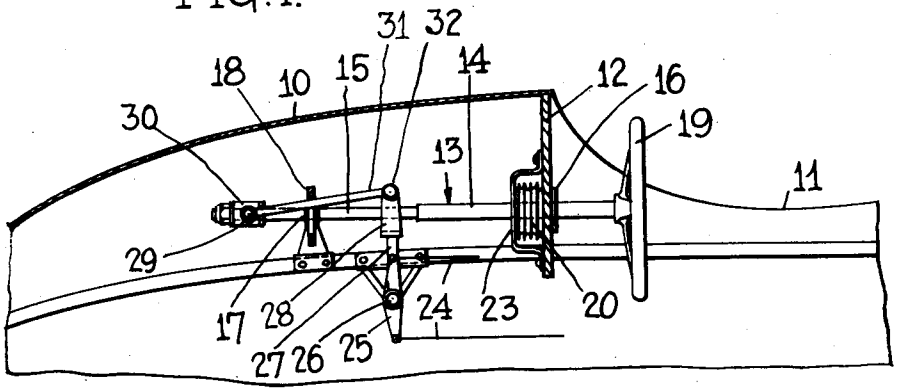
July 16, 1929. D. J. BRIMM, JR 1,720,661

CONTROL MECHANISM

Filed Nov. 1, 1927

FIG. 1.



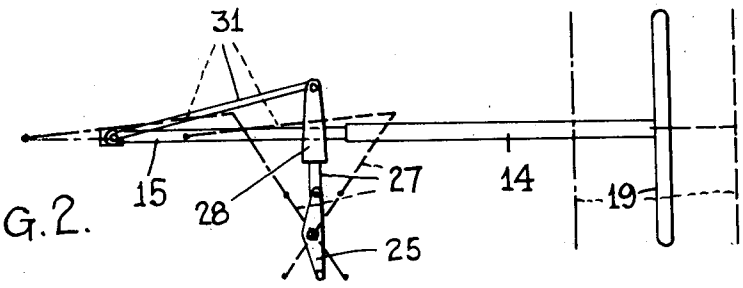
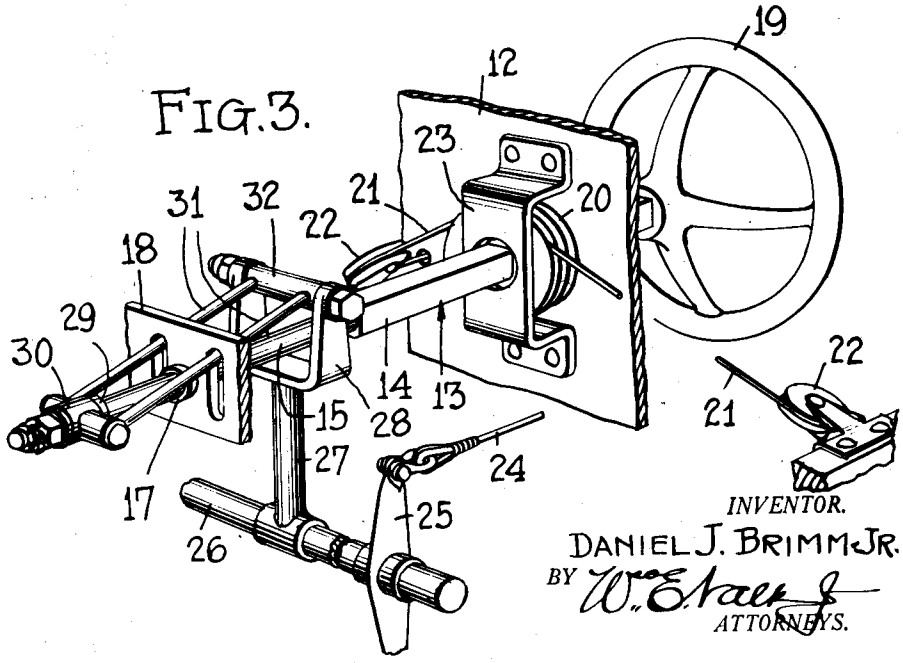




FIG. 2.

FIG. 3.




INVENTOR.

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Patented July 16, 1929. 1,720,661

# UNITED STATES PATENT OFFICE.

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## CONTROL MECHANISM.

Application filed November 1, 1927. Serial No. 230,243.

My invention relates to control mechanism and is more particularly concerned with an aircraft control surface operating mechanism in which the control device is both axially movable in a fore and aft direction and rotatable; one control surface being responsive in its movement to the axial movement of said control device and another being responsive in its movement to its rotation.

In the drawings, wherein like reference characters denote like or corresponding parts,

Fig. 1 is a side elevation of the control surface operating mechanism as it appears installed in the hull of a flying boat;

Fig. 2 is a semi-diagrammatic view showing the relative movement of the control device and its associated arm, and

Fig. 3 is a perspective view of such mechanism.

In the embodiment of the invention selected for illustration, a portion of a flying boat hull 10 is shown. Within the hull 10, at or near its forward end, a cockpit 11 is formed, said cockpit having fastened therein and extended there-across an instrument board 12. The control device, which, as intimated, is both axially movable in a fore and aft direction and rotatable, is designated in its entirety as 13. At one end, and throughout a substantial portion of its length, said control device is polygonal in cross-section as indicated at 14, whereas at its opposite end and throughout the remaining portion of its length it is circular in cross-section as indicated at 15. Bearings 16 and 17 carried by the instrument board 12 and a hull frame member 18 respectively, support the control device in a manner admitting of its movement as aforesaid. Upon one end of said control device, i. e., that end extended into the cockpit 11, a control wheel 19 is mounted.

As it is intended that one control surface (or one set of control surfaces, as the case may be) shall be responsive in its operation to the rotation of the control device, a drum 20 is mounted loosely on that portion of the control device of polygonal section. From this drum 20 control leads 21 extend right and left to said control surface or surfaces (not shown), said control leads being arranged over pulleys 22 where required. By giving to the center opening in the drum 20 a polygonal section corresponding to that of the control device, said drum is rotatable with said control device to take in or let out the control leads 21 as desired. A bracket 23 fastened to the instrument board 12 and extended over the back face of the drum holds the latter against axial movement.

The fore and aft movement of the control device 13 is relied upon to operate the other control surface or surfaces. Said last mentioned control surface or surfaces (likewise not shown) are provided with control leads 24. These control leads 24 are fastened to lever arms 25 mounted on a transverse shaft 26. Intermediately of its ends, said shaft 26 is provided with an arm 27 having a forked end 28. As said shaft 26 is mounted beneath the control device 13 the arm 27 fastened thereto is extended off therefrom in an upward direction.

Between the prongs of the forked end 28 of the arm 27 the control device 13 is carried. Said control device (see Fig. 2) throughout that portion of its length beyond the plane of intersection of the arm 27 therewith is circular in cross-section. On said circular portion of the control device a flange 29 is formed. This flange 29 acts as an abutment for a collar 30 loosely mounted on said control device and to which links 31 are pivotally fastened, said links, at their opposite ends, being fastened to a cross-pin 32 mounted to swivel in the outer prong ends and extended from one to the other of the prongs. A nut 33 is threaded on the end of the control device to hold the collar against axial movement without in any way interfering with the rotation of the control device in said collar. Accordingly it will be seen that as the control device 13 is axially moved in a fore and aft direction, the arm 27, and hence the shaft 26, is rocked back and forth to operate the control surface or surfaces to which the control leads 24 are fastened. Such movement of the control device 13 and the arm 27 is clearly illustrated in Fig. 2, wherein the angles assumed by the arm 27 are indicated. To admit of the rise and fall of the links 31, in the operation of the control device, without engaging the cross-frame member 18, slots 34 are formed therein thru which said links are carried. It is apparent from the above that the turning couple occasioned by the rotation of the control device, in so far as it affects the collar 30, is

washed out by the duplication of the linkage 31 at opposite sides thereof. It is further apparent that the control device may be rotated and at the same time axially moved in a fore and aft direction to simultaneously operate the separate controls. Moreover, where the control surfaces in operation are the ailerons and elevators respectively of an aeroplane, that degree of controlability usually provided in an aeroplane is fully retained.

While I have described my invention in detail in its present preferred embodiment, it will be obvious to those skilled in the art after understanding my invention, that various changes and modifications may be made therein without departing from the spirit or scope thereof. I aim in the appended claims to cover all such modifications and changes.

What I claim is:

1. Operating mechanism for an aircraft control surface including a control device mounted for rotation and for axial movement in substantially a fore and aft direction, a transversely extending shaft mounted beneath said control device, an arm fastened to said shaft and extending off therefrom in an upward direction, said arm at its outer end being forked to straddle and to extend well beyond and above said control device, a collar mounted loosely upon said control device, lugs extending out from said collar on either side thereof, a swivel connection extending from one to the other of the prongs of said forked-end arm, links fastened to said lugs and to said swivel connection, one each at opposite sides of said control device, for rotating said shaft as said control device is moved axially, and a control lead fastened to said control surface and responsive in its movement to the movement of said shaft.

2. Operating mechanism for two independent aircraft control surfaces including a control device mounted for rotation and for axial movement in substantially a fore and aft direction, said control device throughout different portions of its length being of polygonal section and of circular section respectively, a drum rotatable with and mounted on that portion of said control device of polygonal section and with respect to which said control device is axially movable, a control lead fastened to one said control surface and wound around said drum for operating said control surface as said control device is rotated, a transversely extending shaft mounted beneath said control device at a point intermediately of its ends, an arm fastened to said shaft and extending off therefrom in an upward direction, said arm at its outer end being forked to straddle and to extend well beyond and above said control device, a collar mounted loosely upon that portion of said control device of circular section, means carried by said control device for holding said collar against axial movement thereon without interfering in any way with the rotation of said control device, lugs extending out from said collar on either side thereof, a swivel connection extending from one to the other of the prongs of said forked-end arm, links fastened to said lugs and to said swivel connection, one each at opposite sides of said control device for rotating said shaft as said control device is moved axially, the links in each instance being extended in a backward and upward direction from the outer end of said control device and being held by said swivel connection at all times parallel, and a control lead fastened to the other said control surface and responsive in its movement to the movement of said shaft.

In testimony whereof I hereunto affix my signature.

DANIEL J. BRIMM, JR.