T. W. KIRBY.
Construction of Ships.

No. 230,286. Patented July 20, 1880.

Fig. 1.

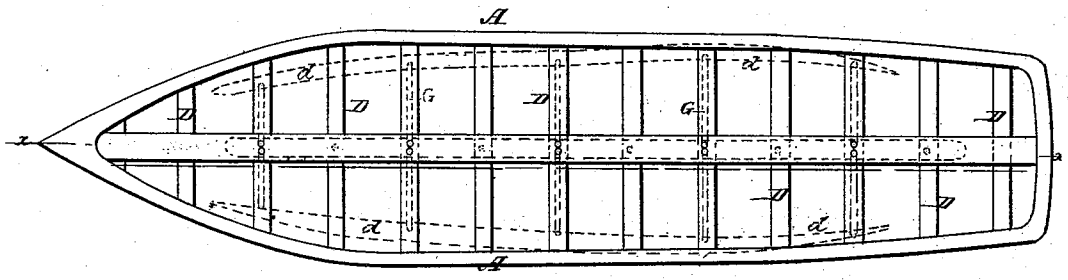


Fig. 2.

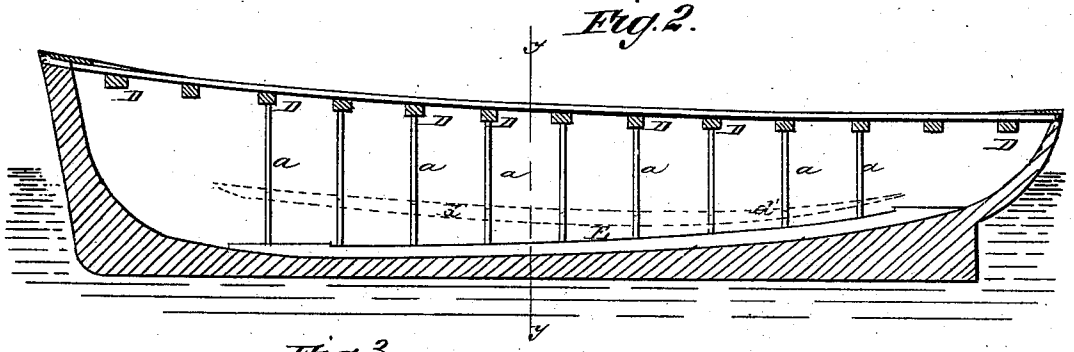


Fig. 3

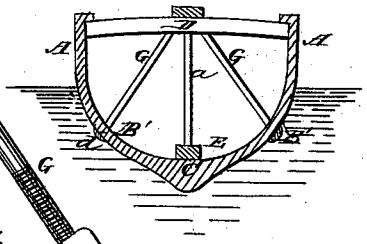
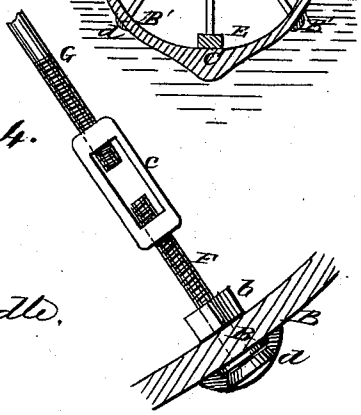


Fig. 4.



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UNITED STATES PATENT OFFICE.

THOMAS W. KIRBY, OF GRAND HAVEN, MICHIGAN.

CONSTRUCTION OF SHIPS.

SPECIFICATION forming part of Letters Patent No. 230,286, dated July 20, 1880.

Application filed April 5, 1879.

To all whom it may concern:

Be it known that I, THOMAS W. KIRBY, of Grand Haven, in the county of Ottawa and State of Michigan, have invented a new and Improved Construction of Ships, of which the following is a specification.

The object of my invention is to provide ships' hulls with devices and arrangements for strengthening the bilge and bottom and preventing what is known as "hogging."

It consists in connecting the bilge with the beam by iron rods, serving as braces that sustain it from the beam and thus prevent it from yielding to any strain.

In the accompanying drawings, Figure 1 is a top plan of the ship, looking down in the hold. Fig. 2 is a longitudinal vertical section of the same on line *x x*. Fig. 3 is a cross-section on line *y y*, and Fig. 4 represents in detail the mode of connecting the rods with the ship's bilge.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A A are the ship's sides. B B are the bilges. C is the bottom. D indicates the beams. E is the keelson, and *a* represents the stanchions connecting the keelson and beams together, sustaining the latter and the deck, and supporting the bottom to some extent.

F represents the bolts for connecting the ends of the hog-rods G with the bilges B. They consist of iron bolts passed through the bilges diagonally, and the manner of applying them is as follows: A hole is bored through the bilge of a proper diameter to receive the bolts. Then the bolt or rod is threaded its whole length. The end is then headed with a square or rivet head. A washer is next slipped over the rod down to the head, and the bolt inserted in the hole and driven through as tight as a drift-bolt is driven—that is, until its head bears as tightly as possible against the bilge. A nut, *b*, is now passed over the bolt and screwed tightly down against the ship's ceiling. This keeps the bolt in the hole in case a rod breaks by any accident.

The hog-rods G are threaded at each end and connect with the bolts F by turn-buckles *c*, and are passed through the beams and fastened by a nut, or they may pass through an iron plate let into the beam under the deck, and the nut screwed down on it to prevent the nut from cutting into the beam.

By means of the turn-buckles the rods can be screwed up tightly, so that they will afford a direct support to the bilge and bottom. The hog-rods G, it will be observed, connect with every other beam for the length of the keelson on both sides, and thus support the bilges their whole length and prevent the ship's bottom from hogging. The hog-rods G, for convenience, may be made in several sections joined together by solid eyes or couplings.

The advantages of this improvement will be apparent to the skilled ship-builder. It is well known that, owing to the peculiar shape of the vessel's bottom and sides, the bilges are exposed to a very great strain, and that too where they are least able to bear it; consequently, at these points, what is known as "hogging" occurs—that is, the ship's bilges have a tendency to drop and her bottom to spring up.

My invention, however, by staying the bilges from the beam by the hog-rods, gives them strength to resist the strain to which they are subjected, and thus greatly increases the strength and durability of the ships.

The invention is applicable to any kind of ship, wood or iron, and with one or more decks. In the latter the rods are connected with the beams of the second or third deck, as the case may be. In all cases the bolts F are passed through the bilge at the center of the turn at an angle appropriate to the height of the beam.

The heads of the bolts outside may be made of a metal not susceptible to corrosion when the improvement is applied to vessels for southern waters.

The outside streaks *d* on the ship's bilges, where the bolts go through, should be at least one inch thicker than the other plank on the bilges, so that the heads of the bolts can be countersunk in the plank to shield them from contact with objects in the water.

I am aware that hog chains and rods have heretofore been used, so arranged as to cross each other, their upper ends being secured to the sides of the vessel and their lower ends to the bilges; but they do not prevent the bottom of the vessel from rising up between the bilges, or the bilges from settling down. Their office

is to assist in preventing the sides of the hull from vibrating. Each bilge is braced from the opposite side of the vessel, and as the sides drop they necessarily carry down the bilges with them and hog the vessel. Nor can this defect be remedied by placing stanchions between the keelson and beams; for if the rods are crossed the stanchions simply spring up the beams when the bilges drop, because there is nothing to tie the stanchions to the bilges.

My invention overcomes these objections and defects, for by arranging the stanchions and hog-rods as I propose the bilges are prevented from dropping down, or, what would be the same thing in effect, preventing the bottom from being forced upward between the bilges, as in both cases the tendency is resisted by the compressive strength of the stanchions and the tensile strength of the hog-rods. Therefore, any upward strain upon the stanchions, instead of springing the beams upward, is resisted by the bilges through the medium of the hog-rods, and the vessel prevented from hogging.

What I claim is—

The hog-rods G G and stanchions or braces *a*, combined with the beams, the bilges, and the keelson E of the vessel, the stanchions being arranged vertically between the keelson and center of the beams, and the hog-rods being inclined outward from the tops of the stanchions to the bilges, substantially as described, for the purpose specified.

THOMAS WATERS KIRBY.

Witnesses:
Capt. JOHN FURLONG,
Capt. THOS. WALSH.