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MARINE CRAFT AND CONTROL APPARATUS THEREFOR

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FIG. 1

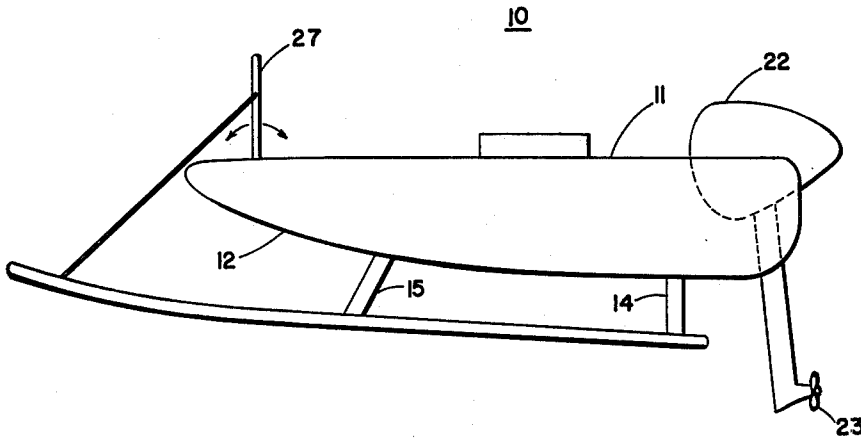


FIG. 2

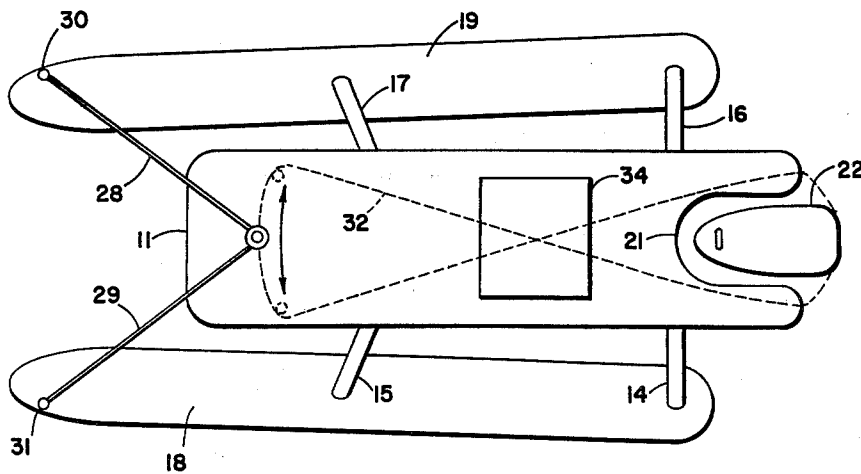
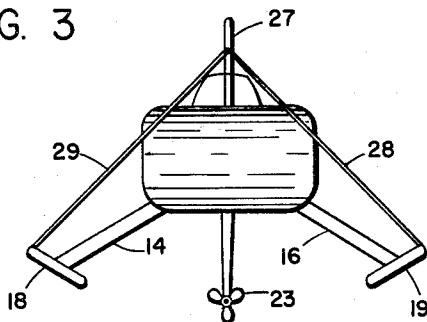


FIG. 3



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MARINE CRAFT AND CONTROL APPARATUS THEREFOR

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7 Claims. (Cl. 114-66.5)

This invention relates in general to new and useful improvements in marine type craft and more specifically to an improved marine type craft utilizing hydrofoils such as water skis.

In the past it has been known that an object might be supported on water due to the reaction between the water and skis when the forward velocity of the object attains a moderate magnitude so that at the particular angle of attack of the water skis sufficient lift is provided so that the surface of the water may be skimmed.

An object of the present invention is to provide an improved marine craft having water skis or adjustable members for supporting the craft while in motion which has a system of control that is unique for effecting both total change in pitch of the water skis to support the craft and differential change in pitch of the skis thus additionally providing excellent maneuverability for altering course of the craft.

The above and other objects and advantages of the invention which will become apparent reside in the details of construction and operation thereof as more fully hereinafter described in claims. Reference is had to the accompanying drawings forming a part hereof wherein:

FIGURE 1 is a side elevation view of a marine craft constructed in accordance with the invention;

FIGURE 2 is a top view of the craft; and

FIGURE 3 is an end view of the craft looking aft.

The hereinafter described craft includes a center air tank which provides the basic flotation of the marine craft at low speeds or while at rest in the water. The center tank also provides the sitting space of the operator and engine mount for the engine that propels the vehicle. The center tank of the vehicle is mounted on two water skis which are operated from a manual controller mounted on the center tank for angular movement in a forward or aft direction to effect on aft movement an increase in the angle of attack of the water skis whereby when the craft is underway a force thereon will lift the center tank above the water surface and the craft skims the surface. The manual controller may be laterally moved also to effect a warping action on the outermost portion of the front end of the skis whereby a differential in pitch angle of the skis is obtained and a banked turn of the craft may be initiated. During such turning of the craft, cables connected to the manual controller may be operated to alter the direction of thrust of the outboard motor driving the vehicle to assist in making the turn. With this general review of the craft and its controls, details of the craft will now be considered.

Referring to FIGURE 1, the marine craft 10 comprises a center air tank member 11 which provides the basic flotation of the vehicle. The center tank 11 is given a suitable forwardly upwardly sloping bottom 12 suitable for efficient forward propulsion of the craft at low speeds. Extending from the center air tank, body member 11 are suitable struts 14, 15, 16, 17 extending in a downward direction. The struts 14, 15 support one water ski 18 and struts 16, 17 support a second water ski 19 in the manner shown also in FIGURE 3 so that the two water skis except for their front ends are rigidly supported at an angle to the horizontal from opposite sides of the center tank member 11.

The center tank member 11 is suitably constructed at

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the stern to provide a recess 21 wherein is supported a conventional outboard motor 22 having the conventional propeller 23.

The maneuvering control apparatus for the craft comprises a manual control stick 27 suitably mounted in the craft for rotation fore-aft in a vertical plane. Stick 27 is also mounted for rotation in a plane transverse to the craft. Connected to the control stick 27 are control links 28, 29 extending therefrom respectively to fastening means 30, 31 on the outboard side of each ski 18, 19 adjacent the front tip thereof. Extending from the controller 27 are control cables 32 extending for control purposes to the outboard motor 22 to alter the direction of thrust of propeller 23 as conventional.

A seating arrangement 34 on the center tank 11 is provided for the operator who may straddle member 11 and place his feet on skis 18, 19 adjacent struts 15 and 17 and slightly to the rear thereof.

At low speeds or at rest, the vehicle 10 is supported in the water by member 11 because of its flotation qualities.

The operator may desire to increase his forward speed by increasing the power output of motor 22. As the speed increases, the operator can initiate the "take off" operation by pulling on the skis 18, 19 by moving the stick 27 backward thereby increasing the angle of attack of the skis relative to the water. If the vehicle has sufficient forward speed, the vehicle will be shortly supported entirely on the water skis 18, 19 and the center tank 11 will be clear of the water while the propeller 23 remains immersed to provide the propulsive effort.

While the operator moves the control stick 27 to increase or decrease the angle of attack of the skis or change the blade angle thereof and thus change the total blade angle, he may be moving the control stick 27 about its pivot in the lateral plane effect a differential or relative change in blade angle of skis 18 and 19 to provide roll and directional control to the marine craft 10. In other words, as the operator displaces control stick 27 toward the left, he applies a twisting action to ski 19 and decreases the control force on ski 18. He decreases the angle of attack of water ski 18 but increases the angle of attack or blade angle of ski 19 thus causing the craft to bank toward the left and alter its course toward the left. When the desired course directionally is attained, the pilot moves the controller 27 to the center position and maintains the newly selected course or heading. The change in course may be supplemented by operation of the cables 32 from operation of the control stick 27 in suitable manner. Thus the operation of the control 32 is coupled to the operation of the controller 27 in differentially changing pitch to facilitate change in direction of the vehicle 10.

While a specific embodiment of the novel craft and control therefor has been disclosed, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. In a marine craft having propulsion means and a center flotation member for supporting the craft in the water while little propulsion effort is being applied thereto, said craft having a water ski rigidly supported except for the front end along each longitudinal side of the member, control apparatus comprising a controller having control means including a link member extending therefrom to the forward end of each ski said controller being operable in one direction for similarly altering the total blade angle of both skis whereby during forward movement of sufficient velocity of the craft the immersion depth of said flotation member is altered, said controller being operable additionally in another direction to differentially alter the blade angle of both skis to alter the direction of forward movement of the craft.

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2. The apparatus of claim 1 with coupling means operated from said controller during differential change in blade angle to alter the direction of propulsion effort by said propulsion means relative to the longitudinal center line of the craft.

3. In a marine craft having two water skis arranged in the longitudinal direction of the craft, means including a control stick connected to both skis for bending the skis similarly altering simultaneously the total blade angle or pitch angle of the two skis to alter the angle of attack, and for differentially altering the blade angle of the two water skis for altering the direction of movement of the marine craft.

4. In a marine craft having two laterally spaced water skis longitudinally positioned on the craft, pitch altering means comprising a rigid member connected between the front and adjacent a side of each of the skis and a control member, said control member being operable in one sense to bend said skis for increasing the angle of attack or pitch angle of the skis to decrease the immersion depth of the craft while in forward motion said control member of said pitch altering means being connected and operable in a second sense for oppositely twisting said skis thereby additionally differentially altering the relative blade angle of the skis to effect change in direction of movement of the craft.

5. In a marine craft having a body member and laterally spaced water skis rigidly longitudinally positioned on the body member of said craft, pitch altering means connected between each ski and member and operable in a fore and aft direction to bend each ski for increasing the angle of attack or pitch angle of the skis thereby to decrease the immersion depth of the craft while in forward motion, said pitch altering means being connected to the outboard side of the respective skis near the front tip and operable for oppositely twisting the skis for additionally but differentially altering the relative angle of attack of the skis to effect change in direction of the forward motion of the craft.

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6. In a marine craft having a body member and adjustable pitch angle ski members rigidly mounted on and laterally spaced on the body member of the craft, pitch angle altering means supported on the body and connected to the members near the front and adjacent a side of each ski member and operable in one sense for increasing the angle of attack or pitch angle of the members to increase the lifting force thereof during forward movement of the craft, and further means including said altering means connected to the members for differentially altering the relative blade angle of the members to effect a change in direction of the forward movement of the craft.

7. In a marine craft having a pair of laterally spaced members arranged from an end view of the craft at an angle to the horizontal and having from a side view adjustable blade pitch angle front portions, means for changing the relative pitch angle of said front portions comprising a controller operable in two manners, and connecting means from said controller to the outboard edge of each front portion transmitting a pushing or pulling force whereby operation in one manner changes similarly both spaced member pitch angles and operation in the other manner differentially changes said pitch angles.

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