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March 23, 1937.

W. W. EVERTS

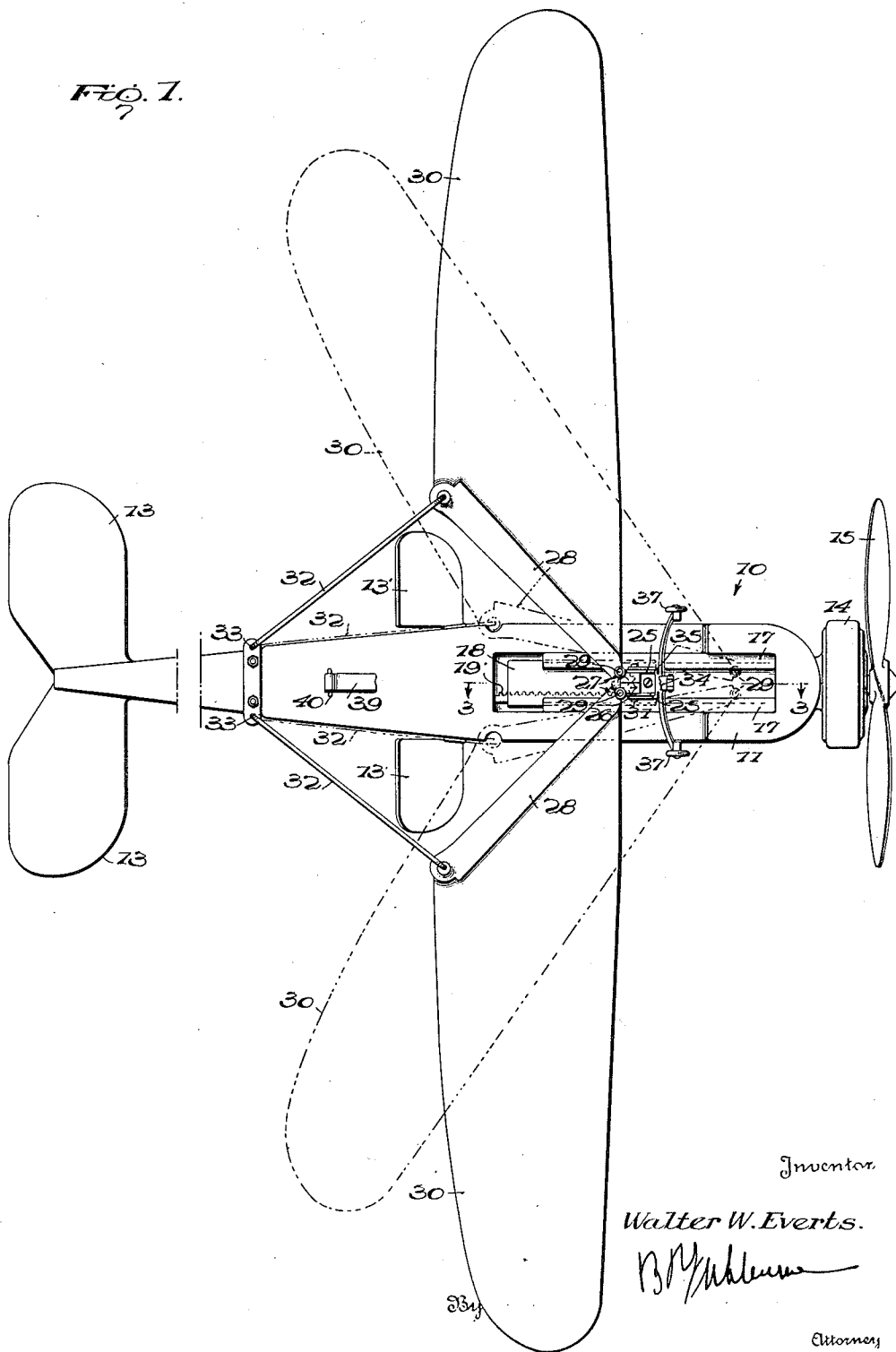
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AEROPLANE

Filed Oct. 10, 1936

3 Sheets-Sheet 1

FIG. 1.



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SEARCH ROOM

March 23, 1937.

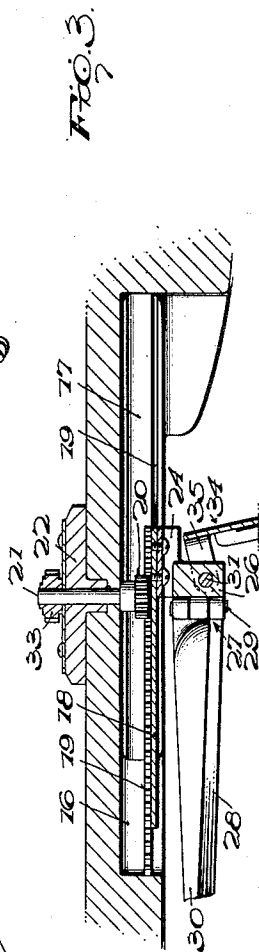
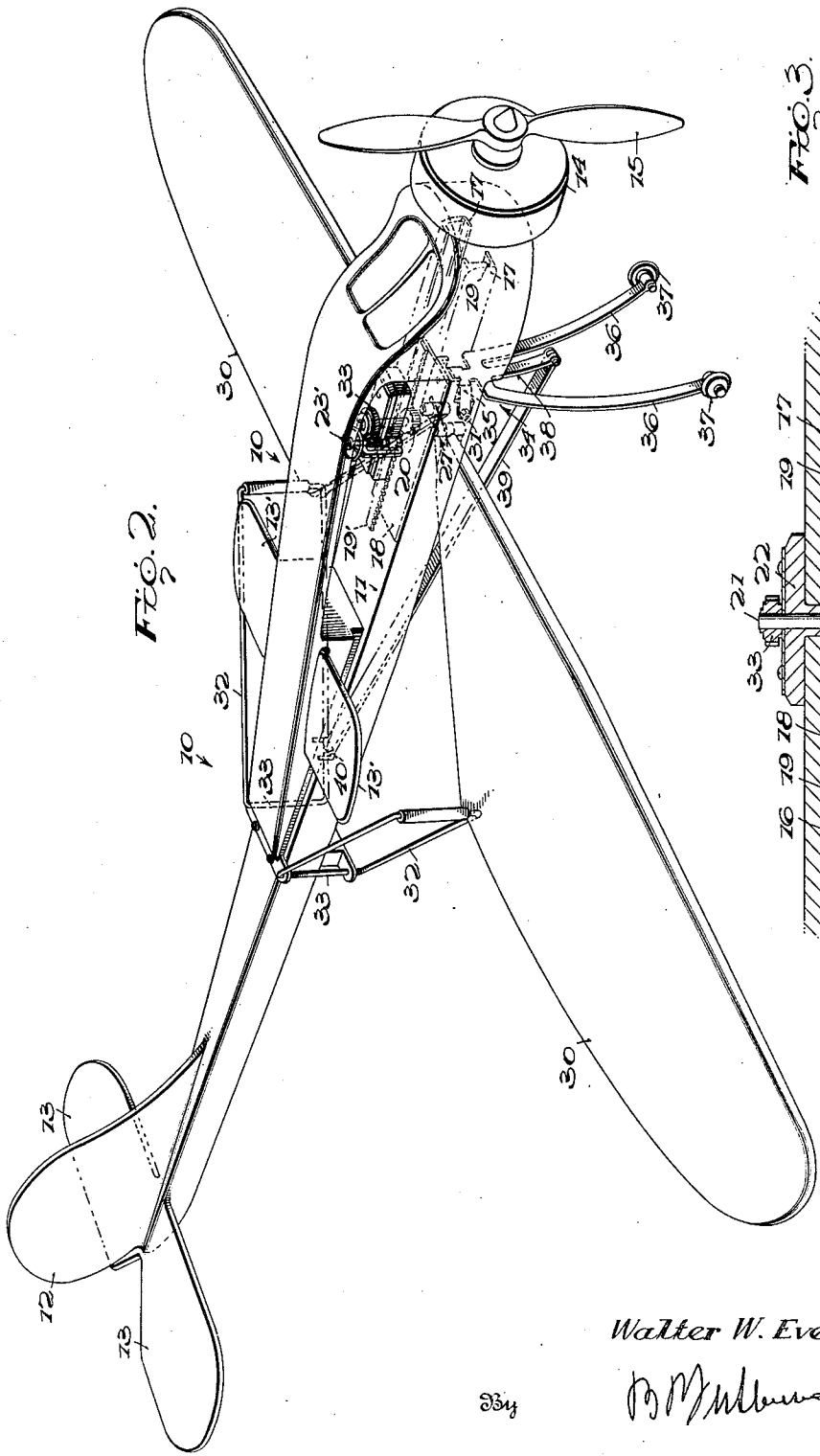
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AEROPLANE

Filed Oct. 10, 1936

3 Sheets-Sheet 2



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March 23, 1937.

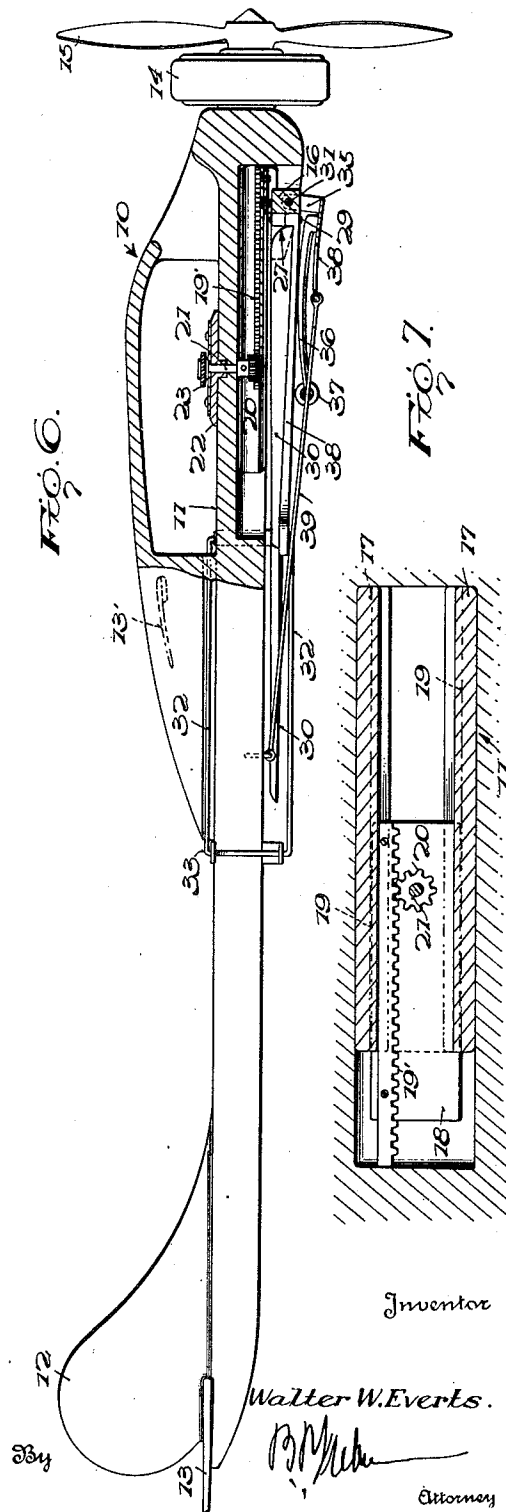
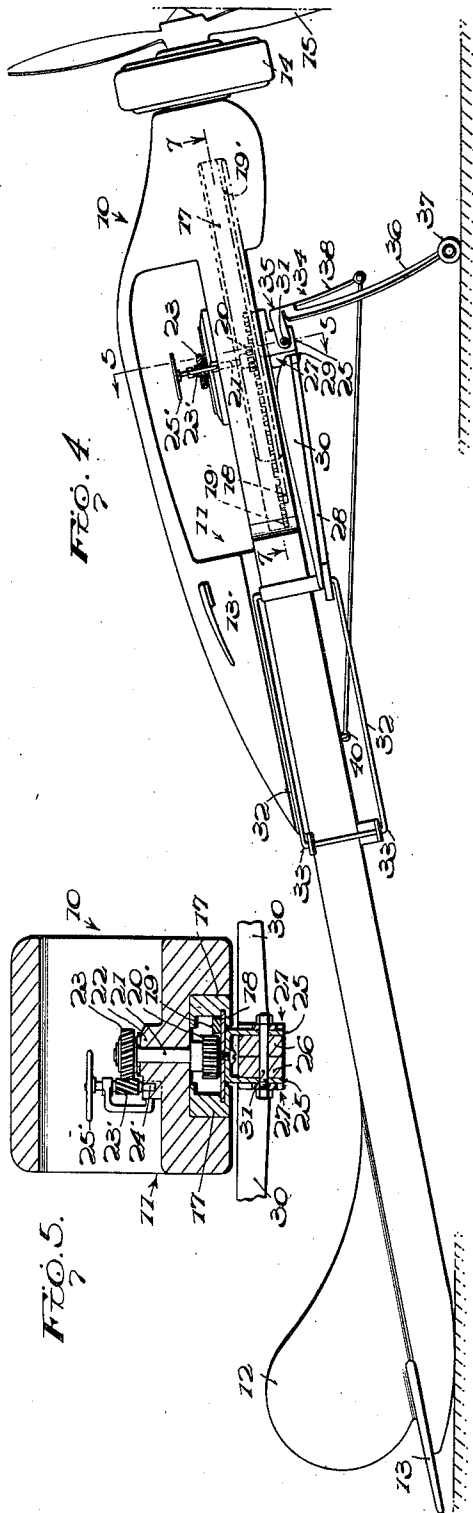
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AEROPLANE

Filed Oct. 10, 1936

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,074,897

AEROPLANE

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Application October 10, 1936, Serial No. 105,109

9 Claims. (Cl. 244-49)

My invention relates to aeroplanes.

An important object of the invention is to provide means to angularly adjust the sustaining planes or wings with respect to the fuselage, so that the speed of the aeroplane may be increased.

A further object of the invention is to provide means for angularly adjusting the sustaining planes or wings with respect to the fuselage without disturbing the center of gravity of the aeroplane.

A further object of the invention is to provide means for adjusting the folding sustaining planes or wings of the aeroplane, which means folds in action, approaching the stream line shape of the fuselage, thereby offering the minimum air resistance, during the flight of the aeroplane at high speed.

A further object of the invention is to provide a chassis which is retracted or folded when the sustaining planes or wings are shifted toward the retracted position.

A further object of the invention is to provide operating means to shift the sustaining planes or wings and the chassis, which is of simple construction, strong, durable, and reliable in operation.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings, which form a part of this specification and wherein like characters of reference denote like parts throughout,

Figure 1 is a bottom plan view of an aeroplane embodying my invention,

Figure 2 is a perspective view of the same,

Figure 3 is a longitudinal section taken on line 3-3 of Figure 1,

Figure 4 is a side elevation of the aeroplane,

Figure 5 is a transverse section taken on line 5-5 of Figure 4,

Figure 6 is a side elevation of the aeroplane, parts in section, with the chassis retracted or folded, and

Figure 7 is a horizontal section taken on line 7-7 of Figure 4.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of my invention the numeral 10 designates the fuselage as a whole, including the usual cockpit 11.

The fuselage is provided at its rear end with a direction rudder 12 and an elevation rudder 13, which are operated in the usual manner. The numeral 13' designates ailerons, which are pivotally mounted upon the fuselage, at the positions shown, and manipulated by any suitable

means. At its forward end, the fuselage carries an engine 14, driving a propeller 15, as shown.

The fuselage 10 is provided in its lower portion, see more particularly Figures 3, 5, 6 and 7, with a longitudinal recess 16, receiving therein spaced tracks 17, rigidly attached to the fuselage by any suitable means. Arranged between the space tracks 17 is a longitudinally movable carriage, slide, or support 18, the longitudinal edges of which operate within grooves 19 formed in the tracks 17. The carriage 18 is therefore adapted to partake of rectilinear reciprocatory movements longitudinally of the fuselage. Any suitable means may be employed to move the carriage 18 longitudinally and hold the same in the adjusted position. For the purpose of illustration, I have shown such means as comprising a rack-bar 19', rigidly attached to the upper side of the carriage 18 near one edge thereof, and engaging a pinion 20, rigidly secured to the lower end of a vertical shaft 21, operating within a bearing 22. The vertical shaft 21 has a worm wheel 23, rigidly secured thereto, and this worm wheel engages a worm 23', formed upon a vertical shaft 24', turned by a hand wheel 25'. Any other suitable means, manually or power operated, may be employed to shift the carriage 18 and hold the same in the adjusted position.

Rigidly attached to the forward end of the carriage 18 is a coupling element 24, having spaced sides 25. Arranged between the sides 25 of the coupling element are the leading leaves 26 of hinges 27, having rear leaves 28 and pintles 29, arranged at a right angle to the longitudinal axis of the fuselage. The rear leaves 28 are rigidly attached to the inner ends of sustaining planes or wings 30, such inner ends being obliquely cut, as shown. The leading leaves 26 are rigidly attached to the sides 25 of the coupling 24, by any suitable means, and a pivot element 31 extends through the parts 25 and 26, for a purpose to be described. Pivotaly connected with the sustaining planes or wings 30, at their trailing edges and their inner ends, are folding links, struts, or elements 32, the trailing ends of which are pivotaly connected with the fuselage, as shown at 33. The links 32 cannot move bodily longitudinally of the fuselage but are capable of swinging laterally with relation thereto, while the carriage 18 moves longitudinally of the fuselage and is incapable of moving laterally with relation thereto. The movement of these parts, which bodily carry the sustaining planes or wings, causes the inner ends of these sustaining planes or wings to be shifted bodily longitudinally of the fuselage and their

outer ends to be swung laterally with relation thereto, as will be more fully explained.

The numeral 34 designates a chassis, in the form of a yoke. This yoke is provided at its upper end with a forked coupling 35, which straddles the coupling 24, and is pivotally connected therewith by means of the pin 31. The chassis includes arms 36, carrying wheels 37. Depending between the arms 36 is a shifting arm 36, preferably formed integral with the chassis, and this arm has pivotal connection with folding link 39, extending longitudinally of the fuselage and pivotally connected therewith at 40. It is thus seen that the chassis is bodily mounted upon the carriage 18 to be shifted thereby while the folding link 39 has a fixed pivotal connection with the fuselage. With the construction, the chassis may be automatically folded when the carriage 18 is moved forwardly to swing the sustaining planes or wings rearwardly, as will be more fully described.

The operation of the aeroplane is as follows. When it is desired that the sustaining planes or wings 30 have the maximum spread and hence the maximum lifting power, the hand wheel 23 is turned so that the carriage 18 is shifted to the rearmost position, Figures 1, 2 and 4. The central longitudinal axes of the sustaining planes or wings 30 are now disposed at substantially a right angle to the central longitudinal axes of the carriage 18 and fuselage, these central longitudinal axes of the carriage and fuselage being in alignment. When the sustaining planes or wings are thus held in the maximum spread or open position, the chassis 34 is also in the distended or open position, for landing. The sustaining planes or wings 30 are usually shifted to the maximum spread or open position for the purpose of landing, and taking off. When the aeroplane is in flight, and it is desired to decrease the air resistance upon the leading edges of the sustaining planes or wings and hence increase the speed of the aeroplane, the sustaining planes or wings are adjusted so that their leading edges and central longitudinal axes are arranged at an acute angle, as indicated more clearly in Figure 1. To accomplish this the hand wheel 23 is turned in a direction to move the carriage 18 forwardly. Upon this forward movement of the carriage 18, the fixed pivots 29 of the sustaining planes or wings are shifted forwardly, whereby the inner ends of the sustaining planes or wings are bodily shifted forwardly. While the inner ends of the sustaining planes or wings are moving forwardly, the sustaining planes or wings are also turned inwardly upon their pivots 29, due to the action of the folding links or elements 32, and the outer ends of the sustaining planes or wings therefore move inwardly toward the fuselage. The folding links or elements 32 also move inwardly toward the fuselage, and when the sustaining planes or wings occupy the innermost folded position, the links 32 are also in close relation to the fuselage, to offer the minimum resistance to the air. When the carriage 18 is moved rearwardly the reverse of this operation occurs, and the inner ends of the wings are shifted bodily rearwardly and their outer ends swung outwardly, until the wings assume the maximum outer or spread position. The center of gravity of the aeroplane may be at a point about 20% to 30% of the chord back of the leading edge of the wings, in their fully extended position, and this center of gravity is not shifted during the adjustment of the wings. This is due to the fact

that the weight of portions of the wings and operating parts which move forwardly balance portions of the wings which move rearwardly, and vice versa. The same is true of the chassis and its operating parts. The wings are so constructed and mounted that the relative lifting forces forwardly and rearwardly of the center of gravity remain substantially unchanged, when the wings are adjusted.

When the carriage 18 is in the rearmost position and the sustaining planes or wings 30 are in the maximum spread position, the chassis 34 is in the open or projected position. When the carriage 18 moves forwardly, to retract or fold the sustaining planes or wings, the chassis 34 turns upon its pivot 31, since the link 39 pulls upon the arm 38, and by the time the sustaining planes or wings have reached the innermost folded position, the chassis is also in the innermost folded position, Figure 6, thereby offering the minimum resistance to the air.

It is to be understood that the form of my invention hereby shown and described is to be taken as a preferred example of the same and the various changes in the size, shape and arrangement of parts may be resorted to, without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. In an aeroplane, a fuselage, wings having inner ends attached to the fuselage and also free ends, means to move the attached ends of the wings in rectilinear lines longitudinally of the fuselage, and means to move the free ends of the wings laterally of the fuselage.

2. In an aeroplane, a fuselage, wings, pivot elements for the wings, guide means for the pivot elements to cause them to move in rectilinear directions longitudinally of the fuselage, and means to move the free ends of the wings laterally.

3. In an aeroplane, a fuselage, wings, pivot elements for the inner ends of the wings, means to guide the pivot elements longitudinally of the fuselage, means to move the pivot elements, and means connected with the wings and fuselage to swing the free ends of the wings laterally with relation to the fuselage upon the movement of the pivots longitudinally of the fuselage.

4. In an aeroplane, a fuselage, a carriage movable longitudinally of the fuselage, wings having their inner ends pivotally mounted upon the carriage, and means to swing the wings upon their pivots.

5. In an aeroplane, a fuselage, a carriage movable longitudinally of the fuselage, wings having their inner ends pivotally connected with the carriage, means to move the carriage longitudinally, and automatic means to swing the wings upon their pivots when the carriage is moved longitudinally.

6. In an aeroplane, a fuselage, a carriage movable longitudinally of the fuselage, wings extending upon opposite sides of the fuselage, fixed pivots attached to the carriage and connecting the wings with the carriage, links pivotally connected with the wings and with the fuselage, and means to move the carriage.

7. In an aeroplane, a fuselage, a carriage mounted to move longitudinally of the fuselage, wings, means pivotally connecting the inner ends of the wings and carriage and arranged near the leading edges of the wings, links pivotally connected with the inner ends of the wings and ar-

76

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ranged near the trailing edges of the wings and pivotally connected with the fuselage, and means to move the carriage.

8. In an aeroplane, a fuselage, a reciprocatory
5 support mounted upon the fuselage, wings pivotally connected with the support, and links pivotally connected with the wings and pivotally connected with the fuselage.

9. In an aeroplane, a fuselage, a support mounted to reciprocate upon the fuselage, wings pivotally mounted upon the support, links pivotally connected with the wings and the fuselage, a chassis pivotally mounted upon the support, a
5 link pivotally connected with the chassis and with the fuselage, and means to move the support.

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