Business and Personal.

The Charge for Insertion under this head is $1 a Line.

G. X. D. will find directions for removing stains from cloth on p. 171, vol. 30.—C. N. F. will find directions for preparing sumach on p. 71, vol. 30.—G. F. will find a recipe for printer's ink on p. 154, vol. 30, and directions for galvanizing sheet iron on p. 59, vol. 24.—M. W. C. will find a recipe for gelatin (isinglass) cement on p. 27, vol. 30, and for cleaning brass on p. 102, vol. 25.

J. S. asks: How small a circle can a small locomotive turn on without causing friction enough to overcome the power of 2 one inch cylinders? The driving wheels are 4 inches in diameter and 6 inches between each driver from center to center, and 14 inches from the back driver to the forward truck wheel. The truck wheels are 4 inches from center to center. A. It will depend upon the play of the wheels on the track. You can strike arcs with different radii, and determine the question after a few trials. By making the intermediate wheels without flanges, you can turn the locomotive in a very sharp curve.

R. M. says: The present method for sawing marble is with sand and water, acted upon by a soft iron blade. 1. Can the teeth of a steel blade be hardened enough to saw marble and stand the wear for any time? A. It has not been found practicable. 2. If this would not answer, how would it do to use the steel blade instead of the iron, as we could put a great deal more pressure on it, and naturally do more sawing? A. There would not be any advantage, in our opinion. We believe the diamonds are the only cutters that are practicable.

J. B. F. R. asks: How long do you suppose a vacuum could be maintained if formed in an airtight cylinder with a rubber leather piston? A. For ever, if the cylinder were perfectly airtight.

J. H. A. asks: What is the rule for calculating the blow of a steam hammer? We have a 300 lbs. steam hammer with a 5 inch cylinder and 12 inches stroke, working at a pressure of 100 lbs. to the square inch. What is the weight of the blow with the hammer working at full stroke? A. We do not know of any rule by which you can calculate this.

R. G. R. asks: Can you inform me of a cheap method of consuming the smoke, or part of it, from soft coal, in a furnace under two tubular boilers 42 inches by 12 feet each? A. A common plan, which is frequently successful, is to admit air to the products of combustion, after they leave the furnace. Others admit air to the furnace, above the fire. You will find a great deal of interest, in this connection, in Mr. Charles Wye Williams' works.

V. A. says: I have lately had an argument with a friend on the subject of the ball dropped down a hole through the earth's diameter. The subject, being conjectural, cannot of course be submitted to experimental research; but inasmuch as some of the well known principles of matter may be involved, we have agreed to abide by your opinion. He asserts that the ball, on arriving at the earth's center and losing its weight, also loses its momentum, and will come to rest without passing the earth's center. I am inclined to disagree with him on the ground that his assertion is at variance with the theory of conservation of force, and am of the opinion that the ball will oscillate for ever from end to end of the diameter, provided that frictional or retarding media, such as air, etc., be excluded. Your opinion is respectfully sought on the question. A. We incline to your opinion.

W. S. B. asks: 1. Is the use of tobacco by smoking it injurious to the teeth? A. Yes. 2. If so, what part of the tooth does it first affect? A. It affects the upper part of the teeth, near the gums. 3. What effect does it have on the brain, if any? A. There is no doubt that the use of tobacco has an injurious effect upon the brain. "Tobacco smoking excites an abundant secretion of saliva; hence some persons maintain that tobacco smoking aids digestion. Smoking acts on the intestines as a slight purgative, and no doubt a pipe or cigar smoked after breakfast is beneficial to some persons. Smoking to excess is no doubt a very harmful habit; it disorders digestion, greatly lessens the appetite, produces much restlessness at night, and weakens both mind and body. Chronic pharyngitis, and chronic dyspepsia in some instances, may be clearly traced to smoking in excess. Even amaurosis is said to be sometimes produced by excessive smoking. Kölliker teaches that nicotine quickly paralyzes the brain and destroys voluntary movement."—(*Ringer.*)

L. C. T. asks: With what tasteless composition can I coat the inside of a keg to make it air and gas tight? I have tried rosin 8 parts to 3 of beeswax, melted and poured in, but without any good effect. I think that the heat from the composition causes shrinking of the staves, which cannot be tightened after the composition sets or cools. A. Take an aqueous solution of gelatin, about 1 quart of gelatin to 3 quarts of water. Heat the barrel and pour in the gelatin solution boiling hot. Revolve the casks several times until you are satisfied that the gelatin has reached every part of the cask. Draw off the remainder. Allow the cask to become cold. Then pour a solution of tannin in water into the cask, in the same manner as the gelatin, except that during this process everything must be cool. Draw off the tannin solution and allow the cask to remain undisturbed for two or three hours, when you have a solid coating, upon the inside of the cask, of tannate of gelatin.

How can I make root beer? To make root beer, take 3 gallons of molasses, add 10 gallons of water at 60° Fah. Let this stand 2 hours, then pour into a barrel, and add powdered or bruised sassafras and wintergreen bark, each ½ lb., bruised sarsaparilla root ½ lb., yeast 1 pint, water enough to fill the barrel, say 25 gallons. Ferment for 12 hours and bottle.

J. T. P. asks: 1. How much greater would be the heat in a box, filled with steam through a perforated pipe, with the pressure in the boiler at 40 lbs. than at 20? A. Temperature at 40 lbs. would be 287° Fah.; at 20 lbs., 259° Fah. 2. Is there any instrument for measuring the heat in such a box? A. The temperature can be measured with a thermometer.

J. B. R. asks: What is the best method of extracting tannic acid from new white oak wine casks, so as to make them perfectly wine clean? A. Ether is the best solvent, but being expensive you can use alcohol in its place. The alcohol can be used again, if purified by distillation.

L. G. D. asks: How can I prevent the bodies of butterflies and moths from becoming oily, and secure those that are already oily from becoming more so? I do not wish to cut out the intestines, as that makes the body look unnatural. A. Soak the insect in benzine by dropping the liquid upon its thorax, continuing this until the insect is thoroughly impregnated even to the tips of its wings; then dry in the wind. Pin the insect under a window raised a few inches, or any other place where a sufficient draft of air can be obtained. The moth should be placed with its head pointing inside, so that the inrushing air may blow up the feathers of the insect and prevent them from becoming plastered or stuck to each other.

S. L. asks: Can you give me a simple process for making bone black or animal charcoal, used in the manufacture of blacking? A. Put clean bones in a crucible, close, and expose to strong heat till calcined. Cool the crucible, remove and powder the contents, wash them in warm water, and dry.

G. H. asks: What is the process of staining glass, such as is used for church windows, etc.? A. The different compounds for painting on glass are glasses of easy fusion, colored with ground metallic oxides and laid on the glass with spirits of turpentine.

Will light, in passing through such glass, assume its color and transmit it to any object upon which it may be reflected? Will liquids so transmit their colors? A. Yes, in both cases.

G. K. asks: How can I mix a cement that will harden under fresh or salt water, in 24 hours or less, and be of a hard and durable nature? A. You do not state what use you want to make of the cement. There are several hydraulic cements; the following is one: Powdered clay 3 lbs., oxide of iron 1 lb., boiled oil to form a stiff paste.

P. J. K. asks: I do not quite understand how it is proved that the earth is round, by viewing a ship on the ocean. The geography books say that the first part of a ship that is seen is the tip of the mast. How can this be, as water cannot be round, as it always seeks its level? A. Your idea as to water "finding its level" is erroneous. Water, by gravity, assumes the spherical form on the earth's surface; and the rotundity of the earth can be demonstrated by the means you describe as well at sea as on land.

R. S.—The phosphorus light you mention is well known, and has been described in our columns.

C. W. says: On August 3 a brilliant star was seen in the west, immediately after sunset; it was as bright as the sun, and gradually faded away till nothing could be seen of it. What was it? A. Probably one of the meteors which are so very numerous during this month.

J. C. S. says: I wish to make some marine glue; in your excellent book of "Instructions for Obtaining Patents" you give directions for making the same, namely: Gum shellac 3 parts, caoutchouc 1 part; dissolve in separate vessels in ether free from alcohol, applying a gentle heat. An encyclopædia says, respecting ether: "Its odor is peculiarly powerful and penetrating if inhaled, producing insensibility to pain, etc. Great care should be taken not to pour it out with a flame below it, otherwise an explosion of a dangerous character might ensue. Mixed with certain proportions of air, it forms a highly explosive compound." I must confess that, in the face of the above, I should be afraid to use ether for making glue until I hear further about it. A. If proper care be taken, the danger is small. Keep in airtight vessels in a cool place. We cannot see the necessity of pouring the ether out with a flame beneath it.

W. A. P. says: Please give me a recipe for glue that will be tough and strong, to fasten emery to leather. A. Marine glue, made of shellac and india rubber dissolved in naphtha, will probably answer well. It is recommended by some to add a little milk to ordinary glue, in securing emery to leather.

H. W. N. asks: Which goes the fastest, a shell boat pulled by two persons, using two oars apiece 10 feet long, or one pulled by two persons using one oar apiece, 12 feet long, weights being equal? A. This is scarcely a matter of theory, but is one of those questions which should be decided by direct experiment.

G. E. H. asks: Can a belt be laced so that the lacing will not be crossed on either side, and at the same time be strong enough to hold from pulling out on a belt that has to be so tight as to be stretched on to the pulley by clamps? A. We think it is better for the lacings to cross.

C. M. P. asks: How can I keep metal boxes from getting loose? Is there anything you can put on the iron before you run the metal that will make the latter stick? A. The iron should be recessed or provided with holes to retain the Babbitt metal in position.

C. H. H. asks: What is wire drawing in a steam engine? A. It is a reduction of the pressure of steam by contracting the opening through which it passes.

How is the hammer test applied to steam boilers? A. By tapping the boiler gently with a light hammer, and judging by the sound whether the iron has deteriorated.

B. asks: Is not an asymptote a line which, approaching a circle, continues to infinity without touching it? A. An asymptote is a straight line which continually approaches nearer to a curve, but never meets it. The straight line is continually dividing the distance between itself and the curve, so that, between two successive equal lengths of the straight line, the distance between the curve and the straight line is only a fraction as great as it was before; but as there will always be some distance to divide, the two lines will never meet.

Can two bodies approach each other from opposite directions in the same line, without meeting? A. The possibility of the two balls continually approaching, and never meeting, might be conceived. Imagine them to be subject to a law by which the space through which they moved in one second was always half the distance between them at the commencement of that second. Then if the distance between them at any given point were 2 feet, it would be after 1 second, 1 foot; after 2 seconds, ½ foot; after 3 seconds, ¼ foot; after 4 seconds, ⅛ foot, and so on; and if the law were unchanged the balls would never meet.

L. B. asks: Will a common cotton boat, usually called in South Carolina a mountain boat, propelled by an engine instead of poles, be subjected to United States inspection, and be required to have a licensed engineer aboard? A. Yes.

A. W. S. asks: Having run an engine for two years, I want to learn to be an engineer. Can you tell me where to go to learn more of the business? A. You need shop experience and education. Cornell University furnishes both. You could enter a machine shop and employ your spare time in study.

J. H. N. asks: What horse power steam engine is necessary to perform work on a farm, such as grinding, sawing, etc.? A. From 3 to 5 horse power.

What is the capacity, in the indicated horse power of a steam engine, of a two horse tread power, elevated and driven by horses, in the manner usually done by threshers? The horses are to be of medium size and capacity. A. From 3 to 4 horse power.

I. asks: A friend of mine affirmed that the revolutions of a wheel could be indefinitely increased by the use of a number of multiplying wheels, without increasing the motor power. I averred that this could not be done without increasing the motor power, for the weight of the wheels would counterbalance the rapidity of the motion; and that finally the mechanism would become so heavy that the number of revolutions would no longer be increased. Who is right? A. Every additional connection would require some power to drive it, and therefore your friend is in error.

J. R. S. asks: Is it a fact that ice houses take fire by spontaneous combustion? If so, I would like a scientific explanation of the matter. I have noticed that there have been quite a number of ice houses burned this season, and that the cause was attributed to spontaneous combustion. One was burned in Massachusetts on the night of July 31. The building was 40x30 feet, with 20 foot posts made as tight as possible, with no means of ventilation; it was filled to the plates with ice packed in fine sawdust. The parties owning the ice had a quantity in another building packed in small hay: after using the ice that was packed in hay, they dried the hay and spread it upon the ice in the ice house. Four days after the building was discovered on fire, the fire bursting from the roof. A. We are not aware of any other case in which the origin of a fire in an ice house has been attributed to spontaneous combustion, although the burning of ice houses is a somewhat frequent event. Workmen so commonly smoke pipes about their work that we would be inclined to attribute the origin of these unfortunate disasters more to this cause than to any other. We would be pleased, however, to receive from our correspondents any additional facts bearing upon the subject. As to providing special means of ventilation for ice houses, we understand that it is considered by many essential to the proper preservation of the ice to do so,

S. E. J. says: If we have a plane surface containing a square foot or yard, how much more pressure will there be on it when it is placed so that the wind can blow square against it, than when it is placed at an angle of 20°, 30° or 45° to the wind? A. Experiments have not been sufficiently extended to enable this question to be answered exactly. Robins and Borda's experiments, however, seem to show that the pressure on oblique surfaces varies nearly as the sine of the angle of incidence.

C. D. says: Please give me the number of figures that it requires to make a billion. A friend says that 3,750,340,240 stand for three billion, seven hundred and fifty million, three hundred and forty thousand, two hundred and forty; and by consulting the arithmetic I find that he is right; but when I go to Webster, I find that it requires a million of millions to make a billion, which would be 1,000,000 000,000, or 13 figures. A. In French numeration, commonly employed in this country, a billion is a thousand millions. In the English numeration, as given by Webster, a billion is a million millions; and the first example, read by the English numeration, would be three thousand seven hundred and fifty millions, three hundred and forty thousand, two hundred and forty.

A. L. K. asks: What are the three and five cent pieces (now in use) composed of? A. Three fourths copper and one fourth nickel. The five cent piece weighs 77 16 grains; and the three cent, 30 grains.

G. A. says: J. S. S. says that he runs one pair of burrs (or rocks, as he calls them) on 40 lbs. of steam. I should like to know the size of his boiler and engine, also the size of stones, and kind and quality of work done. I have a tubular boiler, 10 feet long and 4 feet in diameter, with 72 two inch tubes, with a grate surface of 16 square feet. The engine has two cylinders, 5½ inches bore x 12 inches stroke, running 105 revolutions per minute, cutting off at ½ stroke. We cannot run with 40 lbs. of steam; with 60 lbs., we cannot grind over 100 bushels of corn in 10 hours into feed meal. I think we have a good boiler. The engine will not give us the amount of power we want. Will you give us your opinion, and will J. S. S. further explain his case? A. It might be well to run your engine faster. A good engineer could readily ascertain whether the machinery is doing as well as it should. We should be glad to hear again from J. S. S., in answer to the present correspondent's inquiries.