C. RUHE.

HYDROPLANE MACHINE.

APPLICATION FILED AUG. 10, 1915.

1,177,276.

Patented Mar. 28, 1916.

4 SHEETS—SHEET 1.

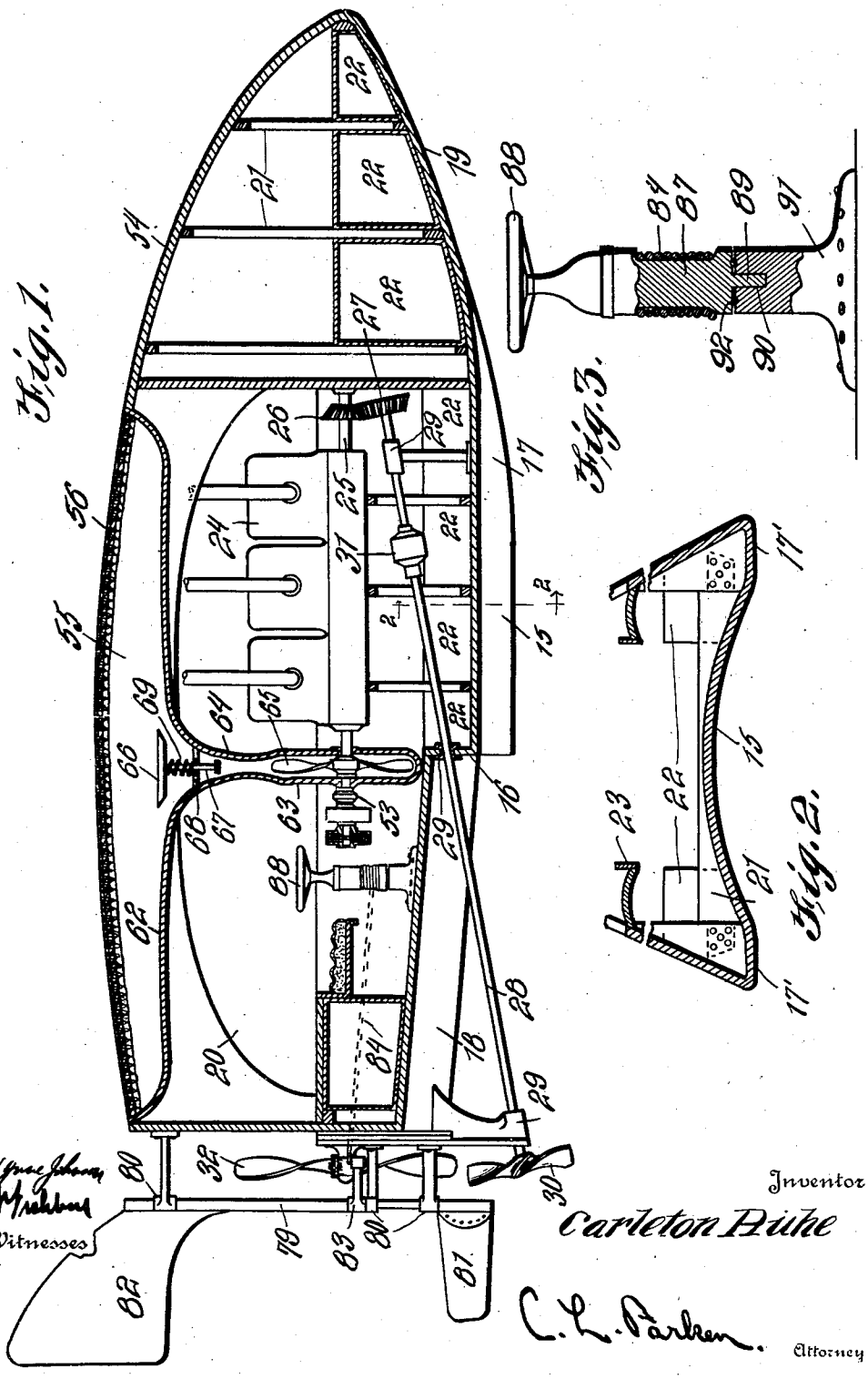


Fig. 1.

Fig. 3.

Fig. 2.

Witnesses

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4 SHEETS—SHEET 2.

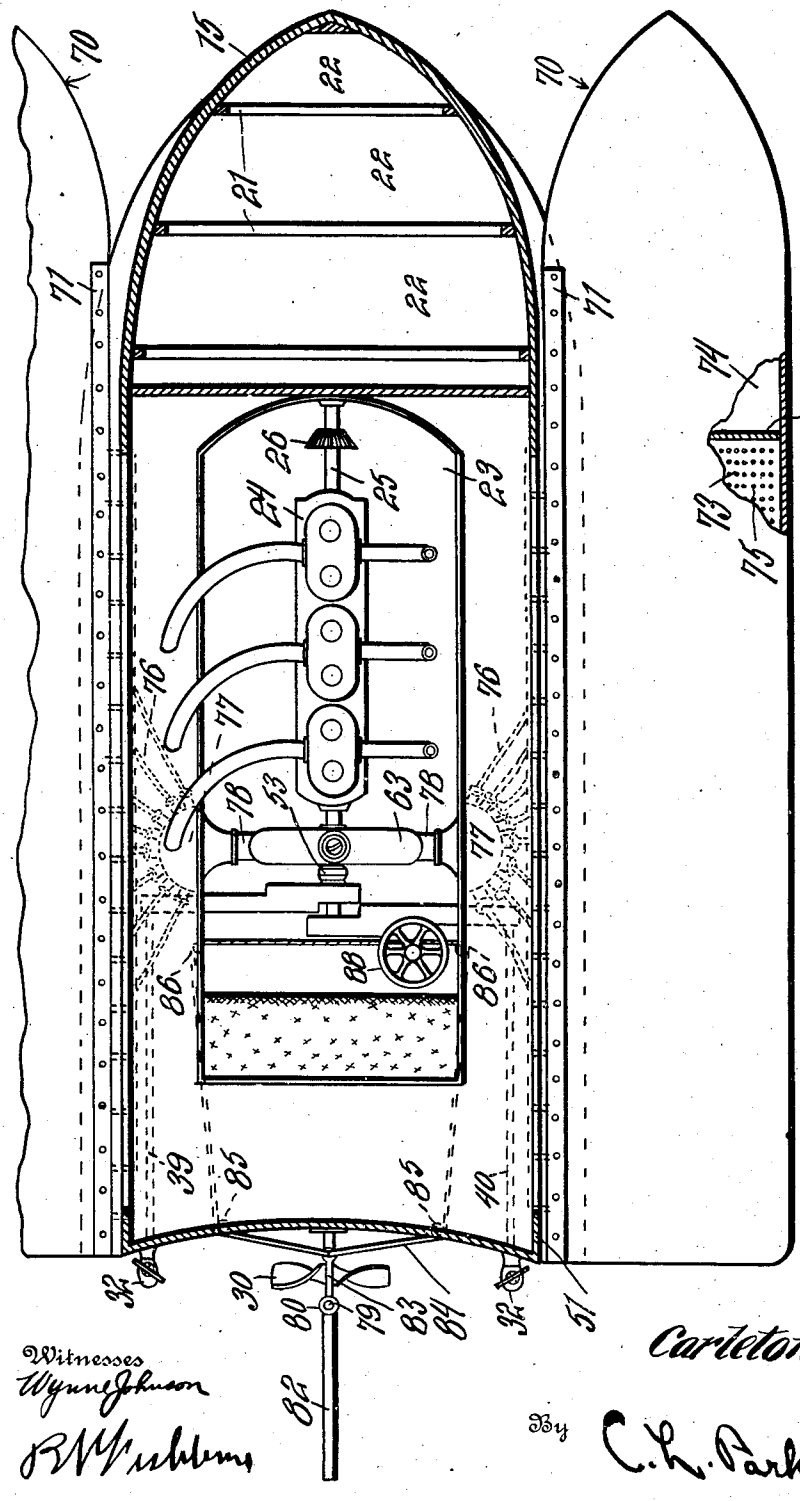


Fig. 4.

Witnesses

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4 SHEETS—SHEET 3.

Fig. 5.

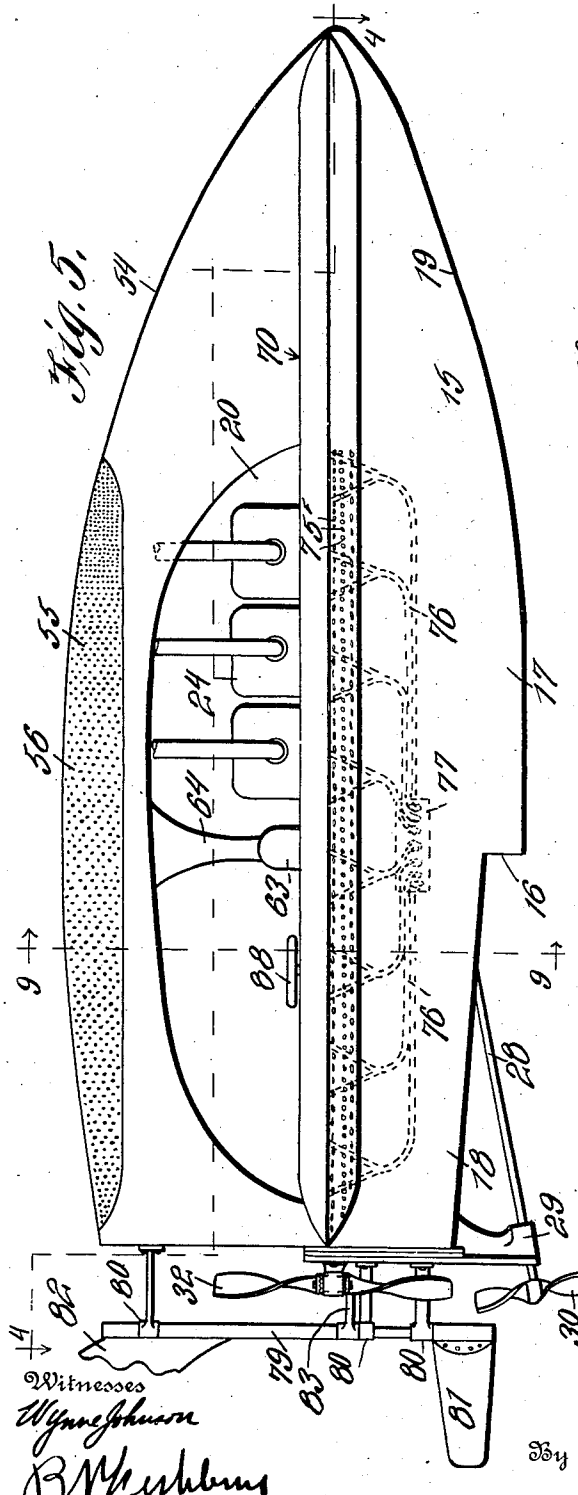


Fig. 8.

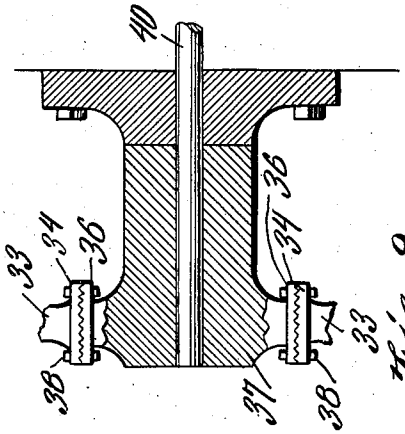


Fig. 7.

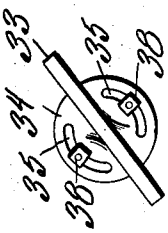
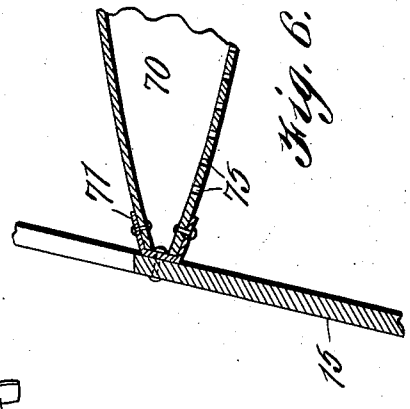


Fig. 6.



Witnesses

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4 SHEETS—SHEET 4.

Fig. 9.

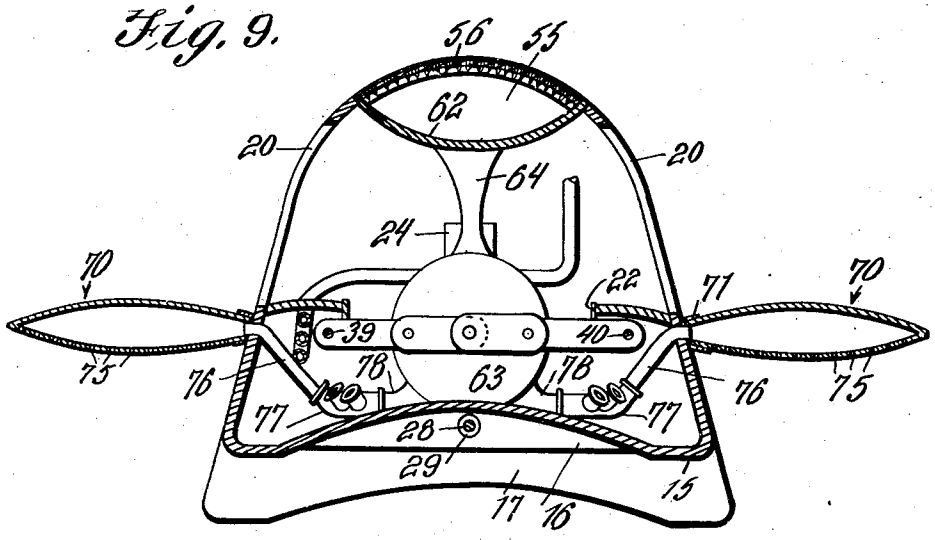


Fig. 10.

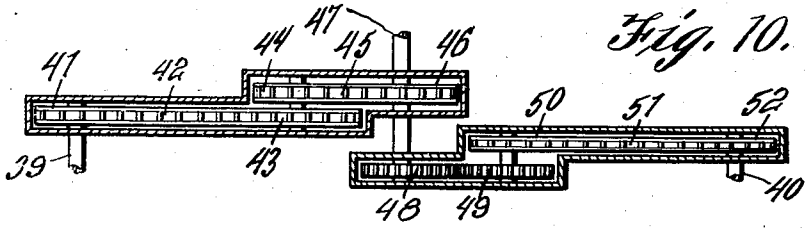


Fig. 11.

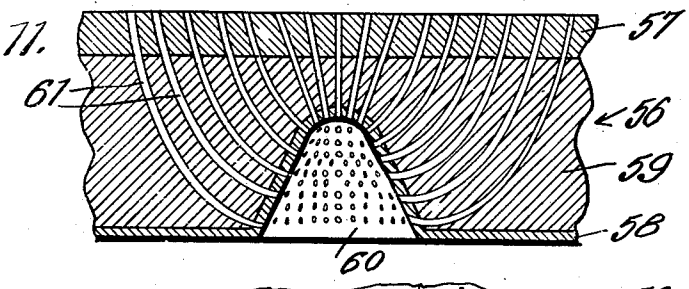
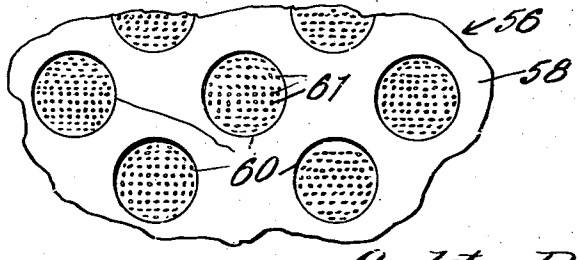


Fig. 12.



Witnesses

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UNITED STATES PATENT OFFICE.

CARLETON RUHE, OF OLEAN, NEW YORK.

HYDROPLANE-MACHINE.

1,177,276. Specification of Letters Patent. Patented Mar. 28, 1916.

Application filed August 10, 1915. Serial No. 44,744.

To all whom it may concern:

Be it known that I, CARLETON RUHE, a citizen of the United States, residing at Olean, in the county of Cattaraugus and State of New York, have invented certain new and useful Improvements in Hydroplane-Machines, of which the following is a specification.

My invention relates to improvements in hydroplanes.

An important object of the invention is to provide a hydroplane which may be driven at a high speed.

A further object of the invention is to provide suction means for partly elevating the hydroplane upon the water, causing the hull to have the minimum friction with the water.

A further object of the invention is to provide means for preventing the lateral tilting of the machine.

A further object of the invention is to provide means for supplying air between the contacting surfaces of the stabilizing wings and the water, whereby the friction between the same is reduced.

A further object of the invention is to provide highly efficient propeller means for the machine.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same, Figure 1 is a central vertical longitudinal sectional view through a hydroplane embodying the invention, Fig. 2 is a transverse sectional view taken on line 2—2 of Fig. 1, parts being broken away, Fig. 3 is a side elevation, partly in section, of a steering device, embodied in the invention, Fig. 4 is a horizontal sectional view taken on line 4—4 of Fig. 5, Fig. 5 is a side elevation of the machine, Fig. 6 is a detail section taken through the stabilizing plane attaching means, Fig. 7 is an end elevation of a propeller blade, Fig. 8 is a detail section through the propeller hub, Fig. 9 is a transverse sectional view taken on line 9—9 of Fig. 5, Fig. 10 is a plan view of transmission gearing, Fig. 11 is an enlarged detail section through a portion of the top wall of a vacuum chamber, and, Fig. 12 is a plan view of the same.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of my invention, the numeral 15 designates the hull of the machine or hydroplane, which is preferably formed of aluminum, while other suitable material may be employed. This hull is preferably of the same width throughout the greater portion of its length, having parallel sides 15′. The hull tapers at its forward end, as clearly shown in Fig. 4. The hull 15 has its bottom stepped, as shown at 16, providing a forward lower portion 17 and a rear elevated portion 18. These forward and rear portions are curved in cross section, as shown in Fig. 2, with their concave surfaces arranged outermost. The bottom of the hull is provided adjacent the forward end of the curved portion 17 with a transversely flat inclined portion 19, extending upwardly toward its forward end, as shown. The concave portions 17 and 18 form edges or runners 17′, upon which the hull travels, upon the speed of the machine increasing, there being a longitudinal air passage formed by the concave portions, whereby the air passes between the bottom of the hull and the water, thus reducing the friction to the minimum.

The hull 15 is provided upon its opposite sides with openings 20, while the top of the hull is preferably closed or covered. The hull 15 is provided with suitable interior frame work or reinforcements 21, as shown. The numeral 22 designates air tanks, suitably arranged within the hull and serving to prevent the machine from sinking, in the case of accident. The hull 15 is provided with a top opening 23, as shown in Fig. 4.

The numeral 24 designates an internal combustion engine of any well known or preferred type, which is suitably mounted within the hull and preferably disposed centrally thereof. This engine embodies a crank shaft 25, as shown.

Rigidly connected with the forward end of the crank shaft 25 is a bevel gear 26, driving a bevel gear 27, rigidly mounted upon a preferably inclined driving shaft 28. This driving shaft is journaled through suitable bearings 29 and has a submerged propeller 30 rigidly connected with its rear end. The driving shaft 28 extends longitudinally of the hull and through the stepped portion 16 whereby the propeller 30 is arranged at the rear end of the hull in the longitudinal axis thereof. The shaft 28 has

a friction disk clutch 31 connected therein, for controlling the rotation of the propeller.

Disposed adjacent the rear end of the hull 15 are semi-submerged or surface propellers 32, arranged upon opposite sides of the submerged propeller 30 and equidistantly spaced therefrom, as shown. Each of these propellers (see Fig. 7) embody blades 33, carrying at their inner ends heads 34, provided with curved slots 35. These heads are adapted to contact with heads 36, formed upon hubs 37. Bolts 38 are carried by the heads 36 and are adapted to enter the slots 35. It is thus apparent that the propeller blades may be angularly adjusted with respect to the hub 37 and rigidly locked thereto. The hubs 37 are rigidly connected with longitudinally extending driving or propeller shafts 39 and 40.

Rigidly connected with the inner end of the shaft 39 is a sprocket wheel 41, engaged by a sprocket chain 42, engaging a sprocket wheel 43. This sprocket wheel rotates a sprocket wheel 44, engaged by a sprocket chain 45, engaging a sprocket wheel 46, which is rigidly mounted upon a stub-shaft 47. The sprocket wheel 46 is of greater diameter than the sprocket wheel 44 whereby the propeller 32 will be rotated at a speed exceeding engine shaft speed. Rigidly mounted upon the stub-shaft 47 is a large gear 48, engaging a small gear 49, as shown. This small gear drives a sprocket wheel 50, engaged by a sprocket chain 51, extending outwardly for engagement with a sprocket wheel 52, which is rigidly mounted upon the shaft 40. The other propeller 32 will be driven at a speed exceeding engine shaft speed and preferably at the same speed as the first named propeller 32, but in an opposite direction. Any other suitable gearing may be interposed between the shaft 47 and shafts 39 and 40. The stub-shaft 47 receives rotation from the rear end of the crank shaft 25, through the medium of a friction disk clutch 53, which controls the operation of the propellers 32, as is obvious.

The top 54 of the hull 15 is provided with a vacuum chamber 55, as more clearly shown in Figs. 1 and 9. This vacuum chamber has a top 56 (see Figs. 9 and 11) comprising an outer wall 57, which is preferably formed of wood and an inner preferably metallic wall 58, providing a space therebetween which is preferably filled with plaster-of-Paris 59 or other cementitious material. The top 56 is provided with a large number of recesses, preferably arranged in staggered relation and containing vacuum cups 60, which are preferably conical and increase in diameter downwardly, as shown. Each vacuum cup is provided with a large number of apertures, as shown in Fig. 1, receiving the inlet ends of air tubes 61, passing through the wall 57 for communication with the atmosphere. At this point it might be stated that means is provided for creating a substantial degree of vacuum within the chamber 55 whereby the air is drawn in through the tubes 61, which tend to move the entire machine upwardly from the water, for a purpose to be described. The tubes 61 being small, they have substantial frictional contact with the air, which serves to lift or elevate the hull of the machine.

The vacuum chamber 55 embodies a bottom 62, communicating with a fan casing 63, through the medium of a connection 64. Rotatably mounted within the casing 63 is a fan 65, carried by the rear end of the crank shaft 25, such fan being preferably provided with clutch means, (not shown) whereby its rotation may be arrested without stopping the engine.

Arranged within the upper portion of the tube or connection 64 is a downwardly seating check-valve 66, carried by a stem 67, operating through guide means 68. The downward or closing movement of this check-valve is opposed by a suitably stiff coil spring 69. The function of this valve is to regulate the degree of vacuum which will be created within the chamber 55 by the operation of the fan 65 and when this degree of vacuum exceeds a predetermined limit the check valve 66 will close thus breaking communication between the fan chamber 63 and the vacuum chamber 55.

Disposed upon opposite sides of the hull 15 are stabilizing planes or members 70 which are preferably rigidly secured to the sides of the hull by angle irons 71, or the like, as shown more clearly in Figs. 6 and 9. Each of the stabilizing planes 70 is hollow and tapers at its forward end and is provided near and spaced from this forward end with a transverse partition 72 (see Fig. 4) providing separate chambers 73 and 74, having no communication. The chamber 73 has its bottom wall provided with apertures 75, which are preferably uniformly distributed throughout the greater portion of its area and adapted to discharge air downwardly. The interior of the chamber 73 has communication with a suitable number of air supply pipes 76, which are connected with a header 77, in turn connected with an air outlet pipe 78 of the fan casing 63. It is thus apparent that the air which is drawn into the fan casing is discharged into the chambers 73 of the stabilizing planes 70 and passes therefrom through the apertures 75 in a downward direction. The function of the stabilizing planes 70 is to prevent undue tilting of the hull or machine and the function of discharging the air from the apertures 75 is to lubricate the lower surface of these planes, preventing undue friction between them and the surface of the water, the air forming in

effect a blanket for covering the contacting surfaces of the planes.

The steering means for the machine embodies a vertical shaft 79, disposed at the rear end of the hull and journaled through bearings 80, rigidly attached thereto. Rigidly connected with the lower end of the shaft 79 is a water direction rudder 81 and an air direction rudder 82 is rigidly connected with the upper end of the shaft 79 and preferably extends above the top of the hull. Rigidly connected with the shaft 79 is an inwardly extending crank 83, (see Fig. 4) connected with a cable 84, extending upon opposite sides thereof. This cable is passed about pulleys 85 and 86 and is connected with a drum 87, so that one portion of the cable is wound thereon while the other portion is unwound therefrom, whereby rotation of this drum will swing the crank 83 in the desired direction. The drum 87 is preferably turned by a hand wheel 88. The drum 87 is preferably vertically arranged and carries a depending cylindrical shaft 89, rotatably mounted upon a vertical opening 90 formed in a base or pedestal 91, rigidly secured to the bottom of the hull, as shown. Bearing balls 92 are preferably disposed between the adjacent ends of the drum 87 and the pedestal 91, as shown.

The operation of the machine is as follows: When the engine is operating, the rotation of its crank-shaft is imparted to the submerged propeller 30 and the semi-submerged or surface propellers 32. The semi-submerged propellers are preferably driven at a much greater speed than the submerged propeller and these semi-submerged propellers are preferably rotated at the same speed and in opposite directions with relation to each other. These propellers serve to effect the longitudinal travel of the machine. During this operation the fan 65 creates a substantial vacuum within the chamber 55, which causes air to be drawn in through the small tubes 61. The air passing through these small tubes has substantial frictional engagement therewith and produces a gripping effect which tends to elevate the entire hull of the machine. In this manner the hull is aided in its elevating movement as the speed of the machine increases, thus tending to raise the hull so that air is free to circulate through the passage provided by the transversely curved bottom of the boat. It is thus apparent that the entire hull is elevated and when the proper speed is obtained the hull will only contact with the water at the edges or runners 17'. The air which is drawn into the chamber 55 is discharged into the chambers 73 of the stabilizing planes, and is forced through the apertures 75. When these stabilizing planes contact with the surface of the water upon the tilting of the hull, the air passing through these apertures serves to lubricate the contacting surface of the planes thus reducing the friction to the minimum. The longitudinal travel of the machine with respect to right or left may be conveniently controlled by proper manipulation of the hand wheel 88, which will shift the direction rudders 81 and 82 in the desired direction.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described the invention, I claim:

1. In a hydroplane of the character described, a hull, propelling means therefor, a stabilizing plane connected with the hull and adapted to contact with the water, and means for forcing air between the stabilizing plane and the surface of the water.

2. In a hydroplane of the character described, a hull, propelling means therefor, a stabilizing plane connected with the hull and provided upon its lower contacting surface with air outlet means, and means to supply air to the air outlet means.

3. In a hydroplane of the character described, a hull, propelling means therefor, stabilizing planes arranged upon opposite sides of the hull and connected therewith and having their lower contacting surfaces provided with apertures, and means to force air outwardly and downwardly through the apertures.

4. In a hydroplane of the character described, a hull, propelling means therefor, hollow stabilizing planes arranged upon opposite sides of the hull and connected therewith and having their lower contacting surfaces provided with apertures, and means to supply air under pressure into the propeller stabilizing planes.

5. In a hydroplane of the character described, a hull, a vacuum chamber disposed upon the upper portion of the hull and having its upper side apertured, propelling means for the hull, and means for creating a vacuum within the vacuum chamber.

6. In a hydroplane of the character described, a hull, a vacuum chamber disposed upon the upper portion of the hull and having its upper side apertured, a suction pump having means of communication with the vacuum chamber, and a valve arranged in the means of communication and adapted to automatically close when the vacuum within the chamber exceeds a predetermined degree.

7. In a hydroplane of the character described, a hull, a vacuum chamber disposed upon the upper portion of the hull and having its upper side apertured, a suction pump

having its inner end connected with the vacuum chamber, stabilizing planes connected with the hull and provided with apertured air receiving chambers, means of communication between the outlet side of the pump and the air receiving chambers of the planes, and propelling means for the hull.

8. In a hydroplane of the character described, a structure to travel upon the water, a vacuum chamber arranged above the structure and connected therewith and having its top provided with openings, vacuum cups arranged within the openings and having apertures, tubes communicating with the vacuum cups and the atmosphere, and means to create a vacuum within the vacuum chamber.

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

CARLETON RUHE.

Witnesses:
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JAMES L. CRAWFORD.