

G. H. CURTISS.
FLYING BOAT.
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Patented Nov. 6, 1917.

1,246,012.

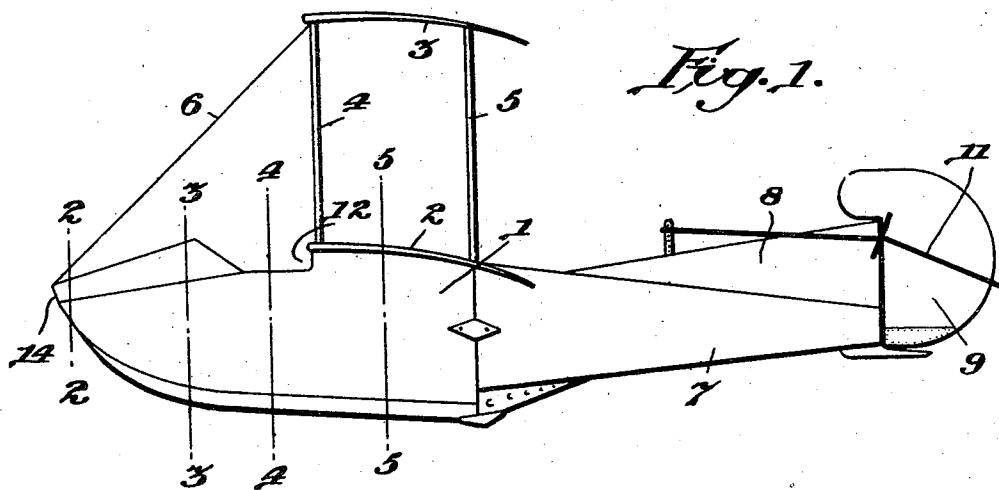


Fig. 3.

Fig. 4.

Fig. 5.

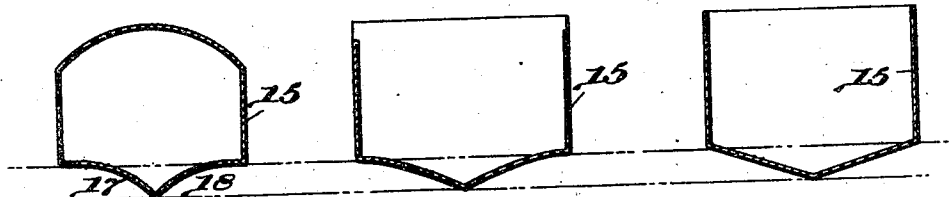


Fig. 6.

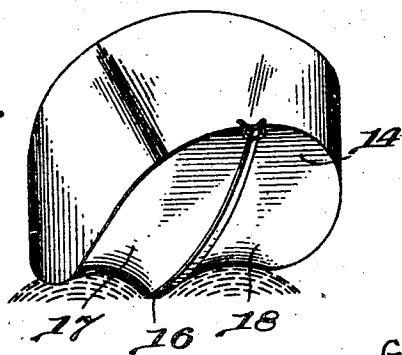


Fig. 2.

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FLYING-BOAT.

1,246,012.

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To all whom it may concern:

Be it known that I, GLENN H. CURTISS, a citizen of the United States, residing at Hammondsport, in the county of Steuben and State of New York, have invented certain new and useful Improvements in Flying-Boats, of which the following is a specification.

My invention relates to hydroplane boats and more especially to what are known in the art as flying boats. It has for its object to construct the hull of such boat so as to produce a cushioning effect upon impact with the water in alighting upon or in running thereover, also to effect a rapid rise of the boat to its planing position upon the surface of the water when starting from a standstill, to prevent lateral displacement in flotation and maintain direction with certainty in the water as well as in the air.

In order to attain my object I form the bottom of the hull as follows: The general position of the main body of the planing surface of the hull is approximately horizontal, but the elements of the surface are variously inclined to the horizontal. The front portion is inclined upwardly, terminating in a substantially flat and wide extremity extending from chime to chime of the boat. Centrally of the bottom there is provided a keel of a depth gradually increasing from the front portion of a point slightly aft of the same, and therefrom extending to the after extremity of the hydroplane surface on a line of greater depth than the chime lines, but substantially parallel thereto or at least at a depth greater than the depth of the chime line by a substantially constant amount. In other words the angle of rearward and downward inclination of the main body of the keel line is substantially equal at each point to the corresponding angle of inclination of the chime lines. At the rearmost extremity the bottom is formed by plane surfaces extending from the chimes to the keel to form an obtuse angle with each other. Intermediate the flat bow portion and the rearmost portion, the surfaces on opposite sides of the keel are concaved, the depth of the concavity increasing gradually from the substantially flat frontal portion to a maximum in advance of the main body of the hydroplaning surface and upon the upwardly inclined portion of the

bow, and from this point gradually decreasing and merging into the plane surface of the rearmost portion.

The effect of this construction is to retain the broad flat landing prow of my earlier constructions, thus insuring a prompt bringing up of the boat to planing position when alighting, and at the same time both to cushion impact by dividing the water laterally and directing it in convex form to the sides of the boat, in a manner providing a fluid cushion for all impacts. A large amount of air is entrained together with the water with the result that the cushioning effect of the convex laterally directed streams is strongly augmented. Still further, in planing along the surface of the water the action of the keel is accentuated by the concavity of the adjacent planing surface, and in planing the large amount of air entrained with the water is retained beneath the hull of the boat with the result that the surface friction of the boat is greatly decreased.

My invention is capable of many embodiments without departing in any wise from its generic spirit. I show in the accompanying drawings that one of those embodiments now best known to me.

Of the drawings—

Figure 1 is a side elevation of a flying boat in which my invention is embodied;

Fig. 2 is a section of the frontal portion of the boat taken on line 2—2 of Fig. 1.

Fig. 3 is a similar section taken at a point slightly aft of the frontal portion and where the surface on opposite sides of the keel are of maximum concavity;

Fig. 4 is a section taken on line 4—4, substantially midway the extremities of the bottom;

Fig. 5 is a section taken on line 5—5, substantially amidships of the body of the boat and across the main hydroplaning portion of the bottom thereof; and

Fig. 6 is a perspective view of the bow of the boat taken from a point slightly to the starboard side.

Referring to the drawings, and first to Fig. 1, 1 indicates the hull of the boat, carrying planes 2 and 3, with the vertical struts 4 and 5 and bracing cables or wires 6, all of which are of ordinary and usual construction and need not be further described. The tail of the boat 7 is provided with the

usual tail fin 8 and vertical rudder 9, the bottom of which rudder is sheathed to a point just above the water line in flotation. 11 is the elevator or horizontal rudder. 12 indicates the cockpit wherein the pilot seat is located.

As in the former types of boats produced by me, the hull is divided into a boat 1 and tail 7. In other types of boat the tail portion might be of a modified form, or else omitted altogether, auxiliary tail floats being used instead. My present improvements relate particularly to the bottom of the main body 1.

The bow is curved rather sharply upward, as indicated clearly at 14, and the bottom at this point is of a width approximately the width of the body amidships, the sides being vertically extending. Fig. 2 shows the flatness of this frontal portion of the bottom and also the commencement of the keel of the boat. Fig. 3, taken on line 3—3 on the upwardly inclined portion of the bow, shows the development of the depth of the keel and the maximum concavity of the surface on opposite sides thereof. It will be observed that the circles defining the concavity of the surfaces are substantially tangent in the embodiment shown to the lines joining the bases of the opposite sides 15. My invention contemplates, however, an increase of this concavity or decrease thereof, in either of which cases the circles would not be tangent to the line connecting the chime lines but would intersect this line. Fig. 4, taken on line 4—4 taken farther aft and upon the horizontally positioned portion of the bottom indicates that the concavity has been gradually decreased, and Fig. 5 taken on line 5—5 shows the elimination of the concavity through the merging of the concave surfaces into the plane surfaces of the amidships section and the after end of the bottom.

As clearly indicated in Fig. 1, after the keel has been developed at the bow of the boat, it rapidly attains a maximum depth, the relation of which to the depth of the chime line is maintained substantially the same from front to rear. The downward and rearward inclination of the bottom at the keel is therefore substantially the same as it is at the chimes. But intermediate the chimes and the keel, such rearward and downward inclination of the bottom, is less than that of the chimes and keel until the point of maximum concavity has been substantially reached, and from there aft the inclination of the intermediate surfaces is greater than that of the surfaces adjacent the chimes and keel.

The perspective view of Fig. 6 gives an idea of the general appearance of the bottom from the bow. The flat frontal portion 14 is clearly visible as is also the development of the keel 16, and of the concavity

of the surface 17, 18 adjoining the frontal portion 14. Further in this view is clearly shown the cleavage of the water and its lateral displacement in two convex bodies which form a pair of cushioning bridges, so to speak, beneath the bottom of the boat. This takes place at each impact of the boat with the water whether such impact is due to the alighting of the boat upon the water, or head on striking of the waves in planing over rough water, in the latter case, of course being a rearward as well as a lateral deflection of the water. Considerable air is entrained in the channels formed by the concave surfaces 17, 18, and as a result not only is the cushioning augmented, but the skin friction is so cut down that the planing efficiency is very substantially increased.

What I claim is:

1. A boat having a scow-like prow and a hydroplaning bottom in which its keel portion is of greater depth than its depth at the lateral margins of said bottom, and surfaces connecting such margins with the said keel in contours which in cross section range from flatness to concavity, and again to flatness, the rear flattened surfaces making a dihedral angle with the keel as the vertex of said angle.

2. A boat having a hydro-bottom provided with a keel portion, a scow-like bow, chime edges, and surfaces connecting said edges with said keel portion, said surfaces being characterized by transverse concavity, the concavity in each instance disappearing gradually both fore and aft as said surfaces approach the ends of said hydro-bottom.

3. A boat having a hydroplaning bottom the front of which is upwardly inclined to form a broad laterally extending landing prow, the frontal portion of which is substantially flat, provided with a keel portion emanating from the flat frontal portion aforesaid and of a depth greater than the lateral marginal portions of the bottom, and having its surfaces on opposite sides of the keel disposed to form channels of a depth increasing from said flat frontal portion to a maximum adjacent the rear end of said inclined prow and from thence decreasing to a minimum at the rear end of the bottom.

4. A boat having a hydroplaning bottom provided with a keel portion having a downward and rearward inclination substantially equal to the same inclination of the lateral marginal portions and a depth greater than said lateral marginal portions, the downward and rearward inclination of the surfaces intermediate said keel portion and said lateral marginal portions being greater than the same inclination of both the keel and lateral marginal portions.

5. A boat having a hydroplaning bottom formed with a flattened bow, a keel portion emanating from said flattened bow to reach

a depth greater than the lateral margins of said bottom, the boat having bottom surfaces connecting the keel and said margins in contours increasing from the bow flatness to a maximum concavity and diminishing from the latter again to flatness, the rearward flattened surfaces making a dihedral angle with the keel as the vertex.

6. A boat having a hydroplaning bottom provided with a keel in substantially the same horizontal plane as the transversely aligned margins of the bottom at the bow of the boat and in a lower plane at the rear of said bottom, the boat having bottom surfaces to connect the keel portion with the bottom margins at a salient dihedral angle at one end and in the same plane of common flatness at the other end and intermediately with contours evolved on arcs of varying radii.

7. A boat provided with a flattened scow-like bow rounding off sharply into a hydroplaning bottom, said bottom including longitudinal surfaces of a variable curvilinear cross section, the maximum curve of said cross section being attained in immediate proximity to the flattened bow to provide cushioning means therefor upon impact thereof with the water and the cross sectional curves of said bottom surfaces being similarly flattened in a gradual rearward

progression to merge into an angled rearward gliding portion.

8. A hydroplane boat including a bottom characterized by longitudinal saliency, the hydroplane portion of said bottom terminating rearwardly at the point of maximum saliency, the bottom in the vicinity of the bow and in transverse section having a double concavity of relative prominence, said bottom being flattened out gradually to minimum concavity in the vicinity of said point of maximum saliency.

9. In a hydroaeromachine, the combination with means for effecting aerial flight, of a flotation body having a longitudinally salient bottom at the keel line of said body, that portion of said bottom in advance of its point of maximum saliency constituting a hydroplane surface characterized by concavity at each side of the keel line of such prominence and depth that the water is deflected when hydroplaning outwardly and downwardly, the concavity in each instance becoming less acute toward the rear end of the hydroplane surface.

In testimony whereof I affix my signature in presence of two witnesses.

GLENN H. CURTISS.

Witnesses:

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H. C. GENUNG.