

Jan. 28, 1930.

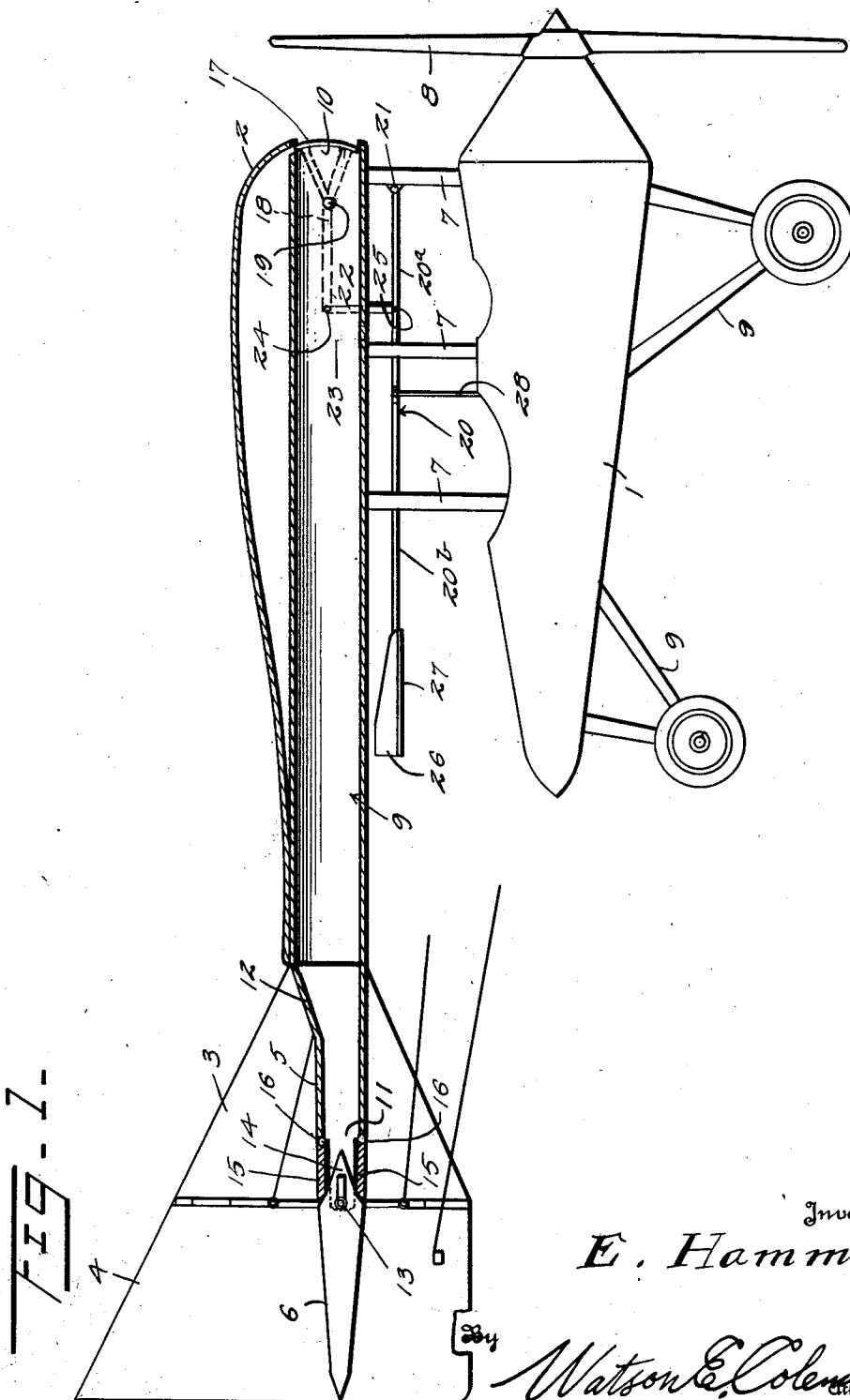
E. HAMMONS

1,744,889

MEANS FOR INSURING THE SAFE LANDING OF AIRPLANES

Filed Aug. 27, 1929

3 Sheets-Sheet 1



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Fig. 2.

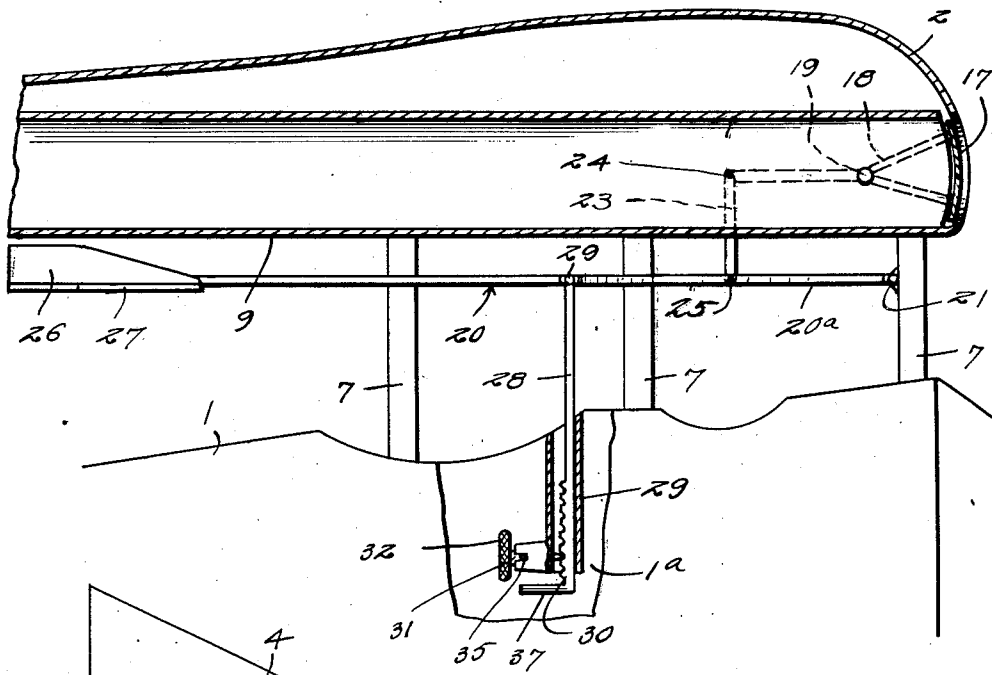
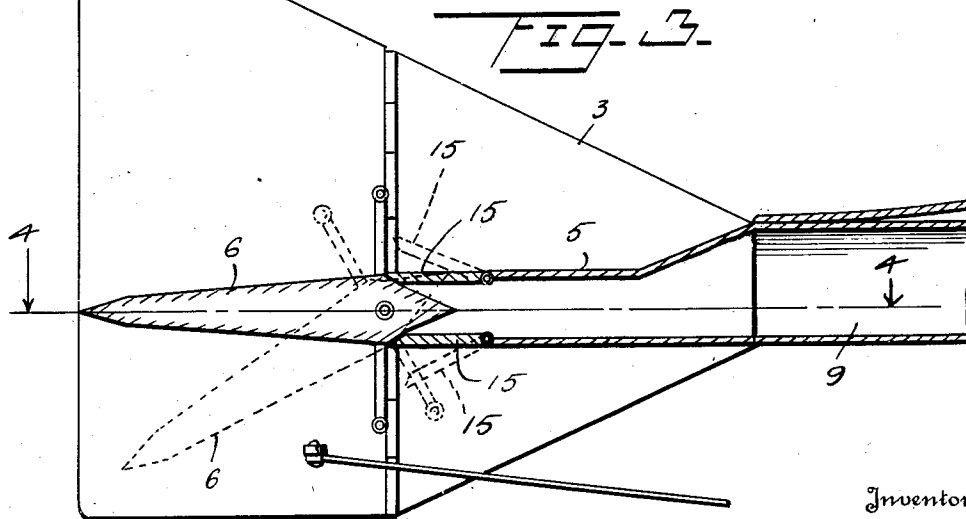


FIG. 3.



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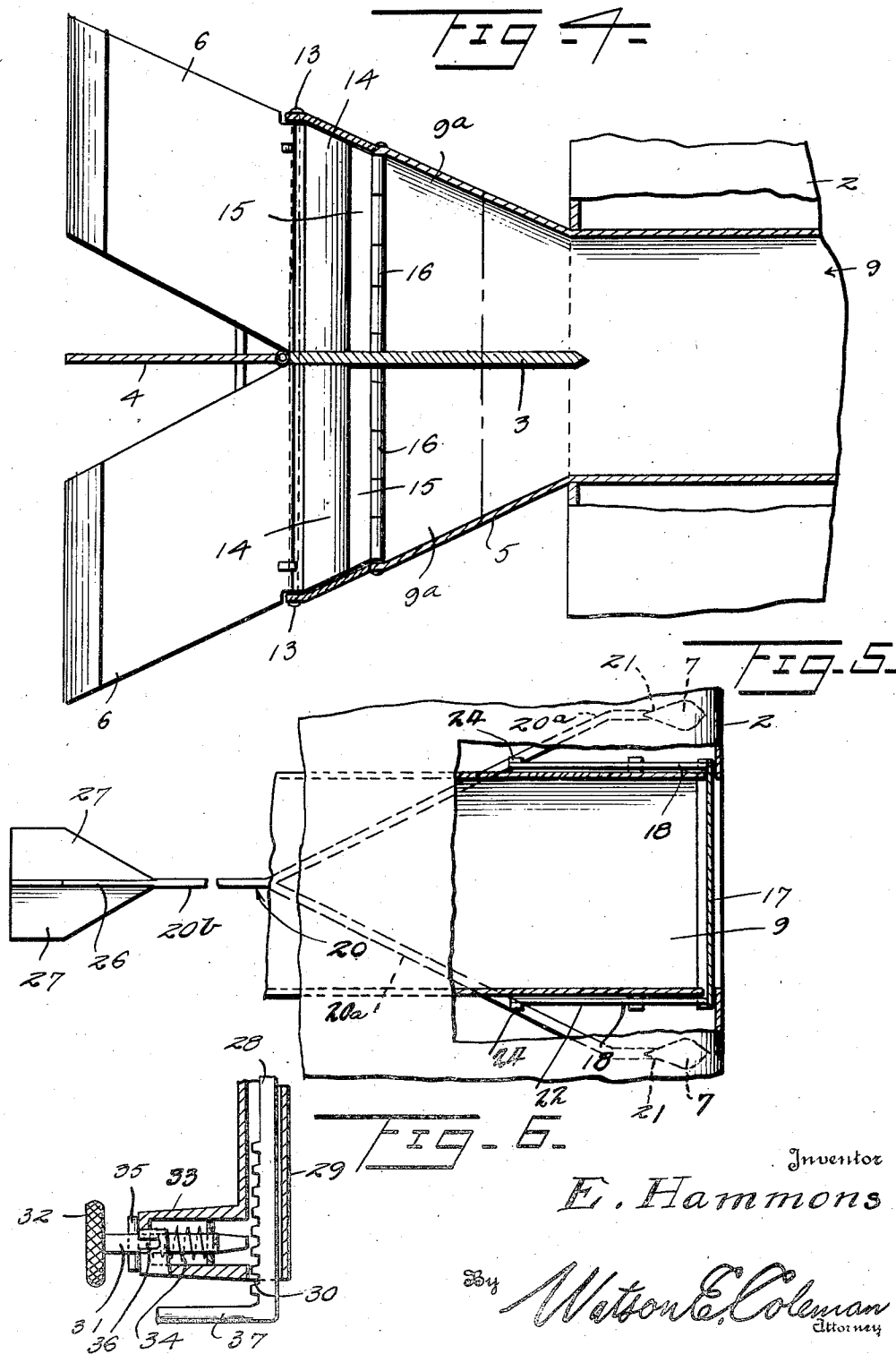
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MEANS FOR INSURING THE SAFE LANDING OF AIRPLANES

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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

EDWARD HAMMONS, OF RAVENNA, KENTUCKY, ASSIGNOR OF ONE-HALF TO FRANK B. THOMPSON, OF RAVENNA, KENTUCKY, AND FIFTEEN ONE-HUNDREDTHS TO DEWEY DUNAWAY, OF HAZARD, KENTUCKY, AND FIFTEEN ONE-HUNDREDTHS TO CLARK C. STAMFILL, OF RAVENNA, KENTUCKY

MEANS FOR INSURING THE SAFE LANDING OF AIRPLANES

Application filed August 27, 1929. Serial No. 388,778.

This invention relates to airplanes and has for one of its objects to insure the landing of such machines on an even keel and thus reduce to the minimum the possibility of accidents while landing.

To attain the foregoing and other objects, the nature of which will appear as the description proceeds, the invention comprehends the provision of an airplane embodying means adapted to hold its nose above the horizon during and after the reduction of its movement to landing speed.

The invention further comprehends the provision of means adapted, after the movement of the airplane has been reduced to landing speed, to increase the pressure of the air against its horizontal fin or stabilizer in a manner to prevent it from spinning and to hold its nose above the horizon.

The invention further comprehends the provision of means which shall be adapted, after the reduction of the speed of the airplane to about ten miles per hour, to automatically function to effect an increase of the pressure of the air against the stabilizer.

The invention further comprehends the provision of means of the character stated which shall embody an air channel extending through the wing and stabilizer of the airplane and of such formation that the passage of air therethrough will increase the pressure of the air against the stabilizer, and a manually and automatically controlled valve adapted to control the passage of air through the channel.

The invention still further comprehends the provision of means adapted to be manually controlled to effect an increase in the pressure of air against the stabilizer.

The invention is hereinafter fully described and claimed, and illustrated in the accompanying drawings, wherein:—

Figure 1 is a view partly in vertical section and partly in side elevation of an airplane embodying the invention;

Figure 2 is a sectional view taken on a plane extending vertically and longitudinally through the front end portion of the air channel and through the valve for con-

trolling the passage of air through the channel;

Figure 3 is a sectional view taken on a plane extending vertically and longitudinally through the rear end portion of the air channel and one of the elevators of the airplane;

Figure 4 is a sectional view taken on the horizontal plane indicated by the line 4—4 of Figure 3;

Figure 5 is a view partly in top plan and partly in horizontal section of a portion of the wing, air channel and means for controlling the passage of air through the air channel, and

Figure 6 is a sectional view taken on a plane extending vertically and centrally through the means by which the means for controlling the passage of air through the air channel may be latched in closed position.

While the invention is illustrated as applied to an airplane of the monoplane type, it is to be understood that it is capable of application to airplanes of any type. The airplane is diagrammatically illustrated, 1 designating the fuselage, 2 the wing, 3 the vertical fin, 4 the rudder, 5 the horizontal fin or stabilizer and 6 the elevators of the airplane. 7 designates the struts, 8 the propeller, and 9 the landing gear of the airplane.

In accordance with my invention, the airplane is provided with an air channel or slot 9, which extends through the wing 2 and stabilizer 5. The air channel 9 extends from the leading edge of the wing 2 to the trailing edge of the stabilizer 5. It is arranged at the longitudinal center of the airplane, and is provided with an inlet opening 10 located in the leading edge of the wing 2 and with outlet openings 11 located in the trailing edge of the stabilizer 5 at opposite sides of the vertical fin 3.

The air channel 9 is of uniform width and depth from the leading edge of the wing 2 to the leading edge of the stabilizer 5. The depth of the air channel 9 abruptly decreases rearwardly and downwardly in the front end portion of the stabilizer 5, and then continues through the stabilizer with a depth which is uniform but less than the depth of its por-

tion extending from the leading edge of the wing 2 to the leading edge of the stabilizer 5. The air channel 9 has two rearwardly diverging branches 9^a in the stabilizer 5, each branch leading to an outlet opening 11.

5 The elevators 6 are pivotally mounted, as at 13, in the rear ends of the air channel branches 9^a, and they are provided forwardly beyond their pivots 13 with forwardly converging portions 14, which are arranged within the rear ends of the air channel branches 9^a.

10 The upper and lower walls of the air channel branches 9^a are provided with sections or flippers 15, which are hinged at their front edges, as at 16, and have their rear edges arranged in contact with the upper and lower sides of the elevator portions 14.

A valve 17 is provided for controlling the entrance of air to the air channel 9. The valve 17 is arranged at the front end of the air channel 9 and is of arcuate formation in cross section. Arms 18 fixed to the ends of the valve 17 and pivoted, as at 19, to the sides of the air channel 9 pivotally support the valve for movement into closed or opened position. When it is in closed position, the valve 17 extends across the front end of the air channel 9, and when in opened position, it is above the air channel.

Means are provided for automatically controlling the position of the valve 17. This means maintains the valve 17 in closed position when the airplane is flying at normal speed and automatically opens the valve when the airplane is flying at landing speed. This means comprises a lever 20 located below the wing 2 and having a forked front end portion 20^a which is pivoted at 21 to the two front struts 7 of the airplane. The lever 20 extends rearwardly from the front struts 7 and the rear portion 20^b thereof is located at the longitudinal center of the airplane. The lever 20 is connected to the arms 18 by links 23, which are pivotally connected, as at 24, to the arms and pivotally connected, as at 25, to the forked end 20^a of the lever.

The lever 20 will, when it is moved downwardly, swing the valve 17 into opened position, and it will, when it is swung upwardly, swing the valve into closed position.

The lever 20 is provided at its rear end with a vertical fin 26 and horizontal fins 27 which, when the airplane is travelling at normal flying speed, are acted upon by the air stream beneath the wing 2 in a manner to hold the lever against downward swinging movement, with the result that the valve 17 is maintained in closed position when the airplane is travelling at normal flying speed. When the speed of the airplane is reduced preparatory to landing, the weight of the lever will overcome the upward pressure of the air stream against the horizontal fins 27 and move down-

wardly, with the result that the valve 17 will be moved into opened position.

Means are provided for latching the valve 17 in closed or partly closed position and to permit it to be manually moved from one of its positions to the other. This means comprises a bar 28 pivoted, as at 29, to the lever 20 and extending downwardly therefrom into a cock pit 1^a. The bar 28 extends through a guide tube 29 arranged within the cock pit 1^a, and is provided on its lower end portion with notches 30. A bolt 31 having a manipulating handle 32 is slidably mounted in a sleeve 33 extending rearwardly from the lower end of the guide tube 29. The bolt 31 is adapted to engage in one of the notches 30 of the bar 28 to secure the valve 17 in its adjusted position. A spring 34 serves to yieldingly hold the bolt 31 in projected or bar engaging position, and a pin 35 carried by the bolt and adapted to engage the outer end of the sleeve 33 serves to hold the bolt in retracted or bar releasing position.

The sleeve 33 is provided with slots 36 adapted to receive the pin 35 when the bolt 31 is in projected position. The bar 20 is provided at its lower end with a rearwardly directed handle 37 by means of which it may be moved to swing the valve 17 in the direction of its opened or closed position.

From the foregoing description, taken in connection with the accompanying drawings, it will be understood that, when the bolt 31 is in retracted position and the airplane is travelling at normal flying speed, the valve 17 will be closed and no air will be travelling through the channel 9, and that when the speed of the airplane is reduced preparatory to landing, the valve will be opened and air will travel through the channel. The air travelling through the channel 9 creates a pressure which is greater than the pressure against the under side of the wing 2 and which acts upwardly against the stabilizer 5, and this pressure against the stabilizer prevents the plane from spinning and holds its nose above the horizon, with the result that it will land on an even keel. As the tapered front ends of the elevator 6 extend into the rear end of the air channel 9, the air streams passing from the channel will impinge against the under sides of the elevators when they are depressed and against their upper sides when they are elevated. The flippers or movable sections 15 of the air channel 9 permit the elevators 16 to be readily operated, and they will, when the valve 17 is closed and the airplane is travelling at normal flying speed, occupy planes coincident with the upper and lower sides of the channel and the elevators, with the result that no drag will occur at the elevators.

If the aviator wishes to open the valve 17 before the movement of the plane has been re-

duced to landing speed, it is only necessary for him to exert a downward pressure on the handle 37, and he may latch the valve in fully or partly closed position through the medium of the bolt 31. When the valve 17 opens, it cuts out the circle of pressure around the channel 9 and gives it a short cut over said channel. The invention enables the tail of the airplane to be made comparatively short due to the fact that the required air pressure will act against the stabilizer when it is needed. The wing and tail are so arranged that they are at an angle to the horizontal when the wheels and skid are on the ground. In view thereof the angle of attack of the wing will be such as to slow the airplane down and enable it to be brought to a stop after a comparatively short run.

While I have described the principle of the invention together with the structure which I now consider the preferred embodiment thereof, it is to be understood that the structure shown is merely illustrative and that such changes may be made, when desired, as fall within the scope of the invention as claimed.

I claim:—

1. An airplane embodying a wing, a stabilizer, an air channel located in the wing and stabilizer and extending from the leading edge of the wing to the trailing edge of the stabilizer, that portion of the channel located in the stabilizer being of less depth than that portion located forwardly beyond the stabilizer, a valve for controlling the entrance of air to the channel, and elevators pivotally mounted at the rear end of the channel.

2. An airplane embodying a wing, a stabilizer, an air channel located in the wing and stabilizer and extending from the leading edge of the wing to the trailing edge of the stabilizer, that portion of the channel located in the stabilizer being of less depth than that portion located forwardly beyond the stabilizer and provided with two discharge openings located at the trailing edge of the stabilizer, a valve for controlling the entrance of air into the channel, and an elevator arranged at each of said discharge openings.

3. An airplane embodying a wing, a stabilizer, an air channel located in the wing and stabilizer and extending from the leading edge of the wing to the trailing edge of the stabilizer, that portion of the channel located in the stabilizer being of less depth than that portion located forwardly beyond the stabilizer and provided with two discharge openings located at the trailing edge of the stabilizer, a valve for controlling the entrance of air into the channel, and an elevator arranged at each of said discharge openings and provided with portions extending into the channel through said openings.

4. An airplane embodying a wing, a stabilizer, an air channel located in the wing

and stabilizer and extending from the leading edge of the wing to the trailing edge of the stabilizer, that portion of the channel located in the stabilizer being of less depth than that portion located forwardly beyond the stabilizer and provided with two discharge openings located at the trailing edge of the stabilizer, a valve for controlling the entrance of air into the channel, an elevator arranged at each of said discharge openings and provided with tapered front edges extending into said openings, and flippers constituting portions of the upper and lower walls of the channel and resting in contact with the tapered ends of the elevators.

5. An airplane embodying a wing, a stabilizer, an air channel located in the wing and stabilizer and extending from the leading edge of the wing to the trailing edge of the stabilizer, that portion of the channel located in the stabilizer being of less depth than that portion located forwardly beyond the stabilizer and provided with discharge openings in the trailing edge of the stabilizer, an elevator arranged at each of said discharge openings, and means adapted to upwardly deflect the air escaping from said discharge openings when the elevators are raised and adapted to downwardly deflect the air when the elevators are depressed.

6. An airplane embodying a wing, a stabilizer, an air channel located in the wing and stabilizer and extending from the leading edge of the wing to the trailing edge of the stabilizer, that portion of the channel located in the stabilizer being of less depth than that portion located forwardly beyond the stabilizer and provided with discharge openings in the trailing edge of the stabilizer, an elevator arranged at each of said discharge openings, means adapted to upwardly deflect the air escaping from said discharge openings when the elevators are raised and adapted to downwardly deflect the air when the elevators are depressed, a valve for controlling the addition of air to the channel, and means for opening and closing the valve.

7. An airplane embodying a wing, a stabilizer, an air channel located in the wing and stabilizer and extending from the leading edge of the wing to the trailing edge of the stabilizer, that portion of the channel located in the stabilizer being of less depth than that portion located forwardly beyond the stabilizer and provided with discharge openings in the trailing edge of the stabilizer, an elevator arranged at each of said discharge openings, means adapted to upwardly deflect the air escaping from said discharge openings when the elevators are raised and adapted to downwardly deflect the air when the elevators are depressed, a valve for controlling the addition of air to the channel, and means for automatically

holding the valve closed while the airplane is moving at normal speed and adapted to open the valve when the speed of the airplane is reduced to a predetermined degree.

- 5 8. An airplane embodying a wing, a stabilizer, an air channel located in the wing and stabilizer and extending from the leading edge of the wing to the trailing edge of the stabilizer, that portion of the channel
10 located in the stabilizer being of less depth than that portion located forwardly beyond the stabilizer and provided with discharge openings in the trailing edge of the stabilizer, an elevator arranged at each of said
15 discharge openings, means adapted to upwardly deflect the air escaping from said discharge openings when the elevators are raised and adapted to downwardly deflect the air when the elevators are depressed, a valve
20 for controlling the addition of air to the channel, a shaft to which the valve is fixed, an arm secured to the shaft, a lever extending longitudinally of the airplane and pivoted thereto at its front end, a link connecting
25 the arm and lever, and fins secured to the rear end of the lever.

9. An airplane embodying a wing, a stabilizer, an air channel located in the wing and stabilizer and extending from the leading edge of the wing to the trailing edge of the stabilizer, that portion of the channel
30 located in the stabilizer being of less depth than that portion located forwardly beyond the stabilizer and provided with discharge openings in the trailing edge of the stabilizer, an elevator arranged at each of said discharge openings, means adapted to upwardly
35 deflect the air escaping from said discharge openings when the elevators are raised and adapted to downwardly deflect the air when the elevators are depressed, a valve for controlling the addition of air to the channel, a shaft to which the valve is connected, an
40 arm secured to the shaft, a pivoted lever, a link connecting the arm and lever, a slidably mounted bar connected to the lever and provided with a handle, the bar being provided with longitudinally spaced notches, and a spring pressed bolt adapted to be engaged in one of said notches.

10. An airplane embodying a wing, a stabilizer, an air channel located in the wing and stabilizer and extending from the leading edge of the wing to the trailing edge
55 of the stabilizer, that portion of the channel located in the stabilizer being of less depth than that portion located forwardly beyond the stabilizer and provided with discharge openings in the trailing edge of the stabilizer, an elevator arranged at each of said
60 discharge openings, means adapted to upwardly deflect the air escaping from said discharge openings when the elevators are raised and adapted to downwardly deflect the air when the elevators are depressed, a

valve for controlling the addition of air to the channel, a shaft to which a valve is fixed, an arm secured to the shaft, a lever extending longitudinally of the airplane and pivoted at its front end thereto, a link connected to the arm and lever, fins carried by the rear end of the lever, a rod pivotally connected to the lever, and a latch cooperating with the rod.

In testimony whereof I hereunto affix my signature.

EDWARD HAMMONS.