Dec. 14, 1965 A. D. IRVING 3,223,066

BOAT STRUCTURE

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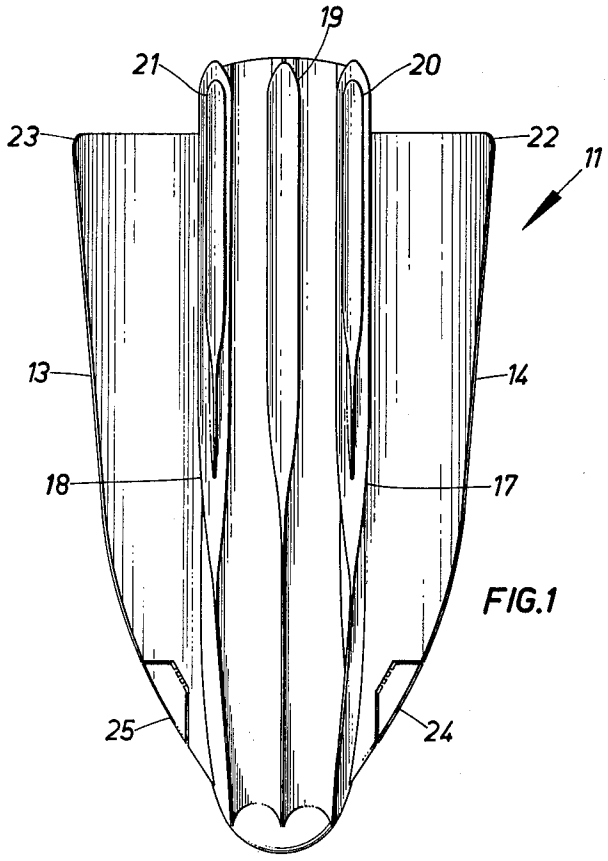


FIG.1

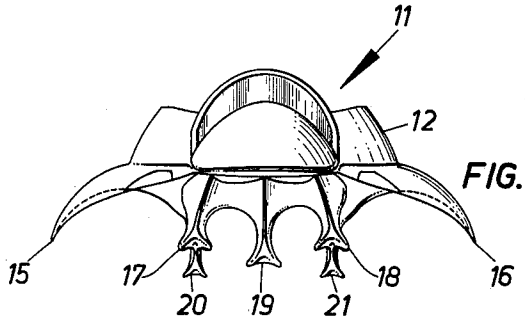


FIG.2

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BOAT STRUCTURE

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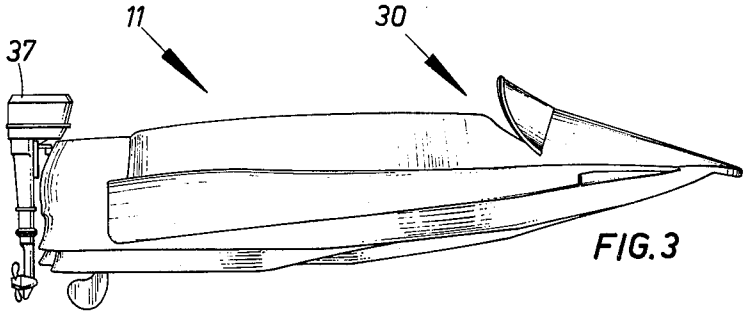


FIG. 3

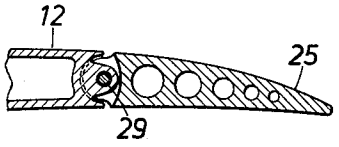


FIG. 5

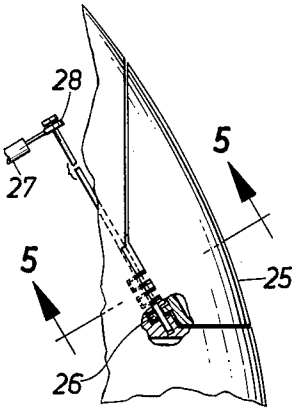


FIG. 4

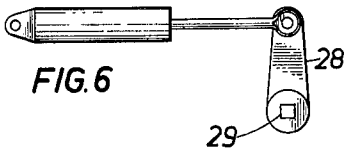


FIG. 6

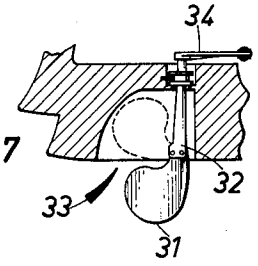


FIG. 7

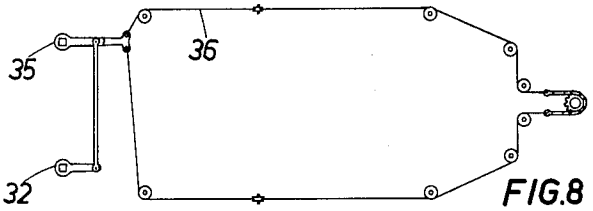


FIG. 8

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3,223,066

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BOAT STRUCTURE

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5 Claims. (Cl. 114—66.5)

This invention relates to improvements in watercraft of the high speed planning type.

It is conventional practice in the design of high speed watercraft to provide various types of hydrofoils and similar devices such as for instance planning depths whereby a comparatively small amount of the watercraft actually touches the water surface during a high speed run. In such designs it is also conventional practice to provide planning depths staggered in position from the forward end of the craft to the aft end.

While such methods do in fact aid in increasing the speed of the watercraft the devices resorted to ordinarily increase drag on water surface which results in the utmost speed being somewhat limited. Alternatively, larger and more powerful motors have been resorted to in order to increase the speed of watercraft, this in turn results in increased drag due to the inefficiency of the planning or hydrofoil surfaces.

By resort to the present invention however, a low drag and highly efficient watercraft is obtained with increased manoeuvreability, particularly on high speed turns.

It is an object of the present invention therefore to provide a watercraft wherein a series of planes are utilized in order that the craft may be progressively lifted from the water as the speed is increased thereby to reduce the water drag thereon.

It is a still further object of the present invention to provide a watercraft wherein means are provided to steer the craft by the action of the wind force on movable portions as the craft is propelled through the water.

A still further object of the present invention is to provide a watercraft which incorporates together with the supporting planes a transition plane in order that the lifting force from each series of planes will be transferred gradually thereby retaining an even force during acceleration of the craft.

Other objects and features of the invention will be apparent from the following detailed description and accompanying drawings in which like numerals refer to like parts throughout the various views:

FIGURE 1 is a bottom plane view of a presently preferred embodiment of the invention;

FIGURE 2 is a frontal view of the embodiment as illustrated in FIGURE 1;

FIGURE 3 is a side view of the embodiment as illussrated in FIGURE 1;

FIGURE 4 is an enlarged plan view of a movable aileron for use with the present invention;

FIGURE 5 is a section along the line 5—5 of FIGURE 4;

FIGURE 6 is a view in the direction of the arrow 5 in FIGURE 4;

FIG. 7 is a view of a rudder;

FIG. 8 is a view of the pulley system for actuating the tillers.

With reference to FIGURE 1, FIGURE 2, and FIGURE 3, a watercraft indicated generally as **11** is illustrated and comprises a hull portion **12** threaded with a pair of side wings **13** and **14**. The wings extend substantially the length of the hull **12** and curve downwardly as shown in FIGURE 2 to provide the rear most tip **15** and **16**.

A first pair of planes **17** and **18** are secured to the underside of the hull **12** in parallel, spaced apart relationship to extend substantially the length of the hull **12**. The planes **17** and **18** project a distance below the hull bottom in order to be immersed in the water while the craft **11** is at rest.

At intermediate plane **19** is secured to the underside of the hull **12** and projects there below a distance somewhat greater than the distance of the pair of planes **17** and **18**.

A second pair of planes **20** and **21** are secured to the underside of the first pair of planes **17** and **18** and project a distance there below somewhat greater than the projection distance of the plane **19**.

In this way a pair of side planes **17** and **18** and a second pair **20** and **21** are provided whereby progressively the craft **11** can be lifted from the water as it proceeds in a forward direction. The mid planes **19** serves to act as a transition support during the change from the first pair of planes **17** and **18** to the second pair of planes **20** and **21**.

During the forward motion of the craft the side wings **15** and **16** depending downwardly in curved fashion have their lower most endwise tips as at **22** and **23** touching the surface of the water. During extremely high speed runs the craft is entirely borne on the second pair of planes **20** and **21**. During normal manoeuvres one or the other of the tips **22** and **23** will touch the surface of the water this having the effect of stabilizing the craft from too much roll during a high speed turn.

With reference to FIGURE 4, FIGURE 5, and FIGURE 6, means for controlling the aileron is illustrated wherein an aileron as at **24** or **25** is provided in the forward portion of each of the wings **22** and **23** respectively. As shown in the enlargement in FIGURE 4 the aileron **25** is hinged on the hinge points as at **26** and is adapted to move upwardly or downwardly according to control responses as received from the manual controls in the cockpit.

It should be noted here that the particular arrangement of control as required for the operation of the craft can be any one of several conventional types of control and for this reason the specific type has not been illustrated in the drawings.

It is considered preferable however to provide a hydraulic cylinder **27** operable on the link arm **28** in order that the shaft **29** secured rigidly to the aileron **25** at the hinge point **26** and be operated from a remote position such as the cockpit indicated at **30** in FIGURE 3.

With reference to FIGURE 7 and FIGURE 8, separate means for controlling the manoeuvres of the craft are illustrated wherein a rudder **31** is shown hingeably secured to the rudder post **32** whereby the rudder **31** can be folded up out of the way into the well as at **33** upon the craft being operated in shallow water.

A conventional tiller **34** is provided on each rudder, the operation of the tiller post **32** and **35** being effected through the pulley system **36**.

It will be further understood that other means for controlling the rudder can be resorted to and that the means shown are done by way of example only.

The driving or propulsion means for the device can be an outboard motor as at **37** in FIGURE 3 or other means such as an inboard motor, can be resorted to if so desired. In addition it will be understood that still further means such as for instance reaction type motors can also be utilized with this device.

In use the craft can be suitably propelled over the water surface and during acceleration the first and second pair of planes together with the mid plane act to lift the craft clear out of the water. Also at this time the side wings **13** and **14** also contribute to lift by means

of the water passing there beneath to provide a lifting force. As acceleration progresses the first pair of planes **17** and **18** lift clear of the water and the lower planes **20** and **21** together with the mid planes **19** serves to support the craft. At still further high speeds the mid plane **13** leaves the water and the two planes **20** and **21** support the craft on the water surface together with the action of the side wings **15** and **16**. It will also be seen that during de-acceleration the reverse action takes place and the craft gradually sinks back into the water to be floated by the hull **12**.

From the foregoing it will be seen that the present invention provides a watercraft with high speed capabilities whereby the craft can be supported on a comparatively small lifting surface during the high speed run and which is adaptable by progressive means to be taken from a fully floating position to a high speed supported position.

It will be further understood that although specific embodiments of the invention have herein been described and illustrated, the invention also contemplates such variations as may fall within the scope of the appended claims.

I claim:

1. A water craft comprising: means for driving said craft over water; a hull having a forward end an aft end; a first pair of planes secured to the underside of said hull in a fore and aft direction, said first pair of planes being spaced apart in parallel relationship, and to project below said hull underside; a mid plane secured to said hull underside in a fore and aft direction substantially parallel to and mid way between said first pair of planes, and to project a distance below said hull underside greater than the projection distance of said pair; and, a second pair of planes secured to the undersides of said first pair in a fore and aft direction to project a distance therebelow greater than the projection distance of said mid plane, whereby upon said means driving said craft forwardly in water, said planes will lift said craft successively out of the water until supported entirely on said second pair of planes, said mid plane acting to add support during transition from said first pair to said second plane pair.

2. A water craft comprising: means for driving said craft over water; a hull having a forward end and an aft end; a first pair of planes secured to the underside of said hull in a fore and aft direction, said first pair of planes being spaced apart in parallel relationship, and to project below said hull underside; a mid plane secured to said hull underside in a fore and aft direction substantially parallel to and mid way between said first pair of planes, and to project a distance below said hull underside greater than the projection distance of said first pair; a second pair of planes secured to the undersides of said first pair in a fore and aft direction to project a distance therebelow greater than the projection distance of said mid plane, whereby upon said means driving said craft forwardly in water, said planes will lift said craft successively out of the water until supported entirely on said second pair of planes, said mid plane acting to add support during transition from said first pair to said second plane pair; and a pair of side wings curve downwardly, secured to an extending substantially the length of said craft to either side thereof to aid in supporting and guiding said craft.

3. A water craft comprising: means for driving said craft over water; a hull having a forward end and an aft end; a first pair of planes secured to the underside of said hull in a fore and aft direction, said first pair of planes being spaced apart in parallel relationship, and to project below said hull underside; a mid plane secured to said hull underside in a fore and aft direction substantially parallel to and mid way between said first pair of planes, and to project a distance below said hull underside greater than the projection distance of said first pair; a second pair of planes secured to the underside of said first pair in a fore and aft direction to project a distance therebelow greater than the projection distance of said mid plane, whereby upon said means driving said craft forwardly in water, said planes will lift said craft successfully out of the water until supported entirely on said second pair of planes, said mid plane acting to add support during transition from said first pair to said second plane pair; rudder means for steering said craft; and, a pair of side wings curved downwardly, secured to and extending substantially the length of said craft to either side thereof to aid in supporting and guiding said craft.

4. A water craft comprising: means for driving said craft over water; a hull having a forward end and an aft end; a first pair of planes secured to the underside of said hull in a fore and aft direction, said first pair of planes being spaced apart in parallel relationship, and to project below said hull underside; a mid plane secured to said hull underside in a fore and aft direction substantially parallel to and mid way between said first pair of planes, and to project a distance below said hull underside greater than the projection distance of said first pair; a second pair of planes secured to the undersides of said first pair in a fore and aft direction to project a distance therebelow greater than the projection distance of said mid plane, whereby upon said means driving said craft forwardly in water, said planes will lift said craft successively out of the water until supported entirely on said second pair of planes, said mid plane acting to add support during transition from said first pair to said second plane pair; a pair of side wings curved downwardly, secured to and extending substantially the length of said craft to either side thereof to aid in supporting and guiding said craft; and an aileron device secured to the forward end of each said side wings and operable to steer said craft at high speeds.

5. A water craft comprising: means for driving said craft over water; a hull having a forward end and an aft end; a first pair of planes secured to the underside of said hull in a fore and aft direction, said first pair of planes being spaced apart in parallel relationship, and to project below said hull underside; a mid plane secured to said hull underside in a fore and aft direction substantially parallel to and mid way between said first pair of planes, and to project a distance below said hull underside greater than the projection distance of said pair; a second pair of planes secured to the undersides of said first pair in a fore and aft direction to project a distance therebelow greater than the projection distance of said mid plane, whereby upon said means driving said craft forwardly in water, said planes will lift said craft successively out of the water until supported entirely on said second pair of planes, said mid plane acting to add support during transition from said first pair to said second plane pair; rudder means for steering said craft; a pair of side wings curved downwardly, secured to and extending substantially the length of said craft to either side thereof to aid in supporting and guiding said craft; and an aileron device secured to the forward end of each said side wings and operable to steer said craft at high speeds.

No references cited.

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