

United States Patent

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[56]

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[54] BOATS
3 Claims, 9 Drawing Figs.

[52] U.S. Cl..... 114/66.5

[51] **Int. CL**..... **B63b 1/26**

[50] **Field of Search**..... 114/66.5 H

ABSTRACT: The present invention relates to a boat including a hull having an inboard tunnel and foils with dihedral surfaces coacting with the tunnel at both the bow and stern.

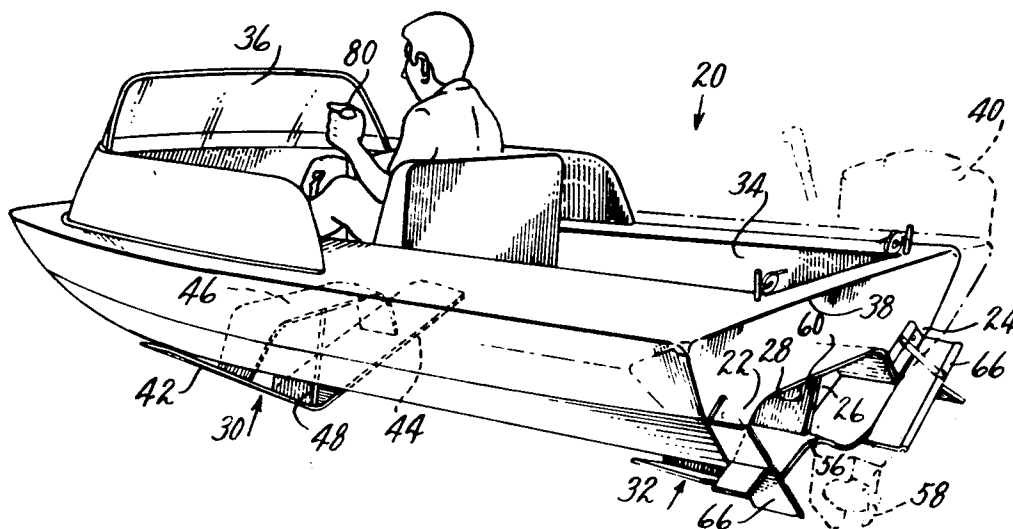


Fig. 1

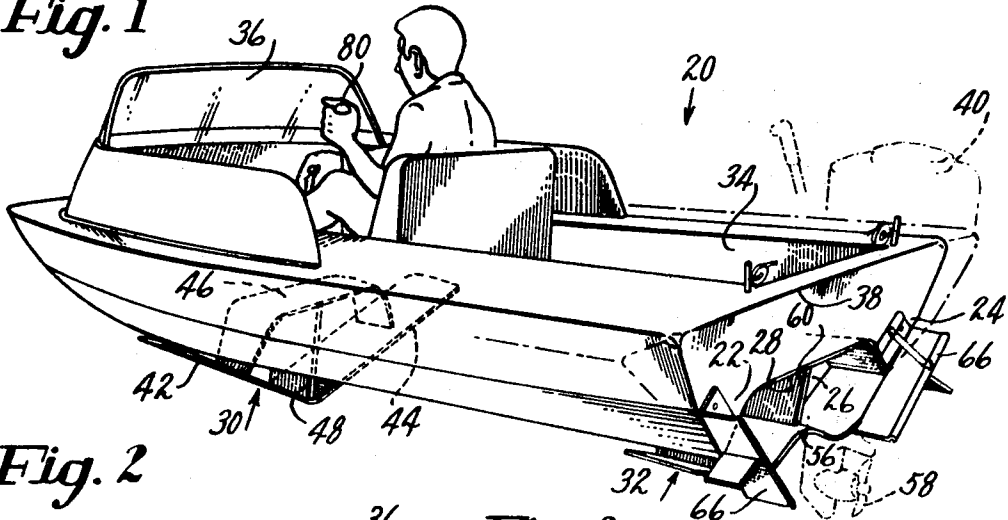


Fig. 2

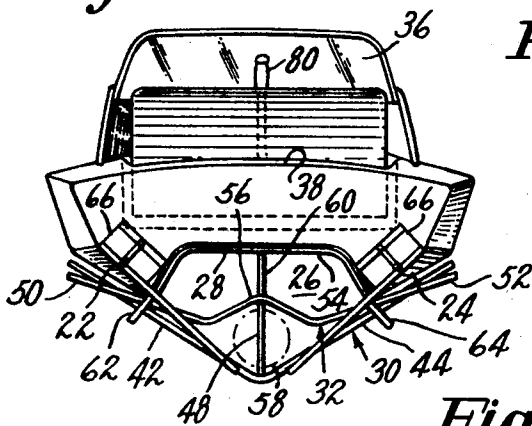


Fig. 3

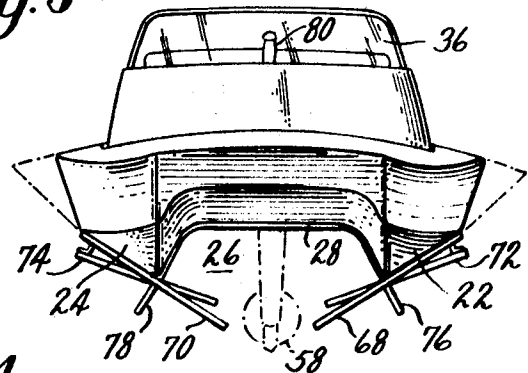


Fig. 4

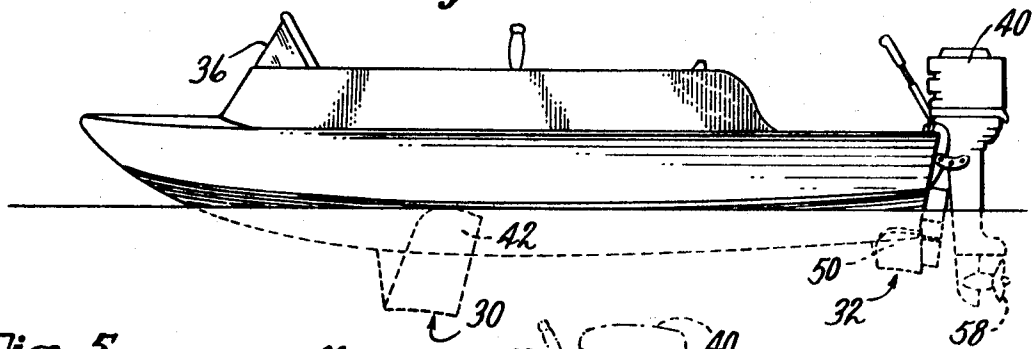
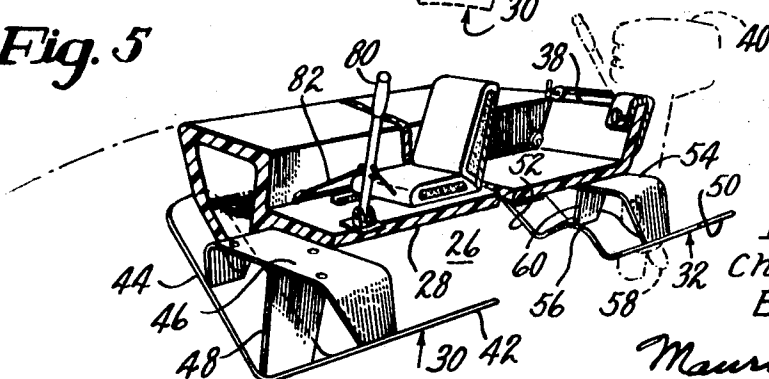


Fig. 5



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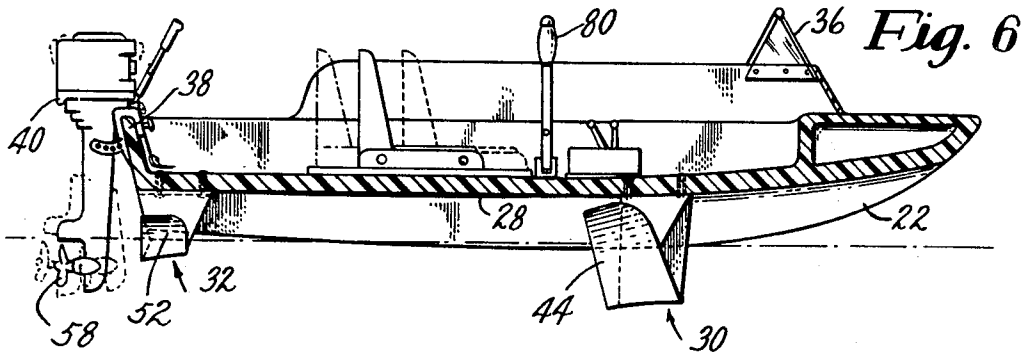


Fig. 7

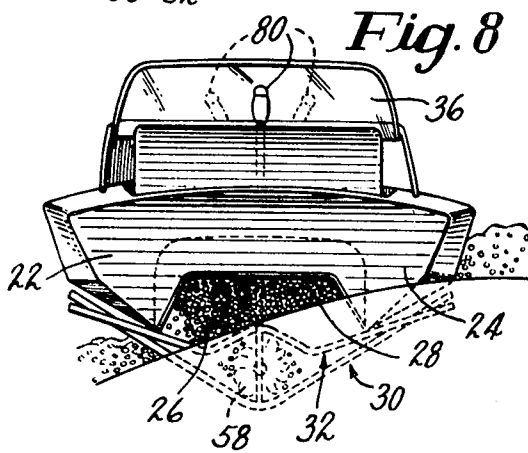
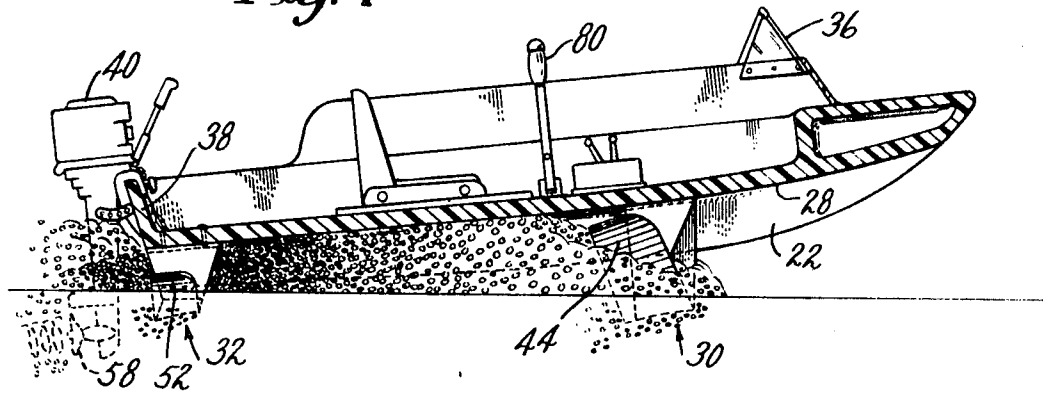
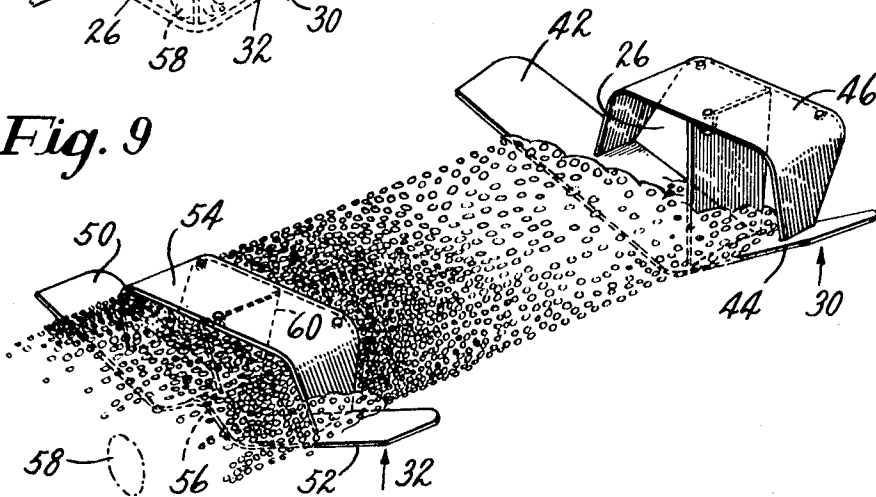


Fig. 9



BOATS

The present invention relates generally to improvements in boats and more particularly to improvements in the construction of boats of the catamaran type provided with foils mounted on the hull. Although the invention is herein described with reference to an embodiment comprising an outboard motor, it will be appreciated that with appropriate modifications, features of the invention will be equally applicable to sailboats.

A primary object of the present invention is to provide a relatively lightweight boat adapted either to power or to sail and characterized by great stability, especially in rough water.

A related object is to provide a boat requiring a minimum of heavy and expensive reinforcing members while maintaining a very high degree of safety.

A further object is to provide a boat adapted, because of its light weight and great stability, to a very high ratio of speed to horsepower, especially in rough water.

Still another object is to provide a boat having a hull lifted out of the water to such an extent while under way that the hull presents minimum drag below the water line.

In the achievement of the foregoing objects a feature of the invention relates to a catamaran form of hull readily moldable, although not necessary so from plastic foam material and including a tunnel between two hull sections or pontoons and pairs of foils fore-and-aft adapted to be acted upon both by water and by air in order to assist in lifting the hull when the boat is either under power or under sail. The forward foils on the bow of the boat are so shaped that they cooperate in creating turbulence, spray and waves in the stream passing through the tunnel to assist in increasing the flotation or to lift the hull largely out of the water when the boat is traveling at high speeds. The rear foil is shaped to bridge the path of the outboard motor propeller with which the boat may conveniently be driven and in addition provides a measure of protection to the motor from surface obstructions, a desirable construction feature in a boat adapted to high-speed travel. In addition, both pairs of foils may be employed to provide improved transverse structural strength by conveniently providing a common mounting base for both foils of each pair. An alternative feature is especially useful in an economy version of the illustrative embodiment adapted for less severe service.

The foregoing objects and features and many advantages of the present invention will be best understood from a detailed description of an illustrative embodiment taken in connection with the accompanying drawings in which:

FIG. 1 is a side view in perspective of a boat according to the invention shown out of water;

FIG. 2 is a front view of the boat of FIG. 1;

FIG. 3 is a rear view of a boat similar to that of FIGS. 1 and 2, but showing an alternative foil construction and mounting;

FIG. 4 is a view in side elevation of the boat of FIGS. 1 and 2 shown with an outboard motor and at rest in the water;

FIG. 5 is a sectional detail view showing hull construction and foil mounting;

FIGS. 6 and 7 are views in longitudinal section of the boat of FIG. 4 but showing it underway at slow and high speeds respectively;

FIG. 8 is a view in rear elevation of the boat of FIGS. 6 and 7 shown riding the back of a wave; and

FIG. 9 is a schematic exploded view illustrating the action of the foils and of the water in the hull tunnel, the hull having been removed for clarity.

Turning now to the drawings, particularly FIGS. 1, 2 and 4, there is shown a catamaran hull indicated generally at 20 and having integral port and starboard pontoons 22 and 24 respectively. The hull may conveniently be molded integrally of a foam plastic material already well known for boat hull purposes such as polyurethane. Alternatively the hull may be economically fabricated from commercially available sections of such foam material. Regardless of the mode of construction, the pontoons 22, 24 define between them a tunnel 26 in-

cluding a lift surface 28 cooperatively associated with fore-and-aft foil pairs indicated generally at 30 and 32 respectively in all views except FIG. 3 in which an alternative construction is depicted the form, function, and mode of operation of the foil pairs 30 and 32 will be explained in detail below. The hull 20 further includes an open cockpit 34 and is furnished with a windshield 36. At the rear, the cockpit 34 is closed by a transom 38 appropriately reinforced to support a motor 40 which may be of reasonably small power for the speeds which are attained in rough water. For example, with a 25 horsepower motor a 12-foot boat has been propelled smoothly in 3-foot seas at a speed of approximately 30 miles per hour.

As shown in all views except FIG. 3, each of the foil pairs 30 and 32 is an integral assembly so that a common base upon which the foils of the pair are mounted assists transversely strengthening the hull. Thus the fore foil pairs comprises port and starboard foils 42 and 44 respectively, typically a welded assembly with an inverted trough-shaped base 46 which is reinforced by a strut 48 stretched between the midpoint of the base 46 and the junction of the two foils. The aft foil pair comprises port and starboard foils 50 and 52 also a welded assembly with a common inverted shallow U-shaped base 54. The foils 50 and 52 meet in a shallow semicircular trough 56 arranged generally concentrically with the axis of the propeller 58 of the motor 40. For added stiffness, the uppermost point of the trough 56 is connected by a strut 60 to the midpoint of the base 54. Added directional stability is obtained by adding longitudinal fences 62 and 64 to the aft port and starboard foils respectively. There is additionally provided a pair of adjustable stabilizers 66 at the stern of the boat. The stabilizers 66 are provided with fences as seen in FIG. 1 are of a commercially available design. By appropriate adjustment of the stabilizers 66 the lift of the hull may be suited to the type of seas in which the boat is operated and also to the load and to the motor.

As shown in FIG. 3, forward port and starboard foils 68 and 70 are separately attached to their respective outside pontoon surfaces. Similarly separate aft port and starboard foils 72 and 74 are individually secured to the hull. For this purpose it is advantageous to provide mounting inserts molded in the pontoons. The aft foils 72 and 74 are provided with directional stabilizers fences 76 and 78.

It is thus seen in FIGS. 6 to 9 inclusive that the foils cooperate with the tunnel 26 to provide lift to the hull in a manner which is not completely understood. It is theorized, however, that a part of the lift is derived from the action of the water and to a lesser degree the action of the air upon the forward surfaces of the pontoons 22 and 24. The water and the air, also exert an upward force on the foils themselves. In addition, water and spray from the foils exert upward forces in the tunnel especially upon the relatively large horizontal lift surfaces 28. In addition, when the boat is in the position of FIG. 7 while being operated at high speed, spray and waves are compressed in the rearward portion of the tunnel and not only exert an upward force directly but also indirectly. By being compressed by motion of the boat between the walls of the tunnel and the water, the spray and foam in the rear of the tunnel exerts considerable lift.

The steering of the boat is accomplished by a joy stick 80 pivoted on the floor of contact for movement in a plane transverse to the length of the boat. The stick 80 is connected by cables, one of two to the motor 44 and appropriately pivoting the motor.

In addition to the foils mounted beneath the hull it is possible to obtain even greater lift and stability by the use of winglike aerofoils mounted above the hull either at the bow or the stern to cooperate with the already described foil and hull surfaces.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A boat adapted to be propeller driven comprising a hull formed with a tunnel, a first pair of dihedral foils mounted on the hull at the entrance to the tunnel and a second pair of foils

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at the stern, the stern-mounted foils having a common base and being joined in a shallow semicircular trough generally concentric with the axis of the propeller.

2. A boat according to claim 1 further characterized in that the hull includes two pontoons defining the tunnel and that the foils at the entrance to the tunnel are also mounted on a common base secured to the pontoons.

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3. A boat comprising a hull formed with a tunnel adapted to conduct water while the boat is under way, the tunnel being defined by a pair of pontoons interconnected by a generally horizontal lift surface and dihedral foils mounted one on each of the pontoons at the entrance of the tunnel.

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