No. 696,103. Patented Mar. 25, 1902.

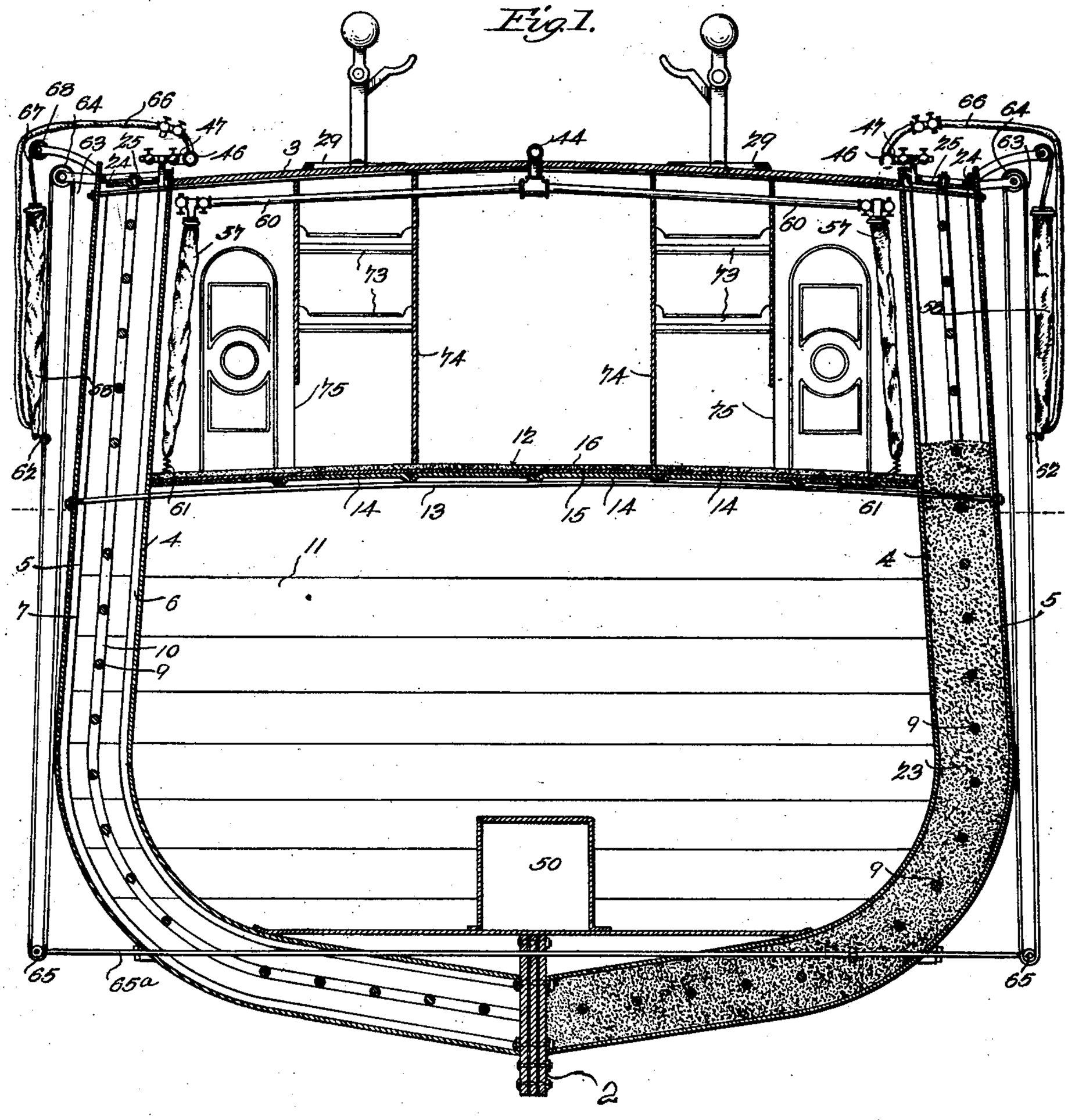
J. K. LEEDY.

SHIP.

(Application filed Apr. 30, 1901.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

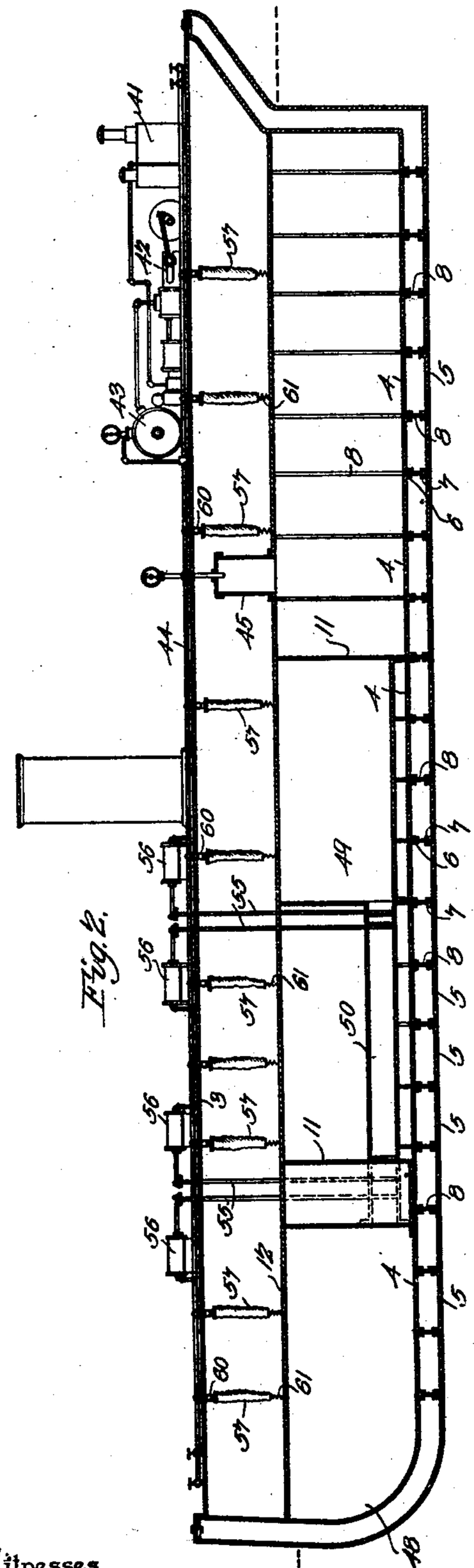

Fig. 2.

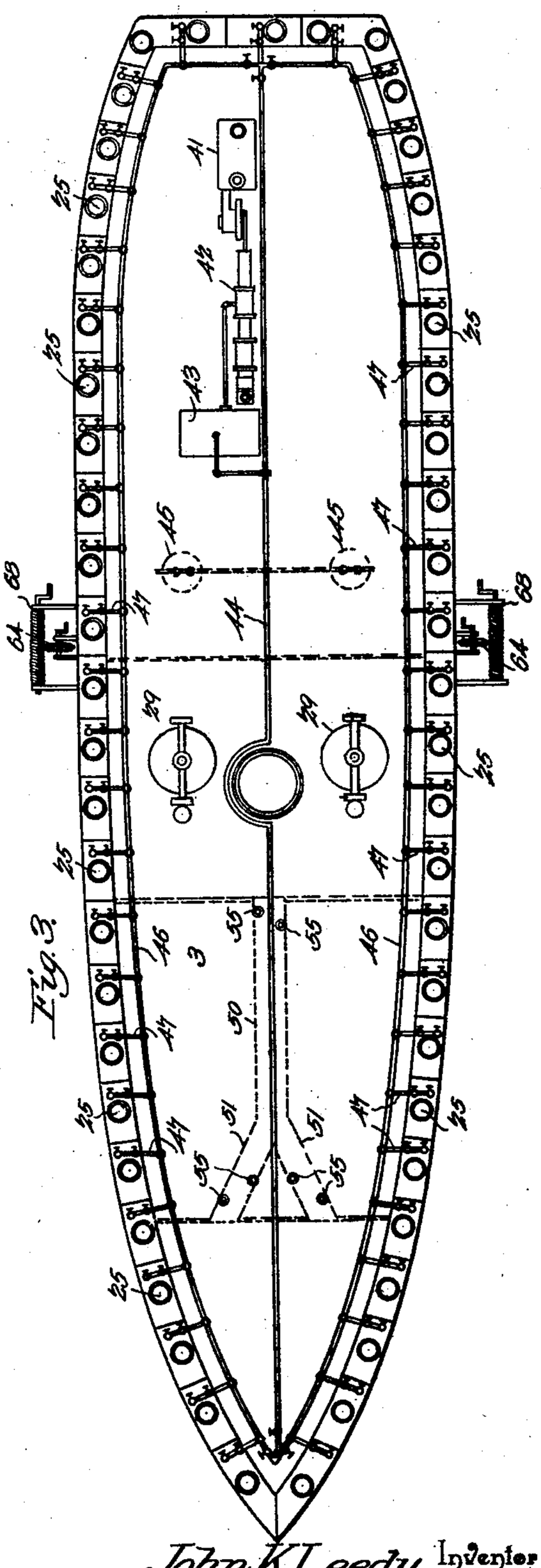

Fig. 3.

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(No Model.) 4 Sheets—Sheet 3.

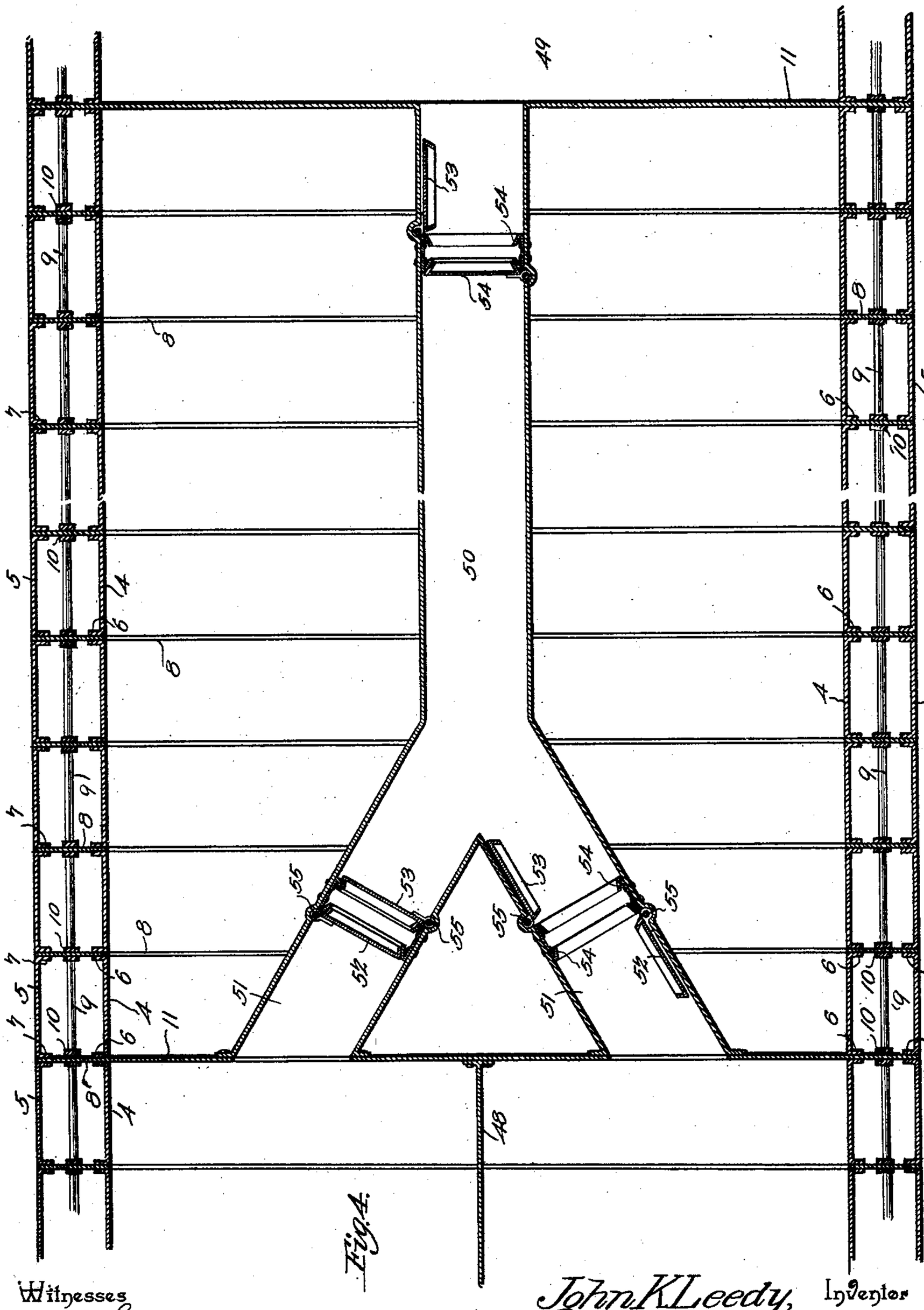

Fig. 4.

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(Application filed Apr. 30, 1901.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 5.

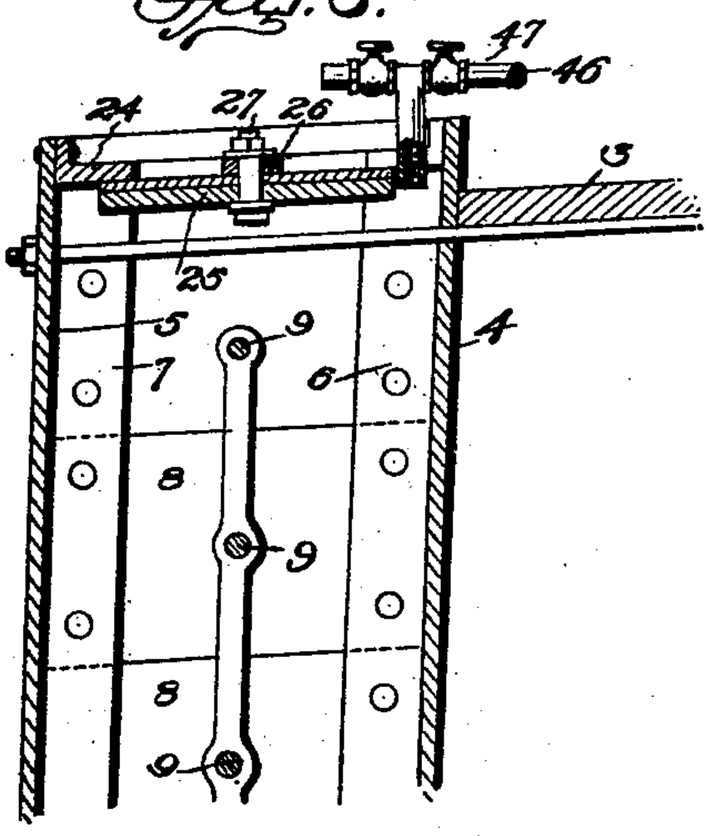


Fig. 6.

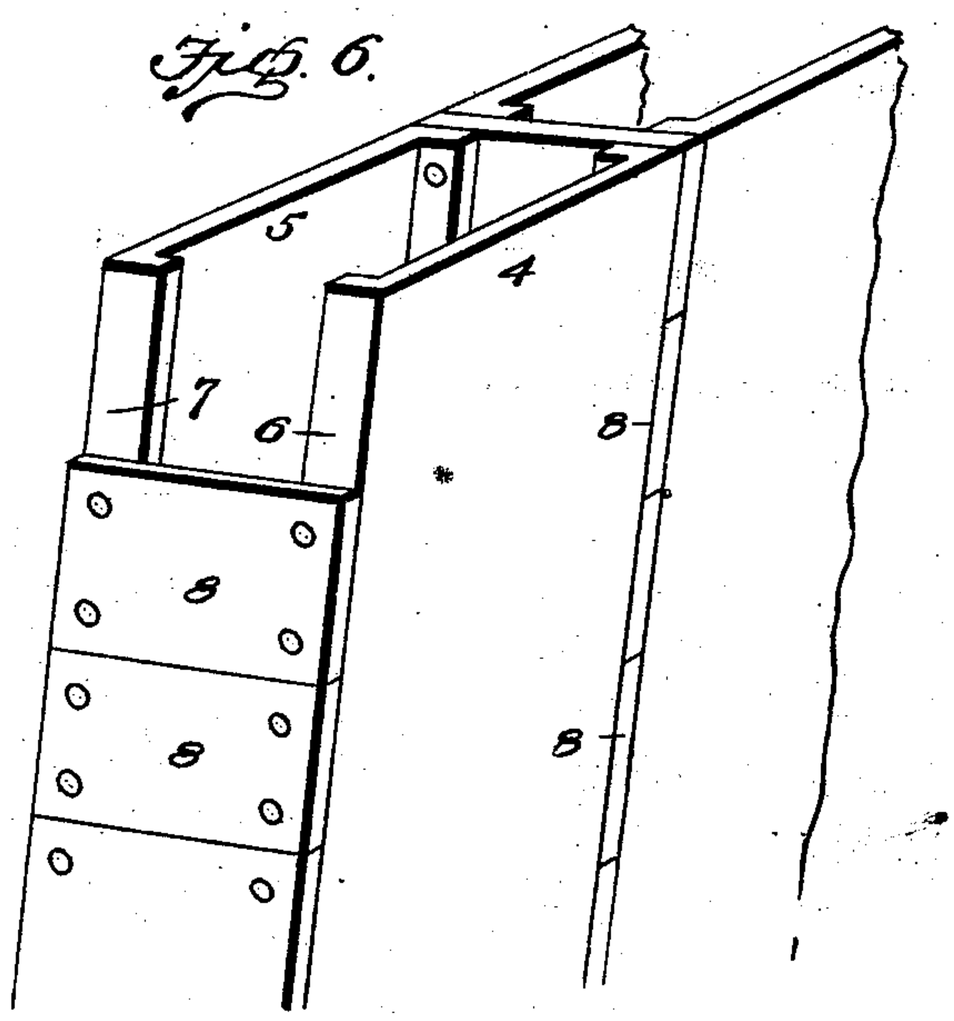


Fig. 7.

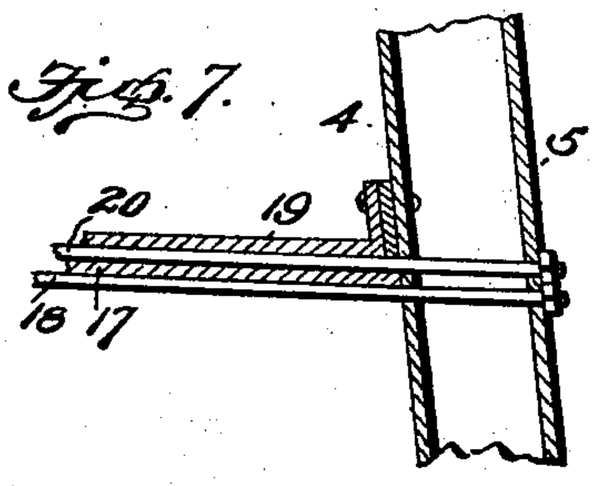


Fig. 8.

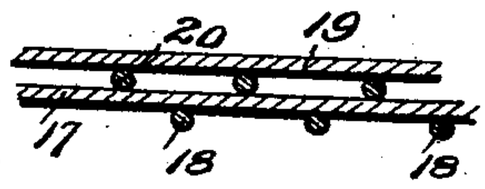
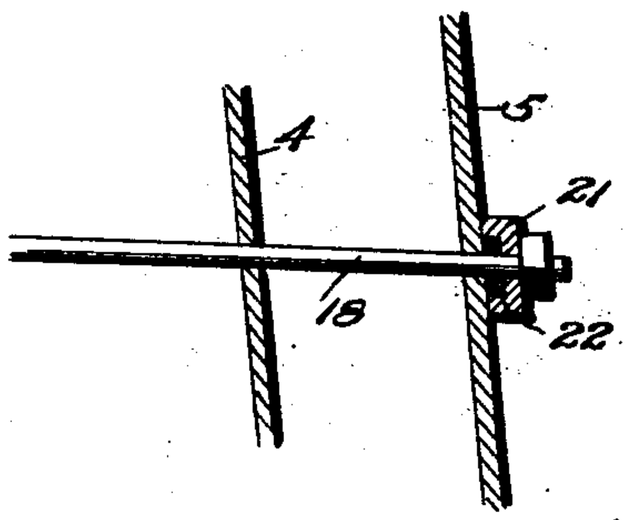


Fig. 9.



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UNITED STATES PATENT OFFICE.

JOHN K. LEEDY, OF ROANOKE, VIRGINIA.

SHIP.

SPECIFICATION forming part of Letters Patent No. 696,103, dated March 25, 1902.

Application filed April 30, 1901. Serial No. 58,171. (No model.)

To all whom it may concern:

Be it known that I, JOHN K. LEEDY, a citizen of the United States, residing at Roanoke, in the county of Roanoke and State of Virginia, have invented a new and useful Ship, of which the following is a specification.

The invention relates to improvements in ships.

The object of the present invention is to improve the construction of ships and to provide a simple and comparatively inexpensive one adapted to exclude water should the hull be stove in or otherwise punctured and provided with means for covering or closing punctures and for preserving its buoyancy sufficiently to prevent it from sinking.

A further object of the invention is to provide simple and efficient means for enabling a ship to be given a lift to assist in floating it off a rock or bar should it strike the former or become grounded upon the latter.

The invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended.

In the drawings, Figure 1 is a transverse sectional view of a ship constructed in accordance with this invention. Fig. 2 is a longitudinal sectional view. Fig. 3 is a plan view. Fig. 4 is a detail horizontal sectional view illustrating the arrangement of the tunnel or passage extending from the engines to the coal-bunkers. Figs. 5 and 6 are detail views illustrating the construction of the hull of the ship. Figs. 7 and 8 are detail views illustrating a modification of the lower deck. Fig. 9 is a detail view illustrating the arrangement of the elastic washers or disks for sealing the perforations through which the transverse rods pass.

Like numerals of reference designate corresponding parts in all the figures of the drawings.

The hull of the ship, which may be of any desired form, is composed of a continuous series of ribs extending upward from the keel 2 to the deck 3, and each rib consists of inner and outer plates 4 and 5, forming inner and outer walls and spaced apart for purposes hereinafter described. The keel 2, as clearly illustrated in Fig. 1, is composed of a series of plates connected together by bolts or other suitable fastening devices, and the ribs are secured at their lower ends to the keel, between the upper and lower edges thereof. The inner and outer plates 4 and 5 have their longitudinal edges bent at right angles to form inwardly-extending flanges 6 and 7, to which are bolted or riveted transverse plates 8, separating the ribs and dividing the spaces between the inner and outer walls formed by the inner and outer plates 4 and 5 into separate compartments. The lower ends of the inner and outer plates are bent inward to form flanges, which are bolted to the keel 2, as clearly shown in Fig. 1. The ribs are supported by horizontal rods or rungs 9, disposed longitudinally of the ship and extending across the spaces between the transverse plates 8 and through suitable openings of braces 10, consisting of narrow bars extending longitudinally of the ribs and arranged at the opposite faces of the transverse plates, as clearly illustrated in Fig. 4 of the drawings. These horizontal rods or rungs 9, which may be continuous, if desired, are arranged at regular intervals and form a complete ladder for each hollow rib to enable workmen to readily descend to the lower portions of the ribs while constructing the hull. The ribs, which are formed by inner and outer plates 4 and 5, as before described, are shown in the drawings the same width throughout their entire length; but they may be made tapering, and they are curved, as shown, to give the hull the desired form. The hull may be provided at intervals with transverse plates 11, extending entirely across the ship and forming transverse bulkheads, as clearly illustrated in Fig. 4 of the accompanying drawings.

The ship is provided with upper and lower decks, the lower deck 12 being located a suitable distance below the main deck 3, as clearly shown in Fig. 1; but the number of decks may, of course, be increased. The lower deck, which is supported by transverse rods 13, preferably consists of a series of plates 14, a continuous copper plate 15, and a layer 16 of solder. The plates 14, which are arranged at the bottom of the lower deck, have their edges bent downward, as indicated in Fig. 1, and are soldered together, the solder being arranged in the gutters formed by

the downwardly-bent edges. The continuous copper plate 15, which extends entirely across the ship, is suitably secured to the upper faces of the lower plates 14, and the solder 16 is arranged in a thin layer over the copper plate. The rods preferably extend through the sides of the hull and are threaded for the reception of nuts, and besides supporting the lower deck they serve to brace the ribs. The lower deck forms an air-tight wall or ceiling for the top of the hold of the vessel for a purpose hereinafter described.

Instead of constructing the lower deck as above described it may consist of a lower plate 17, a series of lower rods 18, an upper plate 19, and rods 20, interposed between the said plates, as clearly illustrated in Fig. 7 of the accompanying drawings. The lower rods 18 support the floor and are soldered or otherwise secured to the lower face of the lower plate, and the space between the plates may be filled with solder. The rods will be galvanized or otherwise coated to enable them to be readily soldered to the plates, which may be constructed of copper or any other suitable material. The rods 18 and 20 extend through the sides of the ship, similar to the rods 13, and all of these rods will be provided with sealing devices, preferably consisting of a hollow washer 21 and a gum disk or sealer 22, arranged in the hollow washer and adapted to be compressed by the nuts of the rods. After the nuts have been tightened the rods are cut off and headed or riveted to retain the nuts on them. The inner plates of the ribs may be reinforced in any suitable manner at the points where the transverse rods extend through the sides of the hull.

The spaces or compartments formed by the inner and outer plates of the ribs are designed, as illustrated in Fig. 1 of the accompanying drawings, to be filled with suitable material—such as coal-tar, lead, zinc, or any other composition—which will form a solid hull and render the same absolutely air-tight. This filling 23 is designed to extend about a foot above the lower deck 12, and the spaces above the filling are designed to contain compressed air to form a buoyant hull and to exclude water. The spaces at the upper ends of the ribs are closed by means of plates 24 and lids or covers 25. The plates 24 are rectangular and are provided with upwardly-extending marginal flanges, which are riveted or otherwise secured to the inner and outer plates 5 and 6 and to the adjacent transverse plates 8. These plates are provided with manholes, which after the hull has been completed are closed by the lids or covers 25, centrally secured to frames or spiders 26 of the plates 24 by bolts 27 or other suitable fastening devices, gum packing being interposed between the lids or covers and the said plates 24 to make the connections absolutely air and water tight.

The upper deck, which may be constructed in any suitable manner, is designed to be provided with suitable doors 29 for affording access to the interior.

The ship is designed to be provided at its upper deck with a suitable engine 41 for operating an air-compressor 42, which is connected with a tank or reservoir 43, having a pressure-gage, and connected with a main longitudinal supply-tube 44, extending centrally of the ship, as clearly shown in Fig. 3. The main central supply-tube is connected by suitable transverse branches with cylindrical shells 45, which communicate with the hold of the vessel, and a suitable pressure-gage is arranged at this point for indicating the pressure of the air in the hold of the vessel. The main central supply-tube is also connected at its ends with side tubes or pipes 46, located at opposite sides of the ship and connected at intervals by short branches 47 with the air spaces or compartments within the upper portions of the hollow ribs. These short branches 46 are provided with cocks or cut-offs arranged in pairs and located at opposite sides of the portion which communicates with the interior of the ribs, and by this construction and arrangement the pressure within the hollow ribs may be readily controlled. Should the upper portion of the hull become punctured, sufficient compressed air can be forced into the space or compartment to exclude or force out the water, and by this arrangement of ribs and transverse plates any puncture will be localized, and the compressed air may be concentrated at such point.

The ship is preferably provided at its bow with a bulkhead and with a longitudinal partition 48, dividing the space in advance of the front bulkhead into a pair of coal-bunkers, and the ship is designed to be provided with suitable chutes for enabling coal to be introduced into the bunkers. Extending forward from the space or compartment 49, in which the engine or engines are located, is a longitudinal tunnel 50, provided at its front with forwardly-diverging branches 51, extending to and communicating with the coal-bunkers. This tunnel, which is preferably constructed of sheet metal, may be made in any other suitable manner, and within the branches and the rear portion of the tunnel are arranged oppositely-hinged doors 52 and 53, disposed in pairs and hinged to the opposite walls of the tunnel and opening in opposite directions and adapted to be automatically closed should there be a rush of water in the tunnel. The doors are arranged to close on suitable seats 54, having packings of rubber or other suitable material and flared to conform to the configuration of the edges of the doors. Should water flow into the tunnel or the branches in either direction, one or the other of each set of doors will be automatically closed and the flow of water will be shut off. The pintles 55 of the doors consist of vertical rods or shafts extending to the upper deck and provided with suitable arms

designed to be connected with pistons of cylinders 56, whereby the shafts or pintles may be rocked to operate the doors from the deck. The cylinders are designed to be operated by compressed air; but any other suitable means may be employed for enabling the doors to be opened and closed from the main deck or other portion of the ship.

In order to increase the buoyancy of the ship and to prevent the same from sinking, inner and outer inflatable bags 57 and 58 are arranged at intervals, as clearly shown in Figs. 1 and 2. The inner inflatable bags, which are disposed vertically, as clearly shown in Fig. 1, are connected at their tops with transverse branch tubes 60 and are secured at their lower ends to coiled springs 61. The transverse branch tubes, which are connected with the central longitudinal feed pipe or tube 44, are provided at their outer ends with cocks or cut-offs located at opposite sides of the joint or connection at the upper ends of the inflatable bags and adapted to cut off the supply of compressed air and also to permit the bags to be deflated. The coiled springs 61, which are connected with the lower deck, retain the inflatable bags in an upright position and at the same time are adapted to yield to any movement of the bags. The outer inflatable bags 58, which may be arranged at any desired intervals and which may be of any number, are connected at their lower ends by hooks 62 with one of the flights of an endless chain 63, and these endless chains are arranged in an upright position on the exterior of the boat and are mounted on upper and lower wheels 64 and 65. The upper wheel 64 is a sprocket-wheel and meshes with the chain and is mounted upon a shaft, which is provided with a suitable crank-handle for rotating it to operate the endless chain; but any other suitable means may be employed for actuating the chain, and when a large number of bags are employed means may be constructed for simultaneously lowering all of them. The lower end of the outer bag which is connected by a flexible pipe or tube 66 with the adjacent side supply-pipe 46 and is secured to one end of a rope or cable 67, which is wound around the windlass 68 and which is adapted to draw up the bag after it has been used. The outer bags are run down to the bottom of the hull while in a deflated condition and are expanded or inflated after they have been lowered. This will result in lifting the ship and will be found exceedingly effective in getting the same off a rock or off a bar should the ship strike the former or become grounded upon the latter. Lower wheels 65 may be either smooth pulleys or sprocket-wheels, and they are preferably supported by transverse rods 65^a, extending entirely through the lower portion of the hull of the ship and assisting in bracing and supporting the latter.

In order to increase the buoyancy of the ship, the bunks 73 are inclosed in casings 74, provided at one wall with a bottom opening 75, located at a point below the lower bunk and adapted to permit a person by stooping to readily enter the casing. The casing is air-tight, and should the ship be in a sinking condition the bunk-casings will serve as air-compartments and will assist in floating the ship.

The ship may be provided with pumps of any desired construction for removing water from the hull; but these pumps will be preferably constructed for operation by compressed air, so that they may be operated by the engine and the air-compressor on the main deck of the ship.

The hull may be provided on its interior with a lining of sheet-copper soldered at the joints, and this lining may be extended throughout the entire interior of the hull, and the latter will be preferably constructed of heavy sheet-copper, whereby rust, rot, and corrosion will be avoided.

What I claim is—

1. A ship provided with a hull consisting of a series of ribs composed of inner and outer upright plates curved to conform to the configuration of the hull and spaced apart, and the transverse plates connecting the inner and outer upright plates and interposed between the ribs, substantially as described.

2. A ship provided with a hull consisting of ribs composed of inner and outer plates 4 and 5, curved to conform to the configuration of the bottom of the hull and spaced apart and provided at their longitudinal edges with side flanges, and the transverse plates secured to the side flanges of the plates 4 and 5 and cooperating with the latter to form separate spaces or compartments, substantially as described.

3. A ship provided with a hull consisting of the upright rib-plates 4 and 5, spaced apart and forming inner and outer walls, the transverse plates connecting the rib-plates and cooperating with the same to form separate compartments, and the horizontal rods extending longitudinally of the hull and located between the inner and outer rib-plates and forming a series of ladders, substantially as described.

4. A ship provided with a hull consisting of the upright rib-plates 4 and 5 spaced apart and forming inner and outer walls, the transverse side plates connecting the inner and outer plates 4 and 5, the braces extending longitudinally of the rib-plates and arranged at opposite sides of the transverse plates, and the horizontal rungs supported by and arranged in openings of the braces and located between the transverse plates and forming a series of ladders, substantially as described.

5. A ship provided with a hull consisting of a keel composed of a series of plates secured together, the inner and outer rib-plates 4 and 5 spaced apart and secured to the keel and extending upward therefrom, the transverse

plates connecting the rib-plates, the upper and lower decks, means for closing the spaces formed by the ribs and the transverse plates at the top of the ribs, and a filling of suitable material arranged in the spaces formed by the ribs and the transverse plates and extending upward from the keel to a point above the lower deck, substantially as described.

6. In a ship, the combination of a hull consisting of inner and outer rib-plates spaced apart, the transverse plates connecting the rib-plates and coöperating with the same to form spaces, the lower deck extending across the hull and forming an air-tight hold, the filling arranged in the spaces between the ribs and the transverse plates and extending upward from the bottom of the hull to a point above the lower deck, means for supplying compressed air, and supply-pipes extending from such means to the hold and to the spaces within the upper portions of the ribs, substantially as described.

7. In a ship, the combination of a hull consisting of hollow ribs, the lower deck extending across the hull and forming an air-tight hold, and the filling extending from the bottom of the hull to a point above the lower deck, the side feed-pipes provided with short branches having cut-offs and connected with the hollow upper portions of the ribs, and means for supplying compressed air to the feed-pipes, substantially as described.

8. In a ship, the combination of a hull having hollow ribs, the side feed-tubes provided with short branches connected with the hollow ribs and provided with cut-offs, and means for supplying air to the feed-tubes, substantially as described.

9. In a ship, the combination of a hull having an air-tight hold and provided with hollow ribs, an air tank or reservoir, feed tubes or pipes extending from the reservoir to the hold and to the hollow ribs, and an air-compressor designed to be arranged on the deck of the ship for supplying compressed air to the tank or reservoir, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN K. LEEDY.

Witnesses:
S. W. HANELL,
M. A. JENNINGS.