

APPLICATION FILED JUNE 17, 1912. RENEWED FEB. 23, 1915.

Patented Sept. 14, 1915.

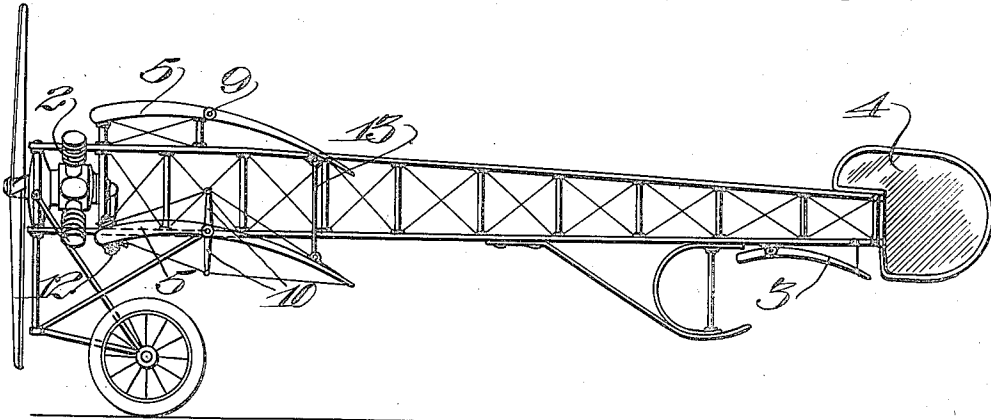


Fig. 1.

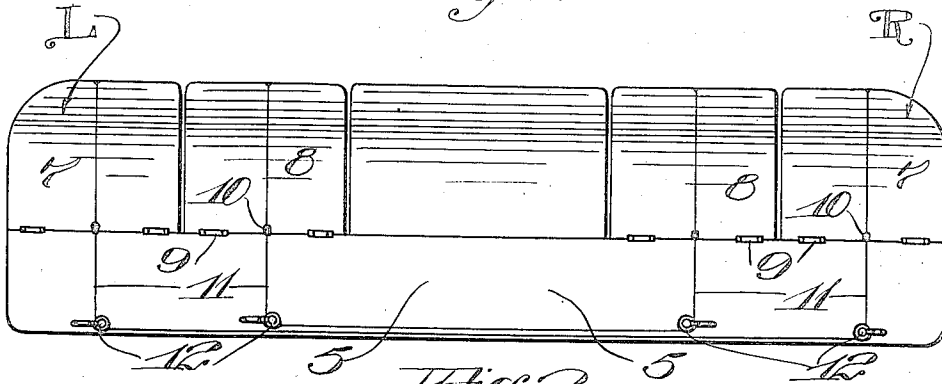


Fig. 2.

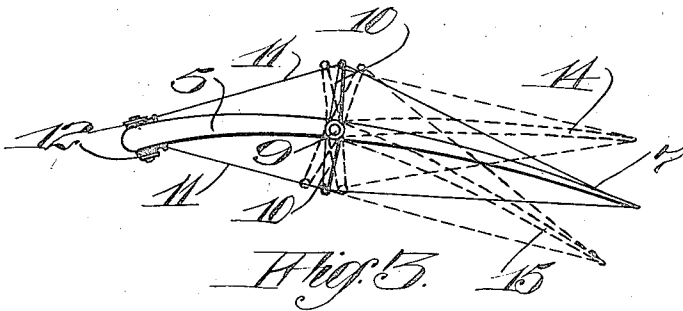


Fig. 5.

Witnesses:
 Jas. Kirkcaldy
 A. S. Burns

Inventor.
James P. Whie.
By E. H. Strong.
Attorney.

UNITED STATES PATENT OFFICE.

JAMES P. ERIE, OF OAKLAND, CALIFORNIA.

AEROPLANE.

1,153,612.

Specification of Letters Patent.

Patented Sept. 14, 1915.

Application filed June 17, 1912, Serial No. 704,114. Renewed February 23, 1915. Serial No. 10,119.

To all whom it may concern:

Be it known that I, JAMES P. ERIE, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Aeroplanes; of which the following is a specification.

This invention relates to an automatic lateral balancing device adapted to be attached to any form of aeroplane.

It is well known from observation that many birds employ, while in flight, what is commonly known as wingwarping, tilting and swinging of the wing tips, and various other movements to produce lateral stability. In the construction of flying machines a considerable number of ways suggestive of bird wing control, all more or less effective, have been employed for the maintaining of lateral balance as wing warping, tilting wing tips, hinged wing tips, ailerons, variable wing areas, shifting weights, etc., all of which are capable of use both independently or in various combinations.

The object of my invention is to produce a lateral balancing device so constructed as to operate automatically against disturbing forces.

Further objects and advantages will appear in the following description.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a standard biplane machine, showing the application of my invention. Fig. 2 is a diagrammatic plan view of an aeroplane showing the attachment of my device. Fig. 3 is a cross section of the same, the dotted lines indicating the position of the opposite ailerons.

This invention relates to an automatic lateral balancing device, and particularly pertains to that type in which ailerons are employed. In the construction here illustrated I have shown my invention as applied to a standard well known type of biplane machine which is provided with an engine 2, and propeller, and any suitable form of elevator 3, for longitudinal control. The steering of the machine is also accomplished in the usual way by a vertical rudder 4.

To the rear edges of the main plane as 5, I have shown the attachment of my device which consists of a plurality of independ-

ently hinged ailerons, there being an equal number on each side from the center of the plane. Referring to Fig. 2 I have shown two on each side. These are indicated by the numerals 7—7 and 8—8. These are hinged, as at 9, to the rear edge of the main plane in such manner that they may be oscillated to swing about the hinge either upwardly or downwardly, as shown by dotted lines in Fig. 3. Each set of ailerons as 7 and 8 are provided with vertical extensions or levers 10, which are connected by flexible cables as 11, in such manner that when the aileron on one side is elevated the aileron on the opposite side will be depressed. The flexible cable connecting each set of ailerons may be guided over suitable pulleys as 12. When the invention is applied to a biplane, as shown in Fig. 1, it is only necessary to connect each pair of ailerons on the lower plane with the flexible cable connections to produce the desired movement, the upper ailerons being connected with the lower ailerons by suitable connections, as by the rods 13. The action of the automatic lateral stabilizing ailerons will be as follows:

When the wind pressure becomes greater on one side of the plane than on the other, as sometimes occurs when the plane is struck by a wind gust, the ailerons on the side from which the gust comes will have a tendency to yield to the air pressure by reason of the greater pressure to which they are exposed; the wind pressure being less on the opposite side of the plane will allow the ailerons on this side to become depressed or yield in the opposite direction from the ailerons on the other side where the pressure is greater. In fact it can plainly be seen that it would be impossible for the ailerons, as 7 on the right side of the plane marked R, to move in either direction without a corresponding reverse movement of the aileron 7 on the left side of the plane marked L, by reason of the cable connections between the two. These opposite movements of a set of ailerons are plainly shown in Fig. 3, by the dotted lines 14 and 15.

Thus it can be seen that any tilting of the plane caused by disturbing forces will decrease the lifting surface at that point by changing the angle of the aileron into a position where it will have less lifting power. This taking place on the side of the plane having the highest elevation, or which is exposed to the greatest wind pressure, will

increase the lifting surface or capacity of the opposite side of the plane by increasing the lifting angle of the ailerons on that side, with the result that the greater lifting
5 angle produced will promptly force it back to its normal position. The moment the wind pressure becomes equalized or even throughout the surface of the plane the ailerons will, by reason of their connections,
10 have a tendency to straighten out and equalize with relation to each other and hold the plane in a horizontal position.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—
15

In a device of the class described, a lifting plane comprising a narrow stationary front portion, ailerons hinged to the rear edge of

said stationary front portion, said ailerons being of a width greater than the stationary 20 portion and arranged in inner and outer pairs on the opposite ends thereof, the outer pair constituting the rear end corners of the lifting plane, freely movable means directly connecting the outer pair of ailerons and 25 freely movable means directly connecting the inner pair of ailerons to permit free independent differential movement of each pair of ailerons.

In testimony whereof I have hereunto set 30 my hand in the presence of two subscribing witnesses.

JAMES P. ERIE.

Witnesses:

WALTER REIMERS,
GENEVIEVE S. DONELIN.