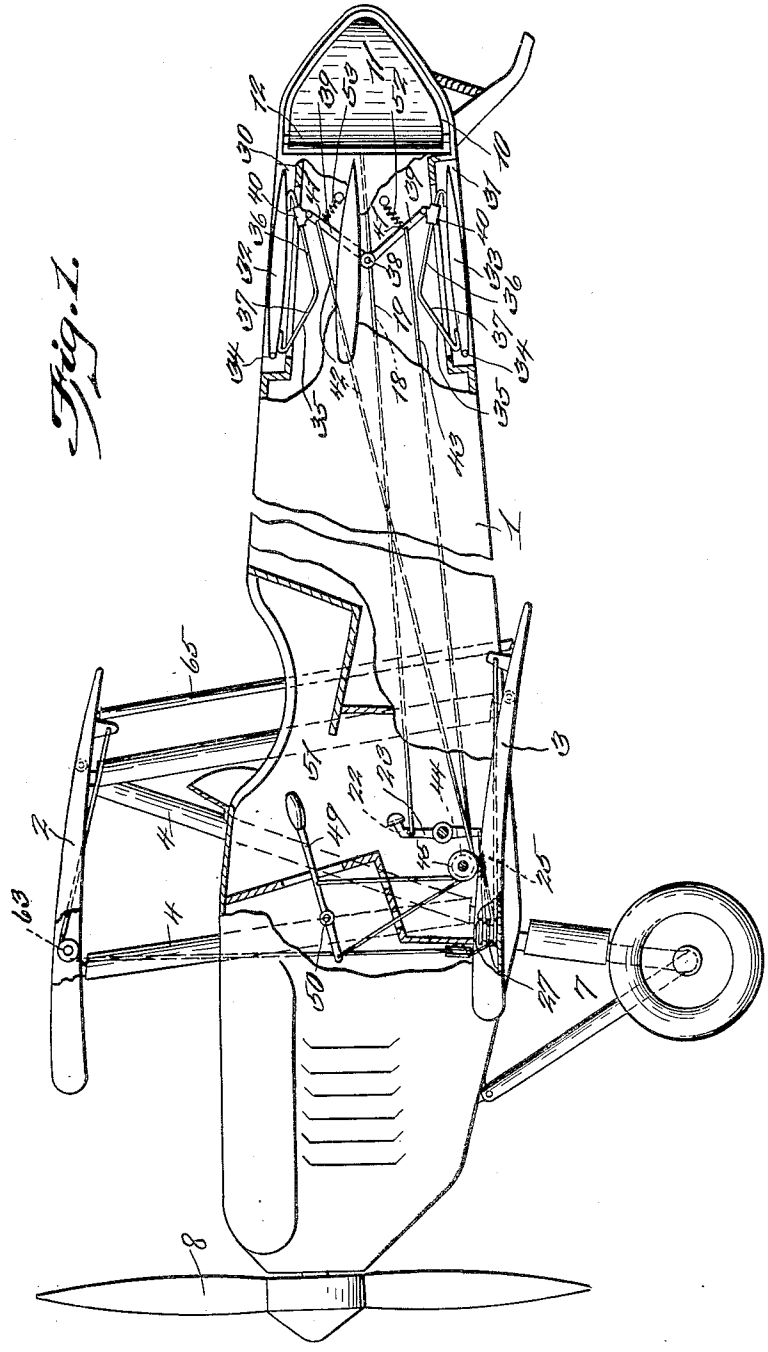
June 20, 1933. E. J. MURRAY 1,914,448

ELEVATING AND STEERING MEANS FOR AIRPLANES

Original Filed June 25, 1930 5 Sheets-Sheet 1

Fig. 1.



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ELEVATING AND STEERING MEANS FOR AIRPLANES

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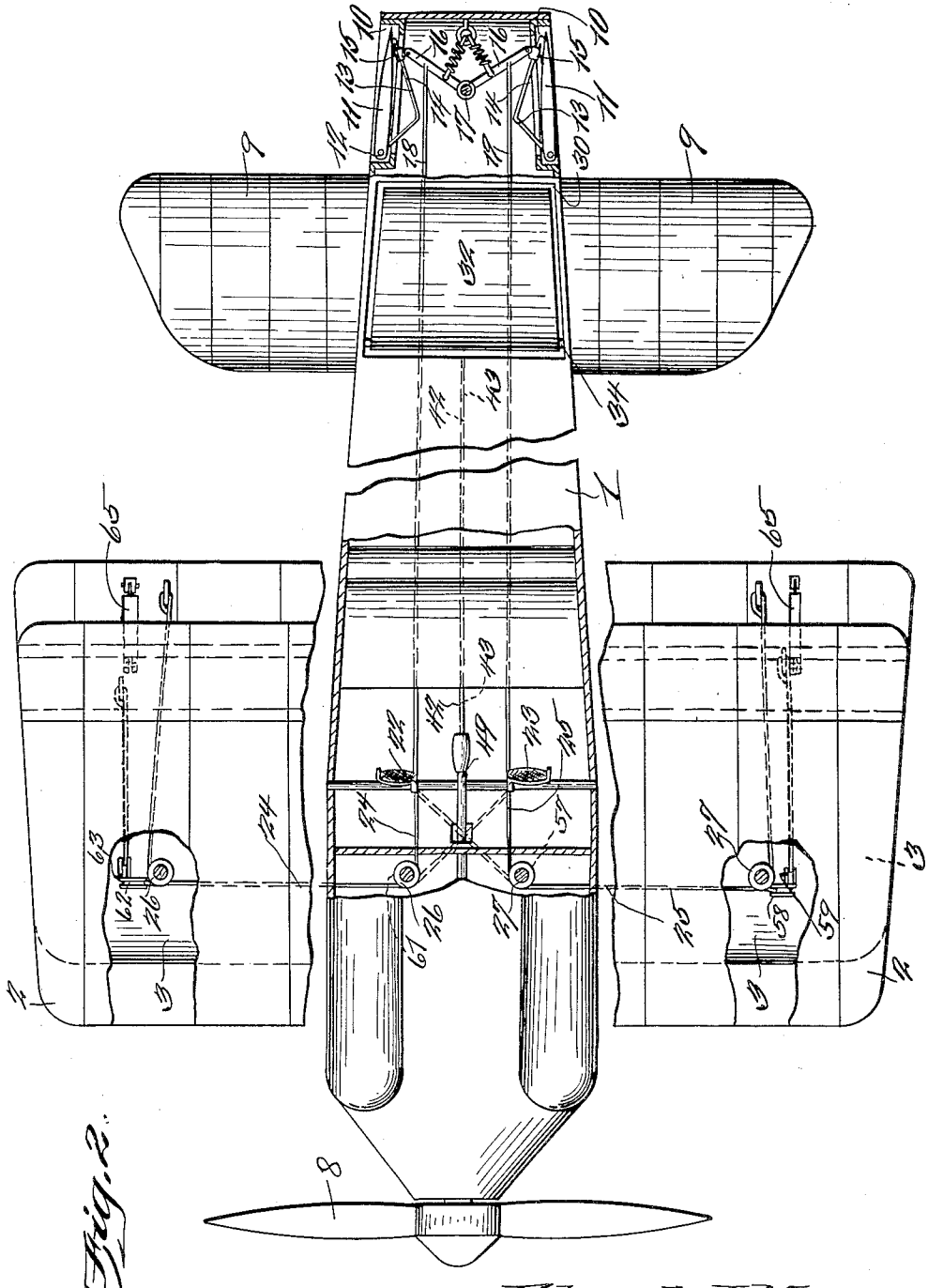


Fig. 2.

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ELEVATING AND STEERING MEANS FOR AIRPLANES

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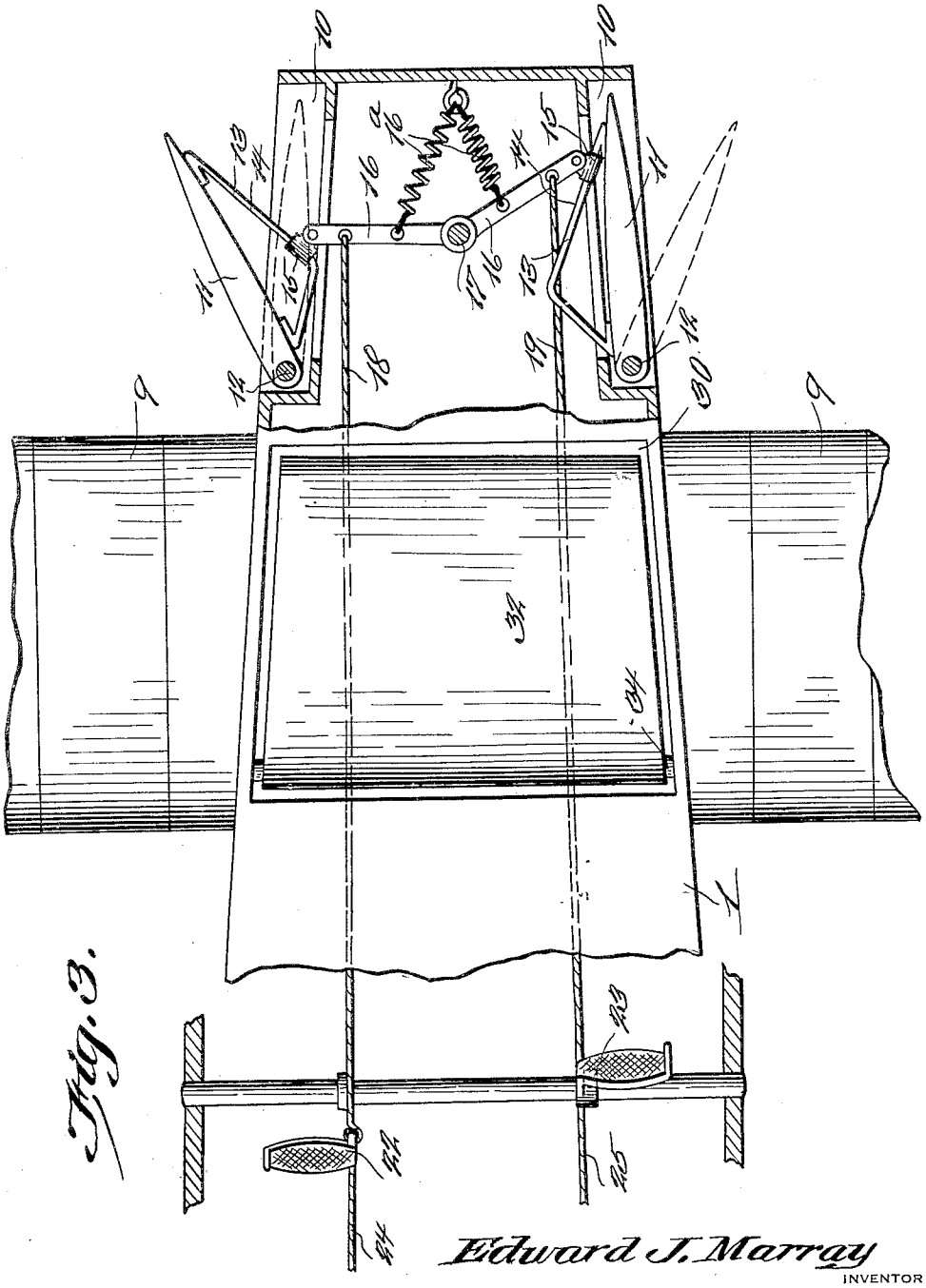


Fig. 3.

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ELEVATING AND STEERING MEANS FOR AIRPLANES

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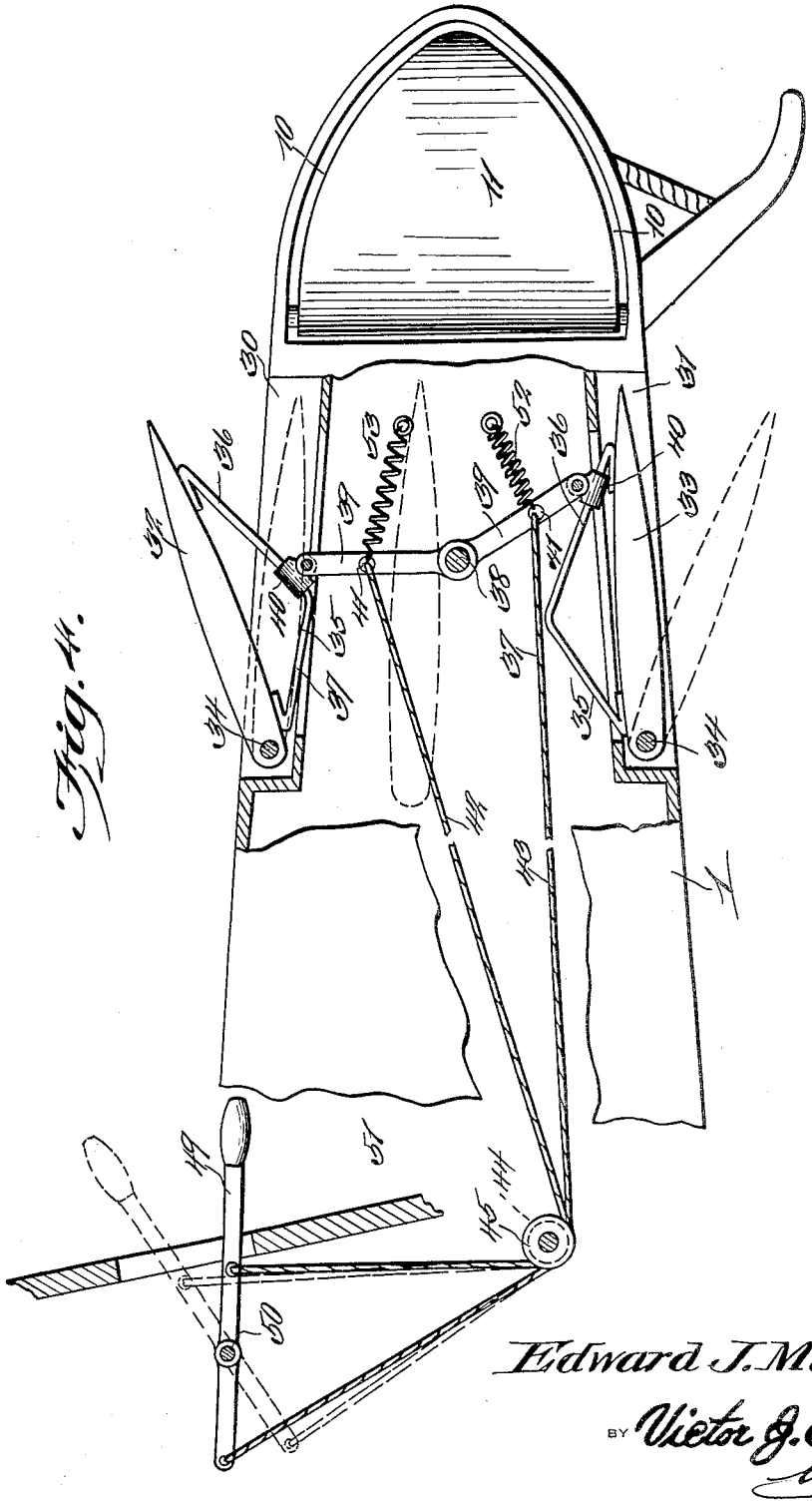


Fig. 4.

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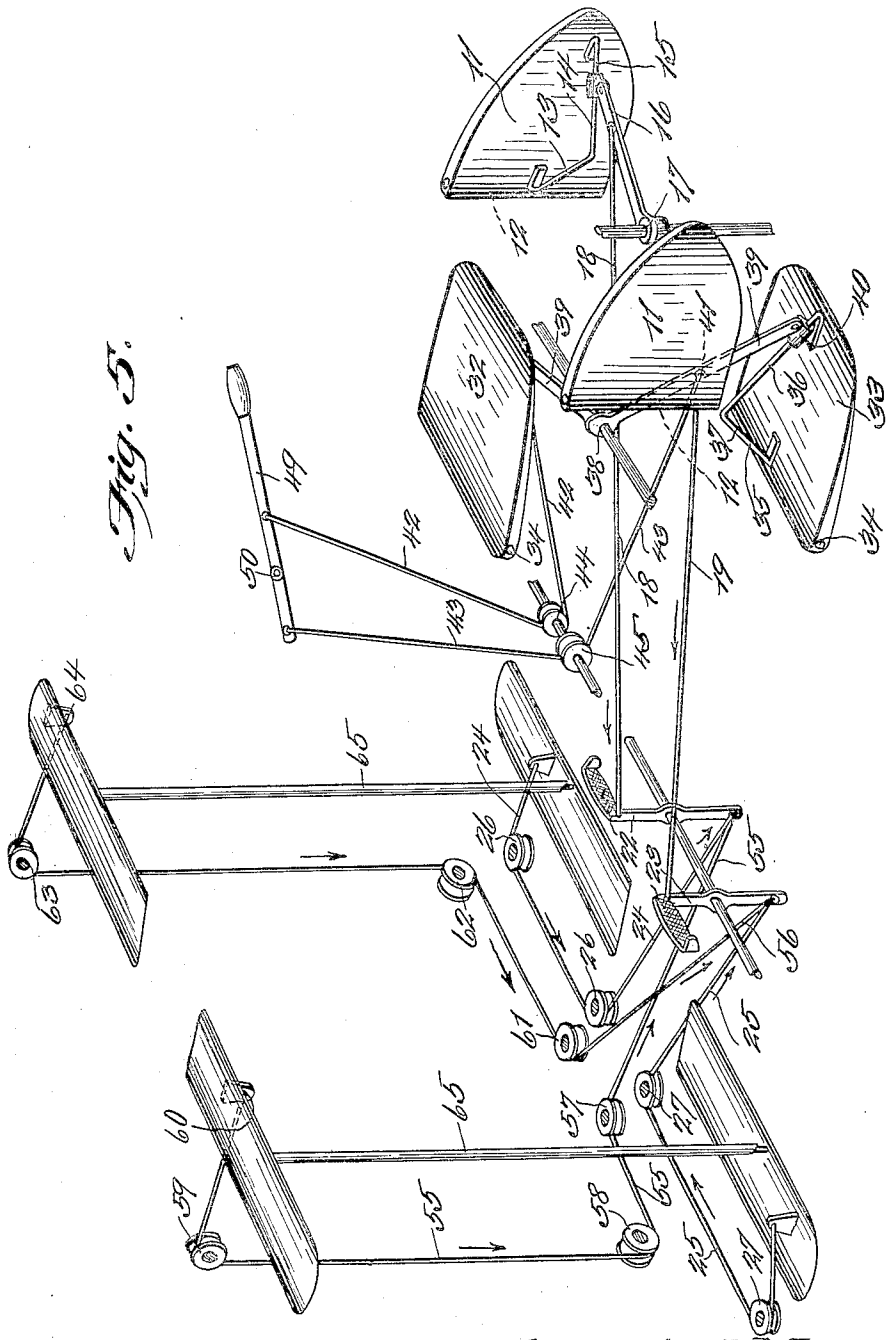
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ELEVATING AND STEERING MEANS FOR AIRPLANES

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Fig. 5.



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Patented June 20, 1933 1,914,448

UNITED STATES PATENT OFFICE

EDWARD J. MURRAY, OF PHILADELPHIA, PENNSYLVANIA

ELEVATING AND STEERING MEANS FOR AIRPLANES

Application filed June 25, 1930, Serial No. 463,741. Renewed November 2, 1932.

The present invention relates to an improved elevating and steering mechanism and control means for airplanes, and a purpose of the invention is to facilitate the control of the elevating and steering elements, by means of hand and foot operating devices, and at the same time control the rudder or steering device through the medium of foot operated means simultaneously with the operation of the ailerons, so that in turning to the right or to the left, the steering of the airplane may be gauged relatively to the banking of the plane and vice versa.

Another purpose is to provide in an airplane elevating and descending elements counter-sunk in the wall of the tail end of the fuselage, in conjunction with a usual stick controlled mechanism, to operating the elevating and descending elements in order to facilitate the ascension and descension of the plane. The counter-sinking of the elevating and descending elements particularly decreases air resistance to a considerable degree, especially in traveling straight ahead or at least approximately so, for the reason that when the elevating or descending elements are in normal position there is practically no air resistance whatever, it being practically a thorough and complete stream line action of the plane through the air.

Still another purpose is the provision of counter-sunk rudder or steering elements, which are similar in action to the elevating elements, in fact there being no air resistance as long as the steering or rudder elements are in normal position, and the air resistance is reduced to a minimum under such conditions. However, when the rudder or steering elements have been moved to make a right or a left turn, naturally there must be some resistance in order to cause the turn, and since the rudder or steering elements are operative simultaneously with the ailerons of the wings, the banking of the plane and the steering thereof to the right or the left can be accomplished with substantial precision.

It is to be understood that the particulars herein given are in no way limitative, and that while still keeping within the scope of the invention, any desired modification of details and proportions may be made in the construction of the appliance according to circumstances.

The invention comprises further features and combination of parts to be hereinafter set forth, shown in the drawings and claimed.

In the drawings:—

Figure 1 is a view in side elevation of an airplane, showing the elevating elements applied, the tail of the fuselage being in section in order to disclose the elevating elements, and also illustrating the connection with the stick whereby the plane may ascend or descend, the steering or rudder construction being partly indicated.

Figure 2 is a plan view of Figure 1, the tail of the fuselage being in section and illustrating the steering or rudder mechanism in conjunction with the forward operating control, which is also connected to the ailerons.

Figure 3 is a sectional view in plan view showing the construction of the steering or rudder elements, showing one of them having been operated, in order to more clearly show the construction and operation.

Figure 4 is a sectional side view of the tail end of the fuselage, showing it in section and clearly showing the construction and arrangement of the elevating elements, showing one of them having been operated.

Figure 5 is a detailed skeleton perspective view showing the elevating elements and the rudder elements, the ailerons and the means for operating all of them.

With reference to the drawings, 1 identifies a fuselage of an airplane, provided with the usual upper and lower wings 2 and 3, the struts 4, the landing gear 7 and the usual propeller 8.

The tail end of the fuselage is equipped with the usual stabilizing wings 9, and opposite sides of the tail end of the fuselage are provided with depressions or counter-sinks 10, in which the rudder or steering elements 11 are arranged, said elements being hingedly mounted at 12, in such a manner that they are capable of being moved outwardly on their hinge connections for steering the plane to the right or the left.

In order to accomplish such a result the

rudders or steering elements 11 are provided with angle members 13, the rods 14 of which act as guide rods for the sleeves 15, which are carried by control rods 16, pivoted at 17 on the inside of the tail end of the fuselage. Suitable cables 18 and 19 are connected to the control rods 16 and are connected to the foot pedals 22 and 23. Suitable cables 24 and 25 are also connected to the pedals and pass over pulleys 26 and 27 and in turn are connected to the ailerons of the wings, the construction and arrangement of such parts being such that when the foot pedals are actuated the rudder or steering elements operate simultaneously with the ailerons in order to synchronize the operation of the rudders or the steering elements with the ailerons, whereby the steering action of the rudders may perform simultaneously with the operation of the ailerons, and hence render the banking of the plane incident to the steering thereof to the right or the left.

When one or the other of the cables 18 or 19 are pulled by disposing one of the pedals 22 and 23 the control rod 16 moves on its pivot, and the sleeve slides on the guide rod 14, moving the rudder outwardly from its depression from the fuselage at the same time the proper aileron is actuated. Both rudders operate in a similar manner and with its respective aileron.

Also in depressions 30 and 31 in the upper and lower surfaces of the tail end of the fuselage elevating elements 32 and 33 are disposed, being hingedly mounted at 34. These elements carry angle pieces 35 comprising guide rods 36 and the brace rods 37. Pivoted within the tail end of the fuselage at 38 are control rods 39, the sleeves 40 of which slide on the guide rods 36, and connected at 41 to the control rods 39 are cables 42 and 43, which pass over pulleys 44 and 45 and are connected to opposite sides of the usual stick 49 located pivotally at 50 in the cock pit 51. Obviously when the stick is tilted downwardly or upwardly, it depending on how the stick might be mounted for operation, one or the other of the cables 42 and 43 is pulled. If the cable 43 is pulled to move the descending element 33 outwardly to cause a descension of the plane the cable 42 tends to slacken slightly, a spring 52 being provided to hold the element 32 in its depression. However if the stick is operated to pull the cable 42, the cable 43 will slacken, a spring 53 will therefore retain the ascending element 33 closed. When the elevating element 33 is moved outwardly the plane descends.

The invention having been set forth, what is claimed is:

1. In an elevating and steering mechanism for airplanes, the combination with a fuselage, of elevating and rudder elements hingedly mounted at the tail end of the fuselage and counter-sunk therein to insure stream line travel of the airplane, of means operatively connected with the rudder elements and in turn with the usual wing ailerons for actuating such elements and ailerons simultaneously.

2. In an elevating and steering mechanism for airplanes, the combination with a fuselage, of elevating and rudder elements hingedly mounted at the tail end of the fuselage and counter-sunk therein to insure stream line travel of the airplane, of means operatively connected with the rudder elements and in turn with the usual wing ailerons for actuating such elements and ailerons simultaneously, and means operatively connecting with the elevating elements for causing the plane to ascend or descend.

3. In an airplane control mechanism, the combination with a fuselage having depressions in its sides at the tail end thereof, of rudder elements hingedly mounted in said depressions and provided with angle members including guide rods, control rods pivoted in the fuselage and having sliding connections with the guide rods, pedal operating means operatively connected with the control rods for actuating them for moving one or the other of the rudder elements laterally for steering to the right or the left.

4. In an airplane control mechanism, the combination with a fuselage having depressions in its sides at the tail end thereof, of rudder elements hingedly mounted in said depressions and provided with angle members including guide rods, control rods pivoted in the fuselage and having sliding connections with the guide rods, pedal operating means operatively connected with the control rods for actuating them for moving one or the other of the rudder elements laterally for steering to the right or the left, said airplane including upper and lower wings having ailerons, and means connecting the pedal operating means and the aileron for actuating the ailerons simultaneously with the rudder elements.

5. In an airplane, a fuselage having depressions in its upper and lower faces at the tail end thereof, said depressions being in pairs, one pair on the top and bottom surfaces of the fuselage forward of the other pair of depressions which are formed in the sides at the rear, elevating elements hingedly mounted in the upper and lower forward depressions and provided with angle members having guide rods, control rods pivoted in the fuselage and being slidably connected to the guide rods, manually operated means operatively connected to the control rods for actuating the elevating elements, tensioning means for the control rods, thereby tensioning the elevating elements, rudder elements hingedly mounted in the side depressions, said airplane having wings provided with

ailerons, pedal operating means operatively connected to the rudder elements, and means connecting the pedal operating means and ailerons for actuating the ailerons simultaneously with the rudder elements.

6. In an airplane, a fuselage having depressions in the upper and lower faces at the tail end thereof, elevating elements pivotally mounted in said depressions, angle members carried by the elevating elements and provided with inclined guide rods, said angle members operating through the bottoms of said depressions, control rods pivotally mounted within the fuselage and in turn provided with operative connections with the guide rods, tensioning means for the control rods, thereby tensioning the elevating elements to hold them in the depressions, and a manually operated lever having cable connections with the control rods, for operating the elevating elements for causing the plane to ascend and descend.

In testimony whereof he affixes his signature.

EDWARD J. MURRAY.