A. B. E. L. will find directions for making vinegar on p. 58, vol. 30. Eggs can be preserved by the process described on this page. This also answers L.—G. M. will find a recipe for dyeing silk black on p. 89, vol. 26.—H. C. H. can tin cast iron by the process detailed on p. 212, vol. 26.—J. B. E should try a quick drying oil paint for his varnished thread.—J. F. should read our article on p. 64, vol. 30, on "Indicating Steam Engines."—A. R. and F. H. should address such queries to engine manufacturers.—C. M. can transfer engravings to metal by the process of transferring to wood, detailed on p. 198, vol. 30.—L. E. B. will find a description of a bone fertilizer on p. 198, vol. 29, and p. 148, vol 30. For mills see our advertising columns.—L. M., E. W. M., and C. H. F. will find the particulars of the offer of a premium for a car coupling by the German railway confederation on p. 162, vol. 29.—C. A. S. can mold rubber by following the directions on p. 283, vol. 29.—X. L. C. R. S. T. should send his name and address.—H. & B. will find a recipe for aquarium cement on p. 90, vol. 30.—R. F. will find directions for constructing a sun dial on p. 409, vol. 30. A sun dial shows solar time, which must be corrected for mean time by the fast and slow tables published in most almanacs.—H. B. B. will find directions for exterminating ants on p. 234, vol. 27.—G. E. F. should consult the booksellers who advertise in our columns.

M. E. T. asks: Is the force of the powder destroyed by putting tissue paper between the ball and the powder? A. No. 2. What is the *modus operandi* of loading a pistol and catching the ball in the teeth? A. A peculiarly constructed pistol is used. 3. Would an invention for coupling freight cars when standing on the top of the car be of use? A. There is always room for a valuable improvement in any department.

J. S. F. asks: Ought there to be any difference in the capacity for pulling between two locomotives, one having a 24 inch and the other a 20 inch stroke, the cylinders being of such diameters as to contain the same number of cubic inches, the valve motion in each being proportional to the stroke, but being alike in every other particular? A. Yes, if steam pressure, piston speed, and other particulars were the same in both engines.

J. S. asks: What is the best non-conductor of magnetism? A. An interval of space.

W. P. says: I have a boiler 24 feet × 42 inches. Water is supplied by an injector. I wish the water to go into the boiler hotter; it takes 50 lbs. of steam to keep up a supply of water. Would it be practicable to run the water from the injector through a coil into a heater, thence to the boiler, and would it require more steam, or would the heater aid the injector? A. Your injector cannot be in very good order, if it will not work with a lower pressure of steam. You do not send enough data to enable us to answer your question definitely. If the use of the heater causes additional back pressure in the engine, it will be a question, to be determined by experiment, whether the heater is economical or not.

J. H. K asks: How can I estimate the pressure of a column of water 26 feet high? A. Divide the head of water in feet by 2.8, and the result will be the pressure in the base in pounds per square inch.

W. C. S. asks: 1. In the bursting of a steam boiler, where the top of the boiler is thrown off, does all the water instantly flash into steam? If not, does the water that remains in the boiler instantly cool down to 212° when the pressure is removed? A. A large portion of it would suddenly be converted into steam, which might carry off the remaining water mechanically. 2. What is the temperature of water in a boiler working under average pressure? A. Between 300° and 350° Fah.

B. R. K. asks: Where and by whom was the first steamboat made? A. There are authentic accounts of experiments with small steam vessels in Europe, as far back as 1698. The first practical steamboat, on the authority of Mr. Woodcroft, was the Charlotte Dundas, built by Symington of England, in 1801. Regular steam navigation, that is, the running of a steamer regularly, carrying passengers and freight, was effected in America in 1807, by Fulton, and in England, in 1812, by Bell. You will find these facts, and many others of interest in this connection, impartially stated, and in general well authenticated, in Woodcroft's "Sketch of the Origin and Progress of Steam Navigation."

F. H. asks: Why is a common flat iron called a sad iron? A. Possibly from an old north of England word "sad," applied to anything heavy.

B. asks: How can spiral steel springs made of bars ½ an inch square be galvanized without destroying the temper? What would be the result of hardening the springs before galvanizing, and upon withdrawing them from the galvanizing bath and plunging them into cold water? Would this harden them if not previously hardened, the heat of the galvanizing tank being probably under 700° Fah.? Could the temper afterwards be drawn to the requisite point, and if so, by what process? A. We think the best plan would be to plate them by means of a battery.

B. W. asks: Can you inform me how Philadelphia ice cream is made, and why it is different from Boston ice cream? A. The difference is due to the fact that genuine Philadelphia ice cream is made ont of the purest and richest materials.

J. B. E. asks: How can I dye ivory and get a nice clear red color? A. Use bichloride of tin for the mordant. After having steeped the ivory in this a short time, immerse in a hot solution of Brazil wood or cochineal.

E. H. M. asks: How are toy balloons made? Are they of india rubber or gun cotton? A. The rubber bags are imported from Paris, and they are merely filled here with pure hydrogen.

E. L. asks: How can I prepare paraffin which melts at a temperature of from 95° to 100° Fah.? A. By removing in the course of the distillation those hydrocarbons of the paraffin series which have a lower melting point.

J. B. H. asks: 1. Is there any cure for hydrophobia? What is the best thing for a person to do when bitten by a mad dog? A. The victims are commonly treated by dosing with whisky. 2. What can I do with my dogs to prevent them from going mad? A. Tie stones around their necks and put them under water.

B. & S. say: We are running a 10 × 18 inches engine at 220 per minute, with a tubular boiler 12 feet long and 52 inches in diameter. The average pressure of steam by gage is 80 lbs. We take the steam from a cast dome with a safety valve on top; the orifice in boiler for dome is 5 inches in diameter, the steam supply being 2½ inches. The boiler foams very much, running mud and dirt through engine, cutting valve, valve seat, and cylinder rings out in a few days' run. One party says that if we put on a steam dome 24 inches in diameter and take steam from that, it will obviate the difficulty. Is this so? Another says that a surface blow-off will be all that is needed. A. You do not send quite enough data. It would seem, however, that the orifice in the boiler for the dome is too small. We think it quite probable that a larger dome, properly connected, would remedy the trouble to some degree. But we think it would be desirable for you to get a feed water heater (of which there are several in the market) that will remove the greater part of the dirt from the water before it goes into the boiler.

W. F. S. asks: Which is the best form, for accuracy, for the inside of a spirit level tube? Should it be a right line or a curved one? A. It is necessary that the tube should be curved.

E. W. S asks: Will you give me the philosophy of "blowing up"? If a person lies down on his back, upon the floor, holds himself perfectly stiff, crosses his hands so as to get his arms out of the way, and inhales all the air he possibly can: and three, four or more persons stand around him and at a given signal all raise their arms and take a full breath, then lower their arms, at the same time expelling all the air from their lungs upon the person lying upon the floor: with their index finger they can quickly raise him as far as they can reach. A. We think that the blowing up process is chiefly efficacious in making all the lifters act in unison It must be evident that if four persons lift a man, each one sustains about one fourth of the weight upon one finger; so that, if this weight is not perceptible, it would seem to be due to the imagination.

N. F. A. asks: What is the best for a person to read for general improvement? A. It would be well for you to get a reliable cyclopedia, which will be a very good work for you to read, for useful information You will find in it replies to most of your other questions, which are quite similar to many that have recently been answered in our columns.

S. H. asks: 1 What should I read besides the SCIENTIFIC AMERICAN in order to know what has been invented or discovered in any particular line? A. The patent records of different countries. 2. Is there a reward offered for plans to improve the mouth of the Mississippi? A. No. 3. Suppose that a pair of birds were placed so that they could not see other birds of their kind. Would such birds build nests like their parents? If so, what is the philosophy of such knowledge? A. They would. The philosophy of their action we cannot explain. 4. Can iron be melted by sun glasses? Why are not such glasses more in use for heating purposes? A. Yes, but it is not generally a convenient method. 5. What will prevent magnets from attracting iron? A. We do not know of anything. 6. Will magnets wear out? A. Yes.

C. S. A. asks: 1. Which is the stronger, wire rope or the same weight of iron made into a solid rod of the same length? A. The former. 2. Is there any substance that will make more gas, at a less cost, than ordinary blasting powder? What will make the most gas in the shortest time? A. These questions are too indefinite.

E. asks: Why are gunpowder engines not in general use? A. Gunpowder engines are too expensive to run to compete successfully with steam engines.

F. H. T. asks: Is there a substance (producedin making gas from coal) which is somewhat like lime and is composed in a great part of carbon? A. No. 2. Is there a process for plating steel on cast iron? A. We never heard of any.

J. H. A. asks: Is there any law that requires a man who runs a steam fire or stationary engine to have a certificate? A. There is no United States law. Most States, however have local laws on the subject.

F. C. S. asks: What examination must a person pass to get a license to run an engine? I have made the steam engine a study, and feel convinced that I could run one and take good care of it, but I hear that examiners often try to confuse young applicants. A. The laws vary somewhat in the different States. But so far as we know, the examination required for license to run a small engine relates principally to the care and management of the boiler.

P. S. S. asks: Is Cornell University a good school for mechanical engineers, and, all other things being equal, would it be more advantageous for me to go there and study for a mechanical engineer than to enter some first class machine shop? A. You will need instruction at such a school, and practice in the shops also. We think it would be well for you to take such a course first.

J. M. asks: Are there any high pressure engines on steamers running between Liverpool and New York city? A. No.

W. S. D. says: How can I make a glass globe into a globe mirror? A. Melt together 1 oz. clean lead and 1 oz. of fine tin in a clean iron ladle; then immediately add 1 oz. bismuth. Skim off the dross, remove the ladle from the fire, and before it sets add 10 ozs. quicksilver; now stir the whole carefully together taking care not to breathe over it, as the fumes of mercury are very pernicious. Pour this through an earthen pipe into the glass globe, which turn repeatedly round.

J. B. S. says: 1. I have a four inch whistle, which, when set at its highest pitch, does not give satisfaction. I propose to put a trumpet on it; of what material should it be made? Will galvanized iron do, or tin, if painted? A. Galvanized iron will answer, but the best material is brass. 2. Should the small end be closed? A. By all means close the small end. 3. How close around the whistle should it fit? A. If we fully understand your question, the closer the fit the higher will be the pitch.

H. P. asks: Why is it that pork shrinks from the bone when boiled, if it is killed in the decrease of the moon? A. This is a popular fallacy.

J. R. L. asks: Would it be practicable for an amateur tourist in a trip around the world to use to advantage photographic implements and materials, instead of sketching, for the purpose of securing pictures of the objects of interest and beauty he might meet? Would it require special care and arrangements to adapt such pictures to the stereoscope? A. There is a great number of amateurs, who travel to every part of the world and take excellent photo pictures, and that too with all their apparatus contained in a box no larger than a small valise.

R. A. asks: Is water an element in a scientific sense? If not, what combination is it? A. Water is a compound of two elements, oxygen and hydrogen, in the proportion of 8 parts by weight of oxygen to 1 part by weight of hydrogen.

W. D. S. asks: 1. How can I make the green and the gold lacquer with which they lacquer clocks, and how is it applied? A. For gold lacquer, take of seed lac 6 ozs., amber and gum guttæ, each, 2 ozs., extract of red sandal wood in water 24 grains, dragon's blood 60 grains, oriental saffron 36 grains pounded glass 4 ozs., pure alcohol 36 ozs. Grind the amber, the seed lac, gum guttæ, and dragon's blood on a porphyry; then mix them with the pounded glass, and add the alcohol (after forming with it an infusion) and extract of sandal wood. The varnish must then be completed as before; the metal articles are heated, and those which will admit of it are immersed in packets: the tint of the varnish may be varied by modifying the doses of the coloring substances. For green, use any green transparent vegetable color, mixed with the above. 2. With which cement can I mend glass ware? A. Use diamond cement. 3. What mixture can I use to stop cracks in walnut furniture? A. Take equal parts of beeswax and sealing wax and mix them by melting them together, or dissolve in alcohol. Color with umber. 4. How is the gilding done on toilet sets and on furniture? A. Use yellow shellac varnish in the desired pattern, upon which lay the gold leaf.

C. H. M. asks: Which is the healthiest State in the Union? A. That State in which the greatest regard is paid to religion, law, and education. In respect to physical advantages, most are in the first rank.

G. D. F. says: Water boils at the sea level at 212°. Here in Argenta, Montana Territory, it boils at 200°. Does the altitude affect the degree as marked on the thermometer, or is it the pressure of atmosphere only which affects the boiling? A. Water does not boil until the tension of the vapor formed by heating it is greater than the atmosphere's pressure. At the sea level, where the pressure of the atmosphere is about 15 lbs. per square inch, the water must be heated to 212° before its vapor has sufficient tension to overcome this pressure. At Argenta, where you are so much above the sea, and have a much less depth of atmosphere above you, the pressure is not so many pounds, and the boiling point is correspondingly lower.

H. W. G. says: 1. Please give me the analysis of crude carbolic acid or dead oil. A. Carbolic acid consists of 12 atoms of carbon, 6 atoms of hydrogen, and 2 atoms of oxygen. The less volatile portion of the fluids produced by distillation of coal tar contain considerable quantities of this substance. It may be extracted by agitation of the coal oils (boiling between 300° and 400°) with an alkaline solution. The latter, separated from the undissolved portion, contains the carbolic acid in the state of carbolate of the alkali. On addition of a mineral acid, the carbolic acid is liberated, and rises to the surface in the form of an oil. To obtain it dry, recourse must be had to digestion with chloride of calcium, followed by a new rectification. If required pure, only that portion must be received which boils at 370°. Commercial carbolic acid is generally very impure. Some specimens do not contain more than 50 per cent of acids soluble in strong solution of potash. The insoluble portion contains naphthaline, fluid hydrocarbons, and small portions of chinoline and lepidine. 2. Are there any fertilizing properties in it, and if so in what proportion? A. We have never heard of its use as a fertilizer.

J. J. asks: If there is any substance that can be used as a flux in melting iron, that will answer as a substitute for limestone? A. Other substances, like caustic soda or fluor spar, can be used, when certain objects are to be obtained.

L. H. says: On p. 267, vol. 20, one per cent of carbolic acid is recommended for removing green moss from brown stone stoops. How much is that to a quart of water? I have a house with white marble stoop, sills, etc. Will the above remove the discolorations, also the iron rust? A. Seventy-five grains to a quart. It will partly remove the discolorations but not the iron rust.