Answers to Correspondents

A. C. L. will find a good recipe for cement for leather on p. 119, vol. 28.—H. will find directions for making skeleton leaves on p. 123, vol. 29. The question as to the tank full of water is a schoolboy's problem, and the other is incomprehensible.—D. G. N. can cleanse iron for soldering by using sulphuric acid much diluted with water. We never heard of using an acid to prevent the splitting of wood.—W. S. E. will find directions for a good silver wash on p. 137, vol. 30.—F. B. M. will find directions for cleansing coins on p. 217, vol. 26.—J. F. G. is informed that Körting and Morton are two different persons.—W. M. S. will find a recipe for violet ink on p. 58, vol. 30, and for oil boot polish on p. 73, vol. 26.—F. C. R. can enamel his steel apron supporters by the process described on p. 107, vol. 30.

G. W. McB. asks: 1. Does the magnetic meridian move from east to west and from west to east at regular periods? For what length of time does it move in one direction? What is the movement per year? At what dates have the changes taken place as far as known? A. The needle moves irregularly. The oscillations to the east and west of the true meridian require several centuries for their completion. For instance, at Paris in 1668 the variation was 0°, and it moved west till 1814, when it reached 22° 34′ W.

L. H. D. asks: Can you give me some simple method of preparing sensitized paper for exposure in the camera? A. Take chloride of ammonium 200 grains, water 5 fluid ozs., albumen 15 fluid ozs.; beat the whole to a perfect froth. As the froth forms, transfer it to a dish and let it subside. When partially subsided, transfer to a tall, narrow jar and let it settle for some hours. Pour off the clear solution for use. To apply it, pour a portion into a flat dish to the depth of ½ inch. Cut paper to proper size, hold it by the two corners, bend in a curved form (convexity downwards) so as to touch in middle first; and gradually lower the corners. Let it rest on the bath 1½ minutes, then take it off and pin it up by the corners. To make the paper sensitive, work by the light of a candle. Take nitrate of silver 90 grains, distilled water 1 oz. Take a sufficient quantity, pour into a porcelain dish. Lay sheet on in same way as before; allow 3 minutes contact for thin paper and 4 to 5 minutes for thick. Raise the paper with tweezers tipped with sealing wax, hang up to dry, and protect from the light.

I. S. D. asks: How can beeswax be dissolved in ether? A. It is soluble in the usual way, but sparingly, that is, a large body of ether is required to dissolve a comparatively small quantity of the wax.

C. O. K. asks: 1. Is grape sugar an important article of trade in the United States, and for what use is it chiefly employed? A. Grape sugar is largely manufactured in the United States. It is largely employed in wine making and in the brewing of beer. That its use is extensive may be gathered from the fact that to 8 cwts. of malt, 1 cwt. of sugar is employed. It is also used instead of honey in confectionary, for coloring liquors and vinegar brown, and in making rum and cognac, beer and wines. 2. Is there a treatise on grape sugar manufacture published? A. We know of no such work. 3. Are there any patents on the process? A. Yes.

C. H. F. asks: 1. In extracting essential oil from flowers, how much salt by weight should be us to a pound of flowers? A. We know of no method of extraction in which salt is used, nor do we see how common salt can possibly extract an essential oil. 2. Is there any better way to obtain the perfume of flowers? A. The essential oils in flowers, being present in very small quantities, are best obtained, by digesting the fresh flowers with pure olive oil, or with cotton wool soaked in sweet olive oil, the fresh flowers being placed in alternate layers with the cotton saturated in oil; in some cases pure lard is used. The flowers should be renewed till the oil is saturated with the odor. The cotton is pressed to extrude the oil. The essential oil may be recovered from the sweet oil by agitation with strong and highly rectified alcohol.

W. H. M. L. asks: 1. What will make the cream rise on milk, to get all the cream there is in the milk? A. There is no better way than the old-fashioned one of getting the cream from milk by letting it stand. In winter you might set the pans in warm water. 2. Is there an instrument made to detect water in milk? A. The water in milk may be detected by an instrument called a lactometer. It can also be detected by taking a glass tube and dividing it into 100 equal parts, then filling it and let stand 24 hours. The cream, if milk is pure, will rise and occupy 11 to 13 divisions of the tube. 3. How do they tell the speed of vessels at sea? A. The speed of vessels at sea is determined by an apparatus called a log. It is a small piece of wood of a peculiar shape, weighted and attached to a line which is divided into equal spaces called knots. When the log is thrown into the water, the latter keeps it from being drawn forward, and the speed of the ship is found by the number of knots run out in a certain time.

F. W. R. asks: What is the best method of making a heavy cloth waterproof? A. Dissolve soft soap in hot water and add a solution of sulphate of iron. An insoluble iron soap falls to the bottom; separate it from the liquid, wash and dry it, and mix with linseed oil. The addition of dissolved india rubber to the oil improves the paint.

E. B. says: It may not be generally known that wrought iron, by repeated heating and cooling follows a different law from cast iron, in that, as the latter expands, the former contracts. My attention was first called to this by the foreman of a foundery, who found that rings, set around the bub of a pattern as anchor to lift the sand, soon became too mall and had to be sent to the blacksmith for enlargement. Since then I have had occasion to use this knowledge in practice, and have reduced the size of a ring about one thirtieth of an inch by heating and cooling four times. The ring was one fourth by one inch, with one inch internal diameter. The process does not seem to injure the iron, as the rings were drawn about one inch in ten and were made of the common round rod in use for such purposes. A. That wrought iron shrinks by being heated and quenched is a well known fact, which has been employed for years to shorten the length of rods, etc., requiring to be very exact. But if the heating and cooling are equal all over, the first application only is effectual. That cast iron expands by repeated heating and cooling is not known, and is, to say the least, doubtful. If heated once and quenched, it hardens and expands (as does wrought iron and steel from hardening). If heated and cooled in one place at one time, and in another place at another time, your gradual expansion is explained; if otherwise, the phenomenon, if true, is new.

J. M. C. asks: What will be the pressure on the staves at bottom, middle, and top of a tub 9½ feet in diameter and 9 feet high, holding a liquid weighing 12 lbs. to the gallon? A. The pressure on the staves at bottom will be 5·6 lbs. per square inch, at the middle 2·8 lbs per square inch, and at top nothing.

J. E. B. says: I enclose you one of two eggs laid last week by the same hen. I think it is empty or nearly so. A. The egg weighed about one eighth of one of the same size. Upon breaking it open the yolk was found at one end, perfectly dry and hard. Your supposition that the egg is a fresh one is incorrect, it having been laid months before and become dry by heat. The shell of the egg when first formed is soft, and adheres closely to the solid contents; consequently the egg could not have been laid in the condition that you found it in. The egg was almost empty, no white of the egg being present, which shows conclusively that it was an old one.

T. C. P. asks: Is there a quick method of tanning small bits of rawhide? A. There is a method of quick tanning by the use of alcohol.

W. S. J. asks: How can I soften common machine steel so that I can cut it off easily with the parting tool? I want to make rollers ⅜ inch in diameter 3-16 inch thick. I have made it blood red, and let it cool off in lime and charcoal; and the steel is so hard it takes on an average 5 minutes to make each roller. A. There is no process to soften steel which will give you any practical benefit over the lime and charcoal process. Your trouble probably lies in the parting tool, which should be made of the best steel, about ⅛ inch thick, and given plenty of clearance at the point; it should be hardened right out, and placed to cut at the center. One minute is sufficient time to make such a roller, if it is made of any ordinary steel. Try using oil with the parting tool; it may assist it.

G. F. J. says: In your issue of July 11, J. W. asks if a true cylinder can be bored by a boring bar not having a sliding head (the cylinder being fed up by the lathe carriage) if the bar is not true or parallel with the ways of the lathe? He contends that the bore will be straight, but will not be round. You answer that the bore will be true, whether the bar is true with the shears or not. The only result of the bar being out of true is that the cylinder will be thinner at opposite ends on opposite sides. I think that, with a little consideration, you will be convinced that your answer is wrong, and J. W. is right. Your answer is correct where the cutter head feeds longitudinally upon the bar, but not for the case where the cylinder feeds up to the cutter. In the latter case, if the bar were not parallel with the ways (transversely, for instance), the bore would be straight with the ways, because the circle described by the cutter does not change in its relative position to the ways, consequently the cylinder would not be thinner on opposite sides at opposite ends as you stated. But the bar not being parallel, the circle of the cutter would not be upon the same plane as the diameter of the cylinder, but at an angle with it, consequently the transverse diameter of a cylinder, bored with a cutter revolving in such a direction, would be less than the perpendicular diameter. The relative position of the circle of cutter to diameter of cylinder might be shown by placing a ring inside a true cylinder of the same size, and then twisting one side of the ring toward one end of the cylinder, and the other side toward the other end. With a cutter running at a considerable angle, the bore might be made quite elliptical. A. The plane in which the cutter of the boring barrel revolves is the plane of the diameter of the bore, and your ring, placed in the same plane, will show the cylinder to be round, as stated in our answer to J. W. on this page.

J. W. says: You state that the cylinder will be bored true but not parallel with the outside. If this be the case, will the ends of the cylinder be faced off truly with the central line of the bore, or with the outside of cylinder, supposing it to be done with the same tool? A. The end face of the cylinder will be true with the center line of the bore, that is, at a true right angle with the center line.

F. D. asks: What are the dimensions and details of Gramme's electric machine? A. It is impossible to answer this question, as there are none of these machines as yet in this country, the one ordered for the Stevens Institute having not yet arrived. When it does, we shall be glad to furnish the information desired.

A. B. E. L. asks: How can butter be kept fresh? A. The usual method employed is that of keeping the butter in a cool place in a receptacle, airtight or nearly so. A highly accomplished housekeeper says: Put the butter into a stone jar, cover it thickly with salt. Put a linen cloth over the top, and then fit on tightly a stone cover. Of course, keep in a cool place

J. J. K. asks: 1. How can I get the greatest power in a steel horseshoe magnet, and what kind of wire should the electro-magnet be wound with? A. By touching it with your electro-magnet as near the base or curve as possible, and gradually drawing it out towards the poles; repeat the operation several times, taking care not to reverse the poles. 2. I have a battery of 13 pairs of Grove cups and an electromagnet made out of ½ inch iron, wound with about 200 yards of silk-covered copper wire of No. 20 gage; all the power I can impart to a magnet of steel (9 inches long, 1¼ inches broad, ½ inch thick) is to lift itself; it should lift more, but I am stuck; all I can do, it remains the same. A. Your electromagnet, if properly constructed, ought to answer the purpose. The trouble may be due to poor quality of steel of which your horseshoe is made. 3. Was the English man of war sunk at Hell Gate, New York harbor, about the year 1747, ever visited by a diver, and can it be got at?—[Will some reader, versed in local history, answer this?—EDS.]

L. B. asks: What is a cone pendulum, such as is said to be used for regulating the great telescope at Washington? A. A contrivance resembling one arm of a steam engine governor. It is driven by a turbine and revolves once in two seconds. A 6 inch flywheel is attached to the clockwork, and a brake is applied, by electricity, whenever the tendency is to revolve too fast.

F. A. S. asks: What is the correct proportion of the French meter to the United States foot? A. The meter=3·2808992 feet.

C. W. K. asks: 1. How can I make wax into sheets for making wax flowers, and how can I give it the different colors? A. See p. 50, vol. 30. 2. Does the sun radiate light? A. Yes.

R. A. B. asks: 1. How is blood albumen prepared? A. See p. 41, vol. 24. 2. When is it best to drink blood, as soon as drawn from the ox, or after it has been stirred and the clot removed, as done for manufacturing purposes? A. It is customary to use the blood directly after it is drawn, though the remedy is not prescribed by physicians of standing.

G. B. D. asks: 1. How near does the best electromagnetic motor approach the best steam motor in point of economy? A. Steam is many times the cheapest. 2. Is it true that Dr. Page constructed a carriage and propelled it through the streets of Washington by means of electricity? A. Yes. 3. In answer to H. L. C., p. 346, vol. 30, you say the coil should not exceed an inch and a half in diameter; are your readers to understand from this that electromagnets cannot be successfully made larger than 1½ inches, everything being in proportion? A. The question was for a very small motor. 4. How much more per horse power would it cost at the present day to use electricity? A. It has been variously estimated from five to ten times in favor of steam.

R. L. says: I am constructing an astronomical achromatic telescope, but wish to make a terrestrial telescope instead. The achromatic object glass is 2½ inches diameter, and 30 inches focus, and the Huygbenian eyepiece is of a half an inch focus. What should be the dimensions of the other two lenses to make this into a terrestrial telescope, and where should they be situated? A. Place, about 2 inches in front of your eyepiece, two plano-convex lenses half an inch in diameter, one inch focus and two thirds of an inch apart, the convex sides facing each other, as in the Ramsden or positive eyepiece. 2. Could I use this astronomical for a terrestrial telescope? A. Yes. 3. Would there be any objection to it other than that of the objects being inverted? A. No.

G. T. W. asks: I. Can you tell me whether sugar dissolved into sirup can have its power of crystalization destroyed, so as to remain uncrystalizable again? How may it be done in a simple way? A. If a solution of sugar be long boiled, it irrevocably loses its property of crystallizing. This prejudicial alteration is effected still more rapidly by the addition to the sugar of 1-20 of its weight of oxalic, citric, malic, or any of the stronger acids. 2. How is printer's gold size made? A. Take ½ lb. linseed oil, 2 ozs. gum animi; powder the gum and add gradually to the heated oil. Strain, and mix with vermilion till it is opaque. 3. What is fuchsin? Is it such a substance that it is practicable to apply it to the preservation of meat in a hot climate? A. Fuchsin is the hydrochlorate of anilin, and is used in dyeing. It very frequently contains arsenic. It is not suitable. 4. Is boric acid in small quantities added to food injurious in any way to health? A. Probably it is.

W. M. K. says: 1. There is a difference between a degree of longitude and latitude at the poles; but how much is that difference in miles, and what is the difference at 10° from the poles? A. Longitude is the distance east or west of a given meridian. All meridian lines pass through the poles, consequently there is no such thing as longitude at the poles. Latitude is the distance north or south of the equator; and as the plane of the equator is at right angles to the axis of the earth, the poles are a quadrant's distance (90°) from the equator. A degree of latitude is invariable. A degree of longitude is $\frac{1}{360}$ of the earth's circumference at the equator, and constantly decreases as we go towards the poles. At 10° from the poles the diameter of a curve whose plane is perpendicular to the earth's axis is 2(3970 × sin. 10°) = 1378 miles. (3970 = radius of earth approximately.) 1378 × 3·1416 = 4331 miles, or circumference of the circle. $4331 \times \frac{1}{360} = 12{\cdot}04$ miles, or the length of a degree longitude. 2. What is the best proof that the earth revolves on its axis? A. There are several ways of proving that the earth revolves on its axis. Perhaps the simplest way is to fix a telescope in position on a clear night and watch the stars cross the field of view. Or else place yourself behind a pole or other fixed object and notice the stars as they seem to pass behind the object and re-appear on the other side. 3. At what place is the Mississippi river the broadest? A. At the mouth. 4. Why are the polar circles and the tropics drawn upon the globe? A. The tropics are two parallels of latitude, one on the north and the other on the south of the equator, over every point of which, respectively, the sun in its daily course passes vertically on the 21st of June and 21st of December in every year. Their latitudes are about 23° 28′, respectively north and south. The arctics are two small circles or parallels of latitude 23°28′ from the poles. They indicate the limit or boundary of that region about each pole where the sun is above the horizon during the entire day (24 hours) once in a year. 5. Can there be thunder and lightning without a cloud in the sky? A. There may be thunder and lightning from clouds which are not seen. In that case we see simply the reflection of the lightning upon the sky. 6. What is the proper temperature of a schoolroom or dwelling to promote health and comfort? A. From 55° to 70° is a good temperature for a schoolroom. 7. Is there any substance that will remove stains of whitelead paint out of carpet or clothing without injuring the fabric? A. Benzine or turpentine will remove white paint stains.

W. N. W. says: 1. I am desirous of heating to redness a piece of platinum wire, ¾ of an inch and $\frac{1}{100}$ of an inch in diameter, by the electric current. I am familiar with the heating effect of the battery current, but do not wish to use this plan. Can I heat the wire by a frictional machine operated by hand? A. Not without considerable expense and large apparatus; besides, they are never free from danger. 2. As I wish to be able to heat the wire in a few moments at any time, I think a magneto-electric machine would be the thing. Economy of space is very important. What are the required dimensions for such a machine? Which method of developing the current will occupy the least space? A. You might use a magneto-electric machine, but we think a small battery would answer your purpose better, such as a Smee, with carbon plates about 10x12 inches. 3. What is the very smallest surface of zinc that will heat the wire? A. About 500 or 600 square inches. 4. How small a magnet and armature revolved by hand will answer the purpose? A. About two feet, and an armature containing about fifty yards of wire; of course the temperature of the wire would depend upon the number of revolutions per minute made by the armature.

R. W. C. asks: 1. What size are toy balloons? A. About 6 inches in diameter. 2. How many pounds will one that contains one cubic foot of hydrogen raise from the ground? A. About 495 grains, supposing the india rubber to have no appreciable weight. 3. How often must they be replenished, if at all? A. There is no rule. It depends upon the rate at which diffusion takes place through the india rubber film. 4. Which is the cheapest way of preparing pure hydrogen, and what is the proportionate yield? A. From zinc and dilute oil of vitriol. Sixty-five pounds of zinc should yield two pounds of hydrogen.

O. O. O. asks: How can I make ordinary exploding powder to hiss or burn slowly? A. Mix powdered charcoal with it.

C. T. asks: How can I clarify beer? A. Take isinglass, finely shredded, 1 lb, sour beer, cider, or vinegar 3 or 4 pints; macerate together till the isinglass swells, and add more of the sour liquid until a gallon has been used. Strain and further dilute. A pound of good isinglass should make 12 gallons finings, and 1½ pints finings is enough to clear a barrel of beer.

W. N. J. says: A certain philosopher states that "the moon has either no atmosphere at all, or one exceedingly rare, and not extending more than a mile from its surface. Hence it must be destitute of water, for any liquid on its surface would long since have been dissipated by the heat of the lunar days, there being no atmospheric pressure to check evaporation. If there were any water on the surface of the moon, clouds would certainly be observed at times dimming its face." 1. I ask for information through the SCIENTIFIC AMERICAN. Supposing water in the shape of lakes to exist on the surface of the moon, how could evaporation take place, and clouds float, to dim the moon's surface, if there were not an atmosphere having a certain pressure through which vapor could rise and form clouds? A. The elastic force of a vapor which saturates a space containing air or gas is the same as in a vacuum. 2. Does evaporation check by atmospheric pressure, or does this pressure assist evaporation? If the moon has no atmosphere, and water exists to a considerable amount, it would certainly not be dissipated, but heaped up mountain high by the expansion of particles during a day of three hundred hours of intense solar heat, and then subside again during the following long night, and of course escape detection by the closest observers. A. The rapidity of evaporation is inversely as the pressure upon the surface of the evaporating liquid, that is, pressure diminishes evaporation.

P. R.—B.'s cheap telescope, described in No. 1, vol. 30 of the SCIENTIFIC AMERICAN, is an interesting experiment. You had better buy an achromatic objective, if you can afford it; if not, save your eyesight and money.

F. asks: 1. Of what diameter ought a double acting force pump to be for a 2 inch supply pipe? A. Four inches. 2. Should the discharge pipe be of the same diameter as the supply pipe? A. Yes. 3. Must the air chamber of a pump stand upright if the pump be placed at an angle? A. Yes.

E. P. F. asks: 1. If a globe made of sheet metal, 10 feet in diameter, weighs when full of air 1,000 lbs, how much less would it weigh after exhausting the air so to form a perfect vacuum? A. About 40 lbs. 2. What outside pressure would it have to sustain after the air was exhausted? A. 14·7 lbs. per square inch of surface, or about 650,000 lbs. in all.

L. D. says: 1. The balls we have been using in a ball mill are of cast iron, and weigh on an average 2½ lbs. each, diameter being 5/8 inches. What should be the weight of a solid ball of cast iron of that size? A. About 2½ lbs. 2. Is there any difference in the weights of steel and cast iron balls of the same dimensions? A. The steel ball would be about 2 lbs. heavier. 3. Is a life of Robert Fulton published in the United States? A. There are several works on this subject. See our advertising columns for booksellers' addresses.

S. R. asks: How can I cut window glass to an oval shape? I have a glass cutter, but find it will not cut without several failures, breaking plenty of glass. A. Use a good diamond.

D. asks: What will be the volume of steam at atmospheric pressure, evolved in the conversion of any given volume of water, and what the volume of oxygen and hydrogen at same pressure, evolved in the decomposition of the same quantity of water? A. Supposing that a cubic foot of distilled water at 212° Fah. is converted into steam, and also decomposed into its constituent gases at the same temperature: The volume of the steam formed from this water will be 1,572 cubic feet; the volume of oxygen, 813 cubic feet; the volume of hydrogen, 1,621 feet.

J. E. asks: I saw in your journal a description of a wonder camera; and I have been endeavoring to make one, using an opera glass objective of about 7 inches focus and 1¾ inches diameter for a lens, and an argand gas burner. It will throw upon the screen an ordinary card photograph of about 3 feet high pretty fairly, but the image is not distinct enough. What kind of lens and of what size and focus should I use to obtain the best results with an argand gas burner? Will such a burner give light enough, with a proper lens, to make a clear, distinct picture on the screen 5 feet in high? A. Lantern objectives and condensing lenses are described in back numbers of the SCIENTIFIC AMERICAN. Place a number of burners in a straight line, one behind the other, as flame is nearly transparent.

S. N. M. asks: What astronomers have observed any solar eruptions, having an upward velocity of 600 miles a second? When were such observations made? I suppose that 166 miles a second (Professor C. A. Young's statement) is the greatest observed velocity. A. The observations of Professor C. A. Young, September 7, 1871, indicate more than this velocity. At each explosion we see an eruption of hydrogen. Masses of other metals may precede or accompany it, in a semi-liquid or gaseous condition. They are not seen in the spectroscope while we look at one of the hydogen lines with a wide slit.

A. F. C. says: I have a 3 inch achromatic telescope of 48 inches focus; and with the Huyghenian eyepiece I get a power of about 120. How high a power will it stand, and how must I construct the eyepiece? A. Probably 200. Then 48 inches ÷ 200 = 0·24 inch = equivalent focus of eyepiece. Focus of field lens will be twice this, or 0·48 inch. Focus of eye lens will be one third of focus of field lens, or 0·16 inch, and the two plano-convex lenses will be 0·48 − 0·16 = 0·32 inch apart.

I. G. W. asks: 1. I have an achromatic object glass 2 inches in diameter and 36 inches focus. Of what focus and what distance apart should the eye lenses be to obtain the strongest power compatible with distinct vision for a celestial eyepiece? A. Field lens, of three fifths of an inch focus. Eye lens, one fifth of an inch focus. Distance apart, two fifths of an inch. Equivalent focus, three tenths of an inch. Power, 120. 2. What additional lenses, and what distance apart would it be necessary to add to make a terrestrial eyepiece? A. Two Huyghenian eyepieces make a good terrestrial one. The lowest power is placed about twice the sum of the equivalent foci of the two eyepieces in front of the other. 3. In your answer to N. B in your issue of May 9, you mention the two eye lenses as being respectively ¼ and ⅛ inch focus, and the ⅛ in its own focal distance within the focus of the other, and further say they will be ⅛ inch apart. Is this an error, or should the measurement be from the glass instead of the focus? A. In our reply to N. B. May 9, we should have written "eye lens, ¼ inch focus," as is evident from the context.

A. P. W. asks: 1. Can the vapors of coal oil be condensed by cold water? A. The vapors of coal oil can be condensed by passing them through a tube surrounded by cold water. 2. What kinds of gases are used in gas engines? A. Common illuminating gas mixed with air has been used in gas engines. The mixture is ignited by an electric spark. Some of the hydrogen formed by the ignition united with oxygen of the air, forming water; this produces heat, which expands the gases and drives a piston.

W. M. B. says: I want to paint a disk, 2 feet in diameter, with the seven prismatic colors, in such a manner as to make the surface appear white when I revolve it fast. What proportion of each color must I use? How shall I divide the disk in a proper manner? A. Divide the circumference of your disk into 6 equal parts. Then draw radial lines from the center to each of the 6 points. In the center of the disk, paint a round black spot about 3 or 4 inches in diameter; also paint a narrow black rim on the edge of the disk. In each of the six spaces formed by the radial line, paint the seven prismatic colors; you will thus have six spectra. In a spectrum, the orange occupies the least extent; if, therefore, you make this the unit, the extent occupied by the colors will have the following relation: Violet 4·16, indigo 2·40, blue 2·50, green 2·87, yellow 1·08, orange 1·00, red 3·33.

D. I. F. asks: 1. What is best to kill the effects of nitric acid on the teeth, so as not to hurt the enamel? I have been using said acid on my tongue. A. When the enamel is gone, the dentine is rapidly affected by the secretions of the mouth, especially when the system is not in a healthy condition. Soda is too powerful in its alkaline reaction. Repeated gentle rubbing with a soft brush and a harmless dentrifice like precipitated chalk would be better. 2. How can I detect cider which is not made from apples? A. If you suspect that it is made from oil of vitriol, the latter may be detected, with proper precautions, by chloride of barium.

B. M. K. Jr. says: 1. I constructed a telescope according to the plan given on p. 7, vol. 30, of the SCIENTIFIC AMERICAN. For the object glass I have a meniscus of elliptical form, 1½ by 1⅝ inches in diameter and 3½ feet in focus. The eye glass is a plano-convex lens of 1½ inches in diameter and 1 inch in focus. So far I have failed to produce a perfect object. There is a great deal of prismatic color, and the rays of light seem to produce different foci. What do you think is the matter? A. An elliptical lens cannot be properly figured; besides, your objective is not achromatic. 2. As the hole in the tube is circular, does it make any difference of what form the object lens is? A. A diaphragm which cuts off any part of the aperture of an object glass reduces the amount of light passing through it. 3. Can you tell me how to polish a lens that has become scratched? A. To polish a lens, turn a wooden disk with a broad bandle to the proper curvature; paint the disk with a mixture of pitch and rosin just dented by the thumb nail when cool. Cut grooves across the pitch, dividing it into one inch squares with diagonal grooves across the squares. Warm, and press quickly on the lens with a piece of paper between them. Wash off adhering paper if necessary. Then coat with moist rouge and rub the lens with hypocycloidal polishing strokes while walking round it. Five minutes rubbing will suffice to destroy the figure of any object glass. Herr Steinheil showed us a scratch on a two inch lens which he said would take the workman half an hour to polish out. 4. Will the so-called furniture polish spoil the varnish on a piano forte? A. No.

C. K. asks: 1. Of what could I make a box, to keep matches on a sheet iron mantle from catching fire? A. Of some poor conductor, such as china, porcelain, glass, plaster of Paris, etc. 2. What is the specific gravity of a piece of elmwood weighing 2 ounces, with a piece of lead attached to it weighing 4 ounces, and how can I find the specific gravity? A. The specific gravity of your piece of elmwood can be found by the following equation: Specific gravity $= \frac{2}{6 + (x + 36)}$, where x equals the sum of the weights of the wood and lead in water. 3. Why is it that some lenses show objects upside down? A. Because their action on light is to bring its rays to a focal point where they cross each other, and for this reason the image appears inverted. 4. How can I make a good battery? A. See p. 379, vol. 30.

S. T. asks: How can I bore a journal box to fit a V-shaped journal, and have it quite true, so that it will be exactly the same angle in each half of the box, and one angle true with the other? Are there any special machines for such purposes? Having only a compound rest lathe, the box must be chucked twice, and cannot be set quite true. A. There are no special tools for such a purpose, but your lathe will answer the purpose by the following method: Set the head of the compound rest to the required angle and bore out the front end of the journal box. Then cross the belt of the lathe so that it will run backwards. Use a tool bent round to the right and bore the back half of the box from the right hand side of the box (that is, the opposite side from which the front end was bored), by which method of procedure the box will only require one chucking and is certain to be quite true. Another method is to turn the tool upside down without crossing the lathe belt, and turn the back end of the box from the right hand side as before, but this renders the tool more liable to spring and jar; the first method is therefore preferable, but the rest requires in either case no alteration of its angle to perform the duty on both angles.

H. P. says: I have a cedar tank for rain water for washing purposes, and the water is foul, smelling principally of cedar, mixed with stale or stagnant smells. What shall I do to renovate it? A. We have seen the following recommended: Sprinkle a tablespoonful of powdered alum in a hogshead of water, stirring the water at the same time, then let the water stand for a few hours. If, upon trial, this should not be satisfactory, let us know what results you do obtain, and a method suited to the requirements of this case will be recommended.

J. A. asks: Can you tell me of any preparation (except bismuth and rose water) that can be used for whitening a clown's face, and which will not be injurious? A. We do not know of any that will answer as well.

C. P. says: I am a manufacturer of paper goods and use many different knives. Can you favor me with a recipe for a mixture that I can apply to the interior of the knives that will cause the paper to leave them freely, and yet not soil the paper? A. We have applied to a number of paper houses but find that they use nothing for this purpose. You had better apply to some practical chemist.

J. N. H. asks: 1. Can you give a recipe for making white ink to write on colored paper with a steel pen? A. One part muriatic acid and twenty parts starch water. Very dilute oxalic acid may also be used. 2. How are rubber hand stamps made? A. A number of manufacturers have been visited, and they all decline to explain their processes.

O. C. K. asks: Can you give me a recipe for a wash, to be applied externally to the skin, to keep mosquitoes away? A. Make an extract of pennyroyal, by boiling in a limited quantity of water for a short time, and when cool add a small quantity of glycerin. We do not know of anything that will remove tattoo marks without injuring the skin.

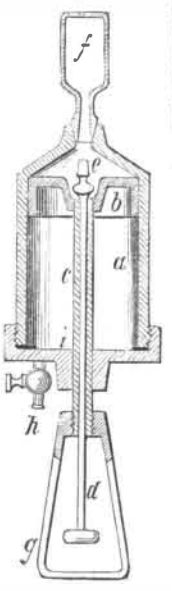
W. F. asks: How can I make the adhesive fly paper? A. A mixture of molasses and linseed oil will answer.

R. K. asks: Can you give me a good shape of furnace for heating locomotive springs to reset and temper them? A. Make a brick furnace somewhat longer than the spring plates, with the blast entering at the bottom, and the chimney having communication with each end of the furnace. Make coke (for use in the furnace) by banking up coal on a blacksmith's fire and burning the gas out of it, which coke will give you a clear fire in your furnace. The top of the furnace may be made to remove, so as to set thereon a tank of oil for tempering the plates.

J. S. H. asks: 1. What is a cheap, simple, and speedy method of utilizing bones on the farm as manure? A. The following plan has been suggested for utilizing bones: Place them in a large kettle filled with ashes, with about one peck of lime to a barrel of bones. Cover with water and boil. After twenty-four hours, nearly all the bones will be soft enough to be pulverized by hand. The rest may have to be boiled ten or twelve hours longer. When pulverized they will be in the form of paste, and suitable to mix with other manure. 2. What is a good process for converting molasses into vinegar? A. Vinegar may be made by mixing 16 parts of pure water, 1 part of sirup of molasses, and 1 part of baker's yeast at a temperature of about 80° Fah., and keeping the compound in a warm atmosphere from ten to thirty days. A little old vinegar added on the second or third day will aid the process.

C. J. M. asks: What will make and keep rain water sweet in a clean wooden cistern? I put one bushel of charcoal in each cistern, but it does not sweeten the water. If charcoal is good, how much and how often should it be renewed? A. If your cistern is clean, and the water also when it goes into the cistern, the impurity is due to the vegetable matter taken up from the wood of the cistern. If you use charcoal to purify it, the best way will be to filter the water through it. Alum is a more effectual agent for purifying the water. A drachm of pounded alum to a gallon of water is sufficient. After twenty-four hours the water will be cleansed. All wooden vessels to hold water should be charred inside.

A correspondent says, in reply to W. C. L., who asked in our issue of June 13, how to procure a vacuum in a common bottle: "I would suggest the enclosed plan, a modification of which I have used. Let *a* represent a cylinder, *b* a piston, *c* a hollow piston rod, *d* a sliding rod for holding stopper, *e* a stopper, *f* a bottle, *g* a stirrup for withdrawing piston, *h* a discharge cock, *i* a cap which screws on to the cylinder. The mode of operation is as follows: Remove the cap, *i*, and fill the cylinder with water, replace the cap (which should be packed with rubber) and, while in this position, withdraw the piston until water appears all around it on the opposite side; also open the cock, *h*, and allow all air to escape. The apparatus should then be reversed, and placed upon a bracket for convenience in operation, and the space over the piston should be filled to overflowing. The bottle may then be filled and the stopper dropped in and pressed tight enough to keep its place when reversed. The stopper should be ground, as also the bottle, to fit their places. The bottle is then inserted in the cylinder, expelling the surplus water as it enters: and when firmly set, the stopper may be withdrawn by the sliding rod, *d*, which has a recess at the end to fit it. Now the piston may be withdrawn as quickly as convenient, the cock, *h*, being opened until the water has all left the bottle, when the stopper may be inserted by the rod, *d*, and the bottle removed. Solids may be introduced during this operation, and fluids at any time. The success will depend upon the scientific and mechanical accuracy of the operator, as the air must be expelled from the water, and care in manipulating must otherwise keep it out."



H. writes to corroborate I. F. B.'s statement concerning the water in the Humboldt and other valleys of Nevada being of a uniform level at various points in the valley, and that, if the streams were straightened and the level lowered by drainage, the frosts and damp and chilly nights would disappear, and farming be much more successful. "I have often observed the same fact in every portion of Nevada and in some parts of California; while here in Montana, we find that the water is never found lower than our streams, rising and falling with them, and in no month of the year can we be sure that we will not have frost. My experience, however, would lead me to differ from him very materially as to the cause and use of different means for the protection of vegetable life. I claim that the air is too dry. It allows the heat from the land to radiate into space with very little or no resistance. I think that I. F. B. will bear me out in this, that we are more liable to have severe frosts after a hot, dry day than after a cold and damp one, and more liable in a clear, still night than a cloudy or windy one. I have suffered intensely from heat two hours before sundown in some of those Nevada valleys, while two hours after it I was suffering just as much from cold. The air was very dry, allowing the heat of the sun to pass through it without resistance, and making the earth very hot; and when the supply was cut off, it would return with equal rapidity over the same free road. I think this is in accordance with Professor Tyndall's thorough and carefully conducted experiments on the subject (See Lecture IX, p. 373, of his work, "Heat as a Mode of Motion"), and I think that he gives us the true theory of frosts in the same work, p. 418. I would say it is the custom here when we anticipate a frost to irrigate or run the water quickly over the surface if possible. I have frequently saved my garden from frost when everything was cut down more or less around it, and that under circumstances that cannot all be accounted for in any other way than that the vapor rising forms a mantle or covering, preventing rapid radiation and thus saving the plants. There are many of your western readers that are deeply interested in this question. Agriculture in the mountains is fast becoming an important industry, and our great banes are early and late frosts. Perhaps some other readers could throw additional light upon the subject."

S. P. says, in answer to S. C. H., who wishes to mount a drawing on a paper background, and then varnish the surface: Paste the drawing on the background. Flour paste is as good as any; and when it is dry, size the surface with a solution of gum arabic or white glue. When that is dry, use any varnish you please. For a delicate picture or drawing, dammar varnish is the best; but it must be applied rapidly to secure an even surface.

M. R. H. asks: How can I render hard, and unaffected by heat, beechwood lasts which are daily subjected to 12 hours dry heat at a temperature of 290° Fah.? Common wooden lasts, undergoing this treatment, in a few months become dry and almost charred the edges break off and they are unfit for use.—C. L. asks: What is the best way to can green corn and green peas?—H. J. asks: Is animal life visible, by the use of the microscope, in the water from hot springs as well as in cold water?—A. E. R. asks: 1. How can I cover the glazing on potter's ware with silver or mercury, so as to make it a reflector of light? 2. Of what is the ash which remains after lead has been heated above melting point for about twelve hours composed?—H. D. M. asks: How can I apply paraffin to make canvas waterproof? What shall I put in the paraffin to make it of a dark color?—S. C. H. asks: How can I prepare mocking birds' food?—J. A. J. asks: How can I make an aquarium?—W. E. L. asks: How can I line iron water tanks, to prevent rust in the water?—G. O. C. asks: How can I remove the blue color from polished steel?—H. D. M. asks: How can I clean petroleum barrels, so as to make them fit for holding cider, etc.?

COMMUNICATIONS RECEIVED.

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

On Feathered Arrow Heads. By F. E. M

On Aerial Navigation. By G. W. M.

Also enquiries and answers from the following:

O. D. O.—E. T.—M. P.—C. S.—G. J.—W. C. L. G.—J. M G. B. A.—E. P. W.—A. W. H.—O. S —J. B.

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 enquiries analogous to the following are sent: "Please to inform me where I can buy sheet lead, and the price? Where can I purchase a good brick machine? Whose steam engine and boiler would you recommend? Which churn is considered the best? Who makes the best mucilage? Where can I buy the best style of windmills?" All such personal enquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

[OFFICIAL.]

Index of Inventions

FOR WHICH

Letters Patent of the United States

WERE GRANTED IN THE WEEK ENDING

June 30, 1874,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

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