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UNIT CARGO VESSEL.

APPLICATION FILED SEPT. 28, 1912.

1,107,741.

Patented Aug. 18, 1914.

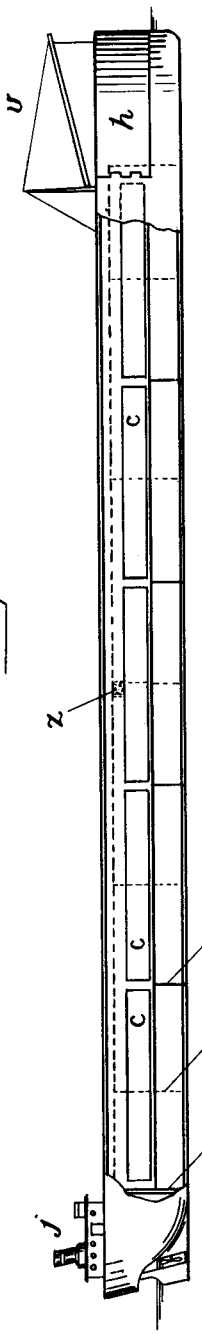


Fig. 1.

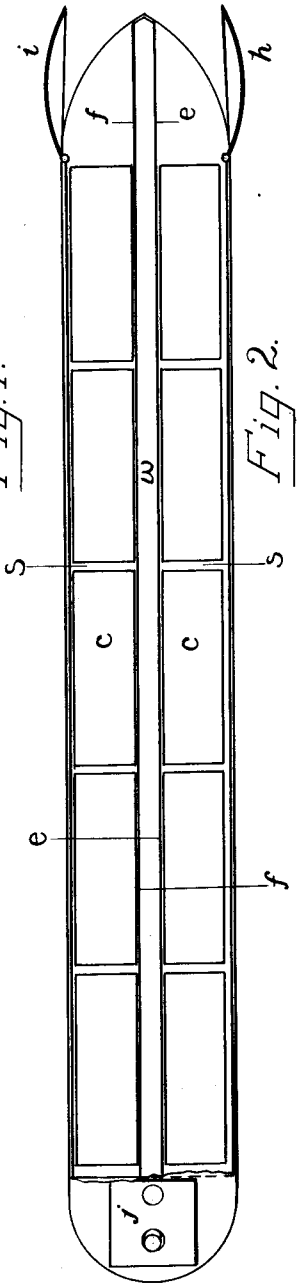


Fig. 2.

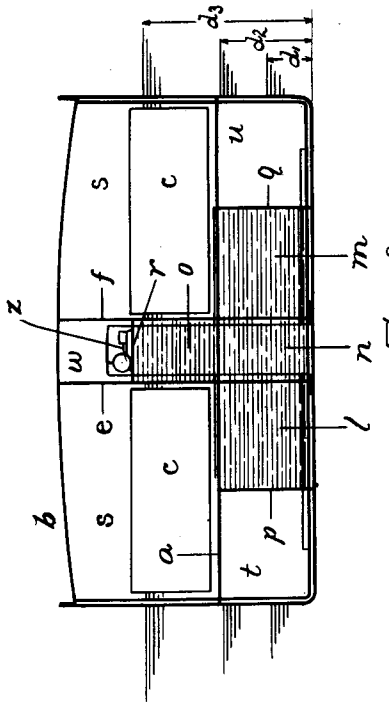


Fig. 3.

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UNIT-CARGO VESSEL.

1,107,741. Specification of Letters Patent. Patented Aug. 18, 1914.

Application filed September 28, 1912. Serial No. 722,996.

To all whom it may concern:

Be it known that we, FREDERICK A. BALLIN and EDWARD H. DODGE, citizens of the United States, residing at Portland, in the county of Multnomah and State of Oregon, respectively, have invented a new and useful Improvement in Unit-Cargo Vessels, of which the following is a specification.

Our invention relates to the construction of sea-going vessels designed to be loaded by floating into the vessel, over its cargo carrying deck barges or scows containing the cargo instead of loading the vessel in the usual manner: by so doing reducing the time vessels are held in port for loading and discharging its cargo. In order to adapt the vessel to be so loaded it is provided with opening side portions and with water tight compartments of sufficient buoyancy to float the vessel with its cargo space flooded by the sea; and means are provided for temporarily flooding certain of the compartments, so as to submerge its load-carrying deck and thus permit the cargo-carrying barges to be floated into the vessel.

The purpose of our invention is the attaining of the following improvements: So arranging the compartments, which are flooded when the carrying deck of the vessel is to be submerged to receive the loaded barges, that the vessel will have the least tendency to list or careen because of unequal filling of the flooded compartments; so constructing the vessel as a whole that its strength, in particular its longitudinal strength, will be maintained notwithstanding the change in construction required to adapt the vessel to its particular purpose; also so constructing the vessel that though the opening portion of its hull have a defective closure, or be torn away by storm or accident, the draft and stability of the vessel will not be altered, but the vessel will, notwithstanding, be able to safely transport its cargo to the port of destination.

Other improvements and features will be described more fully in the body of our specification.

In the accompanying diagrammatic drawings: Figure 1 represents a sectional side elevation of a vessel embodying our improvements; Fig. 2 is a deck plan showing the opening portions of the sides at the bow as opened for the purpose of receiving the cargo-carrying barges: and Fig. 3 is a mid-ship cross-section on a larger scale.

In order to carry out our purpose, the hull of the vessel is provided, preferably at the bow, with movable side portions, and means are provided for effecting a watertight closure when such side portions are closed.

As shown diagrammatically in Figs. 1 and 2, the vessel comprises two decks, main (*a*) and upper (*b*), extending the full length of the hull. On the load carrying deck, *a*, are shown two rows of barges, *c*, *c*, housed in the cargo spaces *s*, *s*, formed by the sides of the vessel, the longitudinal bulk-heads, *e*, *f*, the upper deck, *b*, the aft-end bulk-head *g*, and the opening side portions, *h*, *i*, of the hull at the bow. The compartment aft of the bulk-head, *g*, below and above main deck *a*, may be used for holding the propelling machinery, as represented at *j*. The side opening portions, *h*, *i*, are preferably hinged by means of trunnions on vertical axes, and means are provided for effecting the watertight closure of such side portions with the main deck, the overhanging upper deck, and the bow-ends of the bulk-heads, *e*, *f*, when the side portions are closed. The particular construction of such closure means are unimportant, except as hereinafter especially described, and may be left to the discretion of the constructor.

As shown in the cross-section, Fig. 3 the hull below main deck, *a*, is subdivided into longitudinally extending submerging compartments, *l*, *m*, *n*, *o*, by longitudinal bulk-heads, *e*, *f*, and *p*, *q*, of which the first mentioned two extend to the upper deck *b*. In the upper part of the space confined by the bulk-heads, *e*, *f*, is provided an intermediate deck *r*. The hull of the vessel is so proportioned that its displacement, or draft, without load or ballast will be represented by the vertical line *d'*. The capacity of the submerging compartments, *l*, *m*, *n*, *o*, is so proportioned that when they are filled with water the vessel will be sunk to the depth of the vertical line d^3, thus submerging the load-carrying deck, *a*, sufficiently to permit the floating of loaded scows or barges, *c*, *c*, into the longitudinal cargo spaces or compartments, *s*, *s*. The compartments, *t*, *u*, remain empty and provide the reserve buoyancy of the vessel. They are proportioned to balance the weight of the vessel. All the compartments are further so proportioned, relatively to the weight of the vessel and that of the laden barges or scows to be carried by it, that when the submerging compartments, *l*, *m*, *n*, *o*, are relieved of the flooding water, the vessel will

assume the draft indicated by the vertical line d^2, thus bringing the load-carrying deck, a, above the water level and permitting the remainder of the water in said cargo compartments, s, s, to run off through suitable scuppers, not shown, or through openings at ends, before closing of gates. The longitudinal bulk-heads, e, f, are extended to the bow of the vessel, and the outer ends of the hinged side portions, h, i, when closed, abut against such bulk-heads. The outer lines of the movable hull portions, h, i, are made to conform with the lines of the vessel. They are preferably of box construction and adapted to have sufficient strength to withstand heavy seas; they are also designed to have sufficient buoyancy to float when the vessel is submerged to the depth d^3, thus easing the strain on the trunnions by which they are hinged in place, and rendering these hull portions easily moved. The strain on such trunnions, during the moving of the side opening portions h, i, into open and closed position, is further relieved by having the outer ends of said side portions supported from a derrick boom, as for example represented at v, the derrick being omitted from Fig. 2. Suitable machinery is provided to move the hinged side portions, h, i, into and out of their closed position, such machinery, however, is a matter of choice with the builder and hence has not been shown or described. In the compartment, w, above the intermediate deck, r, are conveniently located the pumps (z) for pumping out the submerging compartments, l, m, n, o, after cargo barges have been floated into the vessel. By reason of the compartment o lying in a higher plane it is flooded last and emptied first, and this helps to maintain the stability of vessel while its compartments are flooded and emptied. The loading and unloading of the vessel with its cargo-containing barges may be facilitated by coupling the barges in train, end to end, and moving such train of barges into and out of the compartments s, by a cable winding on a power driven drum. These devices being self suggesting require no illustration or further explanation. After the hinged hull portions, h, i, have been closed, the compartments, c, become watertight cargo spaces of sufficient cubical capacity to float both vessel and cargo, though the compartments, l, m, n, t, u, become flooded by accident.

The purpose of locating the submerging compartments, l, m, n, o, in and adjacent to the longitudinal center of the ship and locating the reserve buoyancy compartments, t, u, latterly and exteriorly of the compartments, l, m, as shown in Fig. 3, is to minimize the tendency of the vessel to tilt or careen, because of unequal filling of the compartments, l, m, during the operation of lowering the vessel to the degree required for receiving its cargo barges. By extending the bulk-heads, e, f, the full length of the vessel the sides are supplemented and the vessel is given ample longitudinal strength. Since the water line of the vessel at full load is below the deck, a, of the cargo spaces, s, s, it is evident that even though such cargo spaces have free communication with the sea, by reason of the loss of the hinged portions, h, i, or puncture of either side above the deck a, the vessel would not alter her draft, and it is further evident that even with one or more compartments below the deck, a, flooded, if the cargo compartments, s, s, are intact the buoyancy of the vessel is still sufficient for safe transportation.

All compartments below main deck a are preferably subdivided by transverse bulkheads, which may be arranged as indicated by x, y, in order that any accidental puncture of the hull under water line would not cause the flooding of the compartment involved throughout the length of the vessel. The compartments l, m, n, are flooded by the opening of sea valves located in the bottom thereof, such sea valves being of any convenient construction. Gates are preferably also provided in the bulkheads separating the compartments s, o, s, and l, n, m, and in the partition or floor separating the compartments n, o. The valves and gates are operated by stems extending to some convenient point. These details are not shown in the drawings because they are self suggesting to the builder of our vessel.

We claim,

1. In a vessel provided with an opening hull portion at one end for floating in loaded barges, an upper deck, a load-carrying deck below the upper deck, longitudinal bulkheads inclosing a central submerging compartment above and below the load carrying deck, extending lengthwise of the vessel, the space below the load carrying deck being so divided as to provide reserve buoyancy compartments at the sides of the vessel, supplementary submerging compartments located between such reserve buoyancy compartments and the central submerging compartment, said reserve buoyancy compartments so proportioned that their combined displacement equals the weight of the vessel, said submerging compartments so proportioned that when flooded they will sink the vessel to its loading draft, and when emptied their combined displacement in supplement to that of said reserve buoyancy-compartments will place the vessel, with full load, in the condition of its normal draft, and means for flooding said submerging compartments.

2. In a vessel provided with an opening hull portion at one end for floating in loaded barges, an upper deck, a load-carrying deck

below the upper deck, longitudinal bulkheads inclosing a central submerging compartment above and below the load carrying deck, extending lengthwise of the vessel, the space below the load carrying deck being so divided as to provide reserve buoyancy compartments at the sides of the vessel, said reserve buoyancy compartments so proportioned that their combined displacement equals the weight of the vessel, said submerging compartments so proportioned that when flooded they will sink the vessel to its loading draft, and when emptied their combined displacement in supplement to that of said reserve buoyancy-compartments will place the vessel, with full load, in the condition of its normal draft, and means for flooding said submerging compartments.

3. In a vessel provided with an opening hull portion at one end for floating in loaded barges, an upper deck, a load-carrying deck below the upper deck, and a submerging compartment, the space below the load carrying deck being so divided as to provide reserve buoyancy compartments at the sides of the vessel, said reserve buoyancy compartments so proportioned that their combined displacement equals the weight of the vessel, said submerging compartments so proportioned that when flooded they will sink the vessel to its loading draft, and when emptied their combined displacement in supplement to that of said reserve buoyancy-compartments will place the vessel with full load, in the condition of its normal draft, and means for flooding said submerging compartments.

4. In a vessel provided with an opening hull portion at one end for floating in loaded barges, an upper deck, a load carrying deck below the upper deck, and submerging compartments including a compartment running longitudinally centrally over the load-carrying deck, reserve buoyancy compartments so proportioned that their combined displacement equals the weight of the vessel, said submerging compartments so proportioned that when flooded they will sink the vessel to its loading draft, and when emptied their combined displacement in supplement to that of said reserve buoyancy-compartments will place the vessel, with full load, in the condition of its normal draft, and means for flooding said submerging compartments.

5. In a vessel provided with an opening hull portion at one end for floating in loaded barges, an upper deck, a load-carrying deck below the upper deck, longitudinal bulkheads inclosing a central submerging compartment above and below the load carrying deck, extending lengthwise of the vessel, said bulkheads arranged to provide cargo spaces between said central submerging compartment and the sides of the vessel on the load-carrying deck, longitudinal bulkheads dividing the space below the load carrying deck, exterior of said central submerging compartments, into reserve buoyancy compartments at the sides of the vessel, supplementary submerging compartments located between such reserve buoyancy compartments and the central submerging compartment, said reserve buoyancy compartments so proportioned that their combined displacement equals the weight of the vessel, said submerging compartments so proportioned that when flooded they will sink the vessel to its loading draft, and when emptied their combined displacement in supplement to that of said reserve buoyancy-compartments will place the vessel, with full load, in the condition of its normal draft, and means for flooding said submerging compartments.

6. In a vessel provided with an opening hull portion at one end for floating in loaded barges, an upper deck, a load-carrying deck below the upper deck, longitudinal bulkheads inclosing a central submerging compartment below the load carrying deck, extending lengthwise of the vessel, longitudinal bulkheads dividing the space below the load carrying deck, exterior of said central submerging compartments, into reserve buoyancy compartments at the sides of the vessel, supplementary submerging compartments located between such reserve buoyancy compartments and the central submerging compartment, said reserve buoyancy compartments so proportioned that their combined displacement equals the weight of the vessel, said submerging compartments so proportioned that when flooded they will sink the vessel to its loading draft, and when emptied their combined displacement in supplement to that of said reserve buoyancy-compartments will place the vessel, with full load, in the condition of its normal draft, and means for flooding said submerging compartments.

7. In a vessel provided with an opening hull portion at one end for floating in loaded barges, a load-carrying deck below the upper deck, a submerging compartment, longitudinal bulkheads dividing the space below the load carrying deck, exterior of said central submerging compartments, into reserve buoyancy compartments at the sides of the vessel, said reserve buoyancy compartments so proportioned that their combined displacement equals the weight of the vessel, said submerging compartments so proportioned that when flooded they will sink the vessel to its loading draft, and when emptied their combined displacement in supplement to that of said reserve buoyancy-compartments will place the vessel, with full load, in the condition of its normal draft.

8. In a vessel provided with an opening hull portion at one end for floating in

loaded barges, a load-carrying deck below the upper deck, a submerging compartment, longitudinal bulkheads dividing the space below the load carrying deck, exterior of said central submerging compartments, into reserve buoyancy compartments at the sides of the vessel, supplementary submerging compartments located between such reserve buoyancy compartments and the central submerging compartment, said reserve buoyancy compartments so proportioned that their combined displacement equals the weight of the vessel, said submerging compartments so proportioned that when flooded they will sink the vessel to its loading draft, and when emptied their combined displacement in supplement to that of said reserve buoyancy-compartments will place the vessel, with full load, in the condition of its normal draft.

9. In a vessel provided with an opening hull portion at one end for floating in loaded barges, an upper deck, a load-carrying deck below the upper deck, longitudinal bulkheads inclosing a central submerging compartment extending lengthwise of the vessel, said bulkheads arranged to provide cargo spaces between said central submerging compartment and the sides of the vessel on the load-carrying deck, the space below the load carrying deck being so divided as to provide reserve buoyancy compartments at the sides of the vessel, said reserve buoyancy compartments so proportioned that their combined displacement equals the weight of the vessel, said submerging compartments so proportioned that when flooded they will sink the vessel to its loading draft, and when emptied their combined displacement in supplement to that of said load, in the condition of its normal draft, and said cargo spaces so proportioned as to float the weight of the vessel and cargo with the space below load-carrying deck flooded.

10. In a vessel bulkheads arranged to provide cargo spaces between said central submerging compartment and the sides of the vessel on the load-carrying deck, longitudinal bulkheads dividing the space below the load carrying deck, exterior of said central submerging compartments, into reserve buoyancy compartments at the sides of the vessel, supplementary submerging compartments located between such reserve buoyancy compartments and the central submerging compartment, said reserve buoyancy compartments so proportioned that their combined displacement equals the weight of the vessel, said submerging compartments so proportioned that when flooded they will sink the vessel to its loading draft, and when emptied their combined displacement in supplement to that of said reserve buoyancy-compartments will place the vessel, with full load, in the condition of its normal draft, said cargo spaces so proportioned as to float the weight of the vessel and cargo with the space below load-carrying deck flooded.

11. In a vessel of the type described provided with opening side-portions at one end, and deck portions projecting under and over such opening side portions, the side portions hinged between the deck portions, longitudinal bulkheads, extending to such end, adapted to constitute an abutment for said opening-side portions when closed, said side portions made in box-form, whereby they are given independent buoyancy to relieve the strain on the hinges when the draft of the vessel has been lowered by flooding said submerging compartment and the side portions are opened.

12. In a vessel, an upper deck, a load-carrying deck below the upper deck, longitudinal bulkheads inclosing a central submerging compartment extending lengthwise of the vessel, said bulkheads arranged to provide cargo spaces between said central submerging compartment and the sides of the vessel on the load-carrying deck, the space below the load carrying deck being so divided as to provide reserve buoyancy compartments at the sides of the vessel, supplementary submerging compartments located between such reserve buoyancy compartments and the central submerging compartment, said reserve buoyancy compartments so proportioned that their combined displacement equals the weight of the vessel, said submerging compartments so proportioned that when flooded they will sink the vessel to its loading draft, and when emptied their combined displacement in supplement to that of said reserve buoyancy-compartments will place the vessel, with full load, in the condition of its normal draft, opening side-portions above the load-carrying deck at one end of the vessel, the upper and main decks projecting above and below such opening side portions, the longitudinal bulkheads extending to the extremity of such projecting deck portions and constituting water tight abutments for said opening side portions, said cargo spaces so proportioned as to float the weight of the vessel and cargo with the space below load-carrying deck flooded, and means for flooding said submerging compartments.

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Witnesses:
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W. C. SCHMITT.