Correspondence

Artificial Ivory.

MESSRS. EDITORS :—In accordance with the promise given in our last communication [see page 166] we now furnish you with a brief account of the various substitutes for natural ivory that have been introduced or brought under our notice.

The first in priority of date was an articled styled "Compressed Ivory," which was nothing more than a composition of ivory dust and flake-white, cemented together with a strong solution of white shellac, and moulded by pressure into the required spherical form. Its liability to crack was the principal among many other objections to its employment in the manufacture of billiard balls. *Gutta-percha*, soon after its introduction into the mechanical and manufacturing arts, was tried ; but its susceptibility to atmospheric influences (the balls becoming clammy and moist in wet weather) was fatal to its successful employment for the purposes desired. *Vulcanized india-rubber* was next essayed ; and the billiard balls made from it came nearer to the natural ivory balls than any we have hitherto seen or tried. They were of the proper size and weight (the latter quality being given by the admixture of black or white lead), and appeared to answer well in actual play, and were not affected by the weather. The insuperable objection against this article is its color, as it cannot be, or has not hitherto been, capable of being bleached, so as to obtain the white and colored balls which are so absolutely indispensable in the game of billiards. *Vegetable ivory* and *glass* have been suggested, but neither will answer ; the former possesses too great friability, breaking when the balls are brought into violent contact; the same objection applies, in a still greater degree, to glass. *Porcelain* balls have been tried, and found wanting, as the external surface chips and breaks off. *Walrus teeth* have been recommended, but their scarcity and other objectional features prevent their employment. The substitute most recently proposed is *steel*, but hitherto the principal objection to its employment has not been overcome.

The above comprise all the articles which have been experimented upon as a substitute for ivory, or as many as have come under our notice ; none of them afford all the essential qualities required. Our offer of the reward of $10,000 will, we trust, have the effect of stimulating the inventive genius of scientific men and effecting the desired object, as we believe that the substitute sought will be found in an artificial composition ; all natural productions, hitherto tried, having totally failed. PHELAN & COLLENDER.

63 Crosby street, New York City, March 7, 1864.

Cause and Preventive of "Interfering" of Horses' Feet.

MESSRS. EDITORS:—The cause of "interfering" is not owing to the slipping of horses, as many suppose, for all horses slip more or less; but it is due to traveling with their feet too close together. To prevent it, make the inner half or halves of the shoe or shoes one-eighth of an inch thicker than the outer half or halves, and set them even with the face of the hoof. They will travel then far enough apart to not cut themselves when they slip. S. FORMAN.

New York, March 12, 1864.

[This subject is one of great interest to all keepers and owners of horses, and in regard to which there is a wide difference of opinion. Some horses "interfere" in spite of all the skill of the shoer; thus showing that it must result from some infirmity in the animal.—EDS.

Removing Incrustations from Steam Boilers.

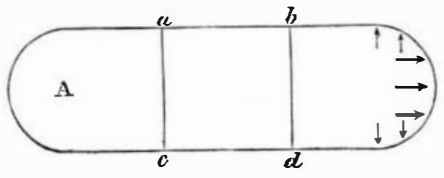
MESSRS. EDITORS:—In your paper of the 9th of January (page 21), among notices of recent patents granted in England, is a composition of gambier terra-japonica, catechu, and myrabolams, for the prevention of incrustation in steam boilers. The two former are the extractive matter of certain trees containing tannin, grown in the East Indies, boiled down into a paste, and then dried into an earthy-looking gum; hence the name of terra-japonica. Myrabolams are pods from some species of acacia, grown in South America, and their value depends upon the tanning principle contained in them. We have received circulars in reference to certain powders to prevent incrustation, which are offered at the modest sum of fifty cents per pound, being nothing but gambier. Now I have used strong fresh tanning liquor, say about 24 gallons for a boiler 3 feet by 22, with the most perfect success; this is the cheapest, the easiest and simplest; once a month this quantity is ladled into the man-hole; care must be taken not to put too much in, as the boiler is apt to foam. This is no new remedy, the detergent properties are no doubt due to the tannic acid; then what is the use of paying a high price for powders when a barrel of strong tan liquor can always be procured? I would like to hear, through the SCIENTIFIC AMERICAN, the experience of those using tanning liquor for the above purpose. J. B.

Santa Cruz, Cal., Feb. 18, 1864.

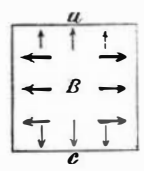
[Very many engineers, in this country, place sticks of green oak or hemlock wood and also bark in their boilers, and thus obtain the same principle that our correspondent mentions. More recently we are told that placing brush or branches of trees in the boiler has been attended with good results, as the lime or scale was deposited on them instead of the iron. It is, as we have often said before—what will answer in one case is ineffectual in another.—EDS.

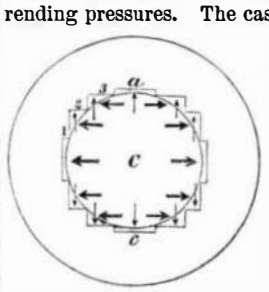
Strength of Steam Boilers.

MESSRS. EDITORS:—Your correspondent, T. W. B., on page 134, is in error. A cylindrical boiler of uniform thickness and texture will separate in a plane of its axis and until the parts are actually rent asunder the tendency of the steam, pressing as it does equally in every direction, is to preserve the circular contour, rather than to destroy it, and the effective rending



force is wholly at right angles to the diameter. Take for illustration a section, *a b c d*, one foot in length in a cylindrical boiler, A, of one foot interior diameter. There will be an effective bursting pressure vertical to the plane of the section, precisely the same as though the boiler were a square trunk of the same width, and of which the diagram, B, may be considered a transverse section, *a* and *c*, representing the points of fracture, and the strong and faint arrows representing respectively the effective and non-effective rending pressures. The case will not be different if we suppose the boiler composed of numerous corrugations, 1 2 3, &c., see the diagram, C, in which the aggregate of effective and non-effective rending surfaces are precisely the same as in the form B.





That the boiler will separate most readily in a longitudinal fracture is evident, for suppose the pressure per square foot represented by *p*, each fracture *a b* and *c d*, of one lineal foot receives the half of this force or the two lineal feet combined receive a force of *p*, compared with which the force against the end of the boiler will be that of $\frac{7854}{10,000}$ to 1, or about $\frac{3}{4}$, which force being divided among the $3\frac{1416}{10,000}$ feet of circumference, leaves a rending force of but about $p \div 2$ to every two lineal feet.

GEO. H. KNIGHT.

Cincinnati, Ohio, Feb. 29, 1864.

MESSRS. EDITORS :—It was with much pleasure that I saw the article of Mr. Toshach, a few weeks ago, in the SCIENTIFIC AMERICAN, concerning the strength of steam boilers ; the formula for finding the amount of strain they would bear, &c., affording most valuable and reliable information to a class of men, among whom are too many not in the way of getting such knowledge, unless it is "handed down" to them. With the view of seconding the efforts of Mr. Toshach in this matter, I wish to enumerate the principles on which the construction of his formula depends ; being persuaded that the reason of a thing will dwell in the mind long after the abstract fact is forgotten. More especially do they seem to be called for, since the untenable remarks of Mr. T. W. B., in relation to the formula.

The *strength* of the shell (other things remaining the same) varies as the *thickness* of the plate forming the shell.

The *strain* to which the shell of a boiler is subjected, under a given pressure of steam, varies as the *diameter* of the shell. Your correspondent, T. W. B. [see page 134] objects to this, and says it is as the circumference. Now as the ratio between the circumference and the diameter of a circle is a *constant quantity* for all circles, his objection vanishes.

And if the pressure of the steam and the diameter of the shell both vary, then the thickness of the shell must vary as the product of the ratios by which the other elements vary. Example :— If the diameter of shell and head of steam are both *doubled*, then the thickness of the shell must be *four-fold ;* or if one is doubled, and the other is halved, then the thickness remains *constant*, &c.

If boilers of different diameters are made of the same thickness of plate, then the pressure of steam they will carry will vary *inversely* as the diameter of the shell—or in other words, the greater the diameter of the shell, the less is the pressure of steam that can be carried.

Experiment has determined the absolute strength of the different kinds of material used in boiler-making ; so that, with the preceding principles and the formula of Mr. Toshach (which flows from them) fixed in the mind, and taking the results of experiment for a starting point, the young boiler-maker may proceed in his work with a degree of confidence and self-reliance, experienced only by those who know what they are about. H. C. PEARSONS.

Ogdensburgh, March 2, 1864.

[Our correspondent is in error about T. W. B.'s position; he asserts the strength is as the semi-circumference—not as the circumference.—EDS.

MESSRS. EDITORS :—At page 134, present volume of the SCIENTIFIC AMERICAN, you published a communication (from me) on this subject, which may require further explanation. The point at issue is the pressure to rupture a cylindrical boiler—whether as the diameter or semi-circumference. The latter is held by the writer of this letter. The required resistance to force increases with the obliquity, and may be illustrated by a tightly stretched string ; where a given force is applied to break it in the direction of the string—or *on* the string—the extreme of obliquity being perpendicular thereto, and is theoretically infinite. Hence if the considered points of rupture be horizontally opposite—the upper and lower parts of the boiler will, by their more *direct* action, have less effective parting force than the remaining lateral portions of the boiler obliquely resisted. If a vertical tie-bolt be inserted with a view of supporting the said horizontal points, the boiler would nevertheless be parted (exploded) at those points by the lateral obliquely-resisted pressure ; but if the tie-bolt were removed from its vertical position, and placed horizontally across the boiler, the horizontal points in question would be secured, and the boiler parted at top and bottom. In short, security would follow the tie-bolt, wherever placed, up to relief by transverse explosion. T. W. B.

Cincinnati, Ohio, March 12, 1864.

The Term "Ratchet."

MESSRS. EDITORS:—*Brande's Encyclopedia* defines the word "ratchet" as meaning, properly and primarily, the pawl or detent. Is not that altogether wrong? Some information from you, as to the history and proper use of that word will oblige—

S. P.

[*Brande's Encyclopedia* is correct. The word "ratchet" is synonymous with "pawl;" and the teeth of the rack in which it plays are called "ratchet teeth;" when in a wheel, the combination forms the "ratchet wheel." Common usage, however, styles the ratchet as a *pawl ;* and this is a good name, as it avoids confusion of terms and ideas.—EDS.

The Best Lime for the Calcium Light

MESSRS. EDITORS:—Having had occasion to use the oxy-hydrogen or Drummond light, I was much annoyed by the breaking of the lime cylinders. Having tried various substitutes, I find that lime made from Italian marble is the most satisfactory. It does not crack, gives a good light and is easily prepared. Small pieces of white marble are put into a clear fire, in a stove or open grate. After remaining at a red heat for twenty to thirty minutes it is, after cooling, easily cut into any desired shape. R. DOUGAN.

Washington, Pa., March, 2, 1864.

A Hint to Letter-writing Bores.

We consider as a general thing that our correspondents are a fair and high-minded set of men, such as we are most happy to accommodate by answering, so far as it is in our power, all their inquiries; but there are a few of whom we can very justly complain. They put to us all sorts of questions, to answer which might require a half-day of our valuable time; and if we snub them off with a short answer they are likely to reply back in complaining terms. It cannot be reasonably expected of us, that we should spend our time in such—to us—profitless letter-writing. We mean to be accommodating, but cannot consent to waste all our time in getting information for correspondents who seem not to know how to appreciate either our forbearance or the value of our time. As an example of what we mean, we have a case before us. A correspondent wants us to hunt through our files for a notice of some book which appeared in the SCIENTIFIC AMERICAN some years ago, and to help him find the book. He also wants us to find for him an English book which we do not believe can be had in this market. Another correspondent wants us to send to England, without delay, to get something which would require time and money to procure for him, but in regard to which he don't even enclose a three-cent postage stamp to prepay our letter. Another encloses three cents and wants a calculation made which would cost us two hours' hard study. It is well enough for all such correspondents to know that our time is worth to us more than a cent and a half per hour. Treat us fairly, and you will have no cause of complaint.

TRIVIAL THINGS.

A sarcastic correspondent writes to us, complaining of our publishing such information as the following:—"Rimmers should not be used in the cored-out holes of castings, as the sand and scale ruin the edge in a short time." He intimates that he knew this a long time ago, and, as a natural sequence, we had no right to put such matter into the SCIENTIFIC AMERICAN. This article is not directed toward that particular correspondent any more than to others who entertain similar views; a little reflection will convince any one how illogical and unreasonable the objection is. Suppose Professor Morse should write us, saying he had read something about the telegraph in the SCIENTIFIC AMERICAN, and considered it really too trivial, as he knew it all years ago; or that Professor Seely, having perused some article on chemistry, should immediately devote four pages to a scathing review of a two-line item; just because he had, in the progress of his studies, learned said elementary knowledge when he was a school-boy. The fact of the matter is, that a newspaper is analogous to a public table; we pay our money and we take our choice. We cannot go to the hotel and order the landlord to carry off the roast beef because we ate roast beef twenty years ago, and don't like it now, for they may be others who do. So it is with elementary knowledge; there are hundreds of accomplished mechanics like our correspondent, who know all about rimmers and grinding-drills, &c., but they have only become accomplished because they *did* know these things and every day experience their value; therefore to the apprentice who is growing up in his trade such reminders as we have mentioned are never lost; for a word in print is remembered longer than a chance caution dropped by some hasty foreman; or it may be the youth is never told and only learns by that hard master, experience, under whose rod we all of us come in the course of life,

Let us not despise little things because they do not happen to be new to us; to *others* they are invaluable, and in no instance does the lesson fail to impress itself upon the mind of those who read, not "as they run," but for the purpose of storing their minds with sound information.

Small Leaks in the Household Ship.

A thousand worm-holes, that will each admit scarcely a gallon of water during ten hours, will much sooner water-log a ship than a large hole through which is poured a gallon a minute. In the financial affairs of a family, though the large outgoes may be canvassed and avoided, the whole income may be *dribbled* away, and no advance be made toward competency, wealth, or position. As a rule, the financial success of any family depends more upon the economy of the wife than upon the earnings or business income of the husband. Mrs. Haskell, in her recently issued "Household Encyclopædia," throws together some of the small leaks in a household ship, which we copy for a double purpose: 1st, to show the men that their wives have a multitude of cares, of little details, to look after—generally far more items than occur in man's business pursuits; and 2d, to perhaps in some cases indicate to housewives details that they may not have thought of before:—

"Much waste is often experienced in the boiling, &c., of meats. Unless watched, the cook will throw out the water without letting it cool to take off the fat, or scrape the dripping pan into the swill-pail. This grease is useful in many ways. It can be burned in lamps mixed with lard; or, when no pork has been boiled with it, made into candles. When pork is boiled alone, it will do to fry cakes, if cleansed. Again, bits of meat are thrown out which would make hashed meat or hash. The floor is sifted in a wasteful manner, or the bread-pan left with dough sticking to it. Pie-crust is left and laid by to sour, instead of making a few tarts for tea, &c. Cake batter is thrown out because but little is left. Cold puddings are considered good for nothing, when often they can be steamed for the next day, or, as in case of rice, made over in other forms. Vegetables are thrown away that would warm for breakfast nicely. Dish towels are thrown down where mice can destroy them. Soap is left in water to dissolve, or more used than is necessary. If Bath brick, whiting, rottenstone, &c., are used, much is wasted uselessly. The scrub brush is left in water, pails scorched by the stove, tubs and barrels left in the sun to dry and fall apart, chamber pails allowed to rust, tins not dried, and iron-ware rusted; nice knives used for cooking in the kitchen, silver spoons are used to scrape kettles, or forks to toast bread. Rinsing of sweetmeats and skimmings of sirup, which make good vinegar, are thrown out; cream is allowed to mold and spoil; mustard to dry in the pot, and vinegar to corrode the castor; tea, roasted coffee, pepper and spices, to stand open and lose their strength. The molasses jug loses the cork, and the flies take possession. Sweatmeats are opened and forgotten. Vinegar is drawn in a basin, and allowed to stand, until both basin and vinegar are spoiled. Sugar is spilled from the barrel, coffee from the sack, and tea from the chest. Different sauces are made too sweet, and both sauce and sugar wasted. Dried fruit has not been taken care of in season, and becomes wormy. The vinegar on pickles loses strength or leaks out, and the pickles become soft. Potatoes in the cellar grow, and the sprouts are not removed until they become worthless. Apples decay for want of looking over. Pork spoils for want of salt, and beef because the brine wants scalding. Hams become tainted or filled with vermin, for want of the right protection. Dried beef becomes so hard it can't be cut. Cheese molds, and is eaten by mice or vermin. Lard is not well tried in the Fall, and becomes tainted. Butter spoils for want of being well made at first. Bones are burned that will make soup. Ashes are thrown out carelessly, endangering the premises, and being wasted. Servants leave a light and fire burning in the kitchen, when they are out all the evening. Clothes are whipped to pieces in the wind; fine cambrics rubbed on the board, and laces torn in starching. Brooms are never hung up, and soon are spoiled. Carpets are swept with stubs, hardly fit to scrub the kitchen, and good new brooms used for scrubbing. Towels are used in place of holders, and good sheets to iron, taking a fresh one every week, thus scorching nearly all in the house. Fluid, if used, is left uncorked, endangering the house and wasting the alcohol. Caps are left from lamps, rendering the fluid worthless by evaporation. Table linen is thrown carelessly down and is eaten by mice, or put away damp and is mildewed; or the fruit stains forgotten, and the stains washed in. Tablecloths and napkins used as dish-wipers; mats forgotten to be put under hot dishes; teapots melted by the stove; water forgotten in pitchers and allowed to freeze in winter; slops for cow and pig never saved; china used to feed cats and dogs on; and in many other ways a careless and inexperienced housekeeper will waste, without heeding, the hard-earned wages of her husband; when she really thinks, because she buys no fine clothes, makes the old ones last, and cooks plainly, she is a most superior housekeeper."

The next time an unthinking husband is disposed to be severe because some trifling matter has been neglected, he should "put that in his pipe and smoke it."—*American Agriculturist.*

Loading Guns by Steam.

The English are great hands at getting up "new" things after they have been invented by somebody else first. An individual named "Walker" (a significant appelation) claims the armor on the Monitors as his discovery, and now another person, Mr. Cunningham, has just invented an apparatus for working large guns by steam power, and thinks it is a great novelty. Capt. Eads, of St. Louis, Mo., has now nearly ready for service a gunboat called the *Milwaukee*, which is an iron-hull gunboat with two revolving turrets, one of which is invented and patented by James B. Eads, and the other is after the plan of Capt. Ericsson. Both mount two eleven-inch Dahlgren guns. In Mr. Eads's turret the guns are moved entirely by steam, and are loaded in the hold of the vessel, and raised by steam to be fired. They are run out by steam and recoil against steam, one man being all that is needed to work the guns, with the exception of loading them. The portholes are only the size of the muzzles of the guns, yet twenty-two degrees of elevation and five degrees of depression can be obtained from them. It is now over two years since Edwin L. Stephens, Esq., exhibited a steam-loading apparatus on board of the *Naugatuck*.

A Chorus of Anvils and Artillery.

At the inauguration of the new Governor of the free State of Louisiana, which was celebrated at New Orleans on the 4th of March, the music probably surpassed, in noise at least, anything previously attempted. It was arranged and conducted by Mr. P. S. Gilmore, of Boston. The voices of 8,000 school children were accompanied by the strains of several military bands, and the chorus was swelled by the beating of 50 anvils, by the ringing of all the bells in the city, and by the thunder of 50 pieces of artillery! The cannon were fired simultaneously by one electric wire, the ends of which were brought to Mr. Gilmore's table, and the times of ringing the bells were controlled by connecting a wire from the table with the telegraph of the Fire Department. It is said that this bold and novel experiment was entirely successful, and that the blending of tremendous sounds was impressive beyond description.

A Novel Patent Case.

An interesting proceeding took place on Saturday, in the Supreme Court of the District of Columbia. The question involved was whether one of several assignees of a patent-right could legally apply for a re-issue. Mr. Holloway, the Commissioner, decided negatively, and, on Saturday, the assignee in question got a mandamus from the Supreme Court of the District to show cause why proceedings in respect to the application for re-issue had been stayed. John L. Hayes, Esq., the chief clerk of the Patent Office, appeared before the court, and made an argument in support of the position taken by the Commissioner, which Chief Justice Carter complimented for its ability, but he ordered that the case should be carried up at once to the court by a compliance with usual applications in form to effect that result.

FEW people comprehend the great amount of sugar used annually in the United States. In 1862 there were 432,411 tuns, or 864,822,000 pounds, or nearly twenty-nine pounds to each man, woman, and child, estimating the population at 30,000,000.