Business and Personal.

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Notes & Queries

It has been our custom for thirty years past to devote a considerable space to the answering of questions by correspondents; so useful have these labors proved that the SCIENTIFIC AMERICAN office has become the factotum, or headquarters, to which everybody sends, who wants special information upon any particular subject. So large is the number of our correspondents, so wide the range of their inquiries, so desirous are we to meet their wants and supply correct information, that we are obliged to employ the constant assistance of a considerable staff of experienced writers, who have the requisite knowledge or access to the latest and best sources of information. For example, questions relating to steam engines, boilers, boats, locomotives, railways, etc., are considered and answered by a professional engineer of distinguished ability and extensive practical experience. Inquiries relating to electricity are answered by one of the most able and prominent practical electricians in this country. Astronomical queries by a practical astronomer. Chemical inquiries by one of our most eminent and experienced professors of chemistry; and so on through all the various departments. In this way we are enabled to answer the thousands of questions and furnish the large mass of information which these correspondence columns present. The large number of questions sent—they pour in upon us from all parts of the world—renders it impossible for us to publish all. The editor selects from the mass those that he thinks most likely to be of general interest to the readers of the SCIENTIFIC AMERICAN. These, with the replies, are printed; the remainder go into the waste basket. Many of the rejected questions are of a primitive or personal nature, which should be answered by mail; in fact, hundreds of correspondents desire a special reply by post, but very few of them are thoughtful enough to inclose so much as a postage stamp. We could in many cases send a brief reply by mail if the writer were to inclose a small fee, a dollar or more, according to the nature or importance of the case. When we cannot furnish the information, the money is promptly returned to the sender.

A. B. W. should put his questions as to saw and shingle machines into comprehensible language.—T. J. P. will find directions for setting a boiler on p. 339, vol. 33.—J. G. E. and many others are informed that there is no formula for the horse power of a boiler.—E. L. N. will find directions for the decalcomanie process on p. 275, vol. 34.—O. C. S. can gild the devices on china ware. See p. 43, vol. 29.—R. T. C. does not give sufficient data as to the wire becoming brittle by exposure to the atmosphere.—T. W. will find directions for making oxygen on p. 75, vol. 32.—A. H. (of Niedergrund, Bohemia) can cut gas retort carbon with a hand saw.—L. F. C. should give his tinplate a coat of oil paint, and let it dry. He can then fasten cloth to it with waterproof glue; see p. 43, vol. 32. For a description of the compound engine, see p. 243, vol. 32.—D. McI. will find on p. 218, vol. 34, directions for making the so-called eggs of Pharaoh's serpents. Asbestos is regularly advertised in our columns.—W. G. W. will find directions for nickel plating on p. 235, vol. 33.—J. O. F. will find instructions for making friction matches on p. 75, vol. 29.—C. W. will find a recipe for a cement for mending crockery and glass on p. 379, vol. 32. For mending leather shoes, see p. 119, vol. 28; for mending rubber boots, see p. 203, vol. 30.—H. C. B. is informed that tattooed marks on the arms are done with gunpowder or Indian ink. For removing the marks, follow the directions on p. 331, vol. 30.—S. H. will probably find that any good cheese, that is soft, will do to make cement.—S. will find that the cement described on p. 80, vol. 31, does not dissolve in water and does not become brittle with age.—J. M. McG., Jr., should read Paddlefast's articles on boat building in the SCIENTIFIC AMERICAN SUPPLEMENT.—H. & R. can dissolve rubber by the process described on p. 119, vol. 28.—J. W. S. can sensitize a piece of paper or metal by the process described on p. 132, vol. 35. As to changes of color by heat, see p. 201, vol. 36. As to a weather glass, see pp. 35, 67, vol. 36.—P. does not give sufficient data as to the hammering in his boiler.—W. C. P. is informed that the preparation is to be taken internally. The human hair is referred to in the question.—T. S. will find directions for fastening rubber to iron on p. 409, vol. 33.—S. R. C. will find a description of a gyroscope on p. 91, vol. 31.—T. K. & B. should know better than to believe in the possibility of an instrument indicating where gold lies buried in the earth.—C. W. K. is mistaken as to the horse power of the engine. See p. 33, vol. 33.—W. T. K. can bleach ivory by the process described on p. 10, vol. 32.—W. S. will find answers to all his queries as to lightning rods on p. 277, vol. 35.—H. R. will find directions for silver-plating without a battery on p. 299, vol. 31.—R. M. will find a formula for the power of an engine on p. 33, vol. 33.—A. I. will find on p. 123, vol. 31, directions for bluing gun barrels.—W. A. W. will find something on the expansion of mercury by heat on p. 354, vol. 26.—O. B., A. G., A. J. B., J. C., R. D. E., F. J. W., N. B., A. P. Q., F. J. N., R. B., C. W., F. C., W. L. McL., A., C. A. R., D. H., H. L., and many others, who ask us to recommend books on industrial and scientific subjects, should address the booksellers who advertise in our columns, all of whom are trustworthy firms, for catalogues.

(1) W. W. H. asks: Please tell me the ultimate weight that the two following girders will bear? One is a cast iron girder, nearly of the Hodgkinson proportions, 7 inches wide at base and 8¼ inches high; and the other is a wrought iron girder or flat bar size, 5 inches x ¾ inch. Both girders being fixed and anchored in strong walls, and the span 20 feet. Please give an arithmetical and not an algebraic calculation. A. Calculated by the usual formulas, the center breaking loads would be: Cast iron beam, about 3,000 lbs., wrought iron beam, about 2,300 lbs.

(2) F. A. B. asks: What is the weight of a missile, and the greatest distance that the bolt could be thrown by the large Krupp gun, that was on exhibition at the Centennial? A. Weight of ball, 1,200 lbs. Probable range, between 4 and 5 miles.

(3) F. B. asks: 1. As a boy swings a bucket of water over his head and it does not fall out, how fast would a 10 foot flywheel with globular cavities on inside rim facing center of wheel have to turn to hold balls of any substance dropped or placed in them? Would there be a different effect if the balls were composed of different materials, as wood, stone, or iron? A. About 25 revolutions a minute, whatever the material. 2. On the principle of a top, a heavy wheel can be turned readily after starting. What difference will it make if, instead of a wheel, it should be as a large governor with heavy balls on arms 8 or 10 feet long, and how much more power would have to be expended to raise those balls on a spiral incline to near the level of their attachments? A. The height of the balls varies as the square of the revolutions. 3. Suppose a perpendicular shaft, moved by cog or belt gearings, had four or more balls suspended by chains instead of stiff arms, would they not assume a similar position? A. Yes, other things being the same. 4. Suppose a tube arranged to turn and describe a circle, with outer end closed, but with an opening below, no wider than the cross section of tube, but giving perpendicular surface enough for a ball to rest against, if the ball could be held there by springs or otherwise until great velocity was acquired and then released, would it not remain there? A. Yes, as we understand your meaning. 5. I have seen a performer manipulating a top which at one time appeared to turn when standing out at right angles from the perpendicular stick that supported it. What held it up? A. Centrifugal force, which was enough to overcome the attraction of gravitation. 6. Does such a top weigh any less acting in that position than when at rest? A. No; it weighs just as much when revolving as when not.

(4) H. T. P. asks: Which has the most steam-generating capacity, and which is capable of the greatest resistance, a single boiler 60 inches in diameter and 18 feet long, or two boilers each 36 inches in diameter and 18 feet long? A. Generally, the two smaller boilers would make the most steam and sustain the greatest pressure.

(5) A. S. D. says: I have a canal about two miles long, which I use as a head race for water power. It runs along the foot of a hill and heavy rains wash dirt into it. How can I clean it out without drawing off the water? A. It would probably be necessary to use a dredging machine.

(6) W. O. R. asks: What is meant by the pitch of a steamer's propeller being 3 feet? A. It means that, if the propeller were working without slip, like a screw in a nut, the vessel would advance 3 feet at each revolution.

(7) J. A. O. Q. asks: Does not the Great Eastern consist of three complete ships? A. No; but the vessel is built with a double hull, and is divided by bulkheads into several compartments.

(8) W. D. S. says: Three men want to carry a bar of iron 9 feet long, weighing 300 lbs. One man carries an end. At what distance must the other two place a bar so that an equal weight (or 100 lbs.) will fall on each man? A. Three feet from the other end of the bar, if it is uniform in section.

(9) J. T. H. asks: Is tallow a good lubricant for cranks making 200 revolutions? Would oil be better? A. Oil is generally better than tallow for crank pins, and there are some special forms of lubricants that answer very well for crank pins and journals moving at a high velocity.

In an engine (double and vertical) 9 x 12 inches, making 200 revolutions, with a band wheel 4 feet in diameter by 14 inches face and 3 inches thick, would there be any danger of breaking the wheel by placing a weight sufficient to balance weight of pistons? A. We think there will be no danger in attaching the counterbalance.

(10) W. M. K. says: What is the rate of increase of friction in proportion to speed of a thin smooth body (such as a propeller blade) in passing through water? What proportionate amount of power would be required to double any given number of revolutions of a fixed submerged screw propeller? A. Within moderate limits, the power is supposed to vary approximately as the cube of the number of revolutions, but the exact law of the variation is not definitely settled; and when the speed becomes very great, the power is supposed to increase in a higher ratio than the cube, but experiments have not been sufficiently extended to establish a general law.

(11) G. B. says: Two bodies of metal of equal weight are to slide over a planed surface. One of these bodies has a bearing surface (supposed to be a perfect friction contact), upon the table it slides on, of 6 square feet; the other body has a bearing surface of only 6 square inches. Will it require more power to slide the body having 6 square feet bearing than it will to slide the one having only 6 inches, or will the required moving power be equal? A. According to the commonly accepted law, the friction depends upon the weight and not upon the area of contact. This rule, however, has some limitations, especially when the area of contact is so small that the pressure per square inch is sufficient to produce abrasion.

(12) H. D. M. asks: Is the phosphorus lamp described on p. 266, vol. 31, of any use? A. The phosphorus lamp may be made and used as directed in the answer, but the light which it emits is extremely weak—a mere phosphorescent glow. It is sufficient, however, in a damp atmosphere, to illuminate the dial of a watch, held close to it, so that with ordinary eyesight the time may be noted in the absence of other luminants without much difficulty.

(13) S. asks: Is there anything that will erase India ink lines from drawing paper? A. Nothing that we know of, except a good steel eraser or sanded rubber.

(14) R. H. & Co. say: 1. In our business we use brads with malleable cast iron heads, for the support of lightning rods, and we galvanize them to prevent rusting. When we use them, we find the cast iron so brittle that a great many of them break. We can come to no other conclusion than that the galvanizing makes them brittle. Are we right? A. Galvanizing iron does not make it brittle. 2. Is it necessary to throw articles that are galvanized into cold water immediately after taking out of the vat? A. No. They should not be thrown into cold water.

(15) B. F. A. asks: How can I stain wood blue, the shade of the field in the American flag? A. Brush it over with a strong, hot solution of nitrate of copper in water, and then go over the work with a hot solution of carbonate of soda (2 ozs. to 1 pint water). 2. Boil 1 lb. indigo, 2 lbs. woad, and 3 ozs. alum in 1 gallon water, and apply with a brush.

(16) C. M. T. asks: What will make photograph paper so transparent that it can be painted in oil colors on the back of a picture, so as to give a life-like color to the picture, or what preparation will make the paper perfectly transparent? A. Try Canada balsam. Paper cannot be made perfectly transparent—only translucent.

(17) C. D. H. says: Our water supply is from springs, and is soft. About two years ago, plain iron pipes were laid; and the 1 inch pipes have become so filled with a very hard rust or scale as to nearly cut off the supply. It forms in irregular masses, and adheres very firmly to the pipe. Is there any known method of preventing or removing the same without taking up the pipe? A. We do not know of any practical method for accomplishing this.

(18) C. K. asks: Can a good polish be put on copper by the recipe given on p. 326, vol. 32, and will it last a reasonable time? A. The recipe has been well recommended. It is better to use a larger proportion of alcohol than is there indicated. See also p. 242, vol. 34.

(19) B. C. M. asks: How is pyroligneous acid (wood vinegar) made? A. It is obtained by distilling wood in iron retorts, resembling those used for making illuminating gas. The condensed products of the distillation contain, with tar and numerous other bodies, crude pyroligneous acid or wood vinegar, amounting in a well conducted distillation to about 7 or 8 per cent of the wood employed. The gas that accompanies the liquifiable distillates is conducted to the furnace under the retort, and serves to continue the distillation without other fuel. In purifying the acid, it is first saturated with lime, evaporated to dryness, roasted at a moderate temperature so as to free it from volatile matters, and decomposed in a retort, having a helm of copper and a condenser of tin or silver, with hydrochloric acid (90 parts acid to 100 acetate of lime), and the acetic acid distilled.

(20) G. B. L. says: I built an oil house last fall, and lined it inside with inch boards, packing space between inside and outside boarding with pine sawdust. The oils on hand are coal oil, linseed, fish, elephant, seal, etc., also turpentine and benzine. The leakage from barrels seems to have thoroughly saturated the floor, and most likely the sawdust has absorbed whatever came in contact with it. Is there any danger of spontaneous combustion during the heat of summer? A. Yes, it is dangerous.

(21) A. H. says: Your correspondent, P., p. 212, vol. 36, seems to overlook the fact that a lightning rod having the deep earth terminal generally recommended by scientific authority, and which he does not favor, would, at the same time, have all the advantages (?) of a rod terminating "at or just beneath" the surface, such as I understand him to recommend. For, before reaching the deep terminal, the rod would come in contact with the surface of the earth; and if the electricity find there or elsewhere a better conductor, the greater portion of it would leave the rod for that conductor, instead of following the rod to the end. With a properly constructed rod, terminating with an extensive metal surface, buried in contact with such worthless scraps of metal as the clippings from tinshops, old tinware, etc., or fine charcoal, or both, in constantly (not "almost always, during a thunderstorm") moist earth, which in many instances would be most easily found in the cellar bottom: there is little probability that the electricity will leave the rod to "pass off on the wet surface" or do damage.

(22) J. P. says, in reply to D. W.'s query as to the sudden welding of a millstone spindle to its step: In the New York *Journal of Commerce*, in the first year or two of its publication, may be found an account of a similar occurrence. A spindle (I think it was of a millstone) was suddenly welded to the support upon which it was running, in the very same manner, as in the case mentioned in your paper. I believe it occurred in the year 1827, or the first half of 1828.

(23) W. D. says, in reply to D. W.'s query as to the welding of a millstone spindle to its step: I have seen this done a good many times. To prevent it, plane a groove in the step ⅛ inch wide and ¼ inch deep; harden the foot of the spindle and step as hard as possible, polish both after hardening, and you will have no trouble about welding together. The oil running through the groove prevents its welding. Use the best of sperm oil, and keep the step level.

(24) W. W. T. says, in reply to the query about the welding of mill points to their steps: I have had several such jobs to repair. The weld is perfect, and has always broken when struck in a different place from the point of union. I have to anneal the step and turn off the part of point left; and I find no check or line marking the place of contact.

(25) B. A. J. says, as to the sudden welding of a mill spindle to its step: I once had a spindle act in the same way while running in a cup of oil.

(26) W. C. says: Please give me a recipe for making powder for mining coal? A. Coarse-grained gunpowder is usually employed. The materials are first perfectly dried and separately reduced to impalpable powders. These are then sifted together, moistened with water, and ground for some time between large millstones kept constantly moist with water. The wet powder is then collected into large lumps and carefully dried. These lumps are grained by bringing them in contact with sharp teeth fixed upon the periphery of a revolving wheel, and agitating in suitable sieves to separate from the finer powder. The powder consists of 76 parts of niter, 13 parts of charcoal (often mixed with a little wood pulp or sawdust), and 11 parts of sulphur.