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## Notes &amp; Queries

J. N. W. will find directions for brown-iron gun barrels on p. 11, vol. 32.—L. M. F. H. and A. L. B. will find a description of an artificial ice process on p. 54, vol. 31.—W. M. B. should test his engine with an indicator.—E. A. K. and H. T. M. do not send sufficient data.—F. B. will find descriptions and illustrations of well-boring apparatus on p. 54, vol. 33.—R. and N. T. should consult Molesworth's "Pocket Book" as to tractive power required to move a vessel.—F. J. H. can brass or bronze iron castings by the process given on p. 283, vol. 31.—J. R. W. will find a recipe for black-board composition on p. 91, vol. 30.—M. L. will find a recipe for paste for fixing labels on tin on p. 253, vol. 30.—S. L. will find a recipe for bluing on p. 219, vol. 31.—J. W. C. will find recipes for hard soap on pp. 331, 379, vol. 31.—R. W. and P. P. S. can water-proof canvas by following the directions on p. 347, vol. 31.—F. L. and O. E. D. will find that the horse power of an engine was explained on p. 33, vol. 33.—D. L. will find a description of bisulphide of carbon on p. 144, 283, vol. 30.—W. R. B. will find information as to the hydrogen in water on p. 81, vol. 33.—R. D. B. can blue iron and steel by the process detailed on p. 123, vol. 31.

(1) J. D. R. asks: What is the maximum strain per square inch upon the drawbar of the locomotive attached to one of the largest passenger trains? A. It is the tractive force of the locomotive divided by the area of cross section of the drawbar. The maximum tractive force of a locomotive is the square of the diameter of the piston in inches x the length of stroke in inches x the greatest pressure in the cylinder in lbs. per square inch + the diameter of the driving wheel in inches.

(2) R. B. F. says: I have seen an engine that runs by superheated steam produced by water falling, drop by drop, upon a white hot iron surface. After the superheated steam has been used, it is turned into the fire and there is decomposed, and the hydrogen burned, the oxygen promoting the combustion. Is superheated steam decomposed on striking an open fire? A. Yes, if the temperature is high enough.

(3) G. C. S. asks: 1. What proportion of gunpowder by weight should there be to the bullet in a rifle? A. The proportion varies with the character of the shooting. 2. How large should a bullet be for a breechloading rifle, the bore of which is 0.31 inch in diameter? A. Almost equal to the diameter of the breech.

(4) W. P. says: I have a house of which the lower story is of stone (30 inches), and the upper story of brick, located on high ground. We had a destructive rain storm, and the rain drove with great force against the north end of the house, soaking through to the paper on the inner wall, causing the paper to mildew, and creating an unhealthy odor. The moisture is in the wall yet. How can I remedy it? A. The joints in the interior of the wall were probably not closely filled with the mortar, and the wall itself not provided with strips on the interior to isolate the plastering. Get a good mason to examine the wall closely on the exterior and point up again all joints that are not smooth and tight; the brick work might have two coats of paint in addition; see also that there is no means of entrance for water at the roof cornice. On the interior, if the plastering has been applied directly to the wall, the surest remedy will be to have it replastered upon strips nailed upon the present plastering.

(5) P. J. M. asks: Do we increase the friction by increasing the surface, supposing no weight to be added? A. Within ordinary limits the amount of friction is independent of the surface.

(6) W. asks: Is the back reducing gear, on a common engine lathe, any addition to the power of the machine, or is it only a convenient method of using the power as taken from the motor? A. The back gear enables heavier work to be done, and takes more power to drive than does the direct use of a belt; but the latter runs more easily and delivers a higher speed to the work.

(7) A. W. L. asks: Can a steam engine be run with water that is strongly saturated with soap? A. It might be done, but it would not be advisable.

(8) J. H. R. asks: What are the diameters of the car wheels used on the eastern roads, the width and thickness of flanges, and the weight? A. Diameter from 30 to 33 inches, width of tread and flange 5 1/2 inches, weight from 450 to 500 lbs.

(9) W. M. M. asks: What metals are there in the eagle pennies manufactured in 1858? A. Copper and nickel.

(10) J. L. says: There is a dispute in regard to the power of an eight inch stroke steam engine. Is it possible to build an engine with an 8 inch stroke that will produce 100 horse power? A. Yes.

(11) J. C. P. says: I am making a piston blower of a square box 3x3 inches inside, in which the piston will work, being driven by a belt wheel and pulley by hand, with a balance wheel on the crank shaft. The piston will have a 6 inch stroke. There is a valve in the bottom of cylinder with 1 inch opening for ingress of the air. What size of pipe and valve do I want for the discharge of air into the receiver from the cylinder? It will make about 300 revolutions per minute. A. A pipe 3/4 inch in diameter will answer. 2. How many lbs. pressure to the inch can I compress into the receiver with this machine? A. Six or seven. 3. Will it make a sufficient blast for a common blacksmith's forge? A. It will not be as efficient as some other devices.

(12) N. W. H. asks: Can live steam be seen in a boiler by inserting a glass in a hole 1 to 2 inches in diameter? A. No.

(13) J. W. asks: 1. I have a flat bottomed steamboat, 12 feet wide by 36 feet long, with a stern wheel 8 feet in diameter by 7 feet long. It makes very good time in still water and down stream, but not so well against a heavy current. Can I change the wheel to advantage? A. We could not tell you without having more data. 2. If I wish to drive it by the engine at the bow, would a shaft and bevel gear answer better than a belt and pulleys? A. You will find that gearing makes the most satisfactory connection.

(14) G. M. says: I have a packing house, and melt the heads and scrap in an iron tank, putting them in quite fresh and clean, using live steam at about 40 lbs. pressure. The lard is of a good white color, but has a burnt smell with it. How can I take it away? A. Use steam of lower pressure in future. We scarcely think that you can remove the smell from that already made. Some of our readers, however, may be able to help you with their experience.

(15) E. R. M. asks: With magnetized iron or lodestone, does the attraction vary as the square of the distance? A. Yes.

Can it be truly said that water raised by the Archimedeal screw flows down a series of inclined planes? A. Yes.

Has the question of a cannon on a train, fired in an opposite direction, been discussed in the SCIENTIFIC AMERICAN? A. Yes. See p. 273, vol. 32.

(16) C. K. asks: In working a suction and force pump, all in good order, will it force more water through a hose 2 inches in diameter without a nozzle on than with a 1 inch nozzle? A. No, unless the pump leaks.

(17) H. H. W. asks: Why is a thimble skein wagon more easily drawn through mud or sand than an iron axled wagon of smaller dimensions? A. When this is the case, it must be due to difference of fitting. We doubt if it is universally true.

(18) W. P. C. asks: At what angle above the horizon should a hose be held for the furthest horizontal play? Is there a rule for calculating the relation between the vertical and horizontal play of the same stream? If a pipe is held to play vertically, and throws a stream 200 feet in that position, and is then inclined to play horizontally, how far should it throw? A. There are rules, approximately correct, to be found in any good treatise on hydraulics. The experimental data on which these rules are founded are, however, rather limited.

(19) J. F. G. asks: 1. What is the proper name for a loop in a pipe, to allow for expansion? A. An expansion joint. 2. I have made an engine of 2 1/2 inches bore by 4 inches stroke. Can you give the horse power? A. See p. 37, vol. 33.

(20) A. W. A. says: I want to run a circular saw mandril; saw is 60 inches diameter, at right angles to line shaft. To accomplish this I have thought of three modes. 1. By bevel gear. 2. By running a half twist belt from line to countershaft, countershaft running directly over line shaft, at a distance of 12 feet. The pulleys on both shafts are to be 30 inches in diameter and of 15 inches face. 3. To turn a corner by means of two loose pulleys in a perpendicular shaft belt (12 inches wide) to run direct from line round loose pulleys to countershaft. Do you think either of these plans is practicable? A. Try the second plan, if the countershaft can easily be arranged.

(21) H. C. D. asks: How many lbs. to the square inch of heated air will it require to run a sewing machine? How large should be the cylinder? What should be the size of the air chamber, and will a kerosene lighted wick be sufficient to expand the air to get the required pressure to run said machine? A. Your questions are too indefinite. It must be evident to you that either the pressure of air, or the size of cylinder, must be fixed as a preliminary operation. We do not think that you can get along with a kerosene lamp unless it is of very unusual dimensions.

(22) W. J. says: 1. I think of making an upright boiler, 13 inches in diameter and 3 feet high with 28 smoke tubes of 1 inch diameter and 1 foot long, arranged around the circumference of the boiler, and 58 circulating tubes 1 foot long, 1 inch diameter, dropping into the fire, screwed well into the crown sheet. The crown sheet is to be stayed to head sheet with four 1 inch stays, 4 1/2 inches apart, and there is to be 1 inch water space around the fire stayed with 3/8 inch stays, 3 inches apart. Shell is to be of 3/8 inch, crown and head sheets of 1/2 inch. Is this a good way to build a boiler to put in a skiff 18 feet long by 4 feet 6 inches beam? A. The boiler will answer very well. 2. What pressure steam can I safely carry? A. You can carry 100 lbs. of steam. 3. What size of engine (slide valve) will it furnish with steam? A. One 3 inches diameter by 3 inches stroke. 4. If it would drive an engine 3 inches diameter by 3 inches stroke, would it be better to put in two cylinders whose united area would equal the single cylinder? A. The single engine will be best. 5. What size and pitch of wheel would you recommend? A. Use a propeller with pitch of 2 1/4 or 3 feet.

(23) F. D. G. asks: How can I clean finger marks off ground glass? A. Try rubbing the spots for sometime with a little tripoli or benzole.

(24) E. S. D. and others.—The zinc in the battery is the positive element and the copper the negative.

(25) C. P. E. says: I have an upright boiler 20 inches in diameter by 60 inches high, with 6 two inch tubes 36 inches long. The grate is 4 inches in diameter. I am building an engine 5x5 inches; is boiler large enough for it? A. No.

(26) S. K. H. asks: Will a piece of bronze statuery, placed on a granite monument exposed to the weather, stain the granite? A. Yes; slightly.

(27) C. W. A. asks: What is the simplest galvanometer that will determine the relative intensities of the different galvanic elements? A. Take an ordinary pocket compass and wind a hundred feet of No. 18 insulated copper wire around it.

(28) E. M. B. says: I have an office telegraph of three stations, using No. 18 gage uncovered copper wire. When first put up, the wires were run as much as possible in the air, and the bell sounded fairly; but the wires being unsightly, I took them down and ran them round on the mop board; then the bell sounded, first faintly, then not at all. Battery is three Leclanché cells. I put a handful of sal ammoniac in the jar, adding water as it evaporates; the porous cell is sealed, so I have not troubled that. What is the matter? A. Insulate your wires by fastening them to porcelain knobs. 2. I have read the article on lightning on p. 145, vol. 31. Shall I connect my main lightning conductors with my 1 inch lead water pipe in the cellar, which is distant from the 9 inch iron street main about 20 feet; or shall I connect through the roof with the feed pipe of water tank which is in the attic, and of course is a continuation of the main feed pipe from cellar? A. Connect with both. The more earth connections you have, the better.

(29) W. B. H. asks: Please give a list of the metals in the order of their ability as electric conductors. A. Silver, copper, gold, aluminum, zinc, cadmium, platinum, cobalt, iron, steel, nickel, tin, thallium, lead, arsenic, antimony, mercury, bismuth, sulphur. Of alloys, brass is between cadmium and platinum, and German silver between tin and thallium. Graphite is between bismuth and sulphur.

(30) G. S. says: I am building a screw press, for which I have a worm wheel of 24 inches diameter and 2 inches pitch. The worm is 6 inches in diameter. With such a worm and wheel, how large a screw shall I require to lift 100 tons to sustain the load for 1 hour? A. This depends on the amount of power applied to the worm. 2. How can I calculate the power required to work such a press? A. Consult Haswell's "Pocket Companion." 3. Is a cast iron table 6 inches thick, 16 inches wide, and 36 inches between supports, able to bear 100 tons in the middle? A. Not with safety.

(31) E. L. C. says: 1. I am building an elliptic spur gear wheel to work on fixed centers; transverse axis is 14 inches, conjugate axis 8 inches. The wheel has 12 teeth. I soon found that the string trammels and compasses would not do for the curve, being too flat, as the pitch curves must touch on the line of centers throughout the revolution, the distance between centers being 11 inches. A. Consult Camus "On the Teeth of Wheels." 2. What is the best shape for the teeth? A. Make epicycloidal teeth.

(32) D. F. C. asks: 1. What is the proper way to set a thread tool to cut a gas pipe tap? A. By the taper. 2. If I use a lathe with a taper attachment, should the tool be set by the taper or by the face plate? A. By the taper. 3. Suppose I use a common lathe without a taper attachment, should the tool be set by the end of the tap or by the taper? A. By the taper.

(33) H. H. C. asks: Will a horizontal copper boiler, 4 inches in diameter by 10 inches long, supply a cylinder 1 1/2 x 1 1/2 inches, with sufficient steam to drive a boat 8 1/2 feet long at 4 miles an hour? A. No.

(34) M. R. says: A friend holds that a crank pin revolves on its axis when the engine is in motion, inasmuch as it is impossible for a body to present the same side first up and then down without turning on its axis. Will you give an explanation and set the matter at rest? A. We think you might find some more profitable subject for discussion. It is a very easy thing, however, to try the experiment, attaching a pointer to some part of the crank pin, if such a demonstration is required to convince any one.

(35) S. G. W. W.—It is best to have the valve of a steam engine close quickly, but it is well to have the ports closed when the piston has completed 1/2 of the stroke at the farthest.

(36) E. H. asks: 1. How can I prevent fish oil from congealing in cold weather? A. The best method is to keep the vessel containing it enveloped in some non-conducting substance, such as straw, sawdust, woolen fabrics, etc. 2. By what process can I transform it into paint oil? A. If you will send us a sample of the oil you mention, we shall be better able to answer your question. You do not state the variety.

(37) E. E. K. says: I have a well of water which is perfectly clear and has a very slight mineral taste. It is extremely hard, and rusts off the iron hoops on well buckets at a surprising rate; when boiled in an iron tea kettle, it leaves a thick rusty coating. It is found in a stratum of hard blue sandstone. What kind of water is it, and is it likely to be wholesome? A. Send us a sample of the water in question, marked plainly with your name and address, and we will test it for you.

(38) J. H. N. asks: 1. How is nitroglycerin exploded? A. It is exploded by means of electric fuses and by fulminates. 2. Is it sure to explode if struck a heavy blow? A. Yes. 3. How are the following exploded: Mercury fulminate, pyroxylin, picric acid, potassium picrate, barium picrate, strontium picrate, lead picrate? A. All these are exploded either by friction or percussion.

(39) H. A. H. asks: 1. If the conducting power of platinum is 100, what is the relative conducting power of an ordinary carbon? A. 0.0246. 2. In making a silver solution by battery process, a spongy substance was found at the cathode. What is its chemical composition, and how can I avoid its formation? A. Quantity of current too small for the solution. Increase the surface of the zincs.