

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 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 kalamining 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. 288, 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 retinning 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 double thread 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., F. 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 3/8 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 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 oxycalcium 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 oxycalcium lamp cannot be made to yield as brilliant a light as the oxyhydrogen under any conditions. In the oxycalcium 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 1/8 to 1/4 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 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 water-proof, 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 3/8 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

7,434,000, Venus 492,000, Earth 1,618,000, Moon 13,000, Mars 13,463,000, Jupiter 23,810,000, Saturn 49,000,000, Uranus 85,052,000, Neptune 140,000,000. 2. Has our distance from Alcyone been estimated or determined? A. The nearest estimate is that it would take light at least three years to traverse the distance. 3. Is there any appreciable amount of heat derived from bodies outside of our solar system? A. No.

(37) P. B. G. says: There is a floating transparent mass which floats over the pupils of my eyes. In looking at a white object the mass looks like a knotted spider's web; in looking at a dark object, or reading, it seems like a blur. A. From your too general description we should judge your trouble was conjunctivitis, that is, a floating mucus, caused by inflammation of the lining membrane of the eyelid. The remedy for this is an astringent wash, alum water, or something of that nature.

(38) J. R. asks: What are the exact proportions of the ingredients used in making oxygen gas, for the calcium or lime light? A. For oxygen, heat strongly in a capacious retort of copper or iron, 4 parts chloride of potash and 1 part peroxide of manganese, well mixed together. Wash the gas well as it comes over. A pound of this mixture should give you about 25 gallons of the gas. 2. What is the best way of making hydrogen to mingle with oxygen? A. Hydrogen is usually prepared by the action of diluted sulphuric acid (1 of acid to 7 of water) on scraps of zinc. This gas should also be well washed before using. Scrap iron and a less dilute acid are occasionally employed, instead of zinc, in manufacturing the gas on a larger scale.

(39) H. C. asks: 1. How much water should I take to dissolve 1 oz. nitrate of silver? A. It will dissolve in 5 ozs. water at 52° Fah. and in 0.6 oz. of boiling water. 2. How much to dissolve 1 oz. tartaric acid? A. Tartaric acid is soluble in 4 parts of water at 60° Fah. and in 0.5 parts at 212° Fah.

(40) S. L. asks: Can tannate of caffeine be made from pure caffeine? A. The tannate of caffeine may be obtained as a beautiful white precipitate, if an aqueous solution of caffeine is added in excess to aqueous tannic acid. An infusion of tea, by its tannin, also precipitates solutions of caffeine.

(41) S. K. asks: What is the proportion of a saturated solution of bromide of potassium? A. This depends altogether upon the temperature at which the solution was saturated. The solubility of the salt increases as the menstruum is warmed. Bromide of potassium is soluble in 1.87 parts of water (by weight) at 32° Fah., in 1.55 parts at 60°, and in 0.98 parts of water, at 212° (boiling point).

(42) W. F. K. asks: 1. Is there to your knowledge any soap made entirely of vegetables? A. There is no soap of this kind. 2. What is put into soap to harden it? A. After the saponification is finished, the soap is coagulated by the addition of common salt. The precipitated soap is then pressed, cut into form, and dried. This gives hard soap.

(43) E. N. W.—Saffranine (C₂₁ H₂₀ N₄) is prepared commercially by treating crude aniline oil with nitrous acid gas, and then with arsenic acid or bichromate of potash.

(44) P. C., & Co., ask: In packing ice in walls 10 inches thick, will coke dust or ordinary cinders be equivalent to sawdust? A. If the coke dust is as porous as charcoal dust, it may answer the purpose. In the absence of sawdust, carpenters' shavings are sometimes used.

(45) J. M. asks: 1. How long will it take ash and maple to season well? A. About 2 years. 2. Would it be better to season them in sheds or in the open air? A. Let them be covered at top. 3. Why is spruce used in preference to other soft woods for pianoforte sounding boards? A. We presume, if so used, it is because it is a tough wood, less likely to split than most woods. 4. Which is the next best wood to spruce for sounding boards? A. Perhaps white wood or pine. 5. How long will spruce take to season well, if cut 1/4 inch thick? A. Six months or so, not to dry, but to season. 6. Which is the stronger, brass or cast iron? Cast iron for your purpose, probably.

(46) E. A. B. says: I notice that A. C. L. makes inquiries in regard to laying a pipe. If he were to use an earthen pipe of considerable larger diameter than the lead pipe, enclosing and retaining the lead pipe in the center of the earthen one by means of spiders placed at suitable distances, thus causing an air space to encircle the lead pipe, would not this form a better protection than if sawdust alone were used? A. The suggestion is a good one for the purpose indicated, provided the air space is hermetically sealed at the outlets. But it will not compensate for want of depth when the pipe is laid in the ground.

(47) R. M. asks: What shall I do, or cause to be done, to stop the serious leaking of five tin roofs, on properties erected last year? The tinman used the best tin, but, as is usual here, the joints are not soldered; but the sheets are raised at the edges two inches or so and pressed together and then turned over slightly. The roofs are rather flat. The seams run from the gutter to the peak of house. The consequence is that when the snow is melting, the water backs up into the seams and flows into the room beneath, doing much damage. The tinner says the seams cannot be soldered now they have been painted. A. In this city the tin is always soldered, except upon steep roofs. The conditions you mention try roofs very much. Perhaps you can remedy it in a measure by tightening the seams, and giving them a coat of rubber paint.

(48) C. F. J. asks: What will remove pimples and black worm specks from the face? A. Take rose water 3 ozs., sulphate of zinc 1 drachm; mix. Wet the face with it, gently dry it, and touch it over with cold cream, which also gently dry off.

What is the chemical name for Paris green, and what are its constituents? A. Paris green (Schweinfurt green) is the aceto-arsenite of copper. In 100 parts it contains: Oxide of copper 31.29; arsenious acid 58.65; acetic acid

1006. Its composition may be formulated as follows: (C₂ H₃ O₂)₂ · 1/2 O₂ + 3 (Cu O, As₂ O₃).

(49) C. A. M. asks: 1. How can I harden Canada balsam without interfering with its color? A. It is hardened to some extent by heating for a short time. 2. How can Canada balsam be rendered colorless? A. It may be bleached by exposure to sunlight. 3. Is there any other transparent substance that can be worked in as soft a condition, or as easily, and afterwards hardened without losing its transparency? A. There are several other gums and balsams (compounds of certain resins with various essential oils) that may be substituted for the Canada balsam—such as balsam copaiba, balsam tolu, gum benzoin, and Venice turpentine, also good collodion. Canada balsam, however, generally gives the best satisfaction.

(50) F. B. says: I want to keep a hot bar such as they have in restaurants. I do not want to use gas, and I cannot put in a stove because I have not got a chimney. How can I do it? A. There are small stoves in the market arranged to burn kerosene oil. If you could provide suitable means of ventilation in your rooms one of these might answer the requirements.

(51) E. W. M. asks: How can a suitable white paint for paper water pails be made? A. Zinc white (oxide of zinc) in oil is the least objectionable paint practically available for this purpose that we know of.

(52) D. says: I copied from a back number of your paper a recipe for an acid blister for curing sprains, ringbones, etc., in horses. I used it according to directions for curb, and believe it has cured it, but I cannot get the sore to heal or the hair to grow over the place. The recipe is as follows: Take oil seneca 14 ozs., oil rosemary 5 ozs., oil lavender 3 ozs., oil turpentine 9 ozs., and pyroligneous acid 4 ozs. Mix well together and place in an earthen vessel, then add and stir in gradually sulphuric acid 1 pint until effervescence ceases. Shave off the hair and apply once a day to the affected part. Keep the part perfectly dry for two weeks, and rest the animal for a month. A. Wash the sore night and morning with pure water containing a little salicylic acid, and cover with a clean cotton cloth, between the folds of which a little of the dry acid has been rubbed. This will purify the sore and protect it from the attacks of insects. If this fails, it will be necessary to treat the animal constitutionally.

(53) B. K. D. asks: If a steampipe 100 feet long is connected to a boiler with an ordinary valve at 20 feet from the end, which is securely plugged, will there be as much pressure at the further end of the pipe as there is between the boiler and valve, allowing the valve to be only one fourth open? A. Yes.

(54) F. B. asks: What size of engine is required to drive a skiff 18 feet long by 4 feet broad, and what size of screw is required? I want to keep her at as light a draught as possible, and get a speed of from 10 to 15 miles per hour. A. You will be obliged to devise special machinery for any such speed as you speak of, and you must determine the necessary data by experiment.

(55) J. B. W. asks: What size of wheel should be used for a boat 100 feet long and of 20 feet beam, drawing 10 feet of water? I have a non-condensing engine, 26 inches in diameter of cylinder and 30 inches stroke? A. You can use a propeller of from 9 1/2 to 10 feet diameter, and of 15 to 18 feet pitch.

(56) W. M. K. asks: At what angle to the line of direction should a plate, in passing through water, be placed, to secure the greatest pressure sideways, with the least resistance to its forward motion? A. As we understand your question, the angle does not make any difference in the pressure on the sides. Possibly, however, we do not get your idea.

What difficulties or objections are there to using nitroglycerin as a motor by exploding it in a cylinder? A. The principal objection is that it would generally be necessary to provide a new cylinder after each explosion.

Is there any chemical compound, safe to use, which will decompose slowly, producing considerable heat? A. We think that you will find that wood and coal are the best compounds.

(57) A. R. says: I wish to discharge under 36 feet head 100,000 gallons of water per minute through a circular iron pipe, placed at an angle of 45° to the horizon. What should be the diameters of the upper and lower ends of the pipe? A. We are not sure that we get the idea. If you will send a sketch, showing the arrangement, we will endeavor to answer your question.

(58) R. V. J. says: I am running two boilers, one at a time, for the purpose of heating a large building. If I pump water to the first gauge, in a few minutes it will run up and fill the glass and all the gauges. Do you know of any remedy? A. Probably the rise of the water is due to the construction of the boiler or the manner in which the steam pipe is attached; but we cannot answer positively, from the data sent.

(59) G. W. asks: With what velocity will air enter a vacuum? A. About 1,300 feet a second, if there is no resistance from friction, etc.

(60) H. G. W. says: 1. Is the most powerful battery the best for electro-plating? A. No, but different solutions require different powers. 2. What sized battery will it take to goldplate a watch case? A. A one gallon cell will answer. 3. Will it take more battery power to silverplate? A. Better use two of the above named cells.

(61) E. D. W. says: 1. I am constructing a line of telegraph 1/4 of a mile in length, and have three relays, each relay has 1/4 of a lb. of No. 30 silk covered wire. Will they be suitable for that distance, and will No. 15 galvanized wire answer for my main line? A. Larger wire, say No. 23, would be better adapted to so short a circuit. No. 15 wire for the line will answer. Use two wires. 2. Will you please send me directions for making a cheap battery for my main line with the above three instruments in circuit. A. Place a disk of copper, to which a guttapercha covered wire is soldered, in the bottom of a jar, and suspend a piece of zinc with

a connecting wire in the upper part; after which fill the jar about 3/4 full of water to which has been added about half a pound of sulphate of zinc. When this is dissolved, drop a few crystals of blue vitriol on the copper disk. Five or six cells will be required.

(62) G. L. P., Jr., says: 1. The ports in a small brass cylinder are out of place. Is it possible to have them filled with brass, so that they may be cut out again? A. Yes, by burning in. 2. Could plaster of Paris be used for cores in casting brass? A. Yes, but it is apt to cause air holes. 3. Would a common house furnace give heat enough to melt brass? A. Yes. 4. What is the best brass alloy for small castings? A. Copper 10, tin 5, zinc 2 parts.

(63) J. T. F. asks: How can the surface of a pane of glass be softened so as to receive any impression, and then harden again? A. This is not feasible, except by a uniform softening of the whole plate in a suitable furnace.

(64) H. F. A. says: I wrote some time ago for directions to electroplate insects, and I ask the following questions: 1. What are the proportions of nitrate of silver and wood naphtha for the dip? A. Make a saturated solution. 2. How shall I treat with ammonia? A. Dip the articles in aqua ammonia. 3. How do you vaporize mercury in order to expose the article? A. By heating, but great care must be taken not to breathe the fumes.

(65) J. H. M. asks: Can you tell me how many cells of a carbon battery (4 inch jars) are necessary for the production of the electric light? A. About 40 or 50 cells.

(66) J. N. asks: 1. Will the pressure in a boiler ultimately raise the water from the bottom, so that the plates will get hot, generate a gas, and cause an explosion? A. If there is plenty of water, and the boiler is reasonably well designed, the water will not be driven from the plates. We know of no good evidence in favor of the generation of the gas. 2. When I was second engineer, we had a force pump of which the check valve spindle was too short. I told the first engineer that it would not be safe, but "he knew his business." On going to start the engine, I found no water at the gauges. I lifted the steam valve, let out the steam, took an iron rod, wrapped a cloth round it, and found only 6 inches of water in the boiler. The fire was damped. I brought some one to see it, who soon made a great change. If I had moved the fire first, I am afraid I should have been moved pretty quickly. Please give me your opinion. A. When the water is low in a boiler, and you do not know where it is, the safest thing to do is to haul the fire if it can be done quickly, or if not, cover the fire over with ashes, and allow the boiler to cool somewhat, before raising the safety valve or admitting water. 3. I have been where several boilers have been connected together, all being fed with one pipe from the force pump. The fires of the middle boilers were urged until they were very hot, and the side fires slow. Then the middle boiler would empty itself into the side boilers. Can you explain? A. Boilers should always be so connected that such action would be impossible. This precaution is only neglected by the reckless or ignorant.

(67) L. B. says: Please tell me how I can find out how many lbs. of steam passing through a 2 inch feed pipe into a 10 x 18 inch cylinder is equal to a horse power? A. The steam per horse power per hour may vary from 20 to 100 lbs., according to the character of the engine. The horse power is the product of the effective pressure in lbs. per square inch, the area of the piston in square inches, and the speed of the piston in feet per minute, divided by 33,000.

(68) J. A. W. says: Will you explain why a certain load located at a distance from a certain power should show more resistance when so attached than it would when more closely located and attached, or, to be more explicit: Why does a train of cars so made up with empty cars in front of the loaded cars pull harder than the same train would with the loaded cars ahead of the empty cars? I know this to be fact. A. If you can conveniently send us the data on which you base your opinion, please do so, together with such observations as have been made in regard to the behavior of the train, especially of the empty cars, when made up in the different ways mentioned. As you state your question, we have not sufficient information to form a decided opinion.

(69) C. A. R. asks: How can I clean deer's antlers without scraping near the roots, where the horns are so rough? A. Try a little fine pumice powder moistened with strong alkali. Rub well and wash with water. Or use muriatic acid, free from iron, in place of the alkali.

(70) W. S. says: I have a conservatory in which the plants droop and die from (I believe) the effects of carburetted hydrogen gas escaping from the pipes in the street adjoining and oozing through the soil in the house. I have complained to the officials in charge of the public gas supply, but they only scout the idea and do nothing. Can you suggest any chemical or other appliance whereby the bad effects of the gas might be neutralized? A. If this is, in reality, the cause, the trouble may be alleviated to some extent by sprinkling the floor with dry slaked lime and charcoal in powder; but the only practicable and effectual way to overcome the difficulty will be to rectify the cause, as there is nothing practically available that may be employed as an absorbent or antidote for the gas.

(71) S. A. C. asks: Please tell me the dimensions for a poultry house for 800 hens, and the way to build it? A. Make the building two stories in height; inclose it with matched boarding; also board it on the inside of the studding, and fill in the exterior frame with sawdust, tan-bark, or clay. If a part of the barn on the south side of the hay-mow can be partitioned off for the purpose, so much the better; or the poultry-house may be erected against the south side of the barn as an extension thereto. Provide an open stairway from the first to second story for self and fowls; let the floor of the first story be of the natural earth, and that of the second story of matched plank. In the first story provide plenty of glass windows on the south, the east, and

the west sides; and in the second story about one half the number of similar windows; provide several of these windows to open for ventilation and protected with wire cloth. Under the stairs in first story place boxes, in which quite young chickens may be brooded over night, secure from rats and other vermin; also, make cages in the corners, in which hens inclined to set at improper times may be placed and fed. Near these provide a box, always filled with sand, lime, and ashes, for the fowls to wallow in. In the second story, on the north side, make boxes for the hens to lay in and set in, with the entrance for the hen on the rear side and the place to take the egg out in front. Plenty of gravel and pounded bones should be given them at all times, with an occasional meal of meat in winter. Overhead the roosts are to be placed, of rough poles, 1 or 2 inches in diameter, with the bark on. Thus provided, the hens will continue to lay, if furnished with meat occasionally, all winter. A place for doves or pigeons may be made in the roof of the building, if desirable.

(72) S. B. M. asks: If you think it possible to re-tin fruit cans after they have been used and rusty, will you tell me the best mode of re-tinning them? My idea is to first cleanse with acid, and then dip in molten tin. A. Your method is a good one. Cover the tin bath with a layer of molten wax to keep the hot tin from contact with the air.

(73) J. F. K. & Co. ask: Is there an improved tool for truing up crosshead wrists? A. We know of nothing but the clamp with serrated teeth.

(74) D. D. asks: How can I use a lamp in a magic lantern so as not to cover much of the reflector? A. The reflector should be set so that the light reflected from it shall come to a focus in the flame of the lamp, then it diverges with the light from the flame, and the two enter the condenser under similar conditions. You can have the body holding the oil on the outside of the lantern, and the oil carried to the burner through a pipe.

(75) A. O. asks: How can I find the magnifying power of a microscope? A. Place under the microscope some definite measure; then look, with one eye, in the microscope, and with the other look at a rule placed the same distance away on the outside. With a little practice, it will be seen how long the one division in the microscope appears to be on the rule outside. In the same manner the apparent diameter of the field may be determined; that is, if 1 division inside covers 100 divisions outside, then the power is 100, etc.

(76) W. E. N. says: What size of steam engine can I run with a boiler 16 inches high and 12 inches in diameter, made of 1/4 inch copper, bound at every 4 inches with bands 1/2 inch thick and 1 1/2 inch wide. The heads are 3/8 inch thick. A. You can make an engine 1 1/2 x 3 inches, if the boiler steams well.

(77) D. H. L. asks: Would there be any danger in eating water melons raised from the seed of a melon which had been poisoned in the stem? A. No.

(78) A lady writes to know what is the matter with her greenhouse. The plants drop their leaves as soon as the heat is raised in the house. The gardener attributes it to the paint on the pipes. The rose house, she thinks, was kept too close during the summer, so that the red spiders became very numerous. But the greenhouse trouble is of another kind. A. See if the gas main is not near the greenhouse; the effect of coal gas in any form would be as described. If the paint used on the pipes has any gas tar in its composition, it is sure death to the plants, and should be all scraped off. Plants will sometimes be several years in recovering from the effects of it. The rose house should be left open during the summer.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the result stated:

S. H.—The stones found in the coffee are small quartz pebbles.—F. G. K.—You failed to number or otherwise designate your specimens. One of them is trap rock, with bright specks of pyrites. The one full of holes is a piece of quartz discolored by sesquioxide of iron. Besides these, there are a piece of slate, a sample of clay containing a considerable percentage of iron, and an iron garnet.—T. S.—It is galena, sulphide of lead. It contains, when pure, 86.6 per cent of lead, and 13.4 per cent of sulphur. The specimen you send is much mixed with earthy minerals and pyrites. It would require an analysis to determine the available quantity of lead.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

- On a Human Clock. By J. F. B.
 - On Spiritualism. By R. S. H., by T. B., and by B. C. H.
 - On the Moon's Rotation. By D. S.
 - On Wrought Iron Bridges. By J. E. G.
 - On Postage Stamps. By J. W. S., and by H. W. B.
- Also inquiries and answers from the following:
- J. M.—M. M.—O. H. H.—L. P. K.—C. R.—E. B. W.—W. J. S.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Inquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who sells rotary nail-cutting machines? Who makes the best coal gas apparatus for hotels, large houses, etc.? Who sells steam blowers? Whose is the best mariner's compass? Why do not makers of paper-making machinery advertise in the SCIENTIFIC AMERICAN?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal,"