Nov. 18, 1930. H. M. SALISBURY ET AL 1,782,149

STABILIZER FOR AEROPLANES

Original Filed Jan. 31, 1928

Fig. 1.

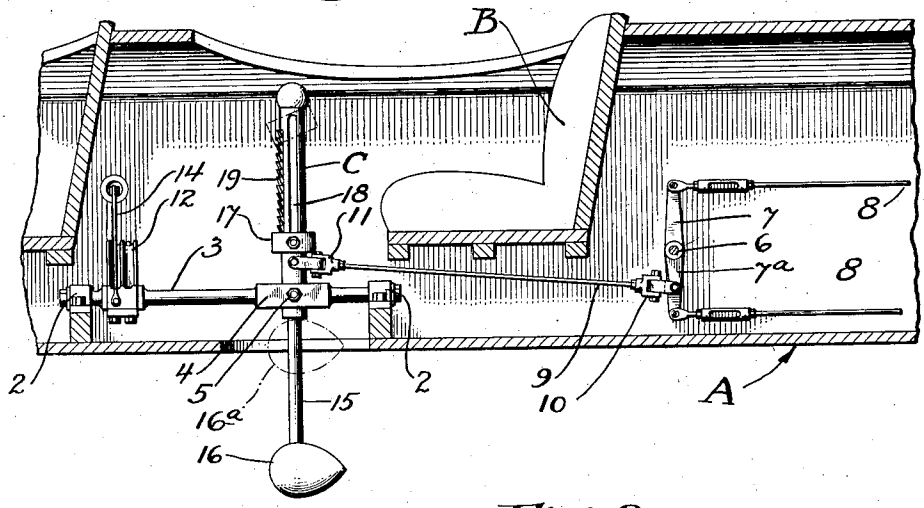


Fig. 2.

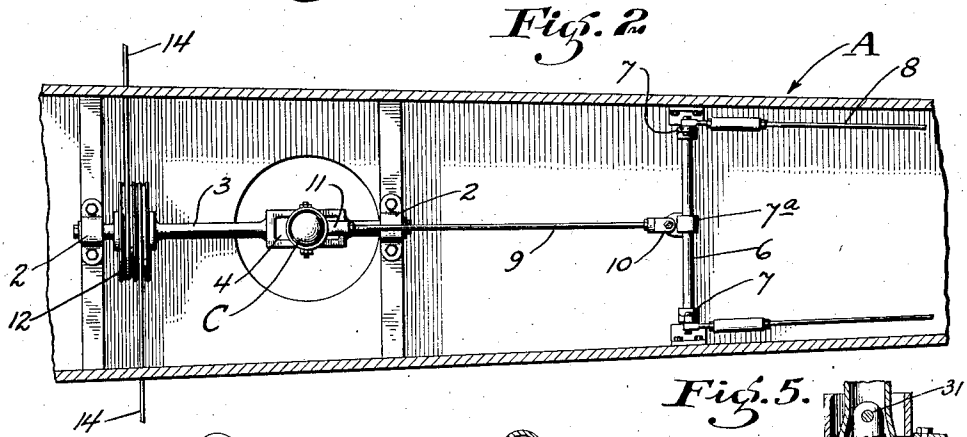


Fig. 5.

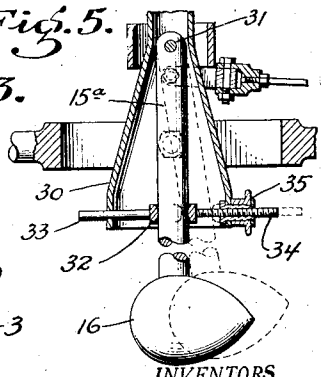


Fig. 4.

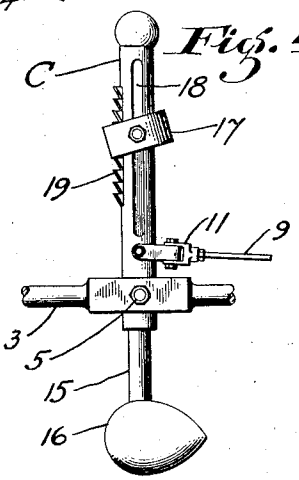
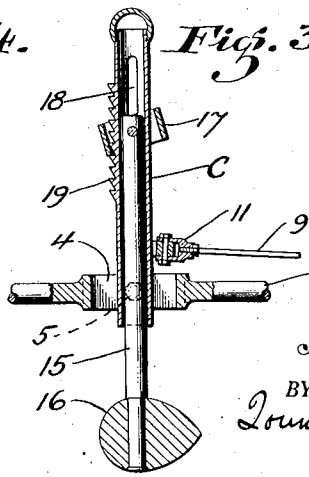


Fig. 3.



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UNITED STATES PATENT OFFICE

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STABILIZER FOR AEROPLANES

Application filed January 31, 1928, Serial No. 250,760. Renewed January 9, 1929.

This invention relates to an aeroplane, and especially to an attachment whereby the elevator and ailerons on a plane may be automatically actuated to maintain the plane in an upright or level position during flight.

When flying through fog, dense cloud formations, and on dark nights it is often difficult to maintain the plane in an upright position, as there are no fixed or visible objects to be guided by. In some cases aviators have lost their lives, or become seriously injured by momentarily becoming physically incapable of handling the controls, and in other instances, loss of lives and wreckage of the plane could have been avoided if the aviator could have left the control just long enough to make a minor adjustment or repair.

The object of the present invention is to provide an attachment whereby the controls, such as the elevator, ailerons etc., may be automatically actuated to maintain the plane in an upright or level position during periods of emergency such as above specified, and further to provide an attachment of this character which may be manually thrown into, or out of operation so that the controls may be manually or automatically actuated, as desired.

The invention is shown by way of illustration in the accompanying drawings, in which:

Fig. 1 is a fragmentary vertically longitudinal sectional side elevation of an aeroplane, showing the application of the invention,

Fig. 2 is a sectional plane view of Fig. 1,

Fig. 3 is a central vertical sectional view of the control lever, said view also showing the attachment whereby automatic operation may be obtained,

Fig. 4 is a side elevation of the control lever and the automatic controlling attachment,

Fig. 5 is a detailed sectional view of the lower end of the controlling lever, showing a modified form of the same.

Referring to the drawings in detail, particularly Figs. 1 and 2, A indicates a portion of the fuselage of an aeroplane, B the aviator's seat, and C the operating lever whereby the ailerons and elevator of a plane are controlled. Extending longitudinally of the fuselage and supported in bearings 2—2 is a shaft 3. One end of the shaft is enlarged and slotted, as at 4, and the operating lever C is pivotally supported in the enlarged portion, as indicated at 5, so as to permit the operating lever to be swung rearwardly and forwardly to actuate the elevator. The elevator is not shown in the present instance, but the controls connected therewith are illustrated, and comprise a cross shaft 6, upon which is mounted crank arms 7. The upper and lower ends of the crank arms 7 are connected through wires or cables 8, with opposite sides of the elevator, and a crank arm 7^a is in turn connected with the operating lever C, through a rod 9, and universal connections such as shown at 10 and 11.

Forward or rearward movement of the controlling lever about the pivot 5 transmits a push or pull on the rod 9, and the crank arm is accordingly transmitted to the cross shaft 6, the movement of the crank arm being in turn transmitted through the cables 8 to actuate the elevator in the usual manner.

The ailerons, which are usually disposed at a point near the wing tips, are not illustrated, but the mechanism controlling same is. This mechanism comprises one or more sheaves, such as indicated at 12. These sheaves are secured on the longitudinal shaft 3. Cables 14, are attached to the respective sheaves and these are in turn connected in the usual manner to the ailerons. Their position is controlled by rocking movement of the operating lever C and the shaft 3, in the usual manner.

The mechanism so far described is more or less standard and common, but its actuation is entirely dependent upon the aviator. The purpose of the present invention is to provide an attachment whereby the operation of the lever C may be automatically controlled. This is accomplished by providing a tubular operating lever C, see Fig. 3, which serves as a guide for a rod 15. The rod 15 telescopes with relation to the tubular operating lever, and carries a weight 16 on its lower end, this weight being preferably stream-lined in

shape so as to afford the least resistance possible when the position is assumed, as shown in Fig. 1. The function of the weight is that of automatically maintaining the operating lever in a vertical position, as such position maintains the ailerons and the elevator in a position which maintains the plane upright or level during flight. The weight is lowered to the position shown in Fig. 1 when automatic operation is desired, but it may be manually raised to the dotted line position indicated at 16^a, if manual control is desired.

To permit raising or lowering of the weight, a handle in the form of a collar, such as shown at 17 is employed, and the operating lever C is slotted on opposite sides, as indicated at 18. A pin projects through the upper end of the rod 15, and the slots 13 and the collar 17 are pivotally attached thereto. A rack bar 19 is secured to the operating lever, and the collar or handle may be thrown into or out of operation therewith, as shown in Figs. 3 and 4. It is thus possible to maintain the weight 16 in a raised or lowered position, or in any intermediate position desired.

From the foregoing it should be obvious that if an aviator feels that he is becoming physically incapable of handling the controls, it will only be necessary to lower the weight 16, so that the controls will be automatically taken care of. The same operation may be resorted to during poor visibility or the like, and in cases of emergency where slight repairs or adjustments may be required. In some instances it may be desirable to set the automatic control so that the plane will slowly climb or slowly descend. With this object in view a modified form of the control lever is shown in Fig. 5. In this instance the lower end of the control lever is expanded or bell-shaped, as shown at 30. The telescoping rod indicated at 15^a is pivotally mounted at the point 31. It passes through a ring 32. This ring is provided with two projecting rods 33 and 34. The rod 33 extends through the lower end 30 of the controlling rod, while the rod 34 which is threaded, passes through a nut 35. By rotating the nut, the rods 33 and 34 are either moved in a forward or rearward direction and as they are secured to the ring 32, it is obvious that the rod 15^a together with the weight 16 will be moved forward or rearwardly, as indicated by dotted lines in Fig. 5. In other words, the weight is thrown out of alignment either in a forward or rearward direction with relation to the longitudinal axis of the control lever C. This will cause the control lever to automatically assume a position where the elevator will be so adjusted that the plane will either slowly climb or descend, as the case may be. If the ring 32 is adjusted so that the rod 15^a aligns with the longitudinal axis of the control lever C, as shown in Figs. 3 and 4, the automatic control will be such as to maintain the plane in horizontal flight. It is thus possible to automatically maintain the plane in horizontal flight or to maintain it in a position where it will horizontally climb or descend, as the case may be.

While certain features of the present invention are more or less specifically described, we wish it understood that various changes may be resorted to within the scope of the appended claims; similarly, that the materials and finishes of the several parts employed may be such as the manufacturer may decide or varying conditions or uses may demand.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:—

1. In an aeroplane, an operating lever whereby the position of the ailerons and the elevator is controlled, a pivotal mounting for the lower end of the lever, a rod carried by the operating lever, a weight on the lower end of the rod, manual actuated means whereby the rod may be raised to a point where the weight will assume an inoperative position, or conversely lowered to a point where the weight will gravitationally function to maintain the operating lever in a vertical position, and means whereby the angle formed by said rod and operating lever may be varied.

2. In an aeroplane, an operating lever whereby the position of the ailerons and elevator is controlled, a pivotal mounting for the lower end of the lever, a rod telescopically mounted with relation to the lever and projected through the lower end thereof, a weight on the lower end of the rod, a handle on the opposite end of the rod, and means on the lever for locking the handle to the lever.

3. In an aeroplane an operating lever whereby the position of the ailerons and elevator is controlled, said lever being tubular in construction and having a slot formed in opposite sides thereof, a rod telescoping within the tubular lever, and projecting through the lower end thereof, a pivotal mounting for the lower end of the tubular lever, a weight on the lower end of the rod, a collar like handle on the lever, a pin secured to the upper end of the rod and projecting through the slotted lever, said collarlike handle being pivotally mounted on the pin, and a rack bar on the lever with which the collarlike handle is adapted to interlock.

4. In an aeroplane a longitudinally extending rock-shaft, an operating lever pivotally secured adjacent its lower end to the rock-shaft, a cross shaft operatively connected with the operating lever and adapted to be rocked thereby, a rod carried by the operating lever, a weight on the lower end of the rod and disposed below the longitudinal shaft, manually actuated means whereby the rod may be raised to a point where the weight will assume a position adjacent the longi-

tudinal shaft or conversely lowered to a position where the weight will gravitationally function to maintain the operating lever in a vertical position, and means whereby the angular relation of said rod and operating lever may be varied.

5. In an aeroplane a rock shaft, an operating lever pivotally mounted on the rock shaft said lever when rocked laterally transmitting a rocking movement to the rock shaft and causing actuation of the ailerons on the plane, and said lever when rocked forwardly or rearwardly causing actuation of the elevator on the plane, a weight attached to the lever at a point below the pivotal point of the lever where it will gravitationally function to maintain the lever in a vertical position, means for raising and securing the weight at a point adjacent the pivotal point of the lever where it will cease to function gravitationally, and means for altering the position of the weight in a horizontal plane with relation to the lever.

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