May 5, 1964 J. Y. COUSTEAU ETAL 3,131,406

VESSELS HAVING A COLLAPSIBLE BOTTOM AND INFLATABLE SURROUND

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Fig. 2

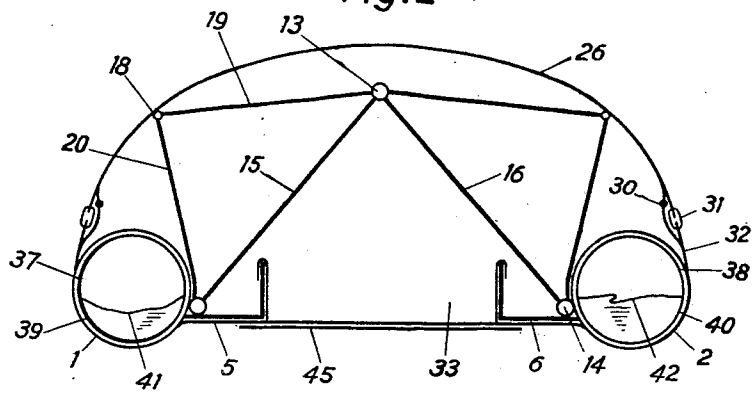
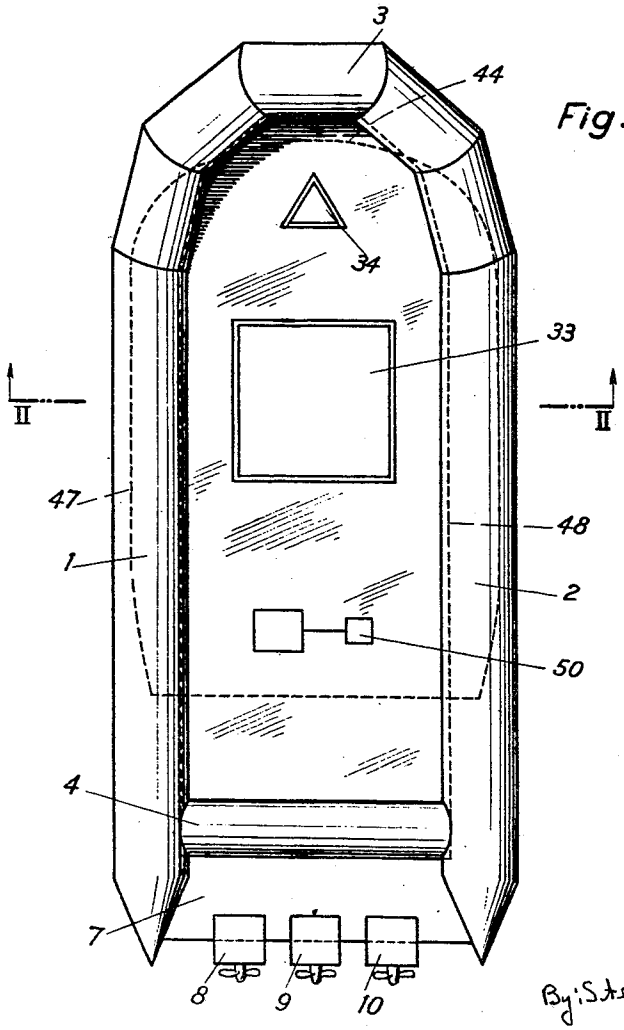


Fig. 1



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Fig. 3

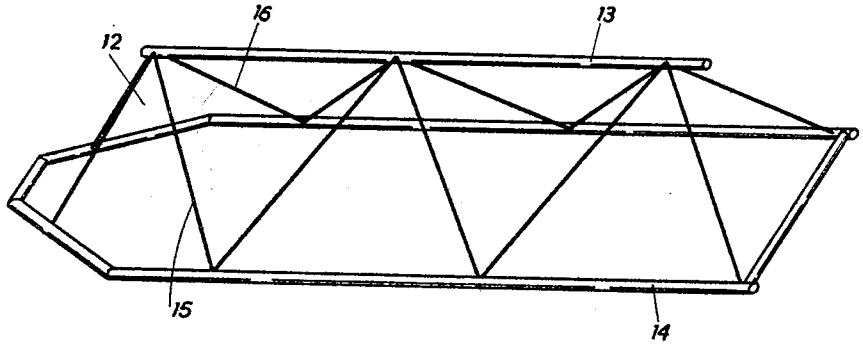
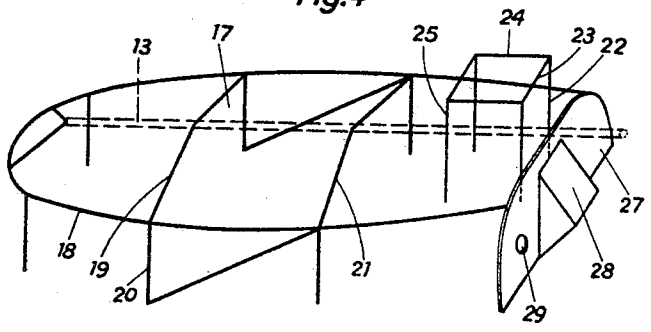


Fig. 4



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VESSELS HAVING A COLLAPSIBLE BOTTOM AND INFLATABLE SURROUND

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12 Claims. (Cl. 9—11)

The present invention relates to a vessel comprising an inflatable float tube of a general U-shape, closed towards the base of the U by a transverse inflatable tube, a bottom canvas or cloth connecting the tubes and a rigid platform or deck which is positioned on the bottom canvas and the edges of which are positioned between the canvas and the float tubes when the latter are inflated.

Vessels of this type are easy to transport in the deflated and folded condition; they can carry loads and motor propulsion units which are large relatively to their actual weight and they behave well in the sea. However, the protection which these vessels offer against bad weather, spray and the breaking of waves is negligible or zero.

An object of the present invention is to permit the occupants of the vessel to be protected and enable them to handle cumbersome equipment under cover, without greatly reducing the facility for transport purposes.

In accordance with the invention, the vessel comprises a frame which is rigid in itself and is positioned on the deck, the periphery of the base of this frame being accommodated between the deck and the float tubes.

The frame improves the rigidity of the vessel; in addition, a cover adapted to the vessel can be mounted on the said frame. Preferably, a canopy of flexible material is fitted on the said frame, possibly secured to the latter at certain points and detachably secured to the float tubes, possibly by means of a flap permanently fixed to the float tubes, the material of the cloth and that of the possible flap, and its fixing means, having little permeability to air. An air compressor sets up a superatmospheric pressure of a few centimetres of water in the space between the canopy and the cloth or canvas situated beneath the deck. The compressor operates at least during travels of fairly long duration.

The canopy protects the occupants of the vessel and the equipment which it covers; the fact that it is inflated prevents it from flapping or forming pockets in which water will remain and enables it to resist heavy seas without fatigue; furthermore, if the canopy should be locally torn the internal superatmospheric pressure to a large extent prevents the entry of water. Due to the canopy being inflated, it does not contact or scarcely contacts the frame, and this considerably reduces the wear thereon; moreover, it contributes to the rigidity of the assembly.

Other objects and features of the invention will become more apparent during the course of the following description when taken in connection with the accompanying drawing which represents one embodiment of the invention.

FIGURE 1 is a plan view of the hull or shell proper of the vessel.

FIGURE 2 is a transverse section on the line II—II of FIGURE 1 of the shell, only the parts in section and the first rods of the frame being shown.

FIGURES 3 and 4 are perspective views showing two assemblies which constitute the said frame. In order of importance, the hull or shell proper comprises essentially, in known manner:

An inflated float tube of a general U-shape with lateral portions 1, 2 and a raised front portion 3; this float tube may be subdivided by water-tight partitions into separately inflatable elements;

a transverse inflated tube 4 forming the base of the U;

a water-tight cloth or canvas 5 fixed to the float tubes towards the bases thereof;

a platform or deck 6 positioned on the bottom canvas 5, the periphery thereof being located between the canvas and the tubes; this deck comprises a lattice of longitudinal and transverse members covered with panels made of a laminated plastic. Its periphery is indicated in FIGURE 1 by the broken line 48.

Propulsion of the vessel can be assured by one or more propulsion units of the "outboard" type, for example three units 8, 9, 10; in order to facilitate maneuvering, the steering controls of these units are preferably inter-connected, as are also their other control means. It is also possible to employ for propulsion purposes one or more aerial propellers, or nozzles which may or may not be orientated and through which is forced the water taken from the area in which the vessel is operating, etc.

The propulsion units can be fixed to a board or plate 7 disposed at the rear of the vessel.

The rigid frame is fitted on the deck and even preferably detachably secured to the latter; this fixing improves the rigidity of the frame. In the example illustrated, the frame consists of two parts:

(A) a triangulated frame, indicated by the general reference 12 and shown in FIGURE 3; this frame 12 comprises a ridge 13, a base 14, which follows the contour of the deck, but slightly set back, and triangulation rods such as 15, 16;

(B) a non-rigid frame indicated by the general reference 17 and shown in FIGURE 4; this frame 17 comprises more especially a belt 18 and rods, for example 19, 20, 21, connecting the belt to various points of the frame 12, to which these rods are fixed. The ridge 13 of the frame 12 is shown in broken lines in FIGURE 4.

The assembly of the two parts 12, 17 is in itself rigid; the part 12 may be rigid in itself, as in the case illustrated.

The frame 17 also comprises rods such as 22, 23, 24, 25, which serve as the framing for a pilot house above the canopy consisting of flexible material 26, and which can also support various parts of equipment, such as a search-light, hooter, radar and the like; it comprises at one end a bulkhead 27 closing the canopy and provided with a lock chamber 28 permitting access to the interior of the inflated canopy, or egress therefrom without an excessive volume of air leaving the canopy.

The bulkhead 27 also carries a fan 29 which places the interior of the canopy under a superatmospheric pressure of 2 to 5 cm. of water, this being permanently maintained while the vessel is moving. The essential purpose of the frame 12 is to give rigidity to the entire vessel; the purpose of the frame 17 is to support the canopy and thus to ensure sufficient free space when the canopy is not under superatmospheric pressure.

The canopy 26 is for example a sheet of polyvinyl chloride reinforced with nylon cloth. It is connected to

the float tubes by flap 32 of rubberised cloth, for example with neoprene, like the float tubes, as shown in FIGURE 2. The connection between the canopy and the flap is duplicated; these two members are laced to one another, as indicated at 31; on the other hand, the edges of strips which are respectively stuck thereto are joined together by a sliding clasp fastener 30. The lacing 31 ensures a rigid mechanical connection while the sliding clasp fastener 30 ensures tightness.

The union 47 between the flap and the bulkhead 27 on the one hand, and the canopy on the other hand, is indicated by broken lines in FIGURE 1.

The canopy is simply placed on the frame 17 and on the ridge 13; it could also be fixed at individual points to these elements. While underway, the canopy is inflated by the fan 29 and only rests on the belt 18; it could also be given a shape such that it does not rest on the said element.

The canopy 26 is preferably provided with scuttles of transparent plastic.

The pilot house, the frame of which is formed by the rods such as 22, 23, 24, 25, is connected to the canopy in the same way as the float tubes, namely, by a flap fixed to the corresponding opening of the canopy, by a lacing and by a sliding clasp fastener. It is in effect the same for the connection between the bulkhead 27 and the canopy.

The deck is formed with several openings or wells which give access to the water:

On the one hand, a large well or opening 33 which enables a driving vessel for example to be placed in and taken out of the water and also enables the said vessel to be boarded; this vessel may be raised or lowered by a block and tackle fixed to the ridge 13;

On the other hand, an opening 34 of smaller dimensions, permitting the use of a propulsion unit which is easily movable for operating at slow speed.

The edges of these openings are fixed to the deck 6; they are sufficiently high so that water does not pass through them, at least when at rest, under the impulse of the swell and waves. The tightness is ensured by the bottom canvas or cloth 5, which forms a sleeve extending the length of the wall of the opening and turned over outwardly of the latter.

While the vessel is underway, it is preferable to close the bottom of the openings, for example by a cloth 45 stretched beneath the bottom canvas. In this way, the resistance to forward movement is greatly reduced, as is also the danger of the water flowing over the sides of the openings. This closure device need not be watertight. In FIGURE 2, the cloths 5 and 45 are spaced apart so that the latter can be seen; in actual fact, they are positioned one against the other.

The float tubes 1, 2, 3, 4, or at least some of them, may serve as a tank for liquids: fuels for supplying the engines, drinking water, etc. Each of the portions thus employed contains two fluid-tight and flexible envelopes or bags disposed one above the other, as shown in FIGURE 2. The upper bag, such as 37 or 38, is inflated with air, for example at a pressure of 80 to 100 cm. of water. The lower bag, such as 39 or 40, contains a liquid which is to be stored, this being a liquid with respect to which the material of the envelope must be inert. When the liquid volume decreases, the air in the bag 37 or 38 expands, the corresponding portion of the float tube thus remaining inflated; the compressor (50 on FIGURE 1) is operated for inflating the tubes with a frequency sufficient for these to maintain a suitable pressure. As the water and fuel is used, the pressure exerted by the upper bags has the additional advantage of placing the liquids under pressure, this greatly facilitating the withdrawal thereof. The very low positioning of these liquids provides a great amount of stability for the vessel.

Preferably, the bags are sufficiently solid to resist the inflation pressure, even when they are not in the float tubes.

The tubes are equipped with manholes permitting the introduction and the extraction of the bags.

A raised platform (not shown) is placed on the float tubes to the rear of the bulkhead. It forms a large working area; it preferably comprises holes similar to the opening 34 but not provided with a raised edge or flange, for the easy mounting of auxiliary propulsion units.

Modifications may be incorporated in the vessel which has been described above and within the scope of the present invention. It can for example be provided with equipment which has not so far been mentioned, such as a radiotelephone transmitter and receiver, an electric generator, a safety compressor and a safety fan, etc. The frame 12, 17 may be of different forms. Our invention should, therefore, be limited only as required by the appended claims.

What we claim is:

1. A vessel, comprising, an inflatable float tube of a general U form closed towards the base of the U by a transverse inflatable tube; a bottom cloth connecting the tubes; a rigid deck positioned on the cloth and the edges of which are accommodated between the cloth and the tubes when the latter are inflated; and a frame, rigid in itself and positioned on the deck, the periphery of the base of said frame being accommodated between the deck and the tubes, and the higher portion of said frame being sufficiently high above said deck for men to move upright on the deck, beneath said frame.

2. A vessel, comprising, an inflatable float tube of a general U form closed towards the base of the U by a transverse inflatable tube; a bottom cloth connecting the tubes; a rigid deck positioned on the cloth and the edges of which are accommodated between the cloth and the tubes when the latter are inflated; a frame, rigid in itself and positioned on the deck, the periphery of the base of said frame being accommodated between the deck and the tubes; and a canopy of flexible material having low air-permeability, said canopy resting on said frame and being detachably secured to the float tubes by fixing means having low air-permeability.

3. A vessel as set forth in claim 2, wherein said canopy is detachably secured to the frame at various points.

4. A vessel as set forth in claim 2, wherein the canopy is detachably secured to the float tubes by means of a flap permanently fixed to said tubes, the material of the flap having low air-permeability.

5. A vessel as set forth in claim 2, comprising an air compressor for setting up a superatmospheric pressure of a few centimetres of water in the space contained between the canopy and the cloth situated beneath the deck.

6. A vessel as set forth in claim 2, comprising an air lock adapted to permit access to the space contained between the canopy and the cloth situated beneath the deck without causing any great loss of air.

7. A vessel as set forth in claim 1, wherein at least one of the float tubes contains at least one liquid, the tube portions thus used containing two fluid-tight and flexible envelopes disposed one above the other, the upper envelope being inflated with air and the lower envelope being filled with liquid.

8. A vessel as set forth in claim 7, comprising an air compressor for inflating the upper envelope.

9. A vessel as set forth in claim 1, wherein said deck comprises a well, the sides of said well extending all around it higher than the water line of the vessel and being lined by the said bottom cloth.

10. A vessel as set forth in claim 9, comprising at least one additional well adapted to dispose a mobile propulsion unit under the canopy and to use said unit.

11. A vessel as set forth in claim 1, wherein said deck comprises a well, the sides of said well extending higher than the water line of the vessel, and said vessel compris-

ing an easily removable panel adapted for closing the bottom of the well.

12. A vessel as set forth in claim 11, comprising at least one additional well adapted to disposed a mobile propulsion unit under the canopy and to use said unit.

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