May 31, 1932. J. G. FAUST 1,861,338

MARINE VESSEL

Filed July 8, 1927 2 Sheets-Sheet 1

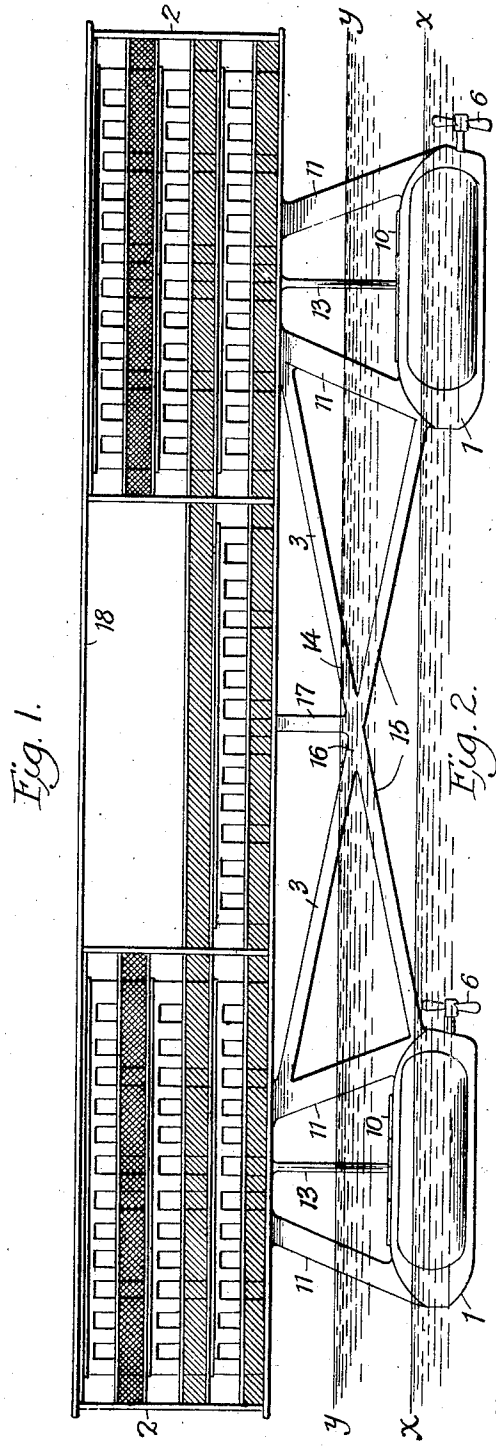


Fig. 1.

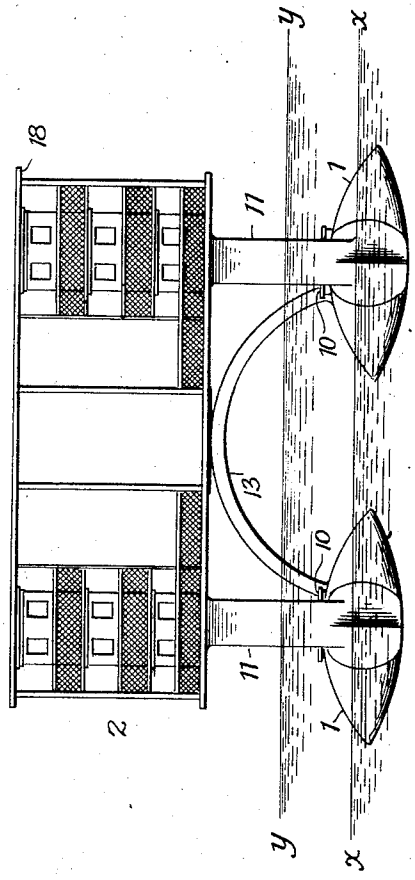


Fig. 2.

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Fig. 3

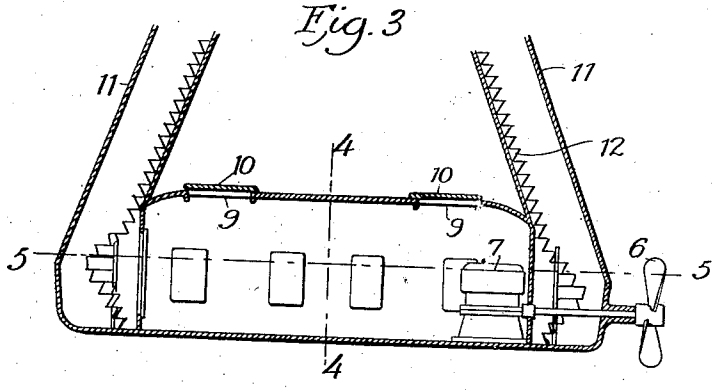


Fig. 4.

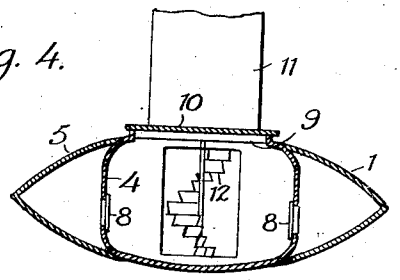


Fig. 5.

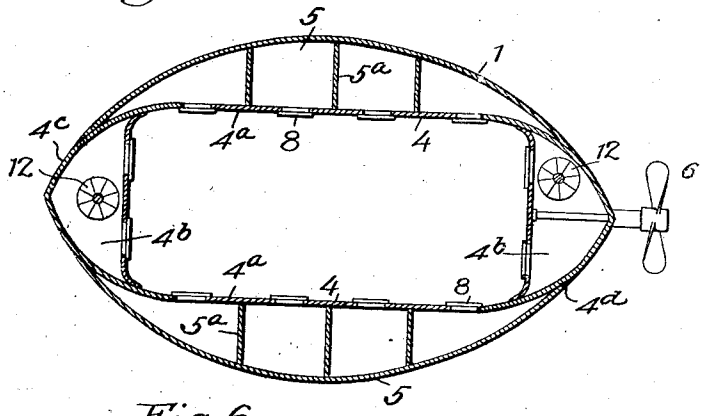
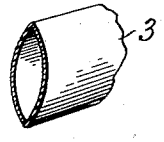


Fig. 6.



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MARINE VESSEL

Application filed July 8, 1927. Serial No. 204,259.

This invention relates to improvements in marine vessels, and one object of the invention is to provide a vessel embodying a submerged multi-float cargo-carrying floatation base, a superstructure lying wholly above the surface of the water at such an elevation as to normally allow the waves to pass beneath it, and a skeleton type of connecting truss-framing rigidly joining and bracing the submerged floatation base and the super-structure, the elements of the base and the framing being of streamline formation so as to reduce to the minimum displacement changes and resistance to the propulsion of the vessel.

A further object of the invention is to provide a vessel of this character in which the floats of the submerged floatation base are of such load carrying capacity and the skeleton stream-line framing so constructed that a vessel of substantially uniform displacement will be produced, namely, one in which the amount of displacement will not be materially increased by variations of load weight up to full cargo weight, so that the amount of the cargo carried will not to any appreciable extent change the displacement or affect the speed of the vessel or amount of power required to drive it at a given speed.

A still further object of the invention is to provide a novel and improved construction of vessel of this type which will have great strength, stability, maneuvering qualities, carrying capacity for freight or passengers, or both, great speed and cruising range and capability of operating safely in stormy weather and in either deep or shallow water; which will be little rocked or otherwise disturbed in stormy weather; which will be practically unsinkable; which may be of great size and yet propelled with relatively less power than vessels of standard types; and which will afford greater comfort for passengers than vessels of standard types.

A still further object of the invention is to provide a vessel which embodies means for carrying airplanes and upon which airplanes may readily alight and from which they may be readily launched.

The principle of this invention allows vessels of very large size to be economically constructed and operated and hence may be advantageously employed in the construction of passenger and freight carrying vessels of great carrying capacity, floating hotels, theaters and the like, airplane carriers or mother ships, troop transports, naval or merchant repair ships, hospital ships, salvage ships, light ships, sea floats for airplanes and airships, and other similar purposes.

The invention consists of the features of construction, combination and arrangement of parts, hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a view in side elevation of an embodiment of marine vessel constructed in accordance with my invention.

Figure 2 is an end elevation of the same.

Figure 3 is a vertical longitudinal section through one of the floats or submarines and the connecting pillars of the framing.

Figure 4 is a vertical transverse section on line 4—4 of Figure 3.

Figure 5 is a horizontal transverse section on line 5—5 of Figure 3.

Figure 6 is a sectional perspective view through a portion of the truss-framing.

In the illustrated embodiment of the invention, the vessel comprises a floatation base consisting of a plurality of floats 1, a superstructure 2, and a truss-framing generally indicated at 3, which supports the superstructure from the floatation base and rigidly connects the floats of the base with each other and with the super-structure.

Any suitable number of the floats 1 may be employed at each side of the longitudinal center of the vehicle. In the present instance two floats are shown at each side of the longitudinal center of the vessel, equidistantly disposed, respectively, between the waist or transverse center of the vessel and the bow and stern portions thereof. In practice, each float 1 may be of a length of from one-fourth to one-fifth more or less of the length of the vessel, so that, with a vessel of, say, an overall length of one thousand feet, each float will be of a length of from two hundred to two hundred and fifty feet. The floats are so proportioned in

length, breadth and depth, and of such weight and load carrying capacity with respect to the weights and dimensions of the super-structure and connecting framing that major portions of the floats will be immersed when the vessel is unloaded, only the top portions of the floats projecting above the surface of the water, while when the vessel is loaded to a certain degree the floats will be entirely immersed in the water. In Figure 1 x—x represents the water line when the vessel is unloaded, and indicates its minimum displacement, while y—y represents the water line when the vessel is loaded to a maximum degree, from which it will be seen that in the fully loaded condition of the vessel the floats 1 and more or less of the framing 3 will be immersed in the water, while the super-structure 2 will be supported by the framing at such a level with respect to the floats as to lie wholly above the surface of the water. The height of the framing is preferably such in practice that when the vessel is fully loaded and the floats submerged to a maximum degree the bottom of the super-structure will lie at a level above the crest of even very high waves, so that under all normal conditions the waves will pass below the body of the super-structure.

The floats 1 are built of metal plate riveted or welded together in the usual way, and are trussed in any suitable manner to adapt them to resist all pressures and strains to which they are subjected in service. Each float may consist of a body or main section 4 of approximately cylindrical, oblong rectangular or other suitable form in cross-section, and an outer shell 5 surrounding the sides, bow and stern portions of the body 4 and imparting to the float a desired streamline formation. As shown in the present instance, the float is of ovoidal form, longitudinally, transversely and in horizontal longitudinal section, giving it a form which provides a proper breadth for stability and floatation effect, while at the same time rendering it capable of traveling with minimum resistance through the water. The shape of each float is also such that as all of its walls or surfaces slope in one direction or the other a geometrical bracing formation is obtained, while all sides or surfaces of the float slope in one direction or the other to allow water flow with a minimum of skin friction. This shape of the float is also of great value for the protection of ships against torpedo attacks in war-time, as the sloping surfaces of the floats will operate as deflectors, either causing the torpedo to be entirely warded off and diverted from its course without injury to the ship, or preventing a fair strike so that in the event of the explosion of the torpedo the amount of damage done will be greatly reduced.

It will be observed that the body 4 as shown in the present instance is provided with flat parallel sides 4^a and cross partitions 4^b forming end walls and that the sides 4^a continue beyond the end walls and form the sloping bow and stern portions 4^c and 4^d, and that the outer shell 5 consists of longitudinally curved fairings or shell sections of ovoid cross section which enclose the sides 4^a between their top and bottom edges and merge at their ends into the bow and stern portions 4^c and 4^d, whereby a sectional float of great strength and having the conformation described may be built by a ready and economical shaping of sheet metal of required thickness, the plates of which may be either welded or riveted together. The body and shell sections 5 may be mutually braced by cross braces 5^a acting also as partitions to form storage or other compartments. As shown in the present instance, the floats are each provided with propelling means, such as a screw propeller 6 driven by a suitable motor 7 within the float, and in practice each float may be provided, if desired, with its own steering gear and all necessary equipment rendering it a navigable unit. Each float therefore constitutes a body of submersible type, so that in the event of derangement of or damage to the propellers or steering gear of any one or two of the floats the vessel may still be propelled and steered by means of the propelling mechanism and steering gear of the other floats. It is to be understood, however, that the propellers upon the floats may be driven by electric motors which may be supplied with current furnished from a common generator on the super-structure. Also it is to be understood that in the use of steering rudders or the like on the floats, these may be controlled in unison by a master steering gear on the super-structure, or that in lieu thereof other steering gear mounted on the super-structure or the truss-framing may be employed.

Each float 1 is designed as a cargo-carrying craft, and may be divided by suitable water-tight partitions into water-tight compartments and living and cargo-carrying quarters or chambers, access from one to the other being afforded through suitable doorways or manholes which may be closed by doors or manhole plates 8. Each float is provided in its top with one or more openings or hatchways 9 for the introduction of fuel and supplies and the introduction and withdrawal of the cargo, which openings or hatchways are closed normally by water-tight covers 10.

The framing 3 comprises pillars 11 arranged in pairs, a pair of such pillars connecting each float 1 with the super-structure 2 and forming a support for the latter. The pillars 11 of each pair are connected and stayed at their lower ends to the bow and stern portions of the float to which they are attached and then project upwardly in converging relation

and are connected and stayed to the bottom of the super-structure 2. Each pair of pillars is thus so arranged as to form with the portion of the bottom of the super-structure to which they are attached an arched supporting column for the super-structure and a triangular form of suspension for the float, whereby a connecting and reinforcing structure between each float and that portion of the super-structure carried thereby is produced. The pillars 11 of each pair are arranged one in rear of each other, so that all the pillars of the floats at each side of the vessel are in longitudinal alinement, and the pillars are of ovoidal form in cross-section, as shown in Figure 6, or of triangular form, or of other suitable equivalent shape so as to secure maximum strength of construction with a streamline shape. The pillars provide passages or companionways between the bow and stern portions of the float and the overlying portion of the super-structure, in which ladders or stairs 12 of suitable type may be arranged to permit passage of the officers and crew between the floats and the super-structure, as well as to permit fuel, provisions or freight to be introduced from above through the companionways into the floats after the covers 10 are applied, as well as the discharge of cargo in part through these hatchways whenever desired or required. Through the pillars ventilation tubes or pipes may extend from the super-structure to supply fresh air to the interior of the floats and to discharge vitiated air, gases of combustion from the motors and any other noxious gases that may be present. Through the pillars also fuel may be conducted to the floats from auxiliary storage tanks or reservoirs in the super-structure, when motors of internal combustion or other fuel-consuming type are used in the floats for propelling purposes.

The truss-framing also includes arched cross girders 13 connecting the front floats with each other and the rear floats with each other, and longitudinal truss girders 14 connecting the floats and inner pillars of the columns with each other at each side of the vessel. Each girder 14, as shown, consists of diagonally arranged girder members 15 each forming a top brace for the inner pillar of one float and a bottom brace for the inner pillar of the other float, said members 15 being crossed and joined at the waist line, as at 16. A central arched cross girder 17 connects the two longitudinal girders 14 at the points 16, thus completing the structure of the connecting framing. All the elements of this framing are of the hollow type and streamline form shown in Figure 6, and a skeleton type of truss-framing is thus produced which is at all points of streamline contour so as to adapt it to easily cleave the water and move with a minimum of resistance therethrough. This type of framing may be comparatively light in weight but of such strength as to support a very long and weighty super-structure and to tie the floatation base and super-structure so firmly and rigidly together as to produce a vessel which is of such strength as to be practically indestructible and unsinkable.

The super-structure 2 may be built to serve any desired purpose. It may be provided with any suitable number of decks with a pilot house and saloons and cabins or quarters for officers, the crew and passengers and compartments for provisions, extra fuel and auxiliary freight. The whole of the super-structure may be devoted to these purposes, if desired, and freight carried in the floats, so that a passenger and freight vessel of great capacity will be provided. As this super-structure may be of great size it adapts the vessel to be built to serve as a floating hospital or theater or troop transport, airplane carrier or mother ship, as a naval or merchant repair or salvage ship, or as a light ship or sea float for airplanes and airships, and for many other similar purposes. When used as a light ship or sea float for airplanes it may be anchored if the water is sufficiently shallow or may cruise slowly within given limits. Because of its type and strength of construction this vessel is adapted to navigate both deep and shallow waters and is of such stability as to easily ride the waves in the roughest weather without damage or material rocking, rolling or other motion. Because of its great stability, no ballast need be carried on this ship, giving greater room for freight or fuel storage, and passengers, crew and livestock may be transported with greater comfort and convenience.

The super-structure is provided with a top deck 18 of the same length and breadth, i. e., of the same superficial dimensions as the body of the super-structure. This deck may serve as a carrier deck for aircraft. It also serves as an airplane alighting and launching platform, permitting airplanes for mail and express transport purposes or observation purposes to travel to and from the ship. The great area of this deck or platform allowed by the permissible size of the super-structure will give ample running space for take-off and landing operations without special equipment, but, if desired, nets or the like to arrest the motion of an airplane in alighting and catapults for launching purposes may be employed. As stated, the vessel, provided with such a deck, may be used as an anchored or cruising sea float for airplanes on which airplanes engaged in overseas flights may alight for reprovisioning, refueling, repairs or other purposes, for which this vessel is admirably adapted.

In addition to the features above noted, a novel and special advantage arises from the construction of a vessel embodying my in-

vention. As stated, the floats 1 constitute cargo carriers. When the floats are unloaded, i. e., without cargo load, these floats are not entirely submerged, their upper surfaces projecting just above the water level line x—x. When the floats are loaded the floats descend and the water level rises to a point below the line y—y and line x—x, at which the floats are entirely submerged. The weight of the cargo carried by these floats gives great stability, and when the floats are loaded a condition approaching maximum displacement is reached, beyond which any added displacement is more or less negligible so far as resistance to propulsion and reduction of speed is concerned because of the use of the skeleton streamline framing 3. It will, of course, be understood that after the floats are loaded and the condition above established is obtained, the addition of a superload weight (weight of passengers, etc.) upon the super-structure 2 will result in a further depression of the vessel and submergence of more or less of the framing 3, dependent upon the amount of superadded weight, until the displacement reaches a maximum and the water level also reaches a maximum at the line y—y. This maximum condition is reached when the floatation base and the super-structure are both loaded to full capacity, the water level under general load conditions and varying between the level y—y and a level at which the floats 1 are just immersed and their tops lie immediately below the surface of the water. The addition of any load weight, therefore, from such a general load condition causes increased displacement but only to such a degree as that resulting from a partial (more or less) immersion of the framing 3. By making this framing of skeleton form and streamline contour it acts with a displacement minimizing effect, such increase of displacement as may occur being practically unimportant from the standpoint of reduction of speed or increase of resistance requiring increased power to secure a given speed. This vessel, therefore, has a maximum displacement below its full load carrying capacity from which it does not vary materially up to full load, the advantages of which will be readily apparent to those versed in the art.

Having thus fully described my invention, I claim:—

1. A marine vessel comprising a divided submersible base made up of a plurality of cargo carrying floats immersed wholly in the water when the vessel is loaded, a super-structure lying well above the surface of the water, and a framing of skeleton type between the base and the super-structure comprising arched columns between the floats and the super-structure, arched cross girders between transversely alined floats, longitudinally extending girders between longitudinally alined floats and the columns thereof, and arched cross girders between the longitudinally extending girders, said pillars and girders being of streamline form.

2. A marine vessel having a floatation base comprising floats, each consisting of a body terminating in tapering bow and stern portions, and fairing shells of ovoid cross section at each side of the body and covering the same between the top and bottom surfaces thereof, said shells being longitudinally curved and merging into the body at the points of intersection of the side walls of the body and the bow and stern portions thereof.

3. A marine vessel having a floatation base comprising floats, each consisting of a body terminating in tapering bow and stern portions, cross walls at the ends of the body at the juncture of its sides with the bow and stern portions, fairing shells of ovoid cross section at each side of the body and covering the same between the top and bottom surfaces thereof, said shells being longitudinally curved and merging into the body at the points of intersection of the side walls of the body and the bow and stern portions thereof, and bracing partitions between the fairing shells and the side walls of the body.

4. A marine vessel comprising a plurality of cargo carrying floats arranged in longitudinally and transversely alined pairs, a superstructure, and a skeleton streamline framing between the floats and between said floats and the superstructure, said framing consisting of a pair of supporting pillars extending convergently upward between the bow and stern portions of each float and the superstructure, an arched support between each transversely alined pair of floats, a truss-girder between each pair of longitudinally alined floats, and an arched support between the intermediate portions of opposite girders.

5. A marine vessel comprising a plurality of cargo carrying floats arranged in longitudinally and transversely alined pairs, a superstructure, and a skeleton streamline framing between the floats and between said floats and the superstructure, said fairing consisting of a pair of supporting pillars extending convergently upward between the bow and stern portions of each float and the superstructure, an arched support between each transversely alined pair of floats, a truss-girder between each pair of longitudinally alined floats and consisting of crossed girder members centrally united and having branches connecting the bow and stern portions of the floats and the inner pillars of the pairs of pillars connecting said floats with the superstructure, and an arched support between the crossed portions of opposite truss-girders.

6. A marine vessel comprising a floatation base formed of a plurality of cargo-carrying floats, each provided with its own pro-

pelling mechanism, said base being substantially submerged in the water when the vessel is unloaded and fully immersed in the water when the vessel is loaded to a certain degree materially below full capacity, a cargo-carrying superstructure, and a skeleton streamline truss framing between the floatation base and the superstructure adapted to be more or less immersed in the water as the vessel is loaded to degrees between said certain load degree and the maximum load degree to provide a displacement structure whose resistance to the propulsion of the vessel does not appreciably vary with variations in its displacement.

7. In a marine vessel, a float comprising a body terminating in tapering bow and stern portions, and fairing shells of ovoid cross-section at each side of the body and covering the same between the top and bottom surfaces thereof, said shells being longitudinally curved and merging into the body at the points of intersection of the side walls of the body and the bow and stern portions thereof.

8. A marine vessel comprising a flotation base, a cargo-carrying super-structure, and a rigid skeleton truss framing between the flotation base and the super-structure formed of elements all streamlined in a common direction and so formed as to provide a displacement structure whose resistance to the propulsion of the vessel does not appreciably vary with variations in its depth of submergence, said flotation base embodying a plurality of longitudinally spaced floats at each side of the longitudinal center of the vessel, each float being longitudinally tapered and of substantially ovoidal form in cross-section.

9. In a marine vessel, a float comprising a body terminating in tapering bow and stern portions and having fairing shells of ovoid cross-section extending longitudinally at each side of the body between the top and bottom surfaces thereof.

10. A vessel of the character described comprising a flotation base embodying a plurality of longitudinally spaced, longitudinally tapering floats of ovoidal cross-section arranged on eacl side of the longitudinal center of the vessel, a cargo carrying superstructure arranged at a high elevation above the flotation base, and a rigid truss framing composed of elements connecting the floats at each side of the flotation base and the floats at opposite sides of said flotation base with each other and also connecting said floats with the super-structure, all of said elements being streamlined in the direction of length of the vessel and of such form as to provide a truss framing whose resistance to travel of the vessel does not appreciably vary with variations in submergence of said framing.

11. In a marine vessel, a float comprising a body having a tapering bow portion, and fairing shells of ovoid cross-section extending longitudinally at each side of the body and merging into the sides of the tapering bow portion.

12. A marine vessel having a flotation base comprising floats, each consisting of a body having a tapering bow portion, and fairing shells of ovoid cross-section at each side of the body and covering the same between the top and bottom surfaces thereof, said shells being longitudinally curved and merging into the body at the points of intersection of the side walls of the body and bow portion thereof.

13. A marine vessel having a flotation base comprising floats, each consisting of a body having a tapering bow portion, cross walls at the ends of the body at the juncture of its sides with the bow and stern portions, fairing shells of ovoid cross-section at each side of the body and covering the same between the top and bottom surfaces thereof, said shells being longitudinally curved and merging into the body at the intersection of the side walls of the body and the sides of the bow portion thereof, and bracing partitions between the fairing shells and the side walls of the body.

14. A marine vessel comprising a flotation base, a cargo carrying superstructure, and a rigid supporting truss framing between the flotation base and the superstructure, said flotation base embodying a plurality of longitudinally spaced floats of ovoidal cross-section at each side of the longitudinal center of the vessel.

15. A marine vessel comprising a flotation base formed of a plurality of cargo carrying floats arranged on each side of the longitudinal center of the vessel, each provided with its own propelling mechanism, said base and its propelling mechanism being of such weight and the floats of such load carrying capacity as to be substantially submerged in the water when the vessel is unloaded and fully immersed in the water when the vessel is loaded to a certain degree below full capacity, a cargo carrying superstructure, and a rigid streamlined truss framing rising from the flotation base and supporting said cargo carrying superstructure, each of said floats being longitudinally tapered and of substantially ovoidal cross-section.

In testimony whereof I affix my signature.

JOHN G. FAUST.