

A. O. PAULSON.
 STABILIZER FOR AIRSHIPS.
 APPLICATION FILED MAY 20, 1912.

1,063,137.

Patented May 27, 1913.

2 SHEETS—SHEET 1.

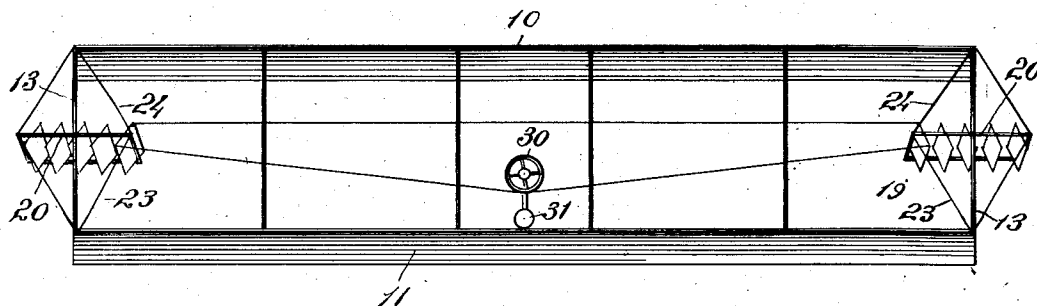


Fig. 1.

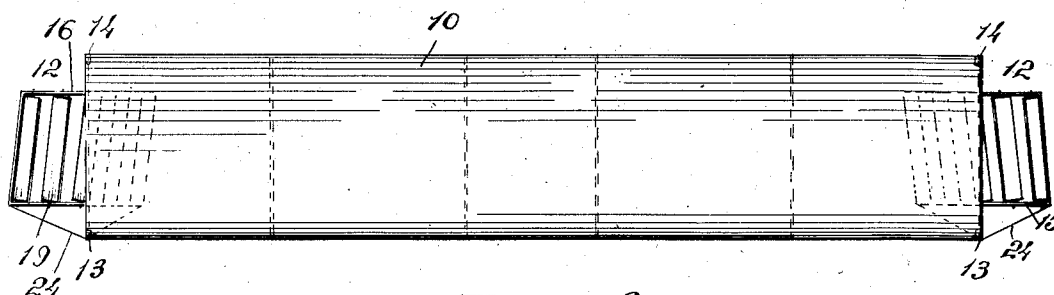


Fig. 2.

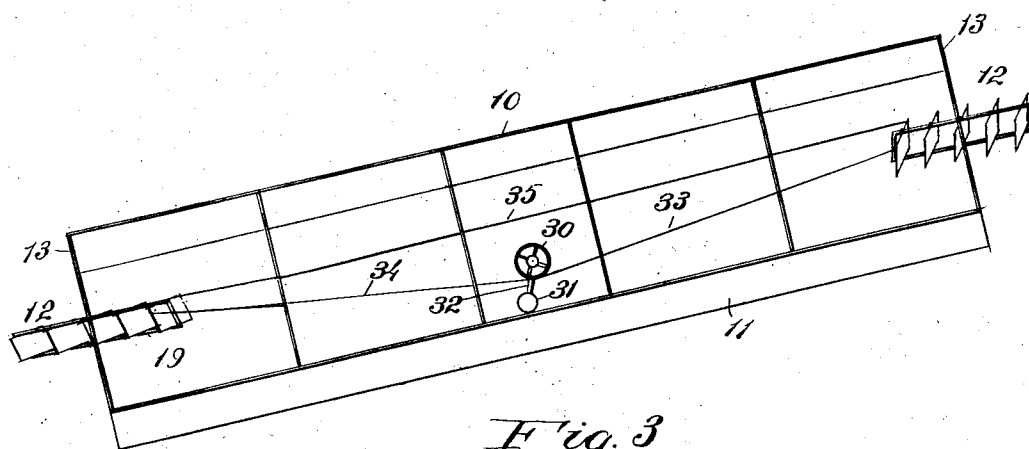


Fig. 3.

Witnesses:
 F. O. Chaffee
 J. H. Paulson

Inventor:
 A. O. Paulson
 By *[Signature]* Atty

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2 SHEETS—SHEET 2.

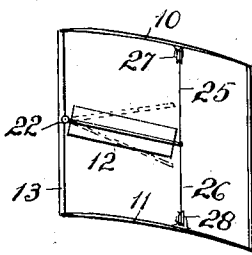


Fig. 4.

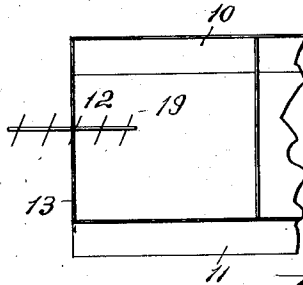


Fig. 5.

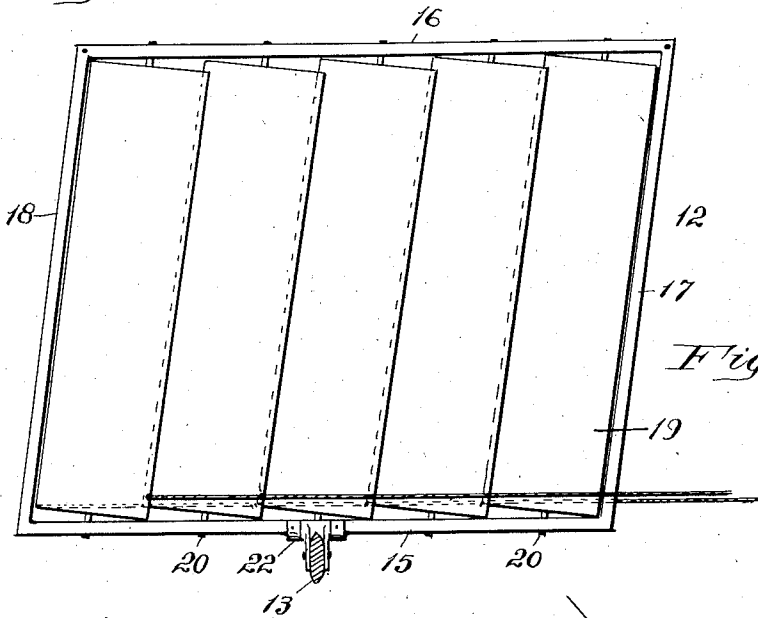
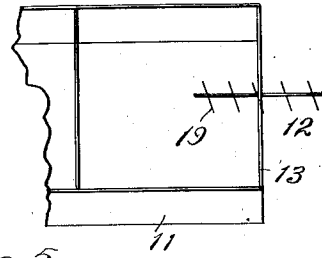


Fig. 6.

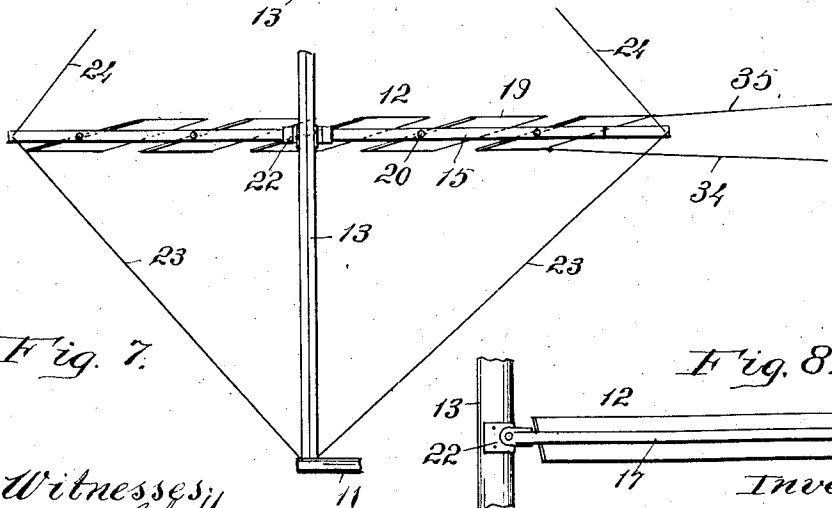


Fig. 7.

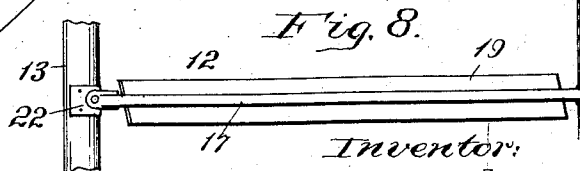


Fig. 8.

Witnesses:
 F. C. Chaffer
 J. H. Hanson

Inventor:
 A. O. Paulson,
 By *[Signature]* Atty

UNITED STATES PATENT OFFICE.

ALBERT O. PAULSON, OF LOS ANGELES, CALIFORNIA.

STABILIZER FOR AIRSHIPS.

1,063,137.

Specification of Letters Patent.

Patented May 27, 1913.

Application filed May 20, 1912. Serial No. 698,620.

To all whom it may concern:

Be it known that I, ALBERT O. PAULSON, a citizen of the United States, and resident of Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Stabilizers for Airships, of which the following is a specification.

My invention pertains to airships and it has special reference to stabilizing means, whereby the pressure of the air may be varied at the ends of the planes in a simple and efficient manner.

One of the features in this invention is that the stabilizing surfaces offer the same resistance to the forward movement of the aeroplane whether the stabilizing surfaces are open or closed, and while one forms a lifting surface the other acts as a rudder to offset the drag on the lifting surface, thus working entirely independent of the steering rudder while in flight normally.

It is well known in the art to which this appertains that only a light pressure vertically is required at the outer ends of the supporting planes in order to raise or lower the planes, and my object is to provide ailerons located at any convenient point in the region of the wing tips so that they may be either manually or automatically operated, to increase or decrease the supporting surface, and accomplish this without resorting to the well known method of giving a greater or less angle of incidence to the ailerons, and by means of which also stability will be imparted to the moving ship by the character and disposition of the ailerons themselves, as will now be set forth in detail.

In the accompanying drawing Figure 1 is a front view of a pair of planes showing the improved stabilizing device between the two planes. Fig. 2 is a top or plan view of the planes, Fig. 3 is a front view of the airship showing the ailerons in position to correct the tilt of the planes. Fig. 4 is an end view of the superposed planes showing the ailerons in a normal position. Fig. 5 is a front view showing a diagrammatic view of the ailerons in their normal position. Fig. 6 is a top view of one of the ailerons. Fig. 7 is a front or edge view of one of the ailerons showing manner of hinging same to one of the frame posts, and staying the same, and Fig. 8 is an end view of one of the ailerons, showing manner of hinging and swinging said ailerons.

It will be observed that the stabilizing device herein shown is adapted for use on any type of airship, but I show it as applied to the well known bi-plane, and in which I illustrate the ailerons as being placed between the planes. I may locate them in any desired place, above or below the planes, or instead of being placed between the planes they may be fore or aft of the supporting planes. In this instance, as stated, the bi-plane comprises the upper and lower planes 10, 11, and for purposes of illustrating my invention, I mount the stabilizers 12, at the ends of the planes, midway between the forward post 13, and the rear post 14, as shown in Fig. 2, or the forward margin of the stabilizer may be secured to the forward post 13, as shown in Fig. 4, this latter arrangement being prepared. The stabilizer comprises a frame, the forward and rear bars thereof, 15, 16, respectively, being parallel with the forward and rear margins of the supporting planes 10, 11, and the end bars 17, 18, are disposed at an angle, and in such relation to the planes that their forward ends extend farther beyond the ends of the supporting planes than their rear ends. Each frame thus constructed has therein a series of shutter blades 19, pivoted along this central line, by means of the projecting pins 20, or otherwise, to the forward and rear bars 15, 16, so that when they are closed they slightly overlap each other and thus form a supporting plane. These planes are therefore parallel with the end bars 17, 18, and, as shown in Fig. 2, are so disposed that their forward ends project farther from the central fore and aft line of the aeroplane than their rear ends. I may or may not have these stabilizers movable so as to change the stabilizer frame at different angles relative to the surfaces of the supporting planes. In practice the stabilizer frames are normally at the same angle as the planes, as shown in Fig. 4, but I show a means whereby the rear end of each frame may be raised or lowered. To accomplish this the forward margin, or bar 15, of the frame 12, is secured to the vertical post 13, by means of a hinge 22, and stay wires 23 extend down from the forward outer ends of the frame 12, to the bottom of the post 13, and similar stay wires 24 join the outer ends of the frame 12, with the upper end of the post 13, thus keeping the frame firmly fixed transversely at its forward end. The rear end of the frame

has a pair of stay wires 25, 26, extending vertically in opposite directions, and traveling over guide pulleys 27, 28, at the upper and lower planes, and from these pulleys the cables extend to a suitable lever or other operative means (not shown) in reach of the aviator. This hinged arrangement of the shutter frames enables the aviator to give a greater or less angle of incidence to the shutters than the supporting planes have, and thus accentuate the drag on that end of the machine, which is particularly serviceable in the turning movement. The important feature, however, is the action of the shutters. By reference to Fig. 3 it will be seen that I provide, centrally in the frame, an operating wheel 30 which has a pendant weight 31, at the lower end of the arm 32. Cables 33, 34, around this wheel, extend out to the respective shutters, and are attached to the lower margins of the shutters, while the upper margins of the shutters have a cable 35, extending entirely across to connect the two sets.

The action of the weight 31 is such that, for instance, should the right end of the aeroplane move downwardly, the weight would swing over by gravity, and by turning the wheel draw the cable 33 to the right and cause the shutters on the left side of the machine to assume a reverse angle to their normal position, while the cable 35 would operate to close the shutters on the right side of the machine. The action resulting therefrom would be to give the depressed end of the planes an additional supporting surface, while the other end of the machine, which carries the open shutters, would under those conditions, be retarded, because the shutters would present an angle of incidence of such a character as to not only drag back that end but also tend to depress it and thereby counteract the tilting action of the planes. It will thus be seen that the stabilizing action is automatic in its character, but as the wheel is under the control of the aviator it is obvious that it may be manually operated without in any manner interfering with its automatic action.

When the machine is in normal flight the shutter blades stand at an angle of forty-five degrees or less, as may be found most serviceable, and also fully ten degrees off from the direction of flight. The forward ends of the shutter blades being farther from the center line of the machine than their rear ends it is obvious that the tendency of the shutters is such as to produce a lift. When, however one stabilizer closes its blades its angle of incidence produces a lift, as it is set in a fixed position, that is fore and aft. The action of closing one stabilizer, opens the other, or rather changes the angles of the blades so that the pivotally mounted surfaces stand at least vertical, or

if so adjusted, that they will be beyond the vertical, or at an angle, which is the reverse of its normal position, and the blades are then at such an angle relative to the forward movement of the machine that it serves the purpose of a rudder, since it drags that end of the machine back, and tends at the same time to depress the machine. It will also be noted that when both ailerons have their blades at forty-five degrees, and ten degrees of its forward course, both ailerons offer forward resistance equal to its lift, plus the amount of resistance, because of not being in the exact line of the direction of flight. When the left side drops the left aileron closes and uses that forward resistance for lifting, and the right aileron uses that forward resistance, similar to the action of a vertical rudder, to hold the machine in the true course of flight. It will further be seen that if when both aileron blades are at forty-five degrees, the rear rudders should be used for turning, the surfaces of the blades automatically keep the machine from skidding, because the angle of forty-five degrees on the outside of the turn will lift the machine on that side if it begins to skid and the surfaces of the other aileron are at such an angle as to depress that side, thus banking the machine.

What I claim as new, is:—

1. In a flying machine, a horizontally-disposed frame at each lateral end of the supporting surfaces, hinged transversely to give a greater or less angle of incidence than the supporting planes, and a plurality of blades in said frame pivotally mounted therein on fore and after pivots.

2. In a flying machine, a horizontally-disposed frame at each lateral end of the supporting surfaces, hinged on a transverse pivot, to give a greater or less angle of incidence than the supporting planes, a plurality of blades in each frame pivotally mounted therein on a line approximately ten degrees off from the direction of flight.

3. In a flying machine, a horizontally-disposed frame at each lateral end of the supporting surfaces, hinged on a transverse pivot, a plurality of blades pivotally mounted on a line approximately ten degrees off from the direction of flight, the forward ends of said blades being farther from the central line of the machine than their rear ends.

4. In a flying machine, a horizontally-disposed frame at each lateral end of the supporting surfaces, means for swinging them to any suitable angle of incidence, blades in said frame pivotally-mounted therein on a line approximately ten degrees from the direction of flight, both sets of blades being normally at such an angle as to produce a lift equal to its drift or resistance in flight.

5. In a flying machine, a horizontally-dis-

posed frame at each lateral end of the supporting surfaces, means for adjusting them to any suitable angle of incidence, blades in said frame pivotally mounted on a line approximately ten degrees off from the direction of flight, means whereby the closing of one set of blades will produce a lift on the depressed side, and means whereby the set of blades on the other side will depress the machine.

6. In a flying machine, a horizontally-disposed frame at each lateral end of the supporting surfaces, means for adjusting them to any suitable angle of incidence, blades in each frame pivotally mounted on a line approximately ten degrees off from the direction of flight, means for closing the blades on one side and producing an upward lift thereby, and means for swinging the set of blades at the other end of the machine to a direction the reverse of its normal position and producing a retarding movement while in flight.

7. In a flying machine, a horizontally-disposed frame at each lateral end of the supporting surfaces, means for adjusting them to any suitable angle of incidence, blades in each frame pivotally mounted on a line approximately ten degrees off from the direction of flight, means for producing a lift on

one set of blades, and means for simultaneously producing a retarding and a depressing action in the other set of blades.

8. In a flying machine, a set of stabilizing blades at each lateral end of the machine, said blades being pivotally mounted fore and aft, on a line approximately ten degrees off from the direction of flight, and means for automatically producing a lift by one set of blades, and for producing a drag or retarding action on the other set of blades.

9. In a flying machine a set of stabilizing blades at each lateral end of the supporting surfaces, said blades being pivotally-mounted fore and aft on a line approximately ten degrees off from the direction of flight and means for automatically or manually producing a lift by the set of blades at one end of the machine, and for simultaneously producing a retarding action and a depressing movement at the other end of the machine by the other set of blades.

Signed at the city of Los Angeles county of Los Angeles State of California, this 14th day of May 1912, in the presence of witnesses.

ALBERT O. PAULSON.

Witnesses:

J. S. ZERBE,
H. E. CLYNE.