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AIRGRAFT, INCLUDING PEDALS FOR SAME
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AIRCRAFT, INCLUDING PEDALS FOR SAME
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# UNITED STATES PATENT OFFICE 

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AIRCRAFT, INCLUDING PEDALS FOR SAME
Original application filed January 19, 1929, Serial No. 333,603. Divided and this application filed May 7, 1929. Serial No. 361,178.

The present invention relates to foot control systems of aircraft of all kinds. It has particular reference to the form and mounting of the pedals themselves and likewise to a dual control system according to which the pilots sit side by side. In this latter connection, the invention relates to means whereby either of two sets of pedals may be operatively connected with transmission members to to which are secured cables or the like leading to the rudder.
This application is a division of my copending application Serial No. 333,603 filed January 19, 1929.
designates the lower plane. The empennage which is not shown is supported at the rear ends of a pair of outriggers of which one is shown in Figure 1 at 16. Retractible landing wheels 17 are provided, these being controlled by mechanism fully described in my copending applications Serial No. 314,585 , filed October 24, 1928 and Serial No. 333,603 , filed January 19, 1929.

Other features with which the present invention is not particularly concerned are the centrally disposed engine controls 18 , stabilizer controls 19 and aileron and elevator control stick 20. As described in the parent application, the control stick 20 has pivoted to the upper end thereof an arm 21 which supports a wheel 22 , the arm being swingable in front of either seat 12 or 13 as circumstances may require.

The two sets of pedals are identical and consequently only one need be particularly described. Reference will accordingly be had to the set in front of the left hand seat 13, the two pedals being designated as 23 and 24 .
Each pedal is in the form of what may be termed a runner and has a rear horizontally extending portion and a forward upwardly inclined portion provided with a heel cleat as at 25 . Each runner comprises a pair of longitudinally extending $U$-section spar members 26 and 27 , these being reinforced at the angle by members 28 riveted in the channels. A metal plate 29 is supported on members 26 and 27 and extends throughout the length of the runner and a layer of some suitable nonslippery material 30 is superposed on plate 29.

The rear end of each runner is supported on rollers or wheels 31 mounted on anti-friction bearings supported on an axle 32 which extends through members 26 and 27 . Wheels 31 are guided in U -section tracks $3 \mathrm{3}^{\circ}$.
In order to prevent vertical displacement of the rear or horizontal portion of the pedal, a longitudinally extending I-beam 34 is secured to the under surface of plate 29 , the lower flange being just clear of the floor and taking under overhanging flanges of parallel $Z$-bars 35 and 36 .
The forward end of each pedal is supported 100
on a normally vertically extending stirruplike lever comprising side members 37 and 38 and a cross bar 39. Each lever is mounted on an axle 40 exteriding transversely of the maof the axles lying in the same line. The forward extremities of members 26 and 27 are provided on their lower sides with recesses adapted to receive a bar 39 , accidental disthe bar being prevented by plates 43 and 44 It will be seen that the runners thus mounted may be reciprocated in substantially horizontal planes and are supported for such 5 movement on the forward levers and the rearward rollers. Ordinarily, the pilot will rest his feet on the inclined portion of the pedal, although if a change of position is desired they may rest on the horizontal portion. If Pedestals 50 and 51 are 2 -bars 54 and 55 tical grooves in which is movable with verwhich is provided with a horizontal slot $56^{\prime}$. Headed ferrules 57 and 58 are slidable on the
60 ends of pins 49 and $47^{\prime}$ respectively, the flanges of these ferrules overlying the margins of slot $56^{\prime}$ as is indicated in Figure 9 in particular.
It will be obvious from the above descrip-
65 tion that upon moving runner 23 forwardly
Arm 48 supports at its end a coaxial pin 49, this pin terminating in the same longitudinal plane of the body-boat as pin $47^{\prime}$.

Disposed centrally of the pilots' compartment opposite pins $47^{\prime}$ and 49, is a substantally square frame comprising four marema strips which support at their points of junc tion, that is, at the corners of the square, pedestals 50, 51, 52 and 53 . The frame is
and runner 24 rearwardly equal distances, pins 49 and $47^{\prime}$ will move downwardly through equal arcs and that ferrules 57 and 58 which slide in slot $56^{\prime}$ will inforce a downward movement of slide 56 . Since the movement of pins 49 and $47^{\prime}$ is balanced, slide 56 will move in strictly horizontal planes and there will be no tendency to jam it in its guides.

Disposed centrally of the slide frame are a 7 pair of standards 59 and 60 which through the intermediary of pin 61, in line with the pivoting axis of the pedal supporting levers, supports a pair of segments 62 and 63. Segment 62 has a transversely extending portion $62^{\prime}$ which at its ends supports pins 64 and 65 at an equal distance from the pivotal axis of the stirrup levers to that of pin 49. Segment 63 likewise has a transverse portion supporting pins 66 and 67 adapted to oscillate in the same arc as pin $47^{\prime}$. Springs 68 and 69 normally pull the segments forwardly and to the latter are attached the rudder control cables 70 and 71.

As has been mentioned above, the pedal 90 arrangement at the right hand side is identical with that at the left, this assembly presenting pins 72 and 73 rockable in arcs of the same circle as pins 49 and $47^{\prime}$. These pins have slidable thereon coupling ferrules 749 and 75 guided in a slot of a slide 76 which in turn is guided in grooves in pedestals 52 and 53.

It has been stated that this supporting frame for slides 56 and 76 is displaceable transversely of the machine. At its left hand limit of movement, as illustrated in Figure 3, ferrules 74 and 75 which ride on pins 72 and 73 are brought over the ends of pins 65 and 67 , while ferrules 57 and 58 will be free of pins 64 and 66. Under these circumstances, pins 65 and 67 are forced to follow the movements of slide 76. Inasmuch as these pins are on different sides of supporting pin 60, a downward movement, for example, will impart forward movement to segment 62 and an equal rearward movement to segment 63. Thus to sum up the sequence of operations, sliding movements of the pedals cause oscillations of pins 72 and 73 which in turn cause vertical reciprocatory movements of slide 76 thus oscillating pins 65 and 67 and imparting opposite oscillatory movements to transmission members 62 and 63. Equal movement of the segments will be inforced due to the fact that cables 70 and 71 are connected in the usual manner to the cross bar of the vertical rudder. Since this manner of connection is well understood, it has not been thought necessary to illustrate it in the 125 drawings.

Under the circumstances above described the machine has been assumed to be under the control of the pilot sitting at the right. If the control is to he changed, it is only necessary 130
to move the coupling frame to the right whereby ferrules 57 and 58 may be moved over pins 64 and 66 while ferrules 74 and 75 will be moved out of engagement with pins 65 of either of the pilots.
Mounted on the compartment floor immediately to the rear of the coupling frame are a pair of transversely spaced segments 77 10 and 78 to which are pivoted levers 79 and 80. Each of these levers has at its lower extremity a pin shown at 81 (Figures 4, 8 and 9 ), this pin engaging in a vertical slot of a pedestal 51 or 52 . Each lever has a spring pressed ${ }^{5}$ plunger as at $79^{\prime}$ and ${ }^{\prime} 78^{\prime}$, these being adapted to cooperate with a pair of spaced serrations on the respective segments. The plungers do not positively lock the levers against movement, but at the same time are adequate to 20 hold the coupling frame in either of its coupling positions. Movement of lever 79 by the pilot at the left, however, will inforce movement of lever 80, without manipulation of the latter by the pilot at the right. It 25 will be understood that with the levers in the position shown in Figure 9, the pilot at the right will be in control of the vertical rudder, while movement of the levers to the left to their other limit position will place the rudder under the control of the pilot at the left, freeing it entirely from the control of the other pilot.

While I have described an embodiment of my invention with some particularity, it is 5 to be understood that I do not limit myself with respect to structure, except as determined in the following claims.

I claim:

1. A control pedal for aircraft comprising a horizontally reciprocable runner, said runner having a substantially horizontal portion and an upwardly inclined end portion.
2. In an aircraft, a control pedal, comprising a horizontally reciprocable runner, and cover means adapted to be disposed over the runner or to be displaced to expose the runner.
3. In an aircraft, a control pedal comprising a horizontally reciprocable runner havso ing a substantially horizontal portion and upwardly inclined end portion, and means connecting the said end portion with mechanism to be controlled.
4. In an aircraft, a control pedal compris-- ing a horizontally reciprocable runner, roller means supporting one end of said runner, and an operating lever supporting the other end of said runner.
5. In an aircraft, a control pedal comprising a horizontally reciprocable runner having a substantially horizontal portion and an upwardly inclined forward portion, roller means supporting said horizontal portion and
porting the forward end of said forward portion.
6. In an aircraft, a control pedal comprising a horizontally reciprocable runner, roller means supporting one end of said runner, an operating lever supporting the other end of said runner, and means preventing vertical displacement of said runner.
7. In an aircraft, control means including a reciprocable slide, a pair of transmission members oscillable about a common axis and means to oscillate said transmission members in opposite directions in dependence upon movement of said slide in a single direction.
8. In an aircraft, control means including a pair of reciprocable-slides, a pair of oscillable transmission members, and means for connecting either of said slides to said members whereby the latter will be oscillated in opposite directions upon a movement of the connected slide in a single direction.
9. In an aircraft, control means including an oscillable transmission member, a pair of reciprocable slides, one disposed at each side of said member, a common frame supporting said slides, means adapted to selectively connect either of said slides with said member, whereby said member will be oscillated in dependence upon reciprocatory movements of the connected slide, and means to shift said frame bodily to selectively connect the slides.
10. In an aircraft, control mechanism including a pair of levers mounted on a common axis extending transiversely of the aircraft, one of said levers having a forward extension and the other a rearward extension, a pin on each extension projecting parallel to the lever axis, and a vertically reciprocable slide horizontally slotted to receive said pins.
11. In an aircraft, control mechanism including a pair of levers mounted on a common axis extending transversely of the aircraft, one of said levers having a forward extension and the other a rearward extension, a pin on each extension projecting paralliel to the lever axis, a vertically reciprocable slide horizontally slotted to réceive said pins, and a coupling ferrule slidable on each of said pins.
12. In an aircraft, control mechanism including a pair of levers mounted on a common axis extending transversely of the aircraft, one of said levers having a forward extension and the other a rearward extension, a pin on each extension projecting parallel to the lever axis, a coupling ferrule slidable on each of said pins and a vertically reciprocable slide horizontally slotted to receive and guide the ferrules.
13. In an aircraft, control mechanism including a pair of levers mounted on a common axis extending transversely of the aircraft, one of said levers having a forward extension and the other a rearward exten-
sion, a pin on each arm extending parallel to the lever axis, a pair of segments pivotal about the axial line of said levers, one of said segments supporting a pin forward of its
14. In an aircraft, two sets of foot actuated control levers arranged side by side, a movement transmitting member disposed between said levers, and selectively operable connections between the sets of levers and said member.
15. In an aircraft, two sets of horizontally reciprocable foot actuated runners, a move-
${ }^{4} 5$ ment transmitting member disposed between said runners, levers supporting the forward ends of said runners and oscillable upon reciprocation of the runners, and selectively operable connections between the levers of
50 each set of runners and said transmitting member.
16. In an aircraft, an actuating lever, a pair of transmitting members oscillable coaxially with said lever, and connections be-
65 tween said lever and members whereby movement of the lever in a single direction is adapted to cause oscillation of said members in opposite directions.

Signed at College Point, Long Island, in 60 the county of Queens and State of New York, this 27 th day of March, A. D. 1929.

IGOR SIKORSKY.

