SUSTAINING AND PROPELLING MEMBER FOR FLUID SUSTAINED CRAFT

Filed June 8, 1934 4 Sheets-Sheet 1

Fig. 1.

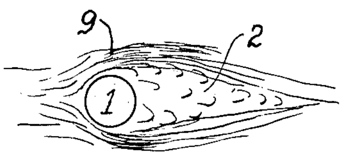


Fig. 2.

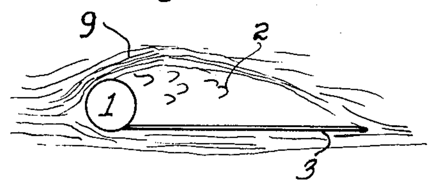


Fig. 3.

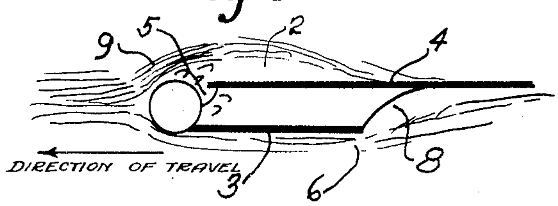


Fig. 4.

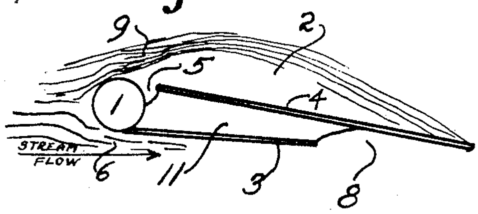


Fig. 5.

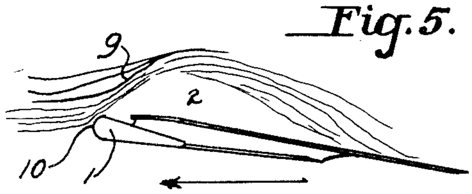


Fig. 6.

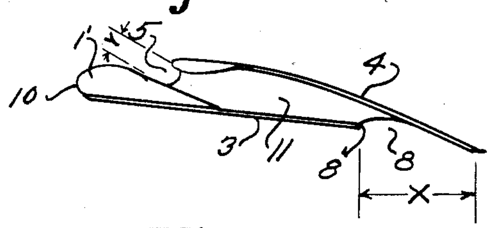


Fig. 7.

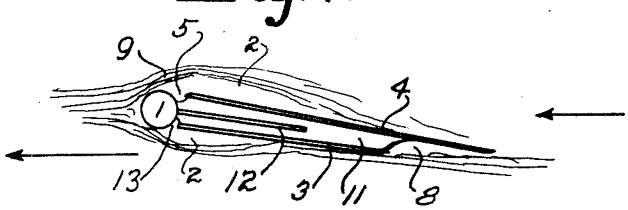


Fig. 8.

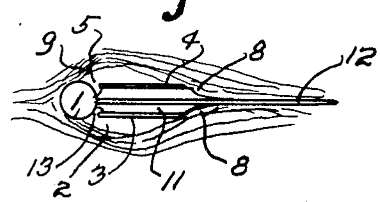


Fig. 9.

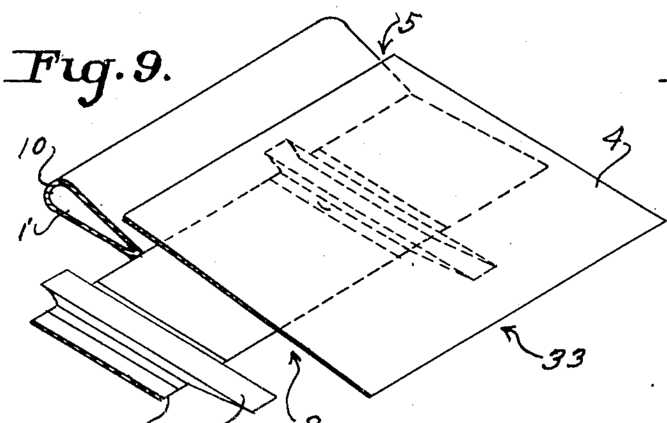
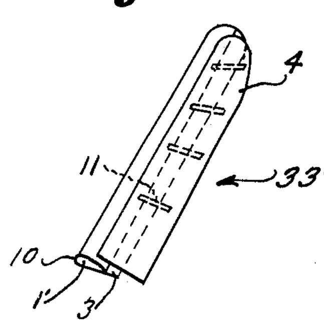


Fig. 10.



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Julius J. Novak.

Aug. 15, 1939. J. J. NOVAK 2,169,325

SUSTAINING AND PROPELLING MEMBER FOR FLUID SUSTAINED CRAFT

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Fig. 11.

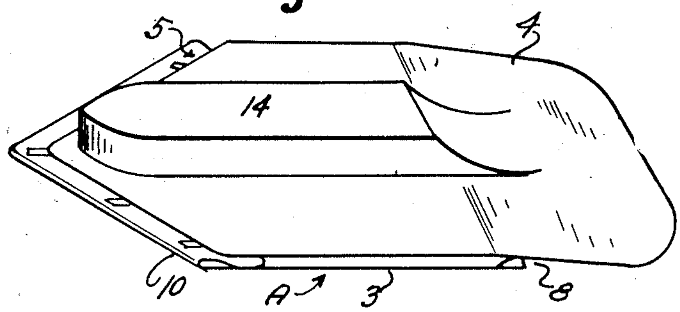


Fig. 12.

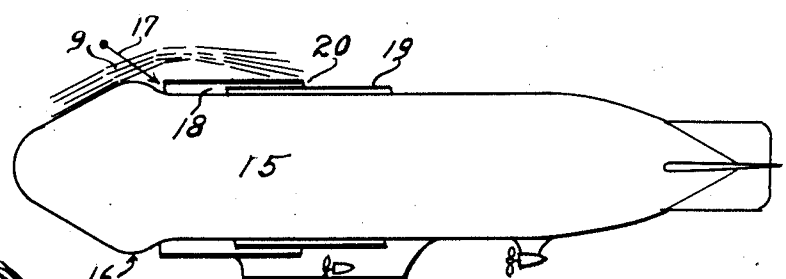


Fig 13.

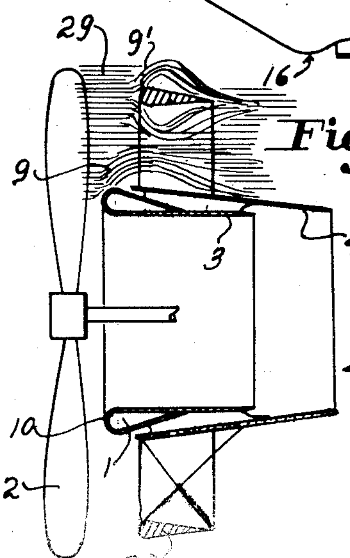


Fig. 14.

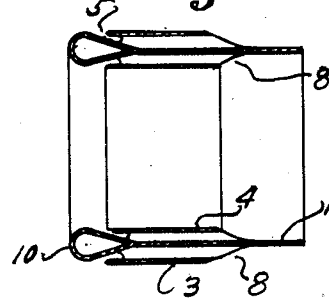


Fig 15.

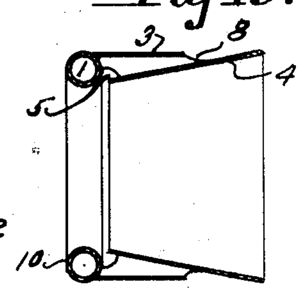


Fig. 17.

Fig. 16.

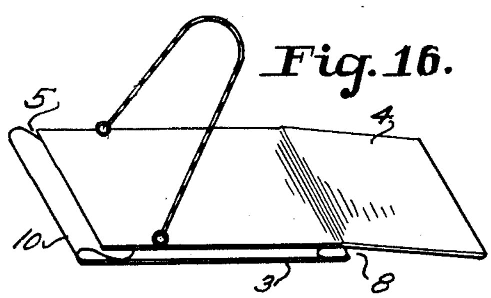
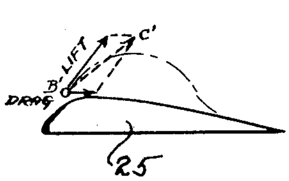


Fig. 18.



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SUSTAINING AND PROPELLING MEMBER FOR FLUID SUSTAINED CRAFT

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Fig. 19.

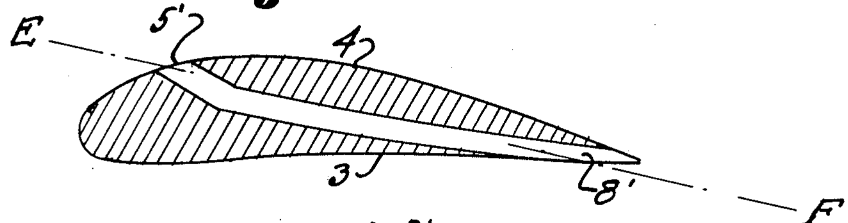


Fig. 20.

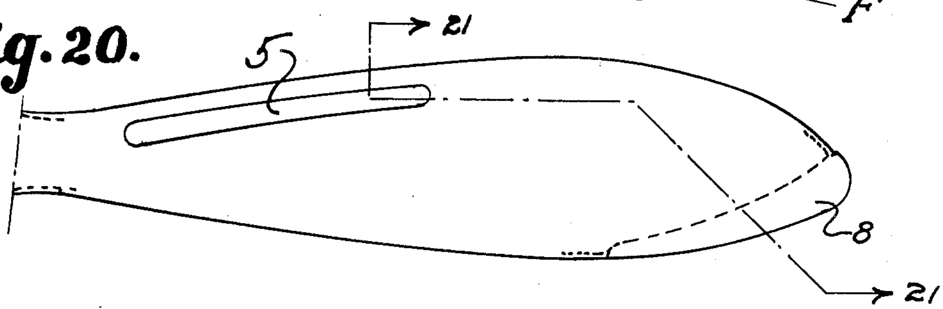


Fig. 21.

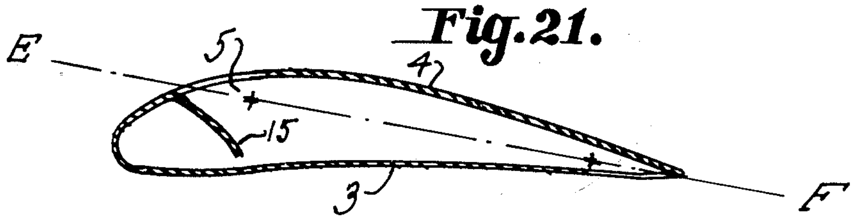


Fig. 22.

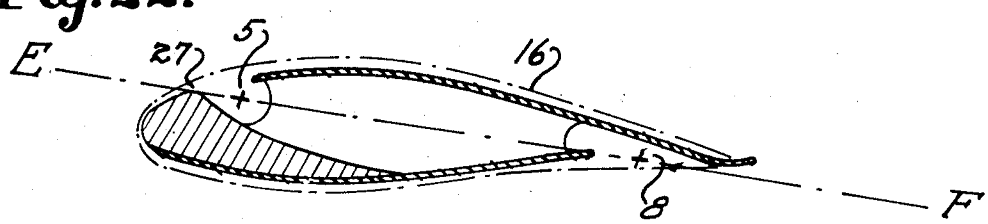
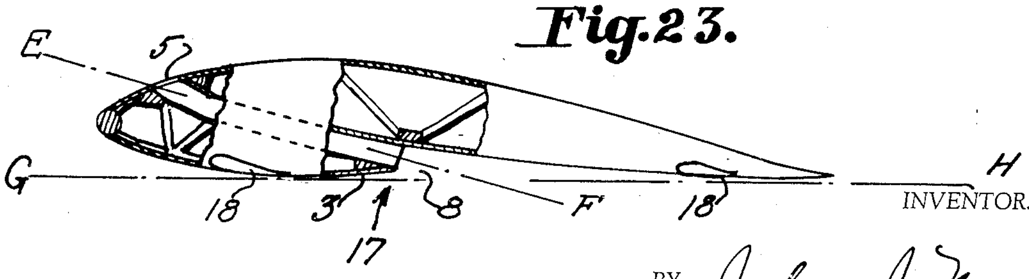


Fig. 23.



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Aug. 15, 1939. J. J. NOVAK 2,169,325

SUSTAINING AND PROPELLING MEMBER FOR FLUID SUSTAINED CRAFT

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Fig. 24.

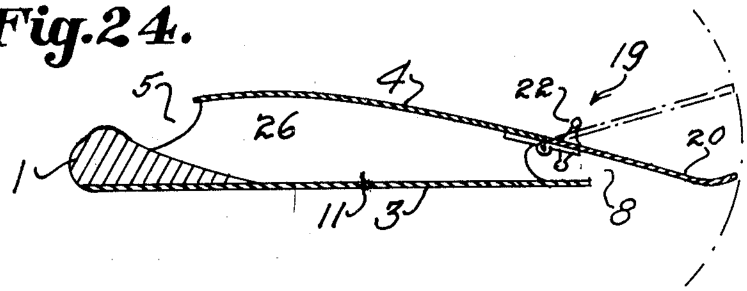


Fig. 25.

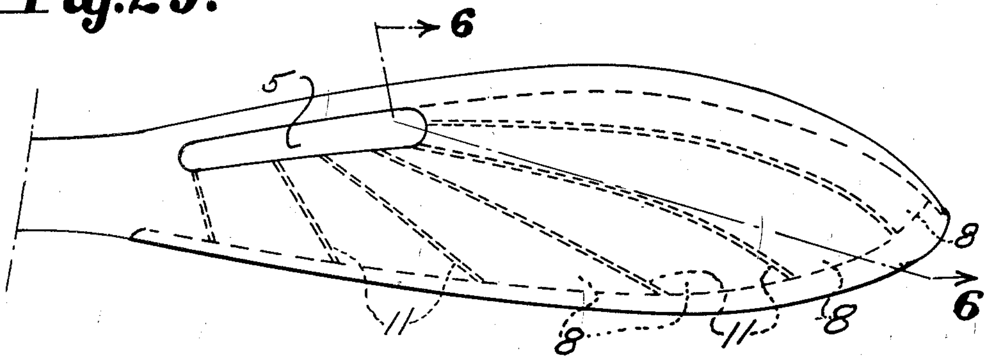


Fig. 26.

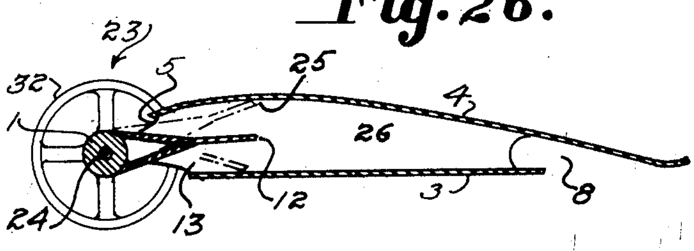
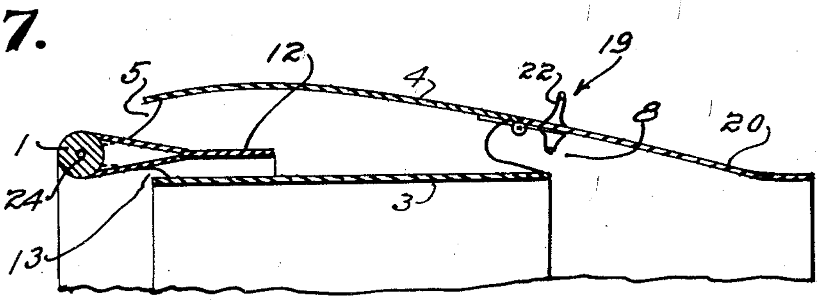


Fig. 27.



INVENTOR.

BY *Julius J. Novak.*

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Patented Aug. 15, 1939 **2,169,325**

UNITED STATES PATENT OFFICE

2,169,325

SUSTAINING AND PROPELLING MEMBER FOR FLUID-SUSTAINED CRAFT

Julius J. Novak, Cleveland, Ohio

Application June 8, 1934, Serial No. 729,566

20 Claims. (Cl. 244—40)

This invention relates to fluid-sustained craft such as aircraft or water craft, and it refers particularly to sustaining surfaces, wings and propellers for such craft for taking advantage of a newly discovered and important aero-dynamic principle. This application is a continuation in part of my application Serial Number 554,990, filed August 4, 1931.

A purpose of this invention is to create a wing, propeller or the like which will be acted upon by a novel combination of several forces generated during flight.

There is here disclosed how a streamlined object will move with little resistance through a fluid and in conjunction with such streamlining, how to take advantage of a deflected fluid or air wall generated at the leading edge during flight by means of a siphon-suction force which is generated by the disclosed novel devices, and which force cooperatively functions with the air wall generated by such forms of a leading edge of a streamlined body, wing or propeller for producing a new and useful result.

It is believed that the air or fluid flowing past a novel wing or propeller as here disclosed will be deflected at the leading edge and return to the wing or propeller form to flow adjacent the trailing edge when it will create a siphon effect through certain exhaust passages and also an attraction or venturi-like pull on the deflected air stream thereby also increasing the vacuum effect and aiding the area of low pressure above and about the leading edge to create a negative drag. The attraction of the siphon-suction force or Venturi-like action through the forms here disclosed is believed to be substantially at right angles to the direction of flow of the deflected air wall, so that an outward or forward pull to the deflected airflow, is the resultant of all the forces generated.

The cooperative forces here above explained will be referred to as the siphon-suction principle.

This invention provides to imitate mechanically the forward structure and air passages of a bird's wing by providing a sustaining cell with a siphon or exhaust terminus and a forward suction or intake port cooperative with an air wall generated and deflected by the leading edge.

An object of the invention is to utilize the fluid stream flowing past a moving surface and a fluid wall deflected at the leading edge thereof to cooperatively increase the efficiency of the moving surface as a sustaining or propelling means.

Another object is to provide a structure of the above mentioned character wherein another force is automatically created while in flight in the air or during motion in a body of water.

Another object is to provide such devices having particular utility in aviation and nautical units of various kinds.

Another object is to reduce the noise usually associated with a propeller.

In order to make my invention more clearly understood, I have shown in the accompanying drawings means for carrying the same into practical effect without limiting the improvements in their useful applications to the particular constructions, which for the purpose of explanation have been made the subject of illustrations.

Figs. 1 to 3 illustrate the construction as evolved in Fig. 4.

Fig. 5 is a cross section of one form of an airplane wing or propeller blade.

Fig. 6 illustrates the invention in another form of a wing or propeller section.

Fig. 7 is a modification.

Fig. 8 shows the invention adapted to streamline a round member.

Fig. 9 is an enlarged view of a wing cell for airplane wings or propeller blades.

Fig. 10 is an airplane or helicopter propeller blade embodying the principle of the invention.

Fig. 11 is an embodiment of the invention associated with a hull, pontoon or the like.

Fig. 12 illustrates the invention applied to the surface or form of an airship.

Fig. 13 is an adjustable cowling related to the functioning of a propeller.

Figs. 14 and 15 are embodiments of the invention adaptable to a cowling structure.

Fig. 16 is the sustaining cell applied to a surf board.

Figs. 17 and 18 are vector diagrams and wing forms to illustrate comparatively the siphon pull principle.

Fig. 19 is a cross section through a solid form of a propeller.

Fig. 20 is a plan view of a hollow type propeller blade embodying the invention.

Fig. 21 is a cross section taken on the line 21—21 of Figure 20.

Fig. 22 is illustrative of Figure 6 and the relation of the ports to each other.

Fig. 23 is a novel pontoon or hull employing the principle of the invention in a useful manner.

Fig. 24 illustrates a flexible portion.

Fig. 25 is a plan view of the cross sections shown in Figs. 5 and 6.

Fig. 26 illustrates a means of varying the ports.

Fig. 27 is a modification of a cowling.

Referring particularly to the drawings:

Fig. 1 illustrates a round member 1 in a fluid stream and the deflected fluid wall 9 converges in the slip stream of the member 1 in such a manner as to produce a drag on the round member while passing through a fluid. This figure is illustrative of the common action of round members passing through a fluid as generally understood by the art, that is of the area of drag or area of low pressure 2, which forms in the after path of such a round member.

Fig. 2 shows the effect of a plane member 3 on the area of low pressure when added to the after side of the round body 1 and which curtails and limits the suction drag effect 2 and converts the same partially to a lifting effect relative to the plane 3 and the member 1.

Fig. 3 illustrates a further control of the area of low pressure 2 by the addition of a second plane member 4. The turbulence or burbling in the area 2 is greatly reduced and the small eddies are immediately absorbed through the intake or suction port 5 by the force of the siphoning action of the cooperating fluid stream 6 passing the trailing siphon port 8.

In Fig. 4 the surface members 3 and 4 are shown inclined in relation to each other, so that the outline of the airfoil form as shown is substantially equivalent to a cross section of a conventional airfoil or propeller section, that is the point of highest camber is approximately one-third or two-fifths of the chord. The siphon or exhaust port 8 is consistent with the lower surface 3 and the terminus of the upper surface 4 and illustrates a generated air wall 9 which creates an area of low pressure 2 above the wing or propeller form, such that all the parts in their cooperative action through a fluid stream will form an area of low pressure 2 above the wing in a manner equivalent to that created by a conventional wing form for producing the forward lift effect. The action of the ports 5 and 8 distinguish this novel type of wing or propeller form from the conventional type in that the stream flow causes a siphon action at the port 8 thereby resulting in a Venturi action or suction through the intake port 5 and a pull or an attraction on the air wall 9 in addition to the conventional lift effect. The rib 11 serves to secure the surface members 3 and 4, and the round or bulbous member together.

In Fig. 5 the leading edge member 1' is substantially streamlined in such a manner that the fluid wall 9 created by the fluid stream impinging on a blunt type of a leading edge 10 is brought in closer relation to the siphon pull action generated through the ports 5 and 8. The turbulence and eddies disappear and are diverted in such a manner as to produce by their velocity an added action on the airstream wall 9. The siphon pull action herein explained cooperatively serves to employ the force of its attraction to the deflected fluid wall 9 in such a manner that the forced velocity of the air wall is as a solid element to the siphon pull component constantly present before the port 5 during the action or flight of the novel airfoil form. This attraction of the siphoning pull to the fluid mass results in a forward and upward lift to the novel airfoil form or propeller imitative of that force believed to be present at the forward portion of a bird's wing. The parts 1', 3 and 4 are mechanical imitations of the structure of a bird's wing and which are placed in the same cooperative relation to each other and the forces generated so as to induce the siphon pull to function with the assistance or action of the passing fluid stream at the terminus port 8.

Fig. 6 is illustrative of a wing or propeller section of substantial airfoil outline and which has the entrance to the suction port 5 formed with a bulbous or blunt edge and streamlined within the confines of an airfoil cross section. The bulbous leading edges merge into the surfaces 3 and 4 and into the contour of the streamlined form. A hollow rib 11 may be employed to maintain the members 1', 3 and 4 in secured and spaced relation.

It is well known that for any propeller of airfoil outline or streamlined form, whether it be intended for service in gases or liquids, the greatest thickness of the blade must, for proper streamlining effect, be located at determinable points intermediate the leading and trailing edges of the blade. In general terms, the proper position for the points of greatest thickness in an airfoil has been defined approximately two-fifths of the entire chord of the airfoil, measured from the leading in the direction of the trailing edge. In that position not only is a proper streamline effect achieved, but also the portion of greatest thickness (and consequently of greatest strength) coincides approximately with the center of thrust of the airfoil. The same is true of propellers which are to be used in liquids, such for example, as ship propellers.

Fig. 7 illustrates a modification of the invention by attaching an intermediate member 12 between the surfaces 3 and 4 and to the leading edge member 1 in such a manner that another suction port 13 is provided at the under side of the wing or propeller form. In this type of wing form a single siphon port 8 cooperates with the two suction ports 5 and 13 in a manner that the attraction for the deflected air wall is divided and acts about the leading edge, thereby aiding to accelerate this form in the direction of flight as indicated by the arrow. The leading edge 1 may be of any tubular, solid, blunt or bulbous member.

Fig. 8 illustrates the natural aerodynamical streamline fluid deflection formed about a bulbous or blunt leading edge member 1 when associated with two surfaces 3 and 4 which are fixed in opposite relations to each other and an intermediate member 12 secured thereto, and extending rearwardly therefrom. The rib members 11 secure the surface members and the leading edge member in such a relation to each other so as to form passages for inducing therebetween a siphon pull effect on the divided deflected stream 9 at and about the leading edge member 1. The illustration of Fig. 8 is also explanatory of employing the siphon pull principle to any round form such as a strut engine cylinder, etc. The slip stream engaging the surfaces of this novel form at and about the ports 8, cause a siphoning or Venturi action through these ports which cooperate with the forward ports 5 and 13 resulting in a forward or accelerating movement of the whole form towards the generated wall 9. This disclosure may be employed also either as a wing form or a propeller blade and so designed that the associated parts may be formed within the confines of a streamlined form.

Fig. 9 is an enlarged view of one manner of constructing a wing or propeller blade 33, and discloses a hollow rib 11, upper member 4, and lower member 3 with a leading tubular member 1' shown in perspective.

Fig. 10 illustrates the construction of Fig. 9

as adapted to a propeller blade 33' for air or water use and also may be adapted as a sustaining air screw of helicopters.

Fig. 11 illustrates the invention adapted to a hull or pontoon 14 of an airplane and the like. The sustaining cell A is submerged until forward movement of the hull by suitable propelling means, when the siphon effect through the passages and ports causes a suction and upward stress at the forward port 5. The hull is thereby raised to the water surface and skims along the surface of the water supported on the attached cell A. The hull 14 is submerged and supports the load when there is no action or movement and the sustaining cell A supports the hull and the load on the surface of the water during forward motion. The bottom surface of the sustaining cell A may also be formed of upwardly or downwardly converging sides forming a V bottom or an inverted V bottom to the hull or may be of curved surfaces.

Fig. 12 illustrates the invention adapted to the sides of an airship 15 the head portion 16 of which is shown slightly increased in diameter so that the deflected air stream wall 9 may pass at an angle to the siphon pull 17 indicated by an arrow, and which is generated through the air channels 18 surrounding the airship. These siphon channels 18 constituting siphon pull cells may be located at the side of the gas bag 15, or cover a portion only. Another member 19 may be inserted to provide gradual decreasing of the step 20.

Fig. 13 illustrates novel cowling 21 of the present invention, behind a propeller and in the slip stream of the propeller blades 22 so that the velocity of the slip stream 29 meets at an angle the air wall 9 created by streamlined annular cowling members, thereby causing a reaction to the propeller from this deflected air wall so that the thrust of the propeller on an airplane is increased. Another ring member 28 is disposed in a movable manner in the propeller slip stream for creating additional fluid wall annular areas 9 in the path of the slip stream 29 for increasing the speed of an airplane. The cowling members here disclosed may be adjustable in relation to the plane of the propeller for varying the action created therebetween.

The inner cowling has a leading edge comprised of a tubular or blunt portion 1, an inner annular ring 3 and an outer member 4, so related in the cross sections thereof as to conform to the wing form disclosed in Fig. 9. In this illustration the siphoning port 8 is interior of the cowling 21. A reversal of the location of the ports 5 and 8 may be adapted.

Fig. 14 is another form of cowling employing the construction in cross section as that disclosed for Fig. 8, that is, aerodynamically functioning in the manner descriptive of Fig. 8.

Fig. 15 is a modification of the cowlings of Figs. 13 and 14 and of the leading tubular form for deflecting the fluid stream and illustrates a reversal of the ports 5 and 8 of the cowling shown in Fig. 13, so that the siphon pull action is caused to function internally about the leading edge member 1. Adjustable means may be provided to vary the distance of any of the cowling members as shown in Figs. 13, 14, and 15 from the propeller. The cross sections of these forms of cowlings may also be substantially of airfoil contour.

Fig. 16 illustrates with a simple device the siphon pull principle as applied to a surfboard. In cross section this surfboard as here illustrated is equivalent of either forms as disclosed by Fig. 4, 5, or 6. During forward movement of this novel surfboard the forward portion will automatically be drawn to the surface of the water by the siphon pull action induced by the force of the water passing the step 8.

Fig. 17 illustrates diagrammatically by a vector diagram the resultant of the siphon pull principle as applied to a wing form of the present invention. The area of low pressure above a wing of this type is aided in its lifting action in a manner as to produce a decrease of wind drag or resistance, or an equivalent of a negative drag. The reaction of the siphon pull on the forward fluid wall is responsible for a high lift effect as approximately shown by the vector B—C, and its direction of stress is very advantageous to a wing lift.

Fig. 18 refers to a conventional form of a wing 25 and also the lift and drag forces which are approximately shown by a vector diagram for comparison with the wing form shown in Fig. 17. These vector diagrams are merely illustrative of the forces apparent in a wing while in flight and are here shown for descriptive analogies only. In this form of wing 25 the area of low pressure by its height and turbulence creates a back drag on the upper wing surface. In my form of wing this area is greatly reduced with an increase of lifting forces introduced by the new siphon pull principle cooperative with a generated fluid wall.

Referring to Fig. 6 it will be noticed that the siphon port 8 is of greater width X, than the width Y, of suction port 5 to induce a strong Venturi action between the surface members 3 and 4 and the inclined or parallel relation of the siphon port 8 to the direction of travel avoids retarding drag to the whole cell member. The inner edge 8' is analogous to a step in hulls of speed boats. A gradual decrease of this step may be provided as by the insertion of another member 19 as shown in Fig. 12.

A conventional cross-section of a solid propeller is illustrated in Fig. 19 and suggestive of a Clark "Y" airfoil. The apertures or passages 8' and 5' may be formed through the propeller at spaced distances so as to comprise a series of suction ports 5 and siphon ports 8 along the leading and trailing edges which will employ the siphon pull action cooperative with a deflected air wall generated by the leading edge for increasing the propeller efficiency and silencing the same during operation.

Fig. 20 is one form of a hollow blade propeller for employing the explained combination of forces which cooperate with the air stream to produce the siphon suction effect and adding their reaction by means of a discharge opening 8 at the blade tip to accelerate the blade in a rotative and forward direction during flight. The propeller blade shown in Fig. 20 discloses a suction or intake port 5 at an intermediate portion of the blade length for cooperation with a fluid wall generated thereabout. The siphon discharge opening 8 at the tip portions thereof permits the entrapped air or fluids to exit therefrom in a forceful state, caused by the centrifugal forces generated on the fluid in the propeller during rotation thereof, thereby also aiding to accelerate the propeller in a direction of the line of flight.

Fig. 21 is a cross section through the hollow blade form shown in Fig. 20, and is taken on the line 21—21 to disclose the relation of the ports within the confines of the streamlined form, and to the line E—F. The leading edge may be perforated or cut a short distance near the highest point of camber and a portion 15 of the upper surface 4 turned or bent inwardly toward the lower surface. A line E—F drawn through the axis of the siphon and suction ports 5 and 8 respectively will be substantially tangent to a surface of the entrance to the suction port 5. The openings 5 and 8 are adapted to function cooperatively for causing the siphon pull effect to become active therebetween.

The noise associated with a conventional propeller is believed to be due to the collapse of the air wall upon an area of low pressure or partial vacuum which is repeatedly and progressively formed at the forward side of a propeller while revolving about its shaft center. The area of low pressure is encompassed by the air mass 9 and the upper surface of the propeller blade. This built up low pressure area within the air mass tries to travel with the propeller blade but is withheld and severed from the propeller blade by the inertia of the air mass 9 and by the resistance of the oncoming airstream, thereby a sudden and complete departure of the propeller blade from the deflected air wall and low pressure area causes a collapse of the air wall upon the low pressure area in a manner that a sharp report to follow similar to the snap produced at the end of a long whip when it is whipped through the air. A propeller blade upon losing its combination of compressed air and low pressure area immediately forms another so that in successive stages during the propeller revolutions, the air wall 9 and the area of low pressure is gradually built up and then suddenly caused to collapse when released. This invention provides the creating of an area of low pressure and by means of the continuity of the suction force present at the forward side of the blades due to the openings therein, causes a continuity of the vacuum state in a decreased form about a propeller and the departure of the area of low pressure is retarded and not complete, thereby silencing the breakdown of compressed air or contraction of the departed low pressure area and causing the area of low pressure to leave the blade in a protracted or gradual state.

The novel propeller illustrated in Figs. 20 and 21 may be formed with apertures through the blade at various sections or with aperture means attached which will function in the same manner to produce a siphon pull effect with cooperation of the air-stream and a generated air wall. This type of propeller may also be formed with a flexible wing tip for effective purposes.

To summarize all of the advantages of the invention, a propeller blade of the instant invention, when set at a certain angle of attack and formed to operate with applicant's principle of siphon-suction will employ during rotational action three forces, that is the siphon-suction principle, the conventional screw action, and the reaction at the propeller tip portions due to the velocity of the entrapped fluid leaving the terminus ports under the influence of the centrifugal force generated during the propeller blade rotation.

Fig. 22 is similar to the designs of the propeller and wing forms shown in Figs. 5 and 6 and more clearly illustrates the relation of the working parts of the airfoil form as being consistent with the outline of a conventional streamline form 16 circumscribed thereabout. The line E—F drawn through the axis of the siphon and suction ports illustrates the ports thus formed will have a surface of the suction or intake port 5 substantially tangent with the line E—F drawn through the axis of the ports.

Fig. 23 discloses a pontoon or hull 19 having a siphon port 8 in the step 17 of the bottom surface 3 and a suction port 5 adjacent the nose or leading edge. The ports thus formed are equivalent in their relation to each other and to the surface of the leading edge in the same manner as explained of the ports in Figs. 21 and 22, and as further illustrated by the line E—F drawn through the ports 5 and 8. Attached cells 18 of streamline contour as shown may be attached at a certain point adjacent to the bottom surface 3 between the leading edge and the step 17 and another is attached near the stern. These attached surfaces may be formed with applicant's ports to employ the siphon-suction principle as explained for any of the streamlined above Fig. 6, 7 or 8. This hull 19 when in action will lift from the waters by the forces acting through the ports and will be raised substantially to a plane G—H, so that the hull will glide on the water surface on the attached cells 18. When applied to a pontoon, the attached cells 18 and the ports 5 and 8 formed through the pontoon will serve advantageously to aid in the efficiency of the structure while in flight in the air currents.

The novel forms of propeller blades shown and here described may advantageously be used in devices of various kinds such as blowers, super-chargers, pumps, etc. The propeller blade is here claimed independently with relation to its future various applications.

Figs. 19 and 20 illustrate the invention in one of its simplest forms. Fig. 19 is a cross-section of a conventional solid propeller blade which has apertures which function as siphon-suction passages 8′ and 5′ formed through the propeller substantially parallel with the surfaces thereof and which may be located at spaced distances in the length of a propeller blade so as to comprise a series of suction ports 5 and siphon ports 8 respectively. Said ports are adapted to cooperate with a fluid wall generated by the leading edge portion and which employ the siphon pull principle for increasing the propeller efficiency. The deflected air wall 9, the blunt nose of the leading edge 1 and the ports 5 and 8 as shown and described in these figures are definite and tangible working elements, important in the operative assembly with the upper and lower surfaces 4 and 3 and intermediate members 12, all of which are so related in the whole construction of the wing and propeller forms shown as to comprise working elements depending upon one and the other for the successful operation of the whole unit in use.

The intermediate portions 1 and 12 of Fig. 7 may be so constructed as to be movable in such a manner that the surface 12 may be moved to close the passage of either ports 5 or 13, thereby directing the air flow through one passage only and as illustrated by Fig. 26.

Fig. 24 is a section of a body or wing form showing a means 19 for flexing the portion 20 of the upper section 4, whereby the siphon or exhaust port 8 may be varied at the port opening to cause a variance of the action effective through the forward port 5 and on a generated fluid wall. It will be understood that control means connected by a linkage of a suitable type may be used to cause the arm 22 to move the flexing surface 20 in such manner to raise or lower the same. Moving the flexing surface 20 will also aid the maneuverability of a craft or body so constructed. The rib member 11 joins the upper surface 4 with the lower surface 3 and the blunt leading edge 1 in a manner to form the passage 23.

Fig. 25 illustrates in plan view the construction of such sections as shown in Figs. 5 and 6. The ribs 11 may be positioned in a converging manner as illustrated for inducing the siphon pull action to function as described for Figs. 20 and 21, that is the siphon discharge ports 8 at the tip portions and along the trailing edges of the blade permit the entrapped air fluids to exit therefrom in a forceful state, caused by the centrifugal forces generated on the fluid in the propeller during rotation thereof.

Fig. 26 discloses a means 23 whereby the openings of the forward port or ports 5 and 13 may be varied in their relation to the trailing or exhaust port 8. The intermediate section 12 is secured to the leading edge portion 1 in such manner that, by suitable control means 32 the leading edge 1 may be rotated about its center 24 and thereby raise or lower the intermediate portion 12 to close either port 5 or 13 or to vary the effective openings thereof in the passage 26 at 25.

Fig. 27 is a combination of the means 19 and 23 illustrated and shown in Figs. 24 and 26. The control means 19 or 23 may be moved independently or cooperatively as the case may require by either a control wheel 32 or a lever and having suitable connecting linkage from an operator's cabin and the wheel 32 to the arms 22. The combination of the forward and trailing flexing means 19 and 23 as illustrated in Fig. 27 may be also adapted for use to an airplane wing and also to a sustaining cell for water craft.

The term blunt or a bulbous edge member is meant that portion which at its greatest thickness is substantially tangent to a line drawn through the axis of the openings 5 and 8 and as shown at 27 in Fig. 22.

Having thus described my invention, what I claim is:

1. A propeller blade comprised of a blunt leading edge portion, an upper surface portion and a lower surface portion and said blade provided with an opening formed in one of said surfaces, another opening in the thrust side and at the outer extremity of said blade, said openings being in spaced relation to each other and said leading edge portion for progressively controlling the area of low pressure about a propeller blade to substantially silence the noise of the blade while in motion.

2. A propeller for use with airplanes and having a cross sectional airfoil contour, said propeller comprised of a plurality of radial blades having forward inlet ports at an intermediate and effective portion of the blade length for cooperation with a fluid stream, said blades formed to generate a suction on said stream by means of said inlet ports, and having siphon discharge openings at the tip portions thereof to permit said fluid to travel radially through said blades and to exit therefrom in a forced condition caused by the centrifugal forces generated on the fluid in said propeller during rotation thereof and for accelerating said propeller in a direction of the line of flight.

3. A propeller for use with air and water craft comprising blades each having a bulbous leading edge portion adapted to generate a deflected fluid wall, opposite side portions integral therewith and substantially tangent to said leading edge portion, and said opposite side portions arranged in spaced and opposite relation to each other and extending from said leading edge for forming passages to induce a siphon pull effect on said deflected fluid wall substantially on a line equal to the axis of said passages.

4. A propeller for air or water craft and of airfoil cross-sectional contour comprising blades having a blunt hollow leading edge portion thereof adapted to generate a deflected fluid wall, surface portions and spacing means joined to said leading edge member and said surface portions and spacing means having communicating ports formed therein to induce a siphon pull effect on said deflected fluid wall generated at the leading edge for causing said blades to be accelerated in a direction towards said wall during rotation of said propeller, and said leading edge and surface portions arranged to conform to an airfoil contour of said blades.

5. A propeller for air or water craft comprising blades having a bulbous leading edge portion thereof adapted to generate a deflected fluid wall, opposite surface portions including a pressure side and a cambered surface joined to said leading edge portion forming a passage therebetween and having a series of communicating ports formed adjacent the leading edge in the cambered surface and at the trailing edge of the pressure side to induce a siphon pull effect on said deflected fluid wall generated at the leading edge, for causing said blades to be accelerated in a direction towards said wall during rotation of said propeller, and said ports including openings, the edges of which are within the surfaces of said blades.

6. A propeller for air or water craft comprising blades having a bulbous leading edge portion thereof adapted to generate a deflected fluid wall, a curved surface portion and substantially flat surface pressure portion cooperatively associated therewith, hollow spacing means between said surface portions and said blades having a series of apertures formed in said surfaces for inducing a siphon pull effect on said deflected fluid wall for causing said blades to be accelerated in a direction towards said wall during rotation of said propeller, and the axis of said apertures substantially tangent to the surface of said leading edge portion, and said apertures consisting of openings, the edges of which are within the profile of said surface portions.

7. A propeller for air or water craft comprising blades having a leading edge portion thereof adapted to generate a deflected fluid wall, a curved surface portion and substantially flat surface pressure portion cooperatively associated therewith, said blades having a series of apertures formed in said spaces for inducing a siphon pull effect on said deflected fluid wall for causing said blades to be accelerated in a direction towards said wall during rotation of said propeller, said apertures positioned in spaced relation and relative to the leading edge so that an imaginary line drawn through the axis of said apertures substantially tangent to the surface of said leading edge portion, and said apertures consisting of openings, the edges of which are within the profile of said surface portions.

8. A propeller blade having an airfoil form and comprised of a leading edge portion for generating a deflected fluid wall, surface portions

connecting therewith and substantially tangent to the contour of said leading edge, said surface portions having diagonally related spacing means therebetween and providing walls for diagonal air stream passages therebetween, said propeller having a siphon exhaust port at a portion of the trailing edge of said propeller blade and a suction port adjacent a portion of the leading edge thereof and adapted to induce an attraction on said deflected fluid wall for accelerating said propeller in a direction towards the line of travel.

9. A revolving propeller comprised of a plurality of radial members, each member having a bulbous leading edge portion and opposite side portions, hollow spacings therebetween, said opposite portions forming in combination with said means a series of siphon suction ports therethrough, and the axis of said ports arranged in said radial members at an angle relative to the plane of rotation and leading edge of said propeller.

10. A propeller construction for use in a fluid medium comprised of bulbous means to generate a deflected fluid wall at the leading edge thereof, opposite surface portions joined thereto and substantially tangent to the surface of said means, said opposite portions having spacing means, and communicating ports formed diagonally therebetween for inducing a siphon pull effect on said wall to accelerate said construction in a direction towards said wall.

11. A propeller of the character described in claim 10 with the axis of said ports substantially tangent to the surface of said bulbous means.

12. A propeller comprised of a plurality of radial members, each member comprised of a bulbous leading edge portion and opposite side portions, said opposite portions arranged to form a series of passages through said radial members, and the axis of said passages substantially inclined to the plane and direction of rotation of said propeller.

13. In a propeller blade, a bulbous leading edge portion, oppositely disposed spaced surface portions attached thereto, spacing means, and an intermediate member positioned between said surface portions in a manner to divide the space formed by said oppositely spaced members, said oppositely spaced portions arranged to form suction intake ports in said propeller, and said intermediate member arranged to form siphon discharge ports with said surface members, and said ports include openings, the edges of which are consistent with said surface portions.

14. In a propeller blade construction a bulbous leading edge portion, oppositely disposed surface portions attached thereto and forming a passage therebetween, spacing means, and an intermediate member positioned in said passage and extending from the trailing edges of said surface portions in a manner to divide said passage and to reinforce said propeller construction.

15. In a propeller blade, a leading edge portion, oppositely spaced surface portions attached thereto, an intermediate surface portion positioned between said opposite portions, said spaced surface portions having suction ports formed adjacent to the leading edge portions and siphon exhaust ports formed at opposite edges of the spaced surface portions adjacent to the trailing extremity of said intermediate portion.

16. A hollow metal propeller blade including a leading edge portion, a cambered portion, and an opposite portion, and having apertures in the surfaces of certain of said portions to provide a plurality of siphon and suction ports the axis of which are in tangent relation to said leading edge portion for silencing a propeller while in motion.

17. An airplane wing of airfoil contour comprised of a hollow leading edge portion, an upper surface member, and a lower surface portion relatively spaced from each other, hollow ribs joining said upper member and said lower surface portion, and said ribs forming in combination the side walls of a passage formed between said relatively spaced member and portion.

18. An airfoil, comprising a body of streamline contour in cross-section characterized by a blunt leading edge of streamline cross-section and a relatively thin trailing edge, an upper surface, a lower surface and intermediate means between said surfaces for maintaining said surfaces and leading edge in predetermined relation relative to said streamline cross-section and said surfaces, and said body provided with a fluid passageway extending from a point in front of the greatest thickness of the airfoil on one surface to a point on the other surface at the trailing edge, and said passageway having certain front and rear edges thereof substantially tangent to a straight line passing through the aforesaid points of said surfaces and lying wholly within said passageway and said airfoil.

19. A propeller blade of airfoil form in cross-section and having a substantially flat bottom portion, blunt leading edge portion and a relatively thin trailing edge, and formed with a fluid passage therethru from an opening in the upper surface adjacent the leading edge to an opening in the lower surface adjacent the trailing edge, the portion of the wing between the bottom of the wing and the passage being of streamlined cross-section and tangent at substantially the point of its maximum ordinate, to a straight line passing thru the center of the opening at the trailing edge of the wing and, within the wing, lying wholly within said passage.

20. A propeller for air and watercraft comprised of hollow propeller blades having a streamlined leading edge portion thereof adapted to generate a deflected fluid wall, and said blades having a suction port formed adjacent the leading edge in one surface thereof, another port formed at the trailing edge in the opposite surface thereof, an intermediate portion formed from the leading edge portion and inclined relative to both said surfaces, said intermediate portion being substantially tangent at the point of its maximum ordinate, to a straight line passing thru the center of the opening at the trailing edge of the wing and, within the wing, lying wholly within the scope of said openings.

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