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.

J. P. D. will find directions for colored whitewash on pp. 235, 236, vol. 36.—A. M. will find directions for electroplating on p. 59, vol. 36.—H. P. can recover silver from photographers' waste by the process detailed on p. 250, vol. 27.—A. W. A.'s difficulty as to 64 and 65 squares in the puzzle can be solved by an inspection of the diagrams on p. 323, No. 21, SCIENTIFIC AMERICAN SUPPLEMENT.—I. A. will find a description of a magneto-electric machine on p. 195, vol. 34. A clock thus would go for 12 hours, and wind itself at the same time for 12 hours more, if such a machine could exist, would be a perpetual motion. As to tempering small drills, see p. 186, vol. 26.—R. B. can prevent rust on iron or steel by the means described on p. 26, vol. 25. For a recipe for a depilatory, see p. 186, vol. 34.—A. T. R. is informed that the hydrocarbon engine is reversible. —T. W. will find directions for making sand belts on p. 235, vol. 36.—M. G. should address a manufacturer of oxygen cylinders.—J. S. C., who inquires as to a water fountain, sizes of pipes, etc., should send us a sketch with dimensions.—O. L. is informed that the proper way to ascertain the relative strengths of corrugated and plain sheet metal is by experiment.—G. H. B. will find directions for making colored printing inks on p. 90, vol. 36.—P. M. will find on p. 250, vol. 36, directions for making a polishing starch.—C. H. B. can braze the ends of his brass plate to make a cylinder of it. See p. 219, vol. 36.—W. H. C. is informed that his method of fluting reamers is not new.—C. C. G. will find his method of raising coal or other weights impracticable.—E. S. G. had better test so simple an experiment and satisfy himself.—W. H. C. is informed that the most satisfactory plan would be to get his tools nickel-plated.

(1) J. H. N., of Christ Church, New Zealand, asks: Is the stearin from which the olein has been extracted by Dr. Mott's process fit to be made at once into good stearin candles, without any further treatment? A. Yes.

(2) B. B. says: I wish to express the strongest coloring matter from certain herbs, sage leaves, for instance. How can it best be done cheaply and quickly? Evaporation during several days, after boiling and simmering, has the effect; but it is inconveniently slow. The color produced is a medium brown. A. Dry the leaves, etc., thoroughly, and grind to a fine powder. Digest this for several days in enough warm water to thoroughly moisten it throughout. Then add enough wood naphtha to make a stiff paste, and after standing an hour transfer to a fine linen bag and express the thick liquid in a screw press. 2. Is there anything that will set the color? A. Try a strong hot solution of alum.

(3) H. K. F. M. says: I have a box made of Bohemian crystal. The cover, which was held to the box by a brass frame, has come apart from its frame. It seemed to have been cemented by a hard substance resembling plaster of Paris. How can I make it? A. Boil 3 parts powdered rosin for some time with 1 part of caustic soda and 5 parts of water; then stir into the soap formed one half its weight of plaster of Paris, and use immediately.

(4) F. N. Y. asks: Would a canvas bag, coated with a varnish made of india rubber dissolved in naphtha, be suitable to hold oxygen gas? A. Yes; but bags made of double pieces of cloth, cemented together with the varnish, are better.

(5) J. A. B. asks: Is there any difference between electricity and magnetism? A. Electricity and magnetism are supposed to be manifestations of the same force whose actions are produced at right angles to each other; the action which occurs in the line of polarization being called electricity, and the one at right angles to this line, magnetism. There is an important difference between them, however, as electricity is essentially a dynamic force, while magnetism is purely static.

1. Is not the idea of the world moving around the sun in an elliptic form absurd? A. No. 2. My idea is that the north star is the center of the universe, or in fact is the magnet that all the suns or fixed stars move around, and that the attraction of the pole of the earth, although it moves around the sun, is the cause of the change of seasons, or, in other words, the angle of light. A. There is nothing whatever to support the idea. But a supposed center of the universe has really been designated by some astronomers.

(6) P. S. asks: How much copper wire does it require to construct an electro-magnet that will uphold 100 lbs., and what size of wire should be used? A. Probably 500 or 600 feet of No. 14 copper wire would be sufficient with 3 or 4 very large size Grove cells and cores about 6 inches long and 1 inch in diameter.

(7) H. S. B. says: Water falls about 16 feet per second. My overshot water wheel moves about 4 feet per second. Do I in that way lose that percentage of the actual power of the water? A. Not necessarily.

(8) C. N. B. asks: Can a steam engine be worked with compressed air the same as with steam? A. Generally speaking, it can; but not in every respect.

(9) J. Y. says: If all the measures of length, surface, and capacity in the world, and all the weights were lost, by what means could new ones be made corresponding exactly with those we now have? A. It would be impossible, as all the measures in use refer to certain arbitrary standards.

(10) R. B. G. asks: If a horse be pulling at the end of a lever and traveling 3 miles an hour, how many lbs. pressure against his collar must he exert, to raise 33,000 lbs. 1 foot per minute? A. The force exerted by the animal will depend upon the length of the lever, which should be given.

(11) C. H. McK. asks: Would a pump so constructed as to create an incessant suction draw water an indefinite distance, or how far would it draw it? A. Such a pump would raise water no higher than any other that was equally tight.

(12) J. W. says: I wish to get some boilers made about 12 inches in diameter and 13 inches deep. I want them to stand a pressure corresponding to 400° Fahr. Do you think it would be safe to have them made of cast iron? A. We think it will be better to use wrought iron. Make the shell about $\frac{1}{16}$ of an inch thick.

(13) J. R. S. says, in reply to E. W. P., who says that he has an artesian well which does not flow; but from which he pumps by inserting a pipe inside the well tubing, and asks: "If we attach the pump to the well tubing directly, allowing no air to enter the tube, would it not be like trying to pump water from an airtight barrel?" If such were the case, the drive well would be a miserable failure; for in all drive wells the pump is attached directly to the tube. I would advise E.W.P. to attach his pump to the well tube direct, and he will gain three times the amount of water that he now gets. By having his pump attached to the well tube directly, the working of the pump creates a vacuum, and the atmospheric pressure on the earth's surface violently forces the liquid to fill the vacuum thus formed, thereby giving a much greater amount of water than can be otherwise obtained. It is a well established fact that more water can be obtained by the drive well than by any other. A. In our answer to E. W. P., it will be evident, we think, to most of our readers, that we only referred to the case in which the well had no connection with the atmosphere, when the pipe was tightly fitted. It appears, however, that it might have been better to have stated this more definitely, and we gladly embrace the opportunity afforded by the interesting letters of our correspondents. We would be glad to receive from J. R. S. some experimental data in proof of his assertion as to the great gain from a tight connection. This also answers J. T. G. and W. H. F.

(14) H. H. S. says: 1. Given, a boat with a 35 feet keel, of 6 feet beam, with fine lines; also a two-cylinder engine, each cylinder 4 x 5 inches; and a wheel 28 inches in diameter and of 3½ feet pitch. Will an upright boiler, with 135 square feet heating surface, and 4 square feet grate surface, be sufficient to run the engine at 250 or 300 revolutions per minute with 100 lbs. steam? A. With good coal and a forced draft, the boiler may be large enough. 2. What will be the probable speed of boat? A. In smooth water, 7 to 8 miles an hour.

(15) F. A. asks: What would be a safe outside pressure for a cylinder of wrought iron, ½ inch thick and 4 feet in diameter, and 8 feet long? A. According to tables given in Wilson's "Treatise on Steam Boilers," the working pressure for such a tube would be about 65 lbs. per square inch.

(16) F. M. M. asks: 1. How large must an engine be to run a boat 12½ feet wide, 75 feet long, drawing 4 feet of water, at the rate of 30 miles per hour, on a river or bay where the surface is smooth? A. We have some doubts as to whether these conditions could be fulfilled. 2. Do steamboats on the ocean use salt water in their boilers for steam, or do they carry fresh water? A. They ordinarily have surface condensers, so that the water of condensation is returned to the boilers.

(17) E. S. N. says: Please give your ideas as to how much water an engine 18 inches in diameter by 22 inches stroke, running at 145 revolutions per minute, at 80 lbs. steam, cutting off at about 18 inches, will require. We furnished an injector for one of the above dimensions, capable of throwing 900 gallons per hour. It was found to be insufficient, and I went to the mill to discover the cause, if possible. The manufacturers of the injector thought it ought to be large enough, and so did we. I found everything set up properly, and the piston and valve were evidently in good order. I finally measured the capacity of the tank which supplied the injector, and found that it drew 960 gallons per hour. A. We do not think the data are sufficient for an accurate calculation. It is possible, however, that some of our readers have made experiments on similar engines, and can give some useful information.

(18) T. W. asks: What size of breast water wheel, with a fall of 2 feet water, would it require to produce the same power as an overshot wheel of 4 feet diameter, 18 inches face, with a fall of 5 feet water? A. If the breast wheel gave the same efficiency as the other, it would require a face about 2½ times as wide.

(19) A. K. says: A. asserts that if a small and a large boiler be set side by side and connected with the top gauge cock of the two boilers, level, when they are first filled with water, and then steam is raised, that the water will not remain the same, that the pressure will be greater in the larger boiler, and consequently will force the water into the smaller one. B. says that the water will always remain the same as long as the boilers are connected; that the pressure on the water will be the same in both boilers, and therefore the water will always assume the same level in each. Which is right? A. The pressures sometimes vary in two boilers connected in this way; and they should be set in such a way that the water cannot be forced from one into the other under any circumstances.

(20) J. T. G. says: I notice your reply to W. G. in regard to pounding of a steam pump, in which you recommend the use of a larger air vessel. I think that W. G. can remedy the difficulty by allowing a small quantity of air to enter the pump cylinder at each stroke, which can be done without sensibly diminishing the amount of water delivered, provided the lift is not so high as to nearly equal the capacity of the pump. That would keep the maximum quantity of air in the air vessel, and I think that the air in the discharge pipe would have the effect of converting a comparatively rigid column into an elastic one. W. G. can easily try the experiment by running with the drain cocks at the end of his pump partially open; and if that remedies the difficulty, he might insert a small check valve opening inward to prevent the discharge of water during the out-stroke. If W. G. tries this, I wish that he would let us know the result through the SCIENTIFIC AMERICAN.

(21) G. H. says: Please decide the following: A. claims that a team of horses can draw a greater load when hitched close to it than when hitched at a distance of 10 or 20 feet. B. claims that, everything else being equal, distance makes no difference, and that the team could pull as many lbs. at a distance of 20 feet as it could at ten or less. Which is right? A. We incline to B.'s opinion.

Please tell me the relative power of conducting electricity of the principal metals. A. According to Matthiessen, the electrical conductivity of the principal metals, under similar conditions, is as follows:

Silver	100·0	Platinum	18·0
Copper	99·9	Iron	16·8
Gold	80·0	Tin	13·1
Aluminium	56·0	Lead	8·3
Sodium	37·4	German silver	7·7
Zinc	29·0	Antimony	4·6
Cadmium	23·7	Mercury	1·6
Potassium	20·8	Bismuth	1·2

(22) S. R. S. asks: How can lime, or rather phosphate of lime, be precipitated from cod liver oil, which is perfectly clear and said to contain 2 per cent of the phosphate? A. This can only be done by first destroying the organic matter of the oil, and then examining the residue for the phosphates with the usual reagents—magnesia solution, barium chloride, nitrate of silver, ammonium molybdate, etc. With so small a percentage of the phosphates, it will be necessary for you to work with concentrated solutions, and slowly. The oil may be oxidized by treating it on the waterbath with hot hydrochloric acid, with some chlorate of potash, added in small quantities at a time. Then evaporate down nearly to dryness, and treat with a little strong nitric and a few drops of sulphuric acid. This will take some time if properly done.

(23) J. H. S. says, in answer to J. H. B.'s query as to a parrot pulling out his feathers: Take a knife and scrape the inside edge of the bill, and the feathers will slip from the bill without coming out. This is done for feather-eating hens; no doubt it will answer for a parrot as well.

(24) S. R. S. says: I have some dentists' pellet gold. I alloyed it with brass and silver. I melted it several times, but it was so very brittle that I could not work it. I then added a $2½ gold coin, and fused, all together, but it was as brittle as before. I then fused it and dropped in lumps of pure saltpeter, but it is still as brittle as before. I fused the gold on a lump of charcoal with an alcohol blowpipe. Please tell me how to work it. A. You fail to state the proportions of your alloy. There may be an excess of zinc and copper, or the fusion may not have been complete. Place it, together with several small pieces of rosin and a little borax or carbonate of soda, in a small blacklead crucible, and heat to very bright redness over a good fire. If this does not obviate the difficulty, fuse the alloy with about three times its weight of nitrate of potassa (saltpeter), and treat the mass when cold with dilute sulphuric acid. Pour off the acid solution and fuse the alloy, together with any silver sulphate adhering to it and a little carbonate of soda. Any silver contained in the acid solution may be recovered by adding a little salt or muriatic acid, and fusing the precipitated chloride of silver with carbonate of soda.

(25) N. S. asks: 1. Can water be decomposed into its constituents (oxygen and hydrogen) with any considerable rapidity, and in large quantities, by electricity? A. Yes; providing a large magneto-electric machine be used. 2. What is the best and cheapest method of generating hydrogen in large quantities? A. The action of iron or zinc scraps on diluted oil of vitriol is among the best. A considerable volume of pure hydrogen may also be obtained with facility by passing superheated steam through a large iron tube filled with scrap iron heated to bright redness.

(26) G. S. D. W. asks: Is there any process by which an engraving can be transferred either to stone or wood, where the printing ink can be made to show up as black as in the original after the transfer has been made? A. We know of no satisfactory method whereby this may be accomplished directly. By means of the chromate of gelatin photographic process, such transfers may be made without great difficulty.

(27) F. M. M. asks: 1. If a steamboat 100 feet long, of 5 feet beam and 4 feet draught, be provided with one set of common side paddle wheels, and power enough to run it at the rate of 10 knots per hour, would two sets of side wheels, with the power doubled and the revolutions of the wheels doubled, double the speed of the boat? A. No. 2. If we take the same boat, side wheels, and power, for running 10 knots per hour, and arrange for the side wheels to feather their paddles, what effect would it have on the speed of the boat? A. You might obtain from 10 to 15 per cent more of the power of the engine in useful effect.

(28) W. J. T. asks: 1. What is the best dark color to paint a laboratory, and what kind of paint must I use? A. One of the best for this purpose is shellac in alcohol, colored to suit with Vandyke or Spanish brown, etc. 2. I wish to varnish my benches. What varnish would you recommend? A. Shellac is commonly used, but copal gives good results, also Brunswick black in oil.

Of what should a waste water pipe be made, so as to resist acids? A. Make it of lead or block tin.

Can you recommend an elementary work on electric batteries? A. Sprague's "Electricity: its Theory, Sources, and Applications," is one of the best.

(29) T. P. H. asks: Can I take a wax impression off type and then electrotype it with a battery? A. Yes. This is the common method of making electrotypes for printing from.

(30) C. M. asks: What are the locations of the various branch mints of the United States? A. A recent authority gives them as Philadelphia, Pa., San Francisco, Cal, Carson City, Nev., and Denver, Col. Assay offices are situated at New York city, Charlotte, N. C., and Boise City, Idaho.