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3,437,067

CONVERTIBLE VESSEL

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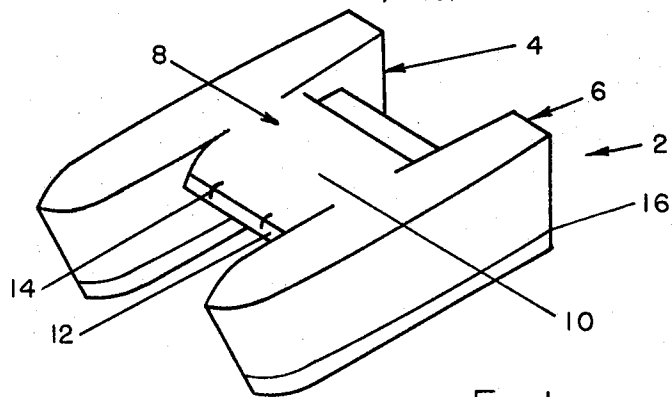


FIG. 1

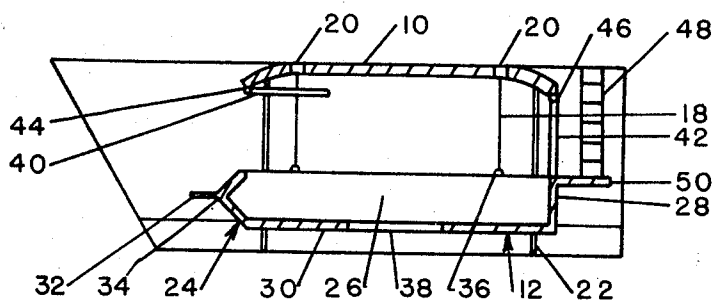


FIG. 2

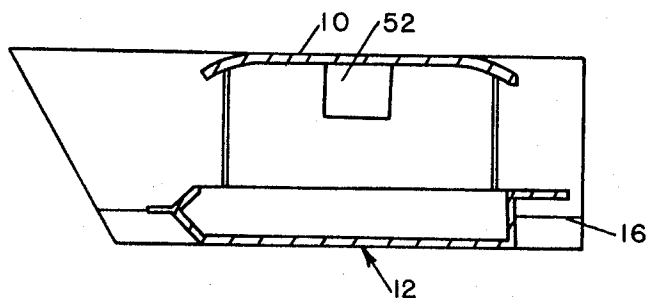


FIG. 3

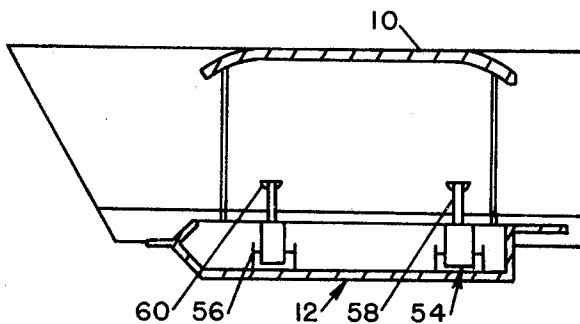


FIG. 4

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1

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CONVERTIBLE VESSEL
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13 Claims

ABSTRACT OF THE DISCLOSURE

A plural hull, convertible vessel with a movable, buoyant body carried between adjacent, side-by-side hulls. The buoyant body may be moved between an upper, intermediate, lower intermediate, and lowermost position to provide the vessel with plural hull vessel characteristics in the upper position, glass bottom boat and houseboat characteristics in the intermediate position, shallow draft vessel characteristics in the lower intermediate position, and dry dock facilities in the lowermost position.

This invention relates to a convertible vessel, and more particularly, to a vessel including at least two hulls held side-by-side and a movable part of the vessel that may be raised or lowered between the hulls to convert the vessel for various uses and for performing various functions.

As is perhaps well known, catamarans, vessels having twin hulls, and trimarans, vessels having three hulls, have been designed to operate in various waters, such as, rivers, lakes, bays and oceans. Catamarans and trimarans have been powered by the wind on sails or by motors driving paddles or propellers. Convertible vessels have been designed to perform various functions that cannot be performed by the basic vessel design. In the past multi-hull or plural hull, convertible, vessels have been designed, for example, an amphibious catamaran was invented by S. P. Bouchard, Sr., as shown in Patent No. 2,850,747.

The present invention relates to a new and improved convertible vessel having at least two spaced-apart hulls that are arranged side-by-side and are permanently connected together by members that bridge the space between the hulls above the water line. A movable part or portion of the vessel is provided for movement up and down between the hulls by moving means or an actuating device for converting the vessel for various uses and for performing various functions. In the preferred embodiment, the vessel is a catamaran with the bridging member forming a deck above the water line. The movable portion is connected to the vessel between the hulls beneath the deck. The movable portion is shaped and sized to provide a buoyant body that may be raised or lowered between the hulls to various positions below the permanent deck structure. The movable portion may include a window or port therein for viewing beneath the surface of the water. When the convertible catamaran is readied for movement across a body of water the movable portion is raised to its uppermost position beneath the deck. The catamaran may be converted into a vessel having glass bottom boat characteristics by lowering the movable portion to an intermediate position.

The movable portion supports its own weight in the intermediate position and may provide an enclosed cabin or compartment when fore and aft bulkheads are moved into position. The catamaran may be used as a houseboat when the enclosed cabin is formed. The movable portion may also be forced downwardly, to a lower intermediate position to provide a shallow draft vessel which allows the vessel to transit shallow bodies of water. When the movable portion is placed in its lowermost position

2

the movable portion will support the entire weight of the vessel. When the movable portion is in the lowermost position the hulls are held above the surface of the water. The convertible catamaran therefore provides its own dry dock facilities.

It is an object of this invention to provide a convertible vessel having at least two hulls with a movable portion between the hulls, having a viewing window for viewing the ocean floor from above the movable portion when the movable portion is lowered partially below the surface of the water, thereby converting the vessel into a glass bottom boat type vessel.

It is also an object of this invention to provide a convertible vessel having at least two hulls with a movable portion between the hulls and a movable fore and aft bulkhead for converting the vessel into a houseboat type vessel to provide an enlarged cabin for in port use.

Another object of this invention is to provide a new and improved vessel having at least two hulls with a movable portion for converting the deep draft vessel having seagoing characteristics into a shallow draft vessel to provide landing craft characteristics.

A further object of this invention is to provide a convertible vessel having at least two hulls with a movable portion between the hulls for raising the hulls out of the water for repair, thereby providing the vessel with its own dry dock facilities.

An additional object of this invention is to provide a catamaran or trimaran with a movable portion or portions that may be raised to a compact position beneath the deck, bridging the space between the hulls, when the vessel is readied for movement across a body of water and that may be lowered to provide glass bottom boat characteristics, houseboat characteristics, and shallow draft characteristics.

In accordance with these and other objects, which will be apparent hereinafter, the instant invention will now be described with particular reference to the accompanying drawings, illustrating the preferred embodiment of the device.

In the drawings:

FIGURE 1 is a perspective view of the vessel with twin-spaced-apart hulls;

FIGURE 2 is an enlarged view, in cross section, of the vessel with the movable portion in a floating intermediate position;

FIGURE 3 is an enlarged view, in cross section, of the vessel with the movable portion in a lower intermediate position providing a shallow draft vessel;

FIGURE 4 is an enlarged view, in cross section, of the vessel with the movable portion in its lowermost position supporting the hulls above the surface of the water.

Referring now in detail to the drawings wherein, an embodiment of the invention is shown, and particularly to FIGURE 1, the convertible vessel, generally designated as numeral 2, is a catamaran having two spaced-apart hulls 4 and 6 arranged side-by-side. The spaced-apart hulls are permanently connected together by a bridging structure 8. It is to be understood that a trimaran or other multi-hull vessel may also be used as the basic vessel. The catamaran may be powered by the wind by using sails or powered by motors driving propellers, pumps or other known devices in order to propel the vessel across a body of water. The particular shape, size and structural characteristics of the hulls and the bridging structure may vary in accordance with known marine engineering principles. The deck 10 covers the bridging structure 8. A movable portion or buoyant body 12 is connected to the vessel between the hulls below the bridging structure 8. The movable portion 12 is sized in rela-

tion to the dimensions of the particular vessel. When the vessel is readied for movement across a body of water the movable portion is raised to its uppermost position and held by locking devices or clamps 14. The movable portion is held above the water line 16 in order to provide a trim vessel with seagoing characteristics. The movable portion 12 may be lowered from the uppermost position as shown in FIGURE 1.

The movable portion 12 may be lowered to the position shown in FIGURE 2 by moving means or an actuating device including hydraulic piston devices (not shown) connected to the bridging structure 8 and the movable portion 12, or by four cables 18 connected between motor boxes 20 in the bridging structure and the movable portion 10. The motor boxes contain winches to wind and unwind cables 18. The power source for the motor boxes may be the vessel's motors or auxiliary power units. Hand winches may replace the motor boxes on smaller vessels. Therefore, the cables 18 are utilized to raise and lower the movable portion 12 between the uppermost position, as shown in FIGURE 1, and the floating intermediate position, as shown in FIGURE 2. The movable portion 12 is also connected to tracks 22. The tracks 22 are attached to the hulls for guiding and stabilizing the movable portion as it is moved between various positions. The tracks 22 are designed to mate with track grasping or following means (not shown) connected to the movable portion 12.

The movable portion or buoyant body 12 is generally box or barge shaped, having a bow 24, a port and starboard side 26, an aft section 28 and a bottom 30. The movable portion or buoyant body 12 is sized to support not only the weight of the movable portion and additional weight of objects carried in the movable portion when lowered into a floating intermediate position, as shown in FIGURE 2, but is sized to support a portion of, or the entire weight of the vessel as shown in FIGURES 3 and 4 respectively. The shape of the bow of the movable portion 12 allows the vessel to be moved forward across a body of water when the movable portion 12 is partially submerged. An extending splash member 32 extends beyond the leading edge 34 of the bow to inhibit, if not prevent water from splashing into the movable portion when the vessel is underway.

The buoyant body is lowered from a clamped position as shown in FIGURE 1, by releasing clamps 14 and lowering the movable portion on a plurality of cables 18. The distal end of the cables 18 are releasably connected to the movable portion 12 at 36, as shown in FIGURE 2. The movable portion may be locked in the floating intermediate position as shown in FIGURE 2 by locking means not shown. The movable portion is locked in the intermediate or lower positions to prevent the movable portion from rolling or pitching independently. The movable portion may be used as a viewing platform to view the ocean floor from above the movable portion 12 through window 38. Therefore the vessel may be converted to provide glass bottom boat characteristics.

When the movable portion is in the intermediate position as shown in FIGURE 2, the space between the hulls can be utilized as a cabin, providing the vessel with houseboat characteristics. The deck of the cabin is the movable portion or buoyant body 12, the overhead is the bridging structure 8, and the port and starboard bulkheads are confronting hull surfaces. The fore and aft bulkheads 40 and 42 respectively, are connected to the bridging structure 8 and are stored beneath the bridging structure. Bulkhead 40 is shown in a stored position and bulkhead 42 is shown in a vertical position. The bulkheads are rotated about hinges 44 and 46 to a vertical position from a horizontal stored position. The forward bulkhead 40 may also be rotated into a vertical position about hinges 44. The bulkheads may be jalousie type windows with sliding doors to provide an entrance way into the cabin or compartment. A ladder 48 provides a

passageway between the deck 10 and the cabin. A protruding portion 50 is connected to the movable portion 12 to provide an outside deck area at the cabin level.

In larger vessels, the hulls 4 and 6 may contain compartments. Access between the compartments in hulls and the cabin formed between the hulls is provided by water tight door 52 outlined in FIGURE 3. The door 52 is sealed when the movable portion is in its uppermost position and the vessel is moving across a body of water.

When the movable portion is moved from the floating intermediate position, shown in FIGURE 2, to a lower intermediate position, as shown in FIGURE 3, the movable portion 12 will support a portion of the weight of the main body of the catamaran, that is, a portion of the weight of the hulls 4 and 6 and bridging structure 8. The vessel has therefore been converted from a relatively deep draft vessel to a shallow draft vessel. The configuration of the vessel in FIGURE 3 is generally shaped similar to that of a flat bottom vessel. Therefore, it can be readily seen that this convertible vessel may be used to transport both men and materials across a body of water as a deep draft vessel and to deposit both men and materials on the shore after converting the vessel into a shallow draft vessel for transiting the shallows adjacent the shore line.

The movable portion may be moved to its lowermost position, as shown in FIGURE 4, to support the hulls 4 and 6 above the surface of the water. In this position the movable portion is utilized as a dry dock when one wishes to repair the hulls.

The movable portion 12 is moved to and from the lower intermediate position and the lowermost position, as shown in FIGURES 4 and 5 by moving means or an actuating device including a plurality of jacks 54, two of which are shown in FIGURE 5. The jacks 54 are rotatably connected at 56 to the movable portion 12 for movement from a horizontal position to a generally vertical position as illustrated. The piston extensions 58 are connected to adjacent hull depressions 60 in order to raise and lower the movable portion 12. A hand driven or motor driven pump (not shown) is connected to the hydraulic jacks to synchronize the upward or downward movement of the movable portion 12. It should be noted that a piston type hydraulic system may be utilized to move the movable portion between the uppermost position, as shown in FIGURE 1, and the lowermost position, as shown in FIGURE 4.

In use, the convertible vessel is readied for transit across a body of water by placing the movable portion in its uppermost position, thereby providing a trim, seaworthy, relatively deep draft vessel. When the vessel is utilized as a sight-seeing or oceanographic vessel the movable portion includes fragile windows or glass ports that may be lowered beneath the surface of the water after the craft transports its passengers to a particular location at a high rate of speed with the fragile windows held out of the water. The passengers may view objects in the water beneath the windows or the ocean floor from a position above the windows. At will the movable portion may be unlocked and lowered to a floating intermediate position. The movable portion may be locked in the intermediate position in order to prevent relative movement between the vessel and the movable portion. The movable bulkheads are lowered to provide a relatively large enclosed cabin or compartment between adjacent hulls. The movable portion may be moved to a lower intermediate position or to the lowermost position by actuating the hydraulic jacks. The lower intermediate position provides a relatively shallow draft vessel having flat bottom boat characteristics. In the lowermost position the hulls are raised out of the water, providing dry apparatus and articles.

The instant invention has been shown and described herein in what is considered to be the most practical and preferred embodiment. It is recognized, however, that departures may be made therefrom within the scope of the

5

invention. Such departures are not to be limited to the details disclosed herein but to be accorded the full scope of the claims so as to embrace any and all equivalent apparatus and articles.

What is claimed is:

1. A convertible vessel of the type having at least two hulls fixed in spaced-apart, side-by-side relation with bridging structure connecting the hulls comprising,
 - a movable portion of said vessel connected between adjacent hulls for movement between an uppermost position above the waterline of the hulls providing a plural hull vessel and a lower position with the movable portion lying partially below the liquid waterline of the hulls lessening the draft of the vessel, and
 - actuating means for moving said movable portion between the uppermost position and the lower position to convert the vessel from a plural hull configuration having a relatively deep draft to a contiguous hull configuration having a relatively shallow draft.
2. A vessel for transportation across a liquid as set forth in claim 4, wherein,
 - said means for moving said movable member to a partially submerged position between the spaced-apart hulls to provide a relatively large compartment having said movable member as a deck, the confronting hull surfaces of the spaced-apart hulls as bulkheads, and the bridging means as the overhead.
3. A vessel for transportation across a liquid body as set forth in claim 2, wherein,
 - said vessel includes movable fore and aft bulkheads for movement between a stored position in the collapsed compartment and a bulkhead position between the bridging means and the movable member.
4. A vessel for transportation across a liquid body comprising;
 - at least two hulls in spaced-apart relation to one another,
 - bridging means connecting said hulls above the liquid body,
 - at least one movable member connected to the vessel between at least two hulls for movement below said bridging means, and
 - actuating means for moving said movable member between an upper collapsed compartment position with said movable member adjacent said bridging means and a lower position providing an enlarged compartment between said bridging means and said movable member.
5. A vessel for transportation across a liquid body as set forth in claim 4, wherein,
 - said movable member including a buoyant structure, and said means for moving said movable member converting said vessel from a relatively deep draft vessel with the movable member above the liquid body to a relatively shallow draft vessel with the buoyant movable member in the liquid.
6. A convertible vessel of the type having at least two hulls fixed in spaced-apart, side-by-side relation with bridging structure connecting the hulls as set forth in claim 1, wherein
 - said movable portion connected to said vessel for movement to a position at least partially below said hulls, whereby said movable portion may be utilized as a dry dock for the hulls.
7. A convertible vessel for transportation across a liquid body comprising,
 - two hulls for supporting a portion of said vessel above the surface of the liquid body,
 - at least one bridging member for fixedly connecting the hulls together in spaced-apart, side-by-side rela-

6

- tion, said bridging member connecting the hulls above the liquid line of the hulls, and
- a movable portion of said vessel lying between and connecting said hulls, said movable portion including an actuating device connected to said vessel and said movable portion for moving said movable portion between a first position above the surface of the liquid and a lower second position with said movable portion lying partially submerged in the liquid,
- whereby said convertible vessel may be converted between a plural hull vessel with said movable portion in the first position and a vessel having the hulls with said movable portion in the second position.
8. A convertible vessel for transportation across a liquid body as set forth in claim 7, wherein
 - said movable portion including a transparent window in the bottom of said movable portion for viewing beneath the surface of the liquid from a position above said movable portion.
9. A convertible vessel for transportation across a body of water as set forth in claim 7, wherein
 - said movable portion having buoyant characteristics, said device arranged to move said movable portion between said first position and a second position providing an enlarged compartment between said bridging member and said movable portion.
10. A convertible vessel for transportation across a liquid body as set forth in claim 9, wherein
 - said vessel is a catamaran,
 - said movable portion lying beneath said bridging member in the first position, and
 - fore and aft bulkheads movably connected to said vessel for movement to enclose the compartment between the hulls when said movable portion is in the second position.
11. A convertible vessel for transportation across a body of water as set forth in claim 7, wherein
 - said device is arranged to move said movable portion between said second position and a position supporting at least a portion of the weight of said hulls for converting the vessel into a relatively shallow draft vessel.
12. A convertible vessel for transportation across a body of water as set forth in claim 9, wherein
 - said device is arranged to move said movable portion between said second position and a position supporting at least a portion of the weight of said hulls for converting the vessel into a relatively shallow draft vessel.
13. A convertible vessel of the type having at least two hulls fixed in spaced-apart, side-by-side relation with bridging structure connecting the hulls as set forth in claim 1, wherein
 - said movable portion connected to the vessel for movement below said bridging structure between said uppermost position, with said movable portion adjacent said bridging structure, which provides a collapsed compartment, to said lower position which provides an enlarged compartment between said bridging structure and said movable portion.

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ANDREW H. FARRELL, *Primary Examiner*.

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