Sept. 27, 1932. R. J. NORTON 1,879,432

HYDROSERVO BRAKE

Filed July 8, 1930

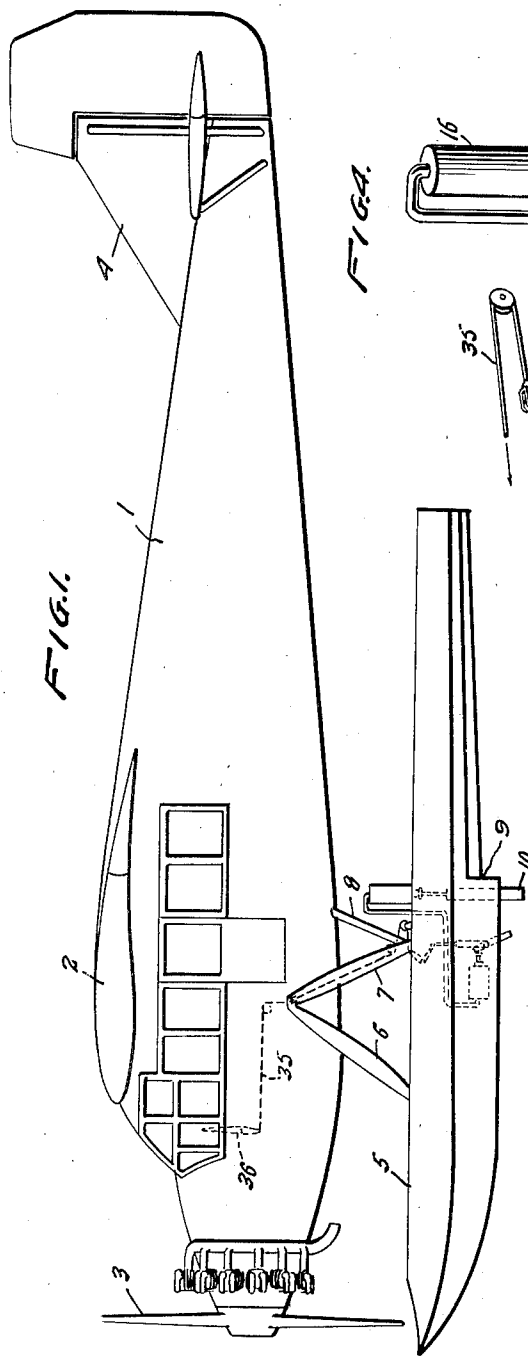


FIG. 1.

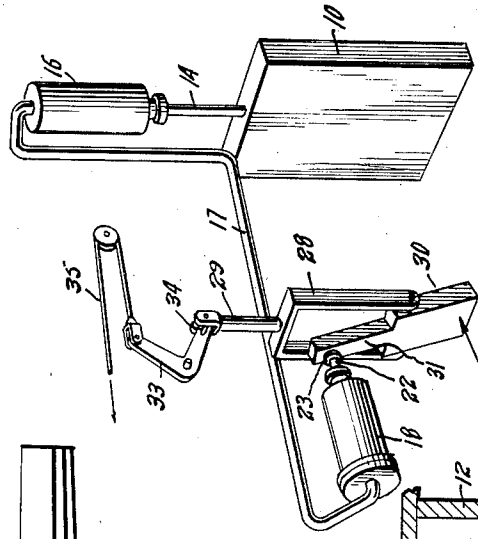


FIG. 4.

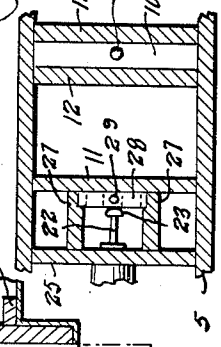


FIG. 3.

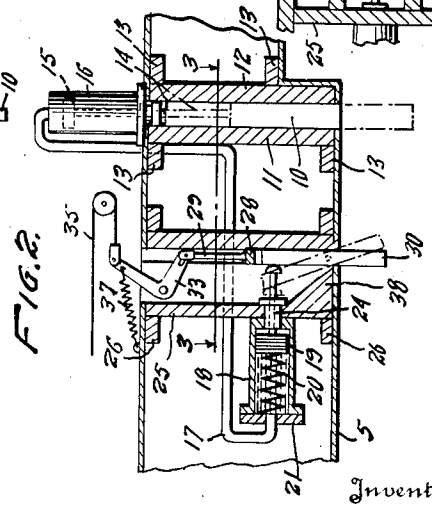


FIG. 2.

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UNITED STATES PATENT OFFICE

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HYDROSERVO BRAKE

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This invention relates to seaplane retarding means.

A major object of the present invention is to provide a retarding means for a seaplane, when operating upon the water, in which the retardation effected is a function of the speed at which the plane is moving.

Another object is to provide a seaplane momentum brake.

A further object is to provide a novel brake for seaplanes and flying boats which is adapted to retard its speed upon the water.

With these and other objects in view the invention comprehends the provision of means coacting directly with the float mechanism of a flying ship which is adapted to cooperate with the water to retard the movement of the ship therethrough in such a manner that the retarding effect is proportional to the surface speed of the ship.

In order to facilitate an understanding of the invention a typical embodiment is shown in the accompanying drawing, in which

Figure 1 is a side elevation of a seaplane showing the mechanism installed;

Figure 2 is an enlarged detail showing the major features of the hydro brake and its operating mechanism;

Figure 3 is a top section taken on line 3—3 of Figure 2;

Figure 4 is an enlarged perspective of the hydro brake and its servo actuator.

As shown in the drawing the invention may be applied to any type of seaplane or flying boat having the fuselage 1, air sustenation surfaces 2, propelling means 3, and empennage 4. Associated with the plane are the floats or water sustaining surfaces, illustrated in this instance by the pontoons 5. These float members are attached to the fuselage in any suitable manner as by float struts 6, 7 and 8.

The pontoons may be of any suitable construction such as wood or light weight, high strength alloys of the duralumin type. Preferably the pontoon bottom is of stepped construction as shown at 9. Mounted on the pontoon for vertical movement with respect thereto is the hydro brake 10. This member may be constructed of any suitable material and of any desired size depending upon the braking effect desired, the ruggedness of the supporting structure, the size of the plane, and so forth.

The brake 10 is laterally supported for reciprocating movement in a well formed by the juxtaposed stanchion members 11 and 12. These members are suitably braced and supported by the ribs or knees 13.

Attached to the upper part of the brake is a connecting rod 14, at the upper end of which is formed a piston 15. This piston is received in an operation within a cylinder 16.

It will be seen that upon the application of hydraulic pressure to the piston 15, it may be caused to move downwardly and to immerse the brake member 10 in the water. Such immersion sets up additional resistance to the movement of the pontoon through the water and thereby serves as a brake or retractor.

In accordance with the present invention, as outlined above, the degree of application of the brake is made to depend on the speed of the plane on the water. This is accomplished by subjecting piston 15 to a degree of fluid pressure which is a function of the speed. As shown, particularly in Figures 2 and 3, the cylinder 16 is connected by a conduit 17 to a second cylinder 18. This cylinder contains a suitable fluid and a reciprocating piston member 19. A return spring 20 abuts one face of the piston and the cylinder head 21, and functions normally to return the piston to inoperative position, that is to say to that position at which the pressure on the fixed body is relieved.

The other end of the piston is connected to a piston rod 22 having a hemispherical or ball-like termination 23. The piston rod extends through a suitably packed gland 24. The piston 18 and its associated structure is suitably secured to the stanchion member 25, which is suitably supported by the framing 26.

Extending between the stanchions 11 and 25 are the vertical frame members 27. As shown in Figure 3, these are grooved, adjacent member 11, to receive the reciprocating clevis 28. As shown in Figure 4, this may

comprise a substantially U-shaped member connected at its upper end to the rod 29 and pivotally connected at its lower end to a pivotal member 30.

The pivotal member 30 is positioned near the bottom of the pontoon and is formed at its upper end with an extension 31, which, as shown, abuts the end of the piston rod 22.

The upper end of the servo member is pivotally connected to a bell crank lever 33 through a pin and slot connection 34. The bell crank, suitably fulcrumed on a fixed part of the pontoon and at its applying end, is connected to a mechanical or other motion transmission mechanism illustrated by the cable 35. This cable or linkage extends into the plane and is operated by any suitable actuator such, for example, as the lever 36. Connected to the bell crank 33 is a spring 37, which functions to return the bell crank, and hence the servo member 30 to inoperative position.

From the description of the parts given it will be seen that upon operation of the lever 36 the bell crank will be rotated about its pivot to effect a downward movement of the member 28 and the attached servo hydro member 30. As the member 30 is immersed in the water the pressure exerted on it will cause its pivotal movement. Such movement will effect a longitudinal movement of the piston rod 22 and the connected piston 19 and will apply a predetermined hydrostatic pressure to the fluid in the cylinder 18. This pressure will be transmitted, in a well known manner, to the piston 15, of the main brake and cause the latter to be depressed or immersed in the water to an extent or degree depending upon the movement of the servo member 30. It will be understood that the hydro brake 10 is provided with suitable retracting means, such as a strong spring positioned within the cylinder 16 and operating upon the lower face of the piston 15, or one or more springs attached directly to the member 10 and to a fixed part of the pontoon.

It will thus be seen that I have provided a hydro servo brake; that is, a water brake wherein increased speed or water resistance serves to more fully apply the brake.

It will be seen then that the mechanism provides for a method of retarding the speed of seaplanes when taxiing or maneuvering upon the surface of the water in which the retardation effected is a function of the speed of the plane.

It will be appreciated that when the invention is applied to a twin pontoon type of craft the hydro brakes 10 may be simultaneously or independently operated. It will also be appreciated that while a hydraulic servo mechanism has been illustrated this is given merely as an example, as other types such as mechanical linkages may be utilized.

The fully applied position of the brake may be determined or fixed by providing any suitable abutment for the member 30, such for example as the stop 38, shown in Figure 2.

While there is shown and described a specific mechanism it is to be understood that this is given merely as one embodiment which typifies the other equivalent mechanical structures by which the functions herein described may be secured and or the desired results achieved.

I claim:

1. A seaplane having a fuselage and a float, a member associated with the float and adapted to retard the plane and means coacting with the member for controlling said member proportionally to the speed of movement of the plane over the surface of the water.

2. A seaplane having subjacent pontoon structure, a retarding means adapted to be depressed into the water and means associated with said retarding means for depressing the retarding means proportionally to the speed of movement of the plane over the surface of the water.

3. A seaplane having twin pontoons, a retarding means mounted on each pontoon and adapted to be depressed into the water and means associated with said retarding means for depressing the retarding means proportionally to the speed of movement of the plane over the surface of the water.

4. A seaplane having subjacent pontoon structure, a retarding means adapted to be moved into engagement with the water, and means associated with said retarding means for moving the retarding means proportionally to the speed of movement of the plane over the surface of the water.

5. In combination with an airplane pontoon, a main hydro brake, an auxiliary hydro brake, means for operating said auxiliary hydro brake and means whereby said auxiliary brake operates said main brake.

6. In combination with an airplane pontoon, a main hydro braking surface, and means to operate said surface comprising an auxiliary hydro braking surface.

7. A braking system for seaplanes comprising a main braking surface and an auxiliary braking surface, said surfaces offering resistance to the medium through which the seaplane is travelling, and means whereby the resistance upon said auxiliary surface is utilized to operate said main surface.

8. A braking system for seaplanes comprising a main braking surface and an auxiliary braking surface, said surfaces offering resistance to the medium through which the seaplane is travelling, and means whereby the resistance upon said auxiliary surface is utilized to operate said main surface proportionately to said resistance on said auxiliary surface.

9. In a seaplane having twin pontoons, a main hydro braking surface on each pon-

toon, and means on each pontoon to operate said surface comprising an auxiliary hydro braking surface.

10. In a seaplane having twin pontoons, a main hydro brake on each pontoon, an auxiliary hydro brake on each pontoon, means for independently operating said auxiliary hydro brakes and means on each pontoon whereby said auxiliary brakes operates said main brakes.

11. In a seaplane, a braking surface adapted to retard the seaplane by being extended to resistance to the medium through which the seaplane is travelling and means controlled by the speed of movement of the seaplane through said medium to operate said brake proportionately to such speed.

12. In a seaplane having sustenation means, a hydro brake mounted on such means at each side of the longitudinal axis of the seaplane, an operator for each of said brakes comprising an auxiliary braking surface, and means to independently operate said auxiliary braking surfaces.

In testimony whereof I affix my signature.

RAYMOND J. NORTON.