W. S. & A. H. BARROWS.

AEROPLANE.

APPLICATION FILED SEPT. 12, 1910.

1,124,584.

Patented Jan. 12, 1915.

2 SHEETS—SHEET 1.

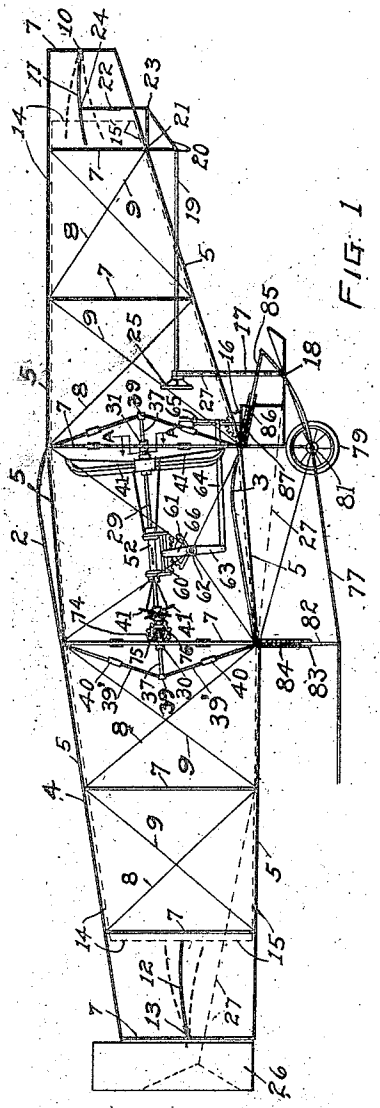

FIG. 1

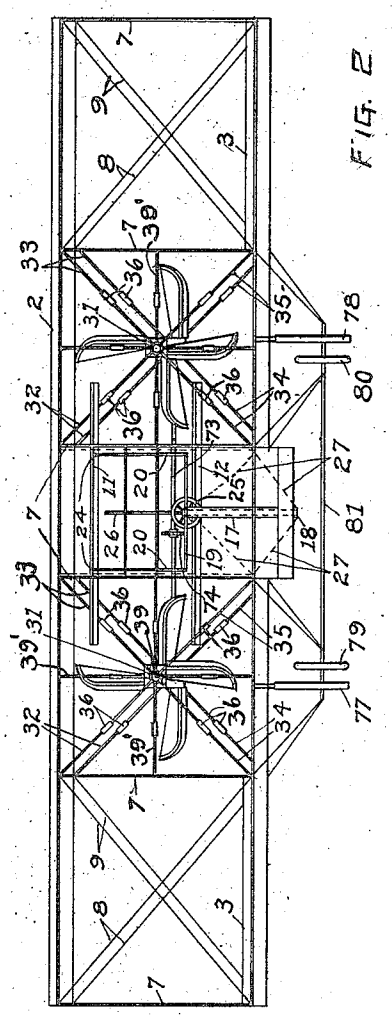

FIG. 2

WITNESSES:

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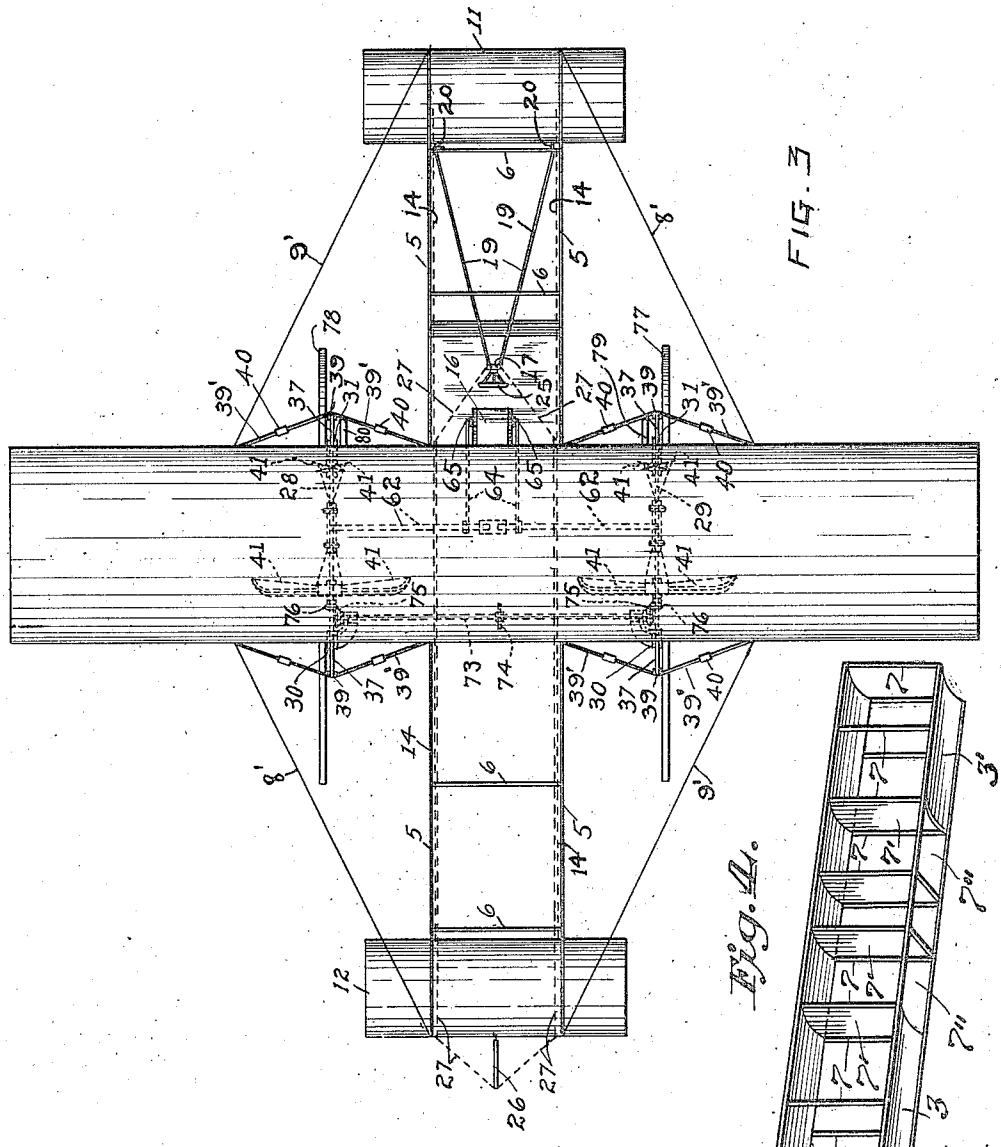

FIG. 3

Fig. 4.

WITNESSES:

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UNITED STATES PATENT OFFICE.

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AEROPLANE.

1,124,584. Specification of Letters Patent. Patented Jan. 12, 1915.

Application filed September 12, 1910. Serial No. 581,652.

To all whom it may concern:

Be it known that we, WILBER S. BARROWS and ASAHEL H. BARROWS, citizens of the United States, residing at Chicago, Cook county, Illinois, and Long Island City, Queens county, New York, respectively, have invented certain new and useful Improvements in Aeroplanes, of which the following is a specification.

Our invention relates to air navigation, and has particular reference to so called aeroplanes.

The object of the invention is to provide improvements that will effect improved stability, a stronger construction with comparatively light weight, and to generally improve the power of the machine to maintain and propel itself in the air.

With this object in view our invention consists in the novel construction, combination and arrangement of parts hereinafter described in detail, illustrated in the accompanying drawings, and incorporated in the appended claims.

In the drawing Figure 1 is an elevation, partly in section, of an aeroplane embodying our invention. Fig. 2 is a front view thereof. Fig. 3 is a top plan view, the dotted lines indicating a part of the mechanism installed between the main planes. Fig. 4 is a perspective view of the planes 2, 3 and 3′, the vertical tubings connecting said planes, and the canvas walls between the upper planes and the inner ends of the lower planes, drawn on a reduced scale.

Referring in detail to the several views, which show a substantially complete machine, though only the parts thereof herein claimed form the subject of the present invention, 2 represents the upper and 3, 3′ the lower of the main planes, concaved upwardly at their forward edges in the usual manner. The frame 4 of the machine consists of light tubing 5 which extends from end to end, while 6 represents transverse tubings between the tubings 5, and 7, represents vertical tubings. The lower planes 3 and 3′ are spaced apart to leave openings below the propellers indicated as 7″, 7″ in Fig. 4. Downward air pressure, produced by the propellers will thus be caused to act against the air below the lower plane sections 3 and 3′, and in order to intensify the upward pressure of propeller air currents against the upper plane 2 canvas walls 7′ are placed at the sides of each propeller.

The spaces occupied by the propellers are indicated substantially at 7″ in Fig. 4, and in Fig. 2 the tubes 7 between which the propellers are shown represent substantially the ends of the walls 7′. The tubings of the frame are braced or supported by diagonal truss-rods or wires 8 and 9, as shown in Figs. 1 and 2. The main planes 2, 3 and 3′ are supported relative to each other in a horizontal plane, by wires or rods 8′ and 9′. To the forward end of the frame as at 10 is pivoted a vertical steering plane, or elevator, 11 and a similar elevator 12 is pivoted at 13 to the rear end of the frame. These elevators are connected to move together with different degrees of angular movement, by means of cords or connections 14 and 15 which run to the steering wheel, but these features form no part of the invention claimed herein. The operator's seat is indicated at 16 and the operating lever at 17, fulcrumed at 18. To the upper end of the lever 17 are pivoted the rear ends of rods 19 which extend divergently from said lever, as shown in Fig. 3, to a pair of forward triangular tubing levers 20, a side view of one of which is shown in Fig. 1. Two such levers are provided to better control and support the forward elevator 11.

21 represents the pivot of each lever 20. Each of these levers is connected with the forward plane 11 by means of a vertical rod 22, pivoted to the lever at 23 and to the elevator 11 at 24, as shown in Fig. 1. On the upper end of the lever is the usual steering wheel 25, by means of which the rudder 26 is controlled through a flexible connection 27 wound on the hub of the wheel. The ends of this winding run from the wheel to both sides of the frame and thence to opposite sides of the rudder by way of the fulcrum of the lever and the sides of the frame as indicated in Fig. 3.

Between the planes two propeller shafts 28 and 29 are arranged, each carrying, or having keyed to its respective ends, two propellers 41. The mountings of both propeller shafts are the same, and referring, therefore, to shaft 29 shown in Fig. 1, its ends are mounted in bearings 30 and 31. Each of these bearings are truss-supported on rods

32, 33, 34 and 35 which extend diagonally from the upper part at one side to the lower part at the other side of the frame, as indicated in Fig. 2. Each rod consists of two sections coupled together by a turnbuckle 36 which permits variation in the lengths of said rods and the adjustment of the positions of the bearings supported by the truss-rods carrying the propeller shafts.

As shown in Fig. 1, the shaft is slightly tilted upwardly and forwardly, which causes the propeller to exert an upward lift as well as a forward propulsion. Each of the shaft-bearings is held against the end of the shaft by means of a rod 37 seated in a socket of the bearing. The opposite end of the rod is truss-supported on the frame in substantially the same manner as the shaft-bearings 30 and 31, a bearing-cap 39 39 engaging the end of the rod 37 and being itself supported by truss-rods 39′ each consisting of sections coupled together and longitudinally adjusted by means of turn-buckles 40. The rods 39′, as shown in Fig. 1, are inclined to tend to draw the caps toward each other, or against the ends of the shaft.

The propeller blades are swiveled in their hubs so that their pitch may be varied, but this feature forms a part of a separate invention not claimed herein. Figs. 1 and 3 show a mechanism for moving the blades, or adjusting their pitch, on their individual axes, as consisting of a sleeve 52 mounted on the shaft and movable longitudinally thereon. The sleeve 52 is caused to rotate with the shaft by being splined to it as by means of a pin or key in the shaft engaging a slot in the sleeve in the usual manner. The ends of the sleeve are connected with edges of the respective propeller blades by means of short rods, the details of which are immaterial to the matter claimed herein. The method of moving the sleeve to turn the blades is shown in a general way in Fig. 1 as consisting of a toothed rack 60 suspended on the sleeve, said rack being moved by a gear-segment 61 keyed to one end of a shaft 62 having secured thereto a lever 63 connected by a rod 64 with a lever 65 at each side of the operator's seat. The gear segment 61 is held in engagement with the rack 60 by means of a link 66 pivoted on the shaft 62 and connected with a suitable part on the sleeve 52. The propeller shafts are, as shown in Fig. 3, driven by a transverse shaft 73 provided with a sprocket wheel 74 that is driven from any suitable source of power, bevel-gears 75 and 76 forming the driving connections between the shaft 73 and the propeller shafts 28 and 29.

Provision is made for utilizing the supporting runners for the body of the plane, as means for assisting the aeroplane to rise from the ground. The runners 77 and 78 have the usual wheels 79 and 80 and said runners are pivoted on a shaft 81 which carries the wheels. Each runner has pivoted thereto a rod 82 which telescopes into a tube 83 within which is a buffer spring 84 that is interposed between the upper end of the rod and the bottom of the tube at the upper end thereof. A rod 85, tube 86, and spring 87 similar to the preceding, but arranged at an incline, are interposed between the forward tip of each runner and the frame. In this instance the spring is tensioned to exert a pulling force upon the rod instead of, as in the case of the spring 84, serving as a buffer. By this arrangement the rear ends or heels of the runners are caused to exert an upward pressure assisting the aeroplane to rise, and when it alights these springs and rods serve as shock absorbers. It will be noticed that in the vertical plane occupied by the propellers the machine is like a monoplane while outside of the propellers, or laterally of them, the machine is a biplane, the lower plane of the latter being in two sections to prevent reaction against the air currents downwardly produced by the motion of the propellers. The balancing of the plane is also improved by having a larger spread of plane above the weight of engine and propellers.

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

1. In an aeroplane, the combination with a single upper plane below which said propellers are arranged, a plurality of separated lower single planes arranged underneath said upper plane, and a propelling mechanism arranged underneath said upper plane in an open space passing between said lower planes.

2. In an aeroplane, the combination with the upper plane, of spaced apart lower planes underneath said upper plane and propellers and driving-mechanism arranged in a space passing between said lower planes, said propellers positioned to throw air currents they create against the upper plane and not against the lower planes.

3. In an aeroplane, the combination with a single spread of upper plane, of single spreads of lower planes spaced apart in a horizontal plane, propellers and driving-mechanism arranged in an open space passing between said lower planes, and means for elevating and lowering both the forward and the rear end of said aeroplane simultaneously.

4. In an aeroplane, the combination with an upper plane, of lower planes, vertical walls connecting said upper and lower planes at the adjacent ends of the latter, propellers and driving mechanism therefor over the open space between said lower planes, and means for guiding said aeroplane.

5. In an aeroplane, the combination with an upper plane, of a pair of lower planes having an open space between their adjacent ends, vertical walls connecting said adjacent ends with the upper plane, propellers and driving-mechanism inclosed above and on two sides by said upper plane and walls, and diagonal truss-rods supporting said propellers on said planes.

6. In an aeroplane, the combination with an upper plane extending substantially the full maximum width of the machine, of a pair of lower planes arranged on the same level below said upper plane, said lower planes being spaced apart between their adjacent ends, a propeller and driving mechanism arranged in the vertical plane passing between said lower planes, diagonal truss-rods supporting the shaft for said propeller, and means for varying the lengths of said truss-rods.

7. The combination with the frame of an aeroplane, of upper and lower planes and a propeller-shaft, rectangular vertical frames and diagonal adjustable truss-rods supporting adjustably the bearings for said shaft.

In witness whereof I, W. S. Barrows, have hereunto set my hand in the presence of two subscribing witnesses.

WILBER S. BARROWS.

Witnesses:
G. T. Kessler,
Mae C. Allen.

In testimony whereof I, A. H. Barrows, have hereunto set my hand in the presence of two subscribing witnesses.

ASAHEL H. BARROWS.

Witnesses:
R. T. Fleming,
Theo. F. Lange.