Oct. 20, 1931. McCLELLAN DAVIS 1,827,933

AEROPLANE CONTROL DEVICE

Filed Nov. 30, 1928

Fig. 1.

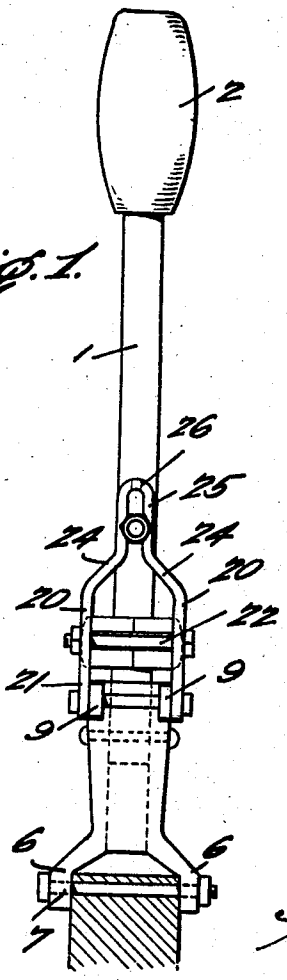


Fig. 2.

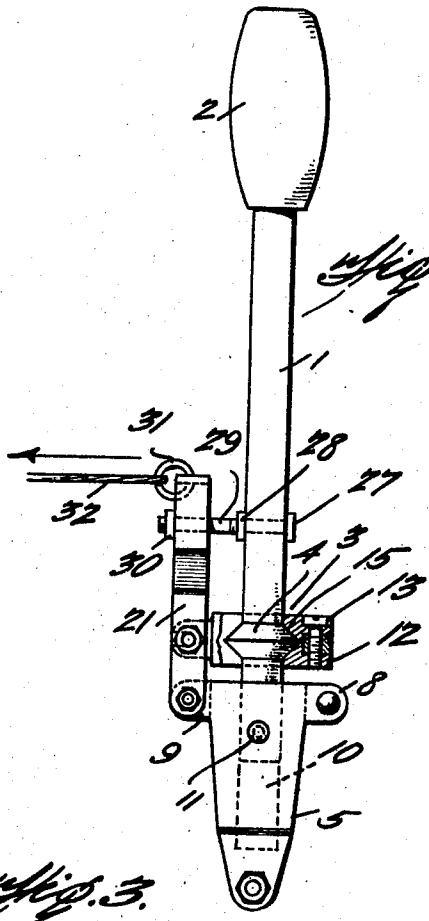
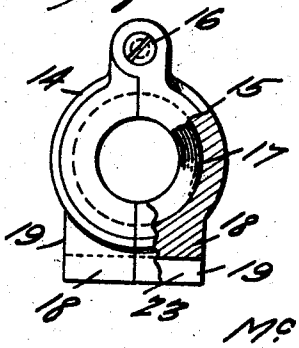


Fig. 3.



Inventor

McC. DAVIS

By Leo Corson

Attorney

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UNITED STATES PATENT OFFICE

McCLELLAN DAVIS, OF PORTLAND, OREGON

AEROPLANE CONTROL DEVICE

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This invention is directed to an improvement in aeroplane control devices and particularly to that class of such devices used for purposes of instruction of students in the handling of aeroplanes.

In aeroplanes designed for instruction, duplicate controls are provided, with such controls arranged so that one may be operated by the student and the other by the instructor. These controls are ordinarily connected so that operation of one will affect both to the extent that the instructor may, by properly operating his controls, initiate the student into the means for operating such.

It not infrequently happens, however, that in the presence of an emergency, the student, by reason of his inexperience, becomes confused or frightened and either aims to operate his controls improperly or else "freezes" to such controls to thereby prevent the instructor from properly controlling the aeroplane. Under these circumstances, it is important that the instructor be capable of disconnecting the student's controls from any operative effect on the aeroplane in order that the aeroplane may thereafter be controlled by the instructor for the proper correction, if possible, of the emergency demand.

It is the primary object of the present invention, therefore, to provide such student's control, and more particularly the joy stick element thereof, with means whereby it may be disconnected from the control devices of the aeroplane at the will of the instructor, the construction providing for locking the joy stick control of the student against separation from control function when desired in order that the student, when in solo flight, will not be subject to accident through the liability of his control becoming ineffectual.

The invention is illustrated in the accompanying drawings, in which:

Figure 1 is a rear elevation of the joy stick control constructed in accordance with the present invention.

Figure 2 is a side elevation of the same.

Figure 3 is a plan view, partly broken out, of the locking collar.

The improved joy stick is constructed of an upper preferably tubular section 1 having an upper terminal hand grip 2. The lower end of the section 1 is circumferentially enlarged, with the enlargement presenting a flat circular face 3 from which the peripheral surface of the enlargement inclines upwardly and inwardly, as at 4, forming what may be hereinafter termed a conical locking extension on the lower end of the section 1 of the joy stick.

The remaining or lower section of the joy stick is in the form of a casting 5 having spaced lower terminal ears 6 through which the joy stick may be pivotally supported, as at 7. The upper end of the casting is formed with spaced forwardly projecting ears 8, through which the control cables are connected, and similar rearwardly projecting spaced ears 9. The casting is formed with a central circular bore 10 opening through the upper edge, and in this bore is secured, through a bolt or like element 11, the lower section 12 of the joy stick proper.

The section 12, which is of similar form to the section 1 in cross section, extends above the upper surface of the casting 5 and is formed with a conical locking extension 13 which is a duplicate of the conical locking extension of the joy stick section 1. Thus, when the sections 1 and 12 are in alignment, the circular flat faces of the respective locking extensions are in contact and the inclined walls of such extensions project in opposite directions from the meeting edges of the sections, as clearly shown in Figure 2 of the drawings.

A locking collar arranged to cooperate with the conical locking extensions of the joy stick sections is illustrated in Figure 3, comprising duplicate sections 14 and 15 pivotally connected through relatively offset ears 16. The collar sections are interiorly formed with channels 17 which accurately correspond to the outline form of the conical locking extensions of the joy stick sections, so that when the collar sections 14 and 15 are closed on the joy stick sections, they effectively embrace and hold in relatively rigid relation, the joy stick sections 1 and 12. Therefore, by means of the collar, and solely through its locking cooperation with the locking extensions of

the joy stick sections, the joy stick sections are held in relatively rigid connected relation, exactly as if the joy stick was a single integral member.

Diametrically opposite the pivotal connection 16 of the sections 14 and 15 of the locking collar, each collar is formed with an angular extension 18. These extensions are so arranged that when the collar sections are in closed position, the proximate faces of the extensions are in contact on a line diametric of the collar, while their opposing edges, indicated at 19, project in parallelism with each other and with the diametric line coincident with the line of contact between the relatively inner faces of the projections.

A holding member is designed to be pivotally supported upon the casting 5 and to cooperate with the sections of the collar to hold said sections in locking relation. This member, as more particularly seen in Figure 1, is of skeleton form including side bars 20 pivotally supported at their lower ends at 21 on the ears 9 of the casting 5. The inner surfaces of the side bars 20 are spaced apart a distance to accurately receive the combined projections 18 of the locking collar between them, and said arms 20 are provided with a transverse rod 22 adapted to seat in a correspondingly shaped recess 23 opening through the rear faces of the projections 18 of the sections of the locking collar. The bars 20 of the holding member above the rod 22 are deflected inwardly, as at 24, and projected upwardly into U-form to provide an inverted U-shaped section 25 defining a comparatively narrow elongated passage 26.

A headed bolt 27, removably secured in the section 1 of the joy stick by a nut 28, projects at right angles to and beyond the joy stick to provide an extended portion 29 which, when the holding member is in operative position, extends through the passage 26 of such member, the terminal of the bolt being threaded for the reception of a nut 30 whereby to prevent movement of the holding member when desired. A ring 31 is secured to the upper end of the holding member and connected to one terminal of a cable or cord 32 which extends within reach of the instructor, who it is understood ordinarily controls a joy stick in rear of the student's joy stick to which the present invention is more particularly directed.

From the above construction it will be apparent that when it is desired to secure the sections of the student's joy stick in fixed relation, the locking collar is closed about the locking extensions of the joy stick sections 1 and 12, the recesses 17 in the locking collar sections snugly fitting and gripping the locking extensions upon the joy stick sections. The holding member is then swung upwardly, the movement being continued until the rod 22 of the holding member enters the aligned recesses 23 in the extensions 18 of the locking collar sections. In this position the inner surfaces of the arms 20 of the holding member will fit over and contact with the outer surfaces 19 of the extensions 18, whereby the locking collar is held in fixed relation to the joy stick sections and the sections of such locking collar are secured against separation. In this movement of the holding member to operative position, the U-shaped upper terminal of such member is passed over the projection 29 of the bolt 27, said projection passing through the passage 26. With the parts in this position, the student has full operative control of the joy stick and connected mechanism, but if for any reason the instructor desires to prevent the student's control of such mechanism, a simple pull on the cable 32 disconnects the holding member from the sections of the locking collar and any attempt by the student to operate the joy stick will at once separate the locking collar sections and thereby free the upper section 1 of the joy stick from any operative influence on the lower section 12. As the control mechanism is connected to the lower section 12, such mechanism will under these conditions be entirely beyond the control of the student.

In the event the student is making a solo flight or for some reason is to retain control of the aeroplane, the nut 30 is applied to the threaded terminal of the bolt 27 after the parts are in the applied locking positions described. This prevents any disconnecting movement of the holding member and the sections 1 and 12 of the joy stick are effectively connected and the controls governed by such joy stick may be operated as if the joy stick was an integral element.

What is claimed to be new is:

1. In an aeroplane, a joy stick made up of sections, a two-part collar for locking the sections in connected relation, a holding member free of connection with the collar and adapted in one position to lock the parts of the collar together and in another position to free said collar parts relative to each other, and means whereby the holding member may be selectively locked against collar part release movement.

2. In an aeroplane, a joy stick made up of aligned sections, the meeting ends of the sections being formed with conical locking extensions, a locking collar made up of pivotally connected sections, the said sections being interiorly formed with channels to interfit with and secure the meeting locking extensions of adjacent joy stick sections, and means whereby the collar sections may be held against separation.

3. In an aeroplane, a joy stick made up of aligned sections, the meeting ends of the sections being formed with conical locking extensions, a locking collar made up of pivot-

ally connected sections, the said sections being interiorly formed with channels to interfit with and secure the meeting locking extensions of adjacent joy stick sections, and a holding member pivotally supported on one of the joy stick sections and adapted to embrace the locking collar sections when in operative position to prevent separation of said collar sections.

4. In an aeroplane, a joy stick made up of aligned sections, the meeting ends of the sections being formed with conical locking extensions, a locking collar made up of pivotally connected sections, the said sections being interiorly formed with channels to interfit with and secure the meeting locking extensions of adjacent joy stick sections, a holding member pivotally supported on one of the joy stick sections and adapted to embrace the locking collar sections when in operative position to prevent separation of said collar sections, and means for securing the holding member in operative position.

5. In an aeroplane, a joy stick made up of aligned sections, the meeting ends of the sections being formed with conical locking extensions, a locking collar made up of pivotally connected sections, the said sections being interiorly formed with channels to interfit with and secure the meeting locking extensions of adjacent joy stick sections, a holding member pivotally supported on one of the joy stick sections and adapted to embrace the locking collar sections when in operative position to prevent separation of said collar sections, and a bolt carried by one of the joy stick sections and adapted to project through a passage in the holding member when the latter is in operative position.

6. In an aeroplane, a joy stick made up of aligned sections, the meeting ends of the sections being formed with conical locking extensions, a locking collar made up of pivotally connected sections, the said sections being interiorly formed with channels to interfit with and secure the meeting locking extensions of adjacent joy stick sections, a holding member pivotally supported on one of the joy stick sections and adapted to embrace the locking collar sections when in operative position to prevent separation of said collar sections, a bolt carried by one of the joy stick sections and adapted to project through a passage in the holding member when the latter is in operative position, and means connected to the holding member to move it into an inoperative position to free the collar sections at will.

7. In an aeroplane, a joy stick made up of aligned sections, the meeting ends of the sections being formed with conical locking extensions, a locking collar made up of pivotally connected sections, the said sections being interiorly formed with channels to interfit with and secure the meeting locking extensions of adjacent joy stick sections, a holding member pivotally supported on one of the joy stick sections and adapted to embrace the locking collar sections when in operative position to prevent separation of said collar sections, a bolt with which the holding member cooperates when in collar locking position, and a nut cooperating with said bolt to secure the holding member at will against separation from the bolt.

In testimony whereof I affix my signature.

McCLELLAN DAVIS. [L. S.]