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A. E. NEWMAN ET AL

2,222,204

CONTROL FOR AIRPLANES

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2 Sheets-Sheet 1

FIG. 1

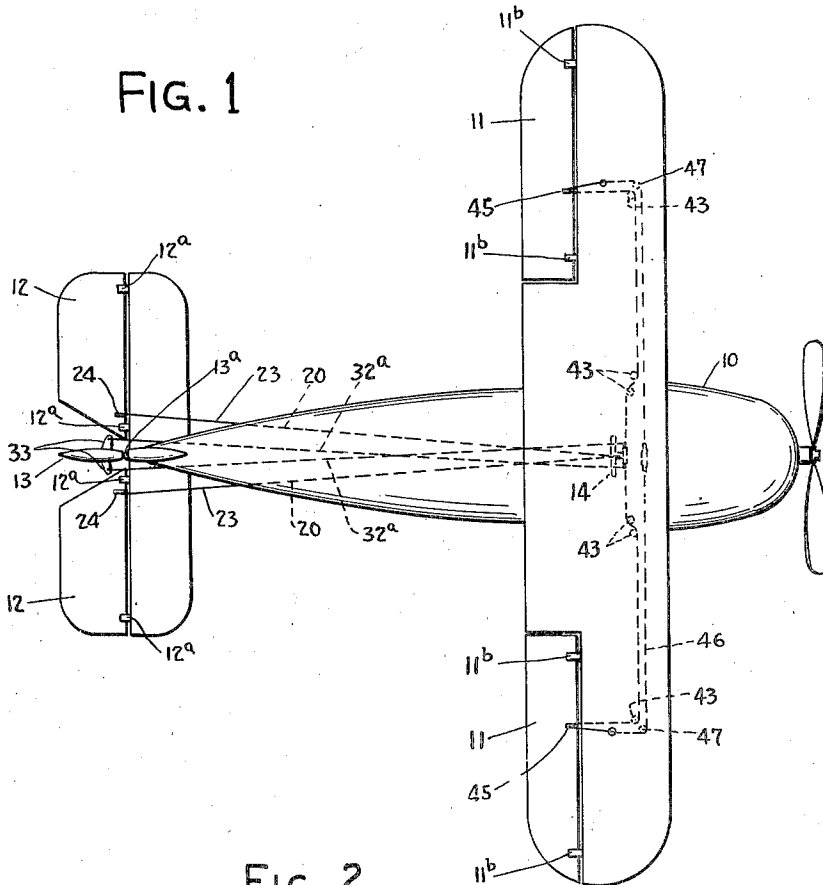
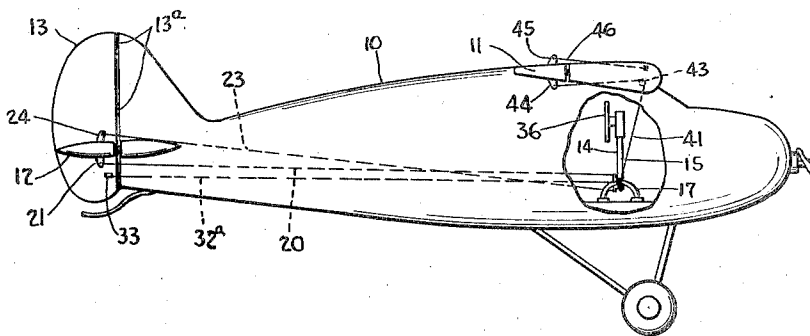


FIG. 2



INVENTOR

ALBERT E. NEWMAN &

JOHN CARL FRANCIS

BY

Ralph Barrow
ATTORNEY

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FIG. 3

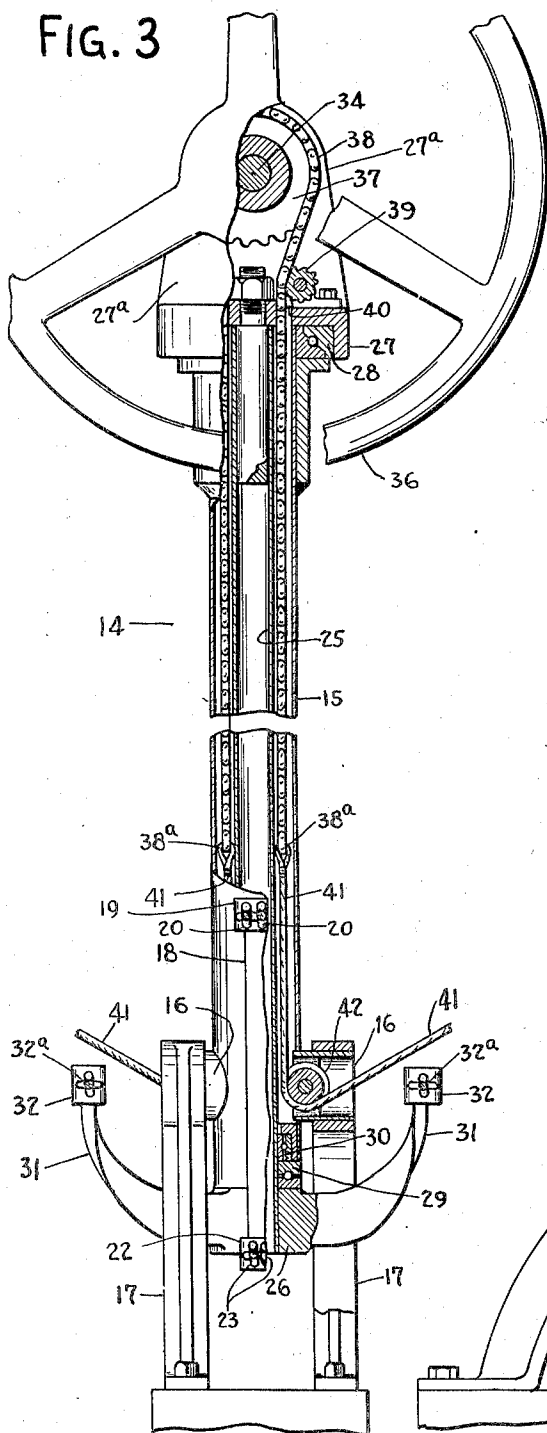
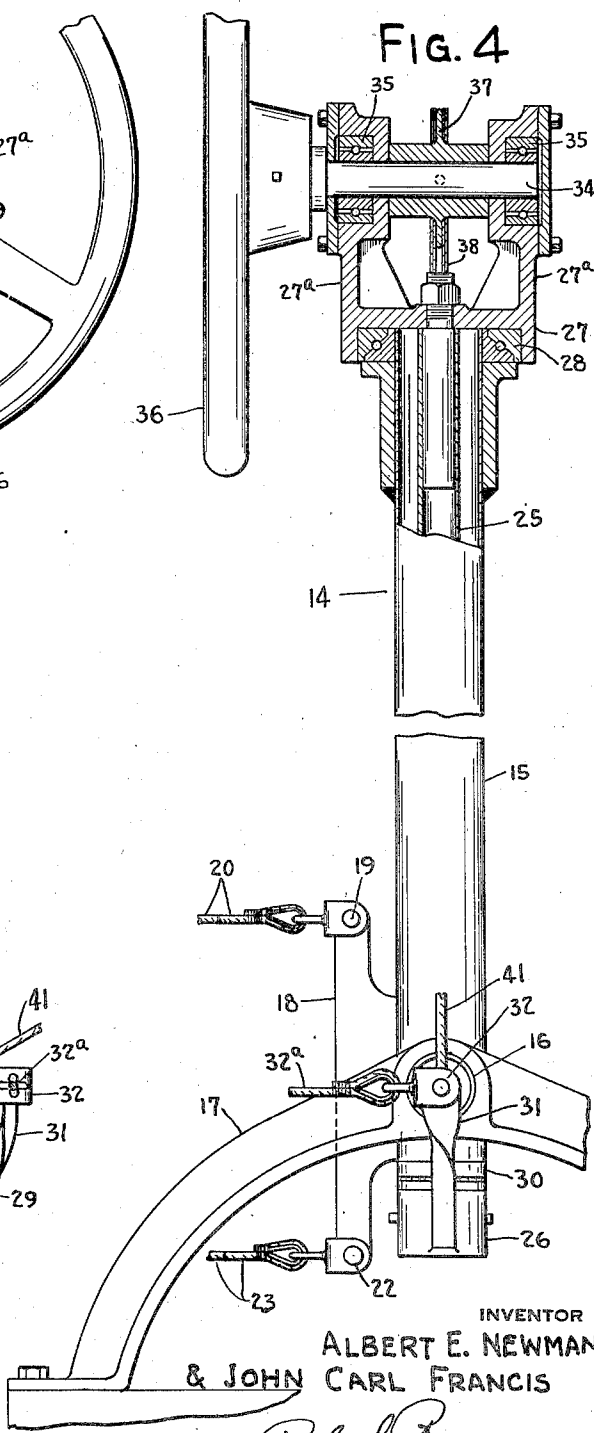


FIG. 4



INVENTOR
ALBERT E. NEWMAN
& JOHN CARL FRANCIS

Ralph Barrow
ATTORNEY

UNITED STATES PATENT OFFICE

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CONTROL FOR AIRPLANES

Albert E. Newman and John Carl Francis,
Akron, Ohio

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6 Claims. (Cl. 244-83)

This invention relates to control mechanism for airplanes.

Heretofore, the airplanes have been provided with two or more controls for manipulating the three major control surfaces thereof, one or more of these control surfaces usually being manipulated by hand means and at least one control surface, such as the rudder, being manipulated by foot control. This arrangement has never been entirely satisfactory because many people lack coordination between the hands and feet and for that reason find it either difficult or impossible to fly an airplane. This multiple control system has been found to be particularly awkward, if not dangerous, when for example the plane is being grounded and the feet are required to be shifted from the foot controls to the brake pedals.

One object of this invention is to provide a single control for airplanes by means of which at least the three major control surfaces, namely the ailerons, elevators, and rudder, may be manipulated individually or two or more simultaneously.

Another object of the invention is to provide mechanism of the character described by means of which the major control surfaces of an airplane may be manipulated without requiring coordination between hands and feet.

A further object of the invention is to provide a more simple, compact and economical structure.

The foregoing and other objects of the invention are attained in the control mechanism illustrated in the accompanying drawings, and described below. It is to be understood that the invention is not limited to the specific form thereof shown and described.

Of the accompanying drawings:

Figure 1 is a top plan view of an airplane having the improved control mechanism therein.

Figure 2 is a side elevation thereof, partly broken away.

Figure 3 is a rear view of a control unit embodying the invention, partly broken away and in section.

Figure 4 is a side elevation, partly broken away and in section, of the mechanism shown in Figure 3.

Referring to the drawings, the numeral 10 designates an airplane having the usual control surfaces thereon, of which 11, 11 are the ailerons 12, 12, the elevators, and 13 the rudder. Suitably located in the cock-pit of airplane 10 is a control indicated generally at 14.

As best shown in Figures 3 and 4, an upright column 15, which is preferably a hollow tube, is provided intermediate its ends with transversely

extending hollow trunnions 16, 16 adapted to be journaled in suitable brackets 17, 17 secured to the floor of the cock-pit. On the rear face of member 15, between the trunnions 16, is fixed a bracket 18 to the upper end of which may be pivotally connected at 19 a pair of cables 20, 20 extending to the lower horns 21 of elevators 12, and to the lower end of which may be similarly connected at 22 a pair of cables 23, 23 extending to the upper horns 24, 24 on the elevators 12, the arrangement being such that the elevators may be swung about their hinges 12^a, 12^a by rocking the column 15 on trunnions 16.

Extending co-axially through the hollow column 15 in spaced relation to the interior surface thereof may be a shaft 25, held against endwise movement by having a bracket 26 secured to its lower end and by a control head 27 secured to its upper end, the shaft being journaled in a suitable bearing 28 at its upper end, and bearings 29 and 30 at its lower end. Bracket 26 preferably has a pair of arms 31, 31 which extend upwardly and outwardly, free of supporting brackets 17, to provide swivel connections 32, 32 substantially on the axial center line of the trunnions 16. From the swivel connections 32, a pair of cables 32^a, 32^a may extend rearwardly to outwardly extending horns 33, 33 on rudder 13. For turning the shaft 25 to manipulate the rudder 13 on hinges 13^a control head 27 is provided with uprights 27^a, 27^a through which may extend a shaft 34, journaled in bearings 35, 35 in the uprights, one end of shaft 34 being extended rearwardly to have secured thereto a suitable hand-wheel 36. Through hand-wheel 36 movements of force may be applied about the axis of column 15 to turn shaft 25 within the column and thereby swing the pivot points 32 about the axis of the column, always in a plane at right angles to the axis of the column and coincident with the axis of trunnions 16. By this means the rudder 13 may readily be manipulated at any angle of column 15, and may be manipulated simultaneously with the rocking movement of the column 15 for manipulating the elevators 12.

For controlling the ailerons 11 on hinges 11^b, 11^b there may be fixed on shaft 34 a sprocket 37 over which is trained a chain 38, the two ends of which, guided by idler sprockets 39, 39, extend through openings 40 in control head 27 and downwardly between column 15 and shaft 25. The ends 38^a, 38^a of the chain 38 are connected to cables 41, 41 which, guided by idler pulleys 42 within the trunnions 16 and suitably arranged pulleys 43, 43 within the wing structure of the plane, extend 55

one to each bottom horn 44 of ailerons 11. To maintain proper opposing balance between the ailerons 11, 11, a cable 46, guided by idler pulleys 47, 47 extends between the top horns 45, 45 of ailerons 11, 11. The pulleys 42 are so arranged within trunnions 16, on the axis thereof, that the cables 41, 41 are guided or turned outwardly from the column without substantial interference with the aileron control for all positions of the elevator and rudder controls. With the aileron control arrangement shown and described turning hand-wheel 36 counter-clockwise or clockwise manipulates the ailerons in opposing relation to bank the plane to the left or to the right, respectively.

In the mechanism shown and briefly described there has been provided a single control unit manually operable to manipulate at least the three major control surfaces of an airplane, each individual control being operable either independently, or simultaneously with each or all of the others, at all times. With such a control the operator may have his feet free and in a restful position while the airplane is being flown and the feet are always available for applying pressure to the brake pedals when the plane is being grounded. Thus has been provided a control unit requiring no coordination between the hands and feet and making for greater safety, simplicity, compactness, and economy of structure.

It is understood that the cables between the control unit and the various control surfaces may be connected in numerous ways. Modifications of the invention may be resorted to without departing from the spirit thereof or the scope of the appended claims.

What is claimed is:

1. A control device for adjusting the control surfaces of aircraft, comprising a unit shiftable in one plane about a fixed pivot, said unit including a hollow member and a member rotatably mounted in said hollow member to rotate about an axis passing through said pivot, one control-surface adjusting means connected to said hollow member to swing in said plane about said pivot with said unit, a second control-surface adjusting means connected to said rotatable member and operable thereby in planes passing through said pivot in all positions of the shiftable unit, shiftable means mounted on said rotatable member of said unit, and a third control-surface adjusting means connected to said shiftable means, said third adjusting means including flexible elements and means for guiding said flexible elements from said unit at the pivot on which the unit shifts in all positions of the unit.

2. A control device for adjusting the control surfaces of aircraft, comprising a unit shiftable in one plane about a fixed pivot, said unit including a hollow member and a member rotatably mounted in said hollow member to rotate about an axis passing through said pivot, one control-surface adjusting means connected to said hollow member to swing in said plane about said pivot with said unit, a second control-surface adjusting means connected to said rotatable member and operable thereby in planes passing through said pivot in all positions of the shiftable unit, shiftable means mounted on said rotatable member of said unit, and a third control-surface adjusting means connected to said shiftable means and including flexible elements extending from said unit at the pivot on which the unit shifts in all positions of the unit, said shiftable means having a manually engageable grip thereon.

whereby said first, second, and third adjusting means are operable either independently or simultaneously with each other.

3. A control device for adjusting the control surfaces of aircraft, comprising a support, a unit including a housing pivoted on said support and a shaft mounted in said housing in spaced relation thereto to rotate about an axis passing through said pivot, said unit thereby being shiftable in one plane about said pivot, one control-surface adjusting means connected to said housing to swing in said plane about said pivot with said unit, a second control-surface adjusting means connected to said rotatable shaft and operable thereby in planes passing through said pivot in all positions of said unit, shiftable means mounted on said rotatable shaft, and a third control-surface adjusting means connected to said shiftable means and including flexible elements extending in the space between said housing and said rotatable shaft, said flexible elements extending from said unit at the pivot on which the unit shifts in all positions of the unit.

4. A control device for adjusting the control surfaces of aircraft, comprising a support, a unit including a housing pivoted on said support and a shaft mounted in said housing in spaced relation thereto to rotate about an axis passing through said pivot, said unit thereby being shiftable in one plane about said pivot, one control-surface adjusting means connected to said housing to swing in said plane about said pivot with said unit, a second control-surface adjusting means connected to said rotatable shaft and operable thereby in planes passing through said pivot in all positions of said unit, shiftable means mounted on said rotatable shaft, and a third control-surface adjusting means connected to said shiftable means and including flexible elements extending in the space between said housing and said rotatable shaft, said flexible elements extending from said unit at the pivot on which the unit shifts in all positions of the unit, said shiftable means having a manually engageable grip thereon whereby said first, second, and third adjusting means are operable either independently or simultaneously with each other.

5. A control device for adjusting the control surfaces of aircraft, comprising a unit shiftable in one plane about a fixed pivot, said unit including a housing and a shaft mounted in said housing in spaced relation thereto to rotate about an axis passing through said pivot, one control-surface adjusting means connected to said housing to swing in said plane about said pivot with said unit, a second control-surface adjusting means connected to said rotary member and operable thereby in planes passing through said pivot in all positions of the shiftable unit, rotatable means mounted on the rotatable member of said unit, and a third control-surface adjusting means connected to said rotatable means and operable by rotation of said rotatable means, said third adjusting means including flexible elements extending in the space between said housing and said shaft and extending from said unit at the pivot on which the unit shifts in all positions of the unit, said rotatable means having a manually engageable grip associated therewith whereby said first, second and third adjusting means are operable either independently or simultaneously with each other.

6. A control device for adjusting the control surfaces of aircraft, comprising a unit shiftable in one plane about a fixed pivot, said unit in-

cluding two co-axially extending members one of which is relatively rotatable with respect to the other about an axis passing through said pivot, one of said members comprising a housing and the other comprising a shaft mounted in spaced relation within the housing, one control-surface adjusting means connected to said non-rotatable member to swing in said plane about said pivot with said unit, a second control-surface adjusting means connected to said rotary member and operable thereby in planes passing through said pivot in all positions of the shift-

able unit, shiftable means mounted on the rotatable member of said unit, and a third control-surface adjusting means connected to said shiftable means, said third adjusting means including flexible elements extending in the space between said members, and means for guiding the flexible elements from said unit at the pivot on which the unit shifts in all positions of the unit upon shifting said shiftable means.

ALBERT E. NEWMAN.
JOHN CARL FRANCIS.