. 31.

(6) G. E. W. asks: Are there minute insects in the human blood? A. When the blood is in a normal condition, there are no parasites present; but they are found in some cases if it be diseased.

(7) S. M. asks: What is a good method of whitening ferns? A. By exposing them for a short time to the action of sulphurous acid gas, obtained by burning a little sulphur.

Is there anything that will remove moles from the skin? A. "They are easily removed by the knife, care being taken to direct the incisions in the line of the ordinary folds of the skin. Better perhaps is *potassa fusa* a point of which is introduced in the center of the *nævus*; it diffuses itself through the areolar mass, the disorganized tissue dries up in a scab, and falls off in ten or fourteen days, leaving very little trace of its existence. This method of treatment is applicable to *nævi* (or moles) of small size only. When of considerable extent, they are beyond the control either of knife or caustic."—*Wilson.*

(8) B. E. D. asks: What ingredients are used to set the colors in muslins, calicoes, etc., making them proof against water? I wish to make colors on papers, such as marbled papers, waterproof. A. Insoluble colors are obtained by taking advantage of known chemical changes; thus chromate of lead (chrome yellow) is precipitated by dipping the stuff into solutions, first of acetate of lead, and then into bichromate of potassa. Mordants are bodies which, by their attraction for organic matter, adhere to the fiber of the stuff, and also to the coloring matter. They are applied first, but in domestic dyeing they are often mixed with the dyestuff. By the use of a mordant, a dye which would otherwise wash out is rendered permanent. Some mordants modify the color; thus alum brightens madder, giving a light red, while iron darkens it, giving a purple. The principal mordants are alum, cubic alum, acetate of alumina, protochloride of tin, bichloride of tin, sulphate of iron, tannin, and stannate of soda.

(9) C. A. B. & Co. ask: How can we make explosive picrate salts, particularly those of lead? A. We can find no mention of any of these salts (except that of potassa) being used as explosives.

(10) D. F. J. asks: 1. How can I make paper adhere to whitewashed walls? A. The usual and perhaps the best method is that of removing as much of the whitewash as possible by scraping, and moistening the wall with water before applying the paper (previously coated with the paste). 2. What is the best method of removing old wall paper to prepare for new? A. Moisten the paper with water for a short time, when it can be removed without difficulty.

(11) W. R. asks: What is the weight in ounces of the largest diamond? A. The largest known diamond formerly belonged to the Great Mogul, and when found weighed 2769·3 grains, or nearly six ounces; it had the form of half a hen's egg.

(12) W. L. P. asks: What are the constituents of natural phosphate of lime? A. The composition varies much. That obtained from Snarum, Norway, contained phosphoric acid 41·54, sesquioxide of iron 1·79, calcic oxide 53·46, and chlorine 2·66, per cent. That from the Ural Mountains contained phosphoric acid 41·99, calcic oxide 55·95, chlorine 0·01, and fluorine 4·20 per cent. The phosphatic limestone found in this country would contain nearly the same as the above; certainly it would not vary much in the amount of phosphoric acid. It is found in Maine, New Hampshire, New York, New Jersey, Pennsylvania, Maryland, and Delaware. A shaft has been sunk near Hurdtown, N. J., and the phosphate of lime (apatite) mined.

(13) G. F. F. asks: With what preparation can I color white ivory chessmen red? A. They may be stained with the ordinary dyeing materials. The ivory should first be steeped in a solution of bichloride of tin as a mordant, and then in a hot bath of Brazil wood or cochineal.

What will remove oil from paper? A. Scrape finely some pipe clay (the quantity will be easily determined on making the experiment); on this lay the sheet or leaf, and cover the spot, in like manner, with the clay. Cover the whole with a sheet of paper, and apply for a few seconds a heated iron box, or any substitute adopted by laundresses. On using india rubber to remove the dust taken up by the grease, the paper will be found restored to its original whiteness and opacity. This simple method has proved much more effectual than the use of turpentine.

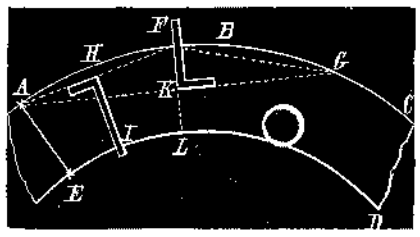
(14) C. H. C. asks: 1. Has there ever been manufactured a glass that will stand a red heat and not melt? A. No. 3. Is there any substance that can be put into glass to render it flexible? A. Nothing, to our present knowledge, accomplishes this, although this (supposed) lost art has been much sought after.

(15) H. J. asks: 1. Will three boilers, each 24 inches long by 7 inches diameter, supply enough steam to run a 3x6 engine, carrying 60 lbs. pressure and making 200 revolutions per minute? A. They would be rather too small. 2. How heavy and how large should the flywheel of an engine of the above size be? A. Diameter 15 inches, weight from 70 to 80 lbs. 3. What pressure would boilers of the above size stand? They are made of 1-16 steel. A. About 90 lbs. per square inch.

(16) A. F. asks: Can any musician inform me how a cornet can be blown completely out of tone? A. It can be done by hard blowing.

(17) R. R. S. says: 1. I use a tin cup to make my tea in. I put cold water into the cup with the tea and set it on to the stove to steep. The cup keeps smooth and bright, but has the tea stain upon its surface. I use this cup very often to boil water in, and it keeps smooth and free from scale. If I use another cup to boil water in, it will become covered with scale in three or four heatings, visible to the sight and perceptible to the sense of feeling. What is the cause of this phenomenon? A. The water undoubtedly contains a large amount of lime, magnesia, soda, etc., in solution. Upon boiling, these would be precipitated and form the scales you speak of. But the presence of tea has a different effect. Tea contains tannin and other substances which exert, doubtless, an influence upon the solubility of the alkalies. In most cases they are very soluble, but, if an excess of the bases be present, rapidly attract oxygen and become brown by the destruction of the gallo-tannic acid. 2. Would not a decoction of tea prevent the formation of scale in steam boilers, if it was applied while they were new, and also on the surface of tea kettles? A. There is a preparation in market, tannate of soda, used for this purpose, which probably acts in a similar manner. The decoction of tea would be too expensive.

(18) J. A. M. asks: What is the quickest method of finding the distance between two circles as A E, without the aid of the radius or diameter of either circle, by the application of the square, on the outside line A C, or the inside line E D? A. Suppose that A B C D E represents material to be cut, and



you wish to find a radial line at the point, A. Draw any chord, A F, and from the point, F, another equal chord, F G. Also connect the points A and G by a straight line. Place a square on the chord, A F, and draw a perpendicular line, H I, at the middle point of this chord. Then place the square upon the line, A G and draw a perpendicular, F K, through the point, F continuing it to L. Make I E equal to I L, and draw the line A E, which will be the direction in which to make the cut. The same construction can be used for finding the direction of the cut at the other end.

(19) Z. S. says: I should like to try Siemens' process of silvering glass, described in *Science Record* for 1874, pp. 64, 98. How is acetic aldehyde made, and how is dry ammoniacal gas made and passed through it? A. Aldehyde may be obtained by the gradual oxidation of alcohol in various ways. It is formed when the vapor of alcohol mixed with air is transmitted through a porcelain tube heated to low redness, or when alcohol is acted upon by dilute nitric or chromic acid; owing to the effects of nitric acid upon the elements of alcohol, it is produced during the preparation of the fulminates of silver and mercury, and it is always present in nitrous ether; it may also be procured from the dry distillation of lactic acid, or lactate of copper. Aldehyde is, however, usually procured by Liebig's method of distilling, in a capacious retort, a mixture of 6 parts of sulphuric acid, 4 parts of alcohol (specific gravity 0·850), 4 of water, and 6 of finely powdered black oxide of manganese. The product, being very volatile, must be condensed in vessels cooled with ice, and the process must be stopped when the distillate becomes acid. Since, however, it is in a very dilute and impure condition, it is to be rectified from an equal weight of chloride of calcium, in order to free it from alcohol and water. This operation is repeated twice, or even three times. Take equal parts of quicklime and chloride of ammonium (sal ammoniac) separately powdered, and intimately mix; transfer to a retort and gently heat. Abundance of pure ammonia, as a transparent, colorless gas, will be given off. It should be passed through a tube containing recently prepared quicklime. The gas is allowed to pass through the liquid in the usual way, which must be kept cool with ice. Prismatic needles of snowy whiteness are thus formed, which is the compound of ammonia and aldehyde required.

(20) D. W. B. asks: 1. How can I make alcohol without distillation? A. We cannot tell you.

There is a quality of iron or iron salt not attracted by the magnet; it is called allotropic, and is soluble in water. How is it made? A. There is no known oxide or form of iron that has the properties you state.

How can oleic acid be made? A. The isolation of this acid in a state of purity is a matter of some difficulty. In order to obtain the pure acid, Varrentrapp recommends that almond oil be saponified with potassa or with soda, and that the soap be decomposed with hydrochloric acid. The mixed fatty acids are then to be digested with half their weight of finely powdered oxide of lead. On digesting the mixed salts of lead with twice their volume of ether for 24 hours, the oleate of lead is dissolved and separated from the other salts. The etherial solution is to be mixed with dilute hydrochloric acid, which decomposes the oleate. The oily acid is dissolved by the ether and rises to the surface. The ether is to be expelled by heat.

How can oil of brick be made? A. Oil of brick is made by saturating fragments of brick with oil, and distilling at a red heat.

Can pyro-acetic spirit be made without distillation? A. No.

Where can red resin be obtained? A. Ask any druggist or dealer in varnishes for it. As to the difficulty of dissolving rubber in ether, see p. 251, vol. 31.

(21) L. K. L. says, in reply to F. H. B.'s question as to which vessel has made the fastest time across the ocean: The Inman steamer City of Brussels left Sandy Hook at 9.15 on the morning of December 4 1869, and dropped anchor in Queenstown harbor after a run of 7 days, 20 hours, 22 minutes. She has since (June 1872) crossed in 7 days, 15 hours, 55 minutes. The Adriatic's best time, May, 1872, was between Queenstown and Sandy Hook 7 days, 18 hours, and 55 minutes.

(22) N. A. K. says, in reply to J. C.'s query as to size of sail for a boat: I think he could have a larger sail on his boat than you recommend. I have a boat 12 feet long, 3 feet wide, and 1 foot deep. She is pointed at the bows, and made of pine boards, ⅞ inch thick, bent dry, without sawing. Her keel is 6 inches wide, hinged so that it will lay flat to the boat when released from an upright position. Her sail is 8 feet on the mast, 9 feet from the end of the boom to the gaff boom is 11 feet and gaff 7 feet. The boat will carry persons, and is perfectly safe.