(No Model.)

W. L. WINANS.

SPINDLE SHAPED OCEAN STEAMER.

No. 504,120. Patented Aug. 29, 1893.

FIG. I.

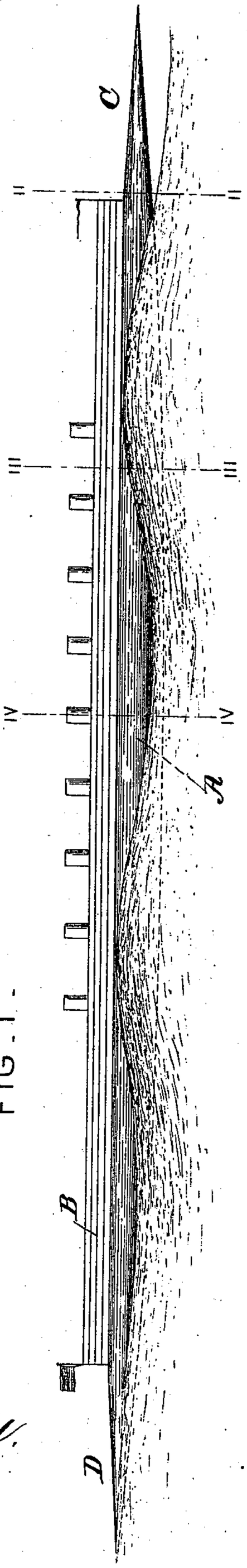


FIG. II.

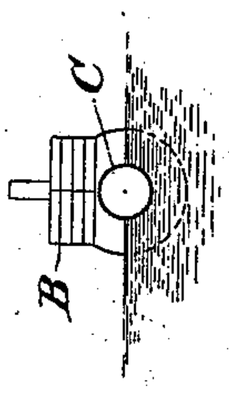


FIG. III.

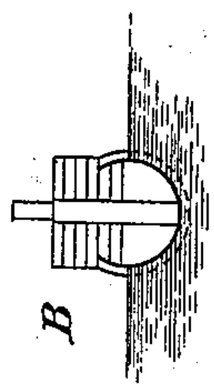
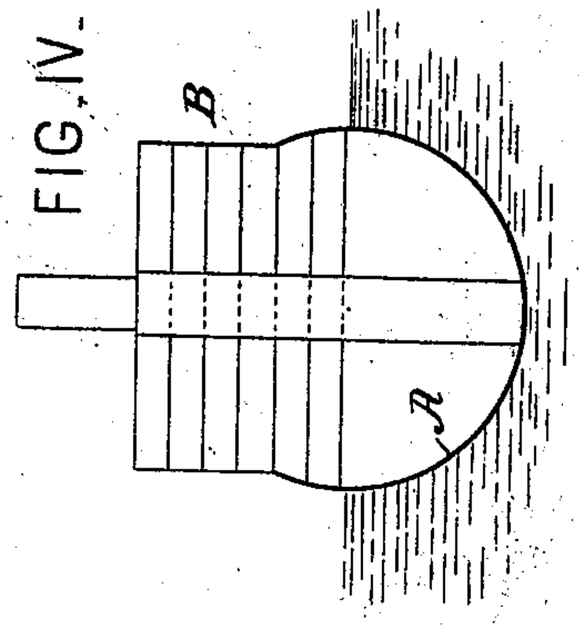


FIG. IV.



Attest.
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UNITED STATES PATENT OFFICE.

WILLIAM L. WINANS, OF LONDON, ENGLAND.

SPINDLE-SHAPED OCEAN-STEAMER.

SPECIFICATION forming part of Letters Patent No. 504,120, dated August 29, 1893.

Application filed February 4, 1893. Serial No. 460,924. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. WINANS, a citizen of the United States, and a resident of London, England, have invented a new and useful Improvement in Spindle-Shaped Ocean-Steamers, which improvement is fully set forth in the following specification.

In Letters-Patent of the United States heretofore granted to Ross Winans, Thomas Winans and William L. Winans (the present applicant) descriptions and illustrations are given of various forms of hulls for steam vessels, differing in detail but similar in principle. Reference may be made to Leters-Patent No. 21,917, granted October 26, 1858, to Ross Winans and Thomas Winans, and No. 161,372, granted March 30, 1875, to Thomas Winans and William L. Winans. Vessels of this type have been termed generically "spindle-shaped," as they are either true spindles, or approximate closely to the outline of a spindle. This term with the significance given to it in the art of ship building will be employed herein.

The present invention relates to the construction of vessels of this type, and the object thereof is to construct for ocean navigation, a vessel of moderate draft and displacement capable of a very high rate of speed, having large capacity for freight and passengers, and great coal endurance, and which will not appreciably roll or pitch or receive injurious shocks when moving or stationary among the largest waves encountered in an ocean voyage.

The result of several hundred experiments which I have conducted among waves of different heights in the development of vessels of this type, shows that a vessel formed and proportioned as hereinafter described, will neither roll nor pitch appreciably among waves such as are frequently encountered upon the Atlantic, that it will be capable of a much higher rate of speed than that attainable by passenger vessels as now constructed, and that there will be no appreciable diminution of speed among the highest and largest waves.

The present invention consists in making the spindle-shaped hull much longer in proportion to breadth of beam than the hulls of vessels are now made, or than it would be possible to make them upon the model followed in the construction of ocean steamers of the ordinary type; this element of greatly increased length in proportion to beam being found essential to the accomplishment of the objects above set forth.

It is well known that ocean steamers as now built, are not made longer than about nine times their beam, that it is not possible to increase this proportion materially, and that owing to the great weight of the ends of the vessel the materials at the middle, even at this length, are often strained up to their full calculated resistance. It is also known that vessels built upon the present accepted models, and with the dimensions designed to produce the best results that can be obtained with those models, will roll and pitch, even in moderate waves, to an extent sufficient to produce discomfort to passengers, and to subject the vessel to shocks and strains. On the other hand I have determined by observation and experiment first that a vessel having a hull of spindle-shape may be made, with moderate displacement and draft, of a length in proportion to beam greater than fifteen to one; and second that a vessel of spindle-shape so proportioned and otherwise properly constructed, will not appreciably roll or pitch or suffer shocks or diminution of speed in waves of the largest size. The absence of pitching in a vessel so constructed and proportioned, is due principally to the great length thereof in proportion to the distance between the crests of the waves. In a vessel made according to my invention, as hereinafter explained in connection with the accompanying drawings, it is found to be practical to make the length as high as twenty seven times the beam, and by this with sufficient beam, entirely to prevent pitching. In such a vessel if the beam be sixty feet, the extreme length would be about sixteen hundred and twenty feet, or about three times the length of the longest ocean vessel. Owing to the peculiar formation of the conical bow and stern portions, and the largely diminished weight of the ends, and of the materials used throughout, the displacement of such a vessel would be about thirty-six thousand tons or thereabout. On the other hand, if it were attempted to increase a vessel of the ordinary

type to three times its length, the other dimensions thereof would have to be increased proportionately so that the beam would be about one hundred and eighty feet, and the displacement (which increases as the cube of the other dimensions) about three hundred and twenty-four thousand tons.

The absence of rolling among waves, in a vessel constructed according to my invention, is due partly to the fact that the natural period of roll or vibration of a vessel having the proportions herein specified, is greatly in excess of that of the waves which it encounters. Other reasons for this fact, which are indicated by my observations under different conditions, need not be here detailed, the fact itself having been demonstrated conclusively.

Other advantages attending the invention are higher speed (especially among waves), increased capacity in proportion to draft, increased comfort and safety to passengers and freight, and economy in construction and in propelling power.

Having obtained a form and proportion of vessel which will not pitch or roll, or be otherwise disturbed in its course by the action of the waves, it results that the weight of materials may be reduced throughout, thereby lessening the displacement and affording greater capacity for engines and fuel. This is one element in the attainment of higher speed. Less power is required in the propulsion of the vessel because, among other reasons, it does not change its course by yawing about, or require constant motion of the rudder to prevent yawing, which in ordinary vessels adds greatly to the resistance which the engines have to overcome. The absence of pitching makes it possible to propel the vessel at the same speed in rough water as in smooth, so that in an ordinary voyage the aggregate gain in time from this cause alone would be considerable.

In the accompanying drawings which form part of this specification:—Figure I, represents in side elevation a spindle-shaped vessel constructed in accordance with the invention. Figs. II and III are cross-sections on lines II and III respectively, on the same scale as Fig. I, and Fig. IV is a central cross-section on a larger scale.

The proportions indicated in the drawings are those designed for a vessel sixteen hundred and twenty feet in length and having a beam of sixty feet. The middle portion A of the hull, being about two-thirds of its entire length, is occupied by the deck and cabins B, and is preferably subdivided and arranged in the manner shown in Fig. IV, though the arrangement may be much modified. The cross-sections of the bow and stern portions C, D, which taper to a point fore and aft of the deck and cabin portions, are circular throughout. The hull A beneath the decks and cabins is, in cross-section, a portion of a circle, the top part of the spindle being cut off, as shown, and the outer walls continued vertically upward; but the deck and cabin portions B can be combined with the spindle-shaped hull in any of the ways pointed out in Letters-Patent No. 161,372 above referred to, and may be flattened at the bottom to decrease the draft as shown in Letters-Patent No. 144,243, dated November 4, 1873. This construction gives a great depth from the top deck to the bottom of the spindle-shaped hull, for about two thirds of the middle part of the vessel, and since tension and compression of the materials composing the top and bottom of the vessel are decreased proportionately to this depth, a saving in weight and cost of materials is effected in constructing these parts of the vessel.

It will be evident that, in the construction of spindle-shaped vessels for ocean navigation, the proportion of length to beam may be varied within certain limits. To insure practical stability of the vessel in the Atlantic Ocean, in all conditions of wind and sea the vessel should not be of less length than about sixteen hundred and twenty feet. This length with a displacement of about thirty six thousand tons and about thirty feet draft of water can be obtained with a vessel of sixty feet beam by making it twenty seven times longer than its beam. With a vessel of eighty feet beam this length with a displacement of about sixty four thousand tons and about forty feet draft of water is obtained by making the vessel twenty and one quarter times longer than its beam. With a vessel of one hundred and eight feet beam, this length with a displacement of about one hundred and eight thousand tons and about fifty four feet draft of water is obtained by making the vessel fifteen times longer than its beam. With a vessel of one hundred and eighty feet beam, this length with a displacement of about three hundred and twenty four thousand tons and about ninety feet draft of water is obtained by making the vessel nine times longer than its beam. These examples show how useful it is to increase the length in proportion to beam to a greater extent than fifteen to one for making a vessel of moderate draft and displacement sufficiently long to insure practical stability of vessel in the Atlantic Ocean in all conditions of sea, and reallzing the other objects of this invention. These examples also make it apparent that in a vessel of proportion of length to beam of fifteen to one or less than this, the results above indicated are not realized to a useful extent in ocean navigation.

As will be clear from the foregoing description the hull, to obtain the results specified, must have a certain actual length, as well as a certain length relative to the beam. I have specified a breadth of sixty feet as the ordinary beam. This is about the minimum required for stability and very high speed to meet the conditions often encountered upon

the North Atlantic Ocean. The beam may however, be somewhat less. For navigating upon oceans where the maximum distance from crest to crest of waves is less than upon the North Atlantic, vessels of forty feet beam, having the required length in proportion to length of waves, would practically accomplish the objects of the invention. Forty feet may therefore be taken as the minimum beam; but in every case the actual length should not be less than the length of three waves of maximum size, measured from crest to crest, in the sea for which the boat is built.

The invention being designed only for ocean navigation has no relation to torpedo boats and similar craft; and I disclaim all submarine vessels.

Having now fully described my said invention, what I claim as new, and desire to secure by Letters Patent, is—

The herein described spindle-shaped hull for ocean-going, self-propelled, surface-navigating vessels, having a length from extreme point to point of not less than six hundred feet, in conjunction with a beam or extreme diameter of not more than one-fifteenth of the length and not less than forty feet, substantially as specified.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WM. L. WINANS.

Witnesses:
FRANCIS A. EVANS,
JOHN ROSE.