May 26, 1959 W. R. TRITT 2,887,978

KEEL FOR PLANING-TYPE BOAT HULLS

Filed Aug. 5, 1957

FIG. 1.

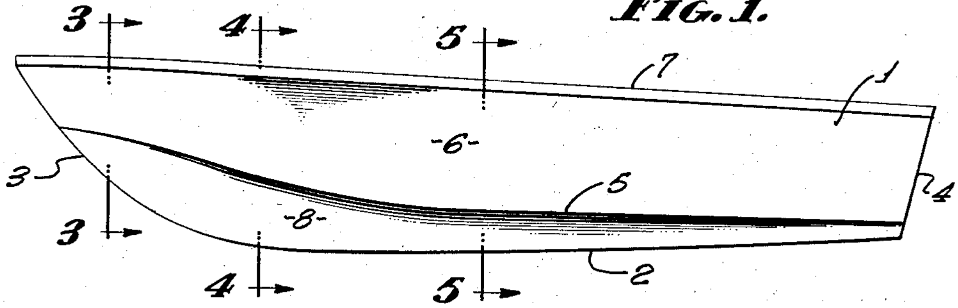


FIG. 2.

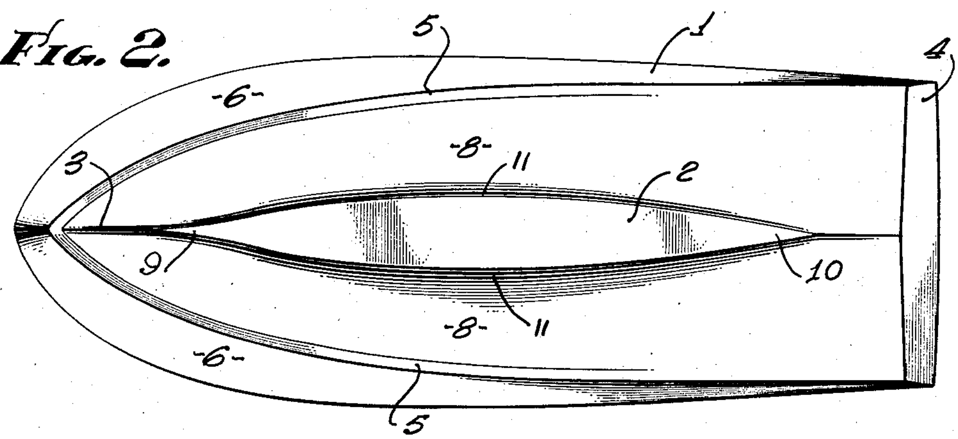


FIG. 3.

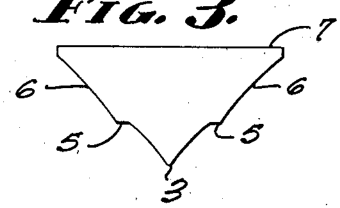


FIG. 4.

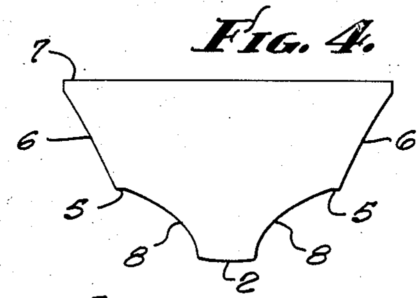
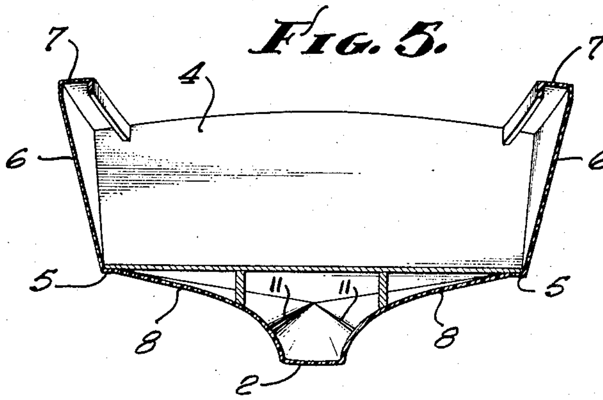


FIG. 5.



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KEEL FOR PLANING-TYPE BOAT HULLS

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3 Claims. (Cl. 114—66.5)

This invention relates to motor boats, either with in-board or out-board motors, of the type generally described as having a planing hull, that is, a hull having bottom surfaces designed to lift the boat at speed and to cause it to plane upon the water with a minimum of displacement, and more particularly relates to a keel or center bottom structure for such boats.

The conventional planing-type motor boat hull has a sharp stem or cut-water, and chines rising forwardly from the water-line and fairing into the stem. The bow surfaces between the stem and the chines are concave, fairing into both stem and chines. Further aft, the bottom surfaces are substantially flat, meeting at the keel in a V which becomes progressively flatter further aft, often to the extent of eliminating the V at the skeg. The keel itself is diminutive, stability being achieved by the hull shape rather than by keel weight, and the keel serving merely as a resistance to skidding when taking turns at high speed.

A boat of such a construction, when engined by a motor of sufficient power, will lift its bow from the water and plane upon the flat rearward bottom surfaces. However it will also tend to pound, even in flat water, and can give the occupants a most uncomfortable ride. Many boat-owners prefer to under-power their boats, believing with reason that a boat which will not attain a pounding speed not only will give a better ride but will have a longer life.

It is an object of my invention to provide a boat designed to travel at speed and so constructed that the initial entry of the hull spreads the water horizontally and permits the boat to travel on a moving cushion of water, rather than on a horizontally stationary water surface. It will be understood by boatsmen that a wave moves horizontally but the water merely moves up and down except when the wave is gathering to break.

It is another object of my invention to provide a boat having a keel so shaped as to split the water at high speeds, in the same way as the stem does at low speeds, and to throw the displaced water sideways and upwards as a moving surface layer upon the still water on which the boat would otherwise pound.

A further object of my invention is to provide a keel for a boat which gives the boat improved planing qualities with more weight aboard with less horsepower.

In the accompanying drawing illustrative of one example of my invention, Fig. 1 is a side elevational view of a boat equipped with my novel keel;

Fig. 2 is a bottom view of the boat;

Fig. 3 is a boat-builder's diagrammatic section of the hull on the line 3—3 of Figure 1;

Fig. 4 is a similar diagrammatic section on the line 4—4 of Fig. 1, showing the beginning of the keel; and

Fig. 5 is a transverse section on the line 5—5 of Fig. 1 and looking aft, showing details of hull structure and also the manner in which the keel, here shown fully developed, causes the water to spread.

Having reference to the details of the drawing, I have shown a boat hull 1 of more or less conventional planing design except for the keel 2. The hull 1 preferably has a sharp stem 3 and a square stern transom 4, with chines 5 beginning high up on the stem 3 and dropping rapidly as they proceed astern and then levelling off. The chines 5 also flare sharply from the stem 3, and then spread gradually, attaining their greatest width at the stern transom 4. The sides 6 of the boat flare from the chines 5 to the deck-line 7, with the greatest flare occurring forward.

The foregoing description is subject to numerous changes and modifications according to the designer's ideas and intention, as it is with the bottom structure of the boat, below the chines 5 that this invention is primarily concerned. From the chines 5, the bottom surfaces 8 slope toward the center line of the boat with a distinct deadrise which is more pronounced forward but is still appreciable at the stern transom 4. Fig. 1 shows a boat as it might be suspended in air. In water, and unless heavily weighted aft by engines, the boat would sink forward when at a stand-still, because of the narrow forward sections and sharp deadrise, as shown in Fig. 4. Conversely, when under way, the bow will lift and the boat will plane upon the flatter portions of the bottom.

The keel 2 begins at approximately the point where the stem of the boat enters the water when the boat is travelling slowly and has not been brought to a planing speed. The keel 2 is characterized by its prominent width relative to its depth, and by the way it is faired into the deadrise of the adjacent bottom surfaces 8. At its forward end 9 it is tapered to fair into the rise of the stem 3, and at its rearward end 10 it not only tapers in width but also tapers in depth, fairing into the hull somewhat forward of the stern transom 4 so as not to disturb water being drawn to a propeller (not shown). At its greatest width, which may be approximately the center, lengthwise, of the hull 1, the keel 2 is greater in width than in depth, so that, although it is shallow, it has a very definite displacement.

In a boat, as herein described, in which the keel is faired into the deadrise, it is sometimes difficult to define with precision the line at which the deadrise ceases and the keel begins. Of course, in a boat having a sharply defined angle between deadrise and keel, no such difficulty exists: the keel begins at the apex of the angle. In this specification and in the accompanying claims, I have adopted the structural definition of a keel generally in vogue among naval architects when a keel is faired concavely into bottom surfaces. The upper limit of the keel is at the line of maximum curvature (corresponding to the apex of the angle); or, if the curve is constant, at the line bisecting the curve. In Figs. 2 and 5, for example, the upper limit of the keel is at the lines 11, which are lines of maximum curvature on the hull or inside it converging rearwardly to the rearward end 10 of the keel. The depth of the keel is from a plane cutting these lines 11 to the bottom of the keel.

In fact the keel 2 flares outward to nearly its maximum width only a short distance aft of where it starts. While I do not desire to be confined to precise dimensions, as on boats for different purposes, hull lines, speeds, and displacements at speed will vary greatly, I have found that the keel 2 may advantageously displace between 15 percent and 25 percent of the water displaced by the boat when standing still, about 17 percent being a good displacement for a so-called sports cruiser. Of course when the boat gathers speed, some of the static displacement is replaced by dynamic lift, and the percentage of remaining displacement represented by the keel 2 is then increased as the forward sections of the boat rise from the water.

The particular function of the keel 2, in combination with the deadrise of the bottom surfaces 8 from the keel 2 to the chines 5, is to displace water laterally and upwardly as a moving cushion of water between the solid stationary water and the bottom surfaces 8 above. It should be emphasized that four factors contribute to this result: the width of the keel relative to its depth; the point where the keel begins, forward of the entrance of the boat into the water when the boat is planing; the deadrise of the bottom surfaces from the keel to the chines; and the fairing or elimination of sharp angles between the keel and the boat's bottom surfaces. The width should be sufficient to displace a substantial amount of water, enough to make the cushion. The cushion should begin forwardly of the surfaces upon which the boat is to plane. As the water cushion should rise as it spreads, the boat hull should have deadrise to permit it to do so. There should be no trap for bubbles or turbulence at the junction of the hull and keel. Thus the keel causes development of angular acceleration of the surface water, both upwardly and outwardly along the bottom surfaces of the boat, spreading this surface water as a moving layer over the water momentarily supporting the boat.

With a keel constructed as described and in combination with a planing hull, I have found the boat to be both dry and comfortable. Even in choppy water, there is noticeable lessening of pounding, and while there may be a theoretical reduction in speed, practically the boat-owner is able to drive his boat at increased speeds with reduction only in discomfort.

I claim:

1. In a boat, the combination of a hull having chines and having deadrise between the center line of said hull and said chines, said deadrise being accentuated forwardly in said hull to create a sharp entrance for said hull into the water, and a keel beginning just forwardly of the foremost point of water line of said hull when said boat is running at speed and becoming, at a point further aft, wider than its depth at that point, and then tapering in width and depth toward the stern, the sides of said keel being faired concavely into the deadrise surface of said hull bottom.

2. In a boat, the construction set forth in claim 1, in which the displacement of said keel is between fifteen percent and twenty five percent of the total displacement of said boat when said boat is at a standstill.

3. In a boat having a hull in which substantially flat bottom surfaces form an acute entrance angle forward and meet at an increasingly obtuse angle rearwardly, finally becoming a planing surface of little deadrise, a keel beginning at approximately the point at which said acute entrance angle cuts the water when said boat is at speed and becoming rapidly wider and having less depth than width in the zone of said obtuse angle and then tapering in both depth and width so as to fair into said hull in the zone of said planing surface, said keel fairing laterally concavely into said bottom surfaces so as to displace water outwardly and upwardly, said displaced water then covering the water under the boat with an outwardly moving surface layer.

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