

Jan. 5, 1926.

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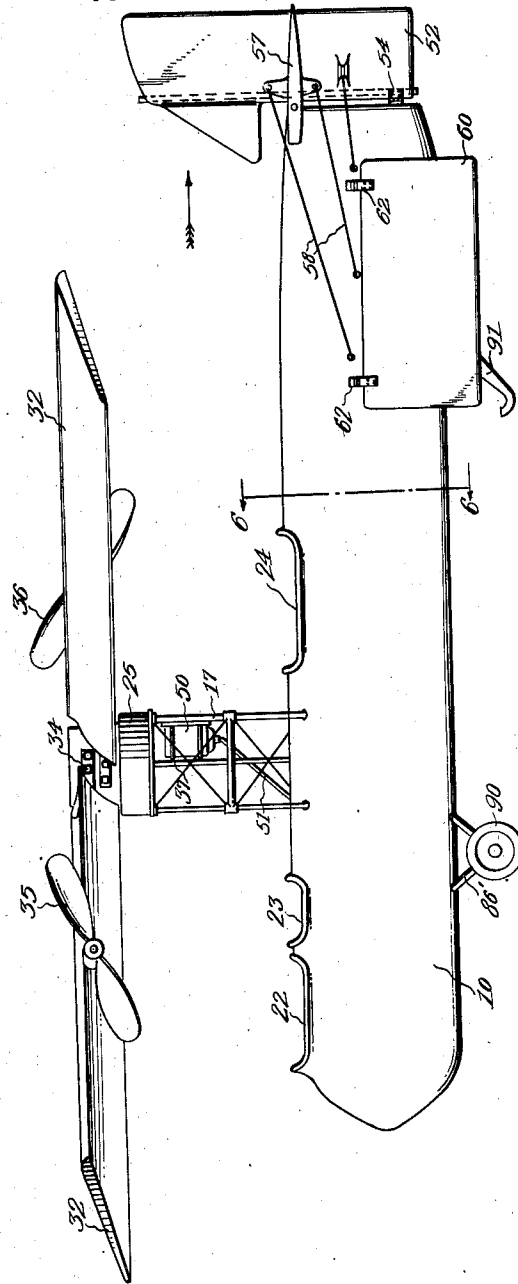
L. ORTEGO

HELICOPTER

Filed Feb. 16, 1925

4 Sheets-Sheet 1

Fig. 1.



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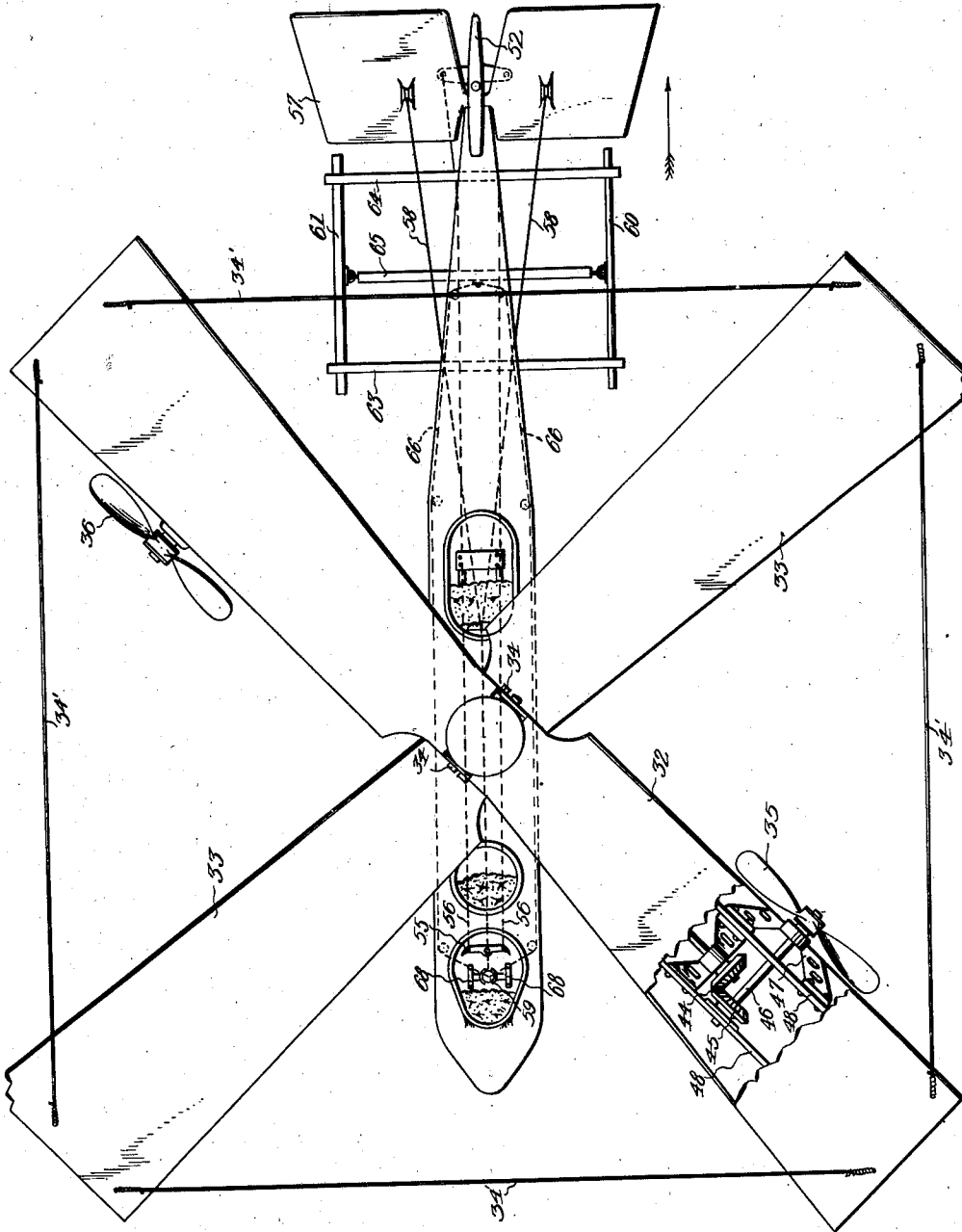


Fig. 2.

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Fig 3

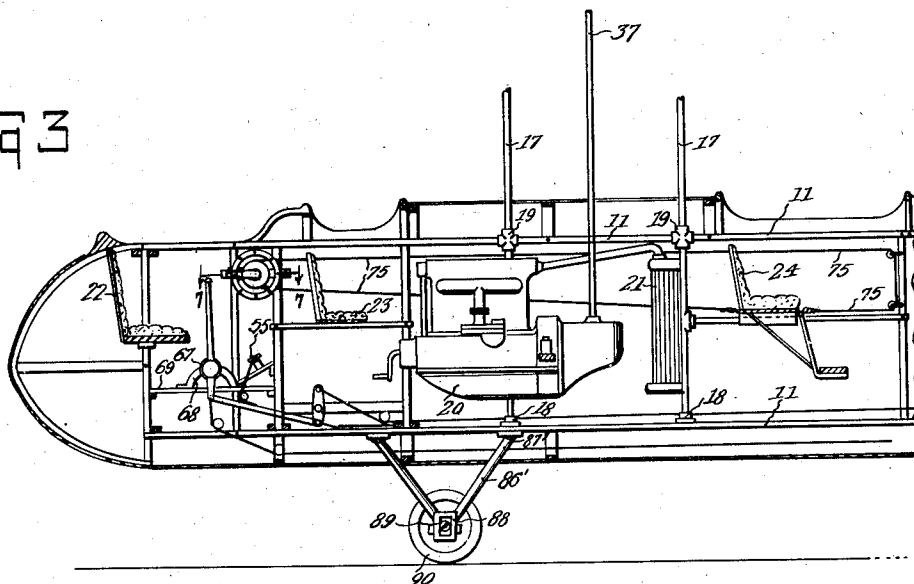
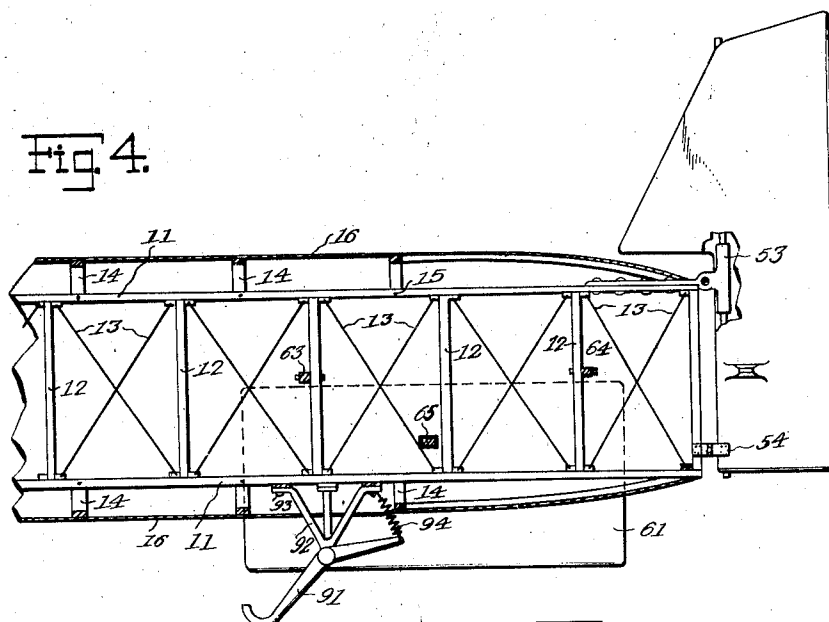


Fig 4



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Fig. 5.

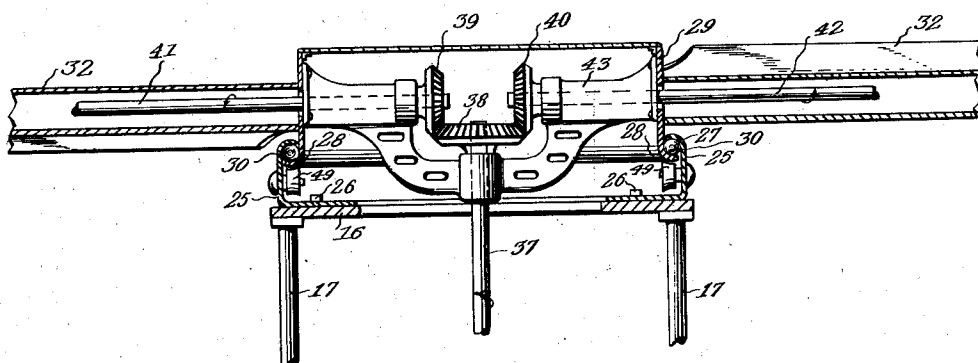


Fig. 6.

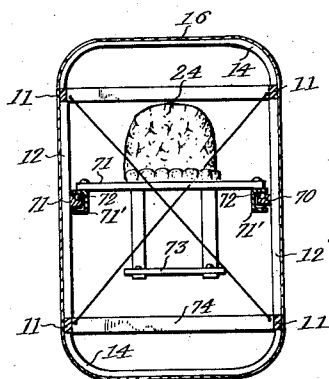
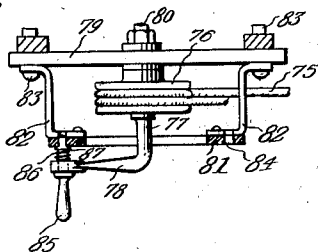


Fig. 7.



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UNITED STATES PATENT OFFICE.

LEO ORTEGO, OF ALEXANDRIA, LOUISIANA.

HELICOPTER.

Application filed February 16, 1925. Serial No. 9,524.

To all whom it may concern:

Be it known that I, LEO ORTEGO, a citizen of the United States, residing at Alexandria, in the parish of Rapides and State of Louisiana, have invented new and useful Improvements in Helicopters, of which the following is a specification.

This invention relates to flying machines and especially to improvements in helicopters.

One of the objects of the invention is to provide a simple and efficient means for sustaining and controlling the flight of an aeroplane.

A further object consists in providing a helicopter with longitudinally movable and adjustable means whereby the vertical thrust of the propellers may be utilized for moving the machine forwardly or rearwardly.

Another purpose of the invention comprehends the positioning of the stabilizing and guiding rudders at the front of the machine and the pilot's seat adjacent the rear thereof. Additionally suitable means are connected to the sides of the fuselage for preventing the same from rotating with the main wings when the machine is in flight.

Referring to the drawings wherein is set forth an embodiment of the invention:

Figure 1 is a side elevational view of the helicopter.

Figure 2 is a plan view of Figure 1 with parts in section.

Figure 3 is a longitudinal sectional view of the rear portion of the machine.

Figure 4 is a longitudinal sectional view of the front portion of the machine.

Figure 5 is an enlarged sectional detailed view of the driving means for rotating the aerofoils.

Figure 6 is a sectional view taken substantially along the lines 6—6 of Figure 1.

Figure 7 is an enlarged sectional view taken substantially along the lines 7—7 of Figure 3.

Referring to the drawings in which like numerals indicate like parts in the several views, 10 denotes the body or fuselage of a flying machine, preferably of stream-line shape. The body 10 is composed of spaced longérons 11 connected together by the vertical struts 12 and the guy wires 13 as shown in Figure 4. The longérons 11 are attached to the transverse spars 14 in any

suitable manner, such as by the bolts 15, while the spars are covered with a suitable waterproof fabric 16.

A frame support or tower 17 of any suitable light metal or wood projects upwardly from the fuselage at a point adjacent the center of gravity of the machine, and is secured to the sockets 18 and brackets 19 carried by the longérons 11 as shown in Figure 3. A motor 20 of any suitable type and a radiator 21 are mounted in the fuselage near the center of balance of the machine. The fuselage is further provided with a cockpit or pilot's seat 22 and a passenger seat 23, preferably positioned to the rear of the engine, and a longitudinally movable passenger's seat 24 arranged in advance of the engine so as to equally distribute the weight of the machine.

A ring 25, made of any suitable light metal, is secured to the frame support 16 by the bolts 26, and has its upper end curved inwardly and downwardly as at 27 to form with a complementary curved portion 28 of the turret 29, a raceway for the ball bearings 30, thus permitting the turret to be freely rotatable about the ring 25. The aerofoils preferably comprise two pair of main wings 32 and 33 positioned substantially at right angles to each other. The wings or blades are preferably of cantilever construction, and are detachably connected to the turret 29 by the bolts 34. Stay wires 34', connected to each of the blades, tend to maintain the latter in proper position when the machine is in flight.

A vertical shaft 37, which extends through the support 17, is geared at its lower end to the engine 20, and has a bevel gear 38 at its opposite end in mesh with correspondingly formed gears 39 and 40 carried by the shafts 41 and 42, which shafts are connected to the propellers 35 and 36, respectively. The shafts are suitably supported in the turret 29 by a bracket 43 preferably made of light metal such as aluminum. The outer extremities of the shafts 41 and 42 terminate in beveled gears 44, which mesh with correspondingly formed gears 45 carried by each of the propeller shafts 46. It will be observed that as the drive shaft 37 rotates in the direction of the arrow, as indicated in Figure 5, the propeller shafts 41 and 42 will rotate in opposite directions, thus caus-

ing one of the propellers to impart a pushing action to the wings and the other propeller to impart a pulling force thereto.

While one of the propeller shafts revolves in a clockwise direction, and the other in an anti-clockwise direction, they both exert a pulling action on the leading edges of the wings so as to prevent the machine from skidding to one side. Suitable supporting brackets 47, connected to the wing spars 48, as shown in Figure 2, act as journals for the shafts 41 and 46. The brackets 47 are preferably provided with ball bearings so as to reduce to a minimum the vibration of the shafts when the machine is in motion.

The wings 32 and 33 are of such a size as to cover over 300 square feet of lifting surface, and are so cambered that the angle of incidence will be such as to normally cause the machine to ascend vertically upward when the wings are rotated. Furthermore, the surface of the wings are arranged so as to supply the necessary sustaining force for maintaining the machine buoyed in the air either when the wings are rotating or the machine is gliding.

When the machine is at rest, the turret 29 engages the rollers 49, carried by the ring 25. It will be observed that these rollers are sufficiently spaced from the curved portion 28 of the turret to permit the latter to ascend and engage the ball bearings 30 when the blades are rotated. A fuel tank 50, carried by the frame support 17, communicates with the engine through a supply pipe 51.

The helicopter is steered laterally by a vertical rudder 52 movably connected to the forward end or nose of the ship by a bracket 53 and a hinge 54 as shown in Figure 4. A foot lever 55, pivoted to the bottom of the pilot's cockpit, is operatively connected to the vertical rudder 52 by any suitable means such as the cables 56, shown in Figure 2. Horizontal rudders or elevators 57 positioned on each side of the vertical rudder 52 are connected by the cables 58 to the hand control 59, and tend to stabilize or balance the ship once the desired height is reached. This rudder also may be used to vary the speed of the machine by changing the angle of incidence of the aerofoils 32 and 33, thus causing the ship to travel either slower or faster as may be desired.

In order to prevent the fuselage 10 from rotating with the wings when the ship is in flight, there is preferably provided side rudders 60 and 61 which are movably connected as at 62 (Figure 1) to transverse struts 63 and 64, which struts are fixedly secured to the fuselage. Additionally, a movable strut 65 is loosely connected to the rudders 61 and 62 so as to maintain them in proper spaced relation with respect to each other. The rudders 61 and 62 are arranged to be swung

about a horizontal axis by means of the cables 66, which are connected to the hand control or lever 59 universally mounted in the pilot's cockpit.

The lever 59 is formed adjacent its lower end with an annular portion 67 arranged to fit in a correspondingly formed socket in the bracket 68, attached to the floor board 69, as shown in Figure 3. Manifestly, when the lever 59 is moved longitudinally it will cause the horizontal rudder 57 to be swung about its axis, but will not materially affect the side rudders 60 and 61. On the other hand, when the lever 59 is moved laterally, it will swing the cables 66 in the same direction, which in turn will actuate the side rudders 60 and 61.

The passenger seat 24 is arranged to be longitudinally slidable in the fuselage so as to change the axis of the machine and vary the angle of incidence of the main planes. Accordingly, the seat 24 is movably connected to side rails 70 by means of a transverse bar 71 which bar has attached thereto a depending bracket 71', arranged to frictionally engage the ball bearings 72, carried by the upper surface of the side rails 70. A foot rest 73, attached to the seat 24, is positioned a sufficient distance from the floor 74 to permit the seat 24 to be moved without danger of the passenger's feet engaging the floor. The seat 24 is connected preferably by a cable 75 to a rotatable drum 76 keyed to a horizontal portion 77 of the operating arm 78, which arm is journaled to the strut 79 by the bolts 80 in the manner as shown in Figure 7. A ring 81, secured to the strut 79 by the brackets 82 and bolts 83, has a series of annularly spaced openings 84 arranged to receive the inner end of a movable plunger handle 85 carried by the arm 78. A spring 86, confined between a lug 87 and the adjacent wall of the arm 78 tends to normally force the handle 85 inwardly into engagement with one of the holes 84. It will be seen that by reason of this construction, the seat 24 may be moved either fore or aft by rotating the handle 85, and may be maintained in any desired fixed position by means of the locking engagement of the handle 85 with the openings 84 in the ring 81. When the seat 24 is not occupied by a passenger any suitable weighted means may be carried by it, such as a sand bag or the like.

The running gear structure comprises a pair of substantially V-shaped brackets 86' connected by the bolts 87' to the underside of the fuselage adjacent the rear end thereof. Each of the brackets 86' is formed with a bearing 88 in which is journaled an axle 89 which carries the wheels 90. A skid or bumper 91 is pivoted to a bracket 92, which bracket is secured to the underside of the forward portion of the fuselage by the bolts 93. The skid 91 is

maintained in yieldable contact with the ground, preferably by a spring 94 connected to one end thereof and the fuselage, so as to reduce the jarring of the machine when it is being landed.

The operation of the helicopter is as follows:

Assuming the ship to be on the ground, the turret 29 will rest against the rollers 49 carried by the ring 25. Upon the engine being started the propellers 35 and 36 are driven through the instrumentality of the vertical shaft 37, geared to the horizontal shafts 41 and 42. The rotation of the propellers 35 and 36 imparts a push and pull action on the wings 32 and 33, which causes the turret at first to rise from its engagement with the rollers 49 and contact with the ball bearings 30, and then to freely rotate about the ring 25. It will be observed that the propellers 35 and 36 are positioned closer to the outer edges of the wings 32 than they are to the turret or wing tower 25, so that the blast from the propellers will strike the side vertical rudders 60 and 61 and thus cause the machine to easily ascend from the ground. As the main planes revolve on their axis, the air is forced directly downward, causing the machine to ascend. The necessary sustentation which buoys the plane in the air being supplied by the wide lifting surface of the aerofoils 32 and 33. The fuselage 10 is maintained stationary relative to the main planes during the flight of the ship by means of the side vertical rudders 60 and 61, which rudders may be adjusted by moving the control lever 59 either to the right or left as may be desired. The lateral stability of the ship is controlled by the operation of the horizontal rudders 57 which tend to balance the machine once the desired height is attained. These horizontal rudders may also be utilized to raise or lower the axis of the fuselage which in turn changes the angle of incidence of the main wings causing the ship to travel at a faster or lower speed. When the machine has attained the desired altitude, it may be propelled forward by the pilot moving the passenger seat 24 towards the nose of the ship which lowers the forward end of the fuselage and changes the angle of incidence of the main wings. Upon the seat 24 being returned to its normal position, the machine will again tend to ascend, while on the other hand, should it ever be desired that the machine be moved backward, it can be effected by moving the seat 24 rearwardly so as to lower the tail of the ship, which in turn would incline the main wings 32 and 33 and cause the machine to be moved to the rear.

While the main wings or aerofoils 32 and 33 are shown of cantilever construction, it

is obvious that these wings may be additionally supported by any suitable form or rigid bracing extending from the turret 29 and connected to the outer ends of the wings.

It is to be understood that the form of the invention herewith shown and described is merely illustrative, and in no sense restrictive, and such changes and modifications as fall within the purview of one skilled in the art may be made without departing from the spirit of the invention and the scope of the appended claims.

I claim:

1. A flying machine of the class described comprising a fuselage having a pilot's seat in the rear thereof, a supporting frame extending upwardly from the fuselage, removable wings journaled to the support, propellers carried by said wings, means for driving said propellers, a vertical rudder at the forward end of the fuselage for controlling the lateral stability of the machine, a member longitudinally movable in said fuselage for varying the pitch of the machine, and vertical side rudders adjacent the forward end of the fuselage for maintaining the latter stationary relative to the wings when the machine is in flight.

2. A flying machine of the class described comprising a fuselage having a frame support extending upwardly therefrom, a pilot's seat positioned to the rear of said support and a passenger's seat in front thereof, rotatable wings journaled to said support, driving propellers carried by said wings, a vertical rudder connected to the front of the fuselage for controlling the lateral stability of the machine, horizontal rudders adjacent said vertical rudders for balancing the machine, vertical side rudders connected to the fuselage for preventing the latter from rotating with the wings, means movable longitudinally in the passenger's seat for varying the pitch of the machine, and means in the pilot's seat connected to said rudders for selectively operating the same.

3. A flying machine of the class described comprising a fuselage having a frame support extending upwardly therefrom, an engine mounted in the fuselage, revoluble wings journaled to said support, driving propellers carried by the wings and operatively connected to said engine, said fuselage having a pilot's seat in the rear thereof and stabilizing rudders connected to its forward end, a longitudinally movable passenger seat in the fuselage in front of the support for varying the pitch of the machine, rudders connected to the sides of the fuselage for preventing the latter from rotating with the wings when the machine is in flight, controlled means near the pilot's seat operatively connected to the rudders,

and controlled means for the passenger seat for selectively operating the same.

4. A flying machine of the class described comprising a fuselage having a support extending upwardly therefrom, an engine mounted in the fuselage, two pair of opposed cambered wings revolubly mounted on said support, one pair of said wings having a pushing propeller connected to the leading edge of one wing, and a pulling propeller connected to the leading edge of the other wing, means operatively connecting said engine with said propellers for rotating said wings, means maintaining the fuselage stationary relative to the wings during the flight of the machine, means at the forward end of the fuselage for stabilizing the machine, and means longitudinally movable in the fuselage for varying the pitch of the machine.

5. A flying machine of the class described comprising a fuselage having a frame support extending upwardly therefrom, a ring secured to the upper end of the support, a revoluble turret movably connected to said ring, aerofoils secured to said turret, propellers attached to the leading edges of the aerofoils, an engine mounted in said fuselage, means operatively connecting the engine to said propeller for rotating the aerofoils, a pilot's seat in the rear of the fuselage, stabilizing rudders connected to the forward end of the fuselage, and means movably connected to the sides of the fuselage for preventing the same from rotating with the aerofoils.

6. A flying machine of the class described comprising a fuselage having a frame support extending upwardly therefrom, a ring secured to the upper end of the support, a revoluble turret movably connected to said ring, aerofoils secured to said turret, propellers attached to the leading edges of the aerofoils, an engine mounted in said fuselage, means operatively connecting the engine to said propeller for rotating the aerofoils, a pilot's seat in the rear of the fuselage, stabilizing rudders connected to the forward end of the fuselage, means movably connected to the sides of the fuselage for preventing the same from rotating with the aerofoils, and a seat longitudinally slidable in the fuselage for varying the angle of incidence of the machine.

7. A flying machine of the class described comprising a fuselage having a frame support extending upwardly therefrom, a ring secured to the upper end of the support, a revoluble turret movably connected to said ring, aerofoils secured to said turret, propellers attached to the leading edges of the aerofoils, an engine mounted in said fuselage, means operatively connecting the engine to said propeller for rotating the aerofoils, a pilot's seat in the rear of the fuse-

lage, stabilizing rudders connected to the forward end of the fuselage, means movably connected to the sides of the fuselage for preventing the same from rotating with the aerofoils, a seat longitudinally slidable in the fuselage for varying the angle of incidence of the machine, and means for maintaining the seat in predetermined position.

8. A flying machine of the class described comprising a fuselage having a pilot's seat and a longitudinally movable passenger seat, a support extending upwardly from the fuselage, an engine mounted in the fuselage, a turret movably connected to the upper end of the support, wings secured to said turret, driving propellers carried by said wings, means operatively connecting the propellers to the engine for rotating the wings, stabilizing rudders attached to one end of the machine, means for preventing the fuselage from rotating with the wings, means operable from the pilot's seat and connected to the movable passenger seat for locking the passenger's seat in any desired position.

9. In a helicopter, the combination of a fuselage having a support projecting upwardly therefrom, aerofoils rotatably mounted on said support, means for driving said aerofoils, a pilot's seat in the rear of the support, a movable passenger's seat in front of the support, stabilizing rudders connected to the front end of the fuselage and operable from the pilot's seat, means on the sides of the fuselage for preventing the same from rotating with the aerofoils, a drum mounted in the pilot's seat and operatively connected to the movable seat, and means associated with said drum for maintaining the movable seat in a predetermined position.

10. In a helicopter, the combination of a fuselage having a support projecting upwardly therefrom, aerofoils rotatably mounted on said support, means for driving said aerofoils, a pilot's seat in the rear of the support, a movable passenger's seat in front of the support, stabilizing rudders connected to the front end of the fuselage and operable from the pilot's seat, means on the sides of the fuselage for preventing the same from rotating with the aerofoils, a drum mounted in the pilot's seat and operatively connected to the movable seat, a ring having a series of spaced openings connected to the fuselage adjacent said drum, and means attached to the drum and adapted to engage the openings in said ring for maintaining the movable seat in a fixed position.

11. In a helicopter, the combination of a fuselage having a frame support extending upwardly therefrom, wings removably mounted on said support, means for rotating said wings, said fuselage having a pilot's

5 seat in the rear of the support and a pas-
 senger's seat in front thereof, a control
 stick in said pilot's seat, a vertical rudder
 connected to the forward end of the fuse-
 10 lage for controlling the lateral direction of
 the machine, side rudders attached to the
 fuselage for preventing the machine from
 rotating with the wings, said rudders being
 operatively connected to the control stick
 15 and adapted to be independently actuated
 thereby, a horizontal rudder connected to
 the front end of the fuselage, a foot control
 in the pilot's seat operatively connected to
 the horizontal rudder, and means compris-
 20 ing the passenger's seat for changing the
 direction of flight of the machine.

12. In a helicopter, the combination of
 a fuselage having a frame support extend-
 ing upwardly therefrom, wings removably
 25 mounted in said support, means for rotat-
 ing said wings, said fuselage having a pilot's

seat in the rear of the support and a pas-
 senger's seat in front thereof, a control
 stick in said pilot's seat, a vertical rudder
 connected to the forward end of the fuselage 25
 for controlling the lateral direction of the
 machine, side rudders attached to the fuse-
 lage for preventing the machine from rotat-
 ing with the wings, said rudders being oper-
 atively connected to the control stick and 30
 adapted to be independently actuated there-
 by, a horizontal rudder connected to the
 front end of the fuselage, a foot control in
 the pilot's seat operatively connected to the
 horizontal rudder, and longitudinal mov- 35
 able means comprising the passenger's seat
 for changing the direction of flight of the
 machine, said last mentioned means being
 operable from the pilot's seat.

In testimony whereof I have hereunto set 40
 my hand.

LEO ORTEGO.