

(29) W. G. W. writes: 1. If 100 cubic inches of air were pumped into a hollow ball, and this ball would just hold up a given weight in the water, say 10 lb. and no more, would pumping 200 cubic inches in the same ball cause it to hold up any more than 10 lb. on the water? A. No, not so much by weight of air. 2. If three cubic inches of water be converted into steam, will the steam weigh as much as the water did? A. Yes. 3. If one gallon of water was converted into steam and confined in the same measure, what pressure per square inch would it have? A. You cannot convert water into steam and confine it in the same space; it will still be water, and can only change to steam by giving it room to do so.

(30) S. B. M. asks: 1. Can I make a simple and cheap battery, using copper or zinc, or both, without mercury? A. Yes. 2. If so please tell me how. A. See SUPPLEMENTS, Nos. 157, 158, and 159, Batteries. 3. To insulate copper wire for an electro-magnet, will common wrapping twine do? A. No, it makes the covering too thick. Use a fine floss. 4. In wrapping wire on an electro-magnet, what do you mean by "layers"? Is it the number of times the wire is wrapped around it? A. It is the number of coils, counting from the core outward.

(31) G. B.—See Professor Wilson's paper "Hygiene of the Hair," in No. 110, SCIENTIFIC AMERICAN SUPPLEMENT.

(32) C. D. W. asks: Would not one paddle or bucket have the same propelling power swept through the water a distance of twenty feet, as twenty paddles or buckets on an endless chain one foot apart, the chain revolving on wheels twenty feet apart—the paddles the same area, and the same power applied to the single one as to the twenty? A. It will depend upon the velocity at which the paddles are driven; if so slow that the water can fill in perfectly between them, the increased number of buckets or paddles will do the most work, if, on the contrary, the speed is so great, that the water cannot fill between the buckets, then the single bucket will do the most work.

(33) H. C. M. writes In answer to S. C. C., April 10, (13), you said that when a train of cars are rounding a curve the greater weight is on the outside rail; please explain. A. The centrifugal force of the train round a curve acts to overturn the cars upon the outer rail, as the center of gravity of the mass is some distance above the top of the rail.

(34) G. T. C. asks: Does an overshot water wheel, when exercising a steady power by means of a crank attached to its shaft, exercise, or is it capable of exercising, more power at one point of revolution than at another? A. More pressure, but not power; the difference in pressure is owing to the different positions of the crank, not to any variation in the power of the wheel.

(35) E. A. W. writes: We would like to know from what height and into what liquid the copper is dropped to make it assume the granulated form, and if a tumbling barrel is afterward used? A. Pour the fused copper in as thin a stream as possible from a height of about a yard into a tub filled with cold water. A trace of sulphuric acid may be added to the water, but this is not essential. Dry the copper in sawdust, by tumbling or otherwise. Consult Larkin's and Overman's "Founder's Guide."

(36) W. F. L. asks: 1. Is it possible to line pulleys so that the belt will run horizontal and be quarter twist without the use of guide pulleys? A. Yes. 2. If so should they (the pulleys) be lined the same as in answer to A. W. D., SCIENTIFIC AMERICAN, of January 11, 1879? A. Yes. 3. I use well water in boiler, and notice in blow-off cock, which leaks some, a dirty looking scale, of which we send sample; do you think it will prove injurious to boiler? A. The incrustation consists chiefly of lime, iron oxide, silica, and alumina. If such an incrustation is permitted to increase there will be danger of overheating the plates. A small quantity (a few ounces) of carbonate of soda may be introduced daily with the feed water, and the blow-off used regularly every day, if possible after the contents of the boiler have remained quiescent for a time. Care should be taken that the water does not run low.

(37) E. C. L. writes: A discussion having arisen among some of our shipbuilders and ship owners regarding the capacity of iron and wooden ships (that is, our spruce ships) to carry dead weight, a great difference of opinion arose on this matter, and it was proposed to refer the question to you to be answered in your columns. Say a ship of 1,000 tons register, same proportions, one built of iron, the other of spruce, which would carry the greatest amount of dead weight cargo? A. It is generally estimated that iron ships will carry from 20 to 25 per cent more dead weight than an oak built ship, and it would probably be from 10 to 15 per cent more than a soft wood ship.

(38) G. M. F. asks: What is the most practical way of protecting Swiss drawing instruments against rust? A. Coat the warm metal with a very thin lacquer of shellac dissolved in alcohol.

(39) S. F. writes: Suppose a hollow globe to have the air exhausted from it, thus containing a perfect vacuum, will it then weigh more or less than it will when filled with hydrogen? A. Less.

(40) G. A. H. writes: A late number of the SCIENTIFIC AMERICAN contains the following question and answer: "What is it that carriage makers use for setting the boxes in the hub, with some kind of cement? A. The boxes are usually secured by wedges. We do not know of a cement that will answer the purpose." The "cement" used is white lead and oil mixed about the consistency of paste. A box set properly in this cement, provided the oil used for lubricating the axle arm does not penetrate the hub and thus soften the cement, will remain perfectly tight until worn out, and cannot then be forced out from the hub only by means of a powerful press, without breaking the box. Wedging the boxes by manufacturers of the finer grade of carriages, is looked upon with disfavor. With the common axle box (of which very few are now used), the shape necessitated wedging. The most improved patterns now made require no wedging for the purpose

of tightening the box, wedges being used only for "truing" the box, so that the rim shall not present a wabbling appearance when the vehicle is in motion. Even this is now found to be unnecessary when the best hub boring machines are used, provided the rim of the wheel has not been forced out of true in setting the tire. Sometimes, and especially with a cheap grade of wheels, the smith is unable to set the tire without bringing the rim out of true, for the reason that proper care has not been observed in selecting the spokes. The same grade of timber is not used in all, therefore some spokes will be stiff and less flexible than others. The result being that the more flexible spokes dish more than those which are stiff, producing a rim out of true, and requiring that the box shall be trued in order to remedy the fault. When the rubbercushioned axle (now the most popular) was invented, it was found to be impossible to set one of the boxes by driving, therefore a press was made that answers the purpose of forcing in the box. The practice followed of forcing the boxes of other grades of axles, until now it is considered to be the easiest, safest as regards breaking, and the most durable method for setting a box; proper care being observed in forcing, the necessity of truing the box is obviated.

(41) J. M. writes: A says that printing is done on cylinder presses from ordinary movable type set in a cylinder which revolves. I say it is not. Which is correct? A. R. Hoc & Co. make a rotary press having one large cylinder on which the movable types are placed. The impression cylinders surround it; they vary in number in the different presses, 2, 4, 6, 8, and sometimes 10 cylinders are used. Fine printing is done on cylinder presses having flat reciprocating beds for receiving the movable types.

(42) T. Q. asks: What can I use to harden the tips of my fingers? Through daily practice on the violin they become very tender and sore, so that I have to cease playing. A. Continued practice will do it. A strong solution of alum in water, or the tincture of white oak bark applied occasionally, may be beneficial.

(43) M. R. asks how the brine is made in which eggs are packed to preserve them. A. Dissolve rock salt to saturation in water and add about 5 per cent of niter.

**MINERALS, ETC.**—Specimens have been received from the following correspondents, and examined, with the results stated:

Buffalo Gap.—57. The fossil is too badly damaged to admit of proper classification. 120. A magnesian limestone. 143. Argillaceous limestone. 146. Argillite containing partially decomposed orthoclase, iron, and copper sulphurets. 133. Argillaceous limestone containing small quantities of chalcocopyrite. 127. A fossiliferous clay slate containing a small amount of lime phosphate. 144. Consists chiefly of lime carbonate and phosphate, and clay. 123. Marcasite, an iron sulphide. The other (unlabeled) samples consist chiefly of argillaceous and ferruginous limestones containing small amounts of organic matters.—E. C.—1. Silver bearing galena (lead sulphide) associated with hematite and iron sulphide in quartzose and doleritic rock. 2. The amount of carbonaceous matters in the shale is small. Its color is chiefly due to iron oxide.—J. F. S.—The sample is kaolinite containing a small quantity of undecomposed orthoclase and sand. As it is almost entirely free from iron it may prove valuable in the manufacture of white "stone china," etc.—W. S. H.—It consists chiefly of charcoal saturated with partially decomposed alkaline thiosulphate. The quantity sent was insufficient for confirmatory tests. Charcoal and the alkaline sulphites are excellent antiseptics.—J. R.—The rock contains nothing of any practical value.—The sample of fire clay in unlabeled tin box (Lawrence's patent) is of fair quality value, about a dollar a ton in New York.—O. B. McN.—Quartz pebbles of no value.

#### COMMUNICATIONS RECEIVED.

Complexity vs. Simplicity. By G. F. W.  
On Consumption. By D. F.  
Boat Rig. By G. A. C.  
On Scientific Credulity. By G. T. B.  
On a Method of Fumigating Vessels. By C. S.

[OFFICIAL.]

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Journal boxes, S. P. M. Tasker, Philadelphia, Pa.  
Key nail fastening for ships, T. W. Kirby, Grand Haven, Mich.  
Rolling mill, S. P. M. Tasker, Philadelphia, Pa.  
Screw machinery, H. A. Harvey, Orange, N. J.  
Sewer gas stopper, C. Y. Wemple, New York city.  
Type writing machine, F. Sholes et al, New York city.