F. L. VAN ALLEN.

CONTROL FOR DUAL CONTROL AEROPLANES.

APPLICATION FILED AUG. 30, 1918.

1,327,183.

Patented Jan. 6, 1920.

4 SHEETS—SHEET 1.

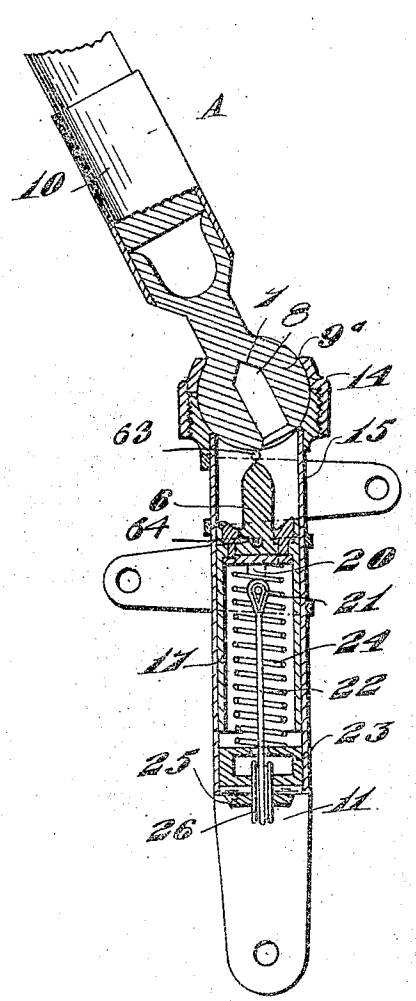


Fig. 2.

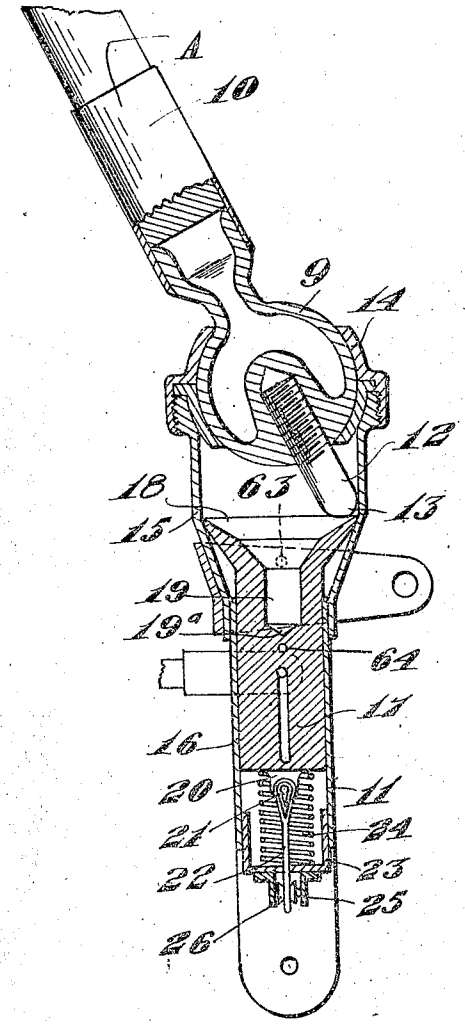


Fig. 1.

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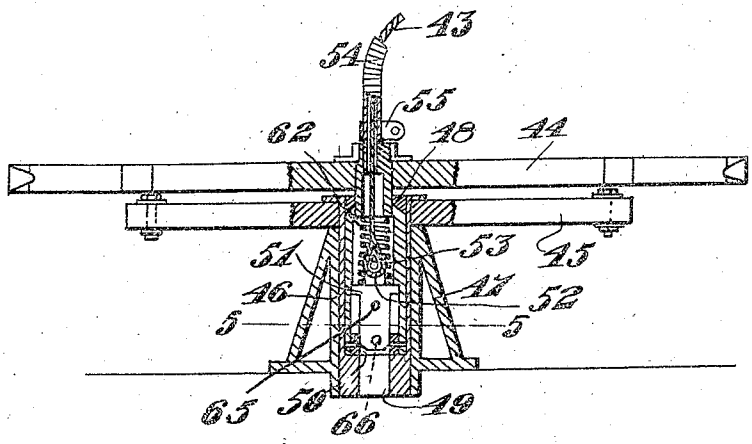


Fig. 4.

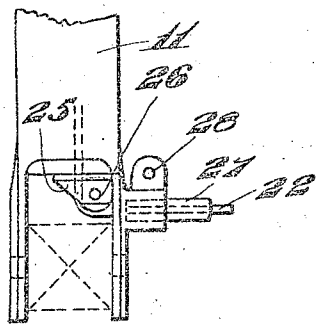


Fig. 3.

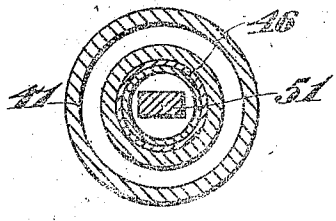


Fig. 5.

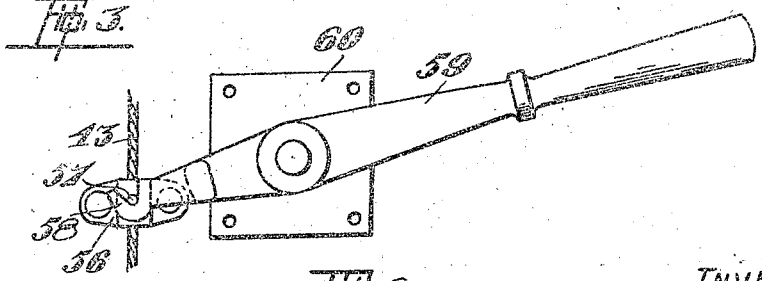


Fig. 8.

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4 SHEETS—SHEET 3.

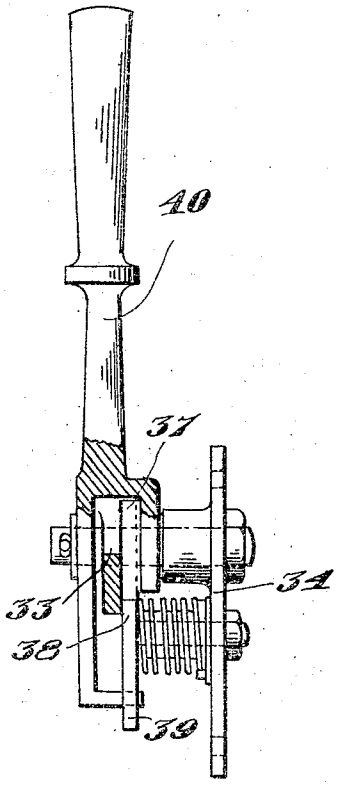


Fig. 4.

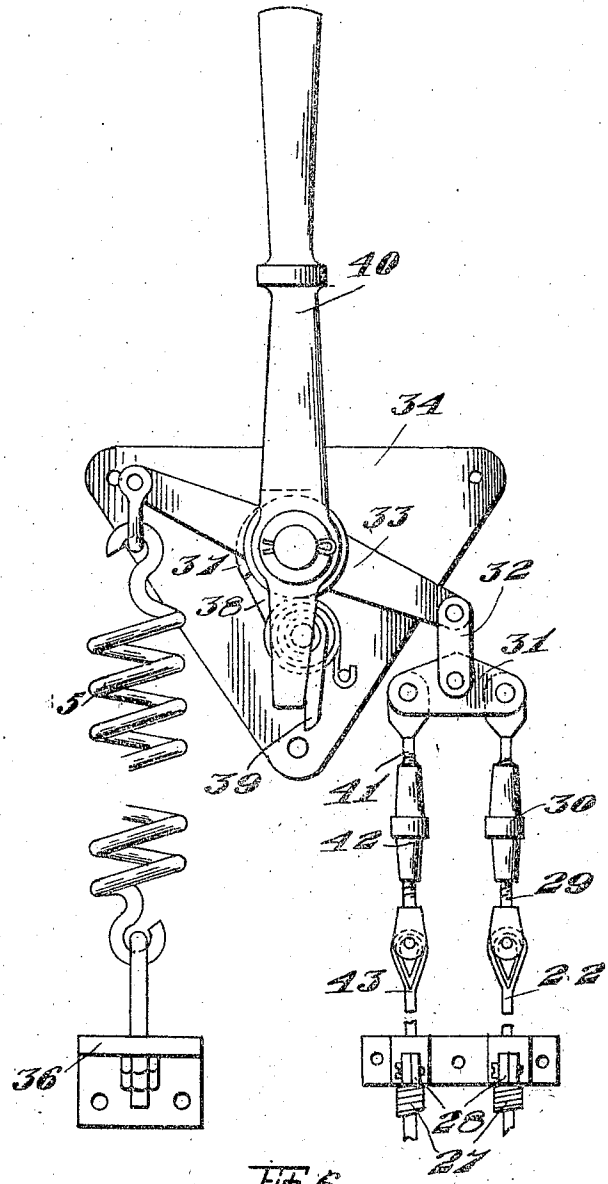


Fig. 6

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4 SHEETS—SHEET 4.

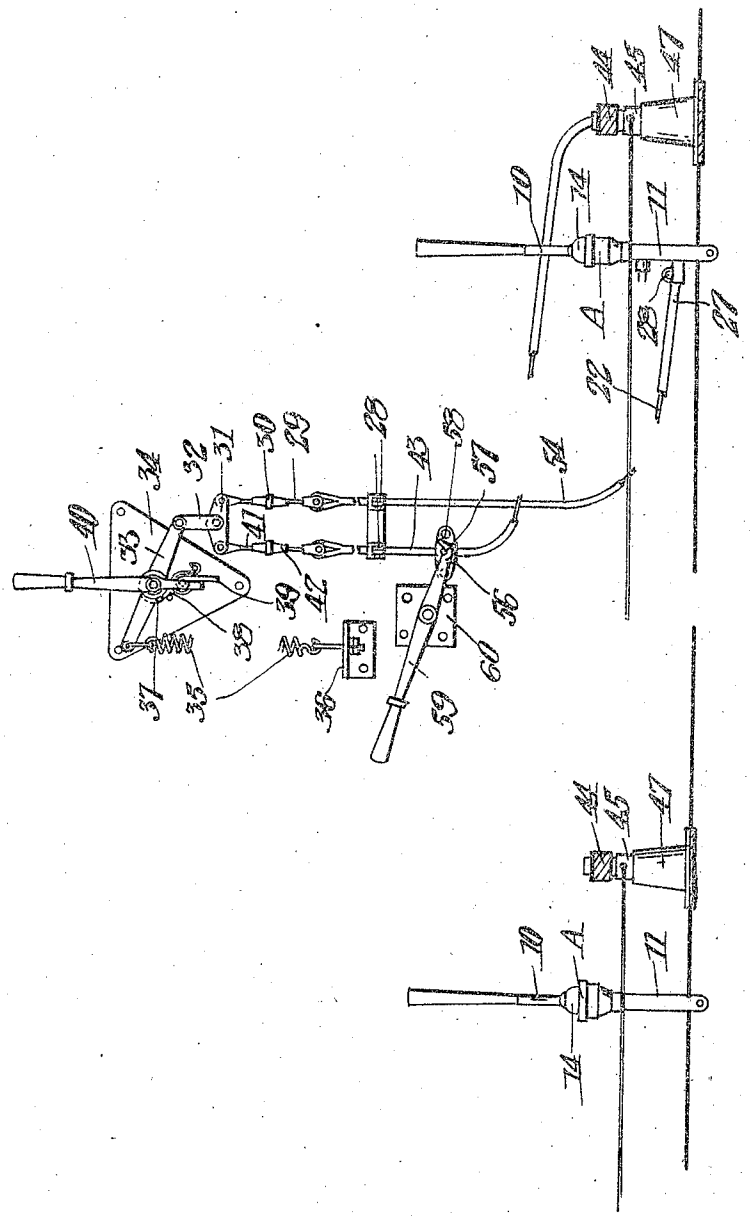


Fig. 5.

WITNESSES

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UNITED STATES PATENT OFFICE.

FREDERIC LANGTRY VAN ALLEN, OF TORONTO, ONTARIO, CANADA.

CONTROL FOR DUAL-CONTROL AEROPLANES.

1,327,183. Specification of Letters Patent. Patented Jan. 6, 1920

Application filed August 30, 1918. Serial No. 252,127.

To all whom it may concern:

Be it known that I, FREDERIC LANGTRY VAN ALLEN, a subject of the King of Great Britain, and resident of the city of Toronto, Province of Ontario, in the Dominion of Canada, have invented certain new and useful Improvements in Controls for Dual-Control Aeroplanes, of which the following is a specification.

This invention relates to improvements in controls for dual control airplanes, and the objects of the invention are to instantaneously release one set of controls of the airplane and render the same useless, while the second set will retain full control of the airplane, to permit of one control of the rudder bar being individually released, while leaving the control stick of that set of controls active, and generally to so arrange the controls that they may be actuated by a pilot and so permit of the controls designed to be actuated by a cadet in training being constructed in such a manner that the training of the cadet will be completed with a much greater measure of safety than has hitherto been accomplished for both pilot and cadet.

With the above and other objects in view the invention consists essentially of the improved construction particularly described and set for the in the following specification and accompanying drawings forming part of the same.

In the drawings:—

Figure 1 is a sectional elevation of the control stick.

Fig. 2 is a sectional elevation of an alternative form of a control stick.

Fig. 3 is a fragmentary side elevation of a control stick shown in Fig. 1, illustrating the manner in which the flexible member extends from the control lever.

Fig. 4 is a sectional elevation of the rudder control.

Fig. 5 is an enlarged transverse section on line 5—5 through the rudder control.

Fig. 6 is a front elevation of the lever designed to simultaneously control the control stick and rudder bar of a dual control machine.

Fig. 7 is a side elevation of the lever, part being broken away in the section.

Fig. 8 is a front elevation of a lever whereby the rudder bar may be individually disengaged while the control stick remains active.

Fig. 9 is a diagrammatic view of my improved control.

Like characters of reference refer to like parts in the several figures.

In teaching cadets and other people the art of flying the airplane used is of the dual control type, so that one control stick is capable of being operated by the cadet or learner while the other control stick is actuated by the pilot or instructor who is in charge of the machine.

The cadet, during the first lesson or so, follows the movements of the control stick made by the pilot, and in the event of the cadet making any slight mistakes these can be remedied by the pilot actuating his control stick.

I have found that under some conditions it may be advisable to render the control under the actuation of the cadet or learner inoperative, and to this end I have provided a controlling lever operatively connected to the control stick and rudder control, and on actuation of which the pilot or instructor may if he deems it advisable render the control stick and rudder of the cadet inoperative.

By reference to Figs. 1 and 2 of the drawings it will be seen that I form the control stick A in two portions 10 and 11, the upper portion 10 in the first said figure being provided with a lower ball end 9 provided with a pin 12 threaded or otherwise secured to the ball and having the point of its lower end 13 tapered.

This ball makes slidable engagement with a socket 14 carried on the upper end by a tubular member 15, the lower end of which is tapered slightly and engages with a tubular member 16.

In the tubular member 16 a plunger 17 is slidably mounted and the upper end of this plunger is flared and provided with a bell shaped opening 18 which connects with a cylindrical bore terminating in lower tapered end 19^a.

On the lower end of the plunger 17 a pair of lugs 20 are provided through which a pin 21 passes, and this pin is adapted to engage one end of a flexible member 22, the object of which will be made clear hereafter.

The lower end of the tubular member 16 is closed by a hollow cap 23 between which and the lower end of the plunger 17 a spiral spring 24 is located and through the central

longitudinal axis of this spring the flexible member 22 passes.

The cap 23 carries a bracket 25 on which the pulley 26 is journaled and around this pulley the flexible member 22 passes. This flexible member passes through the lateral wall of the lower member 11 where it enters and passes through a flexible casing 27 secured to the tubular portion 11 of the control stick by a clasp 28.

The flexible member 22 has its other end connected to a bifurcated end of the rod 29 which is formed in two portions connected by a turn-buckle 30, whereby the effective length of the rod 29 may be adjusted. This rod 29 is connected at the other end to a link 31 which in turn is connected by the link 32 to the lever 33 pivotally supported intermediate of its length to the bracket 34.

That end of the lever 33 remote from the link 32 is connected to one end of the spring 35, the other end of which is anchored to a suitable bracket 36. The lever 33 is provided with a cam projection 37 adapted to co-act with a spring controlled dog 38 which is pivotally mounted intermediate of its length and provided with a tail piece 39 which coacts with the lower offset end of the lever 40 which is pivotally mounted intermediate of its length to the bracket 34.

The lever 40 is also adapted to control the rudder bar of the machine and to this end the link 31 is connected to a rod 41 formed in two portions connected by a turn buckle 42 whereby the effective length of the rod may be adjusted. The lower end of the rod 41 is connected to a flexible member 43 which extends to the rudder control.

The rudder control consists of a pair of bars 44 and 45 superimposed on one another the latter being connected to a tubular member 46 rotatably mounted in a stand 47, the lower end of the bore of the tubular member 46 being reduced to form an oblong orifice 49.

The rudder bar 44 is connected to the upper end of a tubular member 48 which is rotatably mounted in the tubular member 46 and the lower end of the bore of the tubular member 48 is reduced and formed with an oblong orifice 50 designed to register with the orifice 49.

In the tubular member 48 a plunger 51 is slidably mounted the lower end of the plunger being oblong in transverse section and adapted to engage with the oblong orifices 50 and 49 under certain circumstances.

The upper end of the plunger 51 is provided with a pair of lugs 52 through which a pin 53 passes to secure one end of the flexible member 43 to the said plunger, and a spring 62 is located between the plunger and a shoulder on the tubular member 48, the said spring surrounding the flexible member 43.

After the flexible member passes through the tubular member 48 it passes through the flexible tubular member 54 which is secured to the tubular member 48 by a clamp 55.

By reference to Fig. 8 it will be seen that the flexible member 43 is provided intermediate of its length with a clamp 56 formed with pintles 57 adapted to be engaged by the recessed bifurcated ends 58 of the lever 59 which is pivoted intermediate of its length to a bracket 50.

In Fig. 2 which is an alternative form of control stick to that illustrated in Fig. 1 it will be seen that the only difference resides in the fact that the ball 9^a is provided with a recess 8 having a counter sunk outer end and a tapered inner end 7, and a pin 6 is carried by a plunger 17, which pin is provided with a tapered upper end adapted to engage with the recess in the ball 9^a. The location of the spring 24 between the piston 17 and the lower cap 23 is similar to that already described and the other elements of the control stick shown in Fig. 1 correspond to those disclosed in Fig. 2.

When the airplane equipped with a control system of this nature is in use, the pilot actuates the lever 40 in a rearward direction and the lower offset end of the said lever engages with the tail pieces 39 of the dog 38 disengaging the said dog from the cam 37, thus allowing the spring 35 to exert a pull on one end of the lever 33, the other end of which through the links 32 and 31 exerts a pull to the flexible members 22 and 43. The flexible member 22 pulls the plunger 17 downwardly against the action of the spring 24 and disengages the pin 12 from the orifice 19 in the said plunger so rendering the control stick A inoperative.

If the control stick is of the nature shown in Fig. 2 then the pin 6 becomes disengaged from the orifice 8 in the ball end 9^a and thus renders the stick inoperative. The lever 40 is adapted to actuate the lever 33 to remove the tension from the flexible members 43 and 22, and the lever 40 is rotated about its pivotal point until the offset lower end of the lever engages with the lever 33 so rotating the lever 33 until the pawl 38 engages with the cam 37. It will thus be seen that the lever 40 will have to be moved forwardly through an arc equal to the clearance between the offset end of the lever 40 and the lever 33 before movement of the lever 33 can be made by means of the lever 40.

Simultaneously with the rendering of the control stick A inoperative the pull of the flexible member 43 on the piston 51 will disengage the lower oblong portion of the piston from the orifice 49, so that any movement of the rudder rod 44 will not be transmitted to the rudder rod 45.

When it is found desirable to throw the control stick A and the rudder rods into

operation again, the lever 40 is manually operated and will actuate the lever 33, resetting the last said lever and allowing the dog 38 to engage with the cam 37.

This resetting of the lever 33 releases the pull on the flexible members 22 and 43 and allows the spiral spring 24 to press the plunger 17 upward and permit of the pin 12 engaging with the orifice 19 of the plunger 17 as shown in Fig. 1, or permit of the pin 6 engaging with the orifice 8 in the ball 9^a as shown in Fig. 2.

Simultaneously with this movement the spring 62 located above the plunger 51 presses the said plunger downwardly to engage the lower end of the same with the oblong orifices 50 and 49, so that any movement of the rudder rod 44 will be transmitted through the tubular member 48, and plunger 51 to the tubular member 46, and thus the motion of the rudder rod 44 will be directly transmitted to the rudder rod 45, which is connected by flexible members to the rudder of the machine.

It may be found advisable under certain circumstances to permit of the control stick A being left operative while the rudder rods are rendered inoperative, and to this end the pilot actuates the lever 59 which transmits a pull to the flexible member 43 and disengages the plunger 51 from the oblong orifice 49 of the tubular member 46, so that any movement of the rudder rod 44 will not be transmitted to the rod 45.

It will be understood that the rod 44 is provided on the end with foot rests which are engaged by the feet of the cadet and by means of which the rudder vanes are usually controlled and when the rudder rods are out of commission any movement of the rudder rod 44 will not in any way interfere with the actuation of the rudder.

The control stick A may when operative be arranged, so that the lever 40 will not have any control thereon, and to accomplish this I have provided orifices 63 and 64, through the tubular member 15 and the plunger 17 which orifices register when the plunger is forced upwardly to full extent, and a pin is then passed through the orifices to prevent movement or displacement of the plunger.

The rudder control is also provided with orifices 65 and 66 through the tubular members 46 and 48 and plunger 51 and when the plunger is pressed downwardly to full extent the orifices register and a pin is engaged with the orifices, so that the plunger 15 cannot be actuated by the lever 40.

As many changes could be made in the above construction and many apparently widely different embodiments of my invention within the scope of the claims constructed without departing from the spirit or scope thereof, it is intended that all matter contained in the accompanying specification and drawing shall be interpreted as illustrative and not in a limiting sense.

What I claim as my invention is:—

1. In a dual control aeroplane in which each set of controls consists of rudder bars and control stick, lever means for rendering the rudder bar of one set of controls, inoperative while the control stick of the same set remains operative, and lever means for rendering the control stick and rudder bars of the same set simultaneously inoperative.

2. In a dual control aeroplane, a control stick formed in two portions, pin means carried by one of the portions, and a slidable plunger having flared upper end formed with a bell shaped opening connected to a cylindrical bore, the said plunger being designed to engage with the pin means and render the stick operative.

3. In a dual control aeroplane, a control stick formed in two portions, a plunger slidable operating in one of the portions and formed with a flared upper end having a bell shaped opening to engage the other portion of the stick, and resilient means for normally pressing the plunger into engagement with the other portion of the stick.

4. In a dual control aeroplane, a control stick, formed in two portions, means carried by one portion of the stick designed to engage the other and render the stick operative, a lever, resilient means controlling the operation of the lever in one direction, means for manually operating the lever in the opposite direction, a flexible member connecting the lever with the first said means, and a cam and dog means for securing the lever in position.

5. In a dual control aeroplane, a pair of superimposed rudder bars, a tubular member attached to one rudder bar having an oblong orifice in the lower end, a tubular member attached to the other bar and operating in the first tubular member and having an oblong orifice in the lower end registering with the said orifice and a reciprocable plunger having an oblong lower end coacting with the orifices.

In witness whereof I have hereunto set my hand in the presence of a witness.

FREDERIC LANGTRY VAN ALLEN.

Witness:
H. M. CHRISTMAN.