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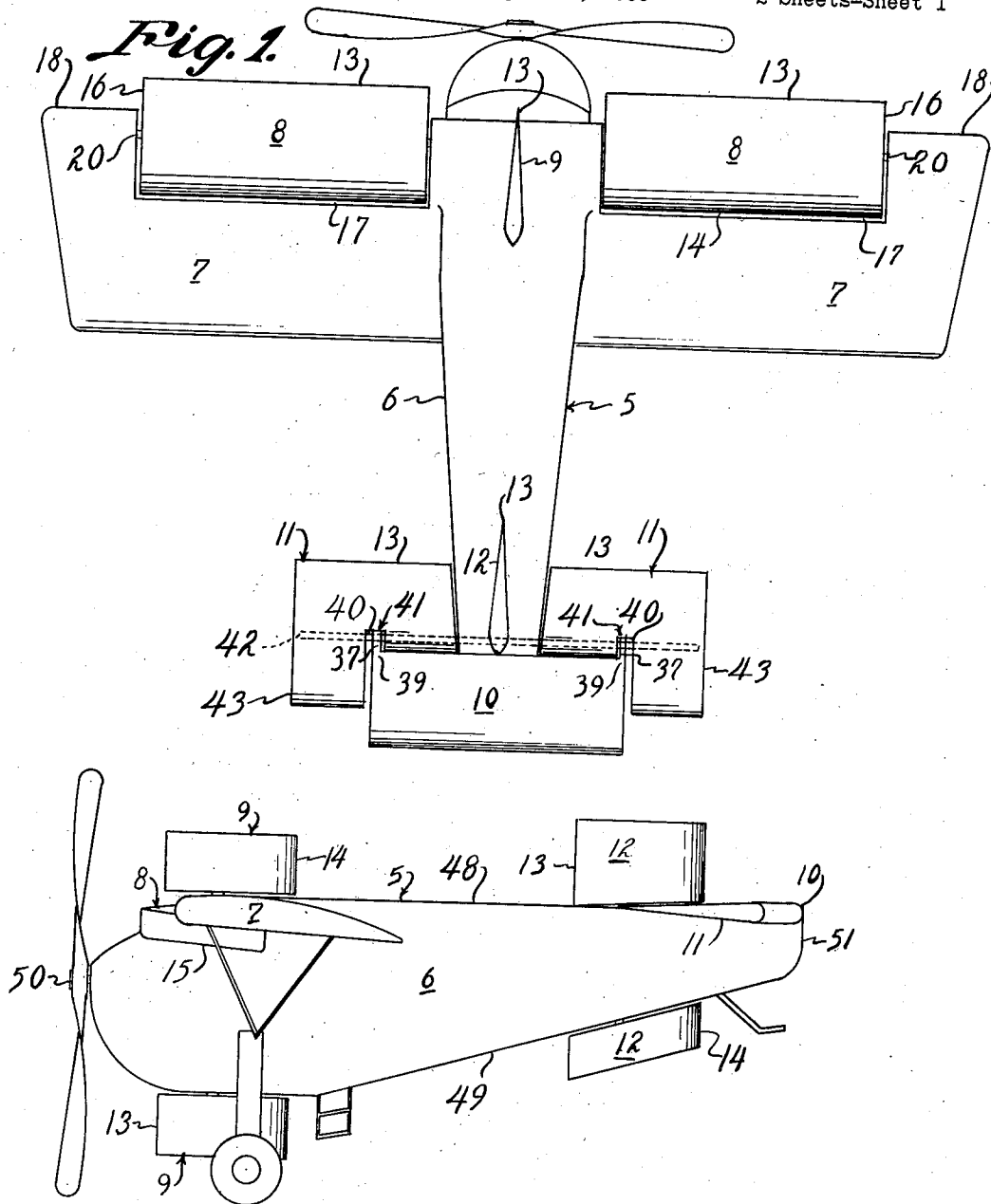
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CONTROL MECHANISM FOR AIRPLANES

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CONTROL MECHANISM FOR AIRPLANES

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4 Claims. (Cl. 244-83)

This invention relates to airplanes and more particularly to improvements in the control mechanism thereof, and has for its principal object to provide a plurality of vertical and horizontal control members or rudders upon the upper and lower surfaces of the airplane at each end thereof for facilitating the movement of the craft, together with means for operating same.

Another object of this invention is to provide foot and hand operated controls for the aforementioned vertical and horizontal rudders, the controls being designed to permit the front horizontal rudders or ailerons to be moved or tilted either in unison with or reversely to one another and independently of the rearward horizontal rudders or elevators, as might be desirable in practice.

A further object of this invention is to provide a plurality of thin and feathered rudders to be positioned fore and aft upon the airplane as stated, the frontal horizontal rudders, or ailerons, having depended integrally formed flanges at the outer ends thereof for supplementing the action of the vertical rudders.

With the foregoing and such other objects in view as may appear from the specification, reference will be had to the accompanying drawings forming a part of the specification, and in which:

Figure 1 is a top plan view of an airplane showing thereon the improvements as set forth in this specification.

Figure 2 is a side view of the assembly of Figure 1.

Figure 3 is a perspective view of the horizontal rudders and related controls, all removed from the airplane.

Figure 4 is a similar view of the vertical rudders and controls.

Referring now more particularly to the drawings it will be seen that the airplane 5, diagrammatically shown, comprises a fuselage 6, at the forward end of which are mounted the laterally extended wings 7, a pair of ailerons 8 in openings in the wings, and a pair of vertical rudders 9, and at the rear end of which are mounted a horizontal stabilizer 10, a pair of horizontal rudders or elevators 11 and a pair of vertical rudders 12.

The aforementioned rudders, both vertical and horizontal, are preferably of a thin feathered cross section, that is wedge shaped, and have their apexes 13 directed towards the forward end of the plane. The trailing edges 14 of the rudders are rounded so as to reduce the "drag" or air resistance thereof. Both the vertical and

horizontal rudders, when in the normal position, are in planes parallel to the longitudinal axis of the craft, although this normal position may be and is varied or shifted to control the movement of the airplane, as will be later described.

The ailerons 8 have depended integrally constructed flanges 15 extended from the outer ends 16 thereof, and which tend to act as vertical stabilizers supplementing the action of the vertical rudders 9 and 12. These ailerons are positioned within openings 17 in the forward edges 18 of the wings 7 and are pivotally mounted therein transversely of the longitudinal axis of the craft by means of shafts 19 rigidly secured thereto and journaled in the interior of the wings at 20.

A horizontal control or steering device 21 is provided for selectively controlling the ailerons, the said steering device comprises a housing 22 through the opposite sides 23 of which shafts 24 are journaled, by means of which the device is pivotally mounted to the fuselage in the bearings 25. These shafts 24 each have a spur gear 26 secured thereto at the inner end thereof within the housing 22, said gears meshing at either side with a crown gear 27 rigidly secured to the lower end of a vertical steering rod or column 28 at the upper end of which is operatively positioned a steering wheel 29 for controlling the steering device as will be explained. Depended levers 30 are rigidly secured to the shafts 24 and are pivotally connected at 31 to the rear ends of connecting rods 32, the forward ends of said connecting rods being similarly pinned at 33 to the depended levers 34, rigidly secured to and depended from the inner ends of the aileron shafts 19, so that any movement of the steering device is transmitted to the ailerons.

The rear horizontal rudders or elevators 11, of substantially the same construction as the ailerons, have their inner rear corners cut away, as shown at 35 for the reception of the horizontal stabilizer 10. This stabilizer is rigidly secured to the fuselage and has forwardly extending apertured portions or lugs 37 at its outer frontal corners 39 for seating within recesses 40 in the elevators and through which the elevators are pivoted to the stabilizer at 41 by means of the shaft 42 extended through the fuselage, elevators and stabilizer lugs outwardly on each side thereof to the outer sides 43 of the elevators. This shaft 42 therefore forms the pivotal connection between the stabilizer and elevators. The shaft has depending lever 43 centrally secured thereto and connected at its lower end 44 to the rear end of a connecting rod 45 the forward end of the latter

being connected to the housing 22 of the steering device, as shown at 46.

The aforementioned ailerons and elevators are adapted to be controlled by the steering device 21 and connections in such a manner that the ailerons may be moved about their axes or shafts in unison with one another and in opposition to the elevators upon moving or "rocking" the steering column 28 forwardly or backwardly or the ailerons may be moved about their axes oppositely or reversely to one another and independently of the elevators upon rotating the steering wheel 29 to the right or left.

The vertical rudders 9 and 12 are similar in cross section to the horizontal rudders and are positioned at the upper and lower sides 48 and 49 of the fuselage at the front 50 and rear 51 thereof in a plane perpendicular to that of the horizontal rudders and are designed to control the sidewise movement or "drift" of the airplane.

The upper and lower front rudders 9 are rigidly connected to each other in a spaced relationship by means of a shaft 52 vertically journaled at 53 through the fuselage, and the rear upper and lower rudders are similarly connected by a shaft 54 vertically journaled at 55 through the fuselage. Short levers 56 are medially and rigidly secured to the shafts 52 and 54 and are pivotally connected at 57 to the ends of a horizontal foot bar 58 by means of connecting rods 59, the bar 58 being medially pivoted to the fuselage at 60 in such a manner that the two sets of rudders will move in opposite directions upon movement of the foot bar.

It is thought that from the foregoing explanation, the construction and operation of this system of controls will be fully understood by one versed in the art of airplane construction. For example, if it is desired to elevate the airplane, the steering column is drawn backwards causing the leading edges of the ailerons to move upward, and the leading edges of the elevator to move downward, or to lower the airplane, the above procedure is reversed. If it is desired to turn the plane the steering wheel is rotated, depending upon the direction of turn, causing one of the ailerons to move upward and the other downward and the foot bar is moved thereby shifting the planes of each set of vertical rudders, the planes being in opposition to one another. Although a preferred form of embodiment of the invention has herein been shown and described, it is understood that changes in the construction and arrangement of the several parts may be resorted to as expediency may dictate, not departing, however, from the spirit of the invention as set forth in the appended claims.

I claim:

1. In a monoplane including fuselage, lateral wings at the head of the fuselage and a centrally located horizontal stabilizer at the rear thereof, there being openings through the forward margins of the wings, aileron shafts supported forwardly across the wing openings transversely of the long axis of the craft, ailerons pivotally mounted on said shafts within the wing openings,

flanges depended from the outer ends of the ailerons perpendicularly to the supporting shafts thereof, an elevator shaft supported across the forward margin of the stabilizer upon lugs extended therefrom, the said shaft being extended laterally of the stabilizer, elevators pivotally mounted on the ends of the said shaft, the latter passing medially therethrough, the elevators being cut out at their inner rear corners to receive the adjacent corners of the stabilizer, and hand controlled means for manipulating the ailerons and elevators co-operatively to cause the airplane to ascend or descend or roll laterally.

2. In a structure according to claim 1, frontal and rear rudder shafts journaled vertically through the fuselage, vertical rudders anchored to the upper and lower ends of the rudder shafts, and foot controlled means for operating the frontal and rear rudders in unison for turning the airplane laterally.

3. In a monoplane including a fuselage with forwardly disposed, laterally extended wings having openings through their leading margins and a pair of ailerons horizontally pivoted on shafts journaled across said openings, including a pair of elevators horizontally anchored on the ends of an elevator shaft journaled across the tail of the fuselage, and including a pilot's seat in the fuselage—a steering housing forwardly of the pilot's seat, pivot rods journaled laterally in the housing and laterally in the fuselage, whereby the said housing may be rocked forwardly and rearwardly, a steering post journaled vertically down into the housing, a steering wheel at the upper end of the steering post, a crown gear anchored to the lower end of the steering post, spur gears anchored to the inner ends of the lateral pivot rods of the housing and meshing at either side with the said crown gear, short levers depended from the pivot rods laterally of the housing, and from the inner extended ends of the aileron shafts, a short lever depended from the elevator shaft, rods connecting at each side the aileron-shaft levers and housing pivot rod levers, and a rod eccentrically connecting the housing with the elevator shaft lever.

4. In a monoplane including a fuselage with laterally extended wings and a pilot's seat, and including ailerons and elevators horizontally pivoted fore and aft on the fuselage, a steering unit for manipulating connections extended therefrom to the said ailerons and elevators, the same comprising a steering housing forwardly of the pilot's seat, pivot rods journaled laterally at one end in the housing and at their outer ends in the fuselage, the said pivot rods pivotally supporting the housing so that it may be rocked forwardly and rearwardly, spur gears anchored to the inner ends of the pivot rods within the housing, a steering post journaled vertically down into the housing between the spur gears of the pivot rods, a crown gear anchored to the lower end of the steering post and in mesh with the spur gears of the pivot rods, and a steering wheel at the upper outer end of the steering post.

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