No. 25.198.

Hermanos Hersch

Impt in the construction of Ships.

Patented Aug. 23. 1859.

Fig. V.

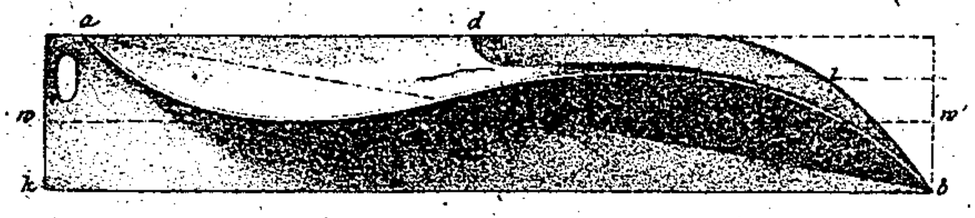


Fig. III.

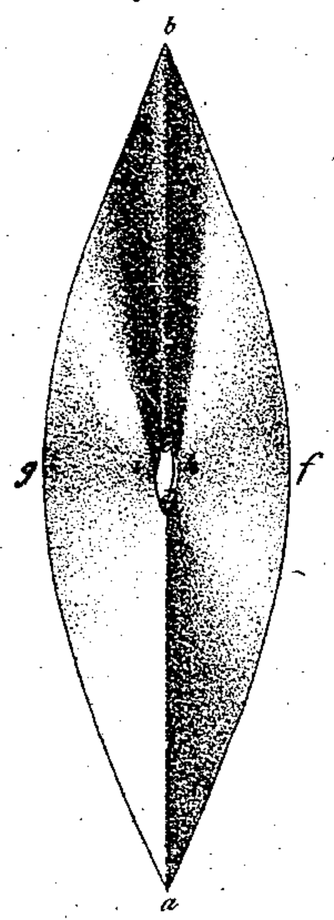


Fig. I.

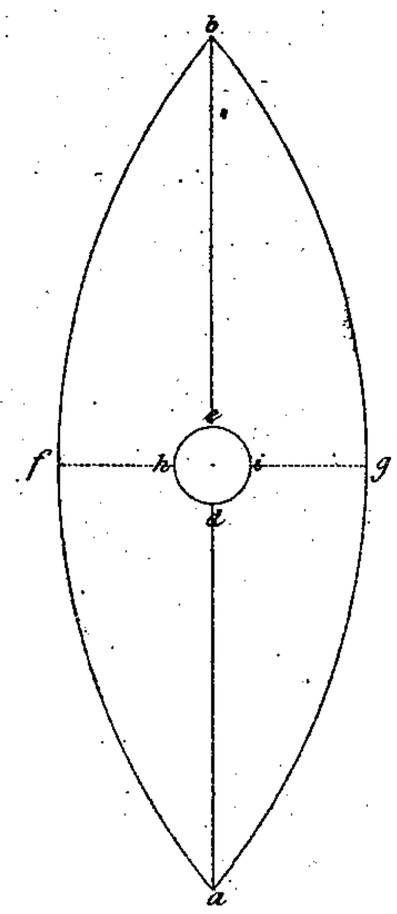


Fig. II.

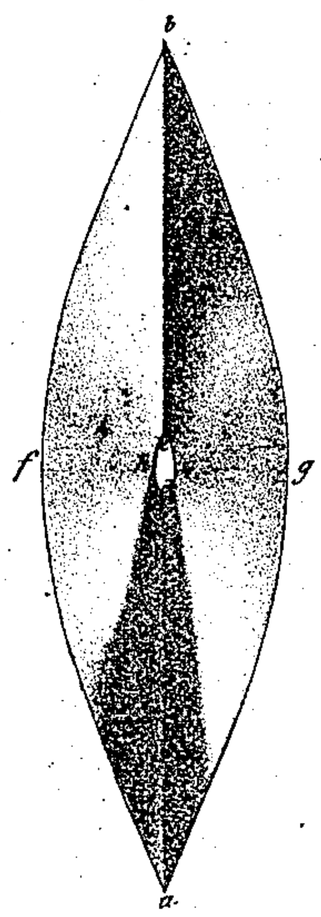
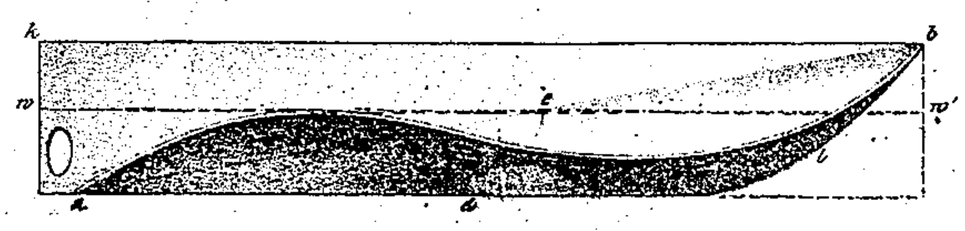


Fig. IV.



Witnesses

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UNITED STATES PATENT OFFICE.

HERMANN HIRSCH, OF BERLIN, GERMANY.

CONSTRUCTION OF SHIPS.

Specification of Letters Patent No. 25,198, dated August 23, 1859.

To all whom it may concern:

Be it known that I, HERMANN HIRSCH, of Berlin, in the Kingdom of Prussia, Germany, have invented a Normal Vessel; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed sheet of drawings, making a part of the same.

The special peculiarity of this new invention is its entirely removing the possibility of breakage of the keel (known as breaking back) in ships and imparting to the bottom a normal form giving a maximum of steadiness without retardation of velocity.

The description of this form of ship, its comparison with those hitherto in use and the account of its peculiar advantages are the objects of the following remarks.

1. Description.

The inventor takes a plane horizontal surface, (Plate II Figure 1) bounded by two arcs *a f b* and *a g b*. The chords of these two equal arcs give the longer axis *a b* bearing the proportion to the shorter axis *f g* of $27\frac{1}{4}$ to 10. A circular aperture *d*, *h*, *e i* is made in the plane the diameter of which stands in the proportion to the shorter axis *g*, *f* of 1 to 4. This aperture allows of the plane surface being curved (or folded or bent) in such a manner as to give the peculiar form of the new ships bottom. The semi axis *d a* is first bent downward and then the semi axis *b e* upward, the folding or bending being confined within two limits. The diameter of the circular aperture will of course be contracted by this bending or folding such contraction being within the limits of $\frac{1}{4}$ and $\frac{1}{2}$ of *h i*.

Fig. 2, Plate II, gives a view of the interior or upper part of the plane so folded. *a d* is the semi axis folded downward all the letters having the same value as in Fig. 1 *h*, *i* is the contracted diameter of the aperture.

Fig. 3 gives a view of the exterior or under part of the plane *a d* appearing above and *e b* below.

On referring to Fig. 2 it will be at once evident that the semi axis *e b* retains no position parallel with its former one, but rises somewhat toward *b*—*a d* retaining a position parallel with that which it originally occupied. In Fig. 3 *e b* is depressed toward *b*, *a d* remaining parallel. In Fig. 4 this is evident. *a d* is horizontal, *e b* rises in such a manner that *b e* can be produced in a right line to *a*. This rising is essential and therefore constant. If the curving or folding be proceeded with in conformity with this principle so that the diameter of the aperture *h*, *i*, is diminished to one-fourth.

Fig. 4 gives us a view (in elevation) of the starboard side of the hull (bottom). The diameter of the opening *h i* being reduced the diameter *d e* becomes increased, but as half of the curvature proceeds upward and the other half in the opposite direction the semi circle indicated in Fig. 1 by the letters *d i e* assumes, when seen from the side the figure of an **S** as shown in Fig. 4. Further as the longer axis given in Fig. 1 as a right line *a b* appears in Fig. 4, after the folding or curvature, horizontal in the semi axis *a d* and elevated in *e b* the arc *a g b* in Fig. 1 must also assume the form of the letter S in Fig. 4. Fig. 4 compared with Fig. 2 will now render the mode of shading the drawing so as to give the appearance of a solid clear, the point *g* in Fig. 4 lying sideward under *e*.

It will be seen from this statement that the bottom consists of four parts viz. two aft and two forward. The Figs. 2, 3 and 4 together show the two after parts in the upper or interior portion convex, and in the under or exterior, concave decreasing in size aft toward the keel and becoming broader amidships. Both portions meet at the keel each more forward part however retaining its own special independent properties (details). Each assumes a compound curvature downward which may be seen in Fig. 4 projected on the longitudinal section of the ship from *e* to *b*. As however the semi-axis rises obliquely each fore portion of the bottom becomes curved obliquely toward the lower part of the ship. In proportion as the folding is effected with greater or lesser contraction of the diameter of the aperture *h i* Fig. 1, the arcs *a g* and *g b* become more or less elevated or depressed, thus imparting a proportionate flatness or sharpness to the bottom of the ship. Fig. 4 *w w'* shows the average water line. On the bottom thus formed a bulk head rising from the keel upward is now erected the after part of which forms the stern post, the lower extremity the keel and the part bent forward, the stem and the head Fig. 4 *k l*. The partition appears at *a d* undisturbed from *d*.

It intersects the foreward half of the hull, and at *d l b* appears as stem and head the two fore portions joining the keel-partition at *e b*.

The aperture for the screw in screw vessels is to be introduced at *w*. This keel partition can be carried upward at pleasure and whether it is to be subdivided in serving as junction for the two longitudinal sections of the ship or whether it be intersected by oblique and other bulkheads and made subordinate to the purposes of the hold depends upon circumstances.

2. Comparison of this form of hull with those hitherto in use.

This comparison must be confined to the chief requisites of a ship viz., firmness, steadiness, capacity and velocity or speed.

1. The firmness which is imparted to the whole construction is so evident that further discussion of it is unnecessary. It is of course increased when other partitions perpendicular or oblique to it are introduced and the liability of breaking back is thus removed; and as it is unnecessary to continue the keel bulk-head into the upper portions of the hull (above the hold) the hatchways may be of any size required. In all the constructions hitherto used the only safeguard against such breakage was afforded by the clamps, wales water ways and carlines.

2. Steadiness.—The steadiness which the whole mass acquires by means of the new and peculiar bottom is increased nearly threefold, the two partially separated curvatures of the fore part taken together with the great want of depth of the hold toward the waist form a mutual support to the two forward portions and to the whole of the after-hold so much so that it may be asserted and proved, partly by calculation and partly by numerous experiments, that a ship provided with such a hold acquires such steadiness of motion as to require no ballast. The same peculiarities secure the vessel against pitching and rolling.

3. Capacity.—The capacity (for the accommodation of cargo) of a vessel built with such a bottom can complete with that of the best constructions hitherto employed. Firstly, because the greater possible freedom is offered in the choice of the form of the part of the ship above water the new bottom being taken as a foundation. Secondly because the length of this bottom gives a proportion to the breadth of beam seldom attained by the present, often exaggerated, efforts to attain great length.

4. Velocity.—The velocity or speed attainable with the new bottom may be seen from the following important peculiarities. The opposing mass of water is divided by the keel-bulk-head and thrown two curves forming toward the whole of the fore part of the ship which are curved nearly in the form of a cone and lie obliquely. Impinging on these surfaces, thus inclined and thus curved, the water must be thrown off with a minimum of impulsive force. Affording a striking contrast to the hitherto almost perpendicular rise of the bows and fore part of the ship. Further, the hollow form of the after part of the hold sinking and becoming sharper aft shows with what force the water flowing along the two sides toward the rudder endeavors to reunite imparting to the ship an uncommon facility in steering and clearly an increased rate of speed.

These advantages being considered together it will be seen what a saving in time and fuel is effected by a ship having this form of bottom combined with the centrifugal screw invented by the same individual.

A singular addition to the above-named advantages is presented by a contrivance by which the ship may be arrested while at full speed and brought to instantaneous rest, and by which also a side motion from the point may be communicated to the ship at pleasure an advantage which the present and increasing danger of collision or fouling must render of the highest importance for merchant ships as well as for the evolutions of war steamers. This contrivance consists of a species of fin attached to the keel-bulkhead which in the usual progress of the vessel remains in the same direction as the keel and of which two may be used together or separately at a greater or less angle with the keel.

Fig. 5 is added to Plate II for further elucidation, it gives Fig. 4 in an inverted position. The letters for reference have the same value in both.

Having now described the nature of my said invention and in what manner the same is or may be performed, I wish it to be distinctly understood that I do claim as my invention—

The form and construction substantially as herein set forth of the hull of ships or vessels, whereby the possibility of breakage of keel is removed and a normal form giving a maximum of steadiness without retardation of velocity is imparted to the bottom.

HERMANN HIRSCH.

Witnesses:
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C. LEHMANN.