Feb. 1, 1927. 1,616,404

G. ARNOLD

NONSINKABLE BOAT CONSTRUCTION

Filed Nov. 16, 1925 4 Sheets-Sheet 1

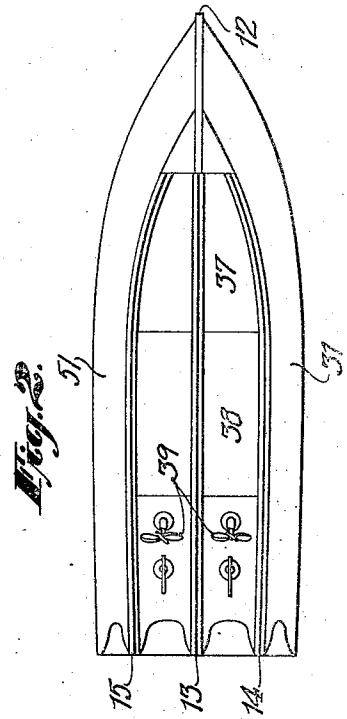


Fig. 2.

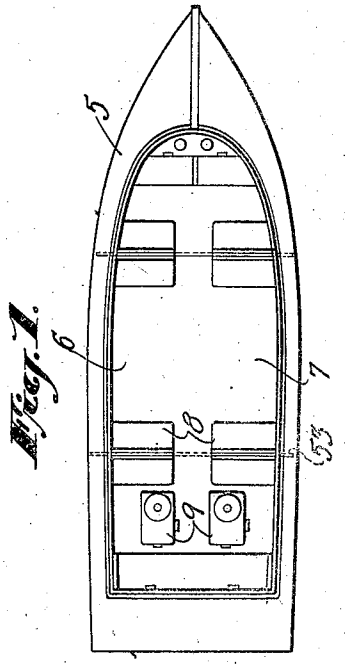


Fig. 1.

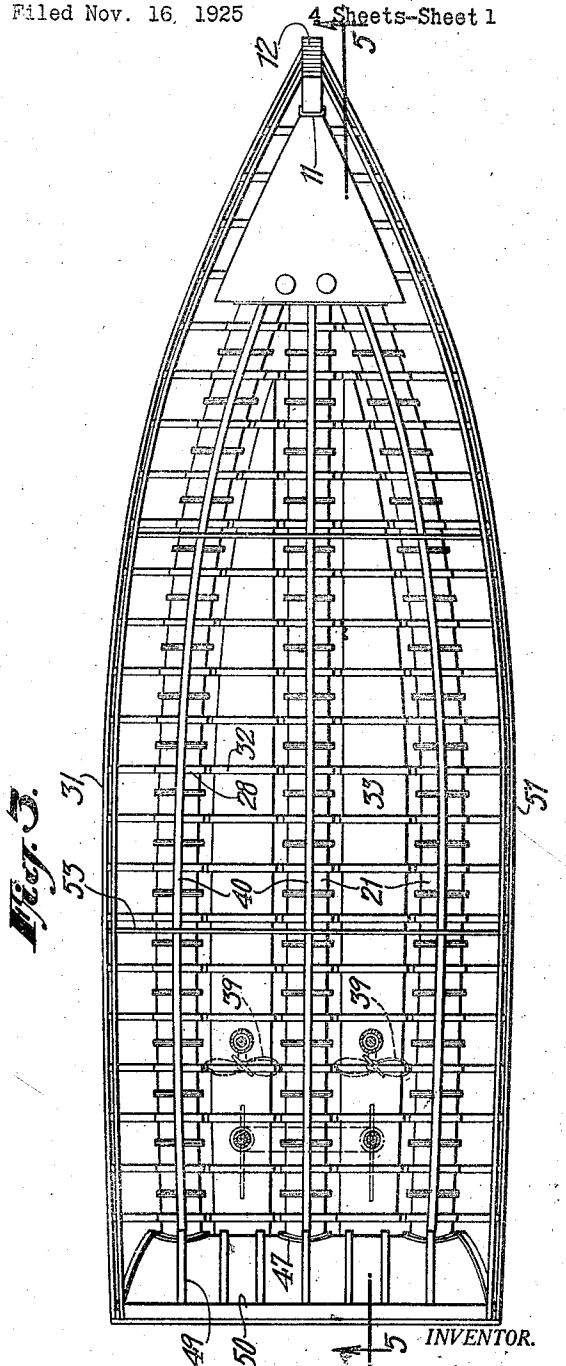


Fig. 3.

INVENTOR.
GEORGE ARNOLD.
BY
Richard B. Owen.
ATTORNEY.

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G. ARNOLD

NONSINKABLE BOAT CONSTRUCTION

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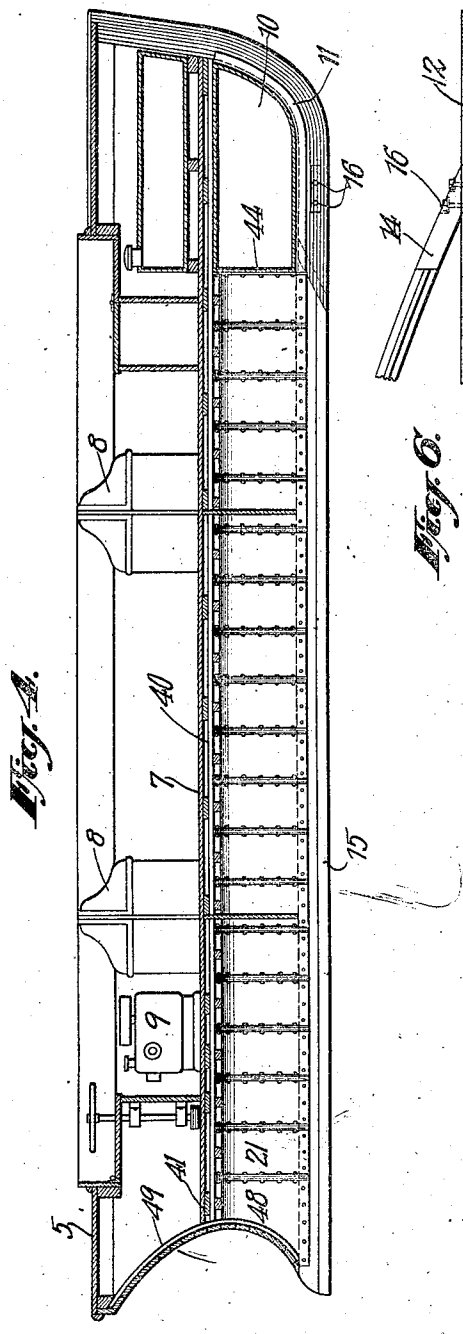


Fig. 4.

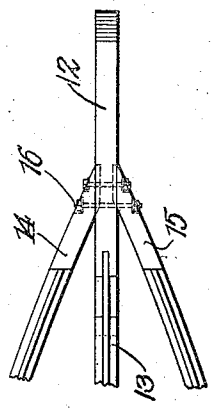


Fig. 6.

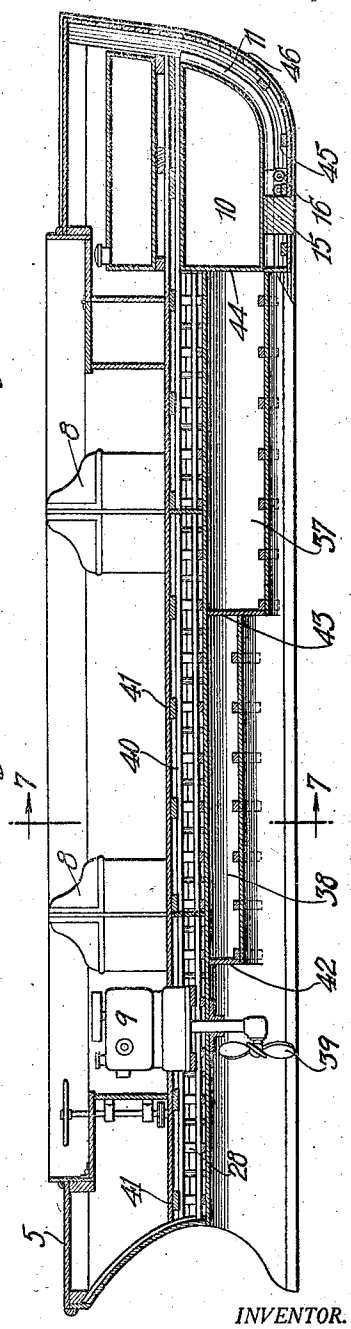


Fig. 5.

INVENTOR.

GEORGE ARNOLD.

BY Richard B. Owen

ATTORNEY.

Feb. 1, 1927. 1,616,404

G. ARNOLD

NONSINKABLE BOAT CONSTRUCTION

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Fig. 7.

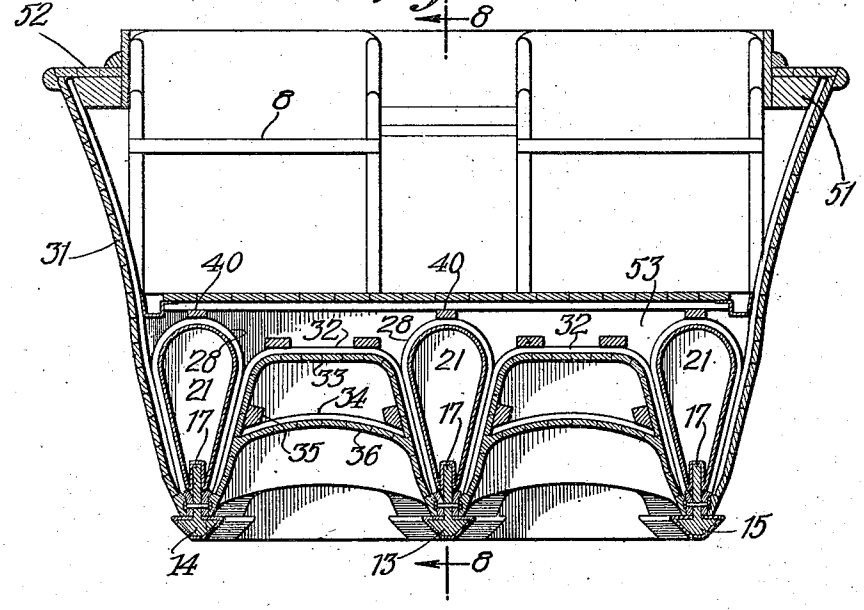
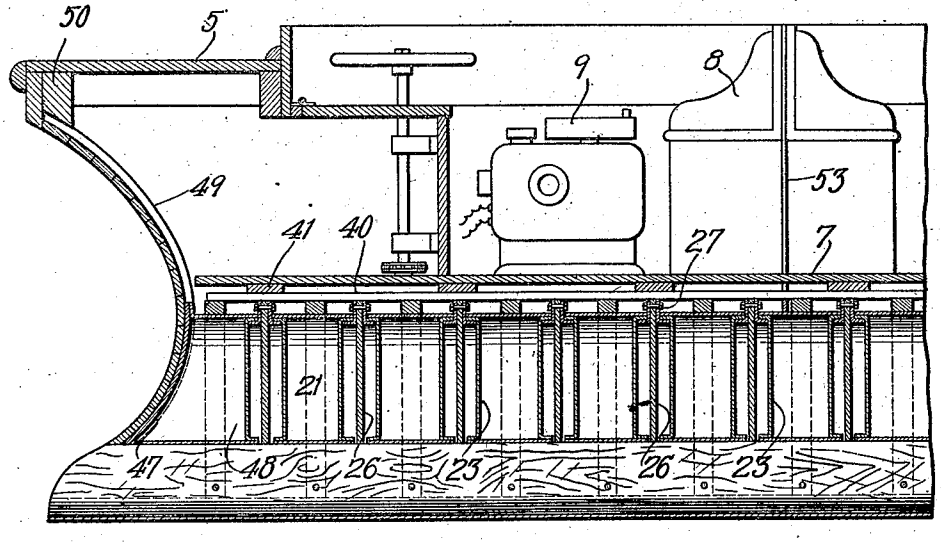


Fig. 8.



INVENTOR.
GEORGE ARNOLD.
BY
Richard R. Brown
ATTORNEY.

Feb. 1, 1927. 1,616,404

G. ARNOLD

NONSINKABLE BOAT CONSTRUCTION

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Fig. 9.

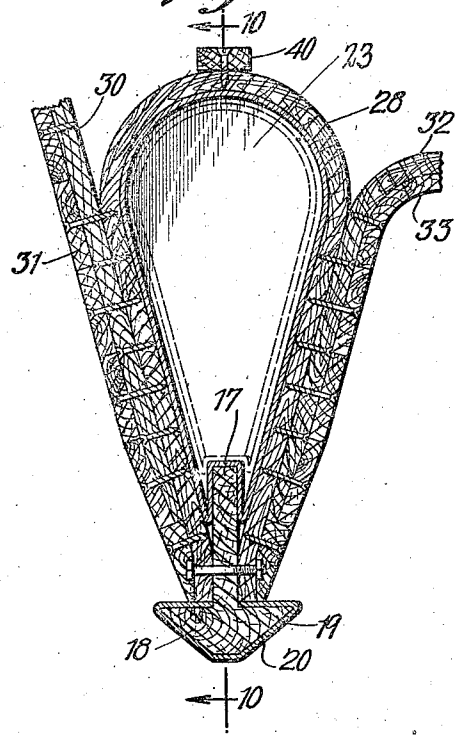


Fig. 10.

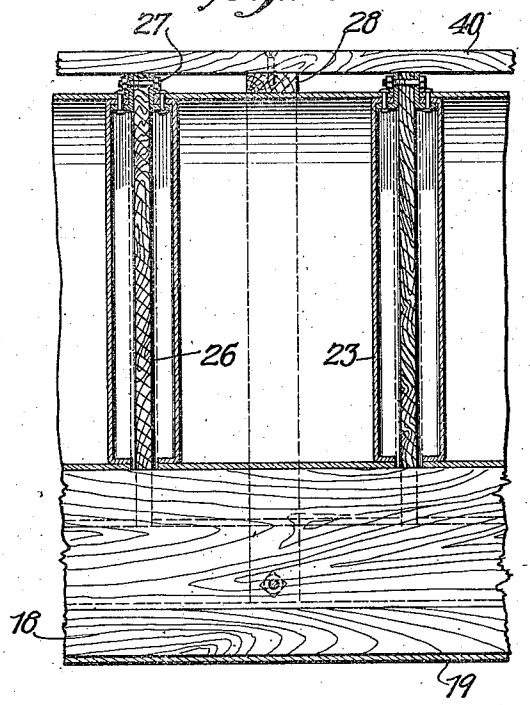
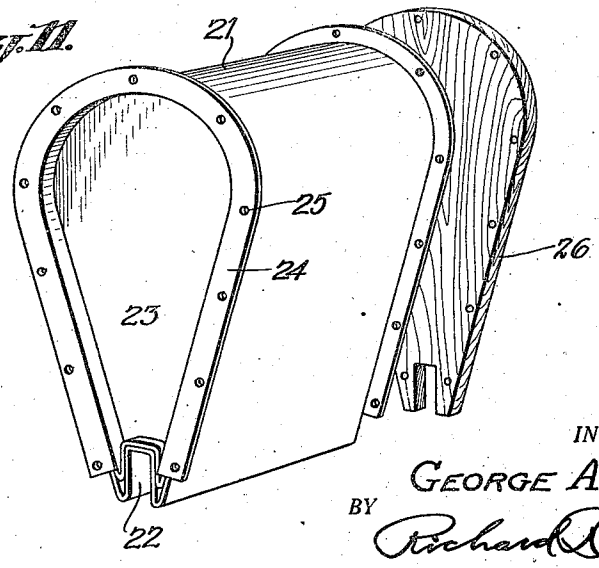


Fig. 11.



INVENTOR.
GEORGE ARNOLD.
BY Richard B. Owen.
ATTORNEY.

Patented Feb. 1, 1927. 1,616,404

UNITED STATES PATENT OFFICE.

GEORGE ARNOLD, OF ASTORIA, NEW YORK.

NONSINKABLE-BOAT CONSTRUCTION.

Application filed November 16, 1925. Serial No. 69,458.

This invention relates to non-sinkable boats and in particular to a boat construction embodying a plurality of chambered keels which will offer less resistance to the passage of the boat through the water than has heretofore been accomplished in boat construction.

A particular object of the invention is to provide a boat with a plurality of chambered keels, which, in the event of accident, such as a collision, only those chambers of the different keels which are damaged will be rendered useless, the chambers being so arranged that any accident thereto would not impair the buoyancy of the boat.

A further object of the invention is to so arrange the keels that they are separated so that any accident which results in the breakage of any particular part of one of the keels will not result in damage to the other, the keels being separated and so arranged that they will prevent sinking of the boat.

A further object of the invention is to arrange a plurality of compartments between the keels which will not interfere with the progress of the boat but rather will be so arranged as to offer very little resistance to the passage of the boat through the water.

In order to provide a boat having air-tight chambers which go to make up a plurality of keels, having compartments or bulkheads therebetween, which are themselves water-tight, it is necessary to embody in a boat of this character, a peculiar under structure, the exact form of the structure being such that the lower part of the boat is substantially water-tight in each and every compartment and yet so arranging the compartments that they do not offer an obstruction to the passage of the boat through the water.

A further particular object of the invention is to provide a keel for a boat which is made up of a plurality of water-tight chambers, placed end to end and secured together to form what is ordinarily the backbone of the whole structure, the keel chambers themselves, being so shaped that they will give an added buoyancy to the boat.

Referring to the drawings, wherein I have shown a preferred embodiment of my invention.

Figure 1 is a top plan view of a small boat showing a possible seating arrangement and motor arrangement.

Figure 2 is a bottom plan view of the boat as seen in Figure 1, the position of the propellers and rudders being clearly shown.

Figure 3 is an enlarged top plan view of the boat hull with the flooring thereof removed to show the interior construction.

Figure 4 is a vertical section through the boat showing the position of the center keel, the flooring and upper part of the vessel.

Figure 5 is a sectional view taken on the line 5—5 of Figure 3 and shows the arrangement of the compartment, fuel tank and upper structure of the boat.

Figure 6 is a fragmentary top plan view of the laminated bow keel piece, showing its connection with the starboard, port and center keel runners.

Figure 7 is a cross section taken on the line 7—7 of Figure 5 showing the relative position of the keels and bulkheads and upper part of the boat construction.

Figure 8 is a fragmentary section taken on the line 8—8 of Figure 7 showing the rear end construction of the vessel.

Figure 9 is a vertical cross section, taken through one of the keels showing the relative position of the keel chamber, keel rib, hull planking and keel rudder.

Figure 10 is a fragmentary cross section, taken on the line 10—10 of Figure 9 and shows the relative spacing of the keel chamber and position of the keel runner and

Figure 11 is a view in perspective showing th construction of the keel chamber and a spacing member used therewith.

Referring to the drawings in detail and in particular to Figures 1 to 5 inclusive, the numeral 5 indicates the deck and 6 the pit of a boat, having the usual flooring 7, seats 8 and propelling motors 9, the forward part of the boat being provided with a keel tank 10, having at its forward end a curved channel piece 11, which rests on the bow keel piece 12, which consists of a series of laminated wood pieces, arranged so that they may be bent as is usual in the bow construction of ships. While I have illustrated and described my construction as applied to small passenger boats, it is to be understood that

this construction hereinafter described, can be applied to any boat, whether it be ocean liners, freighters, or small pleasure boats.

In Figure 6 it will be noted that this laminated bow keel piece is connected at its rear end to the forward end of a timber-like, keel runner 13, the keel runner being suitably rabbeted into the rear end of said bow keel piece and the forward end of two other keel runners 14 and 15, fit into said bow piece and are bolted to the sides of the bow piece as by the bolts 16. These keel runners are provided with an upstanding flange 17, the lower portion of the keel runners being formed to provide a chock 19 of substantially triangular formation, having outwardly extending edge portions 19. The bottom portions 18 of said keel runners, for the purposes of protection, are covered with a steel plate 20 and it will be particularly noted that the extended portions 19 thereof function to prevent the lifting of the vessel out of the water in heavy seas. Upon these three keel runners, namely, the port runner 14, the starboard runner 15 and center runner 13 are built air-tight keels, which form the entire bottom construction of the boat and which prevent its sinking, in the event of an accident. The keels themselves, are made up of a series of keel chambers 21, formed of steel and having their bottoms channeled as at 22 to fit over and rest upon the upstanding flange 17 of the keel runner.

Into the outer ends of these keel chamber sections 21 is fitted a flanged head 23, the flanges thereof projecting out beyond the sides of the keel chamber, as at 24 and being provided with bolt holes 25 through which may be passed, suitable bolts to bind the chambers together, there being positioned between these flanges 24, the wooden, chamber or keel spacers 26, these spacers also acting as cushions to prevent buckling of the chamber walls in collisions. It will be evident that the lower end of these spacers must be cut so that they also fit over the flange 17 of the keel runner and will also act to completely seal each keel chamber. It is evident that once the bolts are drawn up, the bolts being numbered 27, that all of the keel chambers will be fixed together and that each individual chamber will be rendered air-tight. In order to fix the keel chambers or the keel, as a whole, in place in the vessel, use is made of a plurality of ribs 28 which extend from alongside the flanged portion 17 of the keel runner up and around the keel chamber 21. These ribs 28 are shown in Figures 3 and 9 and are in turn, fastened to the ribs 30 which form the side braces of the hull construction and to which are fastened the hull planking 31. On the opposite side, as shown in Figure 9, these ribs 28 are secured to the ribs 32, which, as shown in Figure 7, form the foundation for the planking 33, which forms the bottom of the boat and incidently the compartments which are spaced to begin at a point distant from the rear or stern of the vessel. The center keel will, of course, be positioned between the ribs 32, which form a part of the compartments disposed between the central keel and the port and starboard keels.

Use is also made in making up the compartments of a plurality of ribs 34. These ribs 34 are held in place by the medium of longitudinal strips 35, which are in turn, secured to the planking 33, which form the upper wall of the compartment. To these ribs 34 is secured the planking 36, which forms the bottom of the compartment.

Referring in particular to Figure 5, it can be seen that the forward compartment 37 extends further down and is deeper than the compartment 38, or the one to the rear. The object of having the rear compartment narrower than the forward bulkhead is so that a volume of water will reach the propeller 39, which is driven in the usual manner from the motor 9, and also, when the boat has attained a high speed, the driving force of the propeller 39 will raise the forward end of the boat so that it will more or less travel in that portion adjacent the corners of the rear ends of the compartments, thus, only a small portion of the bottom surface of the compartments will be in actual contact with the water and for this reason, friction will be reduced and the operation of the boat through the water will not be greatly hindered as is the case in the boats employing the usual method of construction.

The ribs 28, which surround the keel chambers at spaced intervals are connected together by the longitudinally extending stringers 40, these stringers also resting upon the flanged portion of the keel chambers, and in turn, supporting the sleepers 41 to which the floor is secured, the floor being indicated by the numeral 7.

It will be evident, upon inspection of Figure 5, that the rear end of the compartment 38 is closed by a suitable wall 42 and the front end thereof, is separated from the bulkhead 37 through the medium of a wall 43, it being understood that there are two compartments 38 and two compartments 37, one of each being disposed between the central keel and the port and starboard keels respectively.

It will be noted upon reference to Figures 4 and 5 that the compartments and the keels terminate at the rear wall 44 of the bow shaped, water-tight keel tank 10 while the keel runners extend thereunder to their engagement with the laminated bow keel piece, before referred to. Adjacent the sides of this keel piece, there is provided the suitable ribs

45 to which the bow planking 46 is secured in the usual manner.

In Figure 8, it will be noted that the rear walls 47 of the rearmost keel chambers 48, will be shaped to coincide with the shape of the stern of the boat as designed and, in this particular instance, I make use of a number of vertical ribs 49, which extend upwardly and are fastened to an upper stern beam 50, across the back of the boat, these ribs 49 having attached thereto the stern planking, which finishes the rear portion of the boat.

In Figure 7, it will be noted that I have provided, along the sides of the boat, the deck beams or rails 51, which are suitably secured to the vertically disposed hull rib 30, and which, in turn, supports the deck planking of the boat. This deck planking is indicated as at 52. Particular attention is drawn to the fact that the three keel runners are rigidly held in position and it therefore follows that the air keels are also secured in position and converge at the forward part of the boat to form the prow thereof. These keels, forming, for the great part the buoyant agency of the boat and being separated, as they are, as has been before described, each constitute a plurality of air tight chambers, which may be damaged to a considerable extent without impairing the buoyancy of the boat.

Of course it is understood that in ocean liner construction, these compartments and keel chambers will be provided with suitable manholes so that they can be painted interiorly to prevent corrosion. In order that the body of the vessel may be suitably reinforced, I provide the steel transverse plate members 53 which conform to the interior shape of the vessel and are suitably secured to the ribs and superstructure of the vessel. I have provided two of these steel reinforcing plates, but any number may be employed, depending upon the length and beam of the boat.

It will be evident therefore, that through the medium of my improved construction, I have provided a seagoing vessel which is practically non-sinkable in view of the fact that the keel itself or those parts which keep the boat in upright position are made of a series of water-tight chambers, these chambers being of sufficient length to insure of a plurality being embodied in one single keel, so that should the boat meet with an accident, a minimum number of chambers will only be destroyed or broken into to admit the water. It is evident that the greater majority of these chambers would have to be filled with water before the boat would sink below its normal water line due to the fact that the great buoyant effect of the other non-injured compartments will prevent the boat from sinking, even though it has taken on a great quantity of water in many injured keel chambers. In the event of a leak, the water can only enter the leaking compartment and there will be no leaks, with the exception of those caused by accidents or corrosion and the air-tight keels being constructed of steel, will withstand the action of the water for an indefinite period.

While I have illustrated and described my invention in a particular manner, I am aware of the fact that various alterations in the construction thereof may be incorporated and it is understood therefore that I reserve the right to change the form of the details of construction or otherwise alter the arrangement of the parts without departing from the spirit of the invention or the scope of the claims submitted.

Having thus described my invention, what I claim is:—

1. A boat comprising a plurality of keels, said keels consisting of spaced water-tight chambers, and keel runners common to said chambers for supporting the same in alignment.

2. A boat comprising a plurality of spaced keels, each of said keels being made up of a plurality of water-tight keel chambers, keel runners on which said chambers are mounted, and a bow chamber at which said keel chambers terminate, said chamber being shaped to conform to the shape of the boat bow.

3. A boat comprising a keel runner, a plurality of chambers mounted on said runner, spaces between said chambers, means for rendering said chambers water-tight, and means for securing said chambers to said keel runner.

4. A boat comprising a plurality of keels, water-tight compartments connecting said keels, one of said compartments being deeper than the other compartment, and means associated with said compartments for retaining said keels in position.

5. A boat comprising a plurality of tanks forming a water-tight keel, a runner forming a bottom closure for said keel tanks, and means on said keel for resisting an upward movement of the boat out of the water.

6. A boat comprising a plurality of air-tight keels, a keel runner in each of said keels, compartments separating said keels, ribs extending about said keels and about said compartments, a central keel bow piece to which said keels are secured, and a keel tank supported on said keel bow piece.

7. A boat comprising a plurality of keels, each of which is composed of a number of water-tight chambers, spacers between said chambers adapted to act as cushions, end plates for said chambers, between which the spacers are positioned and means in said end plates and said spacers for securing the chambers together.

8. A boat comprising a plurality of air-

tight keels, front and rear compartments between the keels, and the front compartment being of greater depth than said rear compartment.

9. A boat comprising a keel runner, a plurality of chambers mounted on said runner, spacers between said chambers, means for rendering said chambers water-tight, means for securing said chambers to said keel runner, said chambers constituting water-tight keels and said keels converging at the bow of the boat.

10. A boat comprising a keel runner, plurality of chambers of substantially pear shaped formation in cross section mounted on said runner, spacing members for the ends of said chambers and means for joining all of said chambers to each other and to said keel runner whereby a water-tight keel is provided for substantially the length of the boat.

11. A boat comprising a longitudinally extending keel, having a vertically disposed rib portion, chambers mounted on said vertically disposed portion, having an inwardly disposed flange adapted to form a groove into which the vertical portion of the keel runner is adapted to fit and said keel chamber being larger in its upper portion than in the lower portion.

12. A boat comprising a keel runner, a plurality of chambers mounted on said runner, spaced walls joining said keel chambers and forming water-tight compartments therebetween and means for securing said chambers to said keel runner.

13. A boat comprising a plurality of keels, water-tight compartments connecting said keels, keel runners disposed at the lower portion of said keels and arranged to have converging connections at the front of the boat with a keel bow piece, and a bow tank supported on said bow piece.

14. A boat comprising a keel runner, a plurality of chambers mounted on said runner, spaces between said chambers, means for rendering said chambers water-tight, means for securing said chambers to said keel runner, and said keel runner having a lower edge substantially triangular in cross section whereby raising of the boat out of the water is resisted.

15. A boat comprising a plurality of spaced keel runners, tanks mounted on said keel runners and joined together end to end longitudinally of the boat to constitute water-tight keels, compartments between said keels, a bow piece to which said keel runners are secured and a bow tank mounted on said bow piece at which said keel chambers terminate.

In testimony whereof I affix my signature.

GEORGE ARNOLD.