

Nov. 10, 1931.

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AEROPLANE

Filed March 24, 1931

2 Sheets-Sheet 1

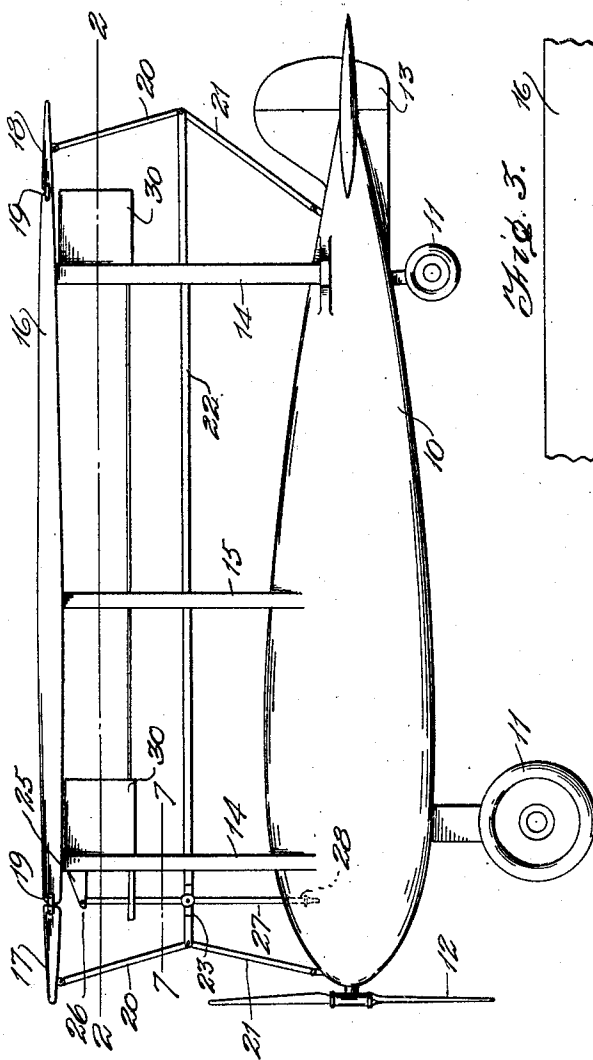


Fig. 1.

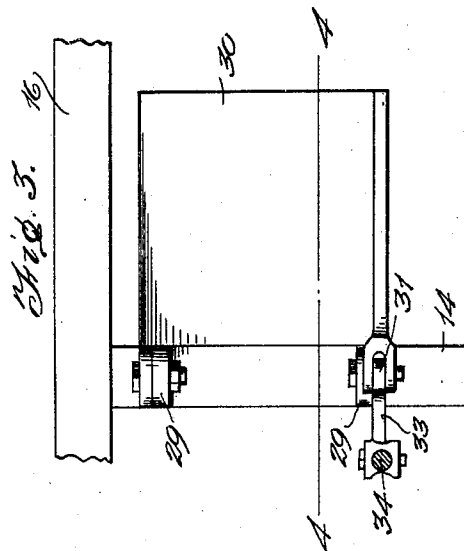


Fig. 3.

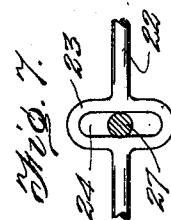


Fig. 7.

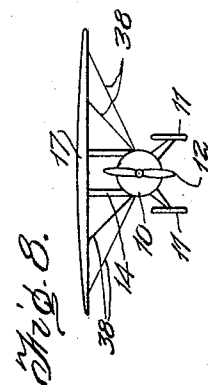


Fig. 8.

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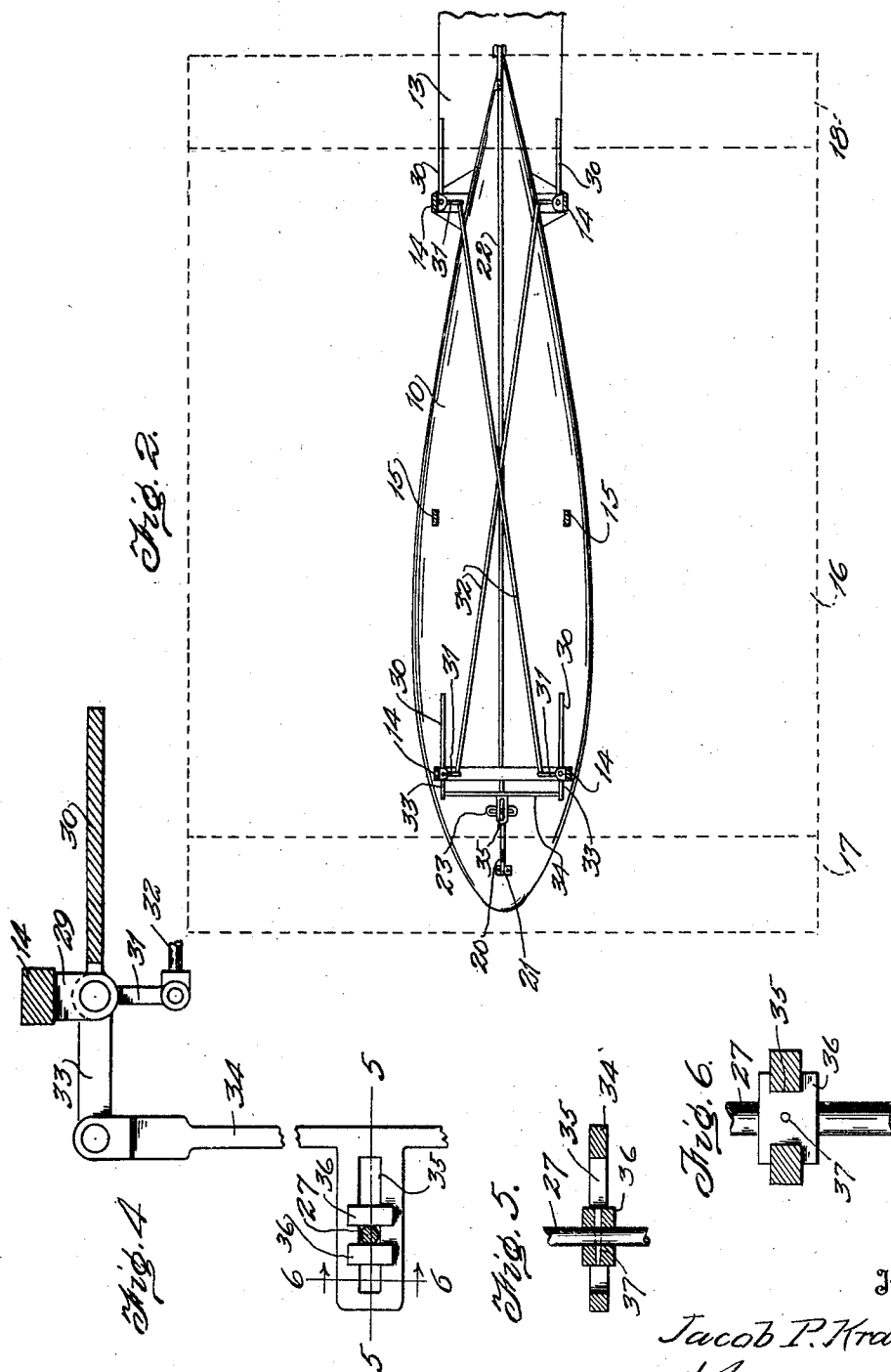
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2 Sheets-Sheet 2



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AEROPLANE

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This invention relates to aeroplanes and has special reference to an improved monoplane.

One important object of the invention is to improve the general construction of devices of this character.

A second important object of the invention is to provide an improved wing structure for aeroplanes.

A third important object of the invention is to provide an improved arrangement of elevator rudders and means for operating the same in a device of this character.

A fourth important object of the invention is to provide a novel aeroplane having an improved arrangement of laterally guiding rudders and means for operating the same.

A fifth important object of the invention is to provide, in an aeroplane, a novel arrangement of elevating and lateral rudders with a single operating lever so connected and arranged that the elevating and the lateral rudders can be actuated independently or simultaneously.

With the above and other objects in view as will be hereinafter apparent, the invention consists in general of certain novel details of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawings and specifically claimed.

In the accompanying drawings like characters of reference indicate like parts in the several views, and:

Figure 1 is a side elevation of an aeroplane as constructed in accordance with this invention.

Figure 2 is a section on the line 2—2 of Figure 1, the wing structure above the plane of the section being outlined in dotted lines.

Figure 3 is an enlarged detail view, partly in elevation and partly in section showing one of the forward lateral rudders and associated parts.

Figure 4 is a still more enlarged section on the line 4—4 of Figure 3.

Figure 5 is a section on the line 5—5 of Figure 4.

Figure 6 is an enlarged section on the line 6—6 of Figure 4.

Figure 7 is an enlarged section on the line 7—7 of Figure 1 showing only the connection between the operating lever and the elevator connecting rod.

Figure 8 is a diagrammatic front elevation showing the brace wires used herein.

In the invention as here shown there has been illustrated an aeroplane fuselage 10 of ordinary construction having landing gear 11 and a propeller 12. An empennage 13 is shown to indicate that the invention may be applied to any existing aeroplane but it is to be understood that such empennage will, in this case, have the elevator and rudder elements fixed against movement, the elevating and steering elements of the invention taking their place.

In this invention pairs of struts 14 are arranged at the forward and after parts of the fuselage and other struts 15 are arranged intermediate these struts 14. A wing 16 is fixed on the upper ends of these struts and extends practically from end to end of the fuselage and is almost as wide as long so that a very large supporting surface is provided by this form of wing. A front elevator 17 and a rear elevator 18 are hinged to the forward and rear edges of this wing as at 19.

This elevator extends the full width of the wing. Arms 20 each have the upper end pivoted to a respective elevator and the lower end pivoted to the upper end of a lower arm 21. These lower arms have their lower ends pivoted to the fuselage so that each elevator is connected to the fuselage by a knuckle. These knuckles are connected by a tie rod 22 having a transverse expansion 23 adjacent its forward end, this expansion being provided with a slot 24. The forward struts 14 support a bracket 25 having a universal joint 26 at its forward end carrying the upper end of an operating lever 27. This lever depends in front of the pilot and is provided on its lower end with a hand grip 28. Fixed to each strut 14 is a pair of brackets 29 to which is pivoted a respective lateral rudder 30 having an inwardly extending arm 31. Tie rods 32 con-

nect the arms 31 at the forward end of the aeroplane with the corresponding arms on the opposite side at the after end.

Forwardly extending arms 33 project from the forward rudders and are connected by a tie rod 34 having a fore and aft slot 35 formed in an enlargement at its center. The lever 27 extends through this slot and on each side of this lever is a guide block 36 slidable in the slot and a pivot pin 37 pivots the lever between these guide blocks.

Brace wires 38 (shown in Fig. 8) serve to aid in bracing the wing.

By means of this construction the lever may be moved forwardly or rearwardly without moving the rudders 30 or may be moved laterally without moving the elevators. However, if the lever 27 is moved rearwardly the knuckles will both be flexed more than normal and both elevators will be pulled down. In like manner forward movement of the lever will raise both elevators. Similarly, lateral movement of the lever 27 will move all four rudders toward the same side. Of course, a combined movement forward or rearward and laterally will move the elevators and also the lateral rudders.

There has thus been provided a simple and efficient device of the kind described and for the purpose specified.

It is obvious that minor changes may be made in the form and construction of the invention without departing from the material spirit thereof. It is not, therefore, desired to confine the invention to the exact form herein shown and described, but it is desired to include all such as properly come within the scope claimed.

Having thus described the invention, what is claimed as new, is:

1. An aeroplane having a fuselage, struts extending up from the fuselage adjacent the forward and rear ends thereof and arranged in transversely spaced pairs, a wing carried on the upper ends of the struts and extending substantially from end to end of the fuselage, rudders each pivoted for lateral swinging movement to a respective strut close beneath said wing, and means to operate said rudders.

2. An aeroplane having a fuselage, struts extending up from said fuselage, a wing carried on the upper ends of said struts and extending substantially the full length of the fuselage, elevators hinged to the wing at the forward and rear edges thereof and extending across the entire width of the wing, knuckles connecting the elevators and fuselage, a tie rod connecting said knuckles, said knuckles and rod being arranged to cause the knuckles to flex and straighten in unison, and an operating lever having connection with the tie rod to move the same longitudinally.

3. An aeroplane having a fuselage, struts

extending up from the fuselage adjacent the forward and rear ends thereof and arranged in transversely spaced pairs, a wing carried on the upper ends of the struts and extending substantially from end to end of the fuselage, rudders each pivoted for lateral swinging movement to a respective strut close beneath said wing, crank arms extending inwardly from the respective rudders, diagonal tie rods each connecting a forward crank arm with the diagonally opposite rear crank arm, other crank arms extending forwardly from the forward rudders, a transverse tie rod connecting the last mentioned crank arms, and an operating lever having connection with the transverse tie rod to move the same transversely of the aeroplane.

4. An aeroplane having a fuselage, struts extending up from said fuselage, a wing carried on the upper ends of said struts and extending substantially the full length of the fuselage, elevators hinged to the wing at the forward and rear edges thereof and extending across the entire width of the wing, knuckles connecting the elevators and fuselage, a tie rod connecting said knuckles to flex and straighten in unison, an operating lever having connection with the tie rod to move the same longitudinally, rudders each pivoted for lateral swinging movement to a respective strut, the struts carrying the rudders being arranged in pairs at the forward and rear ends of the fuselage respectively, crank arms extending inwardly from the respective rudders, diagonal tie rods each connecting a forward crank arm with a diagonally opposite rear crank arm, other crank arms extending forwardly from the forward rudders, a transverse tie rod connecting the last mentioned crank arms, and an operative connection between the transverse tie rod and the said operating lever, the connections of said operating lever and tie rods being such as to permit the lever to move one tie rod without moving the other.

In testimony whereof I affix my signature
JACOB P. KRASTEL.