June 18, 1946. C. DE GANAHL 2,402,379

WING FLOAT DRAG

Filed Oct. 19, 1943 2 Sheets-Sheet 1

Fig. 1

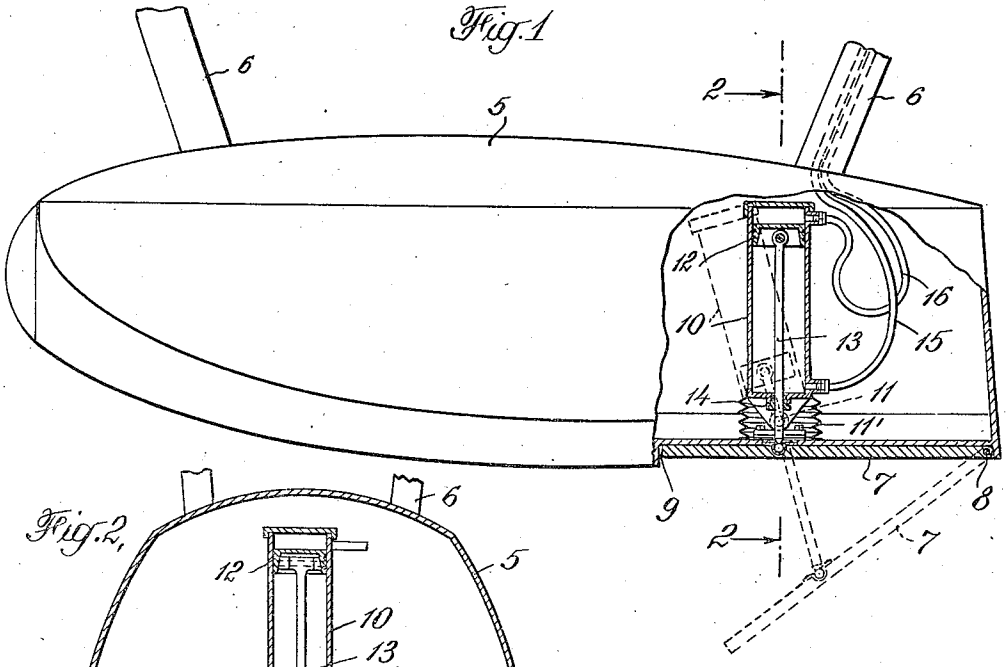
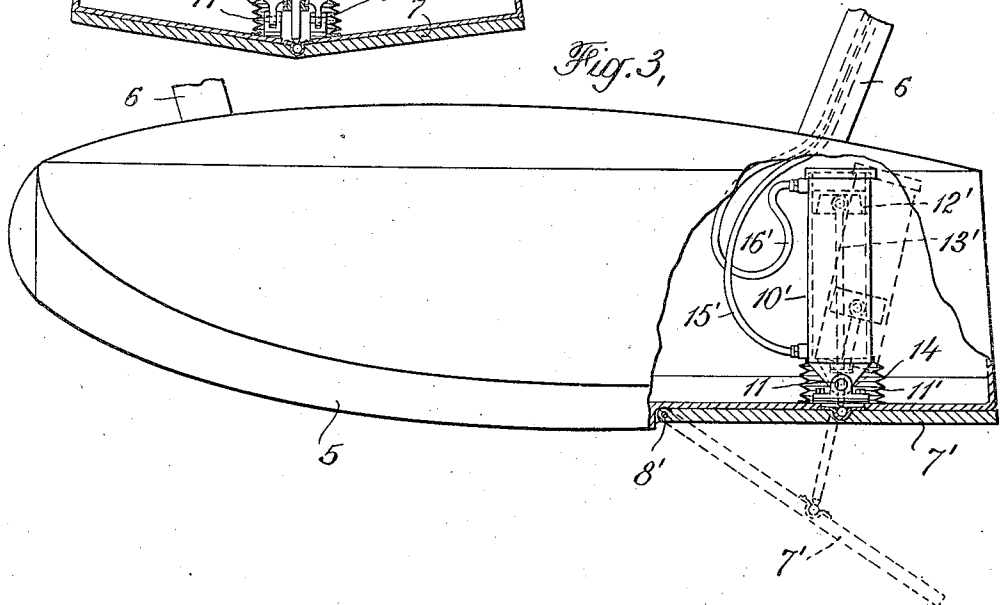


Fig. 2

Fig. 3



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Filed Oct. 19, 1943 2 Sheets-Sheet 2

Fig. 4,

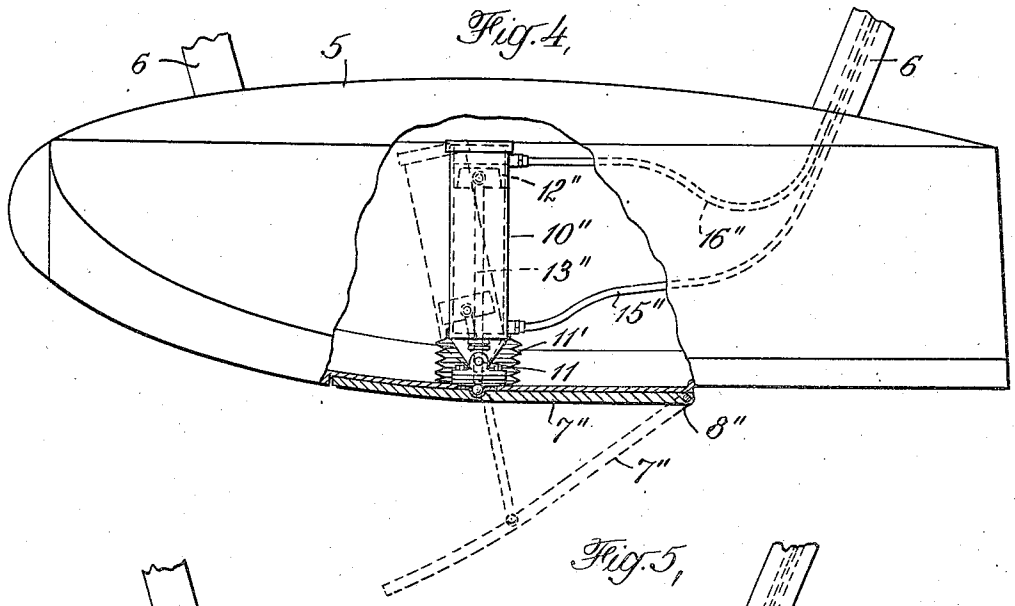


Fig. 5,

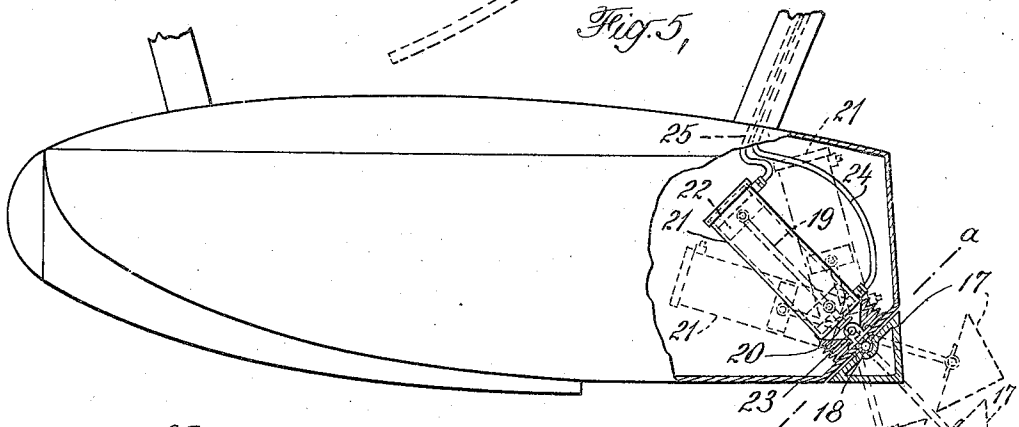


Fig. 7,

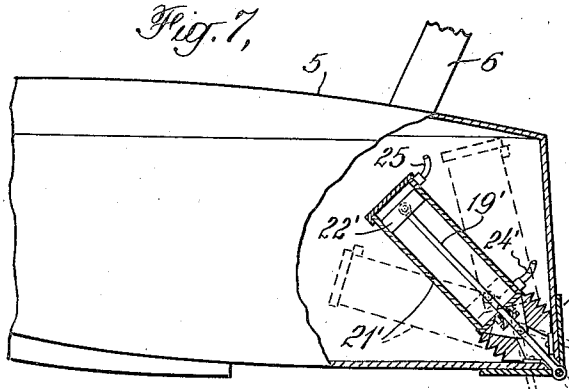
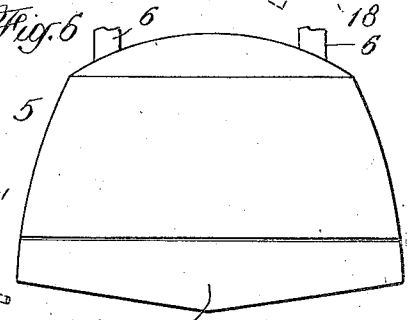


Fig. 6



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WING FLOAT DRAG

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Application October 19, 1943, Serial No. 506,832

4 Claims. (Cl. 244—112)

1

This invention relates to flying boats and amphibious airplanes, and particularly to stabilizing means adapted to offset the effect of wind pressure when the plane is resting on the surface of the water. In taxiing and maneuvering flying boats and amphibious airplanes while on the water, wind conditions are frequently so disturbing that easy control of the plane is difficult. This is due to the fact that on a plane of this type the stabilizer and air rudder have large areas. When wind velocities of 15–20 miles an hour or more are attained, more pressure is exerted on these surfaces than the water rudder alone can counteract. Consequently the operator cannot successfully control movement of the plane on the water.

It is the object of the invention to provide a simple and effective means which is readily controllable by the operator to ensure the movement of the plane in the desired course upon the water.

Another object of the invention is the provision of devices, subject preferably to remote control, whereby suitable drag may be applied to the wing floats as required to resist the tendency due to wind pressure on the fin and air rudder of the plane to move into the wind.

Other objects and advantages of the invention will be apparent as it is better understood by reference to the following specification and accompanying drawings, in which

Fig. 1 is a side elevation of a wing float embodying one form of the invention;

Fig. 2 is a cross-section on the line 2—2 of Fig. 1;

Fig. 3 is an elevation illustrating a slightly modified form of the invention;

Fig. 4 is an elevation illustrating another modification;

Fig. 5 is an elevation illustrating another modification;

Fig. 6 is a rear end elevation of the wing float as shown in Fig. 5; and

Fig. 7 is a sectional view of a modification of the drag device similar to that shown in Fig. 5.

In carrying out the invention, I provide adjustable members connected to the wing floats of the plane below the water line and capable of controlled movement to and from positions in which the members may be ineffective or may introduce drag by resistance to the water in which the floats rest. Such members may have various forms and they may be supported in different ways. They may be actuated by suitable motors of the hydraulic or other type. Preferably double acting hydraulic motors or jacks are used with

2

suitable arrangements well known in the art whereby the motors may be controlled from a central point such as the pilot's seat. In one desirable form, the adjustable members are flaps pivoted in recesses in the bottoms of the floats and having the general contour thereof, so that they offer no added resistance when in closed position. The flaps may be adjacent the sterns of the floats or amidships thereof, and may be pivoted to swing outwardly in counter-clockwise or clockwise directions as desired.

In another form, the adjustable members may be shaped to conform to the lower section of the sterns of the floats and may be projected therefrom when drag is desired. Preferably the devices on the opposite floats are operable independently so that drag may be applied at one side or on both sides of the plane to meet the particular conditions of operation and thus to effectively offset wind pressure in any direction.

Referring to Fig. 1 of the drawings, 5 indicates a wing float of conventional design which may be connected by struts 6 to the wing of the plane. The wing floats may be of any suitable material and construction. As indicated in Fig. 1, a flap 7 is pivoted at 8 near the stern of the wing float 5 and normally is disposed in a recess 9 in the bottom of the wing float. The flap 7 has a surface conforming to the bottom of the wing float 5 and normally offers no resistance to the movement of the wing float through the water.

To afford the desired drag, the flap 7 is projected to the position indicated in dotted lines. Movement is effected by means of a hydraulic jack 10 which is supported for pivotal movement on trunnions 11 within the wing float 5. A bellows 11' permits pivotal movement of the jack and prevents water from entering the float. A ram 12 is connected by a rod 13 to the flap 7. The rod 13 passes through a suitable stuffing box 14. The ram 12 may be caused to move in either direction by hydraulic pressure introduced through pipes 15 and 16 which are connected to the usual hydraulic system of the plane and provided with the customary controls whereby the pilot may actuate the jack 10 and thus project or withdraw the flap 7. As already indicated, the floats on opposite sides of the plane may be provided with flaps 7 which are independently operable by the pilot. When either or both of the flaps 7 are in the outward position, the flaps will afford additional resistance and thereby facilitate control of the plane when it is subjected to wind pressures which otherwise would cause erratic operation.

The structure as illustrated in Fig. 3 is substantially identical with that shown in Fig. 1, with the exception that the flap 7' is pivoted at 8' inboard of the stern. A jack 10' having a ram 12' actuates the flap 7' through a rod 13'. Pipes 15' and 16' permit the introduction of fluid under pressure to effect operation of the ram 12' in opposite directions and thus to open and close the flap 7'.

In the structure as illustrated in Fig. 4, the flap 7'' is pivoted at 8''. In this case, the flap is disposed approximately amidships of the float 5. It may be pivoted at either end, but is preferably arranged with the pivot toward the stern of the float. A jack 10'' is provided with a ram 12'' and the latter is connected by a rod 13'' to the flap 7''. Pipe connections 15'' and 16'' permit the application of fluid to the jack to effect operation of the flap 7'' in the manner and for the purpose hereinbefore described.

In Fig. 5, the drag device takes a different form, being substantially a section of the stern of the float. Thus the stern of the float may be cut away on the line *a*—*b* and a member 17 is shaped to conform with the cut-away section. This member is connected by a ball joint 18 to a rod 19 extending through a stuffing box 20 into a jack 21. The rod is connected to a ram 22. The jack is pivoted on a trunnion 23 so that it may swing about the pivot to adjust itself to different positions of the member 17. Pipes 24 and 25 permit the introduction of fluid under pressure to the jack at either end so that the member 17 may be projected and may assume various positions as indicated in dotted lines in the figure. Thus the operator can project the member 17 or withdraw it. When projected, it will afford the necessary drag, and when withdrawn it will be ineffective. As in the case of other forms of the invention, the floats 5 on opposite sides of the plane will each be provided with members 17 independently operable to attain the desired result.

Instead of cutting away the rearward part of the float 5 as indicated in Fig. 5, the surface may be rabbeted and the member 17' may be formed to fit over the rabbeted surface when it is in normal position, as shown in Fig. 7. When projected, it will form a hollow, cup-like member affording even greater resistance to the water than the form of the device shown in Fig. 5. The member 17' will be connected by a ball joint to a rod 19' and thus to a ram 22' within a jack 21'. Actuation will be effected by the introduction of fluid pressure through the pipes 24' and 25' as in the preceding embodiments of the invention.

Although hydraulic jacks are simple devices which are well known in the art and are easily controllable and therefore suitable for the purpose, other forms of motors may be employed. Any type of reversible motor which will permit

projection and withdrawal of the flaps or equivalent drag devices may be employed, the essential of the invention being the provision of drag devices below the water line of the floats which normally afford no resistance to the movement of the floats and are movable to introduce drag under control of the pilot to counteract wind pressure on the fin and air rudder of the plane.

Various changes may be made in the details of arrangement and construction of the parts without departing from the invention or sacrificing the advantages thereof.

I claim:

1. In an airplane wing float, a member shaped to conform to the lower stern edge of the float, said member normally lying against the lower stern edge of the float and offering no substantial resistance to the movement of the float through water, means carried by and within said float and attached to said member to project said member outwardly into the water to produce drag, and means associated with said projecting means to prevent leakage of water into the float.

2. In an airplane wing float having an inclined planar surface along its lower stern edge, a member of triangular cross section adapted to lie against said inclined surface and to complete the lower stern edge of the float, said member normally offering no resistance to the movement of the float through water, means carried by said inclined surface within said float and attached to said member to project said member outwardly into the water to produce drag, and means associated with said projecting means to prevent leakage of water into the float.

3. In an airplane wing float, a member shaped to conform to the lower stern edge of the float, said member normally lying against the lower stern edge of the float and offering no substantial resistance to the movement of the float through water, hydraulic means carried by and within said float and attached to said member to project said member outwardly into the water to produce drag, and means associated with said projecting means to prevent leakage of water into the float.

4. In an airplane wing float, a member shaped to conform to the lower stern edge of the float, said member normally lying against the lower stern edge of the float and offering no substantial resistance to the movement of the float through water, hydraulic means within said float and attached to said member to project said member outwardly into the water to produce drag, pivotal means affixed to the float, said hydraulic means being pivotally carried by said pivotal means to permit adjustment thereof according to the drag position assumed by said member, and means associated with said projecting means to prevent leakage of water into the float.

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