June 24, 1947. J. G. BAMBERGER 2,422,818

HYDROPLANE

Filed Aug. 2, 1943 2 Sheets-Sheet 1

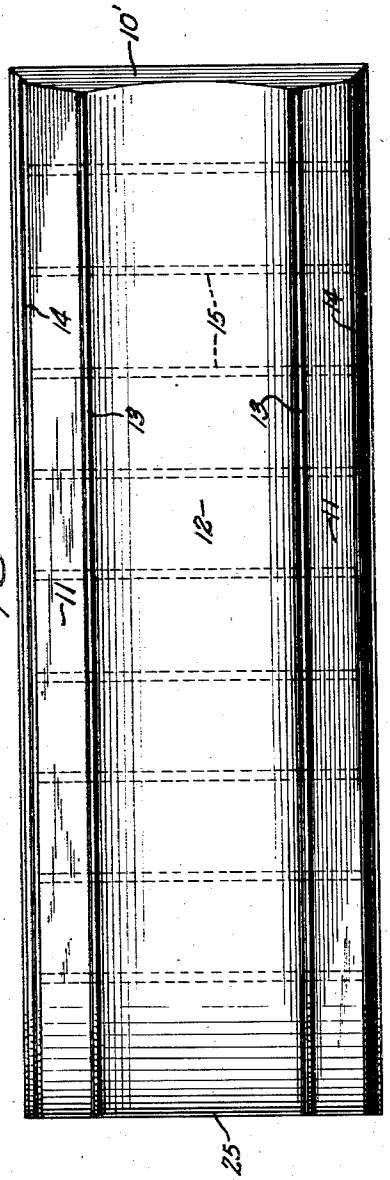


Fig. 1.

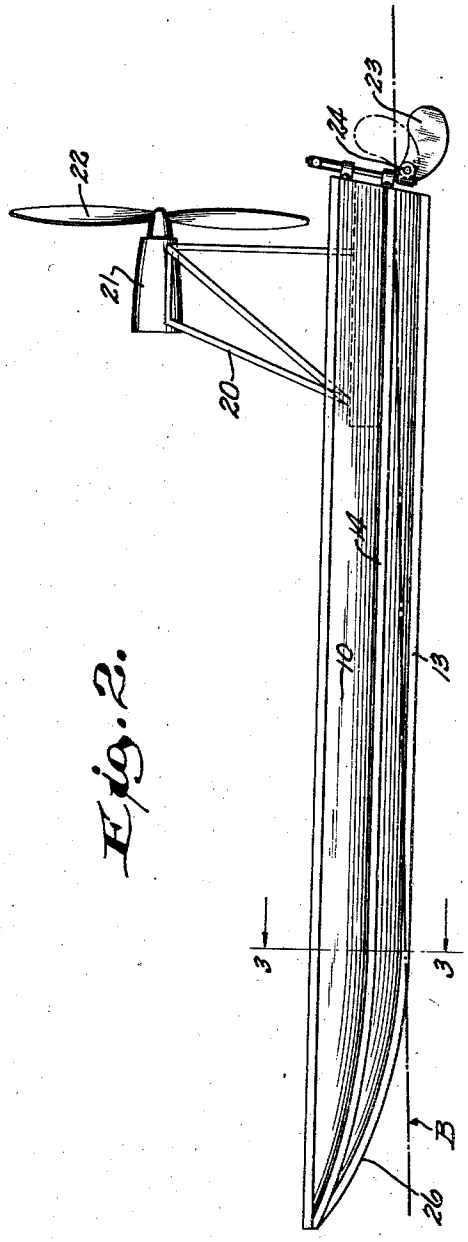


Fig. 2.

INVENTOR.
Julien G. Bamberger
BY
Mosell & Mosell
ATTORNEYS

June 24, 1947. J. G. BAMBERGER 2,422,818

HYDROPLANE

Filed Aug. 2, 1943 2 Sheets-Sheet 2

Fig. 3.

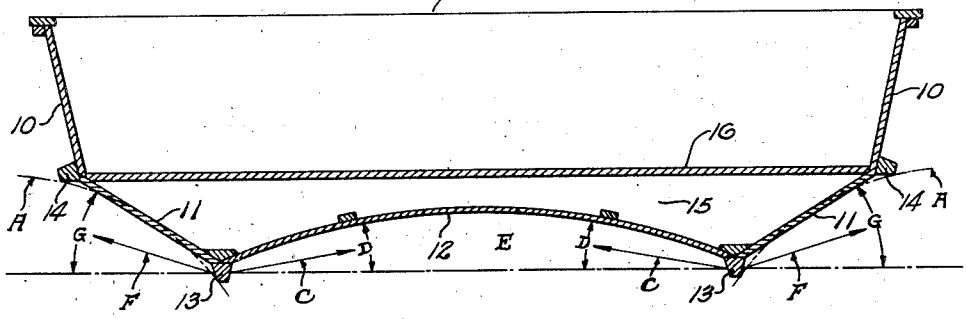


Fig. 4.

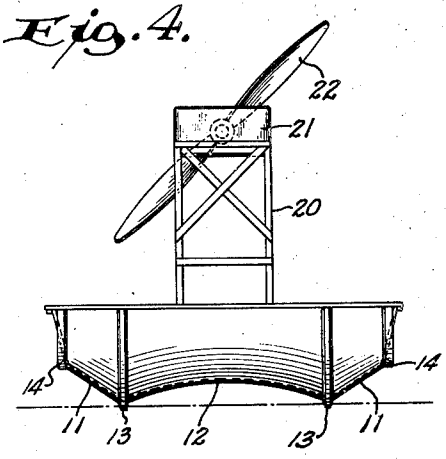
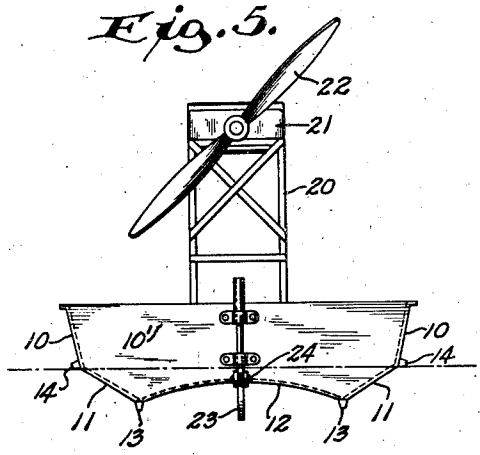


Fig. 5.



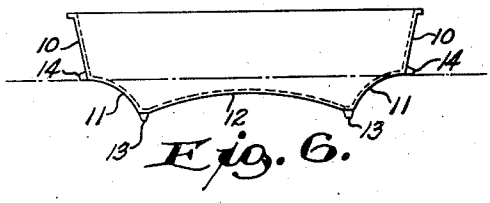


Fig. 6.

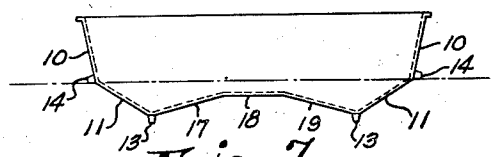


Fig. 7.

INVENTOR.
Julien G. Bamberger
BY
Mosell & Mosell
ATTORNEYS.

Patented June 24, 1947 2,422,818

UNITED STATES PATENT OFFICE

2,422,818

HYDROPLANE

Julien G. Bamberger, Milwaukee, Wis.

Application August 2, 1943, Serial No. 497,001

5 Claims. (Cl. 114—66.5)

1

This invention relates to improvements in boats.

The conventional boat has a hull formed with a bottom which is V-shaped or convex in cross-section, and is usually provided with a single center keel. In addition, the conventional boat has a bow which converges in plan view. These boats present considerable resistance to the water, particularly in the front, and lack maximum stability. Furthermore, such boats are not suitable for use with an air propeller as there is too much friction from water contact to permit high speed operation with a minimum of power, and such boats are inclined to dive when driven at high speed by an air propeller positioned in the stern.

It is one of the objects of the present invention to provide a boat having an improved hull construction which affords increased stability, a decrease of water contact and a decrease of frontal water resistance, the said boat being particularly adapted for use with an air propeller drive to render this type of drive successful and practical. The construction is well suited for use on landing barges, as it is possible to propel the boat close to shore and to ultimately beach the same without difficulty.

A more specific object of the invention is to provide a boat whose bottom is formed with spaced substantially parallel keels extending substantially the full length of the hull, the bottom of the hull being concave in transverse section between said keels. With this construction, when the boat is being operated, there is a violent spraying action in a transverse direction and at an angle to the concave from the inner side of each keel. Thus a major portion of the length of the boat rides in a relatively high position on bubbles, spray, and air, and on the partially submerged spaced apart keels. In addition, the boat is automatically leveled during operation, shocks are cushioned, and the buoyancy of the hull is increased so that a maximum load may be safely carried.

A further object of the invention is to provide a boat as above described, wherein the bottom of the hull outwardly of each keel and for substantially the full length of the boat tapers upwardly and outwardly at such an angle that spraying action in an outward direction from each keel is minimized, and such outward spraying action as there may be serves to maintain the boat in stable condition. In addition the tapered sides serve to keep the interior of the boat dry.

A still further object of the invention is to provide a boat as above described, wherein each tapered side portion is confined between a longitudinally laterally projecting side chine and between one of the keels, the said chine extending substantially parallel to the keel for substantially the length of the boat. Thus, a longitudinally extending area, which is the equivalent of a concave in cross-section, is formed on each side of the hull in addition to the previously mentioned center concave.

2

Other objects of the invention are to provide a boat which is capable of high speed operation when driven by an air propeller and which is so constructed as to reduce the power required for a given speed; to provide a boat which will not dive when driven by an air propeller positioned in the stern; to provide a boat which rides relatively level and in a high position in the water; to provide a boat capable of use for landing purposes which has less under-water projections; and to provide a boat which has increased capacity for its size and is, therefore, suitable for moving troops and equipment.

With the above and other objects in view the invention consists of the improved boat and all its parts and combinations as set forth in the claims and all the equivalents thereof.

In the accompanying drawings illustrating preferred embodiments of the invention, in which the same reference numerals designate the same parts in all of the views:

Fig. 1 is a bottom view of the improved boat;

Fig. 2 is a side elevational view thereof, the dot-and-dash line indicating the water level when the boat is idle;

Fig. 3 is a transverse sectional view, on an enlarged scale, taken on the line 3—3 of Fig. 2;

Fig. 4 is an elevational view looking at the front of the bow;

Fig. 5 is an elevational view looking at the stern;

Fig. 6 is an elevational view looking at the stern and illustrating a slight modification; and

Fig. 7 is similar to Fig. 6 illustrating an additional modification.

Referring more particularly to the drawings the numeral 10 designates flared side portions of the boat which extend longitudinally from the front to the rear and which are closed at the rear by transverse wall 10'. Extending downwardly and inwardly from the lower edges of the side portions 10 are longitudinally extending areas 11. Joining the lower edges of the areas 11 is a bottom hull portion 12 which is concave in cross-section as illustrated in Fig. 3. This concavity 12

preferably extends from the bow to the stern as illustrated in Figs. 1, 4 and 5.

The side longitudinal edges of the concave area 12 are bounded by keels 13. These keels extend from the bow to the stern as shown in Fig. 1 and are substantially parallel throughout their length. At the sides of the hull are longitudinally extending chines 14 which project laterally approximately the same distance as the keels 13 project downwardly. As indicated by the dot-and-dash line A in Fig. 3 the tapered area 11 which is bounded by a keel 13 on one longitudinal edge and by a chine 14 on the other longitudinal edge forms in effect a transverse concavity on each side of the center concave 12. If desired, as shown in Fig. 6, the portions 11 may be transversely curved to produce a still more definite concavity on each side.

The bottom of the hull may be reinforced by a plurality of longitudinally spaced transverse members 15 and the upper edges of these members may in turn support a suitable flooring 16.

As illustrated in Fig. 7, the center concavity 12 of the form of Fig. 3 may be produced by a combination of straight sections 17, 18 and 19. Sections 17 and 19 may be angularly disposed so that the net result is the equivalent of a concave cross-section.

Mounted on a suitable upright support 20 in the stern of the boat is a suitable motor 21 driving an air propeller 22. While an air rudder may be utilized if desired, it is, nevertheless, preferred to utilize an underwater rudder 23 (see Figs. 2 and 5). This rudder may be pivoted for swinging movement on a horizontal pin 24 from the full line position of Fig. 2 to the dot-and-dash line position therein. Thus, if the rudder should hit an under-water obstruction while being moved through shallow water, the rudder can pivot upwardly.

During use of the boat while it is being driven by the air propeller 22, the boat will start out with the water line B in substantially the position of Fig. 2. The spaced keels 13 extend entirely to the front of the bow, as illustrated in Fig. 1, and are parallel throughout the length. The bow of the boat has its front edge 25 straight as indicated in Fig. 1 and of substantially the same length as the stern of the boat. On the under side of the bow the hull is curved upwardly as at 26 (Fig. 2). As the speed of the boat increases, water which, without the center concave would be sprayed outwardly, is sprayed inwardly from the keels 13 as indicated by the arrows C in Fig 3. This water is sprayed inwardly along a line which approximately bisects the angles D between the water surface at the point of contact and the bottom surface of the boat. This spraying action tends to mix with air between the keels 13 and in the space E above the water line as indicated in Fig. 3. This air produces bubbles and the air, bubbles, and spray cushion the shock, level the ride, and exert a lifting force on the bottom of the hull when the boat is moving, which lifting force is increased with the increase in speed. As the speed of the boat increases, the boat rides higher in the water so that air space E is present almost throughout the length of the boat. The stern, of course, is usually submerged to a somewhat greater extent than the rest of the boat, but as the speed increases and the boat travels along, the spray action in the space E will even tend to lift the stern somewhat. This lifting force is augmented somewhat by the lifting force of the air propeller. The action of the air propeller

by its normal thrust in a line parallel to and above the water level has a tendency to push the bow of the boat downwardly. Due to the resistance of the boat to the water the alternative action then occurs. The bow water contact point becomes a virtual fulcrum and the boat has a tendency to nose over, that is the rear end lifts up. The action of the water on the curve 26 at the bow of the boat and the action of the water in passing through the concave 12 neutralizes this nosing-over tendency. Due to the lateral restriction of water between the keels 13, the water passing within the concave portion 12 buoys up the whole body. The greater the forward speed, the greater the planing action and the higher the boat will rise. In effect, therefore, throughout the major portion of the length of the boat, the only submerged portions are the small keels 13. Thus there is a reduced friction with the water and there is a reduced frontal water resistance.

Spray is also directed outwardly from the keels 13 as indicated by the arrows F. This spray approximately bisects the angle G on each side, referring to Fig. 3. The flared side portions 11, which together with the keels 13 and chines 14 produce the concave effect A, serve to confine the outward spray action F and to increase the stability of the boat. The spray action at F is less violent than the spray action at C because the angle D is more acute, and the greater the spray action at C, the less the spray action at F.

While the shape of the hull and particularly the bottom and sides thereof is particularly adapted for use in connection with an air propeller, in order to make the use of such a propeller practical on this type of boat, nevertheless the boat may be driven by an under-water propeller, if desired. Such an under-water propeller would have to extend downwardly in the water a substantial distance to be below the bubbles emerging from the concave 12 at the stern of the boat and this would make the propeller too deep for landing barge purposes. The present invention, including the particular shape for the bottom and sides of the hull in combination with the air propeller, produces a practical result, because the boat has speed, capacity, stability, and in addition a construction which permits operation in shallow water and ultimate beaching.

While in the drawing the keels 13, chines 14 and angled areas 11 are parallel to each other for the full length of the boat, nevertheless the objects of the present invention may be accomplished if these parts are parallel from the stern of the boat at least to the farthest forward potential water line at the bow. Also the center concave 12 must extend forwardly at least to the farthest forward potential water line at the bow. It is to be noted that the angles G are greater than the angles D and said angles D do not exceed 45° with respect to the water line. Thus the spray C tends to be more horizontal than the spray F (Fig. 3) and air is more readily trapped within the concave and above the water line to cushion the shock, level the ride, and increase the buoyancy of the hull. If no center concave were provided, all of the spray would be in an outward direction, as in the usual type of boat. This is undesirable. With the present invention a major amount of the spray is directed inwardly into the concave and this tends to desirably minimize the outward spray action indicated at F. Such outward spray action as does take place, and this spray action may be substantial in rough

weather, is desirably utilized to keep the boat stable due to the particular arrangement at the sides as heretofore described.

Various changes and modifications may be made without departing from the spirit of the invention and all of such changes are contemplated as may come within the scope of the claims.

What I claim is:

1. In a boat, a hull having spaced apart keels which are substantially parallel and straight throughout their length from the stern of the boat at least to the farthest forward potential water line at the bow, the bottom of the hull from the stern of the boat at least to the farthest forward potential water line at the bow being substantially uniformly concave in cross-section between said keels with the longitudinal center line of the hull bisecting said concave, and said hull having longitudinally extending side portions which flare outwardly and upwardly from said keels at an angle which does not exceed 45° with respect to the water line.

2. In a boat, a hull having spaced apart keels which are substantially parallel and straight throughout their length from the stern of the boat at least to the farthest forward potential water line at the bow, the bottom of the hull from the stern of the boat at least to the farthest forward potential water line at the bow being substantially uniformly concave in cross-section between said keels with the longitudinal center line of the hull bisecting said concave, and said hull having longitudinally extending side portions whose longitudinal axes are substantially parallel to each other from the stern of the boat at least to the farthest forward potential water line at the bow and which flare outwardly and upwardly from said keels at an angle which does not exceed 45° with respect to the water line.

3. In a boat, a hull having spaced apart keels which are substantially parallel and straight throughout their length from the stern of the boat at least to the farthest forward potential water line at the bow, the bottom of the hull from the stern of the boat at least to the farthest forward potential water line at the bow being substantially uniformly concave in cross-section between said keels with the longitudinal center line of the hull bisecting said concave, and said hull having longitudinally extending side portions which flare outwardly and upwardly from said keels at an angle which does not exceed 45° with respect to the water line, said keels being substantially straight throughout the major portion of the length of said keels as they extend from the stern to a point near the bow when the hull is viewed in side elevation.

4. In a boat, a hull having spaced apart keels which are substantially parallel and straight throughout their length from the stern of the boat at least to the farthest forward potential water line at the bow, the bottom of the hull from the stern of the boat at least to the farthest forward potential water line at the bow being substantially uniformly concave in cross-section between said keels with the longitudinal center line of the hull bisecting said concave, and said hull having longitudinally extending side portions which flare outwardly and upwardly from said keels to provide areas which extend upwardly at an angle from the outside of each keel more sharply than the center concave extends upwardly from the inner side of each keel, the angle of said longitudinally extending side portions being no greater than 45° with respect to the water line.

5. In a boat, a hull having spaced apart keels which are substantially parallel and straight throughout their length from the stern of the boat at least to the farthest forward potential water line at the bow, the bottom of the hull from the stern of the boat at least to the farthest forward potential water line at the bow being substantially uniformly concave in cross-section between said keels with the longitudinal center line of the hull bisecting said concave, and said hull having longitudinally extending side portions whose longitudinal axes are substantially parallel to each other from the stern of the boat at east to the farthest forward potential water line at the bow and which flare outwardly and upwardly from said keels at an angle which does not exceed 45° with respect to the water line, and means including an air propeller supported in the stern for causing movement of said boat and a partial lifting of the stern to maintain an air space above the water line and within said concave substantially throughout the length of the hull while the keels are in the water.

JULIEN G. BAMBERGER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
987,059	Frampton	Mar. 14, 1911
1,204,355	Hickman	Nov. 7, 1916
1,413,383	Besson	Apr. 18, 1922
1,620,349	Hickman	Mar. 8, 1927
1,686,264	Brownback	Oct. 2, 1928
1,728,609	Holler	Sept. 17, 1929
1,749,017	Brownback	Mar. 4, 1930
1,782,868	Deetjen	Nov. 25, 1930
1,868,054	Easthope	July 19, 1932
1,875,190	Collins	Aug. 30, 1932
2,251,621	Van Hoorn	Aug. 5, 1941
2,285,959	Dubay	June 9, 1942

FOREIGN PATENTS

Number	Country	Date
191,612	Great Britain	Jan. 18, 1923
215,626	Great Britain	May 15, 1924
458,433	Great Britain	Dec. 21, 1936