Notes & Queries

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(1) G. D. T. asks: 1. What is the actual horse power of a steam engine 10 x 14 inches, running at 215 revolutions per minute, with a boiler pressure of 60 lbs., cutting off at ⅕? A. A test would be necessary before this question could be answered. 2. Can the exhaust steam pipe on an engine be turned into the smoke stack without injury to either? A. Introduce the exhaust pipe so that it discharges upward, in the middle of the smoke stack.

(2) F. E. H. says: Please give me a recipe for making Pharoah's serpents. A. The genuine ones are simply sulpho-cyanide of mercury made up by means of gum water into the form of cones, pills, or cylinders. They are still made and sold, on a small scale, in this city. We are not aware of any law specifically referring to them. Several substitutes for the dangerous mercury preparation have been proposed, but the snakes they produce are not so life-like nor so big. The following is said to be the best imitation: Take white sugar 3 parts, bichromate of potash 2 parts, saltpeter 1 part. Pulverize separately and mix intimately; finally press the mixture into small paper cones.

(3) E. L. S. asks: What diameter and pitch of propeller would you advise for a boat 58 feet long, 7½ feet beam, with 3½ feet draft of water, engines having 6 x 8 inches cylinders? A. Diameter 3½ feet, pitch 4½ to 5 feet.

(4) R. S. B. asks: I have some liquid which is neither good old hard cider, for it has a vinous taste, nor yet is it good vinegar. How can I convert it into good marketable vinegar? A. Prepare a large barrel, with a false bottom having a number of holes bored through it. Place this in the barrel about six inches above the real bottom, and fill in above the false bottom to the top of the barrel with good, well burnt charcoal, in coarse powder. Moisten the charcoal thoroughly with some of the cider, cover the barrel with a piece of felt or woolen goods, and allow to remain until there is a perceptible rise in the temperature; then add the cider in such a manner as to keep up a constant percolation of the fluid through the charcoal until the process is complete. The vinegar may be drawn off from a spigot at the bottom.

(5) R. J. C. asks: How much power is there in an overshot wheel propelled by a spout of water 12 inches wide by 3 inches deep? A. A good overshot wheel may give ¾ of the whole effect of the water.

(6) F. O. says: P. is testing a boiler with water from a pipe showing a pressure of 60 lbs. The boiler being filled, the gage shows 5 lbs. The gage is half way from top of boiler: now, if the pressure be added from the pipe, should the gage on the boiler show 60 or 65 lbs.? I claim the cause of the 5 lbs. pressure is due to the weight of water above the gage, and must be added to the 60 lbs., and make the gage say 65. P. says the 6 lbs. has nothing to do with it; the pressure must be 60 lbs. Who is right? A. If the pipe enters the boiler at the lowest point, according to the data furnished, the pressure at the highest point of the boiler would be 60 lbs., and the gage would show a pressure of 65 lbs.

(7) C. G. N. asks: How large a boat will a 3 horse power engine propel, with side wheels? A. Make her from 20 to 25 feet long. Good friction gearing is preferable to ordinary toothed wheels. Side wheels give very satisfactory results in smooth water.

(8) R. B. H. L. asks: 1. What kind of cannon is used for chain shot? A. Chain shot have ordinarily been fired from a smooth-bored gun; but we believe that occasionally a peculiar form of gun has been employed, consisting of two barrels, slightly diverging at the muzzles and having a common vent. 2. How many kinds of cannon have ever been used? A. Cannons are generally classed as muzzle and breechloaders, with smooth bore or rifled barrels. 3. If a cannon 1 inch bore, 70 feet from a target, be loaded with 100 No. 1 shot, to what width would the shot spread? A. It is impossible to give a definite answer to this question, since, as you must be aware, the difference in the performance of different guns, in this respect, is very marked.

(9) T. D. and others.—There is no work on taking the buckle out of saws. It is an art known only to saw makers, and attainable only by long practice and a thorough knowledge of the principle upon which saw plates are worked in order to impart that strain upon different parts so as to overcome the expansion by centrifugal force caused by the velocity of the saws in use.—J. E. E., of Pa.

(10) D. W. W. asks: 1. Is it possible for boiler tubes to get heated to the point of producing a spheroidal state when the proper supply of water is kept up in the boiler? A. Experiments seem to show that, in order that water may assume the spheroidal state, a small quantity must be dropped upon a plate which is heated to a higher temperature than the boiling point of the water. 2. What is the lowest temperature at which the spheroidal state can exist in the case of iron and water, and how is it affected by pressure? A. Under atmospheric pressure, the temperature required is about 290° Fah. In a boiler properly designed, the temperature necessary for the spheroidal state could not be produced, if the ordinary water level was maintained. We have, however, occasionally seen boilers in which the circulation was so poor that tubes were burned out when apparently covered with water.

(11) W. C. B. asks: 1. Is it practicable to pump water through a pipe 150 feet long, it being level from the pump to the well, which is 18 feet deep? Yes. 2. Is it better to have the pipe higher at the well than the pump? A. Lay the pipe as straight as possible, with the highest point at the pump. 3. Should there be a check valve at the well? Yes. Put it at the bottom. 4. What sized pipe should we use? A. A 2 inch pipe.

(12) S. H. S. asks: What is the matter with our stove? When the damper was closed, the draft went around under the bottom of the stove; when the draft is all closed, the smoke or something else will condense into liquid and run through the chimney, through the upper floors, and into the room below. A. This may be owing to some peculiar kind of fuel you are burning, which you do not specify. When the draft is closed the flue soon becomes cold, and the air carrying the smoke precipitates its latent moisture upon the sides of the flue; the moisture naturally carries the particles of unburnt fuel with it. If this is the cause, a more free draft would abate the difficulty.

(13) M. B. says: I have a boat 50 feet long and 10 feet wide. The engine is 8 x 9 inches. What size and pitch of wheel should I use? A. You can use a wheel 3½ feet in diameter, with 5 feet pitch. In general, a wheel that is properly proportioned for speed is likewise suitable for towing.

(14) J. J. says: It is claimed that the outside horse, in plowing a circle, commencing in the center, gains only so much as he gains in the first round and no more, as the inside horse follows all the time after. Others assert that the outside horse gains each round plowed, and will gain in each round so long as they continue plowing in a circle, and that each and every day the outside horse has traveled the farthest. Which is right? A. This is a very pretty question, of little or no practical importance; and we therefore forego the satisfaction of answering it, and throw it open to the competition of those who may be interested in finding a solution.

(15) M. J. asks: What is the method of testing hydraulic cement for water? A. It consists in gaging a small quantity of the dry powder with water, and immediately immersing it in water. If the sharper edges crack or break away after a short time, the cement is too hot or fresh, or is inferior in quality.

(16) J. H. D. asks: What weight can an average horse raise, if hitched to a rope, the rope to pass over a pulley, and the weight attached below? A. The following table, given by Mr. Trautwine, furnishes a fair statement of average results, the speed of horse being miles per hour, and the traction in lbs.:

Speed.	Traction.	Speed.	Traction.
¾	333	2¼	111
1	250	2½	100
1¼	300	2¾	91
1½	167	3	83
1¾	143	3½	71
2	125	4	63

(17) J. A. K. asks: What causes an explosion when water is pumped into a hot boiler? Is it the sudden generation of steam, or does the boiler crack? A. When an explosion takes place under such circumstances, steam is formed rapidly; and the iron, weakened by overheating, cannot resist the pressure.

(18) J. W. A. McC. asks: By what rule can I find out what quantity of water will be supplied by a wooden pipe, with a 3 inch bore, having a head of water of 250 feet, the length of said pipe being about 10 miles? A. If we knew all the particulars of the case, we could only give you approximate rules; and it would be useless to attempt to furnish information from the meagre data you have sent. We hope to treat of matters of this kind, in special articles, before long.

(19) R. E. B. says: If I take out a water wheel 10 feet in diameter, and replace it with one 2 feet in diameter, using the same quantity of water, do I gain any power? A. Not from the fact of its being larger. If the new wheel is a better one than the other, *per se*, there will, of course, be a gain.

(20) T. A. B. asks: Should the balance wheel of a gig saw or vertical re-sawing machine and the gate and connecting rod of the same form a perfect balance, to prevent thump or jar? A. Vertical resawing or other rapidly operating machmery should be balanced so as not only to counteract the weight of the gate or frame and connecting rod, but also the momentous force, and this latter depends upon the velocity at which it is run. I know of no established rule for accomplishing this. About the only way that I know of to get a perfect counteraction is to construct the balance wheel with more counteracting weight than is really required. Then remove the surplus little by little until the machine moves properly.—J. E. E., of Pa

(21) W. M. K. asks: To what extent, if any, will air in an open inverted vessel, mingle and pass off with a current of water when deeply immersed and under a pressure of 500 lbs. to the square foot? Would hydrogen or some other gas remain longer unchanged in bulk than atmospheric air? A. Either the air or hydrogen will be absorbed much more readily by the water, under these circumstances, than under ordinary pressure.

(22) G. H. says: I have in my cellar a horizontal single flue boiler for the generation of steam for heating purposes. Trouble seems to be caused by a sluggish combustion. It does not smoke nor emit gas; but no matter how much coal is put in at one time, the fire burns dull, and it is difficult to raise 3 lbs. of steam and hold it. The flue fills with soot quickly, which hangs in festoons, indicating that there is no draft. A. Your description will not enable us to help you very intelligently; but we would recommend that you see whether the chimney, *per se*, is in good working order.

(23) H. F. J.—We cannot estimate the performance of your engine and boiler accurately from the data sent. If you will put a check valve on the end of your pipe, we think you will have no more trouble.

(24) O. K. and others ask: 1. How is the focal length of a microscope lens calculated? A. Focal length is reckoned from the center of the combination. 2. How can I test lenses for chromatic faults? A. The only test for achromatism is the color; if there is no color, the lens is achromatic. The best lenses are made of two kinds of glass cemented together and burnished in the cell, there being no necessity for removing them. 3. How can I ascertain and compare the powers of microscopes? A. In comparing the magnifying power of microscopes, opticians generally have agreed to consider 10 inches as the distance of distinct vision; then by comparing the real size of the object with the apparent size of the image at a distance of 10 inches, the magnifying power is easily determined. See p. 25, vol. 33.

(25) G. W. S. asks: What should I put on a wooden plug joint to harden the wood (poplar, bass, or lime) and at the same time to keep the joint from moving when fastened in by a screw at right angles to the plug? A. Powdered resin might answer your purpose.

(26) G. W. J. says: 1. I am running a pair of high pressure engines, 15 x 28 inches, with 100 lbs. steam, at 150 revolutions per minute. These engines are both connected to the same shaft, with a fly wheel only 3 feet in diameter but very heavy. On the crank shaft is a cog wheel 2 feet in diameter, geared in another wheel on a countershaft, 5 feet in diameter, or 2½ to one. Connected to this countershaft is a screw 10 inches in diameter, with square thread of 1¼ inch pitch, or 9½ threads to the foot, running through a cast iron nut. How much thrusting pressure do we apply to that nut?