

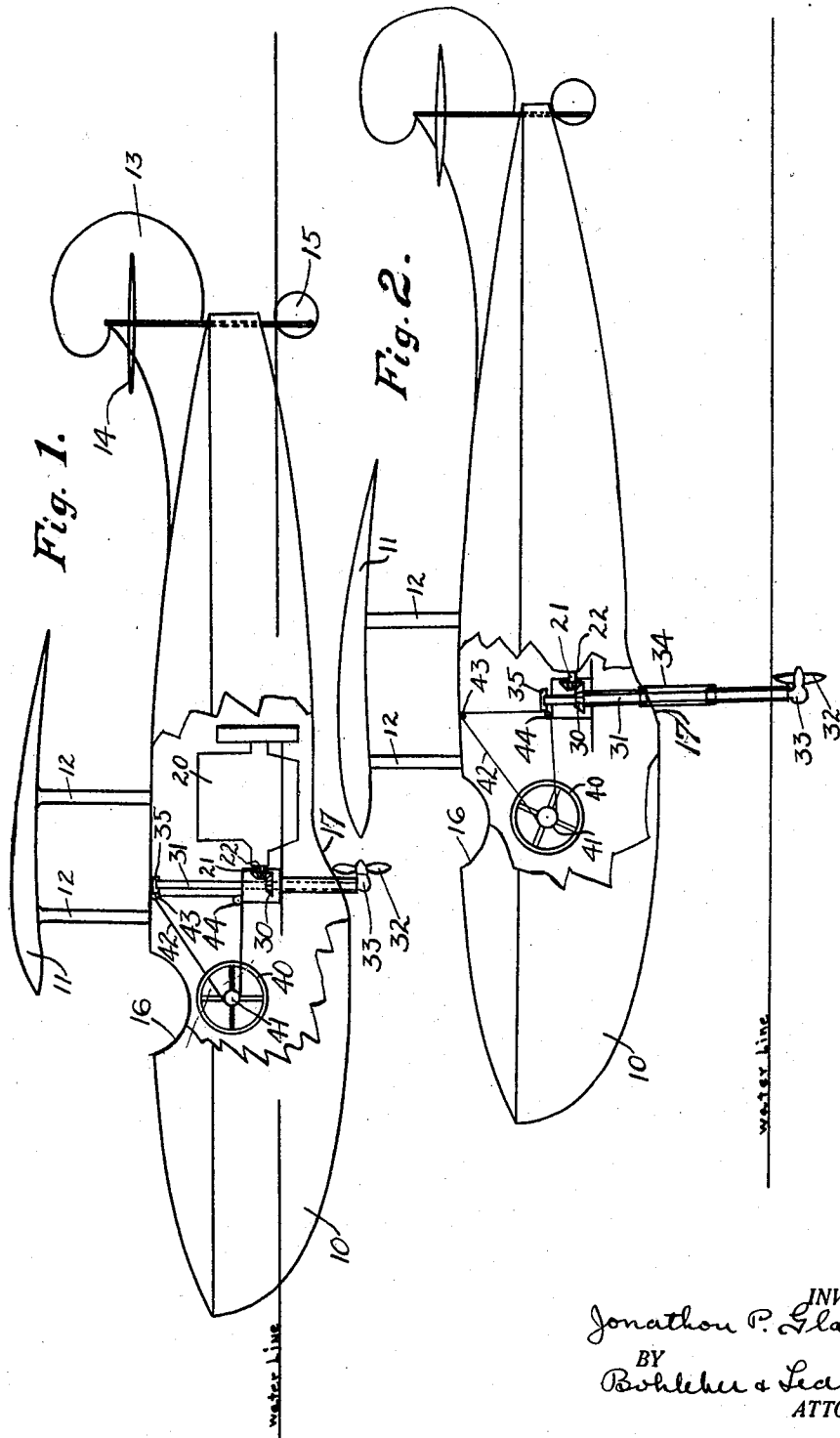
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AIRPLANE

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AIRPLANE

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This invention relates broadly to aircraft and more particularly to heavier than air machines which are adapted to start from and return to the surface of the water.

5 The present invention is directed primarily to hydro-airplanes which embody accepted principles of control in flight and which are capable of attaining relatively high rates of speed, but which can be operated with practically all of the dangers of present day flying eliminated. Such planes, as herein contemplated, may be used to teach some of the principles of flying but are designed primarily with the thought in view of affording a craft capable of attaining a high rate of speed at or near the surface of the water so that it can be used for speed by persons unskilled in flying or by children in the same manner that hydroplanes are used at the present time.

20 The air propeller is relied upon in present practice to propel an aircraft through the air. Such a propeller, whirling in an exposed position on the craft, is one of its most dangerous features, especially where the craft is to be used by other than highly trained fliers. The present invention, therefore, has for its object a craft designed along airplane lines which may rise from and descend to the water but which is incapable of attaining a dangerous altitude and which avoids the use of an air propeller. To this end the craft is provided with a water propeller and the propeller shaft is preferably extensible so that the propeller may remain in the water even though the craft leaves the surface thereof. The prime mover of this craft may be of any convenient character, and, if desired, may take the form of the usual outboard motor which is relatively an inexpensive source of power.

45 The invention also seeks practical means for maintaining the propeller in the water at any desired distance below the plane so as to make it impossible to gain such an altitude as to become dangerous in case of accidents or tail spin, for instance.

50 These and other objects of the invention and the means for their attainment will be more apparent from the following detailed

description taken in connection with the accompanying drawings illustrating one embodiment by which the invention may be realized and in which:

Figure 1 is a view showing a flying boat 55 provided with a water propeller and resting on the surface of the water.

Figure 2 is a view showing the same boat in motion and risen above the surface of the water.

60 In the illustrated embodiment the craft is shown as provided with the hull 10 of a flying boat having a single lifting surface or wing 11 suitably mounted, as by the struts 12, on the hull. This hull carries the usual airplane rudder 13 and elevator 14 and in addition is equipped with a rudder 15 for use below the surface when the craft is travelling on the water. The craft illustrated is used by way of example only and any vehicle having a structure such that it is capable of rising from and returning to the water is within the purview of the invention.

75 The prime mover of the craft is indicated at 20 and may conveniently be disposed within the hull 10 to be immovably fixed therein or to be itself elevated and depressed for a purpose more apparent hereinafter. At the forward end of the crank shaft 21 of the prime mover 20 there is shown a bevel gear 80 22 meshing with a bevel gear 30 mounted to be always in mesh with the bevel gear 22. The bevel gear 30 is mounted for sliding movement with respect to but for rotation with a vertical propeller shaft 31 which is 85 slidable from the position shown in Figure 1 when the craft rests on the surface of the water to the position shown in Figure 2 when the craft is flying above the surface. The propeller shaft and hence the propeller is disposed substantially in the transverse vertical plane including the center of lift of the wings. It is well understood that the maximum lift of a lifting surface or wing is approximately one third the distance in rear of the front 95 edge of the wing, and it will be seen upon inspection of the drawings that the vertical propeller shaft 31 is located substantially in a transverse vertical plane including this point. By this disposition, the thrust of the 100

propeller occurs at that point which is unaffected by the elevation or depression of the tail, so that when the hull is pointing downwardly toward the water or pointing upwardly therefrom the relative position of the propeller with respect to the surface of the water is not altered. Similarly in turning to the right or to the left, the thrust of the propeller is not affected by the change in direction of the hull and the propeller shaft lies in what is, in effect, the vertical axis about which the hull turns.

It will also be observed that the propeller shaft is located just in rear of the beginning of the step 17 whereby the forward portion of the bottom of the hull presents a surface unbroken by any projections or apertures, say, for the passage of the propeller shaft. This construction reduces all possible resistance to the progress of the boat in planing on the surface of the water, it being recognized that the surface between the prow and the step is the planing surface. At its lower end propeller shaft 31 carries the water propeller 32 which is driven thereby by suitable driving connections contained within a suitable housing 33 mounted on the lower end of a telescoping extensible support 34 therefor. The propeller 16 is lowered from its "in" position shown in Figure 1 to its "out" position shown in Figure 2 in any convenient fashion, say, by means of a hand wheel 40 adjacent the cock pit 16. About a sprocket 41 rotated by the hand wheel 40 a continuous chain 42 may pass which also passes about a sprocket 43 or the equivalent carried near the upper portion of the hull and a similar sprocket 44 adjacent the gearing 22, 30. The upper end of propeller shaft 31 is journaled in a bearing 35 which is secured to the chain 42 so that rotation of the hand wheel 40, say in a clockwise direction, which of course, causes the travel of the chain 42 in a similar direction, will cause the propeller shaft 31 to travel downwardly carrying with it the bearing 35 to project the propeller 32 to "out" position. Of course the reverse movement of the wheel 40 will cause the travel of the propeller 32 to "in" position.

It will be readily understood that the propeller 32 rotating on an axis substantially parallel to the line of flight will cause the craft to travel along the surface of the water and that it may be steered conveniently by the water rudder 15. As the craft gains headway the lift of the wing 11 will tend to raise the hull 10 out of the water thereby permitting still higher speeds to be attained. At a predetermined speed the craft will tend to leave the water and travel above its surface so long as this speed or a greater one is maintained. In order to maintain this speed the propeller is projected downwardly so as to remain in operative position within the water. Of course, so soon as that rate of

speed is attained which will carry the craft to an altitude above that permitting the propeller in its "out" position to have traction in the water, the speed of the craft will decrease and it will again settle back to that point at which the propeller is in the water. Thus the altitude of the craft above the water is limited to that which is relatively safe. To limit the altitude the degree of projection of the propeller shaft may be adjusted.

It will thus be seen that a craft is provided which is capable of attaining high rates of speed by travelling just on the surface of the water or just above its surface and that this speed will be far in excess of that of boats equipped with hydroplane hulls. This craft is moreover an extremely safe one so that it can be put in the hands of younger people in lieu of the hydroplanes now used since it cannot rise to a height sufficient to be dangerous in flight and there is moreover no air propeller likely to injure the occupants of the craft. It can be readily seen that the operator's altitude is limited to the distance of the length of the "in" and "out" limits of the adjustable propeller shaft. In lieu of the adjustable propeller shaft the present day outboard motor may be used. In this event it is obvious that the entire motor may be moved up and down, to the "in" and "out" positions, and that other arrangements may be availed of to attain the same result such as the relatively horizontal shafts used on present day crafts which may be elevated and depressed by suitable means.

Various modifications will occur to those skilled in the art in the type of aircraft to which this invention is applicable as well as in the type of prime mover and disposition of propeller shaft and no limitation is intended except as set out in the appended claims.

What I claim is:

1. An aircraft having a flying boat hull, wings for flying through the air, and a water propeller disposed substantially in the transverse vertical plane of the center of lift of the wings.

2. In combination, a streamline flying boat hull having a forward planing surface and a step rearwardly thereof, a lifting surface, a prime mover, a vertical propeller shaft rotated thereby and protruding through the hull just in rear of the planing surface and step, and means to adjust the propeller shaft vertically in a plurality of driving positions.

3. In a craft of the character described, in combination, a hull adapted to float upon the water, and having a planing surface, a lifting surface whereby the craft may fly through the air, a prime mover, a water propeller as the only propelling means for the craft, and operable connections between the prime mover and the propeller rearwardly of the planing surface and including means to maintain the propeller in the water irrespec-

tive of whether the aircraft is floating on the water or flying through the air.

4. In an aircraft, in combination, a boat hull having a planing surface, a lifting surface, a prime mover, a shaft rotated thereby and disposed rearwardly of the planing surface, a water propeller, means to maintain the propeller axis substantially parallel to the line of flight of the craft, operative connections between the shaft and propeller, and means to adjust the propeller in a plurality of driving positions in a vertical direction.

5. In a craft, in combination, a hull having a forward planing surface, a lifting surface, a prime mover, a substantially vertical propeller shaft rotated thereby and extending below the hull in rear of the planing surface, a water propeller thereon, and means to adjust the propeller shaft vertically in a plurality of driving positions.

6. In a craft, in combination, a hull, lifting surfaces for flying through the air, a water propeller as the only propelling means for the craft, and means to adjust the propeller in a substantially vertical direction to permit the hull to leave the water while the propeller remains therein.

7. In a craft of the character described, a hull, a lifting surface whereby the craft may fly through the air, a water propeller as the only propelling means for the craft, means to maintain the axis of the propeller substantially parallel to the line of flight, and means to adjust the propeller in a substantially vertical direction to permit the hull to leave the water while the propeller remains therein.

8. In an aircraft, in combination, a water propeller as the only propelling means for the aircraft, and means to adjust the propeller toward or away from the aircraft while maintaining said propeller substantially always in the same straight line to permit the aircraft to leave the water while the propeller remains therein.

In testimony whereof I affix my signature.
JONATHAN P. GLASBY.