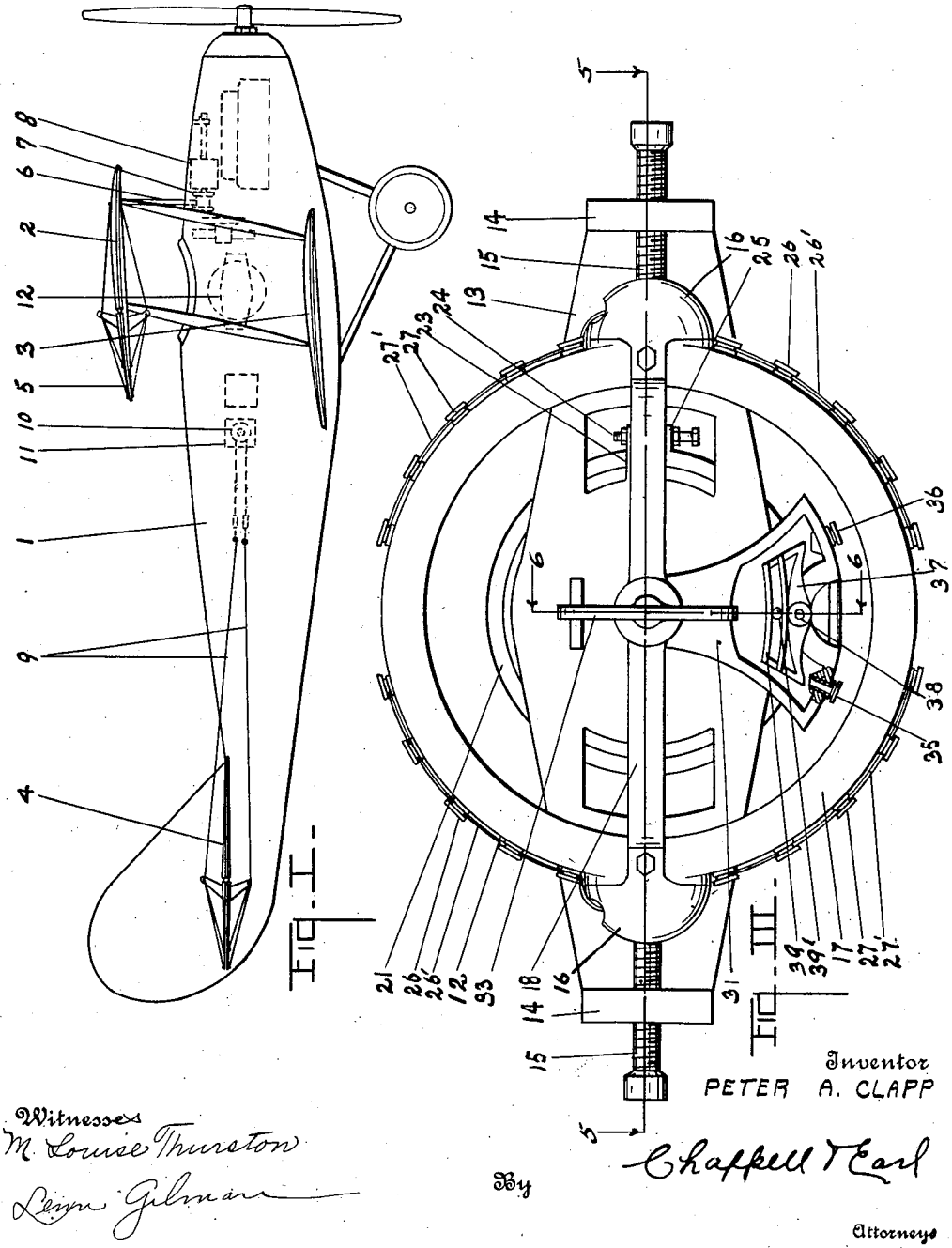
P. A. CLAPP.

CONTROL FOR AIRPLANES.

APPLICATION FILED JUNE 10, 1920.

1,365,090. **Patented Jan. 11, 1921.**

4 SHEETS—SHEET 1.



Witnesses
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4 SHEETS—SHEET 2.

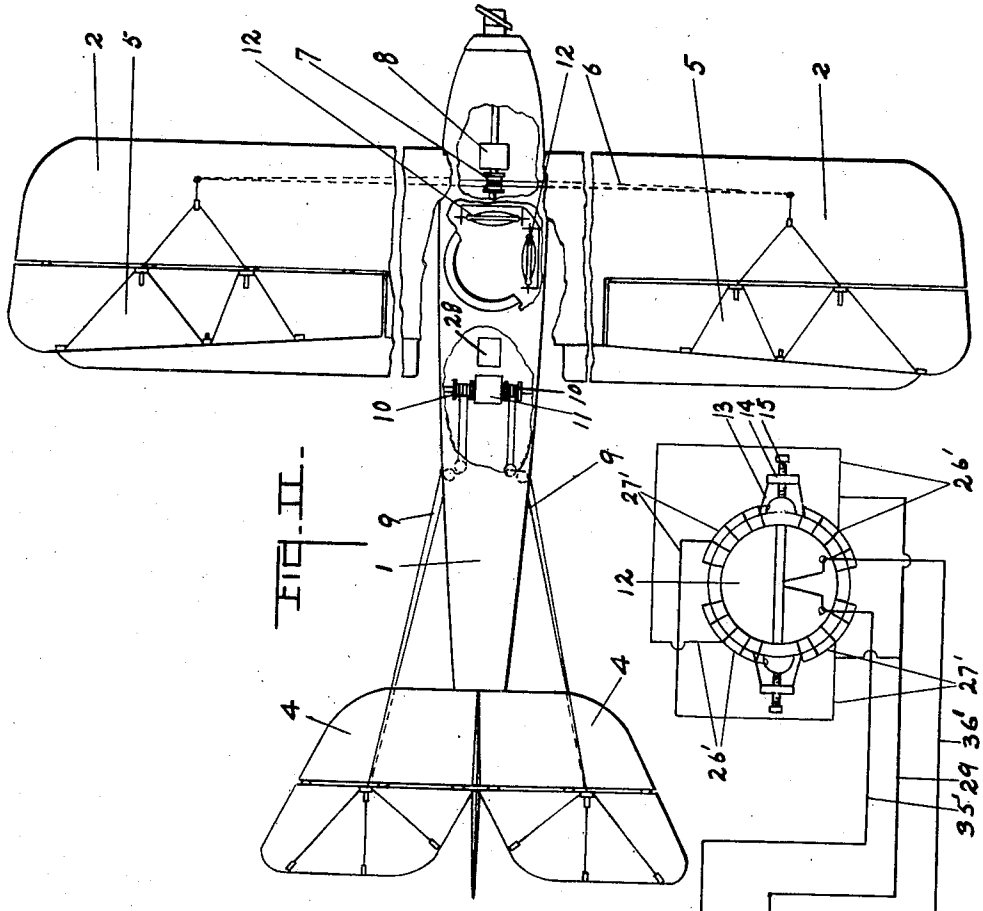


FIG. II.

FIG. VII.

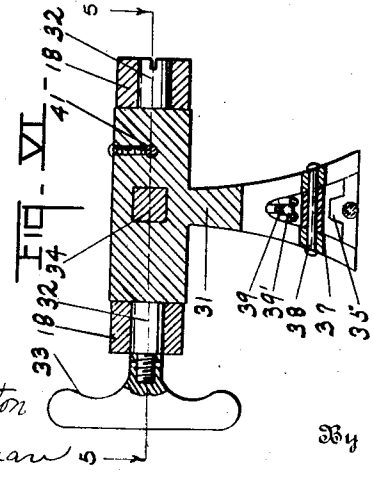


FIG. VI.

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4 SHEETS—SHEET 3.

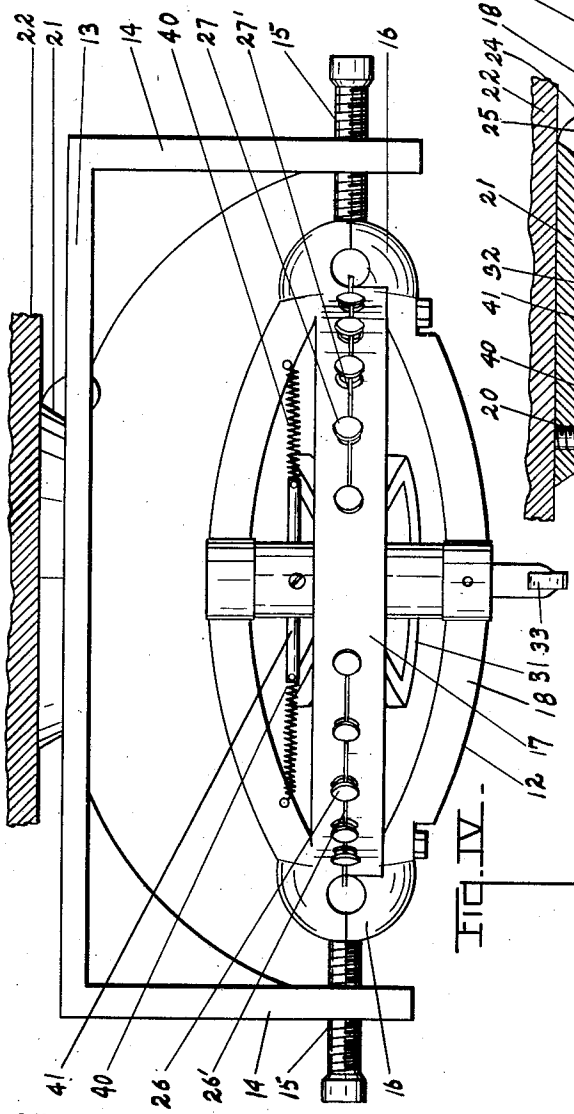


FIG. IV.

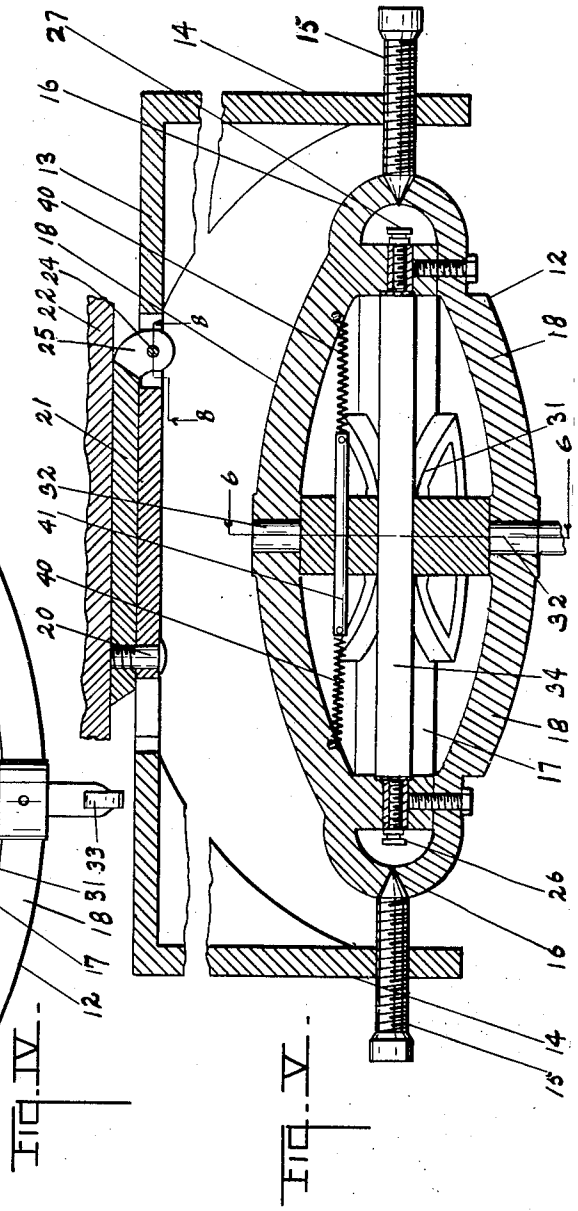


FIG. V.

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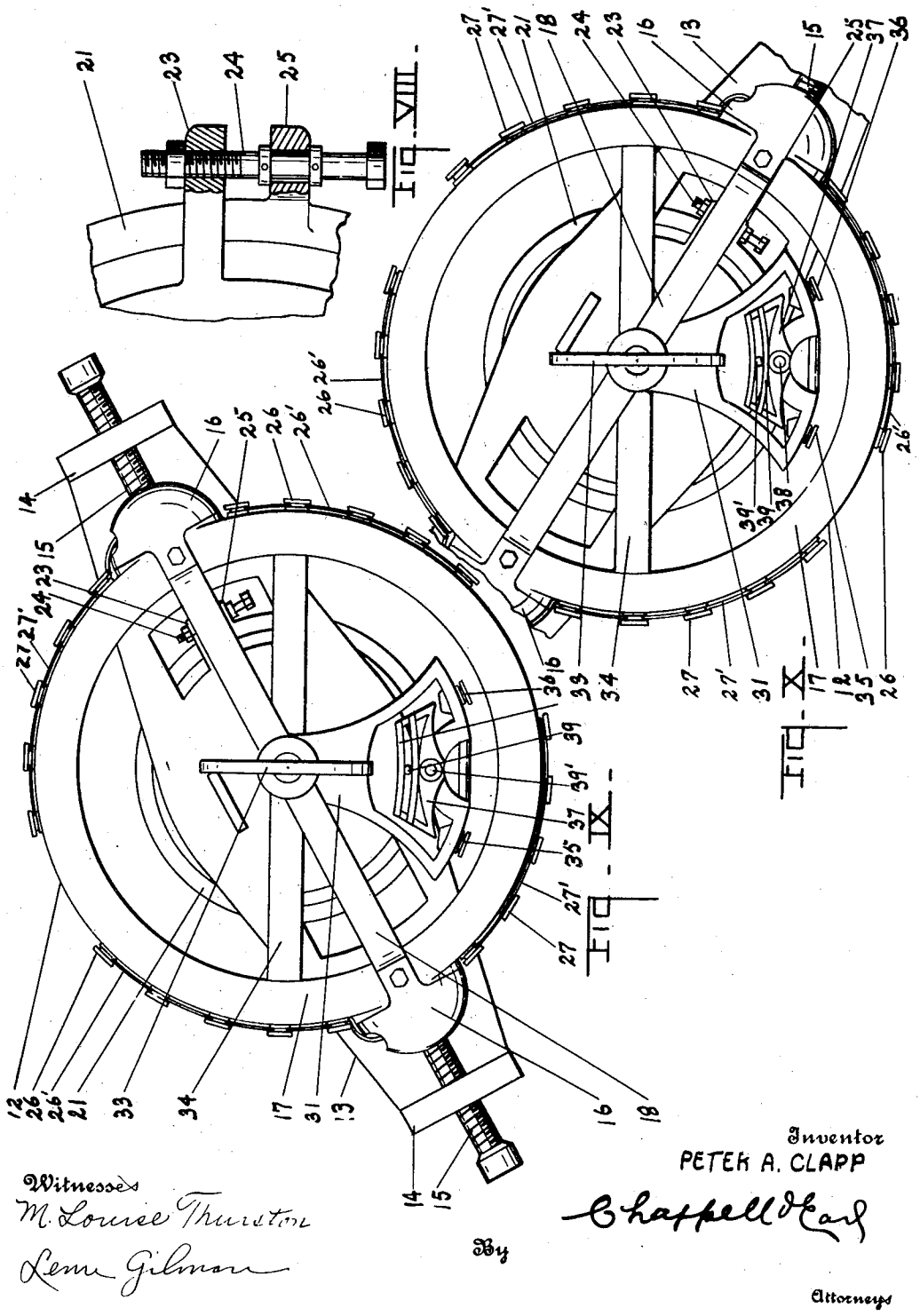
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4 SHEETS—SHEET 4.



Witnesses

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UNITED STATES PATENT OFFICE.

PETER A. CLAPP, OF KALAMAZOO, MICHIGAN, ASSIGNOR OF ONE-THIRD TO WILLIAM L. SHERMAN, OF KALAMAZOO, MICHIGAN.

CONTROL FOR AIRPLANES.

1,365,090. Specification of Letters Patent. Patented Jan. 11, 1921.

Application filed June 10, 1920. Serial No. 387,864.

To all whom it may concern:

Be it known that I, PETER A. CLAPP, a citizen of the United States, residing at Kalamazoo, county of Kalamazoo, State of Michigan, have invented certain new and useful Improvements in Controls for Airplanes, of which the following is a specification.

This invention relates to improvements in controls for airplanes.

The main objects of this invention are:

First, to provide an improved control for airplanes by means of which the machine is automatically maintained on a straight or horizontal course or at the desired ascending or descending angles.

Second, to provide an improved control device having these advantages which is easily adjusted to secure the desired result.

Third, to provide an improved control device having these advantages which is comparatively simple in structure and not likely to become inoperative in use.

Further objects, and objects relating to structural details will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification. The invention is clearly defined and pointed out in the claims.

A structure which is a preferred embodiment of my invention is clearly illustrated in the accompanying drawing forming a part of this specification, in which:

Figure I is a side view of an airplane embodying the features of my invention, the parts being shown in conventional form.

Fig. II is a detail plan view of the structure shown in Fig. I.

Fig. III is a side elevation of one of my improved control devices, parts being broken away to show structural details.

Fig. IV is a plan view with the support shown partially in section and partially broken away.

Fig. V is a detail horizontal section on a line corresponding to line 5—5 of Figs. III and VI, certain parts being shown in full lines for convenience in illustration.

Fig. VI is a detail transverse section on a line corresponding to line 6—6 of Fig. III.

Fig. VII is a diagrammatic view showing one of the control devices and the motor controlled thereby and the electrical connections therefor.

Fig. VIII is a detail section of the adjustable mounting of the control device.

Fig. IX is a front view corresponding to Fig. III, showing the position of parts when the airplane is at an ascending angle.

Fig. X is a detail front view showing the position of parts when the control device of the airplane is at a descending angle.

In the drawing similar reference characters refer to similar parts throughout the several views, and the sectional views are taken looking in the direction of the little arrows at the ends of the section lines.

Referring to the drawings, 1 represents the body, 2 and 3 the planes, and 4 the rudder of an airplane, the parts being shown in conventional form. The plane 2 as illustrated is provided with adjustable wings 5 which are controlled through the cables 6 and the drums 7 driven from the motor 8. The rudder is controlled by the cables 9 and the drums 10 driven by the motor 11. The motors 8 and 11 are what is known as reversing motors, each motor being controlled by one of the control devices 12. As these are duplicates, a description of one will suffice.

The control device which controls the wings 5 is positioned transversely of the machine while the control device which controls the rudders is positioned longitudinally of the machine. The supporting frame or bracket 13 is provided with a pair of forwardly projecting spaced arms 14 carrying the pivots 15 which engage pivot bearings 16 in the body member 17. This body member is preferably annular in general form as illustrated and is provided with a pair of side bars 18.

To adjust the bracket 13 and to bring the pivots to horizontal position on the airplane body, the bracket is pivoted at 20 on the support 21 mounted on the part 22 of the airplane body. The support 21 is provided with a forwardly projecting lug 23 engaged by the screw 24 carried by the lug 25 on the bracket 13. Suitable lock nuts are provided so that the parts are securely retained in their adjusted position, the object being to permit the adjustment of the supporting frame or bracket 13 when the airplane is in its horizontal flying position. The body member 17 is supported by the pivots for lateral balancing so that it maintains its upright position.

The body member is provided with a

double series of contacts 26 and 27 arranged in opposed groups. The contacts of each series are electrically connected as indicated by the wires 26′ and 27′. The two series are connected to the source of currrent as the battery 28 by the wire 29, the battery being connected to the motor 11 as by the wire 30.

A control member 31 is mounted on the spindle 32 on the cross bars 18 of the body member and is provided with a hand piece 33 at its front end by means of which the control member may be adjusted. The control member is provided with a contact bar 34 the ends of which are adapted to coact with the contacts 26 and 27, the contacts being arranged in two groups so as to insure a more perfect electrical connection.

The control member carries a pair of switch contacts 35 and 36 which are connected by the wires 35′ and 36′ to the motor 11, the motor being driven in one direction when one circuit is closed and in the other direction when the other circuit is closed.

The balancing switch member 37 is mounted on the pivot 36 to coact with these switch contacts. The pivot 38 of the balancing switch member is arranged radially relative to the spindle 32 so that when the switch member 37 is balanced, the pivot for the switch member and the control member are in the same vertical plane.

The switch member is provided with the curved balancing ball way 39 in which is the ball 39′. The switch member is in electrical connection with the contact bar 34 as indicated in Fig. VII.

When it is desired that the plane shall travel at an angle, for instance an ascending angle of 15°, the control member is adjusted or turned down to an angle of 15°. This causes the balancing switch member to close the switch which will drive the motor in the desired direction and the switch remains closed until the angle desired is reached when it is opened by the balancing of the balancing switch. When, however, it varies from such angle, one or the other of the switches will close, as the case may be, and the plane is thus maintained on its course.

The structure illustrated is provided with means for automatically returning the control member to its initial or normal position, such means consisting of the springs 40, the outer ends of which are connected to the rear cross bar 18 of the body member and their inner ends connected to a rod 41 arranged transversely of the spindle of the control member.

With the parts arranged as I have illustrated and described, I provide a means for automatically maintaining the plane on the desired course and at the same time one which is subject to manual control.

I have illustrated my improvements largely in conventional form. I believe, however, the disclosure made will enable those skilled in the art to which my invention relates to embody or adapt the same as may be desired or to the particular conditions of installation required.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination in an airplane control means including a motor provided with a pair of control circuits, of an adjustably mounted bracket, an annular body member pivotally mounted on said bracket for lateral balancing, a double series of insulated contacts mounted on said annular body member and electrically connected, and connected to one of the motor control circuits, a control member pivotally mounted within said body member and provided with a contact adapted to coact with the contacts on said body member, a pair of switch contacts disposed on said control member below its pivot and connected to the motor circuits, a balancing switch member pivotally mounted on said control member to coact with one of said switch contacts when out of balance and provided with a curved ball way centered above the switch member pivot, and a balancing ball in said way.

2. The combination in an airplane control means including a motor provided with a pair of control circuits, of an annular body member, a double series of insulated contacts mounted on said annular body member and electrically connected and connected to one of the motor control circuits, a control member pivotally mounted within said body member and provided with a contact adapted to coact with the contacts on said body member, a pair of switch contacts disposed on said control member below its pivot and connected to the motor circuits, a balancing switch member pivotally mounted on said control member to coact with one of said switch contacts when out of balance and provided with a curved ball way centered above the switch member pivot, a balancing ball in said way, and a spring acting to return said control member to its initial position.

3. The combination in an airplane control means including a motor provided with a pair of control circuits, of an annular body member, a double series of insulated contacts mounted on said annular body member, the contacts of each series being arranged in opposed groups and electrically connected and connected to one of the motor control circuits, a control member pivotally mounted within said body member and provided with a contact bar the ends of which are adapted to coact with the contacts on said body member, a pair of switch contacts disposed on said control member below its pivot and connected to the motor

circuits, a balancing switch member pivotally mounted on said control member to coact with one of said switch contacts when out of balance and provided with a curved ball way centered above the switch member pivot, and a balancing ball in said way.

4. The combination in an airplane control means including a motor provided with a pair of control circuits, of an annular body member, a double series of insulated contacts mounted on said annular body member, the contacts of each series being arranged in opposed groups and electrically connected and connected to one of the motor control circuits, a control member pivotally mounted within said body member and provided with a contact bar, the ends of which are adapted to coact with the contacts on said body member, a pair of switch contacts disposed on said control member below its pivot and connected to the motor circuits, a balancing switch member pivotally mounted on said control member to coact with one of said switch contacts when out of balance and provided with a curved ball way centered above the switch member pivot, a balancing ball in said way, and a spring acting to return said control member to its initial position.

5. The combination in an airplane control means including a motor provided with a pair of control circuits, of an annular body member, a double series of insulated contacts mounted on said annular body member, the contacts of each series being arranged in opposed groups and electrically connected and connected to one of the motor control circuits, a control member pivotally mounted within said body member and provided with a contact bar the ends of which are adapted to coact with the contacts on said body member, a pair of switch contacts disposed on said control member below its pivot and connected to the motor circuits, a balancing switch member pivotally mounted on said control member to coact with one of said switch contacts when out of balance, and a spring acting to return said control member to its initial position.

6. In a structure of the class described, the combination of a body member pivotally mounted for lateral balancing, a control member pivotally mounted on said body member and provided with a contact member, said body member being provided with contacts with which the contact on said control member coacts when in its neutral position and when adjusted in either direction from its neutral position, a pair of switch contacts on said control member, a balancing switch member mounted on said control member to coact with one of said switch contacts when out of balance and provided with a balancing ball way, and a balancing ball in said way.

7. In a structure of the class described, the combination of a body member, a control member pivotally mounted on said body member and provided with a contact member, said body member being provided with contacts with which the contact on said control member coacts when in its neutral position and when adjusted in either direction from its neutral position, a pair of switch contacts on said control member, a balancing switch member mounted on said control member to coact with one of said switch contacts when out of balance and provided with a balancing ball way, and a balancing ball in said way.

8. In a structure of the class described, the combination of a body member pivotally mounted for lateral balancing, a control member pivotally mounted on said body member and provided with a contact member, said body member being provided with contacts with which the contact on said control member coacts when in its neutral position and when adjusted in either direction from its neutral position, a pair of switch contacts on said control member, and a balancing switch member mounted on said control member to coact with one of said switch contacts when out of balance.

9. In a structure of the class described, the combination of a body member, a control member pivotally mounted on said body member and provided with a contact member, said body member being provided with contacts with which the contact on said control member coacts when in its neutral position and when adjusted in either direction from its neutral position, a pair of switch contacts on said control member, and a balancing switch member mounted on said control member to coact with one of said switch contacts when out of balance.

10. In a structure of the class described, the combination of a body member pivotally mounted for lateral balancing, a control member pivotally mounted on said body member and provided with a contact member, said body member being provided with contacts with which the contact on said control member coacts when in its neutral position and when adjusted in either direction from its neutral position, a pair of switch contacts on said control member, a balancing switch member mounted on said control member to coact with one of said switch contacts when out of balance, and a spring acting to hold said control member in its normal position.

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

PETER A. CLAPP. [L. S.]

Witnesses:

GRACE B. THOMPSON,

MARGARET L. GLASGOW.