June 21, 1932. H. H. SEMMES 1,863,944

SEAPLANE

Filed May 23, 1931

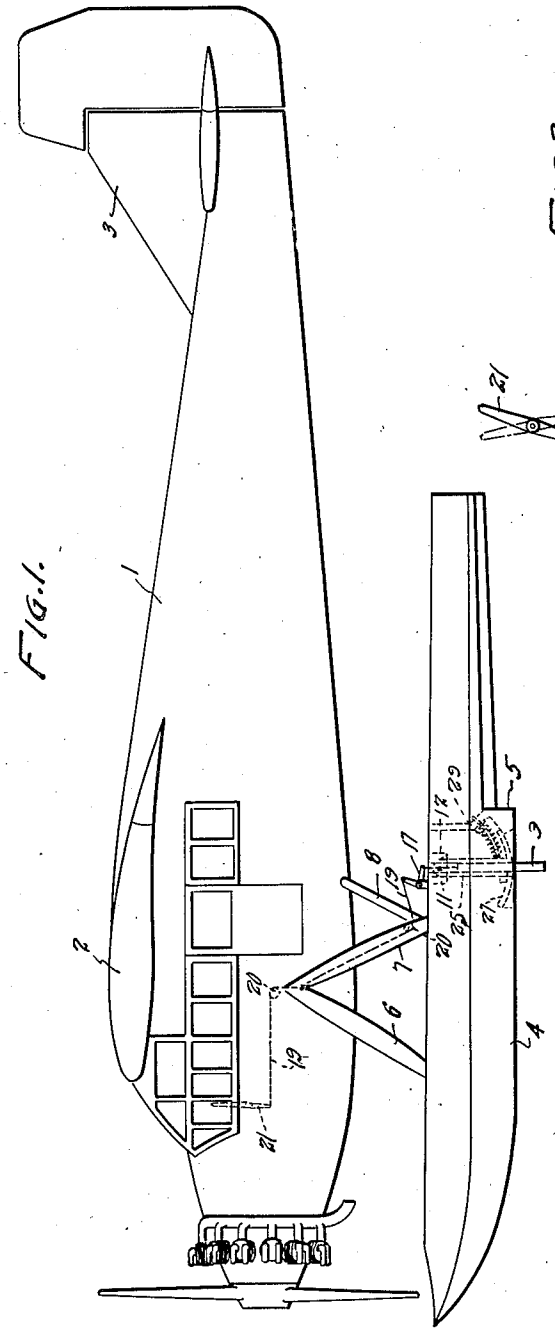


FIG. 1.

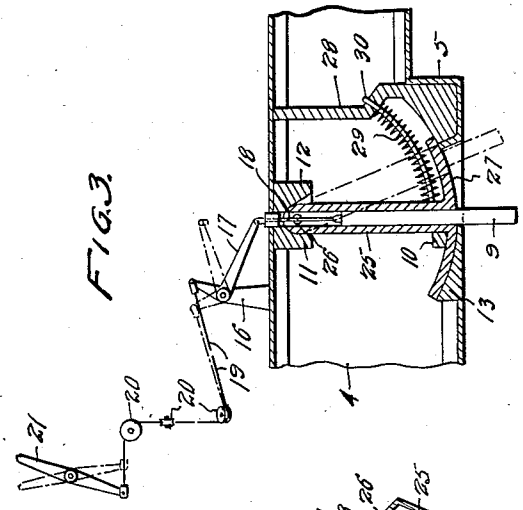


FIG. 3.

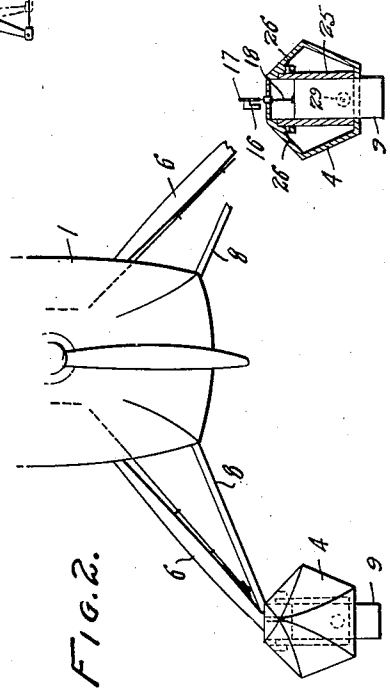


FIG. 2.

Inventor

HARRY H. SEMMES

By M W McConkey

Semmes & Semmes Attorneys

Patented June 21, 1932 1,863,944

UNITED STATES PATENT OFFICE

HARRY H. SEMMES, OF CHEVY CHASE, MARYLAND, ASSIGNOR TO BENDIX AVIATION CORPORATION, OF SOUTH BEND, INDIANA, A CORPORATION OF DELAWARE

SEAPLANE

Application filed May 23, 1931. Serial No. 539,597.

This invention relates to seaplanes and more particularly to arresting means for seaplanes, and is a continuation in part of my application Serial No. 465,402, filed July 2, 1930.

The seaplanes and flying boats as now employed involve certain inherent disadvantages, particularly in respect to the ability to maneuver or taxi, and to retard speed within a relatively short distance.

An object of the present invention is to generally improve the taxiing characteristics of seaplanes and flying boats.

Another object is to provide a seaplane which may be arrested or retarded while moving upon the water within a relatively short distance.

A further object is to prove a novel type of arresting mechanism for seaplanes.

Yet another object is to compensate for the sluggish turning movements of single screw seaplanes.

A further object is to provide a water brake for seaplanes.

Yet another object is to provide a novel type of steering means for seaplanes and flying boats.

A further object is to provide a novel type of arresting mechanism for seaplanes, so constructed that the arresting force can not exceed a certain predetermined maximum value. It is well known that if the undercarriage of an airplane landing or taxiing at high speed encounters a sudden or high resistance, the airplane will tend to nose over. While my novel type of water brake will not cause such an accident if properly used, I insure the prevention of such accidents by providing means which prevents the arresting force thereof from exceeding a safe maximum value.

Yet another object is to provide means whereby a sudden shock received by the arresting mechanism may be properly absorbed without causing undue strain on the parts.

With these and other equally important objects in view the invention comprehends the concept of providing a seaplane or flying boat with independently operable members which are adapted to increase the resistance between the float member and the water so as to retard the speed of the float. Preferably the retarding mechanisms are laterally spaced and independently operated so as to effect turning movements of the plane independently of the usual air rudder.

In order to more clearly explain the invention a physical embodiment of it is disclosed in the accompanying drawing, in which—

Figure 1 is an elevation of a seaplane of the double pontoon type;

Figure 2 is a partial front elevation of the device shown in Figure 1; and

Figure 3 is an enlarged detail of the arresting means and operating mechanisms.

As shown in the drawing the invention is applicable to either seaplanes or flying boats. As shown in the drawing the invention may be embodied in a seaplane having the usual elements of structure including the fuselage 1, sustentation surfaces 2 and empennage 3. Associated with the plane are the twin floats or pontoons 4. These may be of any suitable structure and are preferably of the hollow V-bow type to give a good cruising bow and good freeboard. The pontoons are shown with one step 5. but of course it will be understood that any number of steps may be employed.

The pontoons are attached to the fuselage either directly or through the intermediacy of sustaining or lifting surfaces, as when the invention is applied to a biplane. This attaching mechanism may comprise the pontoon struts 6, 7 and 8. These are shown in conventional form but it will be understood that they typify any desired type of attaching structure which is adapted to insure against hogging and sagging effects. Like-

wise interfloat struts may be employed to minimize racking effect.

As will appear more fully hereinafter, it is preferable to provide additional bracing means between the floats and the fuselage so as to neutralize or take up the torsional stresses resulting from the application of the water brake on one side only of the longitudinal axis of the plane.

When the invention is applied to a twin float or pontoon type of craft each pontoon may be provided with a water brake 9. As shown, this may comprise essentially a vertically movable element which is adapted either to be moved upwardly in the inoperative position and out of contact with the water or to be depressed into the water to present a relatively large contact area and to thereby increase the resistance to movement of the pontoon through the water.

The pontoon is suitably constructed and is rigidified at the points adjacent the water brake. The pontoon itself may be and preferably is constructed of a light weight alloy of low corrodibility and high tensile strength such, for example, as the alloy dural. Adjacent the water brake 9 the pontoon may be provided with the lateral framing members or ribs 10, 11, 12 and 13. Pivotally associated with the upper members 11 and 12 is the guide or well 25 for the water brake. The upper end of the well 25 is pivoted at 26, and rounded off to fit in a similarly shaped recess formed by the members 11 and 12. At its lower end, the well 25 is provided with a curved shield 27 adapted to exclude water from the interior of the pontoon, and, in cooperation with the member 28, to act as a guide when the water brake is moved backwardly. A compression spring 29, under initial tension, is mounted upon a curved rod 30 attached to well 25 and passing through an orifice in member 28.

The spring 29 holds the well 25 in normal position against rib 10 until and unless the pressure on the water brake exceeds a predetermined safe maximum. The well and water brake then move towards the dotted line position shown in Figure 3, wherein the water brake is partially withdrawn from contact with the water and the part of the surface which remains exposed is tilted backwardly to cause little resistance.

Positioned on any convenient part of the pontoon and preferably adjacent the well is a lug 16. Upon this is pivoted a bell crank lever 17, which latter is pivotally connected through the connecting cable 18 to the water brake 9. This cable is sufficiently stiff to transmit vertical motion to the water brake, while remaining flexible enough to accommodate the swinging of the water brake under excessive resistance. Each bell crank, and hence each water brake is connected through suitable linkage illustrated by the cable 19 and pulleys 20 to the operating lever 21. The bell crank and cable have been described as merely typical of any type of mechanism whereby the water brake may be immersed in the water, to subserve its arresting or braking function, and to raise the water brake into its inoperative position. Preferably and, as shown in Figure 3, the brake 9 is positioned adjacent the step section 12 of the pontoon so as to accentuate the retarding effect of the brake 9 by the vacuum effect caused by increasing the depth of the step.

As shown in Figure 1, the water brake is preferably positioned substantially to the rear of the center of gravity of the machine so as to further obviate any dangers of nosing over when the brake is applied.

The device described is adapted to subserve a number of useful functions. It will be appreciated that if the two brakes 9 are applied simultaneously the increased resistance to movement of the pontoons through the water will quickly and effectively retard the speed of the plane. In this circumstance the mechanism acts as a water brake. The device is also particularly useful for maneuvering or taxiing. As is known, single screw flying boats or seaplanes generally turn rather easily in one direction but badly in the opposite direction, due to the slip stream effects. Furthermore, it is also known that twin floats are much more difficult to maneuver than the single hull type. The present improvement provides a supplementary method for maneuvering or steering the craft on the water which may be used independently of the air rudder or conjointly with it. It will be appreciated that if one only of the water brakes 9 is operated the pontoon on that side of the plane will be considerably retarded in speed and the entire plane will tend to turn on that pontoon as an axis. This operation is quite comparable to the operation of the independently operated wheel brakes on an airplane when used for steering purposes.

By placing the brakes in the rear of the center of gravity the speed of the craft may be retarded without danger and in fact with increased safety, for since the brakes are positioned rearwardly of the center of gravity their application will tend to cause the plane to settle at the stern and to elevate at the bow.

As noted hereinbefore, the invention is equally applicable to flying boats of the central hull type. In applying the invention to such ships it is necessary only to mount the water brakes 9 on the opposite sides of the hull.

It will, of course, be understood that the particular type of brake and the mechanism therefor may be widely varied both as to structure and mode of operation. That shown and described is given merely as typifying any type of mechanism in which water brakes are positioned on opposite sides of the longi-

tudinal axis of the plane and which are adapted to be either simultaneously or independently operated so as to subserve not only arresting functions but also steering functions. As noted above these brakes may be used independently of the air rudder or conjointly therewith. One of the brakes may be employed to compensate for the sluggish turning in one direction of a single screw ship. It will be appreciated that when it is intended to operate the brakes independently it is advisable to provide additional bracing between the pontoons and the fuselage so as to compensate for the different relative speeds of the pontoons and the torsional stresses thereby set up. Preferably this bracing may be of any desired type adapted or conformed to the particular structure of the ship in which the invention is to be employed.

If desired, means may be provided for adjusting the initial tension of spring 29. This may comprise a collar having screw threaded engagement with member 28, which slidably receives rod 30 and upon which the end of the spring may bear. Again, the resilient device shown may be replaced by a structure similar to an oleo gear, wherein a dash pot or other shock absorbing device may absorb sudden shocks received by the water brake.

While a practical example has been shown and described it is to be understood that this typifies any type of mechanism which embodies the broad concept herein disclosed, which concept is conceived to reside in the idea of providing independently operable water brakes so as to not only decrease the speed of the craft when maneuvering on water but also to provide for increased dirigibility.

I claim:

1. In combination with a water brake, means for extending said brake into contact with the water, and automatic means for withdrawing said water brake, at least partially, when a predetermined pressure thereon is reached.

2. In combination with a water brake, means for extending said brake into contact with the water, and automatic means for changing the angle of incidence of said water brake to reduce the resistance thereof, when a predetermined pressure thereon is reached.

3. In combination with a water brake, means for extending said brake into contact with the water, and automatic means for reducing the resistance of said water brake when a predetermined pressure thereon is reached.

4. The combination of a water brake, a guide therefor, and resilient means holding the guide in normal position.

5. The combination of a water brake, a guide therefor, and resilient means holding the guide in normal position and yieldable when a predetermined pressure on the water brake is reached or exceeded.

6. The combination of a water brake, a pivoted guide therefor, a stop, and resilient means holding the guide in normal position against said stop until a predetermined pressure upon said water brake is reached.

In testimony whereof, I have hereunto signed my name.

HARRY H. SEMMES.