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THE NEW RACING SLOOP YACHT ATLANTIC.

The yacht Atlantic was successfully launched on May 1 from the shipyard of her builder, Mr. John Mumm, at the foot of Fifty-fifth Street, South Brooklyn. Her keel was laid in February last.

The new clipper has been built after the designs of Captain Philip Ellsworth by a syndicate of yachtsmen composed of prominent members of the Atlantic Yacht Club.

Her length over all is 95 ft. 7 in., and on the water line 84 ft. Her extreme beam is 23 ft. 2 in. The hold is 10½ ft. deep, and the draught of water 8½ ft. We illustrate her outline in plan and elevation. In cross section her lines are full and well rounded, the angle at the keel being noticeably blunt. The characteristic feature in the construction of the yacht is the extreme lightness of the materials employed. The frame is made of oak and black larch, and the ceiling of Oregon pine. The clamps are of yellow pine. Her outside planking is also of Oregon pine, with the exception of the three upper strakes, and is 2½ inches in thickness. Many of these planks have been cut from mast stuff, and are fifty to sixty feet long. In the interior, metal knees made of cast steel, 4 by 1¼ inches, are used to resist the racking strain of her spars. Wooden hanging knees on each side support the strains on her deck. A shelf of yellow pine running round her side and under her beam ends will meet the torsional strains brought to bear upon her frame.

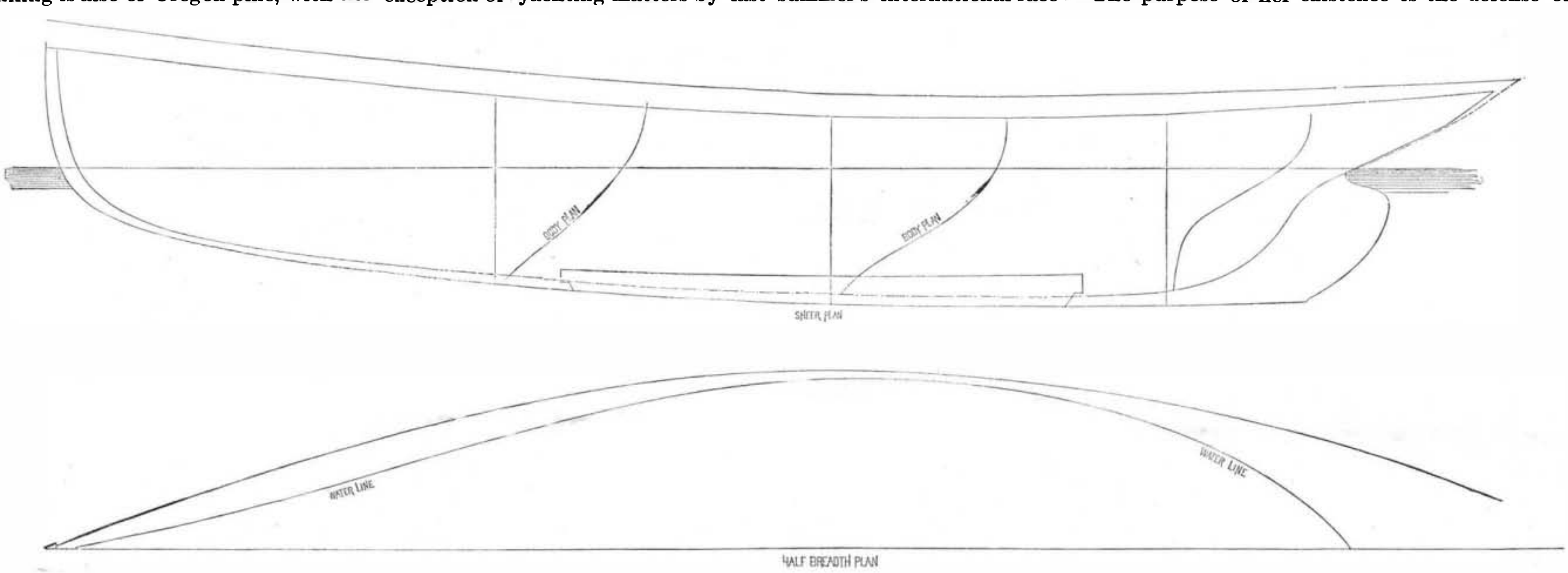
At the time of the launch, she had only her bowsprit in, and had a mean draught of 6 feet and 4 inches. Thirty-four tons of lead form the ballast on her keel. The casting and handling of this immense piece was a matter of some difficulty, but was successfully accomplished by building a mould directly under her timbers.

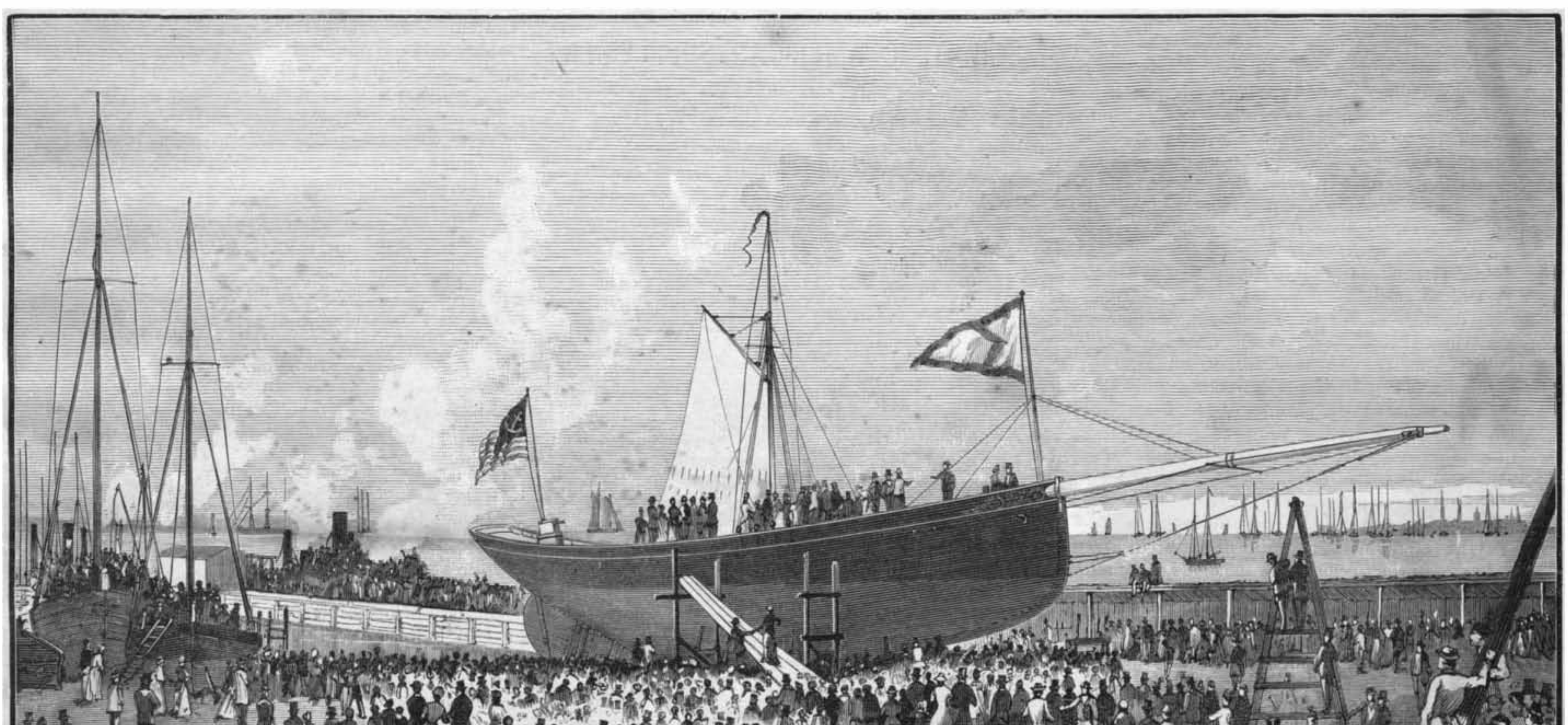
It is estimated that the total ballast will be about forty-five tons. We have secured a very spirited picture of the yacht just as she is about to take her first plunge into the waves. The lively interest excited in yachting matters by last summer's international race was shown by the large crowds that have watched her evolution and were on hand at the christening. Much admiration was expressed for the graceful lines, and particularly for her light flotation.

Her sail power will be very large. The mainmast is 50 feet, with a gaff of 47 feet and a boom of 76 feet 6 inches. Her suit of racing sails numbers 15. They have been specially woven for the Atlantic, and vary in weight from the heaviest duck to the lightest cotton drillings. The spread of the mainsail is 4,000 square feet, and that of the large jib 1,150 feet. The club topsail adds 1,560 feet to her sail area, and the balloon jib topsail, intended for gentler breezes, 4,180 square feet. Her spinnaker boom is 72 feet long, and carries a sail of 4,400 square feet.

Such are the main dimensions and features of New York's representative clipper yacht. She is to all appearances a thorough-going racer, and has been built for work.

The purpose of her existence is the defense of the





THE NEW RACING SLOOP YACHT ATLANTIC.

America's cup, for which the British cutter Galatea is now the avowed competitor. Whether the Atlantic will fulfill her mission, and win the honorable office of defending the cup, will be determined by the preliminary races between the four competitive American clippers, the Puritan, Priscilla, Mayflower, and Atlantic. Each boat has its champions, but they are all so admirable that the most experienced yachtsmen hesitate to express any opinion about the result of the forthcoming trials. The success of the Puritan has made the superiority of the centerboard over the cutter a foregone conclusion in the minds of nearly all American yacht owners. This confidence has made the interest in the national contest much more lively at present than in the real contest between the American champion and the British challenger. Apparently, everything possible has been done to make the successful clipper, whichever she may be, a worthy representative of the most advanced principles of American yacht building.

Iron Foundations for Heavy Guns.

In case of a war with foreign powers, we should be forced to the rapid construction of temporary fortifications behind earthen parapets. One of the great difficulties in the way of such construction is the time required for building properly the heavy, massive masonry foundations up to this day regarded as necessary under heavy guns. This difficulty may be now avoided (according to Captain W. H. Bixby, Corps of Engineers, U. S. Army) by the use of wrought iron instead of masonry for these foundations.

Captain Bixby proposes to replace the present slowly built, difficultly moved, difficultly releveled masonry foundations for heavy guns behind earthen parapets by rapidly constructed, easily moved, easily releveled wrought iron foundations, to rest on cross girders or sleepers, embedded in the earth of the *terre-plein*, and provided with a front parapet anchorage sufficient to resist all direct recoil.

The holding power of anchorages embedded in mere earth is well known by the experiments of our Q. M. Department on suspension bridge anchorages during the war of 1861–65, and it is also well shown by the Shoeburyness experiments of 1881 (see p. 41, Part 2, of Captain Bixby's report on "Sea Coast Fortifications in Europe").

A 40-foot earthen parapet and suitable iron rod and cross girder anchorage may well be trusted to resist and absorb all the direct horizontal recoil of even a 100-ton gun, leaving to the foundation alone the lighter duty of supporting the carriage and gun and the comparatively small vertical component of the recoil.

An iron girder foundation, resting on sleepers and earthen bed, may be fairly well trusted to serve as an efficient support to the vertical weights and blows of our heavy guns, after the first few rounds have been fired. A little unequal settlement may naturally be expected, but such settlement is of minor account today, for two reasons: first, heavy guns of the present and future must be traversed by machinery, and such machinery will overpower the slight extra resistances due to unequal settlement of the gun's platform; second, whenever an unequal settlement becomes marked and objectionable (probably not oftener than once in a month during action), the iron girder foundation can be jacked up and earth tamped in underneath it (exactly as is currently done to remedy similar unequal settlements of railroad tracks).

It seems now quite probable that future fortification in the United States (when it does come) will demand economy of time rather than economy of money. In any case the advantages which may arise from rapidity of original construction, rapidity of construction in place, facility of repair, facility of change of position if necessary to allow of other angles of fire, facility of replacement if necessary to allow of guns of greater weight and size—all these advantages appear sufficient to authorize at least the trial of such a foundation under one of our heaviest guns.

Captain Bixby's suggestions are now being considered by the War Department, and will undoubtedly lead to some change in the present slow methods of gun foundation construction.

The Tongue in Disease.

One of our medical contemporaries states that different complaints are indicated by the condition of the tongue, as follows:

A white-coated tongue indicates febrile disturbance; a brown moist tongue indicates disordered digestion or overloaded primæ viæ; a brown dry tongue indicates depressed vitality, as in typhoid conditions and blood-poisoning; a red moist tongue indicates debility, as from exhausting discharges; a red dry tongue indicates pyrexia, or any inflammatory fever; a "strawberry" tongue with prominent papillæ indicates scarlet fever or rotheln; a red glazed tongue indicates debility, with want of assimilative power of digestion; a tremulous, flabby tongue indicates delirium tremens; hesitancy in protruding the tongue indicates concussion of the brain; protrusion at one side indicates paralysis of that side.

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Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 542.

For the Week Ending May 22, 1886.

Price 10 cents. For sale by all newsdealers.

AN UNDERGROUND RAILWAY FOR NEW YORK CITY.

In March, 1870, the SCIENTIFIC AMERICAN published illustrations of an underground railway which had then been built, for a distance of one block, under Broadway, New York. It was known as the Beach pneumatic tunnel road, the cars to be propelled by compressed air, but was never completed, except for a distance of about two hundred feet. From that day to this, the project of an underground Broadway railroad has come up at almost every session of the State Legislature, until a bill for this purpose has at last been passed, and received the Governor's signature. There are said to be grave doubts about the constitutionality of the act, which will have to be settled before the work of building is actually begun, but the names of the eminent capitalists and business men connected with the enterprise afford an assurance that this great undertaking will now be prosecuted in earnest.

By the plan adopted, the company is allowed forty-four feet under the surface, the least width between the sidewalks on Broadway being, for a short distance, thirty-nine feet, and the average width being about forty-nine feet. The sewers, water, gas, and steam pipes, with tubes for wires, etc., are to be carried in vaults and subways of brick or iron, to be built and kept in repair by the company; they are to be open for entrance at every quarter of a mile distance, and it is estimated will cost $400,000 a mile. This will, of itself, be a great saving to the city, and obviate the necessity of the frequent tearing up of the pavement, at present so great a source of public inconvenience. The kind of power to be used is not specified; it may be electricity or any motor not emitting smoke, gas, or cinders.

During construction, a temporary bridge is to be maintained over all places where the work is going on, so that travel will not be interfered with during the progress of the work. The road is to extend under Broadway from the Battery to Fifty-ninth Street, a distance of about four and a half miles, with a branch at Madison Square to Forty-second Street, but both of these lines to be further continued, if found desirable, in the future. The sections named are to be completed within five years, and the city is to receive for the privileges granted three per cent. of the gross revenue. The capital stock of the company is fixed at $25,000,000, and the cost of building is variously estimated at from $3,000,000 to $6,000,000 per mile.

The only work in the world at all similar to this proposed arcade subway under Broadway is the underground railway system of London, by which that city is belted by a nearly complete double circle of subterranean roadway, though with many open cuttings within high walls. These underground roads cost from two and a half to four million dollars per mile, and pay from three to four per cent. interest on the capital invested. Although the total population of London is more than four millions, while that of New York should not be placed higher than probably one-third of this, the rapid growth of the latter city, and its peculiar configuration, determining most of its travel in main north and south lines, seem to indicate that the new road is likely to have as large a business, in proportion to its mileage, as its London predecessor. Let us hope that it will, also, be as well and solidly built, for the London road is, both in its building and operating, a most creditable example of a high order of engineering skill.

PROGRESS OF INDUSTRIAL ELECTRICITY.

"How was that made?"

This question was asked of a prominent metal merchant as a vessel was handed him, made in the shape of a head-light reflector. It was composed of copper about one sixty-fourth inch thick, tough, pliable, and very smooth on the inner surface. Examining the edges of the flange, the merchant noticed that the thickness of the metal did not vary in the least around the entire rim.

"It was spun."
"No."
"Stamped."
"No."
"Pressed."
"No."
"Cast? Impossible."
"No, it was not cast."
"Then it must have grown."

It had grown, but it was with the rapidity that only electricity can give to growth.

The process by which the above casting or vessel was made is as follows:

A rigid male form is made of the approximate shape and less in size than the article wished to be reproduced. This form is then immersed in a kettle of refined wax, paraffine, or similar substance.

The shape of form will decide in what position the form is to be held; in the case of a reflector, the form is held with small end up. The wax must be pure, and free from dirt or water to get best results. The wax is heated so that it will run nicely. By immersing form in kettle and withdrawing vertically, the wax will run smoothly, and as it cools in a few seconds leaves a smooth, true surface. This surface is now rendered