L. H. RAY.

CONTROL FOR AEROPLANES.

APPLICATION FILED OCT. 18, 1912.

1,067,271.

Patented July 15, 1913.

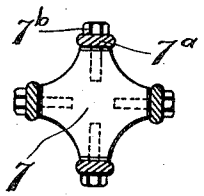


Fig. 4.

Fig. 1.

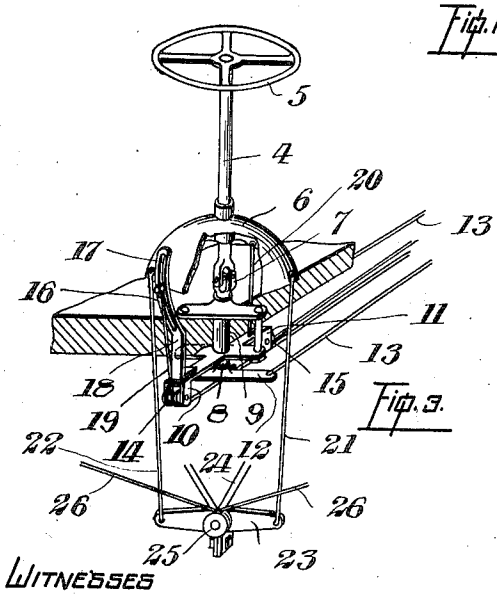


Fig. 3.

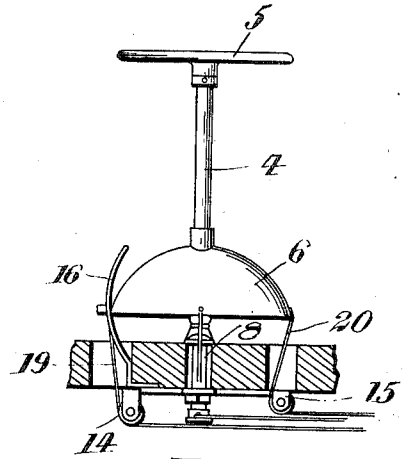


Fig. 2.

WITNESSES

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UNITED STATES PATENT OFFICE.

LEWIS HECTOR RAY, OF OTTAWA, ONTARIO, CANADA, ASSIGNOR OF ONE-HALF TO FREDERICK PHILIP GODSON, OF TOUBURY, ENGLAND.

CONTROL FOR AEROPLANES.

1,067,271. Specification of Letters Patent. Patented July 15, 1913.

Application filed October 18, 1912. Serial No. 726,484.

To all whom it may concern:

Be it known that I, LEWIS HECTOR RAY, a subject of the King of Great Britain, residing at the city of Ottawa, Province of Ontario, Dominion of Canada, have invented certain new and useful Improvements in Controls for Aeroplanes, of which the following is the specification.

My invention relates to improvements in controls for aeroplanes and the object of the invention is to devise a control device which will operate the elevating plane or planes, the vertical rudder, and warp the wings as required or actuate the ailerons where these are used in place of wing warping.

A further object is to construct a device which will operate any of these controlling elements of the machine independently of each other but will at the same time permit of any or all these controlling elements being suitably actuated at the same time as necessity may demand.

The invention consists of a column provided with a suitable hand wheel at its upper end, a bell shaped member mounted on the column, said column being free to rotate within the bell, a vertical spindle below the column, a lever connected to its lower end suitably connected to the rudder, the upper end of the spindle being connected by a universal joint to the lower end of the column, a sleeve extending around the spindle and having forwardly and rearwardly extending projections, pulleys suitably mounted on both projections, means connected to the bell and tail or elevating plane bearing against the pulleys, a curved plate having a slot therein situated above the floor boards of the machine, a bolt extending through the slot in the curved plate and threaded into the bell member near the periphery thereof, a tripod extending down below the frame of the machine, a double ended lever pivotally connected to the tripod, a drum suitably connected to the lever and means connected to the bell member and the ends of the lever for oscillating the latter and means connected around the drum and to the planes for warping the same as required, all as hereinafter more particularly described and illustrated in the drawings in which:

Figure 1 represents a perspective view of a monoplane showing my controlling device applied thereto. Fig. 2 is a side elevation of the device showing floor boards in section. Fig. 3 is a perspective view of the device, and Fig. 4 is a detail of the universal joint between the column and the vertical spindle.

1 are the planes of the machine and 2 is the rear elevating or tail plane.

3 is the vertical rudder.

4 is the vertical steering column having the hand wheel 5 at its upper end and 6 is the bell shaped member extending around the same, but independent thereof.

7 is a universal joint connecting the column with the spindle 8.

9 is the sleeve surrounding the spindle and having the forwardly and rearwardly extending projections 10 and 11.

12 is a lever secured to the bottom of the vertical spindle 8, the ends of which are connected by cables 13 to a suitable lever on the rudder post.

14 and 15 are the pulleys pivotally connected to the forwardly and rearwardly extending projections 10 and 11.

16 is a curved plate extending upwardly above the foot-board and having a slot 17 therein.

18 is a pin connected near the lower periphery of the bell shaped member and designed to slide in the slot 17 when the bell is swung backwardly or forwardly about the universal joint 7.

The bell shaped member 6 although independent of the column 4 will be tilted either forwardly, backwardly, or laterally when the column is tilted in the corresponding direction.

19 and 20 are cables connected to the front and to the back of the bell member, said cables extending down over the pulleys 14 and 15 respectively and passing rearwardly to a suitable lever on the elevating plane.

21 and 22 are cables connected at the top to the sides of the bell member and at their lower ends to the lever 23 pivotally connected to the lower tripod 24 of the machine.

25 is a drum secured to the lever 23, and 26 are the wing warping wires wound around the drum and secured at one point thereto. The universal joint 7 is of star shape and the forks 7^a are secured to the star shaped member by the cap screws 7^b.

The operation of the device is as follows: When it is desired to elevate the machine the wheel is pushed forward thus drawing

on the rear cable 20 which will pull the tail plane up. When it is desired to depress the machine the wheel and column are pulled backward. When it is desired to flex the wings the wheel and column are pushed to the right or to the left as desired, and when it is desired to turn the vertical rudder the hand wheel is rotated. Any or all of these movements may be performed independently or simultaneously as occasion may demand.

From the above description it will be seen that as all these operations can be performed at the same time the necessity of having to use several separate pedals or levers to perform some of the functions required in the control of the aeroplane will be done away. It is well known that three separate movements are required, that of elevating and depressing the machine, that of steering horizontally and that of flexing or warping the wings to maintain lateral equilibrium. Hitherto it has been the custom in control devices to have at least one of these movements controlled by separate means and the advantage of the device constructed according to my invention is that they are all controlled by three separate movements of a single device.

Although I have shown my device as applied to a monoplane it is to be understood that it can with equal efficacy be applied to any form of aeroplane, hydro-aeroplane or airship.

What I claim as my invention is:

1. In a control device for aeroplanes, the combination with the rudder, elevating plane and means for retaining lateral stability, of a bell-shaped member, a column extending therethrough and free to rotate therein, said column provided at its upper end with a hand wheel, a suitable spindle mounted below the column and having a lever at its lower end suitably connected to the rudder, a universal joint connecting the column with the spindle, a sleeve surrounding the spindle having forwardly and rearwardly extending projections, pulleys suitably mounted on the forwardly and rearwardly extending projections and cables connected at their forward ends near the front and rear surface of the periphery of the bell-shaped member passing around the pulleys and connected to the elevating plane, and means connected to the bell-shaped member for operating the lateral balancing means.

2. In a control device for aeroplanes, the combination with the rudder, elevating plane and means for retaining lateral stability, of a bell-shaped member, a column extending therethrough and free to rotate therein, said column provided at its upper end with a hand wheel, a suitable spindle mounted below the column and having a lever at its lower end suitably connected to the rudder, a universal joint connecting the column with the spindle, a sleeve surrounding the spindle having forwardly and rearwardly extending projections, pulleys suitably mounted on the forwardly and rearwardly extending projections and cables connected at their forward ends near the front and rear surface of the periphery of the bell-shaped member passing around the pulleys and connected to the elevating plane, a tripod connected below the frame of the machine, a lever pivotally connected thereto, a drum connected to the lever, cables connecting the ends of the lever with the sides of the bell-shaped member, a curved slotted arm, and a bolt extending through the slotted arm and threaded into the bell-shaped member for preventing the rotation of the latter.

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

LEWIS HECTOR RAY.

Witnesses:

RUSSEL B. SMART,

D. C. A. RAYE.