July 7, 1970 M. G. H. GIRODIN 3,518,956

BUBBLE HULLS

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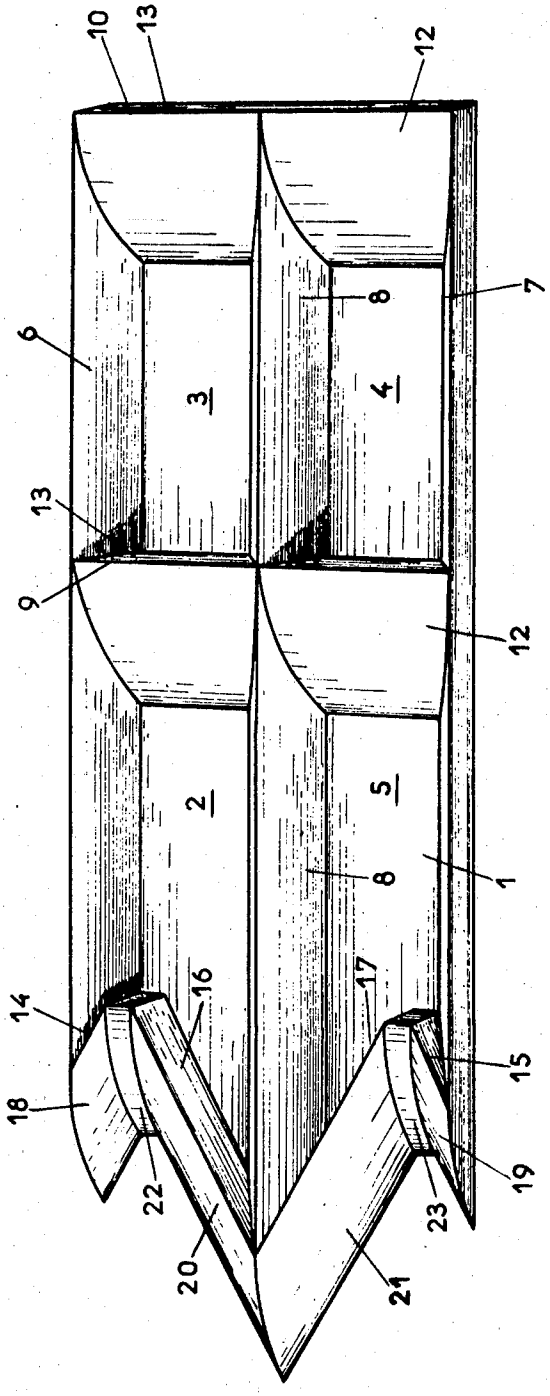


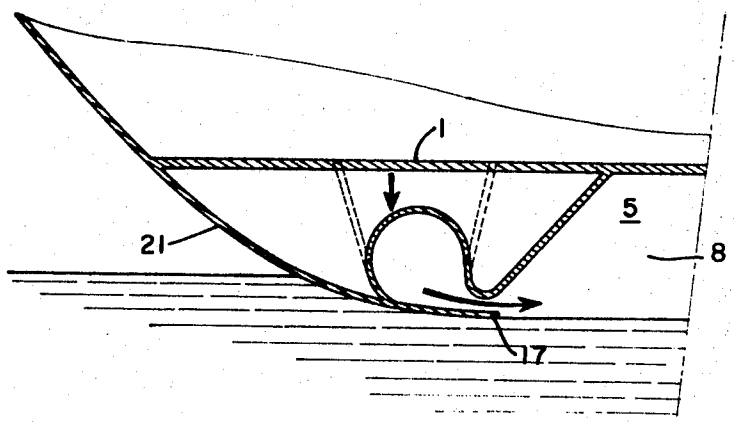
FIG. 1

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Fig. 2.



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BUBBLE HULLS

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ABSTRACT OF THE DISCLOSURE

A hull for a water vehicle of the captured air bubble type wherein the lower exterior surface area of the hull is divided into at least four symmetrically disposed compartments for capturing air bubbles.

BACKGROUND OF THE INVENTION

This invention relates to over-water vehicles having a captured air cushion, which are known as bubble hulls.

Tests with hulls of this type have not hitherto given the expected results.

These setbacks are caused by two main reasons:

(1) The bounding walls of the bubble did not have neutral flow, that is to say the streams of water at the outlet of these walls were not horizontal.

(2) Stability was not obtained.

SUMMARY OF THE DISCLOSURE

The present invention has the object of obviating above-mentioned disadvantages.

The present invention is characterised in that the bottom part of the hull is divided into compartments; the compartments being open at the bottom in such manner as to give rise to the formation of at least four elementary captured air bubbles. The compartments are bounded by three longitudinal partitions, one of which is in the axis of symmetry of the hull, and by three transversal partitions. The bottom edges of all the partitions are preferably in a single plane which is substantially horizontal at rest.

The above briefly described structure results in division of the bubble into four elementary bubbles and provides stability because in the case of a difference in level the bubbles of the portions which are immersed to a greater extent will be at a higher pressure than the bubbles of the portions which have emerged to a greater extent. Accordingly, the difference in pressure between the respective bubbles supplies the lifting couple.

According to another characteristic of the invention, the front walls of the transversal partitions are convex cylindrical in shape. The axes of the cylinders are perpendicular to the plane of symmetry of the hull in the case of the front walls of the rearmost partitions, while the axis of the cylinders of the front walls of the front partition form an acute angle with said plane of symmetry.

These front walls terminate horizontally at their vanishing point, that is to say tangentially to the bottom limit plane of the bubble.

In contrast to previous procedure, these walls are not provided to perform a lifting function, and the tangential connection avoids any downward acceleration of the liquid.

According to another characteristic of the invention the front transversal partition, taken as a whole and viewed in plan, has a V-shaped form, the point of the V forming the stem of the hull.

The overall shape of the bow of the vessel, viewed in plan will preferably be that of a W, the outer side

branches of the W forming lateral aprons having the effect of containing the two branches of the central stem wave and of reducing, if not eliminating, their drag effect.

Each bubble is preferably supplied continuously with air by an independent blower or, as an alternative, the bubbles are fed by a common blower delivering into a number of pipes equal to the number of compartments. In the case of a single blower each pipe has a loss of head suitably calculated to make the deliveries uniform, since otherwise they would be disturbed by the movements of the hull.

The pressurised air is preferably introduced into each compartment through the bottom portion, tangentially to the bottom limit plane.

Other characteristics of the invention will be clear in the course of the following description, which is given solely by way of example of embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWING

In the accompanying drawing, FIG. 1 illustrates the hull, which is assumed to be in section through a horizontal plane immediately above the flat bottom and viewed from below, with nevertheless a slight effect of perspective.

In this construction, the hull may have any shape and structure in the invisible portion beyond the sectional plane. This flat bottom **1** constitutes on its lower side the upper plane delimiting the bubbles.

FIG. 2 is a sectional side elevation view of a portion of the hull shown in FIG. 1, FIG. 2 depicting the preferred method of furnishing pressurised air to the bubble-defining hull compartments.

The invention relates to the arrangement of the portion beneath said flat bottom.

DESCRIPTION OF AN EMBODIMENT

As can be seen from the drawings, four depressed compartments **2**, **3**, **4** and **5** are seen when the bottom is viewed from below, this resulting from the following method of partitioning:

Two longitudinal partitions **6** and **7** bound the compartments laterally. The outer walls are extensions of the hull and the inner walls are flat and inclined towards the interior of the compartments.

The middle partition **8**, the edge of which is in a plane of symmetry of the hull, likewise has flat walls inclined towards the interior of the compartments.

The transversal partitions, the edges of which are designated by **9** and **10**, have convex front walls **12** in the form of a cylinder having a horizontal axis perpendicular to the plane of symmetry of the hull. Along the edges **9** and **10** these walls adjoin the bottom limit plane of the bubble. The rear walls **13** of these partitions are flat and vertical or inclined towards the interior of the compartments.

The bow of the vessel has here the general shape of a W, the bottom edges of the outer branches of the W being designated by **14** and **15** and the bottom edges of the branches of the central V, defined by the forward transversal partition, being designated by **16** and **17**. The walls **18** to **21** are convex cylindrical, the axes of the cylinders forming acute angles with the plane of symmetry of the hull. Their faces are joined along the edges **14** to **17** tangentially to the bottom limit plane of the bubble.

The faces **18** and **20** are joined together, and the faces **19** and **21** are joined together, by cylindrical surfaces **22** and **23**, the axis of the cylinders being perpendicular to the aforesaid plane of symmetry. The rear faces are preferably vertical.

As may clearly be seen from FIG. 2, air will preferably be supplied to the compartments by means of narrow slots disposed along the rear faces of the transversal walls, preferably near the edge situated in the bottom limit plane of the bubbles.

Consequently, in the event of the failure of the blower or blowers, air cushions will remain available which will provide support.

As the result of the form of partitioning which has been described above, four separate air bubbles are captured which are contained in four fluid-tight compartments of general prismatic shape.

I claim:

1. A hull for a vessel characterised in that the bottom portion of the hull is divided into a plurality of compartments, the compartments being opened at the bottom and giving rise to the formation of at least four elementary air bubbles, said compartments being defined in part by three rigid longitudinal partitions, one of said longitudinal partitions being aligned with the axis of symmetry of the hull, said compartments being further defined by at least three rigid transversal partitions, the bottom edges of all of said partitions lying in a single plane which is substantially horizontal with the vessel at rest.

2. A bubble hull according to claim 1, characterised in that the front walls of the transversal partitions are of convex cylindrical shape, the axis of the cylinders being perpendicular to the plant of symmetry of the hull in the

case of the front walls of the rearmost partitions, while the axis of the cylinders of the front walls of the front partition form an acute angle with said plane of symmetry.

3. A bubble hull according to claim 2, characterised in that the front walls are terminated horizontally at their vanishing point and tangentially to the bottom limit plane of the bubble.

4. A bubble hull according to claim 1, characterised in that the front transversal partition, as a whole and viewed in plan, has a V-shaped form, the point of the V forming the stem of the hull.

5. A bubble hull according to claim 4 characterised in that the shape of the forward end of the hull including said front partition will be that of a W.

6. A bubble hull according to claim 1, characterised in that the pressurised air is introduced into each compartment through the bottom portion and tangentially to the bottom limit plane.

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