Business and Personal.

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Answers to Correspondents

A. O. F. asks: Is it ever necessary for a locomotive slide valve to lift from its seat, either on sud, denly reversing the engine, when running down grade, or from any other cause? And if it does lift from its seat, what causes it to do so? How much must it lift under the most extreme circumstances? 2. I have lately made improvements on the balanced slide valve which I had patented through your agency. Will it be necessary in order to secure the improvements by a patent, to have a reissue of the original patent, or can I secure the improvements by a separate patent? A. 1. The valve may rise from its seat whenever the pressure underneath is greater than that on top. A very slight lift would equalize the pressure on the two sides. 2. It is not necessary to have a reissue.

S. G. F. asks: With what substances can I pack a filter to run about fifty barrels of water per day? We are much troubled with muddy water and have tried charcoal and gravel with no effect, as they soon clog up on passing this amount of water daily. A. If your water is very dirty, it will be well to have two filters, so that one can always be kept in operation. It may be that your present filter is not large enough.

H. L. R. asks: 1. How can I take the gold off a silver watch and chain which have been gilded? 2. How can I harden brass, silver or gold wire? 3. What will give gold its natural color after being heated? 4. What will eat steel screws out of a brass or nickel watch movement, without injury to the movement? A. 1. Probably by friction. 2. By hammering. 3. Polishing. 4. We do not know of anything that will answer. You might dissolve the other metals away from the screws.

M. H. P. says: In our old almanacs, we always found the sun to rise and set at 10 o'clock twice during the year, in March and September. But in the almanacs of the last two or three years it has varied 15 or 20 minutes. Is this variation due to a fault of the almanac maker, or has there been variation in the sun's rising and setting during the last few years? How much variation is there in the time of sun's rising and setting on the dates of January 1, 1866, and January 1, 1873? A. A calendar year exceeds the true solar year by 12·38 seconds, so that there is an error amounting to one day in 3,866 years.

W. J. B. asks: 1. Why should a fast motion engine have lead, and why not use the cam instead of the eccentric? Does not the lead work against the engine? 2. If a boiler is not large enough, will a steam drum of 24 inches diameter and 8 feet length increase its capacity more than one 18 inches diameter and 4 feet length? A. 1. Lead has the effect of preventing shocks and jars. The eccentric is a cam. 2. Increasing the size of the steam drum would increase the steam room, but would probably have no effect on the steaming capacity.

J. E. H. L. asks: 1. Why does extending the arms above the head stop bleeding from the nose? 2. Why does pressure on the upper lip just below the nose prevent sneezing? 3. Why does a woolen string tied around the leg above the calf prevent cramps? A. We are not sure that these statements are facts.

P. J. D. asks: 1. Can I learn phonography without assistance? 2. What instrument must I use to engrave letters on coffin plates and other plated goods? 3. How can I make gold leaf stick to glass? A. 1. Yes, with constant practice. 2. A burin specially made for engraving on metal. 3. Use best rum ½ pint, isinglass ¼ oz. Make a solution of these, add ½ pint distilled water, and filter through linen. This size required 24 hours to dry, after the gold leaf is applied.

E. J. O. says, in reply to A. D., who asks how to fill a dent in an iron cylinder with lead: Clean it well, and tin it over in the usual way (using muriatic acid) with a soldering iron, and melt in a little solder. "I frequently stop holes in cast iron patterns in that way with good success."

T. D. H. and several other correspondents ask: How can I make a cement for use in putting an aquarium together? A. Use equal parts, by measure, of litharge, plaster of Paris, fine beach sand, and powdered rosin. When wanted for use, make into a putty with boiled linseed oil.

J. asks: 1. What is the best and most effective plan of furnace which a poor man could erect in order to smelt from fifteen to twenty tuns of lead ores per week, and run the same into pig? The lead ore contains from forty to sixty per cent silver. A. We cannot give you definite advice without knowing more of the matter. It is better for parties who have professional work of this kind to take it to men who make a specialty of such matters.

W. T. V. asks: 1. What kind of material or sizing can I apply to cloth or woolen goods to smooth en the surface, stiffen the fabric, and, at the same time, render it waterproof? 2. How can glue be prepared so that it will remain liquid and fit for use when cold? A. 1. Moisten the cloth on the wrong side first with a weak solution of isinglass, and when dry with an infusion of nut galls. 2. A little nitric acid added to a solution of glue will prevent its gelatinizing.

R. N. asks: How much power is gained by using steel packing instead of rope packing for a cylinder, if any? 2. Can steel packing be used instead of rope after having used the latter for several years without having the cylinder bored? The cylinder appears to be pretty smooth and true. A. 1. We could not answer the question without more data. 3. We suppose so, but cannot tell definitely, as persons' ideas may differ about the meaning of "pretty smooth and true."

R. L. asks: 1. How can I cement whalebone to wood? 2. In what is the Fahrenheit thermometer superior to the Réaumur and centigrade instruments? A. 1. Take isinglass ½ oz., water 4 ozs., let stand for 24 hours, and evaporate in a water bath to 2 ozs.; add rectified spirit 2 ozs., and strain through linen; mix while warm with a solution of 4 ozs. best gum mastic in 2 ozs. rectified spirit: triturate with powdered gum ammoniac 1 dram, until perfectly incorporated. 2. The use of the different kinds is a matter of custom only. Fahrenheit believed his zero to be the point of absolute cold, an idea which is now known to be widely erroneous.

J. A. F. will find the following composition good for journal boxes: Copper, 24 lbs.; tin, 24 lbs.; and antimony, 8 lbs. Melt the copper first, then add the tin, and lastly the antimony. It should be first run into ingots, then melted and cast in the form required for the boxes.

J. W. and other querists for books on atmospheric electricity will find the subject treated in any good text book on physics. Lyon's "Treatise on Lightning Conductors," and Phin's "Lightning Rods, and How to Construct them," will probably be useful to you. See our advertising columns for bookseller's addresses.

A. N. asks: How can I solder broken chisels, files, etc., together? A. Clean off the ends by filing, and upon the joint lay a thin strip of sheet brass. Cover the part with a paste of clay, free from sand, to the thickness of one inch, the coating being 4 inches along on each side of the joint. Dry slowly near a fire, and then heat to a white heat in a blast, whereby the clay vitrifies. Cool very slowly, and knock off the clay.

J. P. asks: 1. Is silver coin pure enough to plate with without refining? 2. What is rotten stone? 3. What is Bath brick, such as electroplaters use for cleaning work? 4. What is water of Ayr stone? 5. Is there anything that I can put upon the surface of glass to render it a conductor, so that I can plate it? I want the surface of the plate when removed from the glass to be as smooth as the glass upon which I have plated. I can use plumbago, but I am afraid it will make the surface rough. 6. What is the best composition for brass gun barrels? A. 1. Yes. 2. It is a native polishing powder, composed of infusorial silica. 3. A polishing material, made in England, and sold in bricks. 4. A kind of hone, found in Scotland. 5. Try gilding, as described on p. 250, vol. 29. 6. Copper 90·5 parts, tin 9·5 parts.

Smoker can mend his amber mouthpiece by smearing the parts which are to be united with linseed oil, hold the oiled part carefully over a hot cinder or a gas light, being careful to cover up all the rest of the object loosely with paper; when the oiled parts become a little sticky, press them together, and hold them so till nearly cold. Only that part where the edges are to be united must be warmed, and even that with care, lest the form or polish of the other parts should be disturbed; the part joined generally requires a little repolishing.

J. H. S. asks: What are the dimensions of the interspaces of the wire gauze used in the manufacture of Davy's safety lamps? A. One thirty-sixth of an inch = 1,296 holes to the square inch.

J. H. M. says: 1. I think there is some mistake in the answer to Y.E.'s question on horse power of an engine in No. 22 of your vol. 29. You say 63·6×70×63×2×16÷33000×12. I think the last sign should be to divide. 2. Two of us are in dispute about the horse power of an engine. Diameter of cylinder is 16 inches, length 30 inches, working at 100 revolutions per minute with a pressure of 90 lbs. to the square inch. We leave it to your decision. A. 1. In the example mentioned, the stroke of the engine is taken in inches. These must be reduced to feet—or, in other words, the fraction must be divided by 12. It is a general principle that multiplying the denominator of a fraction by any number has the effect of dividing the fraction by that number. 2. If an engine should give an indicator diagram in accordance with the data sent, the indicated horse power would be 28·96×90×5×100 : 33,000 = 91$\frac{4}{11}$.

F. M. H. asks: How can I find a rule for the heating surface and horse power of steam boilers? I think the following is incorrect; it applies to tubular boilers only: Two thirds the circumference of all the tubes, multiplied by the length, will give the heating surface, and every 15 square feet of heating surface will be equivalent to one horse power. A. The practice of different makers varies so much, and there are so many ways of rating the horse power of a boiler, that we cannot give you any definite rule.

W. A. C.—We cannot answer your question as to pumps in a coal mine from the above *data*. Under some circumstances, we think that the pressure in the 3 inch pipe would be increased.

E. M. J. asks: How can I gild a small wooden flower stand? How can some portions be made bright, the rest remaining a dead color? A. Rub the wood smooth and prime with glue size, then put on two coats of oil paint and one of flatting. Smooth over, when dry, with wash leather. Put on gold size; and when it is sticky to the touch, it is ready for the leaf, which put on carefully and dab with cotton wool. A thin transparent glazing can be used to deaden the gold in places.

W. T. says: 1. We have in our factory a sectional boiler which has been in constant use for about three and a half years. The capacity is fifty horse power, and it is at all times under a pressure of ninety-five pounds. It has commenced to leak badly in three or four of its connections. The leaks are directly over the fire. What can I use to stop them? 2. Is there any danger of rods which run through tubes rusting off? If so, what would be the effect? 3. Do you consider such boilers perfectly safe? 4. We blow off once a week. Should the boiler be examined internally? If so, how often? The water is taken from a natural reservoir, and is both soft and clean. A. 1. Probably it will be necessary to replace the leaky sections, though possibly you may be able to face them off. It would be well for you to address the makers of the boiler. 2. We scarcely think there is much danger. 3. As safe as any similarly constructed boiler. 4. We should suppose that once every three or four months would be quite sufficient.

A. L. A. asks: Are not portable engines much more liable to get out of order and give trouble than stationary, and does not the heat from the boiler cause unequal expansion of the different parts of the work, hence loosening the joints, etc.? A. If proper provision is made for expansion, we think that portable engines can be made quite as durable as stationary engines. It is true, however, that there are difficulties in the arrangement, and hence some builders place their portable engines on a separate support.

C. D. C. asks: 1. Where can I get a very powerful magnet? 2. Are magnets durable? 3. Which has more attraction for a magnet, a point or a flat surface? 4. What is the farthest distance at which a powerful magnet will lift an ounce weight? 5. What difference is there between a magnet and a lodestone? A. 1. From any good maker of philosophical apparatus. 2. Yes, with proper usage. 3. We suppose the magnet will attract either with equal intensity. 4. This could only be determined by experiment for any particular case. 5. One is a piece of metal which has received its magnetic force from another magnet, the other is iron ore which has magnetic polarity.

W. asks: What is the rule for computing the number of tuns of ice contained in an ice house, the length, width, and depth being given? A. Calculate the number of cubic feet in the ice house, and divide by thirty-five. This gives the number of tuns of ice that the building will contain if it be closely packed.

G. A. R. asks: How do you determine the diameter of a steam chest for a roll valve engine? 2. Is the roll valve more economical than the slide valve? 3. Do you know of a good book which treats on the roll valve? A. 1. It will depend upon the width of ports and travel of valve. You will find dimensions of these laid down in any standard work on valve motion. 2. We do not know of any tests which have been made to determine the relative merits of the two styles of valves. 3. None that treats of this, specially.

G. O. asks: Has any account of the government boiler tests at Sandy Hook and at Pittsburgh been published? A. The experiments are incomplete, and probably the detailed report will not be rendered until further tests have been made.

H. P. asks: Is there any known substance that can be put in with hard cast iron when it is being melted, to make a soft casting? 2. Has there been a rotary steam engine invented that is practicable? If not, would the invention be of use? A. 1. We think not. 2. Yes, but there is great room for improvement, and the invention would be of great value.

E. B. asks: 1. By what means was accurate alignment of the Hoosac tunnel attained? 2. It is proposed to cut a tunnel between England and France. As the opposite shores are not in sight of each other, will you explain the manner of making the survey? A. 1. We suppose it was done by running the line accurately across the mountain, and then transferring it by means of angles or bearings. 2. In running a line between England and France, if stations suitable for triangulation could not be found, it might be necessary to use buoys, or some similar device, to locate intermediate stations.

G. S. T. says: I wish to line steam boxes, for steaming stave bolts, with some material, such as roofing felt or sail canvas, and would like to know if there is any kind of paint which I can apply to it which will resist the action of the steam. I use both exhaust and live steam. There will be a lining of boards to protect the canvas from injury. A. Perhaps marine glue will answer. In reply to your other question, see our advertising columns.

W. T. T. asks: What is the greatest power that can be attained by a steel spring, as used in clocks, watches, etc., and the greatest number of evolutions that could be applied to such power, before it becomes exhausted? A. This question is too indefinite. Springs could probably be made of any desired power.

W. L. asks: In burning the cotton dust produced in extracting wool from cotton fabrics, which is impregnated with oil and sulphuric acid, will the fumes have a tendency to harm the tubes of a boiler? A. We suppose this is a matter that could be best determined by experiment.

C. McC. asks: 1. If I place my engine on either center, should the eccentrics be set so that the lead will be the same when the link is shipped to back, as it is when shipped to go ahead? 2. Is tallow the best lubricant for cylinders, if steam is made from alkaline water? 3. What is the best packing for expansion joints? 4. What is the best thing to put on an engine to keep it from rusting when shut down for winter, it being exposed to damp? 5. What will wrought iron pipe expand in length in proportion to size? A. 1. This cannot generally be done. 2. Probably oil would be better. 3. Hemp is commonly employed. 4. A mixture of white lead and tallow. 5. Wrought iron expands about $\frac{1}{100}$ of its length, on being heated from 32° to 212° Fahrenheit.

J. B. H. asks: 1. What is peat and how can it be distinguished? 2. If anything without fertilizing properties is spread on the ground, why does it improve the soil? A. 1. Peat is a mineral fuel, retaining many of the characteristics of its original vegetable structure. 2. Nearly all organic matter furnishes nourishment to the plants by its decomposition, and hence cannot be said to be without fertilizing properties.

J. S. S. asks: Has a locomotive any greater pressure or weight upon the track when exerting her full force to bring a train into motion, than she has when standing at rest? A. No.

J. N. P. says: Auchincloss, on page 33, gives the description of setting the eccentric to cut off at an angle of 150°, and says: "By carrying the crank to the 150° position we observe that the port, S, remains open a distance, C," (which, by the way, is wrong; for the valve ought to be as near the seat, C, on the right as it is now to the bridge on the left) "and the most ready means of closing it is to lengthen the valve face the distance, L." Furtheron, he says: "But on referring to Fig. 6, it is clear that no such addition can be made without necessitating a change also in the eccentric location, for it would render the admission 30° too late. Hence we must unkey the eccentric, advance it 30°, and refasten it." It is to this that I want to call your attention. He says he wants a cut-off at a crank angle of 150°; and he carries the crank to that angle and lengthens the valve face whatever it lacks of meeting the seat. I would ask if he has not got the cut-off where he wants it to be without advancing the eccentric at all. I am not taking the admission into consideration. Now if he moves his eccentric forward 30°, in order to get the admission at the proper time, does he not get a cut-off 30° before the crank gets to 150°? It certainly seems so to me. A. We have looked over the passage in question, and the author's statement appears to be correct. Make a model with two pieces of paper and try the rule.

J. P. Jr. asks: How is plumbago applied as a lubricant on wood? A. Mix it with tallow.

G. S. asks: 1. Is there any work on hydraulics wherein I can find rules to calculate the diameter of pump plungers, suited to any diameter of water ram? I have a 20 inch ram and a 1 inch plunger; will the same plunger do for a 3 inch ram, keeping the pumps at the same rate of speed, etc.? 2. I have had occasion to change a large ram for a small one, and I do not get half the power. Why is this so? A. 1. You will find the subject treated under the head of hydrostatics in any good work on physics. See our advertising columns for bookseller's addresses. 2. Your small ram is not so powerful as the large one, because the pressure, other things being equal, depends on the relative sizes of the ram and plunger.

G. M. W. says: I have a twelve horse power portable boiler, which I use for heating purposes and running a small engine. I only run the engine once a week. Do you think that, if I brick the furnace up with one layer of fire brick inside, I could keep steam up easier and keep the fire all night? A. You might keep up steam more economically.

J. H. F. says: I have two boilers 5×16 feet, each containing 39 four inch flues. The grates are 4 feet 7 inches in length. The water that supplies the boilers is heated by the exhaust steam from engines, passing through a heater and lime extractor, and then introduced into the front end of boilers. The latter are perfectly clean, and yet the plates over the fire bag down from 1 to 3 inches. They have bagged the same way when water was pumped into the mud drum. Boiler makers here do not seem to know the cause, and their opinions vary accordingly. One thinks the iron too thick (⅜); another that there is too much heating surface, not allowing the water to circulate freely; and another, who thinks his opinion infallible, claims that the oil from the engine causes all the trouble. What is your opinion as to the cause? Do you think oil would have any such effect? A. If there is no scale deposited on the crown sheet, we imagine that the bracing is insufficient.