Aug. 25, 1942. E. WADDINGTON 2,294,104

HYDROPLANE BOAT

Filed Oct. 5, 1939

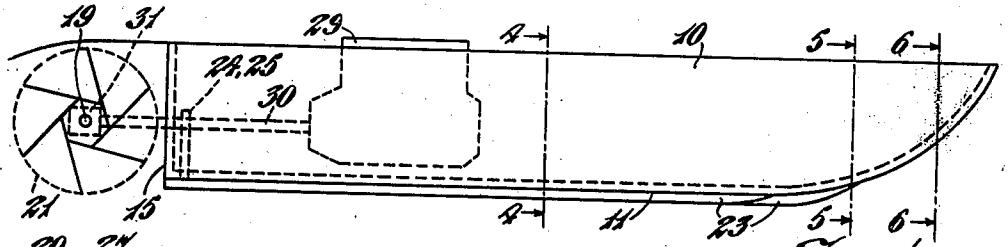


Fig. 1.

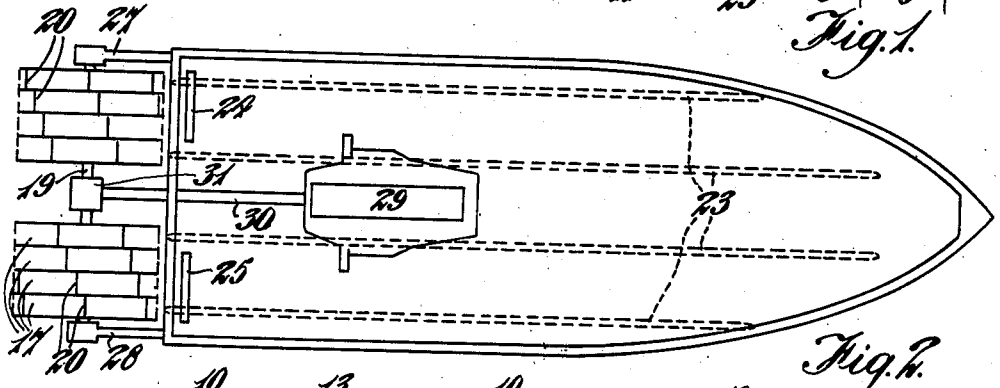


Fig. 2.

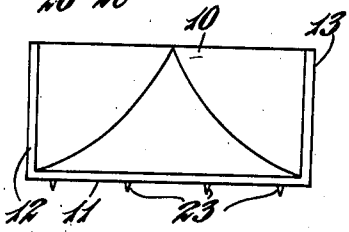


Fig. 4.

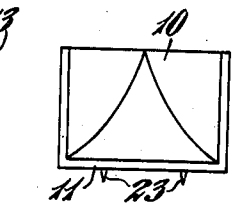


Fig. 5.

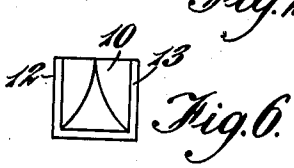


Fig. 6.

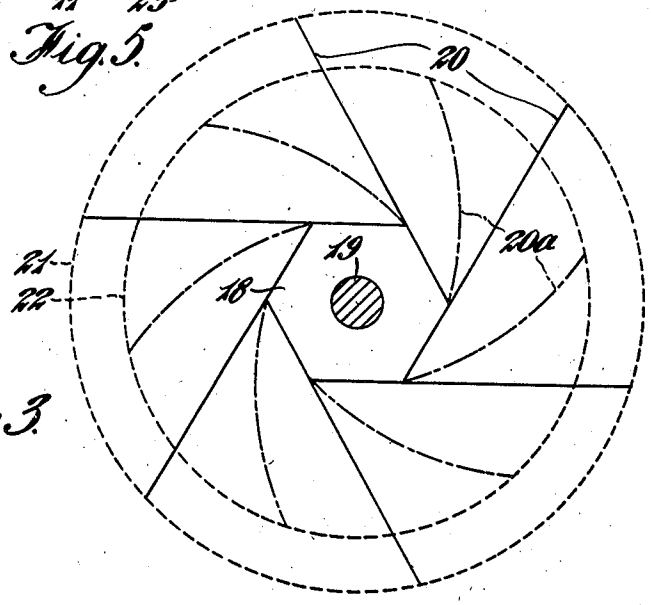


Fig. 3.

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2,294,104

HYDROPLANE BOAT

Edwin Waddington, Barrow-in-Furness, England

Application October 5, 1939, Serial No. 298,093
In Great Britain October 5, 1938

5 Claims. (Cl. 115—49)

This invention relates to hydroplane boats and has for its object to provide improved means for the propulsion thereof.

According to the present invention there is provided on a flat-bottomed hydroplane boat a multi-bladed impeller, the blades of which are composed of springy material such as tapered steel, so that they are capable of deflecting under load with the result that the volume swept by the impeller is correspondingly reduced. Preferably the blades are set so that they always have a rearward inclination relative to the direction in which the impeller rotates. Further, instead of making the blades extend each in a single piece from side to side of the impeller they may advantageously be constituted by a number of separate spring tongues arranged in staggered or echelon formation so as to produce a steady propelling effort owing to the number of impulses which are imparted to the boat for each revolution of the impeller.

Further, the invention contemplates the provision in a hydroplane boat of longitudinal ribs which are fitted to the bottom of said boat and extend substantially parallel with the main axis thereof, said ribs serving to restrict or obstruct lateral spreading of the water as the boat proceeds, thus enabling said boat to be lifted substantially onto the surface of the water as the speed increases.

For steering purposes one or more vanes, plungers or like projectable elements can be fitted in the bottom of the boat, preferably adjacent the stern thereof so as to operate by the drag effect which is produced when one or other is brought into action, said plungers or equivalent elements being capable of retraction so that the streamline form of the bottom of the boat is unimpaired.

The invention is illustrated in the accompanying diagrammatic drawing, in which—

Figure 1 is a side elevation of an improved hydroplane boat;

Figure 2 is a plan thereof;

Figure 3 is a side elevation to an enlarged scale showing the arrangement of the impeller; and

Figures 4, 5 and 6 are sections taken on the lines 4—4, 5—5 and 6—6 respectively of Figure 1.

The hull of the hydroplane boat is indicated at 10 and has a flat bottom 11, as will be seen in Figures 4 and 5, the sides 12 and 13 being vertical and being arranged to taper towards the bow 14. The stern part 15 of the hull is substantially flat, and a multi-bladed impeller 16 is fitted upon a transverse shaft 19 mounted in brackets 27 and 28. An engine 29 having a driving shaft 30 is connected with the shaft 19 by a totally enclosed oil bath gear box 31, whereby the impeller is rotated in a clockwise direction, as viewed in Figure 1. The impeller is divided transversely into short sections indicated at 17 in Figure 2 and each section is provided with a number of tapered steel impeller blades in the manner shown in Figure 3. A central hub member 18 fitted to the transverse shaft 19 is substantially polygonal or circular in shape and is provided with a number of rearwardly inclined blades 20, the tips of which normally follow a path of relatively large diameter indicated by the dotted line 21, the lowest part of which lies just below the level of the bottom 11 as will be seen in Figure 1. When the boat is starting from rest it lies relatively deep in the water, with the result that the lower blades 20 are well submerged. Owing to the resistance offered by the water when the boat is getting up speed the blades 20, by virtue of their springy nature, are deflected rearwardly to the position indicated by the broken lines 20*a*, with the result that the diameter of the swept volume is considerably reduced as indicated by the dotted circle 22. This of course tends to relieve the load upon the driving means. Further, in order to reduce shock as much as possible, the sections 17 of the impeller are arranged so that the blades 20 are staggered, as will be seen in Figure 2, thus producing a very large number of small impulses for each revolution of the impeller. The blades 20 can taper if desired in thickness and/or width towards their outer extremities, and may be quite pointed in shape.

When the boat is well under way the forward velocity acting upon the bottom of the hull causes the latter to be lifted practically onto the surface of the water, with the result that only the tips of the blades 20 become immersed. The peripheral speed of the impeller is however very high, owing to the fact that the blades 20 assume their undeflected position, the blade tips following the relatively large circle 21 in Figure 3.

The bottom 11 of the hull is formed or fitted with a plurality of longitudinal ribs 23 and these largely prevent water from being displaced sideways when the boat is in motion, thus ensuring that the boat will rise in the water. Steering is effected by lowering one or other of a pair of plungers or equivalent members 24 and 25 adjacent the stern 15 of the hull 10. These members when in their fully raised position have their lower parts flush with the bottom 11, so as to preserve the streamline form thereof, but when lowered create drag which may be utilised either for

rounding a turn or for bringing the boat rapidly to a standstill.

It will of course be appreciated that the invention may be applied in ways other than that illustrated and that the accompanying drawing is regarded as being merely diagrammatic with a view to explaining the action of the improved arrangement. The bending back of the steel blades has the following three main advantages when starting up: firstly it temporarily reduces the depth to which the blades are immersed; secondly it temporarily reduces the driving diameter of each set of impeller blades until the boat has gained sufficient speed to rise; and thirdly the bending of the impeller blades under load has the effect of causing the tips to rise vertically out of the water when starting up, said blades however resuming their normal driving diameter when the boat has risen in the water and the resistance to forward progress is consequently reduced.

I claim:

1. In a flat bottomed hydroplane vessel, a horizontal shaft transverse to the keel line of the vessel, a rear paddle wheel mounted on said horizontal transverse shaft, a plurality of resilient blades on said wheel disposed at right angles to the plane of rotation of the wheel, said blades being deflected rearwardly by the resisting action of the water when the forward rotation of the paddle wheel is started whereby the effective diameter of the paddle wheel is reduced and its lifting action increased, said blades being restored to their normal position of full diameter when the vessel is travelling at speed on the surface of the water.

2. In a flat bottomed hydroplane vessel, a horizontal shaft transverse to the keel line of the vessel, a rear horizontally mounted paddle wheel, resilient blades disposed on said wheel at right angles to the plane of rotation of the wheel and tapered towards their outer extremities whereby the blades being deflected rearwardly by the resisting action of the water on forward starting and producing a maximum lifting effect, the extent of bending of the blades decreasing as the vessel rises on the surface of the water until the full diameter of the paddle wheel is regained when the vessel is traveling at speed on the surface of the water with only the pointed tips of the blades dipping therein.

3. In a flat bottomed hydroplane craft, a horizontal shaft transverse to the keel line of the craft, a horizontally mounted stern paddle wheel, blades of springy material secured to said wheel, said blades deflecting rearwardly by the resisting action of the water and exerting a lifting action on the rear of the vessel on forward starting changing to a forward propelling action when the vessel is at speed, said paddle wheel comprising a plurality of circumferential sets of blades disposed at right angles to the plane of rotation of the paddle wheel and the blades of each set being angularly displaced with respect to those of the other sets, and a plurality of longitudinal ribs along the under side of the boat, forming a number of parallel unobstructed channels in the same plane, with their rear ends immediately in front of the paddle blades to ensure that the tip of each blade immerses to the same depth when the vessel is being driven at speed.

4. In a flat bottomed hydroplane craft, a horizontal shaft transverse to the keel line of the craft, a horizontally mounted stern paddle wheel, blades of spring material secured to said wheel, said blades being deflected rearwardly by the resisting action of the water so that the paddle exerts a lifting action on the rear of the vessel on forward starting which changes to a forward propelling action when the vessel is at speed, said paddle wheel comprising a plurality of circumferential sets of blades disposed at right angles to the plane of rotation of the paddle wheel with the blades of each set angularly displaced with respect to those of the other sets, and a steering device constituted by a single pair of separately operable plungers at the rear part of the vessel one on each side of the longitudinal axis thereof adapted to be projected downwardly.

5. In a flat bottomed hydroplane vessel, a horizontal shaft transverse to the keel line of the vessel, a stern paddle wheel mounted on a horizontal transverse shaft, a plurality of sets of rearwardly inclined resilient blades on the wheel disposed at right angles to the plane of rotation, said blades being deflected rearwardly by the resisting action of the water on initial forward rotation of the wheel, whereby a maximum lifting action is obtained which gradually changes to propelling action as the vessel rises on the surface of the water with increase of speed, driving means for operating the said transverse shaft, a plurality of longitudinal ribs on the bottom of the vessel forming unobstructed passageways and a single pair of rear plunger members, normally flush with the bottom of the boat, which may be separately projected downwardly one on either side of the longitudinal axis of the vessel for steering purposes.

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