

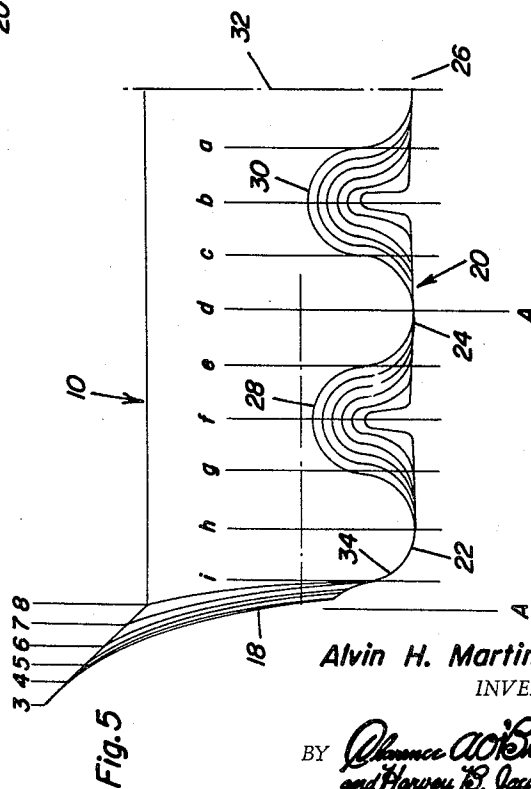
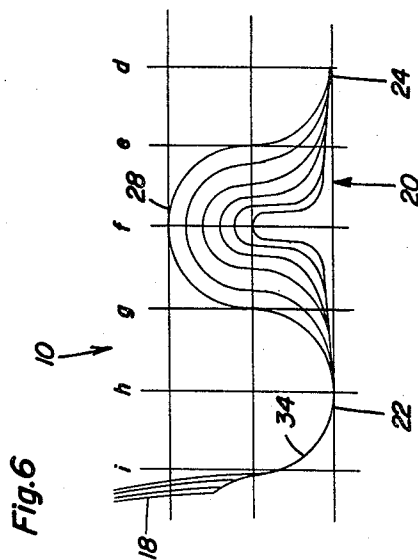
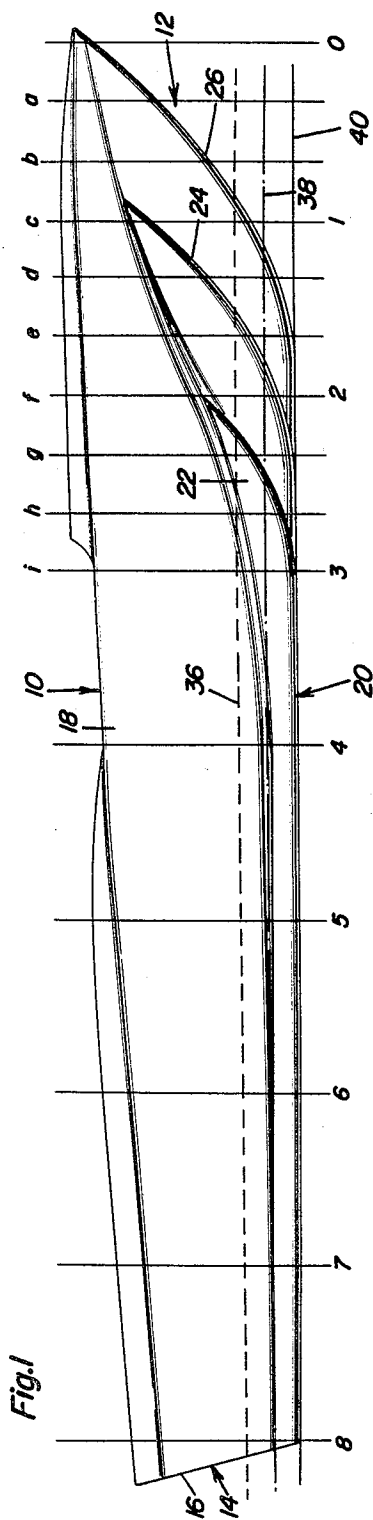
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A. H. MARTIN
BOAT HULL

2,938,490

Filed May 6, 1958

2 Sheets-Sheet 1



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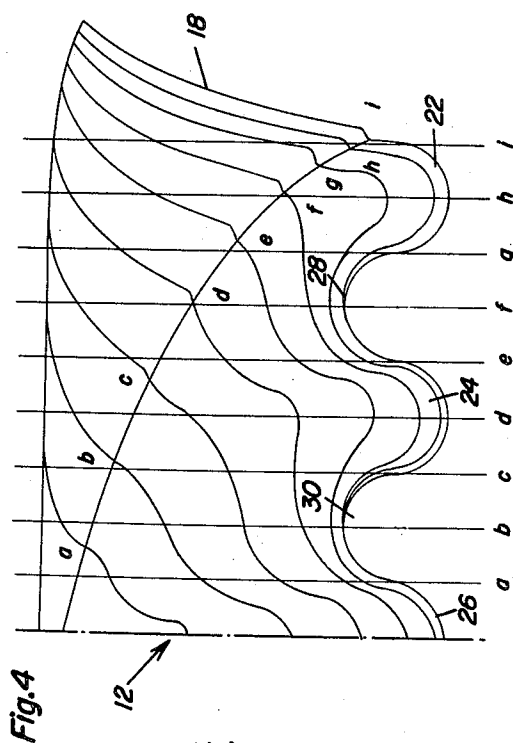
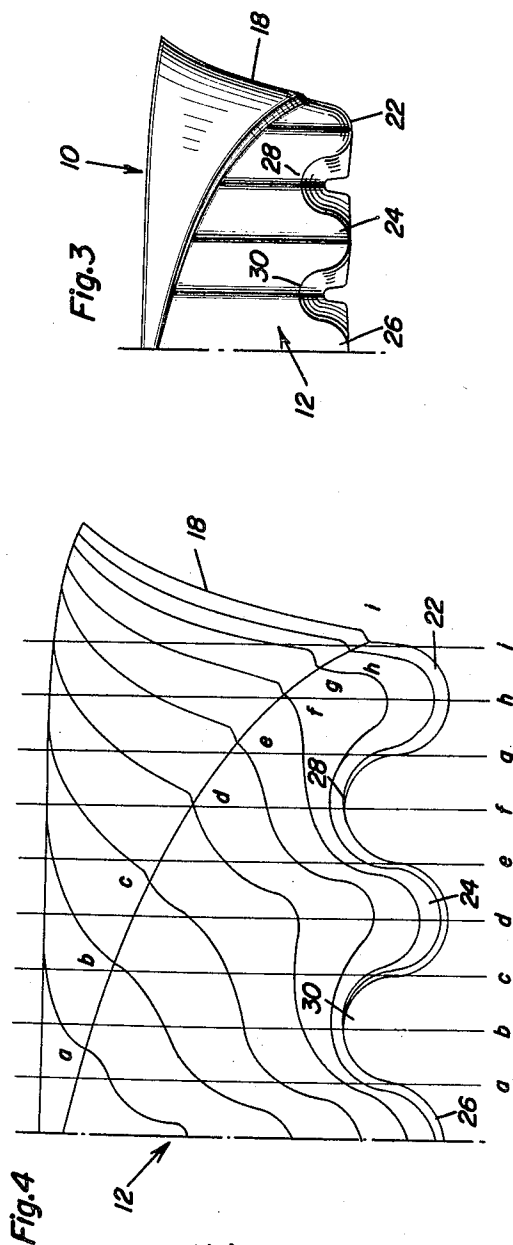
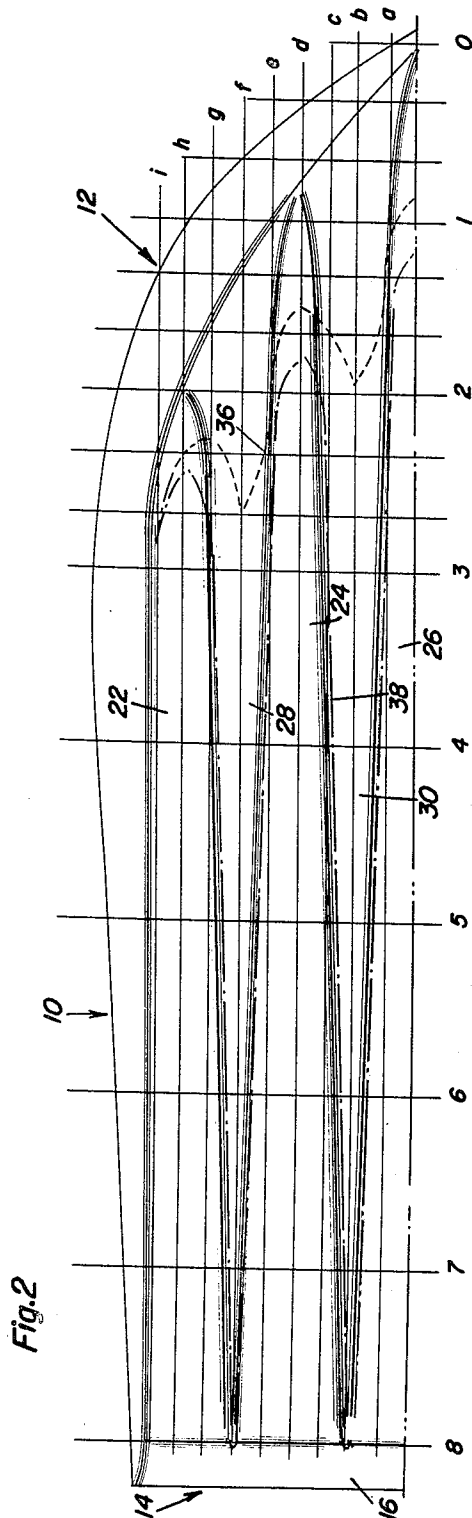
A. H. MARTIN

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BOAT HULL

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2 Sheets-Sheet 2



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2,938,490

BOAT HULL

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7 Claims. (Cl. 114—56)

This invention relates in general to new and useful improvements in boat construction, and more specifically to an improved boat hull.

The resistance to the movement of a boat through and over the water is generally divided into two groups. One is frontal resistance and the other is frictional resistance. In order to reduce the frontal resistance, it is desirable that the boat hull be so designed whereby it will plane. On the other hand, it is desirable that the bottom of the boat hull be so constructed that while a planing action is effected, the frictional resistance remains a minimum.

In order to effect the planing of a boat hull, it is necessary that there be provided lift. In order to obtain lift, it is necessary that the water particles strike the plane of the bottom so that the kinetic energy is transferred from a horizontal force to a vertical force, this appearing when the relative direction of movement between the bottom of the boat hull and the water is at an angle to the bottom. Inasmuch as the water particles are bent or deflected and flow under the bottom of a boat hull, it is obvious that the foremost area of the boat hull, that is the point of contact between the boat hull and the water, produces the maximum lift because at such point a maximum deflection occurs. Further rearwardly the water flows at a lesser angle to the bottom of the boat hull decreasing in its angle towards the stern of the boat and thus decreasing in lift.

A boat hull with a flat bottom line has the lift simply decreasing uniformly from the forwardmost point of contact between the bottom and the water and the aft end thereof. Such a boat hull has no negative lift or suction. On the other hand, if the bottom lines of the boat hull are not straight and parallel, as in the case of a flat bottom, a negative pressure may develop adjacent the stern of the boat and if these areas of negative pressure are restricted from an inflow of air, a partial vacuum is set up and suction is the result. This suction, of course, increases the frictional resistance of the boat hull during movement through the water.

In the design of a planing type hull, it is necessary that the boat as it moves forward climbs to the top of the water from a displacement position to a full planing position. After this has been accomplished, it must then move forward with the least possible resistance. Third, it must be able to flatten out or surmount waves for a smooth ride and at the same time it must have a good direction stability without added appendages. Fifth, the boat hull must be of a sufficient width to provide a transverse stability and at the same time it must provide for flexibility in design for interior space and appearance.

In the ordinary flat type of hull, which is the simplest form of planing hull, the greatest dynamic lift occurs at the leading edge, that is where the bottom of the planing surface first comes into contact with the water. In a planing surface of one angle, that is where the bottom is flat, this lift gradually decreases to nothing at the stern with the result that only a small fraction of the

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bottom area is providing the desired lift, the balance of the bottom area causing a high percentage of increased friction while doing only a small percentage of the lifting. Another disadvantage of such a boat hull design is that there is no inherent directional stability without the addition of appendages and there results a pounding and a rough ride because the water and waves strike the flat bottom.

The most conventional type of hull used today is a modification of the flat planing hull and is of the V or round bottom type. While the planing performance of such a boat has not been improved over the planing performance of the flat bottom design, there are advantages in such a design in that a softer ride is permitted because of the shock absorbing and wave flattening qualities of the bow. Further, directional stability has been added by the V or the rounding of the bottom.

In the three point suspension type hull, the wetted area of the hull has been greatly reduced so as to reduce friction and obtain a favorable power to speed ratio. However, in this type of design speed has been gained at the expense of riding quality and a terrific pounding of the hull results. Further, there is no directional stability without the provision of a suitable appendage.

The so-called sea-sled type of hull provides a means of reducing wetted area and makes use of air and aerated water to reduce friction. While the performance of such a hull is very good, it too has its faults. Limitations on attractive appearance exist, particularly in view of the fact that a square bow is necessary. Also, it is difficult to construct with the necessary strength and the interior space limitations are undesirable in view of the inverted V bottom.

The stepped hull comes the closest to the ideal at the present. It incorporates a soft riding bow section, reduces friction by providing a series of leading edges and again eliminating the trailing surface to decrease friction. There is, however, one main objection to this type of construction in that the areas between the steps must be supplied with large quantities of air or suction will result. Because the steps are vented to the side of the boat, waves of sufficient magnitude to cover the vents cut off the air supply which then results in the undesired existence of suction.

It is therefore the primary object of this invention to provide an improved boat hull which has a bottom construction of such a nature whereby the desired planing occurs with a minimum of frictional resistance and at the same time the desired stability and riding qualities exist.

Another object of this invention is to provide an improved boat hull wherein the bottom is of such a design whereby exceptional longitudinal strength and transverse strength can be obtained by the use of simple bulkheads.

Still another object of this invention is to provide an improved boat hull of such a design whereby favorable power to speed and weight ratio exist and at the same time a softer ride is possible because the design of the boat hull is such that the boat hull rides partially on a cushion of air and large waves are broken up and cannot strike a flat surface in any direction.

Still another object of this invention is to provide an improved boat hull which is so constructed whereby no keels are required and the outer half of the individual outboard sections are rounded so as to prevent the tripping of the boat on a curve with the stability and safety of the boat hull being increased because of the possibility of a wider over-all beam.

A further object of this invention is to provide an improved boat hull design which permits a rectangular over-all shape to provide more usable space without preventing attractive designs, and the boat hull at the same time

having good tracking ability as a result of the longitudinal sections of the bottom.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a sheer plan or plan in elevation of the boat hull which is the subject of this invention;

Figure 2 is a half breadth or half bottom plan view of the boat hull of Figure 1;

Figure 3 is a half elevational view of the boat hull looking at the bow thereof;

Figure 4 is an enlarged half body plan of the bow portion;

Figure 5 is an enlarged half body plan of the boat hull aft of the bow portion; and

Figure 6 is an enlarged fragmentary body plan showing in more detail the configurations of one of the projections and one of the depressions of the bottom.

Referring now to the drawings in detail, it will be seen that there is illustrated the boat hull which is the subject of this invention, the boat hull being referred to in general by the reference numeral 10. The boat hull 10 includes generally a bow 12 and a stern 14, the stern 14 including a transom 16 which slopes upwardly and rearwardly. The boat hull 10 also includes sides 18 and a bottom which is referred to in general by the reference numeral 20.

As is best illustrated in Figure 1, the bottom extends horizontally from station 3 aft and that portion of the hull 10 forwardly of station 3 may be considered to constitute the bow 12.

Referring now to the half body plan of Figure 5, it will be seen that the bottom 20 is formed primarily of an outer projection 22, an intermediate projection 24 and a central projection 26, the central projection 26 being disposed along the center line of the boat hull 10. Intermediate the projections 22 and 24 is a depression 28. A similar depression 30 is disposed intermediate the projections 24 and 26. It is to be understood that the bottom 20 is symmetrical about the center line which is referred to by the reference numeral 32.

The projections 24 and 26 are identical. On the other hand, while the inner half of each of the projections 22 is identical with its corresponding projections 24 and 26, the outer half thereof is of a quarter round configuration, as is illustrated at 34 so as to flare into a respective one of the sides 18. Each of the projections 22, 24 and 26 extends fore and aft of the hull 10 and are in parallel relation. Also, the center lines of the depressions 28 and 30 are disposed in spaced parallel relation and extend longitudinally of the boat hull 10.

The number of projections and depressions may vary as is desired. However, there should be a minimum of three projections and two depressions.

Because the bottom 20 extends in a straight line aft from station 3, the lowermost points of the projections 22, 24 and 26 from station 3 aft lie in a common flat horizontal plane. This provides the desired planing surface. It is to be noted, however, that the widths of the projections 22, 24 and 26 increase from station 3 aft whereas the widths of the depressions 28 and 30 decrease. Further, the heights of the depressions 28 and 30 decrease so that the depressions 28 and 30 are in the form of elongated longitudinally extending troughs which decrease both in width and depth towards the stern 14.

In the particular design illustrated, the projections 22, 24 and 26 extend straight over station 3 and smoothly flare into the bow 12. Of course, the design of the bow 12 may be varied without changing the design of the bottom 20.

The dash line in Figures 1 and 2 referred to by the reference numeral 36 represents the normal water line for the boat hull 10. The dash-dot line 38 represents an intermediate stage of planing of the boat hull 10.

The solid line 40 indicates the water line if the boat hull 10 were able to fully plane on the upper surface of the water.

Because of the particular configuration of the bottom 20, multiple leading edges are provided and thus by the virtue of such multiple leading edges, the greatest amount of lift is obtained. Secondly, because of the particular arrangement of the depressions, the wetted area and skin friction of the hull 10 is reduced by at least 50% over that of a conventional hull of similar size. Third, air is supplied under the hull by the open fronts of the depressions, which depressions function as ducts and which are of sufficient depth that waves cannot block the entrance of the air. Because of this, there is a plentiful supply of air to eliminate suction and to gain additional lift as a by-product.

Because of the particular configuration of the bottom, that is the provision of the projections and depressions in the manner in which they flare into the bow, a soft riding and wave flattening bow for a smoother ride is easily incorporated. This is possible even though the bow may be of substantially any shape as is required for specialized purposes. Further, the outermost projections are rounded and flare into the sides, and therefore there is no possibility of the hull 10 tripping in a turn. On the other hand, because the bottom 20 is formed of a plurality of generally round V bottom sections, directional stability is obtained without having to add appendages, such as keels and the like.

In addition to the advantages in the riding characteristics of the hull 10, the corrugated cross section of the bottom 20 provides an inherent strength in the bottom. At the same time, the configuration and construction of the bottom 20 removes all design limitations for appearance and space.

In the normal hull design, when enough power is used to force the hull to run at a high speed, it is almost impossible to carry its weight far enough aft to make it ride at its most efficient inclination. Further, when attempts are made to carry the weight on a narrow transverse strip under the stern, such as would occur when the weight is moved aft, the hull becomes unstable and attempts to porpoise. In the design of the boat hull 10, the leading edges of the bottom and the lift pattern thereof are angular from the bow to the transom which enables it to ride level and provides for more efficient weight distribution.

It is also pointed out at this time that while there is illustrated a boat hull designed primarily for planing action, many of the principles involved in the boat hull 10 can be applied to a displacement type hull by changing the shape of the longitudinal sections. Such a modified form of boat hull would give a very favorable speed to beam ratio.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A boat hull comprising a bow, a stern, sides and a bottom, said bottom in transverse cross section including alternating projections and depressions, said depressions comprising passageways between said projections extending from said bow to said stern, said depressions decreasing in width from said bow to said stern and said projections increasing in width from said bow to said stern.

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2. A boat hull comprising a bow, a stern, sides and a bottom, said bottom in transverse cross section including alternating projections and depressions, said depressions comprising passageways between said projections extending from said bow to said stern, said depressions decreasing in width from said bow to said stern and said projections increasing in width from said bow to said stern, certain of said projections being disposed outermost and smoothly flaring into said sides.

3. A boat hull comprising a bow, a stern, sides and a bottom, said bottom in transverse cross section including alternating projections and depressions, said depressions comprising passageways between said projections extending from said bow to said stern, said depressions decreasing in width from said bow to said stern and said projections increasing in width from said bow to said stern, said depressions decreasing in height from said bow to said stern.

4. A boat hull comprising a bow, a stern, sides and a bottom, said bottom in transverse cross section including alternating projections and depressions, said depressions comprising passageways between said projections extending from said bow to said stern, said depressions decreasing in width from said bow to said stern and said projections increasing in width from said bow to said stern, said projections and depressions having fore and aft extending parallel center lines.

5. A boat hull comprising a bow, a stern, sides and a bottom, said bottom in transverse cross section including alternating projections and depressions, said depressions comprising passageways between said projections extending from said bow to said stern, said depressions decreasing in width from said bow to said stern and said projections increasing in width from said bow to said stern, said depressions decreasing in height from said bow to said

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stern, all of said projections rearwardly of said bow having lower extremities lying in a common plane.

6. A boat hull comprising a bow, a stern, sides and a bottom, said bottom in transverse cross section including alternating projections and depressions, said depressions comprising passageways between said projections extending from said bow to said stern, said depressions decreasing in width from said bow to said stern and said projections increasing in width from said bow to said stern, said depressions decreasing in height from said bow to said stern, certain of said projections being disposed outermost and smoothly flaring into said sides.

7. A boat hull comprising a bow, a stern, sides and a bottom, said bottom in transverse cross section including alternating projections and depressions, said depressions comprising passageways between said projections extending from said bow to said stern, said depressions decreasing in width from said bow to said stern and said projections increasing in width from said bow to said stern, said depressions decreasing in height from said bow to said stern, all of said projections rearwardly of said bow having lower extremities lying in a common plane, said projections and depressions having fore and aft extending parallel center lines.

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