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Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at the office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) A. V. P. asks the style and size of lens and focus, etc., suitable for a camera obscura for outside sketching. A. A plano convex lens of 2 inches diameter, and 2 feet focus, makes a very convenient proportion of picture for sketching. A sharper defined picture may be made by using two 30-inch focus lenses, 2 inches diameter, in a tube flat sides outward or back to back, 4 inches between the lenses.

(2) P. G. asks: 1. Will a windmill lift surface water through a 1½ inch pipe to a tank 40 feet higher than water level, distant 400 feet? A. A windmill will *force* water the distance and height named, the quantity depending upon the power of the mill. 2. Would it do to carry water for drinking purposes through galvanized pipe? A. Galvanized iron pipe is largely used for conveying water, and is not considered very unhealthy if the water is cold and not allowed to stand in the pipe. Cast iron pipe is better, however.

(3) B. K. F. asks what the mode of printing from engraved or stamped music plates is like. A. Music printing is done in the same way as copper plate printing. The plate is covered with ordinary printing ink by a dapper (plate warm enough to handle easily without blistering the hands); rub off the excess of ink with a rag, then rub the palm of the hand with some whiting and lightly rub over the face of the plate. This requires a little dexterity to wipe in different directions, so as to leave the plate surface bright and the ink in the lines. Then place the dampened paper upon the plate and pass under the roller, which should be blanketed. The press is a rolling platen, with a roller 6 or 8 inches diameter over it and rollers or wheels under it.

(4) G. L. G. asks: What is the pressure per square inch on a steam cylinder 1 foot in height, 8 inches in diameter, when Fahrenheit thermometer shows 420°, and will a brass cylinder same dimensions, a quarter of an inch thick, stand the pressure? If not, how thick necessary? A. 296 pounds above atmosphere. Yes, if perfectly sound, but we would recommend that it be not less than three-eighths of an inch thick, and tested to 450 pounds by hydraulic pressure before submitting it to that pressure of steam, viz., 296 pounds.

(5) O. H. T. asks (1) how to prepare green paint which will stand the heat of steam and not scale off and change color, for painting a steam engine. A. Use a chrome green ground in Japan, and put on in several thin coats, and then coat it over with a good body wearing varnish. 2. Please give the dimensions for making a water tank which will hold four barrels of water. A. Make the tank to hold 16¼ cubic feet, or if round, 2½ feet diameter, 4 feet 2 inches high, or 3 feet diameter, 2 feet 10 inches high. If square, 2½ feet square by 2 feet 8 inches high.

(6) S. S. G. writes: 1. Length and size of bore, weight and shape of ball, weight of powder, and all other conditions being the same, which will throw ball the greater distance—a smooth bore or rifled gun? Does not rifling impede the discharge of the ball, and does it do any other good than to insure greater accuracy to the direction of the shot? A. Smooth bore is best for round bullets. The rifling is necessary for long bullets. 2. What horse power is required to sustain 33,000 pounds immovably without other support? A. Horse power is supposed to be a *moving* power, and is not used in sustaining weight immovably.

(7) L. W. McC. writes: We are running an old fashioned pair of slide valve engines, cylinders 11 inches bore, 36 inches stroke, 70 pounds boiler pressure. We have some controversy on several points. We want not so much a maximum of power (that being ample) as to get say 40 to 70 horse power with a minimum of coal. What size steam and exhaust ports ought they to have? What size steam and exhaust pipes? At what point of stroke ought engine to receive steam to insure economical or harmonious working together? Would we get any very perceptible reduction of fuel, by reducing the driving pulley (which is 9½ feet), enlarging the driven (4 feet), and increasing speed (now 64)? If so, at what speed and pressure of steam would we get the highest economy? Would the saving, if any, be attributable exclusively to increased speed and pressure? Or, would the reduction of driver of itself contribute to the result? One engineer says the economy would be the result only of increased piston speed and pressure, while another says the change in pulleys would also help. Is there any efficiency in ammonia fortior in dissolving or loosening scale on boiler plates and tubes? If so, how used and in what quantities? Would the use of crude petroleum prevent scale? If so, how used, and in what quantities, and is it safe? We use a tubular boiler 60 inches by 16 feet, with 90 three inch tubes, fed from spring water strongly impregnated with lime and (supposed) magnesia, which forms scale rapidly and gives us trouble. The water passes through an old boiler, and is heated with exhaust before being pumped into boiler. Can you tell us how to get rid of this scale and prevent it? We have used various compounds, also soda, tanner's liquor, etc., with only partial and varying results. How many feet of grate surface ought the furnace to have? Distance from grate bars to boiler, from grate bar to bottom of ash pit? What size opening or throat at bridge wall and at back end of the boiler? A. You would not materially economize in fuel by altering the ports or changing the steam or exhaust pipes. 3 inch steam and 3½ inch exhaust pipes are ample for each engine—4 inches main steam. Knowing the point of cut-off of the valve would enable you to decide the best running adjustment of the valve. Cutting off at one-third to one-half the stroke for engines without automatic cut-off is fair practice. The automatic cut-off engines are made to vary from one-tenth to one-half, according to the work. There are other points that are of great importance in the condition of an old engine that require looking after, such as cut faces upon the slide valves, loose piston from wear, the sustaining springs giving out and allowing the piston rings to run loose. The leak of steam at these points is very much overlooked in old engines. Cylinders should be rebored when they are found to be out of shape. An engine that has run ten to fifteen years, especially if of the horizontal kind, needs rehoring and new rings. Much of your loss in economy is derived from the use of two cylinders instead of one of equal power. We do not recommend change in the relative size of pulleys or speed. The steam pipe should be well felted, and the top of the boiler covered 2 or 3 inches deep with fine light ashes if now exposed. As you say nothing about the kind of fuel used, we are to suppose that you are using bituminous coal, which requires a peculiar method of firing. For this coal the boiler should be 3 feet above the grate. Grate 5 feet by 5 feet, or 25 square feet, if you are only using about 50 horse power. Your boiler is rated 60 effective horse power. Ash pit should be two feet deep from top of grate; area over bridge wall equal to area of tubes. Always keep a good flue brush on hand, and see that it is used often and thoroughly; for bituminous coal, twice a week. In feeding the coal never cover the whole grate at once with fresh coal, but feed at the front and gradually push the coal back, always keeping the bright fire at the back of the grate. This tends to consume the smoke. As you have tried nearly all of the chemical compounds for scale, we can only recommend you to try some of the mechanical boiler cleaners.

(8) W. T.—The vernal colure for 1884 is 28° 15′ 26″ west from the point of correspondence of the signs of the zodiac and the signs of the constellations, the time of which is supposed to have been fixed as a reckoning point 140 years B.C.; the precession of 50·26″×2,024 years giving the above position for this year—28° 15′ 26″. You will find Norton's Astronomy a sufficient guide in any mathematical calculation that you may require. The Nautical Almanac for this year will give you the exact data.

(9) J. H. D. writes: I have been told that the sun has receded in the equinoctial point of the ecliptic until, though the equinox nominally takes place in Aries (that is, the sign), it really happens in the 30th degree of the constellation Aquarius. Is it so? A. The zodiac is divided into 12 equal parts of 30° each; the division commencing at the vernal equinox, which corresponds with the first point of Aries, following from west to east in the order of the signs. The first point of the sign Aries is the beginning of the reckoning for right ascension and longitude. The signs of the zodiac corresponded with the constellations of the *same name* about 140 years B C., at which time the arrangement of the zodiac and the naming of the constellations was supposed to have been established. Since then the equinoctial and solstitial points have retrograded nearly one sign; so that now the vernal equinox, or first point of the sign Aries, is near the beginning of the constellation Pisces. In consequence of the precession of the equinox the *star maps* have to be corrected from time to time, the older maps not representing the true reckoning in right ascension. Thus from precession alone the equinox has receded in 2,024 years 28° 15′ 26″, or 50·26″ per year.

(10) H. B. G. writes: The distance from the mouth of the Cumberland River to Nashville, Tenn., is 200 miles, with a fall of fifty feet, or 3 inches to 1 mile. Width of the Cumberland River is about 175 yards. Now, in case of the Ohio River being very high, will it affect the flow of the water in the Cumberland River at Nashville? A. A large rise in the Ohio at the mouth of the Cumberland would very sensibly affect the flow at Nashville. We do not know the topography of the stream, and cannot be expected to give an intelligent answer upon the mere data of 200 miles with 50 feet fall, or 3 inches to the mile. The depth and volume of water flowing in the Cumberland has much to do with the amount of back water from a rise in the Ohio. It is also necessary to know the amount of rise in the Ohio in order to estimate the rise at Nashville.

(11) T. L. asks: What is zylonite? What is vulcanized fiber? What is the correct name of the flaceous plant known commonly as "corn geranium"? A. Zylonite is fiber of cotton or linen and sometimes wood pulp combined with camphor by the alcoholic process, and pressed into a homogeneous mass, or only another name for celluloid. Vulcanized fiber is fiber changed by a chemical combination through the aid of heat. The word vulcanized was coined in the rubber trade. Ask your florist about "corn geranium."

(12) C. A. C. asks: Who established the first locomotive works for building railway engines, and when? A. We think Geo. Stephenson, in England; probably Ross Winans established first works in this country.

(13) W. W. E. asks (1) the rule to find what quantity of water will flow through a pipe when you have the size of pipe, length of pipe, and fall given. A. The result is affected by the character of the pipe (material) and bends. Rule given in Haswell's Pocket Book, page 385:

$39{\cdot}27\sqrt{\frac{h\,d^5}{l}}$ = volume of discharge in cubic feet per second, in which h = head in feet, d diameter in feet, and l = length in feet, in this case,

$$39{\cdot}27\times\sqrt{\frac{50\times 0{\cdot}166^5}{200}}.$$

2. I would like the rule for finding the pressure, friction, velocity, and quantity of water delivered, when you have all the above points to compute by. A. The pressure is, 0·4335 pound per square inch for each foot of head. In Haswell's Pocket Book you find the rules of hydraulics fully treated, also in Trautwine's Engineer's Pocket Book.

(14) F. W. R. asks how to calculate the pressure of water through an iron stand pipe 20 feet high, 2 inches in diameter, water flowing in at the top and discharging at the bottom through an orifice of a quarter of an inch in diameter. Should the pressure be increased or diminished if the stand pipe were reduced to 10 feet high and diameter increased to 4 inches? A. The pressure is determined by the height or head maintained in the stand pipe; the diameter, or flow into or out of, does not affect the pressure. The pressure is 0·4335 pound per square inch for each foot of height or head of water.

(17) V. B. asks: What is used in graining machines to stain poplar lumber in imitation of Spanish cedar? A. Just exactly the composition of the stain used we cannot say, but quite likely a solution such as can be made by boiling ½ pound madder and 2 ounces logwood chips in a gallon of water and brush well over while hot; when dry go over the whole with pearlash solution, 2 drs. to the quart. If not exactly the shade, it can be modified by altering the proportions of the ingredients.

(21) S. G. J. asks: For what is talc used? Is there more than one grade or quality of it? About what price will it bring in market? A. Talc is used extensively in soap making, and also for dressing sheep skins, leather gloves, etc. The domestic talc is used in the manufacture of paper, replacing terra alba for this purpose. A small amount of talc enters into the composition of some lubricating compounds. The talc imported is considered to be of a superior quality as compared with the domestic. The average spot value is about $12.00 per ton.

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April 8, 1884,

AND EACH BEARING THAT DATE.

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