

Oct. 4, 1932.

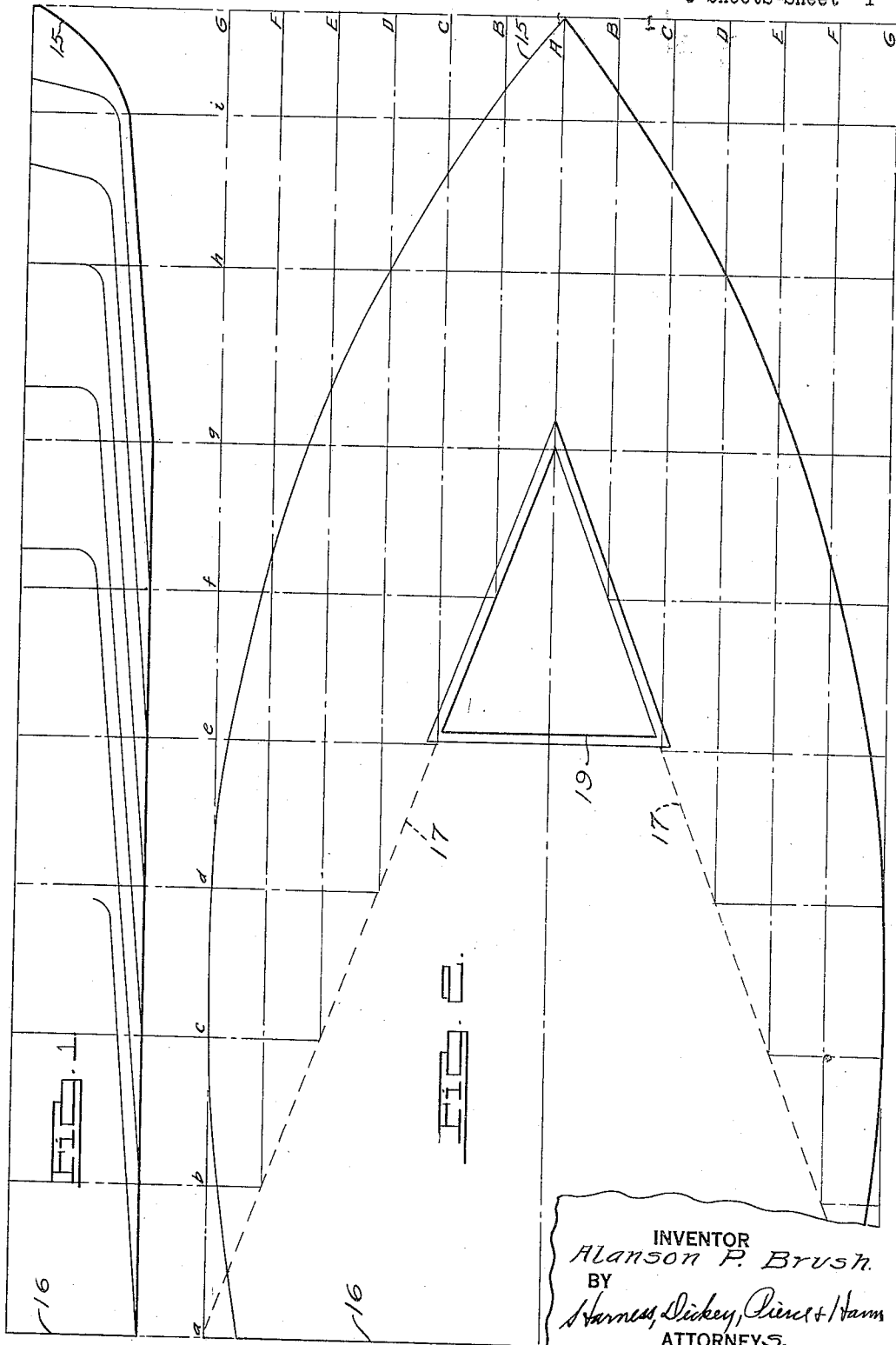
A. P. BRUSH

1,880,371

BOAT

Filed March 31, 1930

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

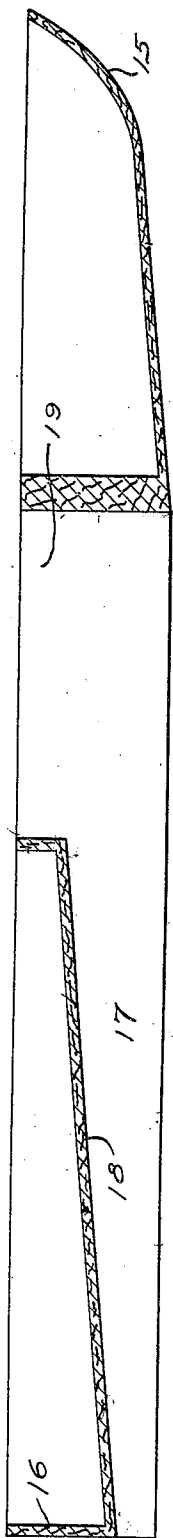


FIG. 1.

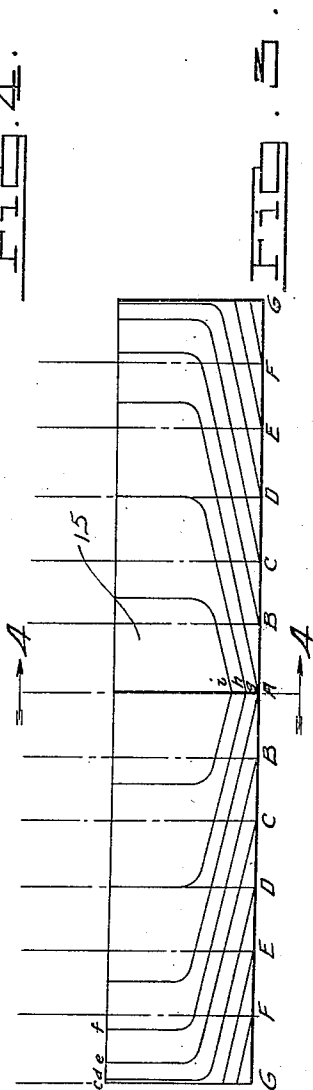


FIG. 2.

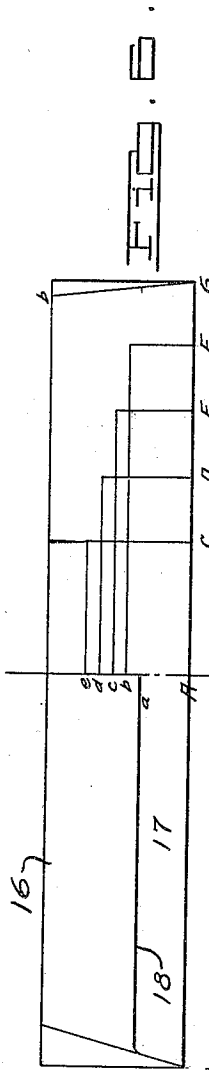


FIG. 3.

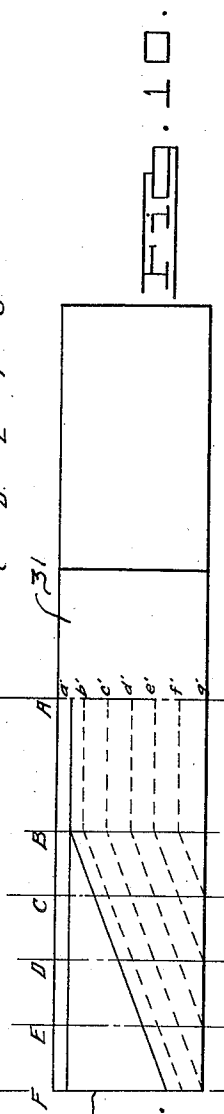


FIG. 4.

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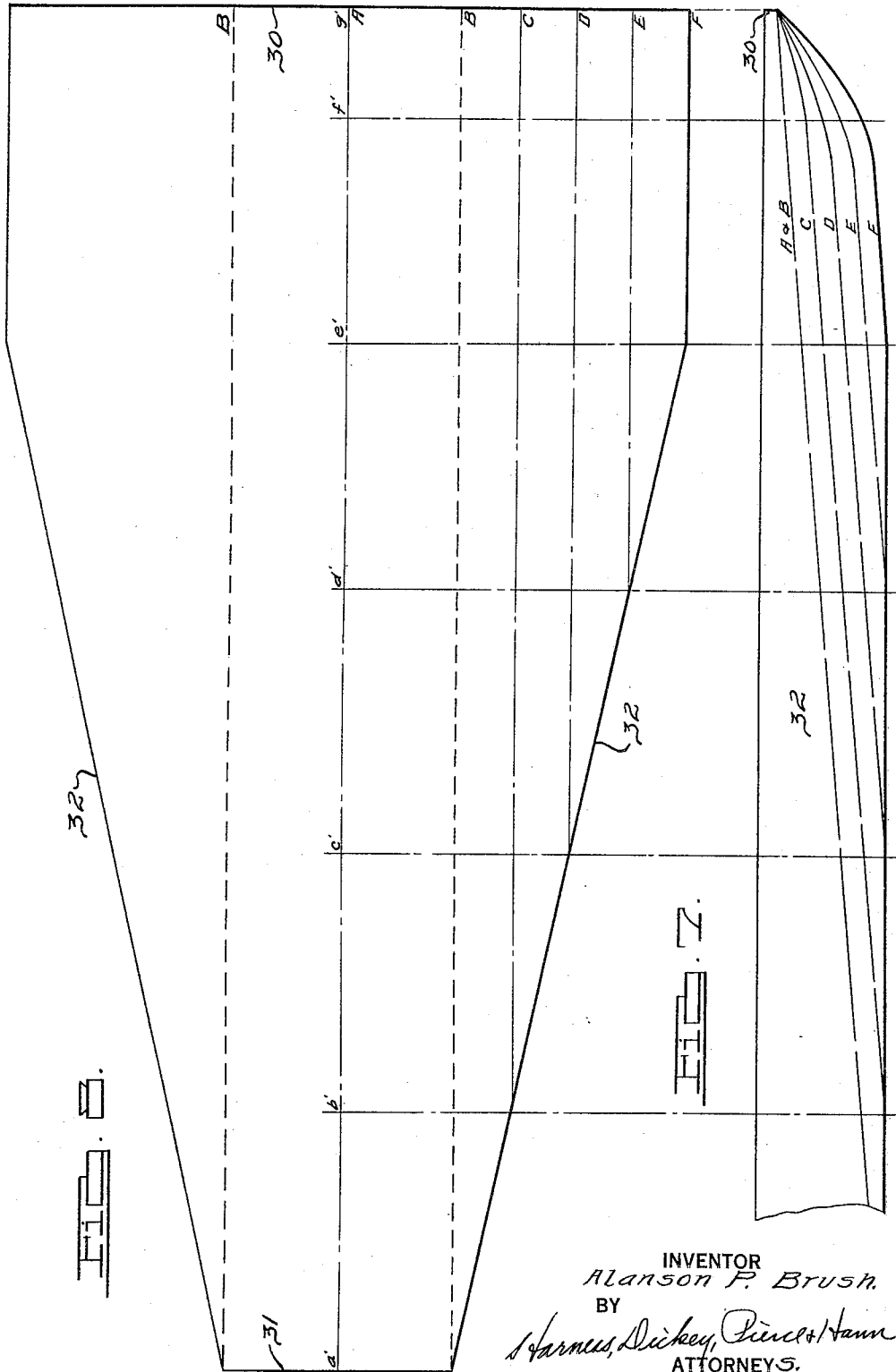
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UNITED STATES PATENT OFFICE

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BOAT

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This invention relates to boats, and particularly to that type thereof commonly known as hydroplanes the principal object being to provide a boat of this type that will have greater stability than hydroplanes heretofore constructed and will have a constant planing angle regardless of the speed.

In boats of this type, which differ from the ordinary displacement type of boat in that they depend upon the reaction of the water against their bottoms due to their speed to raise them sufficiently out of the water so that they skim along over the top thereof rather than through the water, it has been found necessary heretofore in order to obtain longitudinal stability of the boat so that it will not jump while traveling over the water; to provide one or more steps in the bottom surface thereof, so that when the boat is traveling over the water it has two or more distinct areas of support on the water longitudinally spaced from each other. Furthermore, as it is necessary for the successful operation of a boat of this type that it travel at a relatively high speed in order that it may plane sufficiently to get on top of the water rather than pass through the same, it has been common practice in order to obtain lateral stability to make those boats wider than would otherwise be necessary to obtain sufficient planing surface for the proper lifting or planing of the boat.

Furthermore, in this type of boat, as heretofore constructed, the angle of the bottom or planing surface with respect to the water changes with the speed of the boat due to the fact that the rear planing surface travels over the water which has immediately previously been traveled over by the forward planing surface and such water has been displaced from its normal level an amount dependent upon the displacement of the first planing surface in the water, which displacement is usually a function of the speed and other characteristics of the boat.

It is another object of the present invention to provide a hydroplane so constructed as to have a greater longitudinal stability than hydroplanes of conventional construction and to have a greater inherent lateral

stability than hydroplanes of conventional construction.

It is another object of the present invention to provide a boat of the type described which will have a substantially constant planing angle regardless of the speed.

It is another object of the present invention to provide a boat of the type described having in effect a single continuous planing surface for contact with the water, and which planing surface is so formed as to impart to the boat as great a longitudinal and lateral stability as heretofore has been possible with a plurality of planing surfaces.

It is another object of the present invention to provide a boat of the type described in which the length of the water contact of the boat in planing is always greater than the length of planing contact measured longitudinally of the boat.

Further objects will be apparent in the following specification, reference being had to the accompanying drawings, in which

Fig. 1 is a more or less diagrammatic side elevation of my improved hydroplane.

Fig. 2 is a more or less diagrammatic plan view of the hydroplane shown in Fig. 1.

Fig. 3 is a bow view of the hydroplane shown in Figs. 1 and 2.

Fig. 4 is a vertical sectional view taken on the line 4-4 of Fig. 3.

Fig. 5 is a stern view of one-half of the hydroplane shown in the previous figure.

Fig. 6 is a construction diagram of one-half of the boat shown in the previous figures, in end view.

Fig. 7 is a side elevation of a modified form of construction.

Fig. 8 is a plan view of the hydroplane shown in Fig. 7.

Fig. 9 is a bow view of one-half of the hydroplane shown in Figs. 7 and 8; the construction lines being shown thereon.

Fig. 10 is a stern view of one-half of the hydroplane shown in Figs. 7, 8 and 9.

The present invention is equally applicable to that conventional type of boat having a relatively sharp bow in plan view and V-shaped as viewed from the bow, or to that conventional type of boat having a rela-

tively square or blunt bow in plan view and which is of approximately inverted V-shape in bow view. The application of the present invention to the first type of these boats is shown in Figs. 1 to 6 inclusive. As indicated best in Figs. 1, 2 and 3, the boat is shown as being provided with a bow 15 and stern 16. As indicated in Fig. 2, the bow 15 may be made relatively sharp, the boat widening gradually from the bow to a point preferably in the neighborhood of the stern 16 and preferably approximately two-thirds of the length of the boat from the bow, from which point its bottom may extend rearwardly at substantially constant width. The bottom of the boat is provided with a single step indicated generally as at 17, this step being of unusual construction in that each side thereof forms an acute angle with respect to the longitudinal centerline of the boat and extends from a point adjacent the bow 15, shown in the drawings as being less than one-third of the length of the boat from the bow, to the stern, at which point the step preferably merges with the side of the boat. It will thus be apparent that this step forms in the bottom of the boat a triangular recess which extends upwardly thereinto. The bottom of the boat 18 above this recess may slope gradually downwardly towards the stern 16, but will necessarily terminate at the stern 16 above the plane of the bottom of the boat at that point, as indicated in Fig. 4.

I prefer to provide a relatively large opening such as 19 connecting the foremost apex of this recess with the air above the boat in order to relieve any suction effect upon the bottom of the boat that might otherwise be present due to the planing action of the boat on the water, as will be readily understood by those skilled in the art.

Although the lower edge of the step 17 may be slightly curved longitudinally of the boat, I prefer to make the same substantially straight and lying in a single plane, which, as will hereinafter be obvious, will remain substantially parallel to the surface of the water over which the hydroplane is passing. As indicated by the construction lines in Figs. 1, 2 and 3, it will be seen that the bottom of the boat forwardly of the step 17 extends forwardly and upwardly from the step 17, in a direction parallel to the longitudinal centerline of the boat, at a constant angle, to a point materially in advance of the corresponding point on the step 17, where it may merge as desired into the sides of the boat. It will thus be apparent that that portion of the bottom of the boat immediately in advance of the step 17 forms the planing surface for the boat, and this planing surface in plan view is of substantially V-shaped formation and of a length nearly equal to the length of the boat, and of a width commensurate with the width of the boat, and that

the angle of this planing surface with respect to a horizontal plane and in a direction parallel to the longitudinal centerline of the boat is constant over the entire planing surface. It will also be apparent that the length of water contact of the boat is substantially equal to the length of the boat and will remain substantially constant regardless of the speed of the boat. It will also be apparent that the length of planing contact of the boat with the water, by which I mean the length of contact along any line parallel to the longitudinal centerline of the boat and measuring the contact of the boat with the water on such line, will vary in accordance with the speed of the boat. It will thus be apparent that I have provided a boat having a single or continuous planing surface of a width equal to the width of the boat and of a length substantially equal to the length of the boat, and it will be apparent that in providing such a planing surface I obtain a maximum amount of both longitudinal and lateral stability in the boat. It will also be apparent that inasmuch as the boat has but a single planing surface there will be no planing surface on the boat which must travel over water which has immediately previously been disturbed by another planing surface on the boat. As a result of this, not only is it assured that the planing surface will always travel over undisturbed water, but in traveling over the water the boat will remain on substantially the same level of keel regardless of the speed of the boat, the only variation in such case being the length of planing contact. It will further be apparent that with this construction I provide a maximum amount of longitudinal and lateral stability with a minimum amount of wetted surface, thus tending to result in more speed for given horse power than in conventional constructions.

The application of this construction to an inverted V-bottom type of boat is shown in Figs. 7 to 10, inclusive. The boat in these figures is shown as being provided with a bow 30 of relatively great width and a stern 31 of relatively narrow width, the sides of the boat tapering gradually from the neighborhood of the bow to the stern, although this last feature is not essential. The sides of the boat are shown as being of substantially constant height from the stern to a point adjacent the bow. The bottom of the boat between the construction lines B—B is flat and extends at a uniform angle from a point adjacent the deck at the bow, to the stern which is preferably of a width corresponding to the width of this portion of the bottom. The bottom of the boat on either side of the area between the lines B—B and as best illustrated in Fig. 9, extends outwardly and downwardly to the sides of the boat at a constant angle over the length of the

boat. It accordingly follows that any line on the hull and arranged in two branches which the bottom of the boat outside of the lines are disposed transversely of each other, and B—B and lying in a vertical plane parallel both of which are transverse to the normal to the longitudinal centerline of the boat will direction of travel.

- 5 be parallel with the surface between the lines. 3. A hydroplane hull construction having 70 B—B, as illustrated by the construction lines a, a continuous generally forwardly and upwardly, D, E and F. It will be apparent that in this forwardly inclined water contacting surface construction the lower edges of the sides 32, constituting the sole support for the hull and 10 and the stern 31 form the step which is V which is disposed at an acute angle greater 75 formation in plan view and opens towards the than fifteen degrees, when measured in a sub-bow, and that any line on the planing surface, substantially horizontal plane with respect to thus formed extending forwardly from any the normal line of travel.
- 15 point on the step and lying in a vertical plane. 4. A hydroplane hull construction having parallel to the longitudinal centerline of the a single continuous forwardly and upwardly boat will be parallel with any other such line, inclined water contacting surface on its bot- 80 The result of this construction is of course tom constituting the sole support for the hull, exactly the same as that described in connection with the construction shown in Figs. 1 to 6 inclusive, the only difference being that the leading edge of said surface forming an acute angle with respect to the direction of 20 to 6 inclusive, the only difference being that the leading edge of said surface in the first construction the point of the V—being substantially parallel to said leading, 85 shaped planing surface is at the bow while edge.
- 25 in the present construction the point of the V-shaped planing surface is at the stern, the result being the same in both cases in that surface on each side of the longitudinal center line of said boat extending in plan view 90 the longitudinal water contact of the boat remains substantially constant regardless of at an acute angle greater than fifteen degrees speed, a uniform planing angle is maintained, with respect to said longitudinal center line.
- 30 a maximum amount of lateral and longitudinal recess in the bottom thereof, equally disposed on either side of the longitudinal center line 95 amount of wetted surface.
5. A boat of the hydroplane type having a forwardly and upwardly inclined planing surface on each side of the longitudinal center line of said boat extending in plan view 90 remains substantially constant regardless of at an acute angle greater than fifteen degrees speed, a uniform planing angle is maintained, with respect to said longitudinal center line.
- 35 the planing contact varies with the speed, and 6. A hydroplane hull having a V-shaped a maximum amount of lateral and longitudinal recess in the bottom thereof, equally disposed on either side of the longitudinal center line 95 amount of wetted surface.
7. A hydroplane hull having a planing surface extending forwardly from the edge of said recess that the particular shape of the boat in plan and upwardly at a constant angle over the view is relatively immaterial as long as the length of said edge in a direction parallel to 100 bottom of the boat is so constructed as to substantially maintain the relation of the planing surfaces on the opposite sides of the boat.
- 40 I have described each of these boats as having a single continuous planing surface, it is possible by separating these surfaces on their travel, said planing surface extending forwardly of said trailing edge and being inclined upwardly from the plane of the trailing edge.
- 45 8. A hydroplane having a pair of planing surface portions disposed on opposite sides of the centerline of said hydroplane, said portions having trailing edges lying substantially in a common plane and extending at oppositely disposed angles with respect to said 110 centerline, said planing surface portions extending forwardly and upwardly from their trailing edges and at substantially uniform angles with respect to the plane of said trailing edges.
- 50 9. A hydroplane having trailing planing surface edges forming oppositely extending acute angles with respect to the longitudinal centerline of the hydroplane and converging in a forwardly direction, planing surfaces 125 extending forwardly and upwardly with respect to said edges, and a floor lying between and above said edges.
- 55 10. A hydroplane having trailing planing surface edges forming oppositely extending

From the foregoing it will be apparent that the particular shape of the boat in plan and upwardly at a constant angle over the view is relatively immaterial as long as the length of said edge in a direction parallel to bottom of the boat is so constructed as to substantially maintain the relation of the planing surfaces on the opposite sides of the boat. I have described each of these boats as having a single continuous planing surface, it is possible by separating these surfaces on their travel, said planing surface extending forwardly of said trailing edge and being inclined upwardly from the plane of the trailing edge. In the manner disclosed in connection with the construction shown, and yet will not have a single continuous planing surface in a technical sense of the word.

These and other formal changes may be made in the specific embodiment of the invention described without departing from the spirit or substance of the broad invention, the scope of which is commensurate with the appended claims.

What I claim is:

1. A hydroplane hull construction having a continuous generally forwardly and upwardly inclined planing surface on the bottom thereof constituting the sole support for the hull and arranged in two branches which are disposed transversely of each other.

2. A hydroplane hull construction having a continuous generally forwardly and upwardly inclined planing surface on the bottom thereof constituting the sole support for

3. A hydroplane having a planing surface provided with a trailing edge lying substantially in a single horizontal plane, said trailing edge extending at an angle to the line of travel, said planing surface extending forwardly of said trailing edge and being inclined upwardly from the plane of the trailing edge.

4. A hydroplane having a pair of planing surface portions disposed on opposite sides of the centerline of said hydroplane, said portions having trailing edges lying substantially in a common plane and extending at oppositely disposed angles with respect to said centerline, said planing surface portions extending forwardly and upwardly from their trailing edges and at substantially uniform angles with respect to the plane of said trailing edges.

5. A boat of the hydroplane type having a forwardly and upwardly inclined planing surface on each side of the longitudinal center line of said boat extending in plan view at an acute angle greater than fifteen degrees with respect to said longitudinal center line.

6. A hydroplane hull having a V-shaped recess in the bottom thereof, equally disposed on either side of the longitudinal center line of said hull, and a planing surface extending forwardly from the edge of said recess that the particular shape of the boat in plan and upwardly at a constant angle over the view is relatively immaterial as long as the length of said edge in a direction parallel to bottom of the boat is so constructed as to substantially maintain the relation of the planing surfaces on the opposite sides of the boat.

7. A hydroplane having a planing surface provided with a trailing edge lying substantially in a single horizontal plane, said trailing edge extending at an angle to the line of travel, said planing surface extending forwardly of said trailing edge and being inclined upwardly from the plane of the trailing edge.

8. A hydroplane having a pair of planing surface portions disposed on opposite sides of the centerline of said hydroplane, said portions having trailing edges lying substantially in a common plane and extending at oppositely disposed angles with respect to said centerline, said planing surface portions extending forwardly and upwardly from their trailing edges and at substantially uniform angles with respect to the plane of said trailing edges.

9. A hydroplane having trailing planing surface edges forming oppositely extending acute angles with respect to the longitudinal centerline of the hydroplane and converging in a forwardly direction, planing surfaces extending forwardly and upwardly with respect to said edges, and a floor lying between and above said edges.

10. A hydroplane having trailing planing surface edges forming oppositely extending

acute angles with respect to the longitudinal centerline of the hydroplane and converging in a forwardly direction, planing surfaces extending forwardly and upwardly with respect to said edges, and a floor lying between and above said edges, said floor being provided with an opening adjacent the point of convergence of said edges to admit air behind said edges.

11. A hydroplane having trailing planing edges lying substantially in a single plane and disposed at an angle with respect to each other in that plane, and planing surfaces extending forwardly and upwardly from said edges and formed at an angle to the plane of said edges.

12. A hydroplane hull construction having a longitudinally continuous planing surface constituting the sole support for the hull, the water contact length of said planing surface, measured in the direction of the length of said hull, being greater than the length of water contact at any vertical section taken through said surface in a plane parallel to the longitudinal centerline of said hull.

13. A hydroplane hull construction having a longitudinally continuous planing surface on the bottom thereof arranged in two branches which are disposed transversely of each other, said branches being located on opposite sides of the longitudinal centerline of said hull, and any line included in said surface and lying in a vertical plane parallel with said longitudinal centerline being inclined upwardly in the direction of the bow of said hull.

14. A hydroplane hull construction having a planing surface area including complementary surfaces on opposite sides of the longitudinal centerline of said hull and arranged to impart a V-formation to said area in plan view with said centerline bisecting said V, any line included in said surfaces and lying in a vertical plane parallel with said centerline being inclined upwardly toward the bow of said hull.

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