

add 50 parts shellac, and boil until solution is effected. The stiffening may be applied (to the inside of the hat) by means of a brush. As soon as this is done, the hat should be immediately immersed in very dilute oil of vitriol in order to neutralize any excess of alkali, and to properly fix the shellac.

(27) A. N. asks: Is there any danger of lead poisoning, or other serious consequences, from the use of sugar of lead as a wash for sores? A. The danger depends upon the strength of the solution used and the frequency of the application. Colic sometimes results from the very free use of solutions of acetate of lead. Pereira states that paralysis is caused by using acetate of lead.

(28) J. E. K. says: You gave the following recipe for a liquid for mixing rocket stars: Alcohol 3/4 oz., camphor 1/4 oz., isinglass 1/2 oz. How can the isinglass be dissolved in alcohol? A. It cannot. The quantity of alcohol given is just sufficient to render the camphor capable of being properly incorporated with the other ingredients by maceration. Do not add the gelatin until all the other ingredients have been uniformly intermixed by gentle trituration in a mortar.

(29) S. B. asks: In crushing highly sulphurous ores with Cornish rollers at 120 revolutions per minute, will the sulphur have any effect on the iron or face of the rolls so as to injure its texture? A. We think not.

(30) A. B. asks: 1. Of what is Indian ink composed? A. Indian or Chinese ink is formed of carefully purified lampblack and size, or animal glue, with the addition of perfumes, not necessary, however, to its use as an ink. 2. In what substance is lampblack soluble? A. Commercial lampblack always contains more or less resinous and tarry matters, that are soluble in oil of turpentine, benzine, naphtha, etc.; but the purified lampblack (carbon) is itself insoluble in any menstruum.

(31) C. K. asks: What metal or alloy expands the most and quickest at a temperature within 300° Fah.? A. Zinc. Taken at 32° Fah., a rod of zinc 25 feet 4 inches long will have a linear expansion at 212° of about one inch.

(32) V. C. T. says: I have a lot of thin malleable iron castings, which I am having ground, polished, and nickel plated, but they all have a dull leaden appearance after being plated. They tell me the fault is in the casting, that the malleable iron was burnt. Can this be true? A. Malleable iron may be readily nickel plated if the work be first properly finished. If the castings are burnt, it will be necessary to refinish them before a satisfactory deposit can be obtained.

(33) E. S. T. asks: Why do preserves, that are in perfectly airtight jars, mold? A. If the preserves be placed in the jars while hot, so as to completely fill the jar and expel the air, the preserves will not mold.

(34) E. S. H. asks: How can I make colored fires? A. Try the following: For light blue 61 per cent of chlorate of potash, 16 of sulphur, 23 of strongly calcined alum. For dark blue, 60 per cent of chlorate of potash, 16 of sulphur, 22 of carbonate of copper, 12 of alum. For deep blue, use 54 per cent of chlorate of potash, 185 of charcoal, and 27.5 of ammoniacal sulphate of copper. It is hardly necessary to mention that great care is required in mixing these materials, and that each ingredient should be pulverized separately. For red fire use 29 parts chlorate of potash, sulphur 17.3, charcoal 17, nitrate of strontia 45.7, black sulphuret of antimony 57. For green, chlorate of potash 22.7, sulphur 9.8, charcoal 5.2, nitrate of baryta 52.3. For yellow, sulphur 33.8, charcoal 3.8, nitrate of soda 9.8, saltpeter 62.8.

(35) T. L. asks: Is a large deposit of soda, such as is generally deposited from soda springs, of any value? A. Yes. It might be profitably used as a flux in reducing ores.

(36) R. S. asks: How should bodies of cellular structure, being saturated with nitrate of silver to become conductors of electricity, be treated with hydrogen gas? A. Enclose in an atmosphere of pure hydrogen and heat to redness. Solutions of copper are preferable to silver, as they are much cheaper.

How is the double sulphate of nickel and ammonia prepared? A. See p. 139, vol. 29.

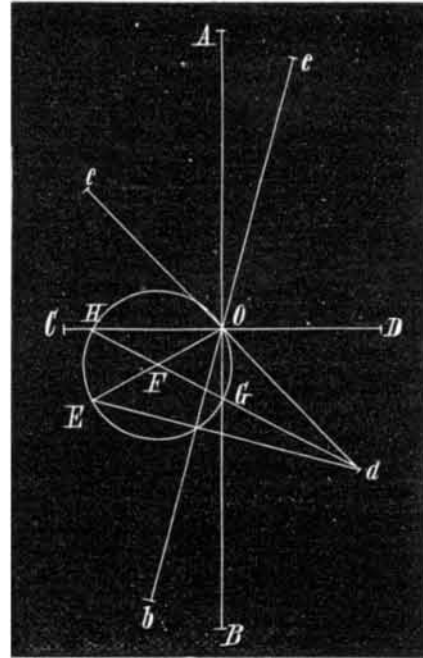
(37) G. S. says: I have a drum head that has lettering on it, done in black. How can I take the marks off without injuring the head? A. You should have stated, if possible, the character of the pigment employed in the lettering. The following is a list of the solvents commonly employed where this is not known: Water, ether, and alcohol, benzole, naphtha, chloroform, bisulphide of carbon, caustic alkalies, diluted acids, solution of cyanide of potassium. They should be applied consecutively in the order given. It must be borne in mind that many of the abovementioned solvents are extremely injurious to the material of the drum head, and care should be exercised to prevent any unnecessary contact.

(38) J. H. B. asks: How can I renovate a sponge mattress that has become hard by use and dampness? A. This has not been satisfactorily accomplished.

(39) C. & Co. ask: 1. In the manufacture of fluid magnesia, to what pressure would you charge the fountain with carbonic acid gas? A. To 12 ozs. water add 1/2 oz. magnesia and add citric acid to slightly acid reaction. Such acidity is generally found more palatable than a neutral solution. Sweeten, add a few drops oil of lemon to flavor, and 18 grains potassa bicarbonate. This is the proper fluid magnesia. Many sell a spurious article made of tartrate of soda with a little soda bicarbonate flavored with lemon. 2. How is the magnesia bottled? A. Bottle in the ordinary way, not using the carbonic acid apparatus.

(40) E. B. J. says: I desire to make a musical instrument, the sound being produced by striking wooden strips, of uniform thickness and varying length. Supposing the shortest strip is 4 inches long, what will be the length of the others down to 2 octaves below the note sounded by that one? What is the best material for the hammers, and what kind of wood gives the best sound? A. The relative lengths of the pieces, for an octave on the natural scale, are as follows: 1, 2/3, 1/2, 2/5, 1/3, 1/4, 1/5, 1/6, 1/8, 1/10, 1/12, and so on as long as desired. We believe they are generally laid on straw, and struck with wooden hammers. Some of our readers, however, may be familiar with the use of the instrument, and will correct us if in error.

Given a set of conjugate diameters of an ellipse, how can the axes be found so that the curve can be conveniently constructed? A. Let cb and cd be



the given conjugate diameters. From d draw a line perpendicular to eb , and make its length, dE , equal to eO . Join the points, O and E , by a straight line, and upon $O E$, as a diameter, describe a circle. Draw a straight line, dH , through d and F , the center of this circle. G and H , where the line cuts the circle, are points in the principal axes, and Gd , Hd , are the lengths of the semi-axes, so that $A B$ and $C D$ are the axes required.

(41) J. B. asks: How can I produce a gloss on hard rubber? A. Ebonite may be worked, in all respects, like any hard wood. Pumice powder and rottenstone are commonly employed as finishers.

(42) E. P. J. asks: 1. What is the precise diameter of the piston of a reciprocating engine, presenting 144 square inches of area? A. Calling π the ratio of the circumference of a circle to a diameter, the diameter in question is equal to 24 divided by the square root of π . As, however, the value of π cannot be precisely expressed in numbers, it is impossible to give the precise diameter of the piston. 2. What would be the horse power of such an engine with 2 feet stroke, running with 100 lbs. boiler pressure to the square inch at 100 revolutions per minute, and cutting off at 1 foot, or 1/2 stroke? A. The data sent are insufficient for an accurate calculation. See p. 33, vol. 63. 3. What is the calculation as to the percentage of power lost by friction in the reciprocating engine? A. It varies in different engines from 10 to 40 per cent. From 20 to 25 per cent would possibly present a fair average. 4. What would be the increase of power in the above named engine if the steam, both before and after the cut-off, were always operating at 1 foot leverage from the center of the shaft, as it now is at the half stroke, without commencing near one dead center and losing its expansion in the other? A. The mean leverage throughout a revolution is about 0.6366 of the length of the crank, and the center of the crank pin moves 1.5708 times as far as the piston in a revolution: so that the whole power exerted by the piston is transmitted to the crank, except what is lost by friction. It would seem impossible to do more than this, whatever the leverage might be. 5. With what speed would a 1 inch square column of water, with 15 feet head, enter a vacuum, without regard to friction in the tube? A. At a rate of a little more than 56 feet per second. 6. Is it true that air enters a vacuum at the rate of 1,300 feet per second? A. This is an average approximate value.

(43) H. E. E. asks: 1. What is squaring the circle? Is it finding a square with an area equal to the area of a circle of given diameter? A. Yes. 2. If so, does not the whole trouble lie in finding the area of a circle? A. Yes. 3. Does not geometry demonstrate the process beyond the possibility of error? A. No.

(44) H. D. P. asks: How is the bronze made that is used for bronzing statuary, etc.? A. Bronze statuary does not require the application of any bronze. Make your castings of: Copper 88 parts, tin 9 parts, zinc 2 parts, lead 1 part. You can then polish the castings to suit your taste.

(45) T. H. says: I saw in a recent issue of your paper a statement that man appeared on the earth 150,000 or 200,000 years ago. Will you refer me to the evidence of the existence of pre-adamite men? A. Sir Charles Lyell's work on "The Antiquity of Man" is a complete resumé of the whole subject, which is too extensive for our columns.

(46) P. S. says: I saw a meteor in Kansas on December 27, 1875, and I wish to know of what kind of matter such bodies are composed. A. Meteoric bodies are of two classes. Some are composed of entirely combustible, while others are of combustible and incombustible matter. They revolve around the sun in orbits more elliptical than the orbit of the earth, so that parts of their orbits are internal and parts are external to the earth's orbit. When the earth and the meteoric bodies come near enough together so as to bring the latter within the earth's atmosphere, they are ignited by the resistance, and are either wholly or partially consumed. If their course and the attraction of the earth would bring them to the earth's surface, then the combustible ones would probably be wholly consumed before reaching it, while the others fall in the form of iron, etc. At times they only pass through the upper portion of the atmosphere, and, after receiving a very warm reception for a few moments, are allowed to go on, but not in their old paths.

(47) J. C. C. asks: What are the ingredients and proportions of the wax used by electrotypers for taking impressions of type? A. Yellow beeswax will do very well.

(48) L. & G. M. Co. ask: What preparation can be applied, with a pen, to mark numbers on the surface of tin plate? A. Squeeze the juice of a lemon into a cup, and put in a bit of copper, of the size of a cent. Let it stand for a day or two, then use it with a quill pen.

(49) J. H. says: I have a material containing free sulphur. By applying heat I drive the sulphur off in the form of gas. How can I condense those fumes, so as to obtain flowers of sulphur? A. It is necessary that the sulphur vapor should not come in contact with the air, otherwise a portion of it will be oxidized and converted into sulphurous acid gas. Sulphur may be volatilized or sublimed at a temperature of 792° Fah. If it then be condensed in suitable vessels, we have the substance commonly known as flowers of sulphur. This is done, says the United States Dispensary, by allowing the fumes to condense on the walls of a brick chamber.

(50) R. E. says: J. H. P. states on p. 114, current volume, that no chimney burners are safe on account of the shortness of the wick tube, and he expects to do better with a tube 4 inches long instead of 1 1/4. He is certainly mistaken. Every coal oil burner should, and most of them do, contain a little flat tube, which serves for the escape of gas formed by heated oil. With this tube a no-chimney burner is just as safe, if not safer, than a burner with chimney. Lamps with chimneys get a great deal hotter than those without, for two reasons: The chimney, producing a better draft, causes a more perfect combustion of the oil, and consequently a whiter light and more heat from the same amount of oil burnt; and the chimney, being always near the flame, gets a great deal hotter than the constantly changing air would without a chimney, and will consequently radiate heat to all the surrounding objects, of which the oil reservoir gets its share. If J. H. P. wants to use a wick tube 2 1/2 inches longer than generally used, he will find that oil of 150 gravity, as the law now requires in most of the States, will not rise at all so high in sufficient quantity to feed the flame: his wick will therefore get charred, and he will be obliged to burn lighter oil, and so increase the danger of explosion.

(51) J. M. S. says: In a recent issue you recommended strips of plank to be used beneath the window sash for the purpose of ventilation. I have used the same, but for applying or removing expeditiously I hinged them at the center, and covered them above and below with felt or rubber to keep out the cold.

(52) M. W. L. says, in reply to C., who asks as to the weight of the 20 and 15 inch guns: They weigh respectively 115,200 and 49,100 lbs.

(53) J. J. B. says, in answer to a correspondent who complained of heating of millstones: To avoid hot grinding, reduce the speed of your millstones and grind slower; and in staffing the stone, put in a piece of writing paper, and let the stone be just so lightly fixed that the paper will slip out from under the staff, near the eye of the stone.

(54) J. J. B. says: To oil a mill spindle at the bush, bore a 1/8 inch hole through the wood block in bush, next to spindle. Take a piece of 1/2 inch iron gas pipe, bend, and insert it, bringing under the stone up through the floor, outside of the curb. Let the outside end be the highest. Use castor oil in oiling, as it never congeals, and you need never have any trouble in oiling millstones in the coldest weather.

(55) W. L. S. says, in reply to an inquiry as to why a telegraph sounder connected with the bell of an alarm clock does not work: Every telegrapher knows that a quick tap on the key, no matter how hard, will not affect the sounder, as it does not give time for the magnet to work. The stroke of the alarm striker is exactly of this nature, and therefore cannot repeat itself on the sounder.

(56) J. C. says, in reply to L. S. C.'s queries as to the effect of dampness on unused boiler furnaces: Into a closed vessel fused by 5 to 10 gallons heavy oil (petroleum paraffin); place the vessel at a safe distance, with a pipe to lead the vapor of the oil under the boilers. Close up every crack or crevice by luting, put a fire under the vessel, and evaporate the oil. The whole of the fire surface, and even where the brick is in contact with the boiler, will be sweated or covered with the condensed vapor of the oil. To protect the inside of the boiler, first dry it by a very light fire under it; then put a few gallons petroleum in each boiler and evaporate it by a light fire under the boiler. As the oil vapor condenses, the whole inside of the boiler will be coated with a rust-proof coat of oil.

(57) D. F. J. says, in reply to J. A. H., who says that the carrying boards of his reels are flat, and that the flour sticks on them: If you give your carrying boards enough pitch, keep your stones in good order, and do not grind hot, you will nothave any further trouble in that line. Sandpaper the boards and then put shellac on them.

(58) J. B. J. says, in reply to H. M.'s query as to the line of the magnetic meridian: Since the latitude and longitude of the place are not given, the question may be considered under two hypotheses: 1. The line may be in Maine or thereabouts, where the declination of the magnetic needle from the meridian has varied from 14° to 17° during the last 40 years. 2. It may be in some of the Western States, where an equal declination, but opposite in direction, has existed during the same period. If the first supposition be true, then the first surveyor made due allowance for the declination, and located substantially a true meridian. The subsequent surveyors, neglecting the declination, located a magnetic meridian, which is constantly and indefinitely fluctuating. If the line in question is west of the Alleghanies, it would seem that the first surveyor ran the line parallel with this needle, disregarding declination: hence it would not be a true meridian, the two subsequent surveyors being in this case approximately correct. The amount and direction of the discrepancy between these two latter appear to favor the first hypothesis: it is readily accounted for, however, under the second, when it is remembered that the deviation of the magnetic needle from the true meridian is a constantly varying quantity.

(59) D. C. R. says: S. H. B. and many others desire information as to building boats. In the first place, make the keel of required length and about 1 1/4 inches thick and 4 inches wide, with a rabbet to receive the edge of garboard strake. Put on stem and stern as required, and fasten them on some good support about 2 feet from floor; then place molds of the shape required, in about 5 sections, across the keel and secure them, and cut the first strake to fit keel and stem and stern. Nail on, and continue to cut and nail on until of the depth required; then bend in ribs and put in seats and other inside finish.

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

J. M. M.—It is ramie fiber.—T. T. R.—It is sulphide of lead (galena) accompanied by sulphate of baryta (heavy spar).—W. P. T.—It is sulphuret of iron, irised by a superficial oxidation.—J. L.—It is iron pyrites, at present not of much commercial value.—W. A. J.—It is bituminous shale, impregnated with sulphuret of iron, to which the glistening metallic appearance is due.—G. D. M.—It is impossible to make an analysis of any value on 2 ozs. of water. One gallon is needed, carefully sealed up in a perfectly clean bottle of white glass.—G. J.—No. 1 is alunogen, a variety of native alum consisting of sulphuric acid, water, alumina, a little iron, etc. It may be purified by solution in water, and then, by saturation with alkali and crystallization, be converted into common alum. No. 2 is blende or sulphide of zinc. No. 3 is black argillaceous shale. No. 4 is ferruginous quartz.—M. R.—There appears to be no market in New York for sand of this character which has to be transported any distance.—J. R. M.—It is calcite or crystallized carbonate of lime.—C. E. G.—The metal is lead: the mineral is muscovite (potash mica).

J. W. S. says: I am taking a carbolate of iodine inhalant for catarrh, and it scents my clothes with an unpleasant odor. Can you tell me of something to mix with it to produce a pleasant odor?—W. McD. says: How can I get a smooth surface on planished copper plates?—T. J. asks: How are the inches, etc., put on wooden rules?—W. S. says: R. W. R. states that he is carrying 20 horse power by a cotton rope. How does he maintain the proper tension during damp or dry weather?

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

- On Thermometrical Tables. By J. B. G.
- On the Sargasso Sea, etc. By M.
- On Bored Wells. By L. L.
- On Windmills. By A. McL.
- On a Registering Barometer. By W. A. B.
- On Projectiles. By R. H.
- On Spacing Circles. By G. B. F.

Also inquiries and answers from the following:
H. C. N.—J. D. M.—O. A.—C. F. E.—E. W.—L. H. Q.—L. D. D.—A. N. W.—W. M. R.—W. S. R.—J. M.—D. M. H.—A. G.—A. W.—C. M.—F. B.—J. E.—F. W.—C. F. E.

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.
Enquiries 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: "Whose is the best smut mill for wheat? Who sells incubators? Who makes fuses for blasting? Who makes small copper tubing? Who sells crushers for treating copper ores? Whose railroad spike machines? Who sells ear trumpets? Who makes electrical musical reporters?" All such