July 16, 1929. M. E. DARE 1,720,667

AEROPLANE CONSTRUCTION

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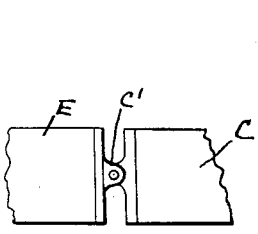


Fig. 6.

Fig. 1.

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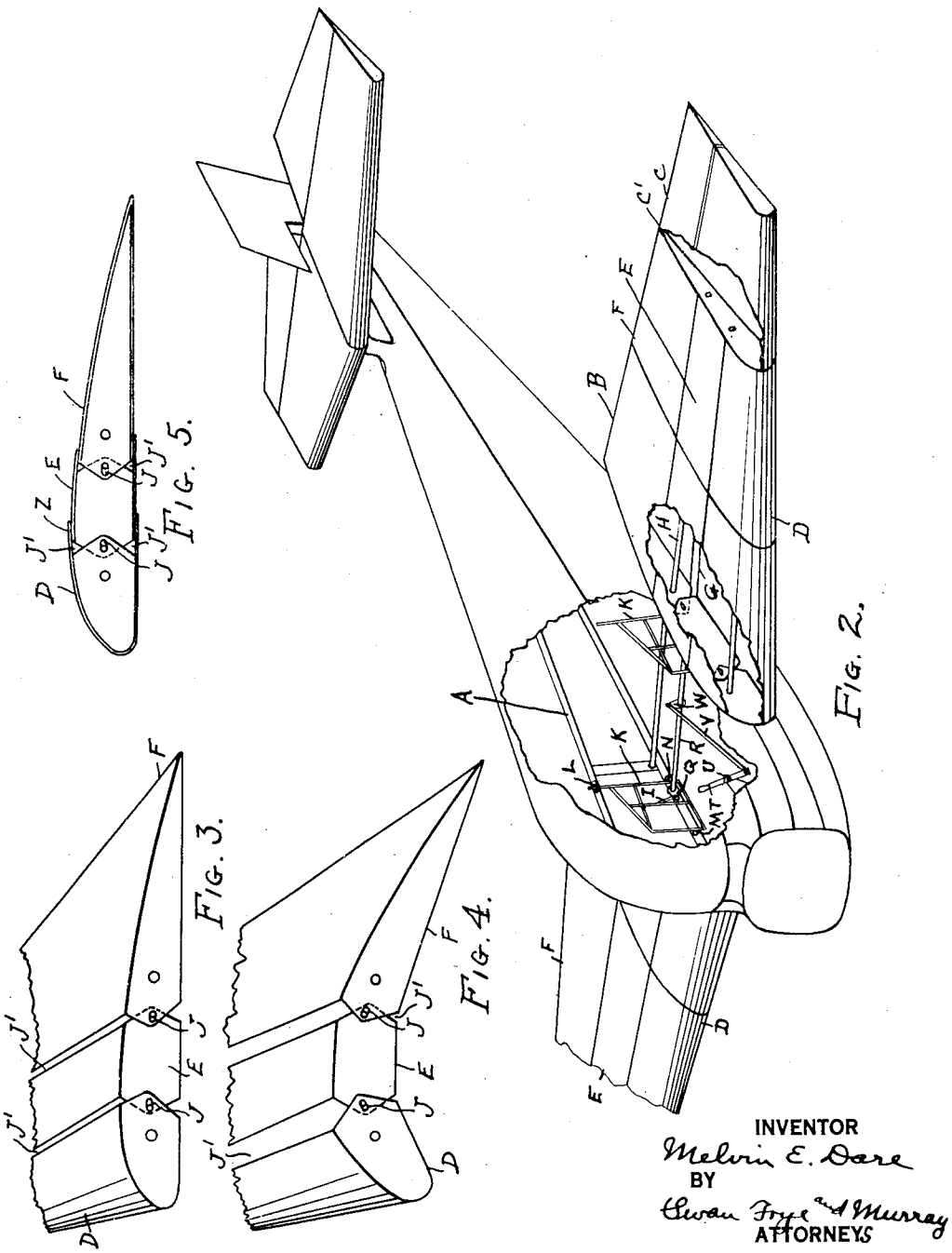


FIG. 2.

FIG. 3.

FIG. 4.

FIG. 5.

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UNITED STATES PATENT OFFICE.

MELVIN E. DARE, OF DETROIT, MICHIGAN.

AEROPLANE CONSTRUCTION.

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This invention relates to aeroplane construction, and has for its object an improved organization of parts by means of which the camber or relative angular positioning of the several hingedly connected portions of a wing may be varied according to whether the operator of the aeroplane desires straight ahead travel or wishes to make the necessary operative adjustments precedent to landing.

In the drawings:

Figure 1 is a perspective of that portion of the fuselage of an aeroplane with which the mechanism here concerned is connected, together with one of the aeroplane wings shown fragmentarily.

Figure 2 is a perspective of the entire aeroplane from a position slightly above and to one side, with parts broken away to show the adjusting mechanism appurtenant to the fuselage.

Figure 3 is a fragmentary perspective of an aeroplane wing section, bringing out the hinged or pivotal connection between the component parts.

Figure 4 is a similar perspective with the camber of the wing sections changed as for landing or for a high lift.

Figure 5 is a side elevational view of a slight modification in the sometimes preferred construction of the various wing sections, in that the covering fabric is shown as overlapping the spaces between the hingedly adjacent wing sections.

Figure 6 is a fragmentary elevational view of a preferred form of hinging or pivoting the outer wing section to projecting struts or supports carried by the fuselage.

A indicates the frame or fuselage of an aeroplane, and B one of its wings, which, discarding from consideration the outer wing section C, not here discussed, is composed of three sections D, E, and F, the outer ones D and F of which are pivotally supported on rods or wing beams G and H, which extend through the aeroplane fuselage. The three sections D, E, and F are successively connected with one another by some such hinging means as the pivot and slot connection J which permits limited angular movement of one section relatively to the other, their meeting edges being bevelled or cut away sufficiently, as at J′, to freely permit this. In the traveling or straight away position of the wings, the sections D, E, and F may be generally stated to lie in the same plane, as brought out in Figure 3. When, however, it is desired to bank the aeroplane's flight preparatory to landing or when a high lift is desired, the movement of the component sections D, E, and F of the wing to substantially the curved position shown in Figure 4 is desirable, and to effect this regulatably and all at one operation, I cause the raising of the center wing section E from the position shown in full lines in Figure 1 to that shown in dotted lines. Due to the pivoting of the outer wing sections D and F on the transverse rods or wing beams G and H respectively, this upward movement of the center section E results in swinging the outer wing sections D and F about their pivotal lines so that the forward wing section D is depressed at its forward or outer edge, while the rear wing section F is depressed about its outer or rearward edge, the resultant position of these component sections when thus actuated being not only shown in Figure 4, but in dotted lines in Figure 1.

My preferred means for effecting this rising movement of the center wing section is shown at K in Figures 1 and 2, and consists of a built-up frame, which is limitedly movable upwardly and downwardly between sets of supporting rollers L, M, and N, carried by the side portion of the fuselage. This frame being in turn connected by means of the ears or projections P with the center section E of the wing, the upward (or downward) movement of the frame carries the center wing section E upwardly or downwardly accordingly, the downward movement restoring the center section E and its companion sections D and F to the straight or traveling position shown in full lines in Figure 1 and also in Figure 3.

An appropriate portion of each frame K is connected, as by links I, with a lever or cam projection Q, which is fixed to rotate with the central shaft R, which is held by bearing straps S in transverse though limitedly rotatable position relatively to the aeroplane fuselage. This in turn is adapted to be acted upon by movement of the hand lever T, which is pivoted at U in convenient position for the operator to reach it, and whose lower end is connected with the link V, which in turn is connected with the cam projection or lever W which is fixed to the shaft R. Thus from a position conveniently adjacent the other operating controls and mechanism, the lever T can be actuated by the operator as and to the degree required for the camber variation of the wing sections desired at any particular time. The movement of the lever T, except when

positively and intentionally actuated, is prevented by some such means as the engagement of its pivot latch or dog X with the ratchet surface Y.

At Z in Figure 5 I have shown a sometimes desirable modification in the construction or finish of the aeroplane wings, in that in place of leaving the wedge-like spaces J′ between each of the wing sections which are shown with particular clearness in Figures 3 and 4, I extend the fabric covering of the wing sections, as shown at Z, so that each overlaps these wedge-shaped spaces and lie flat against the inner edge of the next section of the wing.

The preferred means of connecting the outer wing section C with the aeroplane fuselage is brought out in fragmentary Figure 6, wherein this outer wing section is shown as hinged or pivoted at C′ to the end portion of the laterally projecting struts or wing beams of the fuselage.

It will be evident from the foregoing, and in view of now well established principles of aeronautics, that with the wing sections D, E, and F in the relatively straight position shown in Figures 4 and 6, as well as in full lines in Figure 1, they are positioned for straightaway, high-speed travel, whereas with the wing sections in the curved or relatively overbent position shown in Figure 5 and in dotted lines in Figure 1, they are then in the position needed for landing or for a high lift, the advantage of my improved construction herein disclosed being that either movement is accomplished thanks to the slotted hinged connection of the component wing sections D, E, and F, merely by actuated movement of the center section E.

While it will be apparent that the illustrated embodiments of my invention herein disclosed are well calculated to adequately fulfill the objects and advantages primarily stated, it is to be understood that the invention is susceptible to variation, modification and change within the spirit and scope of the subjoined claims.

What I claim is:

1. Means for varying the camber of aeroplane wings, comprising, in combination with plurally sectioned and hingedly connected wing members the forward and rearward ones of which are pivotally connected with the wing beams of the fuselage, vertically slidable frame members supported by the fuselage and operatively connected with the intermediate section of one or the other of said wing members, and link and lever members adapted to be manually operated, whereby said frame members may be raised or lowered at will, thereby actuating said intermediate sections upwardly or downwardly and in turn actuating the forward and rearward wing sections about their lines of pivotal support accordingly.

2. In combination with plurally sectioned and pivotally connected aeroplane wings, means for regulatably varying their camber, comprising frame pieces operatively connected with the central section of each of the wings and slidably supported by the fuselage of the aeroplane, and manually operable means connected with each of said frame members whereby they may be raised and lowered, thereby moving the center section of each wing accordingly and in turn moving the forward and rearward sections of each wing to positions of diverse angularity relatively to their center section accordingly.

3. In combination with an aeroplane fuselage, transversely positioned wing beams projecting from either side thereof, a pair of flanking wing members pivotally supported therefrom, each wing member being composed of a plurality of hingedly connected sections, frame members slidably supported by said fuselage and operatively connected with the center section of one or the other of said wing members, and means operatively connected with each of said center wing sections and adapted to be manually actuated, whereby said frame members may be raised or lowered, thereby moving their corresponding center wing sections upwardly or downwardly and in turn changing the angular inclination of the forward and rearward wing sections to positions of opposing angularity relatively to their respective center sections.

4. The combination, with an aeroplane fuselage, of plurally sectioned and hingedly connected wing members the outer sections of which are pivotally supported from said fuselage, lifting elements slidably supported by said fuselage and operatively connected with the center section of each wing member, and manually operable means whereby said lifting elements and their respectively connected center wing sections may be raised or lowered, thereby in turn moving the respective forward and rearward sections of each wing out of or into positions of comparative alignment with their respective hingedly connected center sections.

5. In combination with a plurally sectioned aeroplane wing, the component parts of which are pivotally connected with one another, a lifting member operatively connected with the center one of said sections and slidably supported by the fuselage of the aeroplane, and manually operable means whereby said lifting member may be regulatably moved upwardly or downwardly, thereby actuating its connected center section of the aeroplane wing accordingly, and in turn moving the forward and rearward sections of the wing out of or into positions of diversely inclined angularity relatively to the center section accordingly.

6. In combination with an aeroplane fuselage, plurally sectioned wing members pivotally supported therefrom, the several sec-

tions of each wing member being hingedly connected with one another, and means adapted to be manually operated whereby the center section of each wing may be moved upwardly or downwardly, thereby effecting as well the angular movement of the forward and rearward sections of each wing to effect a change in the wing curve.

7. The combination, with a supporting fuselage and wing beams projecting laterally therefrom, of plurally sectioned wing members the forward and rearward sections of which are limitedly rotatable about their respective wing beams and each of which sections are operatively connected with the adjacent edge portions of their intermediate section, and operatively regulatable means whereby the center section of each wing member may be actuated upwardly or downwardly, thereby moving its companion forward and rearward sections into and out of angular relation with respect thereto.

8. In combination with a supporting fuselage, plurally sectioned wing members supported thereby, the component sections of each wing being hingedly connected and provided with overlapping covering fabric at their points of hinged connection, and manually operable means operatively connected with the center section of each wing member whereby the latter may be moved upwardly or downwardly thereby varying the camber of each wing section as a whole.

In testimony whereof I sign this specification.

MELVIN E. DARE.