

Correspondence.

Effect of the Sun's Action on Iron.

To the Editor of the Scientific American:

I noticed recently a published statement that if a plumb-bob were suspended from the center of the dome of the Capitol at Washington, it would move 4 1/2 inches east in the morning and 9 inches west in the afternoon. As the writer does not state whether he makes the assertion from a practical observation or a scientific calculation, I will be a little slow in contradicting the article, but I think it will bear looking into. In a latitude where the thermometer ranges from say 25° below to 125° above zero, iron will expand, under action of the sun, an inch or more to the 100 feet, and marble about the same. This being the case, how can the sun's action on the dome move it east in the morning and west in the afternoon? J. N. HUSTON.

Meridian, Miss., July 15, 1886.

[Tall, slim towers have a small movement to the west, north, and east during the day, because the base is small. The dome of the Capitol at Washington can have but a very small movement, from the abruptness of its lower part in the heavy walls of the building, and from its large proportional base.—ED.]

Cause of the Charleston Earthquake.

To the Editor of the Scientific American:

In connection with the recent earthquake, I venture to suggest a line of investigation which may develop something interesting touching the cause of the same. Major Powell, of the Geological Survey, says that there is a line of weakness in the crust of the earth beginning somewhere south of Raleigh, N. C., and extending in a line along the tide water past Richmond, Washington, Baltimore, and Troy, N. Y.; and that this line of weakness is marked by a displacement. In some places, this displacement is a flexure in the rocks; in other places, a fault; and in the neighborhood of this displacement are found the principal waterfalls which constitute the water powers of the Atlantic slope. "It will be interesting," he adds, "to discover the relations of the point of origin of the earthquake to this line of displacement or weakness."

I suggest the idea that the escape of the vast volumes of petroleum and natural gas from the wells sunk into the bowels of the earth may furnish a cause for the earthquake in this region. It is well known that this oil and gas issues at enormous pressures, varying according to location. The pressure at which they issue proves that these fluid materials are pressed upon by the crust of the earth, which in consequence is partly supported thereby. When a sufficient vent is found for these cushions for the earth's crust, the latter drops from gravity, and the shake is most manifest at the line of greatest amplitude of movement, which, in the present case, is nearly coincident with the line of weakness indicated by Prof. Powell, and the path of the earthquake.

The ventage which volcanoes afford seems to bear some close relation to earthquakes, and why not the ventage of the enormous volumes of natural gas and petroleum, which of late years has progressed to such extensive proportions? If there is any such connection in the relation of cause and effect, it is probable that our recent earthquake has had some disturbing influence on the petroleum and gas wells of the country, probably increasing, by the collapse, the flow and pressure at some points, and reducing it, by opening new cavities, at other points.

I suggest that the oil and gas regions be called upon for data on this subject. If the robbing of the earth of her hidden stores of oil and gas within is to be followed by such results, we cannot know it too soon, and laws restricting production should, for the sake of posterity, be promptly enacted. EDWARD W. BYRN.

Washington, D. C., Sept. 1, 1886.

Theosophy Explained.

The Boston Record describes in the following brief manner the belief of that curious sect in Burmah calling themselves Theosophists, of which Madam Blavatsky, of Russia, and Col. Olcott, of our own country, both residing in Bombay, are prominent converts.

Publications containing the writings of both of these persons are sent to this country by each departing Bombay mail, and it is said that they are creating some interest among a class of original thinkers in Boston.

"Taking the broad fact of mind and matter having been adjudged separate entities or states of being, the theosophists proceed to build upon this stated fact. They claim that while the body lies sleeping, or inert through trance, the soul, by which they mean the mind, or will, is capable of traveling to distant places, noting the events, holding converse, ere she, the soul, returns to her waiting and unconscious body. A theosophist speaks of his 'astral body,' of its power to visit those places which his soul, or mind, or will, has previously determined upon visiting.

"To mention the conditions first, theosophists state

that an 'aura' surrounds them, not only theosophists in particular, but all people. 'Aura' is a species of atmosphere, impregnated with the electrical essences, animal magnetism, or chemical gases that our bodies are constantly discharging; this, encountering the ordinary air, is not dispelled or disseminated, as might be naturally expected; but, to call it human essence for the sake of illustration, this discharged human essence gathers to itself a certain portion of the ordinary air that surrounds us, which it permeates with our own desires and vitality. Therefore it will be seen that this aura is always with us, and ready for all emergencies.

"The way that transference is effected is that a theosophist wishing to appear in a distant city or foreign land seeks seclusion, and then bends the whole force of his mind upon the desire to reach that place. Finally, he either falls asleep or succumbs to a self-induced trance. During the sleep or trance the body lends a portion of its vitality, or more correctly a certain portion having been ejected by the will, the soul is enabled to clothe herself in the waiting aura, and thus become an astral body, an exact counterpart of the sleeping one, and then proceed upon her aerial journey."

THE GALATEA AND MAYFLOWER.

The International Queen's Cup, won thirty-five years ago by the schooner yacht America, has again, after so long a sojourn in this country, become a subject of contest. The Galatea, an English keel boat, having had her challenge of 1885 extended so as to allow of her racing under it this year, has met the American center-board yacht Mayflower for a series of inside and outside course races to decide the future holding of the trophy.

The competitors are illustrated both under sail and as they lay in the drydocks. To show more accurately the general model, the bilge blocks have been omitted, the latter views thus exposing the whole side. They are nearly of the same length, the Mayflower being two feet the shorter. In breadth and depth they differ widely; the Mayflower is much wider and shallower. Being wider, she carries more sail than the Galatea, and is handicapped, having to allow the Galatea 38 seconds over the inside course.

In the Galatea's model will be recognized the convex lines of the conventional cutter. Her sheer is quite pronounced, an end elevation of the hull showing a sharp rise in the bow that is missing in the Mayflower.

In the comparative side views of the two yachts as they lay in the drydocks, further differences will be noticed. The Galatea has a strongly rocking or curved keel. This is an important factor in her turning when tacking. In conjunction with her high momentum, due to her heavy ballasting, it enables her to go about very rapidly, the rudder not having time to check her speed. She is reported to have shown herself eight seconds quicker in stays than the Mayflower. Minor features in the rigging of the two vessels are also to be noticed in the different views. The Galatea's mast-head spreaders are so wide that they actually cause the topmast shrouds to overhang the hull, being wider than the hull itself. The use of a block and fall on the Galatea's bobstay, necessary with a shifting bowsprit, seems clumsy. Her bowsprit is considerably shorter in proportion to her length than is that of the American vessel. In both vessels, however, the bowsprit is far longer than in American yachts of thirty or forty years ago. In those days, a mast far back and short bowsprit was the rule. This feature is shown very strikingly in old pictures of the Black Maria, the first of our largest size racing sloops.

In the Mayflower, it will be noticed that her bilge is but slightly hollow, very little more than is that of her competitor. Accepting the sloop and cutter subdivisions as of any moment, her model, especially in this feature, indicates an approach of the American sloop to the English cutter.

The theory has long held, and has been justified in practice, that a deep vessel was better in a seaway than a shallow one. There is no question that for rough weather, the old American shallow draught racing boats were defective. The foundering in the Gulf Stream of the Black Maria was a sad proof of this. But having overcome this wrong tendency, the point has been to stop when sufficient depth was reached. There is every probability that this has been done in the Mayflower. A broader vessel plunges less, and having a higher center of gravity rolls less, and careens less under sail, than does a narrow one. In these important respects, as affecting comfort, she is the superior. If it can be shown that this width is not inconsistent with speed, it may be considered that one valuable result has been attained.

The Genesta and Puritan, who competed last year for the international trophy, were somewhat smaller than the present competitors, but were large enough to represent the largest type of single-masted vessels. The general result of recent yachting trials has developed the fact that greater speed is to be looked for from the single-masted vessel than from the schooner. This is, to an extent, unfortunate, as the schooner is far the more practical type. In our river

and sound commerce for the last few years, nothing is more striking than the disappearance of sloops and increase in number of schooners. In old times, sloops have been engaged in ocean traffic to a certain extent, but now that rig is being abandoned except for the smallest class of vessel.

We give the table of dimensions of both vessels below. The interesting features are the relative displacement and lead ballast carried. The Galatea, it will be seen, is really 50 per cent larger than the Mayflower, and carries nearly twice as much ballast. Yet by the generous N. Y. Y. C. rules she receives a few seconds time allowance from the Mayflower. The exorbitant amount of outside lead ballast and large displacement certainly tend to make her more nearly a racing machine than is her competitor.

	Galatea.	Mayflower.
	ft. in.	ft. in.
Length over all.....	102 6	100 0
Length on load water line.....	87 0	85 7
Extreme beam.....	15 0	23 5
Depth of hold.....	13 3	8 6
Draught of water.....	13 5	9 0
Length of mast.....	79 0	83 0
Length of topmast.....	47 0	46 0
Bowsprit outboard.....	36 5	38 0
Main boom.....	73 0	80 0
Main gaff.....	45 0	50 0
Spinnaker boom.....	65 5	74 0
Area of sail, per N. Y. Y. C. rule, in square feet.....	7,146	9,000
Tonnage, O. M.....	171 14-95	171 74-95
Displacement, in tons.....	157-03	110-0
Ballast, in tons.....	81-50	48-0
Amount on keel, in tons.....	81-50	42-0

The Galatea is built of steel, and was modeled by Mr. J. Beavor-Webb, a native of Kinsale, County Cork, Ireland. The Mayflower is of wood, and was modeled by Mr. Edward Burgess, of Boston, Mass.

The first race was sailed over the N. Y. Y. C. course. Starting in the Narrows, the yachts sailed down and through the outer bay of New York to and around the lightship that lies about eight miles from the bar, out at sea, a total distance of thirty-eight miles. The Mayflower won by 12 minutes and 2 seconds corrected time; the elapsed time was:

Mayflower.....	5 h. 26 m. 41 sec.
Galatea.....	5 h. 38 m. 43 sec.

The second race was sailed on Saturday, September 11, over the outside course upon the ocean, twenty miles out from the lightship at the entrance to New York Bay and back. It was won by the Mayflower by 29 min. 9 sec. corrected time; the elapsed time was:

Mayflower.....	6 h. 49 m. 00 sec.
Galatea.....	7 h. 18 m. 48 sec.

The winner of two races out of three takes the cup, subject to future challenge.

A challenge designed to settle the question of relative superiority of the English and American vessels in heavy weather has been given to Lieut. Henn, of the Galatea, by Gen. Painc, of the Mayflower. He offers to lie by the Galatea's side off Marblehead and await the equinoctial gale, and be ready to start for a race during the worst of the gale at any time that Lieut. Henn may select. It is stated that Lieut. Henn has been called home peremptorily, and will not be able to remain long enough in this country to accept the challenge.

Continued Decay of the Egyptian Obelisk in Central Park.

A recent examination shows that the obelisk in the Central Park is not so thoroughly protected as many supposed it would be by the hot paraffine treatment last fall. This process was fully described in the SCIENTIFIC AMERICAN of December 5 last, and consisted in heating the stone and applying a mixture of paraffine, creosote, and turpentine. Previous to this the stone had been carefully gone over, and pieces supposed to be loose, on testing with a hammer, or where there were cracks, were removed. It now appears that the stone is again in some places flaking off, or showing slight signs of slow disintegration, although such action is only perceptible on careful examination. It is said to be the result of an insufficient trimming off of the surface of the stone, to remove imperfections before the paraffine was applied; others attribute the result to the application of heat to the stone before putting on the paraffine. It has been decided best to do nothing further in the matter at present, until it is shown to what degree the preservative process will be actually effective for a longer period, although in the end it may be necessary to inclose the stone by building a light glass structure around it.

Minnesota Opium.

During the year 1885, Emil Wescheke experimented on the cultivation of different species of Papaver at New Ulm, Minn., and from the unripe capsules of *P. somniferum* prepared a quantity of opium which, in the air dry condition, contained 2-8 per cent of moisture, and, after drying, yielded 15-230 per cent of morphine, 0-325 per cent of narcotine, 0-416 of codeine, and 3-500 per cent of meconic acid. The author does not believe that the cultivation of the poppy for the production of opium in this country would be attended with profit.—Contrib. Dep. Phar., Univ. Wisc., 1886.

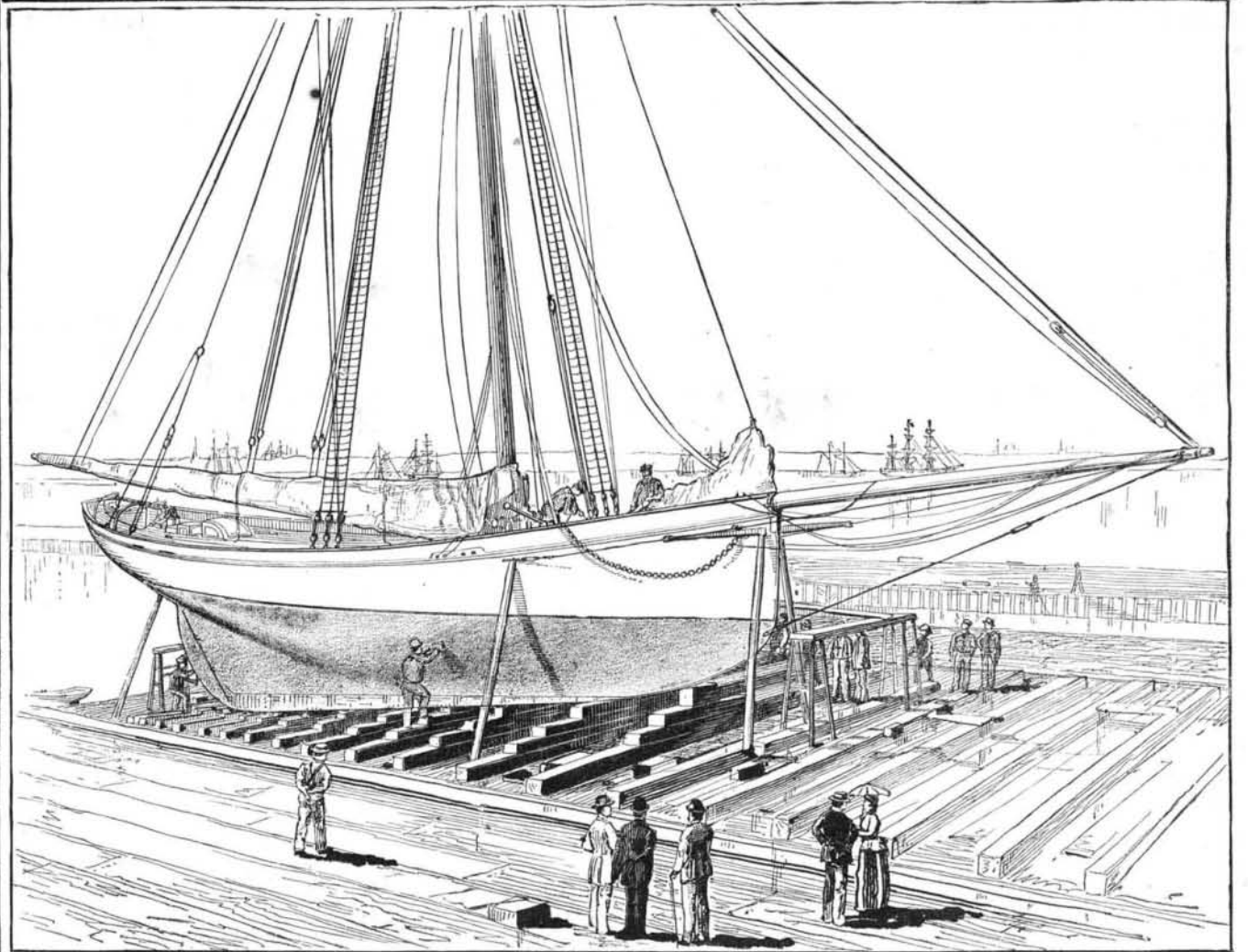
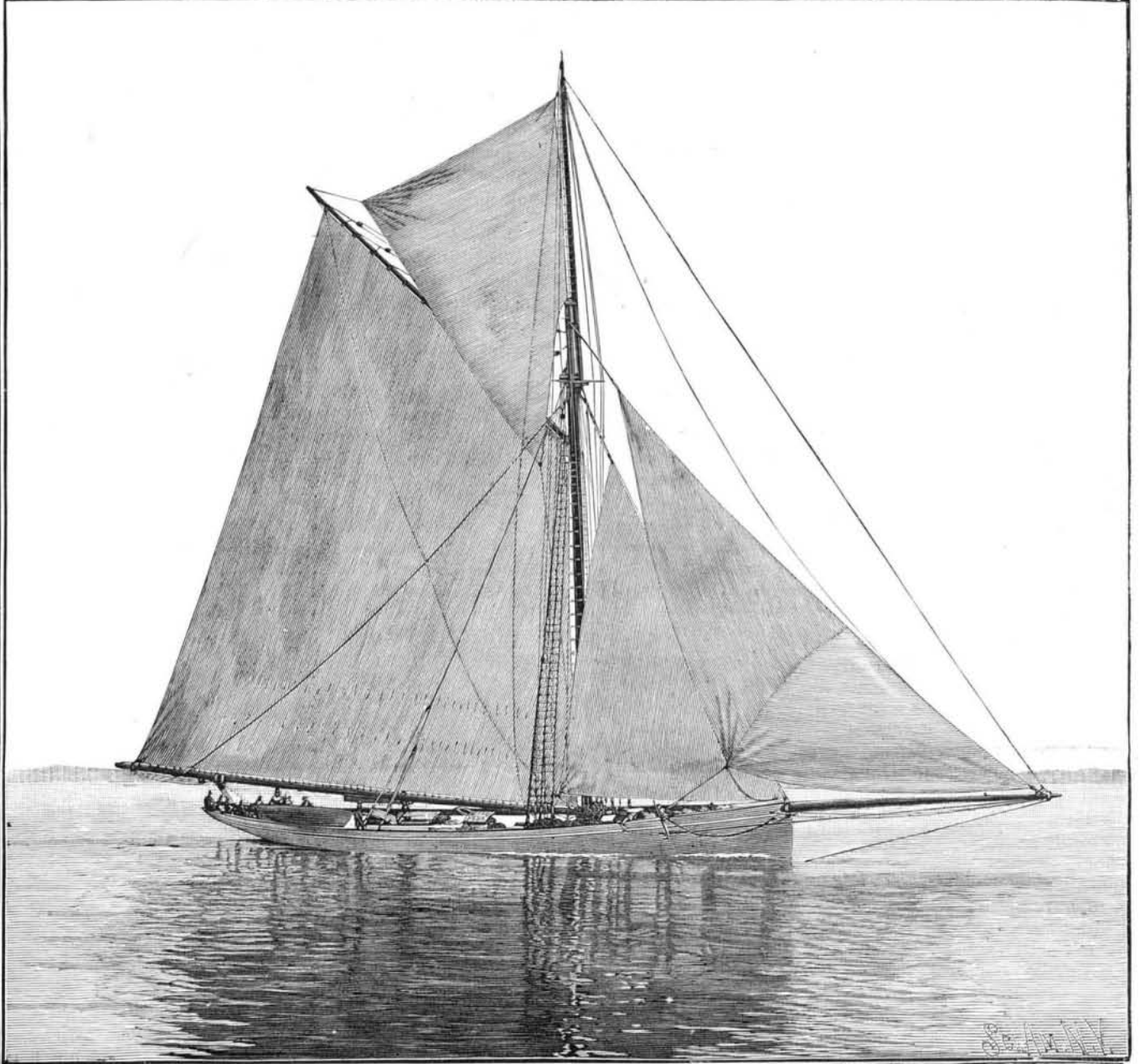
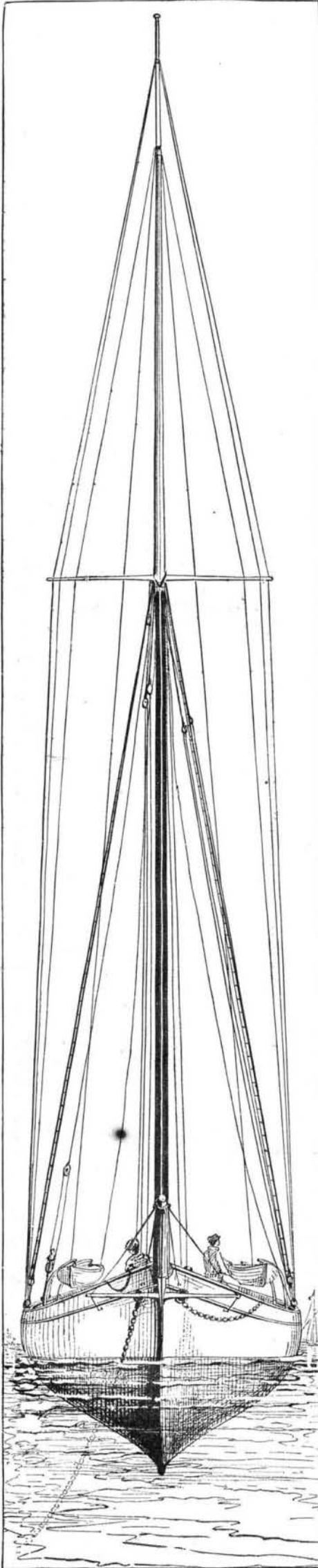
Corrosion of Tea Chest Lead.

A late number of the *Journal of the Asiatic Society*, of Bengal, contains a short memorandum by Professor Pedler, of the Presidency College, Calcutta, on certain experiments which he has made on the corrosion of the lead linings of Indian tea chests. His conclusions are that tea properly manufactured in the ordinary way has no power to corrode lead; but if unseasoned and damp wood is used for the boxes, corrosion of the lead is almost certain, some varieties of wood acting more violently than others. Even with seasoned wood, if it becomes saturated with water, and be then placed in favorable circum-

stances of heat and moisture, corrosion takes place. The active agent, he thinks, does not exist ready formed in unseasoned wood, but is produced by a secondary action from the constituents of the wood. The corrosion is not due usually to contact action between the lead and the wood, but a volatile substance is gradually produced from the unseasoned wood. The corroding agent is usually acetic acid in the presence of moist air and carbonic acid, but other acids of the same series are sometimes produced and also act on the lead; and in the case of butyric and valeric acids the incrustation is of a greenish yellow, while that from acetic acid is whitish or yellow-

ish. The lead being corroded by these acids, which are produced by the decomposition of substances known to be present in the woods, the tea takes up the disagreeable odor of the latter after they have undergone the change in which acetic, butyric, and the other acids are formed, and will thus become deteriorated.

UMBRELLAS, when wet, should be placed with the handle downward to drain. The moisture thus concentrates at the tips and falls from the edge, instead of gathering into the folds of the umbrella, and thus dries quicker and the fabric is better preserved.



ILLUSTRATIONS OF THE AMERICAN YACHT MAYFLOWER.—[See page 181.]