Business and Personal.

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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 ¼ 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 barrevolves 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.