(No Model.)

O. HARTWICH.

SHIP'S FORM.

No. 590,101. Patented Sept. 14, 1897.

Fig. 1.

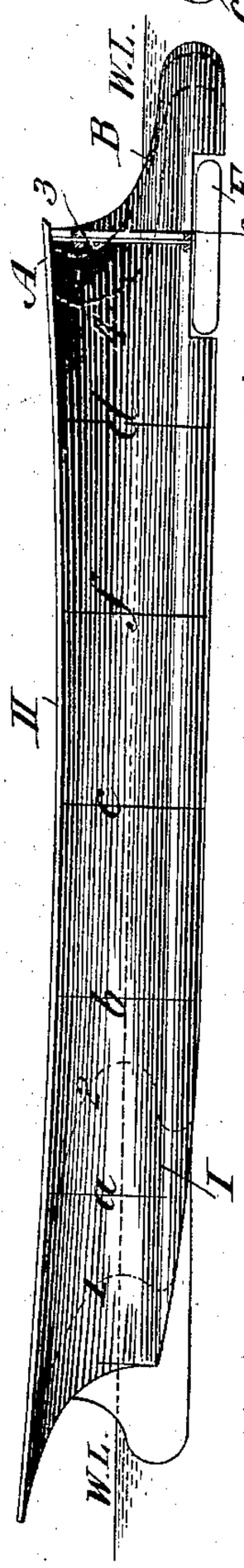


Fig. 2.

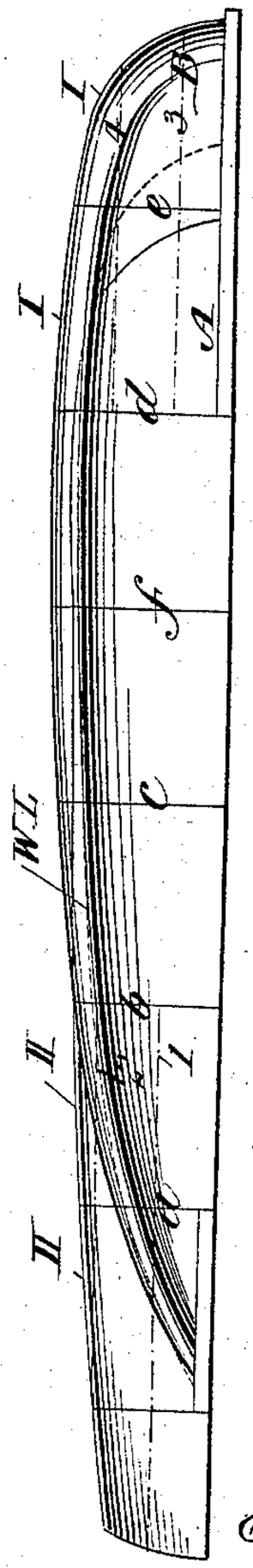


Fig. 3.

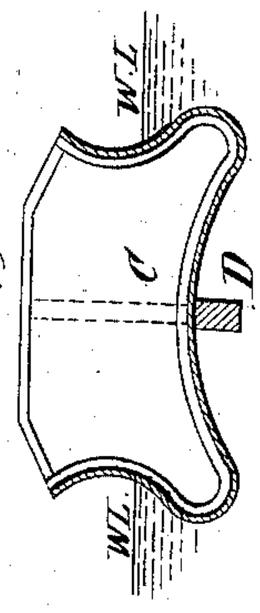


Fig. 4.

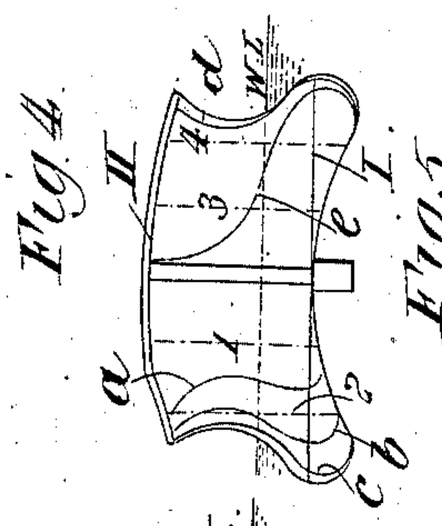
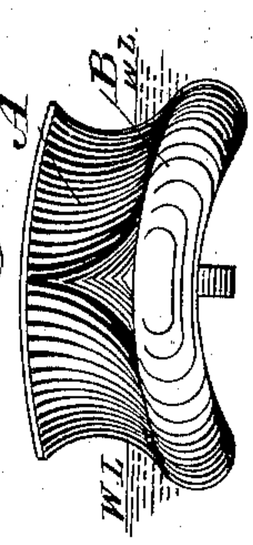


Fig. 5.



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UNITED STATES PATENT OFFICE.

OTTO HARTWICH, OF SWINEMÜNDE, GERMANY.

SHIP'S FORM.

SPECIFICATION forming part of Letters Patent No. 590,101, dated September 14, 1897.

Application filed January 8, 1896. Serial No. 574,768. (No model.) Patented in Germany September 27, 1895, No. 86,379; in England December 2, 1895, No. 23,056; in France December 14, 1895, No. 252,477; in Belgium December 14, 1895, No. 118,854; in Norway December 16, 1895, No. 4,829; in Austria December 29, 1895, No. 45/5,139; in Italy December 31, 1895, XXX, 40,385, and LXXIX, 225; in Finland January 4, 1896, No. 604; in Hungary January 7, 1896, No. 5,081; in Canada February 20, 1896, No. 51,395; in Spain April 11, 1896, No. 18,408; in Portugal June 20, 1896, No. 2,120, and in Denmark January 14, 1897, No. 919.

To all whom it may concern:

Be it known that I, OTTO HARTWICH, a subject of the King of Prussia, Emperor of Germany, residing at Swinemünde, in the Kingdom of Prussia, Germany, have invented new and useful Improvements in Ships' Forms, (which have been patented in Germany, No. 86,379, dated September 27, 1895; in Great Britain, No. 23,056, dated December 2, 1895; in Austria, No. 45/5,139, dated December 29, 1895; in Hungary, No. 5,081, dated January 7, 1896; in Norway, No. 4,829, dated December 16, 1895; in Denmark, No. 919, dated January 14, 1897; in France, No. 252,477, dated December 14, 1895; in Belgium, No. 118,854, dated December 14, 1895; in Italy, Reg. Gen., Vol. XXX, No. 40,385, Reg. Att., Vol. LXXIX, No. 225, dated December 31, 1895; in Spain, No. 18,408, dated April 11, 1896; in Portugal, No. 2,120, dated June 20, 1896; in Canada, No. 51,395, dated February 20, 1896, and in Finland, No. 604, dated January 4, 1896,) of which the following is a specification.

The ordinary forms of the bow and the water-line plan of sea-going vessels, whether they are narrow or broad, are such as to encounter great resistance in the water. The greater the velocity of the vessel the more obvious it is that the vertical cutting through of the waves in front acts prejudicially on the speed, as the masses of water are caused to rise against the bow, increasing thereby the wetted surface, and as the water-line plan is such as not to permit these masses to flow off freely rearward the resistance of the whole ship's body in the water is very much increased. In order to avoid these defects, I have devised a form for a ship's hull to offer the least resistance without interfering with the stability or with the capacity of the vessel, as I shall now describe.

In the first place I modify the shape of the fore part or bow of the vessel in such a manner that instead of cutting through the water vertically it divides the water horizontally, so that one portion of the water is deflected upward and the other portion downward. In addition the water-line plan and the cross-section of the vessel are so formed that the portion of the water which is thrown downward and passes under the body of the ship does not retard the vessel, but rather aids its motion, while the portion of the water which is deflected upward, owing to the peculiar shape of the water-line plan, is so directed as to reduce the resistance to a minimum.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improved vessel, the part adjacent to the rudder-shaft being, for the sake of greater clearness, shown in section. Fig. 2 is a plan of one half of the vessel, with lines indicating the curvature at the points indicated by the three approximately-horizontal lines I W L and II in Fig. 1. Fig. 3 is a cross-section taken amidships on the line *f* in Figs. 1 and 2. Fig. 4 is a double end view showing one half as seen from the bow and the other half as seen from the stern, with lines indicating the curvature of the hull in the vertical transverse planes indicated by vertical lines *a b c d e* in Figs. 1 and 2; and Fig. 5 is a front or bow wiew of the vessel.

For the purpose of my invention I in the first place extend the fore part or bow A of the ship under the water-line, so as to form it somewhat like a ram B, (see Fig. 5,) whose breadth is considerable, while its height is comparatively small, with a rounded front edge to cut the water horizontally; secondly, the cross-section of the ship's body joining this projecting bow by curves of predetermined formation, corresponding to the water-line plan in Fig. 2, is such that the immersed part of the body is broadest immediately behind the bow and is decreased in width toward the stern, first gradually, then more abruptly, according to quite determined curves and not arbitrarily; thirdly, the hull is suddenly contracted just above the water-line,

(see cross-section in Fig. 3,) the greatest width being below the water-level in a part which is rounded off, and which, being at its outer part about level with the keel, turns inward and upward to less depth along the longitudinal center line of the vessel, thus presenting a hollow along the bottom C, divided by the projecting keel D. This cross-section and the plan resulting therefrom insure great stability.

The exact shape of the above-indicated body and water-line plan results from particular displacement-curves of the immersion, which I have invented for obtaining the shape offering the smallest resistance while fully insuring the stability of the vessel.

The shape of the ship in longitudinal section will be understood best by reference to the lines marked 1, 2, 3, and 4 in Figs. 1, 2, and 4.

In order to give the vessel great facility for maneuvering, I provide a bottom rudder E immediately behind the bow, occupying part of the keel-space and completely protected by the bottom. The rudder being also entirely surrounded by the water under the vaulted bottom it acts immediately on the least turning about its vertical axis. This is of particular value and gives the improved rudder decided advantage over the generally-known sunk rudders.

Having thus fully described my invention, I claim as new, and desire to secure by Letters Patent—

1. A ship's hull having a transversely-vaulted concave bottom with a keel extending longitudinally in said concavity, the hull when viewed in plan showing an outline which has its greatest width at or near the bow and decreases in width toward the stern, the hull being tapered at the stern and formed at the bow with a broad rounded projection located with its top surface approximately flush with the water-line and having a horizontal dividing edge, the hull further when viewed from the end or in cross-section, showing an outline which is contracted above the water-line and has rounded portions of greater width approximately level with the keel, substantially as described.

2. A ship provided at the bow with a broad forward projection located under the water-line and presenting a horizontal dividing edge, the hull having a transversely-vaulted concave bottom with the concavity extending forward to said projection, substantially as described.

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

OTTO HARTWICH.

Witnesses:

OTTO HERING,

GUSTAV HÜLSMANN.