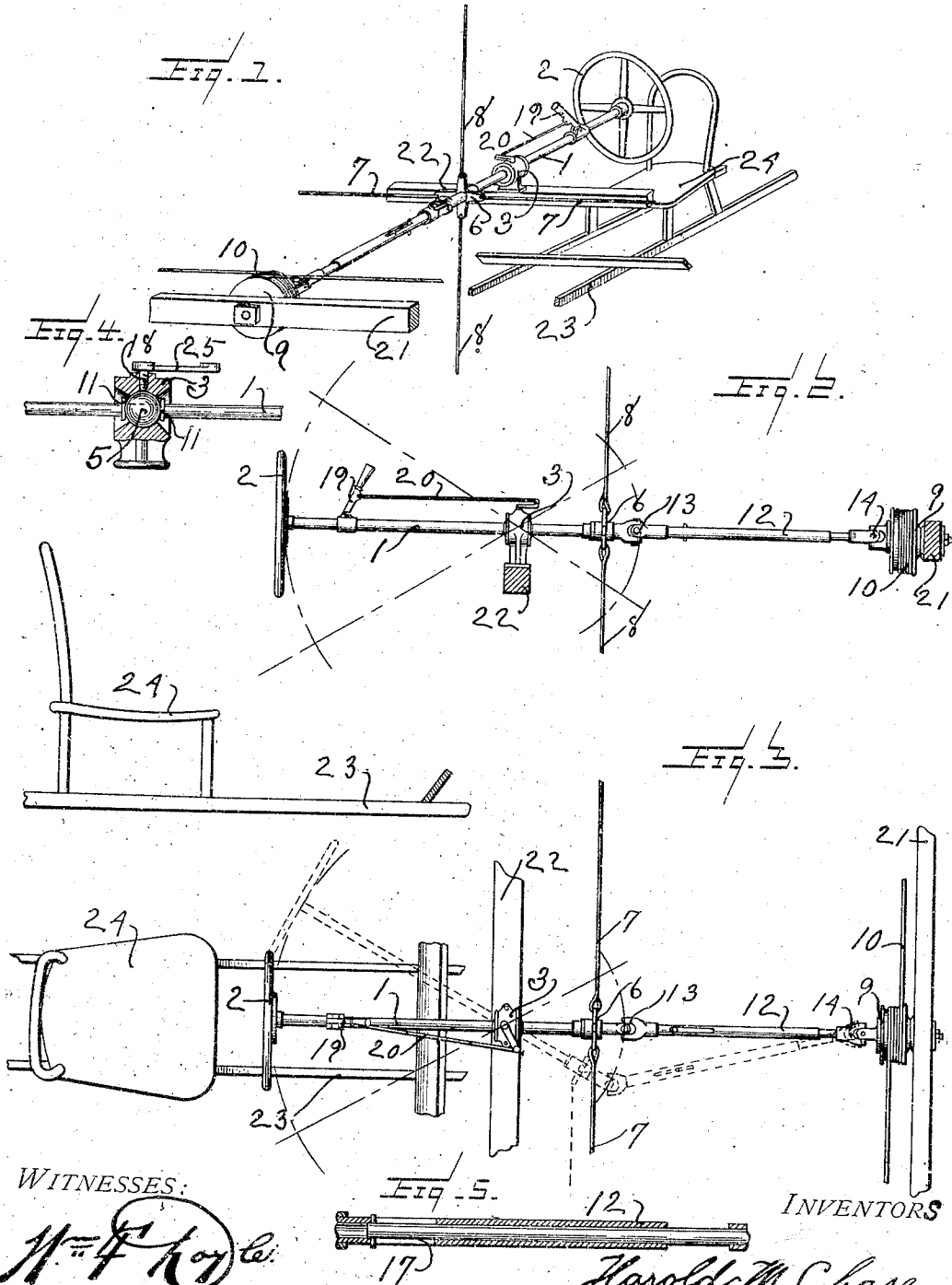


H. M. CHASE & M. F. H. GOUVERNEUR.  
 CONTROLLING MECHANISM.  
 APPLICATION FILED JAN. 4, 1910.

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WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## CONTROLLING MECHANISM.

965,081.

Specification of Letters Patent. Patented July 19, 1910.

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To all whom it may concern:

Be it known that we, HAROLD M. CHASE and MINOR F. H. GOUVERNEUR, both citizens of the United States, residing at Wilmington, in the county of New Hanover, State of North Carolina, have invented certain new and useful Improvements in Controlling Mechanism, of which the following is a description, reference being had to the accompanying drawings, forming a part hereof.

Our invention relates to controlling mechanism designed with especial reference to use with power driven aeroplanes for the purpose of adjusting various of the parts thereof and thereby controlling the direction of movement thereof, although our invention is also capable of general application and of use with any machine having a plurality of parts or elements to be controlled, and comprises mechanism adapted to be operated from and by means of a single manually operated lever and suitable connections extending from said mechanism to a plurality of various parts or elements of the aeroplane or other machine to be adjusted whereby all of the parts with which said mechanism is connected may be adjusted and the machine thereby controlled by moving a single part manually.

We have illustrated the preferred embodiment of our invention in the accompanying drawing, and have described the same in the following specification and particularly specified the features wherein our invention consists in the clauses of the concluding claim, the embodiment of our invention referred to being disclosed as used in connection with a power driven aeroplane for controlling the same.

In the drawings: Figure 1 is an isometric view of our controlling mechanism; Fig. 2 is a view showing a side view; Fig. 3 is a view showing a plan view of our device, Figs. 4 and 5 are views showing details of our controlling mechanism.

The reference character 1 indicates a lever and 2 a hand wheel located within easy reach of the operator and by means of which the lever 1 may be operated. The lever 1 is supported by means of a support 3, the same being shown as arranged intermediate the two ends of the lever 1, and said lever is capable of rotary motion about its own axis and capable also of a swinging movement

with reference to the support 3 above referred to. The support 3 is preferably so designed, and is illustrated as of such form, that the lever 1 may be swung in any direction from a given initial position with reference to the support 3. That is the lever may be swung in an up and down direction, or swung from side to side with reference to said support, or may be swung diagonally the result of which latter motion being that the lever takes up a final position to one side of and also above or below its initial position as the diagonal motion may be considered as the resultant of sidewise or horizontal and an up or down or a vertical movement. The support 3 is preferably in the form of a spherical shell as shown in Fig. 4, and a ball 5 is supported within said shell which ball is provided with a hole through which the lever 1 passes as shown, and which construction permits the lever to be swung in any direction with reference to a given initial position as above pointed out and, the ball not being fast upon the lever, it is obvious that the lever may be rotated upon or about its axis as above specified irrespective of the position into which it may have been swung. Obviously the operator may turn the hand wheel 2 to rotate the lever 1, and may lift or depress the wheel bodily, or move it to one side, or, in fact, move it bodily in any direction to impart swinging motion to the lever 1 as aforesaid.

6 is a spider loosely secured upon the end of the lever 1 so that rotary motion of the lever will not be transmitted to said spider. Motion of the lever 1 in a vertical or horizontal direction, and consequently in an inclined direction, will however be transmitted to the said spider as will be understood.

7 is a member preferably in the form of a flexible cord or cable through which horizontal movements of the lever 1 are transmitted to an element of a machine, an aeroplane in the embodiment of our device illustrated, to be controlled, and 8 is a similar member for transmitting vertical movements of the lever 1 to another element of the machine with which the device may be used. The elements controlled or adjusted by the members 7, 8 may be the horizontal and vertical rudders of the aeroplane, in which case both such rudders will obviously be under the control of a single element, the lever 1. It will be understood that the members

7, 8 pass around suitable guides or pulleys, and connect with a tiller or equivalent element in case rudders are to be controlled, and it will also be obvious that if the lever 1 be arranged so as to swing in but one plane only one element of a machine to be controlled will be adjusted by a swinging movement of the lever.

The rotary motion of the lever 1 upon its axis as above explained is utilized for adjusting or controlling an element of the machine with which our device is used other than the element or elements controlled by swinging movement imparted to such lever, to which end, in the preferred embodiment of our device illustrated, a rotary element 9 is provided, the same being illustrated as a drum upon which a flexible cord or cable 10 is wound and the ends of which extend to the element of the machine to be adjusted to thereby control the machine. If used with an aeroplane, as illustrated, this cord or cable will preferably be connected with the mechanism for warping or twisting the planes to thereby tip the aeroplane upon its longitudinal axis.

The lever 1, is, in the preferred embodiment of our device illustrated, provided with means whereby it is prevented from longitudinal movement with reference to the support 3, to which end collars 11 are placed upon the lever which collars engage the ball 5 and prevent the lever from moving through the ball but do not interfere with rotary motion thereof upon its own axis. Rotary motion of the lever 1 is transmitted to the rotary element 10 by means of any suitable mechanism, the preferred mechanism disclosed comprising a rotary connecting member 12 connected with the end of the lever 1 and with the rotary element 10 by means of universal joints at 13, 14; and this connecting member is preferably formed so as to be of variable length to compensate for variable distances between the end of the lever 1 and the rotary element 10 encountered in the operation of our controlling mechanism in its preferred form. This is best accomplished by forming the member 12 in two telescoping parts as shown, and providing a sliding connection between the two at 17 as shown in Fig. 5. Means are provided whereby the lever 1 may be locked in any position into which it may have been moved shown as comprising a screw 18 in threaded engagement with the shell of the support 3, a lever 19 carried by the lever 1, and a rod 20 connecting the lever 19 with an arm 25 secured to the screw 18.

21, 22 and 23 are parts of the frame of the machine or aeroplane with which our device is used and 24 is a seat for the operator.

Such being the construction of our device it will be obvious that swinging movement imparted to the lever 1 about its sup-

port 3 will be transmitted to an element, or to two elements, of a machine to be controlled, according to whether motion in one plane or universal movement is provided for by the said support, through the spider 6 and flexible cords or cables 7, 8; and that rotary motion of the lever about its axis will be transmitted to another element of the machine through the connecting member 12, rotary element 9 and flexible cord or cable 10. While we have referred to and illustrated the members 7, 8 and 10 as flexible members, thus making it necessary that both ends thereof be connected with the spider 6 or rotary element 9 because motion can be transmitted through such members only by subjecting them to tension, we refer to these elements in the clauses of the claim broadly as means for transmitting motion to the parts of the machine to be controlled; and it will be obvious that if stiff connecting elements be used and such as may be subjected to either tension or compression such elements will have but a single connection each with the spider 6 or rotary member 9.

Having thus described our invention and explained the mode of operation thereof, what we claim and desire to secure by Letters Patent is:—

1. Controlling mechanism comprising a manually operable lever and a support for said lever intermediate the ends thereof; said lever being capable of a swinging movement in any direction from a given initial position and with reference to said support, and capable also of rotary movement about its own axis; means connected with said lever and through which motion derived from swinging movements of said lever in different directions may be transmitted to two separate elements of a machine to be controlled; a rotary element through which motion derived from a rotary movement of said lever may be transmitted to a third element of said machine; and a connecting member extending between said rotary element and one end of said lever and connected with each of said elements by means of a universal joint and through which rotary motion of said lever is transmitted to said rotary element.

2. Controlling mechanism comprising a manually operable lever, a support for said lever intermediate the ends thereof and means for preventing longitudinal movement of said lever with reference to said support, said lever being capable of a swinging movement in any direction from a given initial position about said support, and capable also of rotary movement about its own axis; means connected with said lever and through which motion derived from swinging movements of said lever in different directions may be transmitted to two separate

rate elements of a machine to be controlled; a rotary element through which motion derived from a rotary movement of said lever may be transmitted to a third element of said machine; and a connecting member comprising telescoping sections extending between said rotary element and one end of said lever and connected with each of said elements by means of a universal joint and through which rotary motion of said lever is transmitted to said rotary element.

3. Controlling mechanism comprising a manually operable lever, a support for said lever intermediate the ends thereof and means for preventing longitudinal movement of said lever with reference to said support, said lever being capable of a swinging movement in any direction from a given initial position about said support, and capable also of rotary movement about its own axis; means connected with said lever and through which motion derived from swinging movements of said lever in different directions may be transmitted to two separate elements of a machine to be controlled; a rotary element through which motion derived from a rotary movement of said lever may be transmitted to a third element of said machine; and a connecting member of variable length extending between said rotary element and one end of said lever and connected with each of said elements by means of a universal joint and through which rotary motion of said lever is transmitted to said rotary element.

4. Controlling mechanism comprising a manually operable lever and a support therefor, said lever being capable of a swinging movement in any direction from a given initial position and with reference to said support; means operated by said lever and through which motion derived from swinging movements of said lever in different directions may be transmitted to two separate elements of a machine to be controlled; and locking mechanism for securing said lever in any position into which it may have been moved.

5. Controlling mechanism comprising a manually operable lever and a support therefor, said lever being capable of a swinging movement in any direction from a given

initial position and with reference to said support; means operated by said lever and through which motion derived from swinging movements of said lever in different directions may be transmitted to two separate elements of a machine to be controlled; said support being provided with locking means whereby said lever may be locked in any position into which it may have been moved.

6. Controlling mechanism comprising a manually operable lever and a support for said lever intermediate the ends thereof, said support comprising a ball having a passage through which said lever passes and a spherical seat for said ball whereby said lever may be swung in any direction from a given initial position and with reference to said support; means operated by said lever and through which motion derived from swinging movements of said lever in different directions may be transmitted to two separate elements of a machine to be controlled; and means engaging said ball for locking it and the lever in any position into which said lever may have been moved.

7. Controlling mechanism comprising a manually operable lever and a support for said lever intermediate the ends thereof, said support comprising a ball having a passage through which said lever passes and a spherical seat for said ball whereby said lever may be swung in any direction from a given initial position and with reference to said support; means operated by said lever and through which motion derived from swinging movements of said lever in different directions may be transmitted to two separate elements of a machine to be controlled; means engaging said ball for locking it and the lever in any position into which said lever may have been moved; and means upon said lever and in engagement with said ball for preventing longitudinal movement of said lever with reference to said ball.

This specification signed and witnessed this 3rd day of Jan., A. D. 1910.

HAROLD M. CHASE.

MINOR F. H. GOUVERNEUR.

In the presence of—

H. H. McILHENNY,

GEO. L. MORTON.