J. C.'s query as to a boiler in the shape of a half moon, and E.P. J.'s, as to a vacuum, are incomprehensible.—J. C. H. can remedy the dampness of the walls by using the waterproof glue described on p. 8, vol. 25.—N. V. H. will find directions for gilding picture frames on p. 90, vol. 30.—L. D. is informed that we reprinted the recipe for mending rubber boots on p. 208, vol. 30. Figured fabrics fade in washing because they are not printed in fast colors.—H. K. Jr. will find the needed information as to the weight of flywheels on pp. 177, 288, vol. 28.—R. M. H. will find a description of making ice by means of heat on p. 248, vol. 30.—H. D. O. will find a recipe for aquarium cement on p. 202, vol. 28. Water colors are finely powdered pigments made into cakes with wax.—C. & A. will find full descriptions of nickel plating on pp. 187, 378, vol. 28.

J. W. Z. asks: How can I preserve eggs? A. Eggs may be preserved for any length of time by excluding them from the air. One of the cleanest and easiest methods of doing this is to pack them with the small end downward in clean dry salt in barrels or tubs, and to place them in a cool and dry situation.

G. F. P. asks: 1. Why does paint in Rockport, Texas, change color, white paint turning almost black in patches? A. The effects mentioned are such as would be produced by the presence of sulphuretted hydrogen gas, and it would be well to investigate the sewerage and drainage facilities, and any spots where decaying and putrescible matters might accumulate, in order to determine whether there are any sources of this deleterious gas. 2. Are chromos printed on cloth as well as on paper, and are they not more valuable? Are not the best printed on cloth? A. The best chromos are printed on cloth, which is more durable than paper.

S. V. C. asks: Is aluminum non-magnetic? Would its presence by indicated by a deflection of the needle? A. Aluminum is non-magnetic.

O. A. F. asks: Which kind of prussiate of potash, white or yellow, did H. J. B. use in making his explosive powder? What kind of sugar is necessary? A. The ingredients are yellow prussiate of potash and ordinary white cane sugar. They must be thoroughly mixed together in a dry state.

Q. V. asks: 1. How can I make good silver ink? A. Nitrate of silver, 11 parts; distilled water, 85 parts; powdered gum arabic, 20 parts; carbonate of soda, 22 parts; solution of ammonia, 30 parts. Dissolve the carbonate of soda, and afterwards the gum (by trituration in a mortar) in the water, dissolve the nitrate of silver in the ammonia and add to the carbonate of soda solution. Heat gently to the boiling point; the ink, at first turbid, becomes clear and very dark. 2. What are decarbonized and Damascus steel? A. Damascus steel is steel made from an ore consisting of magnetic oxide of iron and silica, by the use of charcoal furnaces. The name is also applied to imitations of the original Damascus steel. Decarbonized steel is steel from which a portion of the combined carbon has been removed. 3. Is a breech-loading or a muzzle-loading shot gun the safer? A. Both are dangerous in the hands of careless people, and may be safely used with cautious handling.

J. L. S. asks: 1. Where can full and complete information respecting the grinding, polishing, and mounting of specula be obtained? A. We reiterate that Professor Draper's treatise affords the most available information on the construction of specula. John Browning's pamphlet illustrates the method of mounting them. 2. Has Professor Henry Draper improved his processes for the construction of glass specula since the publication of Vol. XIV., 1864, of the Smithsonian contributions for the diffusion of knowledge? A. No. 3. What is the method at present pursued by With, of Hereford, in the construction of silvered glass specula for Browning's telescopes? A. Extra thick glass is used to avoid flexure, and imperfect mirrors are repolished. 4. Of all the methods devised for the construction of specula, which produces the best results in the shortest time? A. The machine for local corrections (Draper, p. 24).

O. C. asks: 1. Why is it that people talk and write so much about the impossibility of the sun being a body of combustible material in a state of intense heat, alleging that, if such were a fact, it would long ere this have been consumed and have left a blank in space? There is no such thing as destructible matter, as this allegation would seem to imply, combustion being nothing more or less than the change of matter from one form to another without destroying one particle of it. A. The sun is really a combustible body, slowly burning, but its condensation supplies more heat. The oxygen and hydrogen, which will in time form the solar oceans, are dissociated by its high temperature. Eruptions throw these gases into the cooler chromosphere, they burn, and, forming water, show us steam lines in the spectroscope. 2. As the attraction of the sun is sufficient to hold all this matter within its limits, how can this destruction of the sun take place? A. A velocity of 380 miles per second is sufficient to carry ejected material clear of the sun's attraction. The observed velocity of projection is 500 miles. Stars, therefore, are in constant interchange of missiles.

J. A. asks: 1. What is the formula for finding the area of a lune when the width of the lune and the respective diameters of the two curves forming the lune are given? A. Draw the chord corresponding to the two arcs of the lune; then multiply half of each arc by its radius, and subtract the least product (the area of the least circular sector) from the greatest. The remainder is the area of the lune. 2. Can you tell me of some of the double stars? A. A few double stars are: *Gamma Leonis*, orange and green yellow; *Delta Corvi*, yellow and purple; *Gamma Virginis*, white and yellow; *Zeta Ursæ Majoris*, white and green; *Iota Bootis*, triple; *Pi Bootis; Epsilon Bootis; Xi Bootis*, orange and purple; *Mu Bootis*, yellow and lilac; *Delta Serpentis, Zeta Coronæ*, white and blue; *Epsilon Lyræ*, multiple; *Beta Cygni*, yellow and blue. All double stars, nebulæ, and clusters are marked in Proctor's "Atlas," price $2.50.

N. B. says: 1. I have a 2 inches achromatic object glass of 30 inches focus, with which I wish to construct a telescope. What size of eyepiece, and of what focus, should I use? What power would such a glass have? A. Use a Huyghenian, or negative eyepiece, field lens about half an inch diameter, ¾ inch focus, the eye lens ¼ inch diameter and ½ inch focus, both lenses plano-convex, plane side next the eye. The eye lens is placed its own focal length within the focus of the field lens, that is, they are half an inch apart. An equivalent single lens would be half the focus of the field lens or ⅜ inch focus; therefore 30 inches ÷ ⅜ inch = 80, the magnifying power of the eyepiece. 2. What is the difference (in construction) between a terrestrial and a celestial eyepiece for a telescope? A. The terrestrial eyepiece is provided with two additional lenses, to erect the image.

H. L. C. asks: Can I make a telescope, of sufficient power to show Jupiter's moons and Saturn's rings, with a double concave lens, 4 inches diameter and of 6 inches focus, and 1 meniscus lens, 4 inches in diameter and of 6 inches focus? I have a double concave lens, 2 inches in diameter and of 8 inches focus, and a meniscus of the same size and focus; they are from a magic lantern. I also have a double concave, ¾ inch in diameter and of 1¼ inches focus, and 1 double concave lens, ½ inch diameter and of 1 inch focus. Would these lenses do better for a telescope or for a microscope? A. Your lenses will not answer, if your description is correct. A tolerable two inch achromatic object glass costs $4.50, and a useful microscope, $6.00. Either would be preferable to a chance combination of cheap lenses.

O. B. asks: 1. What advantage, if any, have the rotary engines over the ordinary piston engine, and why are they not in more general use? What is the principal objection to them? A. We have seen no accounts of thorough tests of rotary engines, and therefore cannot give a decided opinion upon their advantages. 2. Suppose the wheel of a rotary engine to have ¾ of a square inch effective pressure, and its mean distance from center of shaft to be 1¾ inches, it being under continual pressure; how will it compare with a piston engine having the same area of piston and a stroke of 3½ inches under the same amount of pressure, making the same number of revolutions? Would such an engine be worth bothering one's brain over provided that, for cheapness of construction, simplicity, and durability, it will compare favorably with the piston engine now in use? A. If you can build such an engine, it will be worth your while to experiment. 3. How will gas do as a substitute for steam in experimenting on a small scale? A. It is used in several forms of engines.

E. F. M. asks: I. How can I protect iron which is continually in salt water from dirt and barnacles? I have tried several paints now in market, but find that they all fail to keep the iron or wood free. A. The paint must be constantly renewed. 2. How can pitch or tar be reduced so as to make a paint, to be used cold? A. With turpentine, we believe. 3. How can I reduce copper to the fineness of flour? Can it be done with acids? A. By heating the copper in an atmosphere of hydrogen. 4. Is the *Science Record* composed of the copies of the SCIENTIFIC AMERICAN? A. No. 5. How much will it cost to have 1 year's copy of the SCIENTIFIC AMERICAN bound? A. In one volume, $2; in two volumes, $3.

J. H. P. asks: Can air brakes be applied to a train of cars if the engine is loose, or can they be applied without the power of the engine? A. In some arrangements they can only be applied from the engine; in others, they can be managed on each car, independently of all the rest.

C. A. J. says: I have a cellar about six feet deep that I cannot keep the water out of, and I wish you to tell me how and with what I can cement it to keep it dry. The cellar is dug in stiffred clay, is walled up with brick 9 inch wall, laid in Louisville, Ky., cement; the floor had cement spread upon it an inch thick, with one course of brick laid upon it, and then well grouted with cement. A. The reason the water is forced into your cellar, notwithstanding the extraordinary precautions you have taken to prevent it, is because of the exterior pressure the former is subjected to, in being confined in the clay surrounding their foundations and rising around the house to a head equal to the depth of the cellar. If you remove this pressure and point up the breaks, you are very likely to overcome the difficulty To do this, excavate a trench outside the walls, down as deep as the foundations will allow without undermining them, and fill in with stone of all sizes up to 18 inches diameter for about 2 feet in depth and 18 inches out from the house; then refill with the earth excavated, taking the precaution to place gravel or small stones against the wall all the way up for a few inches out. Now, from this lower deposit of stone, provide one or more drains leading away from the house and discharging at a lower level. These drains may be also made of stone like the one around the house, and to prevent their being filled up with dirt some straw or carpenter's shavings may be laid over the stones. In this manner the outward pressure may be removed; and if, when the trench is open, a coat of cement be put on the outside of the foundations in addition, then the prospect of a dry cellar may be reasonably indulged.

A. B. F. asks: How many cubic feet of water displacement does the United States government allow per tun for river steamboats, and for sailing vessels? A. About 36 feet.

O. N. E. asks: 1. What is the best battery for silver plating? A. Daniell's constant battery is a good one. 2. How can an old broken graphite crucible be made over into a new one? A. Powder fine, mix with water into a paste, mold, and dry or bake. 3. How can commercial zinc be purified so as to make suitable zincs for a battery? A. Zinc can be purified by distillation. 4. How much pure silver by weight is there in the United States dollar? A. A silver dollar weighs 412½ grains, and contains 900 parts of pure silver in 1,000; therefore $\frac{9}{10}$ of 412½ grains will give the pure silver by weight in a dollar = 371¼ grains. As to your other question, send to D. Van Nostrand for a catalogue.

J. W. B. asks: How can I grind a double convex lens accurately round, with a bevel on each side, to fit any sized frame? It is now done by hand. Can it be done by machine? A. Yes, by an iron wheel fed with sand and water, or a traversing emery wheel. Glass disks are cut out by a rotating vertical metal tube, fed with emery and water.

J. K. says: It is generally considered by scientific men that the sun is a body which emits heat as well as light. Now if the sun is a hot body, why are not the upper strata of the atmosphere heated to a higher degree of temperature than near the surface of the earth? According to the laws of heat, it decreases as the square of the distance increases: and by this law the upper strata of the atmosphere would be warmer than near the earth, which we know is not the case. Again, the annual mean average temperature of the earth in the warmest parts is 90°. The earth is 93,000,000 miles, and Mercury 88,000,00) miles from the sun. The square of the earth's distance is more than six times that of Mercury, nearly 6¾ times, which would make the temperature of Mercury 607·5°. It seems to me that Mercury must be in a state of fusion. I would like to know why it is colder as we ascend above the sea level for a distance of five miles, if the sun is a hot body? Is not the heat which we derive from the sun caused by friction of the rays of light passing through our atmosphere? A. The sun's rays are hotter at great elevations, but they pass through the air without warming it until absorbed and radiated from the surface. The aqueous vapor acts as hot house glass, preventing radiation.

M. J. T.—In reply to the answer given to W. M. W., which was to the effect that the end of the siphon that discharges the liquid should be on a lower level than the end into which it is drawn, M. J. T. says: "I have always supposed that a siphon would draw water to a level with the shortest leg. I don't see that it makes any difference which is the longest, or whether they are both of a length (or on a level). A. M. T. J. is substantially correct. The liquid will run so long as the discharge end of the siphon is below the level of the liquid.

W. R. B. asks: How is danger to the eye by burning prevented in looking at the sun with a powerful telescope? The eyepiece sun glass will not prevent the heat. Is it done by a diaphragm over the object glass, or how? Of what kind of glass is the sun glass made? Could not a large non-achromatic lens be connected by a small over-corrected lens placed near the focus of the large lens? A. A solar eyepiece may be made thus: Attach a short tube, which fits your eyepiece, at right angles to another which fits the eyepiece tube. Place a 1 inch plano-convex lens so that the center of the plane side forms an angle of 45° with the center of either tube. Ten per cent of the solar light and heat will then be reflected up to the eyepiece, and 90 per cent will pass out of the lens. A diaphragm over the objective may be used. Two sun glasses should be used together, a claret and a green one. The sun's image may be received upon a white sheet of paper with the full aperture.

J. M. D. says: 1. We find in Ray's "Astronomy," Chapter V: "If we would use a higher magnifying power, we must find some way to increase the light; in the telescope this is done by enlarging the object glass." In constructing a cheap home made telescope would not a cosmorama lens, 5 inches in diameter and of 72 inches focus, be a higher magnifying power and give more satisfaction for astronomical purposes than an achromatic lens 2 inches in diameter and of 30 inches focus? A. No, unless it were 90 feet focus. It would then bear a power of 190 only. 2. What is spherical aberration? A. Each zone of a spherical lens has a different focal plane, the outer zones having the shortest focus. 3. Is the sewing machine an American or an English invention? A. American. Howe took his first machine to London.

X. X. O. asks: Can you tell me of any combinations of chemicals that will remove the reddish cast of hemlock sole leather and give it the appearance of oak tanning? A. Try a neutral solution of perchloride of iron.

R. H. W. A. asks: 1. Can I use foil from chewing tobacco for coating a Leyden jar? A. Yes. 2. Please me a recipe for a cement for fastening glass to metal. A. Metals may be made to adhere to glass by a cement composed of powdered litharge 2 parts, white lead 1 part, boiled linseed oil 3 parts, mixed with 1 part of copal varnish to a thick paste.