

S. N. MALTERNER.
AEROPLANE.
APPLICATION FILED MAY 20, 1911.

1,061,917.

Patented May 13, 1913.

2 SHEETS—SHEET 1.

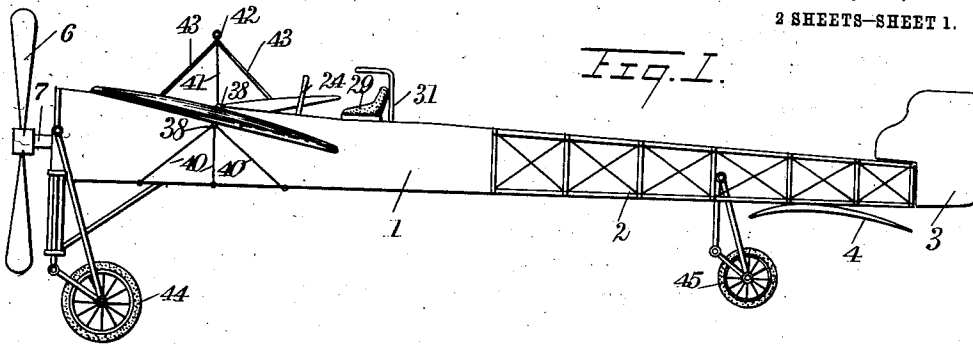


Fig. 1.

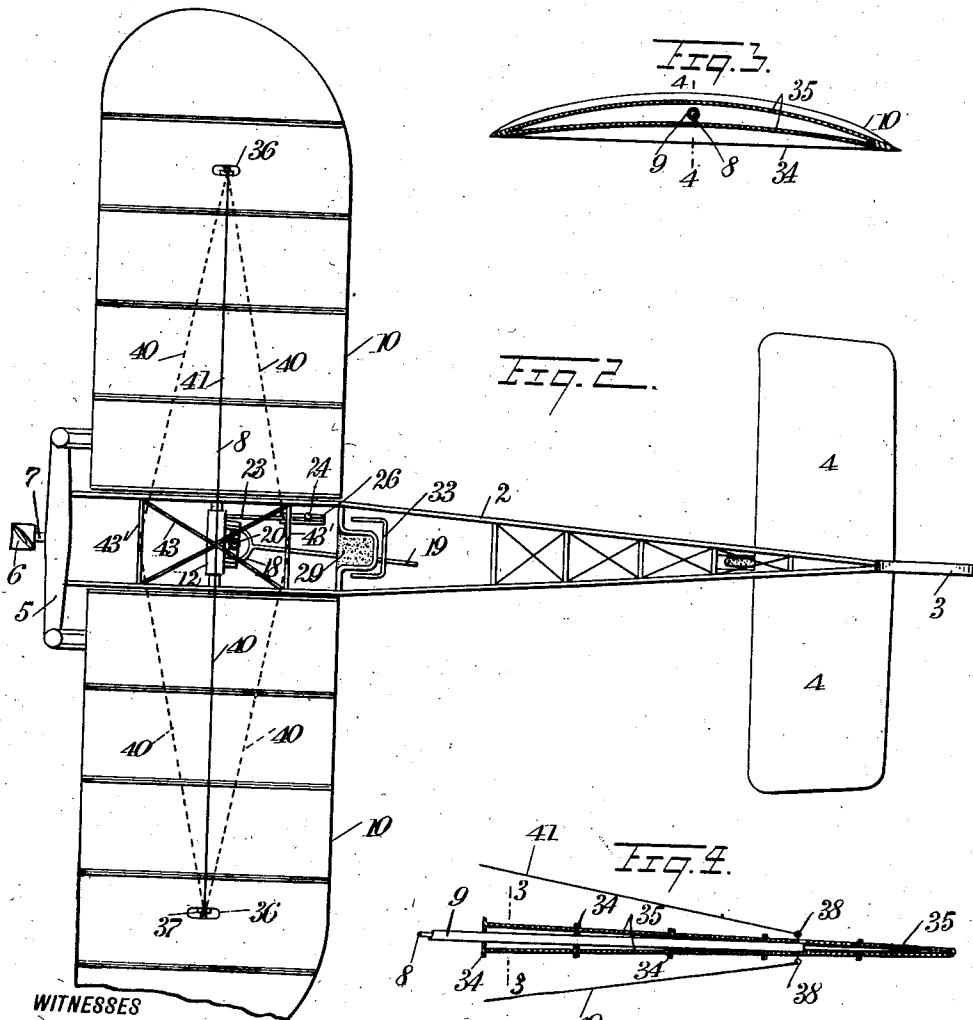


Fig. 2.

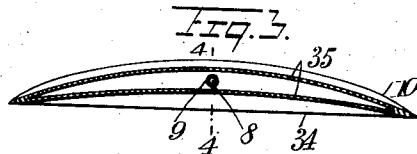


Fig. 3.

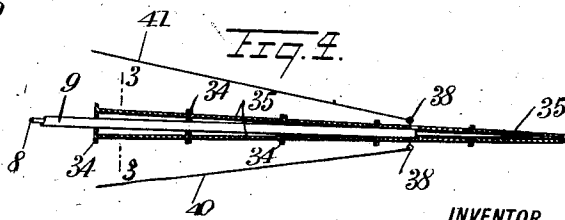


Fig. 4.

WITNESSES

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2 SHEETS—SHEET 2.

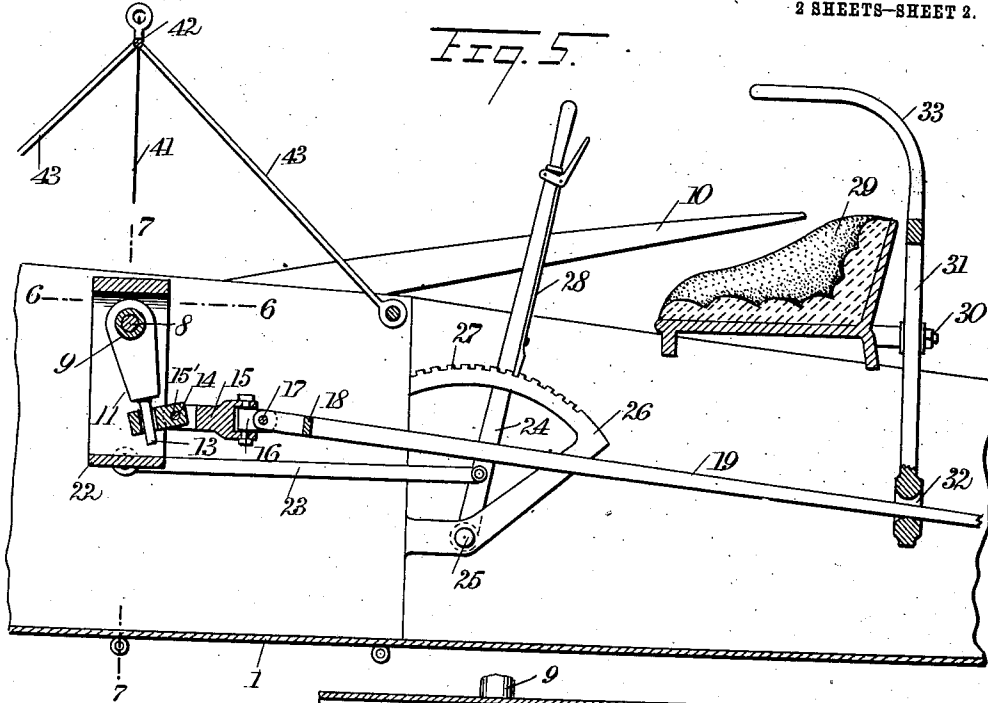


Fig. 6.

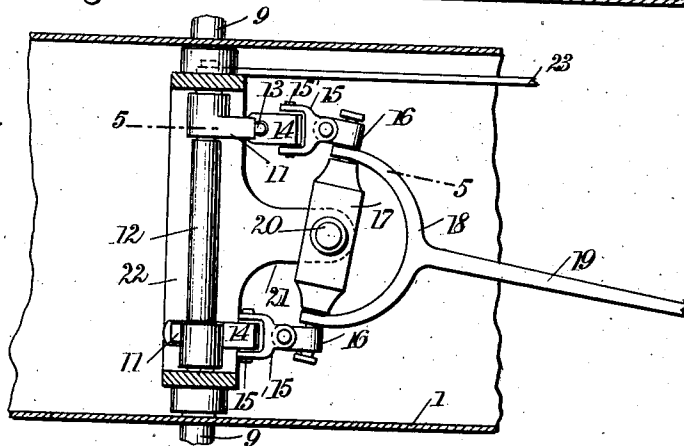
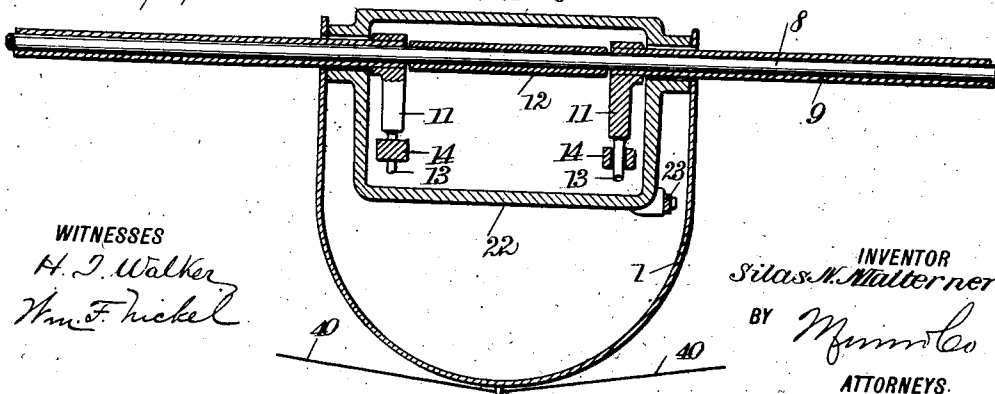


Fig. 7.



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SILAS N. MALTERNER, OF CANTON, NEW YORK.

AEROPLANE.

1,061,917.

Specification of Letters Patent.

Patented May 13, 1913.

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To all whom it may concern:

Be it known that I, SILAS N. MALTERNER, a citizen of the United States, and a resident of Canton, in the county of St. Lawrence and State of New York, have invented a new and Improved Aeroplane, of which the following is a full, clear, and exact description.

My invention relates to aeroplanes, and comprises improved means for adjusting the angles of the main planes or lifting planes together, in the same direction or in opposite directions, as required by the various conditions that arise in actual practice.

To this end it includes an improved arrangement of parts which will be fully described in the accompanying specification and pointed out in the claims appended thereto.

Reference is to be had to the accompanying drawings forming a part of this specification, in which the same characters of reference indicate the same parts in all the views.

Figure 1 is a side elevation of an aeroplane of improved type; Fig. 2 is a top plan thereof; Fig. 3 is a transverse vertical section through the structure of one of the supporting wings of the aeroplane, the section being taken on the line 3—3 of Fig. 4; Fig. 4 is a vertical longitudinal section of the wing structure taken on the line 4—4 of Fig. 3; Fig. 5 is a vertical longitudinal sectional view through the body of the framework of the car, taken on the line 5—5 of Fig. 6; Fig. 6 is a longitudinal horizontal sectional view on the line 6—6 of Fig. 5; and Fig. 7 is a transverse vertical sectional view on the line 7—7 of Fig. 5.

On the drawings I show an aeroplane which is illustrated as of the monoplane type, and it comprises a main frame 1, which is preferably formed of a single plate of wood or metal, this plate being of elongated shape and having a curved bottom and its longitudinal sides bent up as shown on Fig. 7. Rearwardly of this plate extends the tail frame 2, which terminates in a vertical rudder 3, and carries on each side of the same, just forward of the rudder 3, a pair of tail planes 4, which serve as balancing planes to keep the tail level with the front part of the machine. Forward of the body 1 is a transverse bar 5, in front of which is mounted to rotate the propeller 6, the same being re-

volvied by a shaft 7, which may be an extension of the crank shaft of the motor, or may be connected to the motor in any suitable way.

The sides of the body 1 forward of the middle portion thereof are perforated near the upper edges to receive a transverse spar 8, this spar 8 extending through the frame and projecting a considerable distance on each side thereof. The opposite halves of this spar are inclosed in sleeves 9, and the spar 8 with the sleeves 9 thereon forms supports for the main planes 10. As shown on Fig. 4, the spar 8 extends outward to the ends or tips of the wings 10, but the sleeves 9 terminate short of the wing tips and extend at their opposite ends through the sides of the body 1, terminating each in an arm 11, which is rigidly connected thereto. These arms 11 are separated from each other by a loose sleeve 12, mounted on the spar 8 between these arms; and each of the arms 11 terminates in a reduced projection 13, which fits in a transverse opening through a block 14 pivotally connected to a link 15, the latter having a yoke-shaped end receiving the block 14, this block being held in place in said end by means of a horizontal pivot pin 15'. The opposite ends of the links 15 are also yoke-shaped, the arms of the yokes lying in a vertical plane, as shown in Fig. 5, and receive the perforated ends of blocks 16, these blocks being connected to the links 15 to rotate around vertical pivot pins in the manner shown. The blocks 16 have horizontal perforations therethrough, these perforations receiving the outer ends of a horizontal bar 17, on which is pivotally mounted the yoked end 18 of a lever 19. The bar 17 is pivotally mounted on a bolt carried by a rearward extension 21 of a vertical yoke member 22, this vertical yoke member having bearings in its sides concentric with the openings through the sides of the body 1, through which pass the spar 8 and the sleeves 9, and this yoke is loosely mounted with respect to the sleeves 9, so as to swing freely around the same.

The lower end of the yoke 22 is connected to a link 23, which joins the same to an adjusting lever 24. This adjusting lever is pivoted at 25, adjacent the bottom of a curved rack 26 having teeth 27 at its upper surface, this rack being of course rigid with the frame of the machine. The lever 24

has a locking pawl or catch 28, to engage the teeth 27 and hold the lever 24 in any adjusted position.

The seat of the operator is indicated at 5 29, and is mounted in the body 1 adjacent the rear edges of the wings 10, and preferably on a level therewith. This seat has a journal 30 extending rearwardly thereof, on which is mounted a rocking lever 31 having 10 an aperture 32 at its lower end to receive the rear end of the lever 19 passing beneath said seat. The upper end of the lever 31 is yoke-shaped, as shown at 33, the arms of this yoke being horizontal, and one of them 15 being located on each side of the seat 29.

The construction of the wing is shown in particular on Figs. 3 and 4. Each wing is made up of a number of vertical plates 34 having a straight or concave lower edge and 20 a convex upper edge. These plates are rigidly secured to the sleeves 9, and between these vertical plates are secured sheets of light metal, as indicated at 35, these sheets being secured to the plates 34 along their 25 lateral edges, and being secured together at their front and rear edges so as to facilitate the passage of the wing plane edgewise through the air. The plates 35 are of the same shape over the length of the wing, except the outer plates, these outer plates being 30 secured along one edge to the outermost plate 34, and being secured together along their curved edges to form a round tip for the wing, as shown on Fig. 2.

Each of the wings 10 has an opening 36 in its outer end, this opening being made in one of the top sheets 35. The spar 8 near its outer ends carries a pair of collars 37, to which collars are connected an upper and a 40 lower eyelet 38. To the lower eyelet is fastened a number of stays 40, the other ends of these stays being secured to the bottom of the body 1; and the upper eyelet serves as an anchor point for a stay 41, which is 45 joined to the apex 42 of a framework consisting of a number of slanting diagonal bars 43, secured at their lower ends to the sides of the body. 43' are transverse bars joining the lower ends of the bars 43 to- 50 gether.

It will be seen that the top and bottom sheets 35 are connected along their side edges to the plates 34 within the edges of these plates 34. This allows the plates 34 55 to project from the wing at the top and bottom, and the plates 34 thus form keels for the main planes of the aeroplane which facilitate the guiding of the aeroplane when in flight, making it steadier.

Referring again to the yoke 22, it will be noted that this yoke is mounted loosely on the inner ends of the sleeves 9. The arms 11 are rigidly secured to the inner ends of these sleeves, and the bar 17 serves to anchor 65 the operating lever 19, by means of which

the arms 11 are operated, to this yoke 22. As a consequence, when the lever 19 is moved to the right or left, the arms 11 will be operated to adjust the planes in opposite 70 directions. At the same time, when the lever 24 is operated, the yoke 22 will be bodily moved through the link 23; and through the projection 21, the pivot-bolt 20 and the lever 17, the lever 19 will be moved 75 with the yoke without producing any relative movement of the lever 19 and the arms 11.

In operation, when the machine is in flight the aviator can adjust the wings 10 to increase or decrease the angle of the same to 80 the horizontal by manipulating the lever 24. Suppose, for example, the wings 10 to be lying in the same plane, with the lever 19 extending straight back along the longitudinal axis of the machine, if the aviator wishes 85 the machine to rise in the air he will push the lever 24 to the front. This will operate the yoke 22, rotating the same forward around the spar 8, and carrying the bar 17 and the lever 19 with it. This will push 90 forward the lower ends of both the arms 11, so as to tilt the front edges of the wings upward and produce the desired result. By pulling the bar 24 in the opposite direction the angle of inclination of the wings 10 can 95 be decreased instead of increased.

In order to adjust the wings in opposite directions, all the aviator has to do is to lean to the right or left in the seat to cause his 100 shoulder to push against one of the arms of the yoke 33. This adjustment can be made without changing the position of the lever 24. Suppose, for example, the wing at the left of the machine should sink and the one at the right should rise. In this case it 105 will be necessary to increase the angle of inclination of the wing at the left and decrease the angle of inclination of the wing at the right. The aviator therefore merely leans to the right, pushing over the lever 31. 110 This will swing the rear end of the lever 19 to the left, pulling back on the arm 11 at the right, and pushing forward on the arm 11 at the left. This will depress the front edge of the right wing and elevate the front edge 115 of the left wing, which will quickly bring the machine back to a level. The aviator therefore, when the machine tilts to one side or the other, merely leans away from the lower side to make the adjustment necessary 120 to restore equilibrium.

By constructing the body of the wings in the manner shown, a light but strong wing framework is obtained. The plates employed can be made of aluminum, copper or 125 other light metal; and since the body of each wing is hollow, the wings will have considerable buoyancy, and if the other parts of the machine are not too heavy these wings may even cause the whole structure 130

to float, should it ever drop into a body of water.

It will be seen by referring to Figs. 2 and 4 that the openings 36 in the top of the wings permit these wings to be adjusted around the spars 8 without interfering with the stays 40 and 41.

The usual wheels 44 and 45 are employed, being connected to the body of the framework of the aeroplane in any suitable way.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. An aeroplane comprising a main frame and a transverse shaft or spar supported in the sides of said frame and extending laterally therefrom, a sleeve surrounding said shaft and being rotatable thereon, a lifting plane forming a wing for the aeroplane, rigidly attached to said sleeve, an arm carried upon the end of said sleeve within the frame, a member pivotally mounted upon the inner end of said sleeve, and means for adjustably connecting said member and said arm, whereby said arm can be moved relatively to said member to adjust said wing, and whereby the member can be moved to adjust the wing without producing relative movement of said arm and member.

2. An aeroplane comprising a frame, a transverse shaft or spar mounted in said frame and extending laterally therefrom, a sleeve rotatably mounted on the said spar, a lifting plane forming a wing for the aeroplane, rigidly secured to the sleeve, the inner end of said sleeve extending within the frame, a rock arm rigidly secured to the inner end of said sleeve, a member loosely journaled upon the inner end of said sleeve and having adjustable connection with said arm, said member having relative movement around said sleeve as an axis, means for actuating said arm, and separate means for actuating said member, whereby the angle of inclination of the wing can be adjusted by operating the arm alone, and, whereby the angle of inclination of the wing can be adjusted by operating the member without producing relative movement of said arm and member.

3. An aeroplane comprising a main frame, a transverse shaft or spar carried by said frame and extending laterally therefrom, sleeves rotatably mounted upon the said spar and extending within the frame, lifting planes rigidly secured to said sleeves to rotate therewith, said planes forming the wings for the aeroplane, arms secured to the inner ends of said sleeves, a yoke-shaped member loosely mounted upon the inner ends of said sleeves and between the said arms and the sides of the frame, a lever for actuating said yoke, a yoke-shaped lever pivotally connected to a transverse bar for actuating said arms, the ends of said transverse

bar having linked connection with the lower ends of said arms, whereby, when the lever is moved to the right or left, the wings of the aeroplane can be adjusted in opposite directions, said transverse bar being pivotally mounted on a projection extending from the bottom of said yoke, whereby the movement of said yoke will adjust the wings without producing movement of the said arms relative to said yoke, and a lever mounted on the rear of the aviator's seat to be swung to one side or the other, the lower end of said lever having an opening there-through to receive the end of the yoke-shaped lever, said lever pivoted on the aviator's seat having a yoke-shaped upper end, the arms of which are arranged at both sides of the aviator's seat, whereby the aviator may lean to one side or the other to actuate said lever and the yoke-shaped lever to adjust the said wings.

4. An aeroplane comprising a main frame having a transverse shaft or spar extending laterally therefrom, a lifting plane forming a wing for the aeroplane, adjustably supported by said spar, an arm secured to said wing, and a pivoted member adjustably connected to said arm, said member being mounted concentric with said wing, whereby when said arm is moved with respect to said pivotally-mounted member the wing will be adjusted, and whereby when the pivotally-mounted member is moved the wing will be adjusted through the connection of said member with said arm, without relative movement of said arm or member.

5. An aeroplane comprising a frame having a transverse shaft or spar supported thereby and extending laterally therefrom, a rotatable sleeve carried by said shaft, a lifting plane forming a wing for the aeroplane rigidly attached to the sleeve, an arm carried upon the end of said sleeve, a pivotally-mounted member adjustably connected to said arm, and means for moving said arm and said member independently of each other, whereby when the arm is moved the wing will be adjusted, and whereby when the member is moved the wing will be also adjusted through the adjustable connection of said member with said arm, without producing relative movement of said member and arm.

6. An aeroplane comprising a frame or body, a transverse shaft or spar carried by said frame and extending laterally therefrom at both sides of said frame, lifting planes forming wings for the aeroplane rotatably supported by said spar, arms secured to each of said wings to adjust the same around said spar as an axis, a pivotally-mounted member carried by said frame and adjustably connected to said arms, means for moving said arms, and means for moving said member, whereby the arms can be

operated to adjust the same in opposite directions, and whereby the pivotally-mounted member can be moved to adjust the wings in the same direction through its connection with the said arms, without producing relative movement of said member and said arms.

7. An aeroplane comprising a frame, a transverse shaft or spar mounted in said frame and extending laterally from both sides thereof, rotatable sleeves carried by said spar at each side of said frame, lifting planes forming wings for the aeroplane, secured to the sleeves, arms secured to each of said sleeves to adjust said planes, pivotally-mounted means carried by said frame and having adjustable connection with each of said arms, means for moving said arms in opposite directions to adjust said planes, and means for moving said pivotally-mounted means to adjust said wings through the adjustable connection of said means with said arms, and without producing relative movement of said means and said arms.

8. An aeroplane comprising a main frame, a transverse shaft or spar carried by said frame and extending laterally therefrom, sleeves rotatably mounted upon said spar and extending within the frame, lifting planes rigidly secured to said sleeves and rotatable therewith, said planes forming the wings of the aeroplane, arms secured to the inner ends of the sleeves, a yoke-shaped member loosely mounted upon the inner ends of the sleeves and between said arms and the sides of the frame, a lever for actuating said yoke-shaped member, a transverse bar pivotally carried by said yoke-shaped member, means for providing link connection between the ends of said bar and the said arms, and a lever connected to said bar, whereby the movement of said yoke-shaped member will adjust the wings without producing movement of said arms relative to said yoke-shaped member, and whereby when the lever connected to the bar is moved to the right or left, the wings can be adjusted in opposite directions by means of said arms.

9. An aeroplane comprising a main frame, a transverse shaft or spar carried by said frame and extending laterally therefrom, sleeves rotatably mounted upon said spar and extending within the frame, lifting planes rigidly secured to said sleeves and rotatable therewith, said planes forming the wings of the aeroplane, arms secured to the inner ends of the sleeves, a yoke-shaped member loosely mounted upon the inner ends of the sleeves and between said arms and the sides of the frame, a lever for actuating said yoke-shaped member, a transverse bar pivotally carried by said yoke-shaped member, means for providing link connection between the ends of said bar and the said

arms, a lever connected to said bar, whereby the movement of said yoke-shaped member will adjust the wings without producing movement of said arms relative to said yoke-shaped member, and whereby when the lever connected to the bar is moved to the right or left the wings can be adjusted in the opposite direction by means of said arms, a movable member adjacent the seat for the aviator mounted on said aeroplane, and means for connecting said last-named lever to said member to enable the same to be actuated.

10. An aeroplane comprising a frame or body, a lifting plane forming a wing for the aeroplane connected to the said frame or body, and rotatable about an axis, a member mounted on said axis and freely movable thereon, a second member pivoted on the first member and movable relative thereto, connections between the said second member and the wing, and actuating means for said members, whereby the second member can be moved relative to the first member to adjust the wing, and whereby said first member can be moved to adjust the wing without relative movement of said first member and said second member.

11. In an aeroplane, a wing consisting of sections, said sections including vertical longitudinally-arranged plates, and top and bottom sheets secured together at their front and rear edges and to said vertical plates along their sides within the edges of said vertical plates, said vertical plates thus projecting above and below the body of the wing and forming keels thereon.

12. In an aeroplane, a wing comprising top and bottom sheets spaced from each other, a sleeve to which said sheets are secured, a spar on which said sleeve is rotatably mounted, said sheets having openings therein above and below the spar, and means carried by the spar and projecting through the openings to enable stays to be secured to the spar, said openings permitting the body of the wing to rotate on said spar without interfering with the stays.

13. An aeroplane comprising a main frame, a wing supported by said main frame and mounted to be adjustable around an axis, an arm secured to said wing, a pivoted member mounted concentric with said wing, a second member pivoted to the pivotally mounted member, and connections between the said second member and the arm, whereby when said second member is moved with respect to said pivotally-mounted member the arm will be moved and the wing will be adjusted, and whereby when the pivotally mounted member is moved the wing will be adjusted through the connection of said member with said arm, without relative movement of said arm and member.

14. An aeroplane, comprising a main

frame, a wing supported by said main
frame and mounted to be adjustable around
an axis, arms secured to said wing, a yoke
shaped member mounted on said axis and
5 freely movable thereon, the said yoke shaped
member having a rearward extension, a
transverse member pivoted on the rearward
extension of said yoke shaped member, con-
nections between the ends of said transverse
10 member and the said arms, means for actu-

ating the yoke shaped member, and means
for actuating the said transverse member.

In testimony whereof I have signed my
name to this specification in the presence of
two subscribing witnesses.

SILAS N. MALTERNER.

Witnesses:

GENEVIEVE BANTA,
GEORGE A. ADAMS.