

L. says: 1. I want to make a heat governor for a hot air furnace. If I enclose, in a tube exposed to the heat, quicksilver, or simply the air in the tube, from which can I get the most expansion or pressure to act on the damper? A. Quicksilver expands the 0.01543 times its volume on being heated from the freezing to the boiling point, and air 0.3665 times, so that the expansion of air is much greater. 2. Can you suggest a way by which this pressure may best act on a lever? Pure rubber would answer the purpose if perfectly airtight. A. By means of an airtight piston.

M. asks: Is the mineral found with lead ore and known to miners as mundic the same as iron pyrites? A. Mundic is the name of copper pyrites among English miners.

C. H. S. asks: Had eighteen hundred and seventy-four full years of the Christian era passed on January 1, 1874? A. Not exactly. The years as reckoned by the calendar do not agree perfectly with those calculated on astronomical data.

F. C. C. asks: What can I apply to the back of sheet copper to prevent gold adhering, while I am electro-gilding the face? It must not come off into or injure the solution. A. Use a thin coating of varnish.

E. S. asks: What is the proper temper for a magnet, and how much of it should be tempered? A. It should be tempered at as high a degree of heat as possible, and the temper should be drawn to a violet-straw color.

S. S. S. asks: 1. Would a silver rod used for an anode (as in the illustration in your issue of January 31) be as good for plating a dozen forks or spoons as an anode of sheet silver? A. Some electroplaters use anodes of pieces or rods of silver. The general practice is to employ sheet silver; and while the former plan answers, the latter is on some accounts to be preferred. 2. How much silver by weight is calculated to be deposited upon a dozen forks, for single, double, and triple plate? A. Tablespoons are single plated when they are plated with 4 ozs. of silver to the gross, double plated with 8 ozs., and triple plated with 12 ozs. Forks in proportion, according to size. 3. What book do you recommend for traveling electroplaters? A. Roseleur's "Galvanoplastic Manipulations" is a standard authority.

G. P. L. asks: Is there any chemical or other way to remove hair from any part of the face without marring the face or leaving any injurious marks on it? A. Hydrosulphate of sodium can be used, but care must be taken, lest the skin be attacked. See Science Record for 1874, p. 20.

N. A. M. asks: Can you give me a recipe for making nitro-glycerin? A. To prepare nitro-glycerin, very strong nitric acid, density 49° to 90° Baumé, is mixed with twice its weight of concentrated sulphuric acid: 6 lbs. of this mixture, thoroughly cooled, are poured into a glazed earthenware jar, placed in a pan of cold water, and there is next added gradually 1 lb. of concentrated and purified glycerin, having a density of at least 30° to 31° Baumé, care being taken to stir constantly. The mixture is left to stand for some time, and afterwards poured into five or six times its bulk of very cold water to which a rotary motion has been imparted. The nitro-glycerin sinks to the bottom as an oily liquid.

C. S. D. asks: 1. Where is the largest reflecting telescope in the world, and what is the size of its object lens? A. At the National Observatory, Washington, D. C.; diameter of lens, 26 inches. 2. I wish to connect another boy's home with mine by a telegraph wire, and (as it is not convenient to have it suspended from the one house to the other) I want to know if I tar copper wire and put it under the sidewalk (fastened by staples), if the tarred wire will answer the same purpose as insulated wire? And if not, what can I put on the wire that will? A. Use an ordinary insulated gutta percha telegraph wire. 3. I have a blackboard on which it is difficult to leave any mark. What substance shall I put on it to remove that difficulty? A. Put on the blackboard liquid sold by most stationers.

R. E. W. asks: Is there any way of making oxygen gas, cheaper than the common method of using potash and manganese? Nitrate of soda is much cheaper; cannot its oxygen be driven off? A. Nitrate of soda is readily decomposed at a red heat, and yields oxygen, which at first is tolerably pure, but becomes contaminated with increasing quantities of nitrogen.

A. B. asks: Is the white soft matter in the center of a corn kernel pure starch? A. It consists of more than 50 per cent of starch. The remainder is water, fat, cellulose, and nitrogenous substances.

K. K. K. asks: By what means can nitrogen be prepared in large quantities, cheaply, rapidly, and with simple apparatus, similar to a hydrogen generator, so as to be instantly ready? A. By heating nitrite of ammonia.

F. H. M. asks: Is there any sure way of ridding an old house of bedbugs, cockroaches, etc.? A. As to bedbugs, if you can locate their dwelling places, use strong mercurial ointment, soft soap, and oil of turpentine, in equal parts, triturated together. If they are secreted in the timbers, fumigation by burning sulphur is the best method. For cockroaches, make poison wafers of flour, red lead, and sugar, rubbed up with a little mullage; spread out thin to dry.

W. S. X. asks: 1. How can I make lard oil in small quantities? A. Lard oil is chiefly obtained as a secondary product in the manufacture of stearin. It is purified first by agitation with sulphuric acid, and afterwards by steaming it or washing it by water. 2. Is there a polish that will adhere to such articles as a tin lantern of which the tin is worn off? If so, how is it made? A. See p. 315, vol. 29.

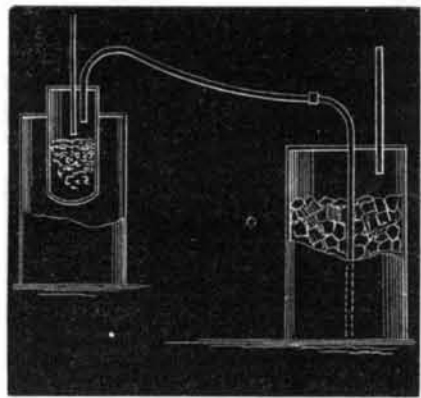
G. W. W. asks: How can canvas be prepared for oil painting? A. The canvas must be strained on a frame of thoroughly seasoned wood, so as not to shrink, and a thin oil filling must be put on till the texture of the canvas is completely hidden. All seams and projections must be avoided.

J. A. M. asks: How can I smooth and polish a piece of rough marble? A. Use (1) wet sandstone, (2) a piece of unglazed pottery (also wet), (3) pumice-stone, (4) lead filings and linae, (5) a little powder of calcined tin, rubbed on with a rouge rag.

Z. P. B. asks: 1. What is the best substance with which to clean common and undressed kid and dogskin gloves with, and how is it applied? A. Damp them slightly, stretch them gently over wooden hands, and clean them with a sponge dipped in benzole. As soon as they are dry, withdraw the hands, and suspend in the air till the smell has passed off. 2. What is the best to clean ivory with? A. Ivory can be bleached by exposing it to the fumes of burning sulphur or to chlorine gas. In answer to your other question, consult a cyclopaedia of manufactures.

C. W. H. Jr. asks: How can cloth or velvet be made to stick to cast iron? A. Try painting the iron with oil paint, letting it dry, and then attaching the cloth with glue.

A. A. W. asks: How can I make bisulphide of carbon? A. You can probably buy bisulphide of carbon more cheaply than you can make it, as it is now manufactured on the large scale. The following apparatus, however, may be sufficiently simple and cheap for your purpose: Bore two holes in the top of an iron bottle, such as mercury is imported in, and into these holes fix two copper pipes, one straight, as on the figure



and the other bent. The bent tube is connected with another tube leading to the bottom of a bottle filled with ice. The iron bottle is fitted into the top of a furnace, so that about two thirds is exposed to the action of the flame. The furnace should have a hole in its top so that the bottle may fit snugly into it, and the top be protected from the fire. The bottle is filled two thirds full of pieces of fresh charcoal; and when hot, a few fragments of sulphur dropped at intervals into the straight tube, which is immediately closed with a plug. The bisulphide of carbon is condensed in the bottom of the ice bottle, and sinks to the bottom of the water. It should afterwards be rectified by carefully distilling in a hot water bath, in contact with chloride of calcium, and condensed as before. Bisulphide of carbon is very volatile and inflammable, so that care must be used in making and handling.

N. H. F. says that J. P., who asked how to prevent a wooden screw from checking, should boil it in water with a little salt in it. It will then never check or crack.

H. G. B. says, to M. B. C., who asked how to increase the rapidity of the drying in his lumber kiln: You need no air at all, and consequently have too much already. Air is good for respiration, but was not made for a drying agent, although it is well adapted to prevent too rapid desiccation. And air-dried lumber has a crust of dried wood on the outside, which retards the internal drying and prevents the thorough shrinking of the wood, leaving it liable to swell or shrink with every change of the weather. Again, air cannot season lumber, which operation is a chemical change of its albumen, preventing its future shrinkage, swelling, and decay. Even eggs can be so coagulated as to keep for 10 years, and I have some, thus prepared, which are thus old, as perfect as ever they were as far as decay is concerned. It was (and still is) thought that the best way of preserving lumber was to extract the albumen, by soaking the lumber in water for 6 or 12 months, or by boiling or steaming. These processes kill the lumber for good work and good finish. The albumen should be coagulated and retained in the pores of the wood, and it will keep out water or damp air as well as if the pores were filled with shellac or other gum, evidently fitting the wood for a very superior finish. This operation is readily accomplished by the well known means of dry steam, requiring fewer days for its completion than the soaking and subsequent drying does months. In fact, it pays well to subject all lumber, no matter by what process it has been seasoned, to dry steam, by the use of which a black walnut tree may be cut in the forest on Monday morning, and worked into furniture by Saturday night, and be better fortified against any tendency to shrink, swell, warp, or decay, and it will show a better finish.

H. P. says: If W. D. B., who asked as to flow of oil from a wick, will lower the wick, when not lighted, below the top of the wick tube, the oil will not spread over the outside of the lamp, which is the case with some, if not all, oils when the wicks protrude out of the tubes.

J. E. D. says, in reply to several correspondents who ask how to gild on glass: First I see that the glass is free from dirt and grease; then with my tongue, I lick the place where I desire the figure or letter to be, and then press the dampened surface upon a piece of gold leaf of sufficient size, taking care to have it smooth and unbroken. After it has dried (which is indicated by its assuming a polished appearance), I place it over a marked board, and with a sharp instrument and ruler scratch lines for the top and bottom of the letters, and then (with quickly drying material) paint the letters, taking care to reverse them so that they will show right from the other side. When the paint is dry, I rub off the superfluous leaf and the job is done. If the work is to be done on large glass, like store windows, it is better to paint the letters first on the outside, as they are to appear, and this will show where to apply the leaf, and also how to paint on the inside, as the paint will show plainly through the leaf. When the job is done, the outside letters can be easily cleaned off. It will help most persons to paint the letters backwards, to mark them with pen and ink on paper, and, after oiling the paper, look at them from the other side.

P. H. B. says, in answer to W. E. S., who asked how a 20 horse power engine can be started and stopped by telegraph: If it be a single engine, it would have to be seen that the crank was in a position to start and the steam pipe and the steam chest would have to be well provided with drip exits; and the throttle valve must be easily worked and well balanced. The throttle lever could be actuated by a magnet, or by weights and mechanisms similar to that employed to trip the hammer in apparatus for striking the fire alarm telegraph bells in cities. A double engine could be so arranged as to be stopped or started, at any time, by the same arrangement.

K. L. H. says, in reply to J. J. G., who asks if there is any compound that will make the beard grow faster than it naturally would: The following recipe is perfectly harmless, and will make the beard grow like mushrooms in a hotbed: Cologne 2 ozs., liquid hartshorn 1 dram, tincture of cantharides 2 drams, oil of rosemary 12 drops, oil of nutmeg 12 drops, lavender 12 drops. Apply to the face daily and wait for the result.

T. A. C. says, in an answer to J. P., whose query about seasoning wooden screws is answered on p. 219, vol. 30: Bore a hole longitudinally through the center of the screw; it will not be apt to crack so badly in seasoning, because then the air can get to the center of the wood, the sap escapes therefrom, the center of the wood contracts, and the strain on the outside is lessened. Of course, the larger the hole, the better for the seasoning process; but it should not, and need not, be large enough to materially weaken the screw. If in addition, you can boil the screw in water, the job will be bettered; if boiled in oil, it will be complete.

J. H. P. says: Tell G. C. B. that cracks and holes in cast iron kettles can frequently be filled by cement composed of glycerin and litharge made into a stiff putty. It requires 3 or 4 days to harden. I have filled holes in kettles an inch or more in diameter with this cement, and used the kettles for years afterwards.

C. D. S. says that R. H. F. can test squares with the dividers by drawing two circles one within the other, from the same center, of 16 and 12 inches diameter respectively; then set the dividers to 10 inches, insert on point in any part of the outer circle, and mark the point exactly where a circle (drawn with the dividers in this position) would intersect the inner circle; now draw a straight line through the center of the circles and through the point marked in the inner circle; and through the outer one, another line starting from the point where the dividers were inserted in the outer circle through the center of the circles until the outer circle is reached. If this is done exactly, the points where those lines intersect the outer circle will form the corners of a perfect square whose side is 11-8187+ inches. If the square is correct, it will fit the square thus formed and also the lines in the center, which divide the circle into 4 equal parts, and the angles must be 90 degrees. This is based on the rule for finding the hypotenuse of a right angled triangle, thus: 6²=36 and 8²=64, sum 100, the square root of which is 10. This is some times called the 6, 8, and 10 rule for squaring buildings.

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

- D. H. E.—This mineral is compact soapstone.
D. B.—The mineral resembling gold, which is inclosed in the quartz, is iron pyrites.
J. K.—The crystal is garnet; it is a silicate of alumina and iron. The red stone is quartz rock, colored by a little oxide of iron. The gray one is silex.
E. L. F.—Your specimen consists of cubical crystals of iron pyrites, inclosed in gray quartz rock.
B. B. S.—Crystals of iron pyrites, inclosed in talcose schist.
H. S. B.—Your specimen consists of a solid mineral portion, and of volatile substances, the latter amounting to 17.75 per cent. Gives off water and oils on heating. The residue left after heating consists of siliceous grains, colored with oxide of iron. Contains a small amount of soda but no potash. We do not know of any use for it other than that of soap, and we can assign no value to it.

O. K.—Your sample of safety powder for use in petroleum oils consists of salts, mostly common salt, which have been dyed yellow, blue, and red in order to disguise their true nature. It is worse than valueless. It does not diminish the explosive nature of the oils, and should be exposed as a fraud calculated to do great injury.

R. S. asks: How can I remove the inside bark of the cocoa-nut, otherwise than by shaving it off?—V. V. V. asks: What must I use to paint show cards with? The oil in ordinary paint discolors the card around the letters. I want something that paints very black, also white and light tints for dark grounds?—G. S. asks: What is the process of ferrotyping?—M. B. A. asks: What is the best way of removing tallow and white lead that has been applied to polished parts of machinery to prevent rust?—W. H. D. asks: Does powder of a coarse grain shoot more strongly than one of a fine grain?—M. F. B. asks: 1. Which will shoot the greater distance, a breech or a muzzle loading shot gun? 2. Is 30 inches long enough for a gun of 10 gauge? 3. What are the different strengths of the materials used for gun barrels? 4. Is Damascus twist as good as laminated steel for gun barrels?—P. J. F. asks: 1. What is the proper charge of powder for a No. 12 caliber shot gun? 2. How much powder will the same caliber consume without waste?

COMMUNICATIONS RECEIVED.

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

- On Kepler's Third Law. By A. L.
On the Elasticity and Slipping of Belts. By J. T. H.
On a Scientific Toy. By E. L.
On Ascertaining the Width of Streams. By J. C.
On the Manufacture of Leather. By D. S.
On Car Building. By N. E.
On Light. By T. H. C.
On the Attraction of the Sun and the Earth. By H. K.
On Ventilation. By E. H. S.
On the Canal Problem. By J. H.
On Foaming in Boilers. By G. C. P.
On Shellac as a Dressing for Wounds. By W. W.
On Squares. By M. T. C.
On Spiders' Webs. By C. T.

Also enquiries and answers from the following: P. T. F.—F. H.—J. R. P.—W. H. C.—T. H. F.—J. W.—T. C. H.—E. W. H.—P. S.—J. L.—F. H. E.

Correspondents in different parts of the country ask: Who sells a machine for testing the strength of the arm by striking a flat surface? Who makes jig saws for cutting out ship timbers? Makers of the above articles will probably promote their interests by advertising, in reply, in the SCIENTIFIC AMERICAN. Several correspondents request us to publish replies to their enquiries about the patentability of their inventions, etc. Such enquiries will only be answered by letter, and the parties should give their addresses.

Correspondents who write to ask the address of certain manufacturers, or where specified articles are to be had also those having goods for sale, or who want to find partners, should send with their communications an amount sufficient to cover the cost of publication under the head of "Business and Personal," which is specially devoted to such enquiries.

[OFFICIAL.]
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