J. A. ARMSTRONG.

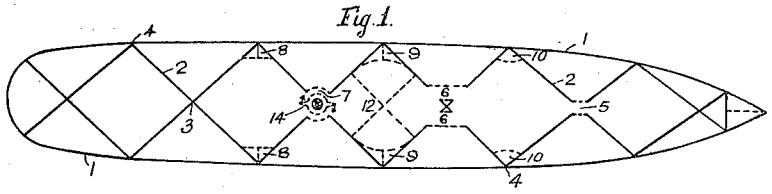
UNSINKABLE SHIP.

APPLICATION FILED APR. 28, 1919.

1,310,233.

Patented July 15, 1919.

Fig. 1.



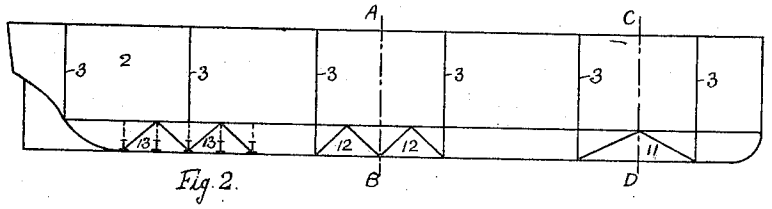
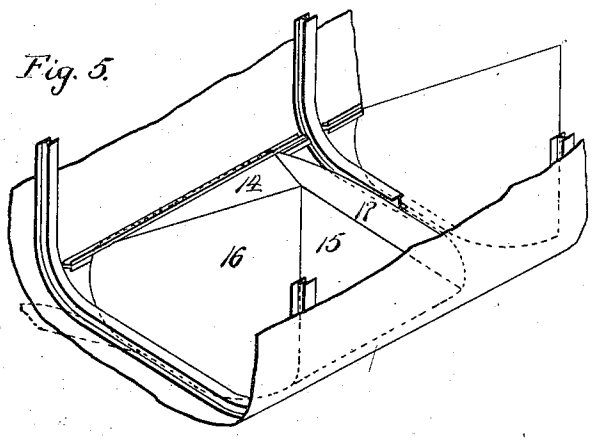


Fig. 2.

Fig. 5.



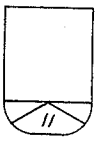


Fig. 4.



Fig. 3.

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UNSINKABLE SHIP.

1,310,233. Specification of Letters Patent. Patented July 15, 1919.

Application filed April 28, 1919. Serial No. 293,307.

To all whom it may concern:

Be it known that I, JOHN ARTHUR ARMSTRONG, a subject of the King of Great Britain, residing at "Gilnockie," Westcombe Park, in the county of London, England, have invented a new and useful Improved Unsinkable Ship, of which the following is a specification.

The object of this invention is to reduce the damage and danger resulting to a ship from puncture of the ship's skin. To this end an improved system of bulkheads is provided which in effect covers the whole interior surface of the ship's skin with triangular or pyramidal compartments of relatively small volume.

In ordinary ship-building practice bulkheads are arranged transversely to the length of the vessel and divide the hull into cross sections with a section of the ship's skin on each flank. A single puncture of the ship's skin on either side of a section with transverse bulkheads floods the entire volume of that section.

It has been proposed to divide the cargo space of a ship into a series of holds of approximately triangular shape in plan by diagonal vertical bulkheads extending in pairs from the outer plating to the middle line of the ship. This present application is not intended to cover such sub-division of cargo space, but is directed to the extension of such diagonal bulk-heads over the entire hull for the purpose of diminishing the damage done by puncture of the hull.

The vertical bulk-heads are arranged diagonally and intersect about the central axis of the vessel, adjacent bulkheads meeting on the line of the ship's vertical ribs, thus forming a series of rectangular or lozenge-shaped holds bounded by triangular shaped compartments. Below them on the inner skin of the ship's bottom are inclined bulkheads preferably in two sets respectively parallel with the length of the vessel and transverse to the vessel, forming pyramidal or prismatic compartments. These triangular and pyramidal compartments alone are bounded by the ship's skin or sides. The triangular compartments each contain but one-quarter of the volume or displacement of an entire compartment of the transverse system. Owing to this a puncture of the ship's skin in any section results in only one fourth of the loss of displacement involved in the puncture of a ship's skin employing the usual transverse bulkhead system. If every section on both sides was punctured there still remains one half of the displacement unflooded, and in that space the parts essentially necessary to save the ship can be located, engines, boilers, magazines, etc; these may be distributed in the series of central holds separated from one another by the bulkheads and protected by the inclosing triangular holds or bunkers, which may contain coal, etc., as an additional protection from shot or shell.

The aggregate length of bulkheads in the present system is increased nearly threefold, but as the unsupported length of each bulkhead section (allowing for the necessary central passages and reinforcements or gussets) is less than in the usual transverse system by at least one half, the bulkheads need not contain one-quarter of the material and weight to offer equal resistance against compartment flooding; and consequently the present system of bulkhead construction does not necessitate any increase in material and weight over the transverse system, for equal strength.

Moreover, as a natural consequence of the crossed zig-zag system of bulkheads the entire vessel is enormously strengthened longitudinally, vertically and transversely to withstand a blow, to act as a ram, or to withstand any shocks or strains due to collision, storm or wreck.

This system is applicable to all sizes and varieties of shipping, from a lifeboat upward, whether for war or mercantile purposes, it is also eminently suitable to knit together the new type of reinforced concrete construction. With respect to protection from below against mines or other obstacles, in ordinary cases the bottoms of the outer triangular partitions require no more protective structures than may be constructionally necessary for floors, bilge etc. The bottom of the interior quadrilateral compartments must however be strengthened, and a second bottom or floor provided to carry the engines, boilers etc. This purpose is served and loss of displacement through puncture is minimized by the use of inclined bulkheads forming compartments of pyramidal or prism form.

My invention is illustrated by way of

example in the accompanying drawings, in which—

Figure 1 shows a plan view of a vessel employing a lattice or crossed system of bulkheads and a variety of methods of constructing intercommunicating passages between the adjacent central rectangular holds.

Fig. 2 shows a vertical section along the ship's axis.

Fig. 3 shows a transverse section on the line A—B of Fig. 2 and

Fig. 4 shows a transverse section on the line C—D of Fig. 2.

Fig. 5 is a fragmentary perspective view of the form of hull shown in Fig. 4, with the floor omitted.

Referring now to the drawings—1 indicates the outer skin of the vessel, 2 the position of the crossed diagonal bulkheads which intersect at 3 and meet at 4 on the ship's sides and ribs. These crossed bulkheads are carried down to the ship's real or false bottom, and as will be obvious restrict the flooding of the ship's skin all around to about one-half of the ship's displacement. 5 indicates by way of example a single passage-way between two adjacent central rectangular holds. 6 indicates a pair of tunnel passages through the side bunk compartments, and 7 indicates a compact form of double passage-way around intersecting bulkheads in which the intersection is brought up in columnar form and may be suitably employed to carry a balanced double or wing water-tight door 14. As such passages as those indicated at 5, 6 and 7 will be necessary on each deck of the ship they may be arranged alternatively single or double above or below each other so as to break joint in the vertical plane of the intersection of the bulkheads. Straight, convex or concave reinforcement compartments to the outer angles of the main holds are indicated respectively at 8, 9, and 10. These reinforcements are connected between the bulkheads or to the ship's ribs and skin and have for their object the strengthening of these portions of the ship against a blow or explosion. Similar reinforcements may be employed as indicated to strengthen the stem and to provide a protection in the case of collision or ramming.

As shown in Fig. 2 I substitute pyramidal or dished cells resting on the ship's outer skin for the usual rectangular cells now employed. By this arrangement I am enabled to save two-thirds of any displacement which would otherwise be lost as a result of the bottom of the ship being punctured. 11 indicates the use of a single pyramidal casing for the bottom of a central hold with a height equal to the distance between the real and false bottoms. This is further seen in Fig. 5 which shows how such a pyramidal compartment is roofed by four bulkheads, two of them, 14 and 15 and parallel to the length of the vessel and two of them, 16 and 17, transverse to the vessel. At 12 I show four such pyramids in like conditions, their positions in plan view being shown in dotted lines in Fig. 1. At 13 I show by way of example the pyramidal cells placed in the line of the ship's ribs with the diagonal bulkheads only brought down to the level of the deck or false bottom. The number of such cells can easily be increased if desired and the pyramidal form modified to suit curved surfaces, and vertical ribs or webs added as required to carry the false bottom of the ship.

The lattice or crossed system of bulkheads above described may very suitably be employed as a reinforcement of a ship of ferro concrete construction.

What I claim is:—

1. In a navigable vessel the combination with the outer skin, of a system of vertical diagonal bulkheads forming with the wall of the hull triangular compartments, and a second system of inclined bulkheads forming with the ship's bottom pyramidal compartments.

2. In a navigable vessel the combination with the outer skin of inclined bulkheads parallel with the length of the vessel, and other inclined bulkheads transverse to the vessel forming pyramidal cells.

In testimony whereof I have signed my name to this specification.

J. A. ARMSTRONG.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."