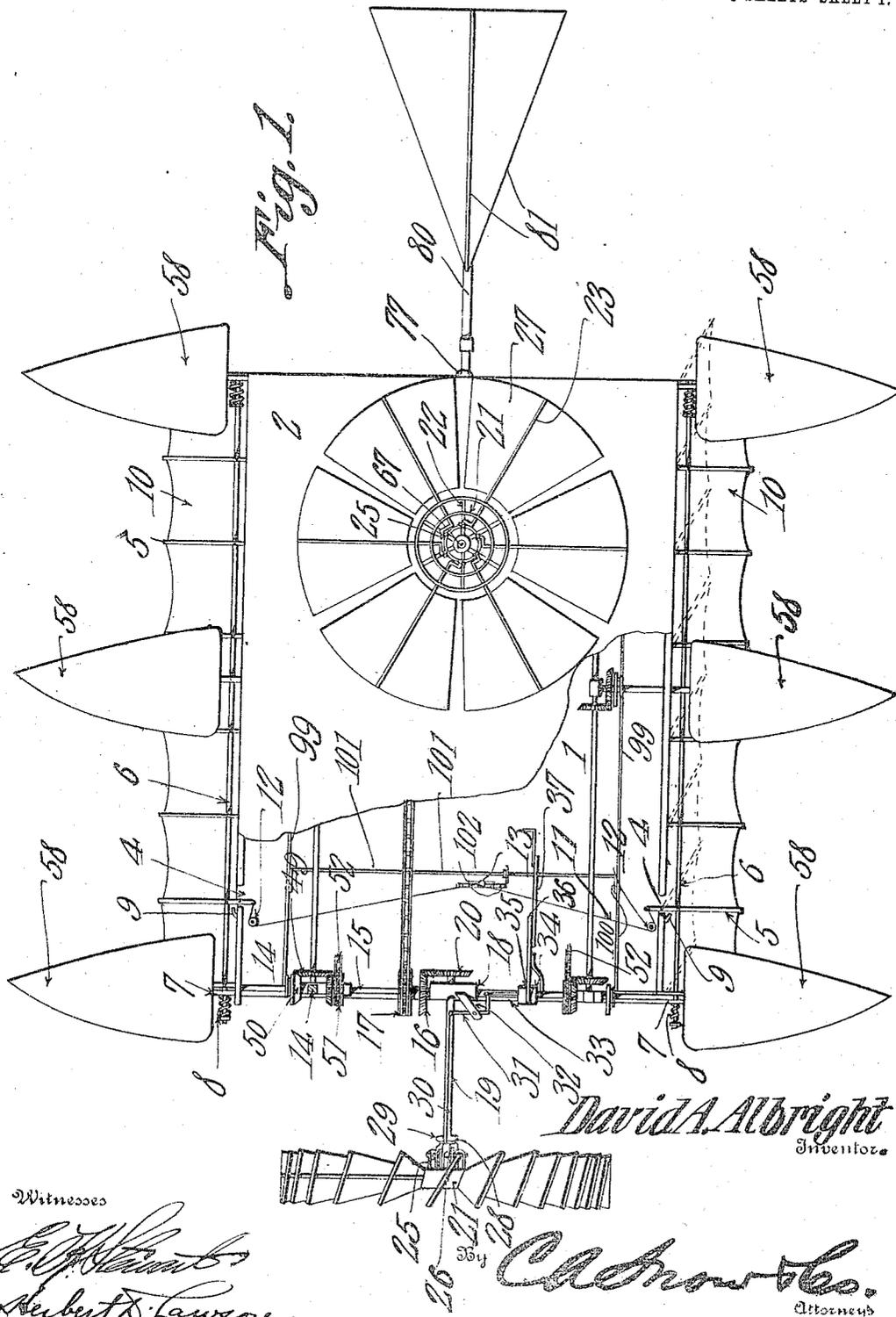


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AERODROME.
APPLICATION FILED JAN. 22, 1910.

994,897.

Patented June 13, 1911.

3 SHEETS—SHEET 1.



Witnesses
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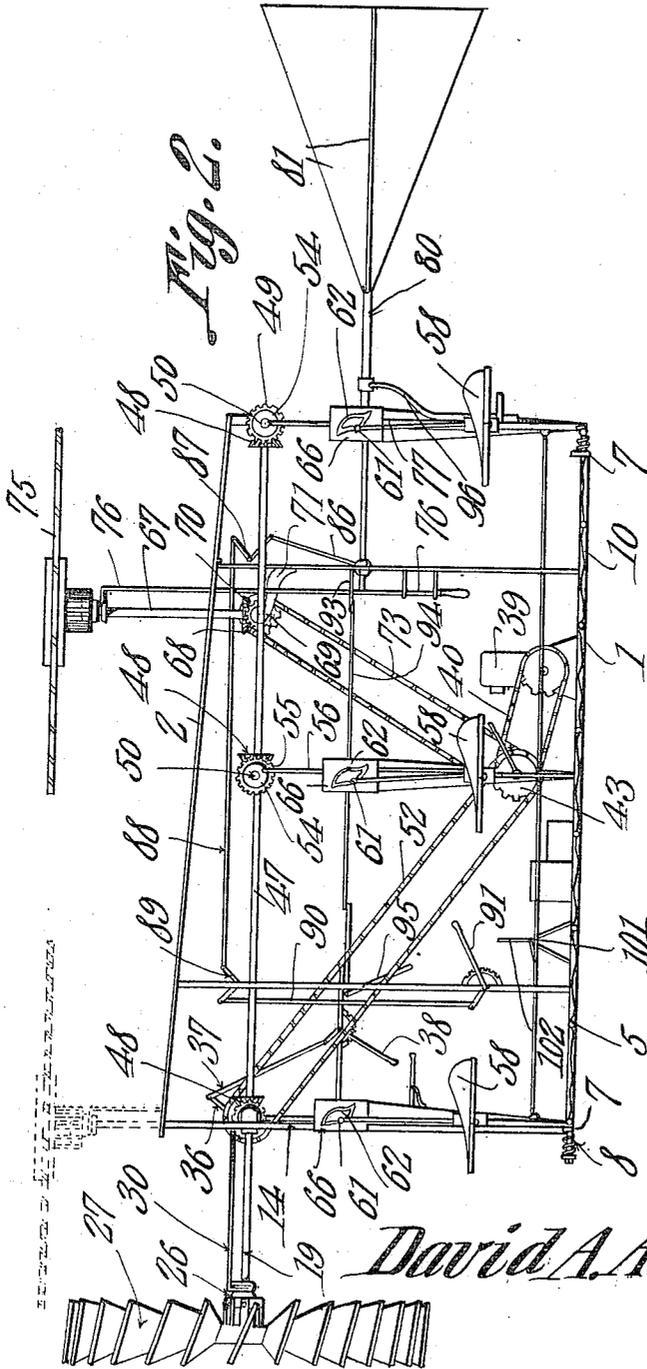
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3 SHEETS-SHEET 2.



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3 SHEETS—SHEET 3.

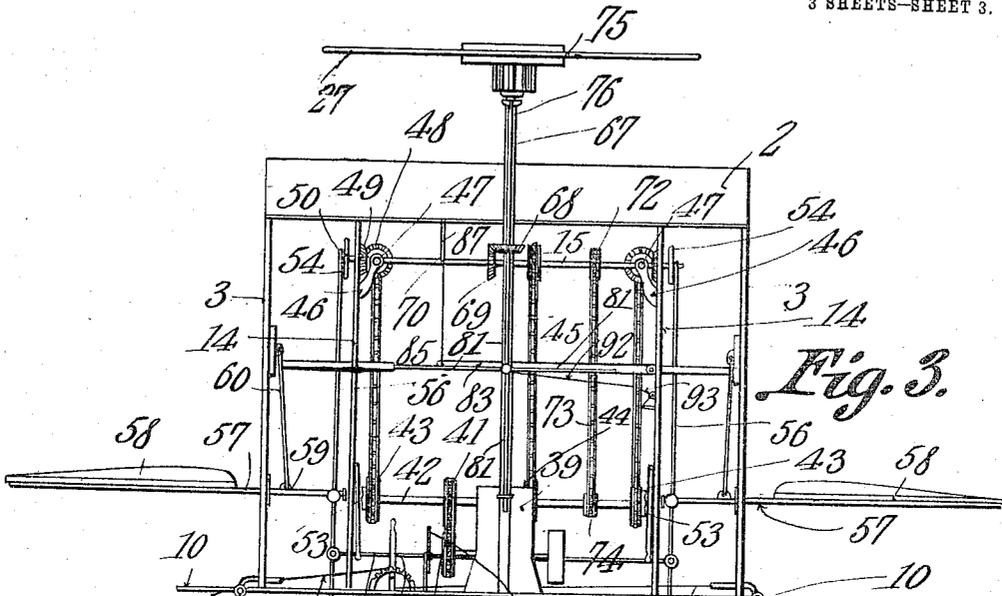


Fig. 3.

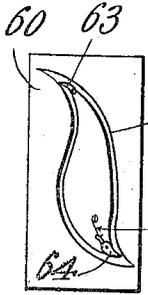


Fig. 5.

Fig. 6.

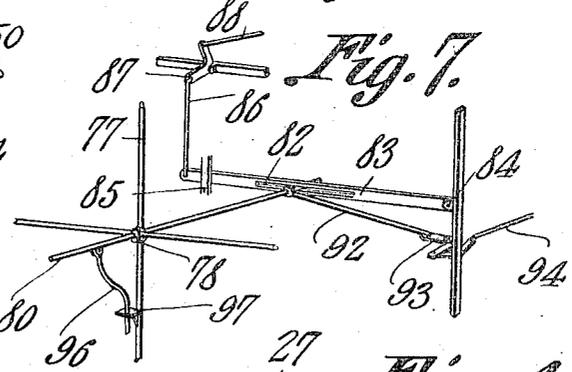
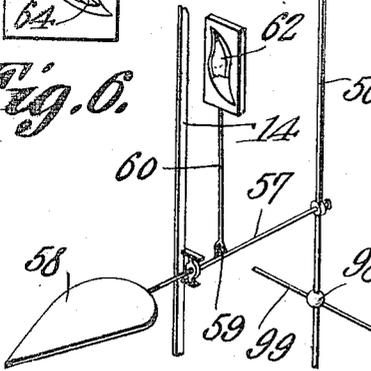


Fig. 7.

Fig. 4.

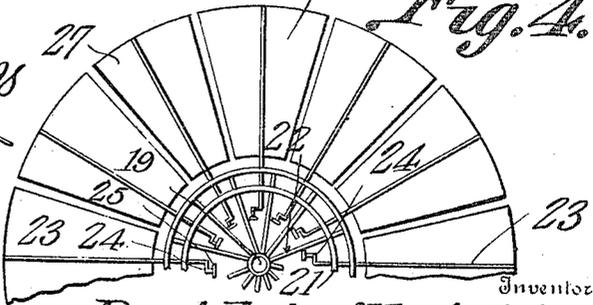
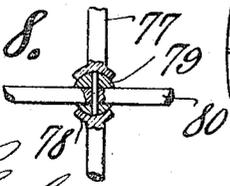


Fig. 8.



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994,897.

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Application filed January 22, 1910. Serial No. 539,442.

To all whom it may concern:

Be it known that I, DAVID A. ALBRIGHT, a citizen of the United States, residing at Gainesville, in the county of Alachua and State of Florida, have invented a new and useful Aerodrome, of which the following is a specification.

This invention relates to aerodromes and the principal object thereof is to provide a combined aeroplane, helicopter and orthoptera, whereby all of the advantages of these types of devices may be combined in one machine.

Another object is to provide an aerodrome having a propeller which is shiftable relative to the body of the machine so as to drive the same either in a forward direction or to elevate and sustain the same.

A still further object is to provide an elevating and sustaining wheel for use in connection with said propelling wheel, both of the wheels having blades which are shiftable with relation to the shaft of the wheels and whereby the said blades can be utilized as sustaining planes to facilitate the soaring action of the machine.

Another object is to provide a machine of this type utilizing a box-like body the upper and lower portions of which constitute soaring planes, there being extensible supplemental planes movably connected to the sides of the body.

A still further object is to provide a machine having laterally extending wings provided with mechanism whereby the same may be flapped to simulate the movement of the wings of a bird.

Another object is to provide a novel form of rudder.

With these and other objects in view the invention consists in certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claims.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings, Figure 1 is a plan view of the complete machine. Fig. 2 is a side elevation of the machine, the side wall of the body being removed so as to disclose the mechanism within the body. Fig. 3 is a rear elevation of the machine. Fig. 4 is an elevation of a portion of one of the elevating wheels. Fig. 5 is a perspective view of one of the wings and a portion of its actuating mechanism. Fig. 6 is an elevation of one

of the guides used in connection with the wing operating mechanism. Fig. 7 is a perspective view of a portion of the rudder operating mechanism. Fig. 8 is a view partly in section and partly in elevation of the rudder bearing.

Referring to the figures by characters of reference 1 designates the bottom plane and 2 designates the top plane of the body of the machine, said planes being connected at their sides by side walls 3. The top plane is inclined upwardly toward its front end and both ends of the body are open.

A longitudinal series of openings 4 is formed in each side of the body and close to the bottom plane 1 thereof, there being an arm 5 pivotally mounted within each of these openings, all of the arms being movable in the same horizontal plane. The arms extending beyond one side of the body are pivotally connected to a rod 6, said rod being parallel with the side of the body and being slidably mounted at each end within outstanding ears 7. Springs 8 are coiled about the end portions of each rod, both of these springs cooperating with the ears 7 so as to exert a constant pull upon the rod in one direction. One or more stops 9 are located upon the side of the body and serve to hold the arms 5 perpendicularly to the side of the body, the said arms being held in this position by the springs controlling them. The various arms at each side of the body constitute a frame work on which is stretched a plane 10 formed of a suitable fabric, said plane cooperating with the top and bottom planes 1 and 2 for the purpose of facilitating soaring action of the machine.

One of the arms 5 of each series is extended into the body of the machine and has a cable 11 secured to it and extending partly around a pulley 12. The cables extending inwardly from the two sides of the machine are attached to an actuating lever 13, the points of connection being at opposite sides of the fulcrum of the lever so that, when said lever is shifted in one direction, both of the cables will be drawn longitudinally thereby so as to swing the inner ends of the inwardly projecting arms 5 in the direction of the adjoining pulleys 12. Said arms will thus be folded against the outer sides of the body of the machine and motion will be transmitted therefrom through the rods 6 to the other pivotally supported arms 5 and,

as a result, all of the arms will be folded against the sides of the body and the fabrics 10 constituting the planes will thus be held in compact folds close to the body. It is of course to be understood that when the parts are thus folded the springs 8 are under stress. The lever 13 may be provided with any suitable mechanism, such as the ordinary pawl and segment, for the purpose of locking the parts.

Parallel supports 14 connect the top and bottom planes 1 and 2 at points between the sides of the body and those supports located at the front end of the body are connected by a rod 15 on which a gear 16 is designed to rotate, there being a sprocket wheel 17 connected to and movable with the gear. An enlargement 18 is formed at the center of the rod and a shaft 19 extends diametrically through this enlargement and is arranged to rotate therein, said shaft being perpendicular to the rod. A gear 20 is secured to the shaft 19 and meshes with the gear 16 and it will be apparent, therefore, that when the gear 16 is rotated, motion will be transmitted therefrom through gear 20 to the shaft 19 irrespective of any swinging action of said shaft about the rod 15.

A ring 21 extends around the outer end of the shaft 19 and is connected thereto by means of radial spokes 22. A series of radially disposed rods 23 is carried by the ring 21, said rods being mounted for rotation within the ring and being provided at their inner ends with cranks 24 each of which is connected, by means of a rod 25, with a sleeve 26 designed to slide upon the shaft 19 and to rotate therewith. A propeller blade 27 is secured to each of the rods 23, said rods extending along the longitudinal centers of the blades and the blades are so proportioned that when the rods are partly turned simultaneously in one direction all of the blades will assume positions in the same plane and with the adjoining longitudinal edges substantially in contact. The blades will therefore form a circular plane. By shifting the sleeve 26 so as to partly rotate the rods 23 in the opposite direction, the blades 27 will be simultaneously shifted so as to act as propellers for the purpose of actuating the machine.

It is of course to be understood that the sleeve 26 may be operated in any preferred manner, the said sleeve being preferably formed with an annular groove 28 engaged by a ring 29. A rod 30 extends from this ring and longitudinally of the shaft 19, the inner end of said rod being pivotally connected to one arm of a bell crank lever 31 which is fulcrumed upon an arm 32 extending from the enlargement 18. The other arm of the bell crank lever 31 is pivotally connected to a rod 33 extending from a sleeve 34 which is loosely mounted on the

rod 15, there being a forked lever 35 engaging the sleeve so as to shift it longitudinally of the rod. Obviously by shifting the sleeve 34 in one direction on the rod motion will be transmitted therefrom through rod 33, bell crank lever 31 and rod 30 to the sleeve 26 and the blades 27 can therefore be shifted so as to either assume positions in the same plane or at any desired pitch. An arm 36 extends from the shaft 15 and is pivotally connected to a rod 37 which is in turn secured to an actuating lever 38. It will be seen therefore that by means of this lever and this connection, the rod 15 can be partly rotated so as to bring the shaft 19 into position either in front of the body of the machine or above said body and perpendicular to the bottom plane 1. When the shaft is in either of these positions the same can be rotated by the mechanism heretofore described and the blades can also be shifted by the mechanism provided for that purpose.

A motor 39 is mounted within the body and motion is transmitted therefrom through a chain 40 to a sprocket 41 located on a transversely extending shaft 42. A sprocket 43 is loosely mounted on the shaft 42 near each side of the body and another sprocket 44 is secured to said shaft adjacent its center, this last mentioned sprocket being designed to drive a chain 45 which passes over and engages the sprocket 17 heretofore referred to.

Brackets 46 are arranged on the supports 14 and constitute bearings for parallel longitudinally extending shafts 47, each of these shafts being provided with gears 48. Each gear meshes with a gear 49 secured to one end of a short shaft which is journaled within one of the supports 14 and one of these shafts 50 is provided with a sprocket 51 arranged to receive motion through a chain 52 from one of the sprockets 43 heretofore referred to. It will therefore be seen that the two sprockets 43 serve to drive the two shafts 47 through the mechanisms provided for said purpose and, by providing clutches 53 each or both of the sprockets 43 can be coupled to shaft 42 and either or both of the shafts 47 thus rotated by the motor.

A disk 54 is secured to the outer end of each of the short shafts 50 and has a wrist pin 55 on which is mounted a depending pitman 56. Each pitman is pivotally attached to the inner end of an arm 57 which extends through one side of the body of the machine and has a wing 58 fastened to the outer end thereof, said wing being preferably shaped to simulate the wing of a bird. The arm 57 is so mounted within the wall of the body as to be capable of swinging either laterally or vertically but the arm is not designed to rotate. Parallel ears 59 extend upwardly from the arm at a point between the pitman 56 and the adjoining wall of the body and

a link 60 is pivotally mounted between these ears and is provided at its upper end with a roller 61. This roller is designed to travel within a guide-way made up of opposed ogee curved grooves 62 having their ends meeting at acute angles, the upper end of the lower groove being normally closed or intersected by a pivoted switch tongue 63 while the lower end of the upper groove is normally closed by a pivoted switch tongue 64. The tongue 63 is held in normal position by gravity but the tongue 64 is preferably provided with a spring 65 designed to hold it in its normal position. It will be apparent that during the upward movement of the wrist pin 55 and the pitman 56, a corresponding upward movement of the arm 57 will be produced, the fulcrum of said arm being within the opening in the wall of the body of the machine. The roller 61 will therefore be forced upwardly within the lower groove of the guide way and will push aside the switch tongue 63 in the path thereof until said tongue has been passed, whereupon the tongue will fall back to its normal position. Upon the completion of the upward movement of the roller and of the wrist pin 55, the parts will begin to move downward and the tongue 63 will direct the roller 61 into the upper groove of the guide-way. The roller will travel along this groove until it strikes the lower switch tongue 64. This tongue will be shifted laterally until it is passed by the roller, whereupon it will return to its normal position. Upon the completion of the downward movement of the parts the roller will be again returned by way of the lower groove of the guide way. Obviously this peculiar movement of the roller will cause the rod 60 to rock with the arm 57 as a pivot and a combined up and down and back and forth movement of the wing 58 will thus be produced so that the tip or extremity of the wing will describe a substantially oval course. Each guide-way 62 is preferably formed within a block 66 secured to the side wall of the body of the machine in any preferred manner.

A shaft 67 is journaled within the top of the body of the machine near the back of the center thereof and the lower end of this shaft is provided with a gear 68 which meshes with a gear 69 secured to a shaft 70 which is journaled in suitable brackets 71. A sprocket 72 is secured to the shaft 70 and is driven by a chain 73 receiving motion from a sprocket 74 on shaft 42. A propeller wheel 75 is mounted on the upper end of the shaft 67, this wheel being of the same construction as the one heretofore described and having pivoted blades which are shiftable by means of a rod 76 extending into the body of the machine to a point where it can be conveniently grasped and actuated by the

operator. The wheel 75, when opened, serves to elevate the machine and, when closed, operates as a plane for facilitating the soaring action of said machine.

A center standard 77 is located vertically within the rear portion of the body and has a socket 78 in the middle portion thereof and in which is fitted a ball 79. A rod 80 extends through and is secured to this ball and is provided at its outer end with triangular blades 81 disposed at right angles to each other to form the rudder. The inner end of the rod 80 projects loosely into a slot 82 formed longitudinally within a lever 83. This lever extends transversely of the body and is pivotally mounted at one end as shown at 84, the other end of the lever being mounted within a guide 85 and being connected, by means of a rod 86, to one arm of a bell crank lever 87. The other end of this lever is connected by a rod 88 with a bell crank lever 89 located near the forward end of the machine, there being a rod 90 which connects the lever 89 with a suitable actuating lever 91. A rod 92 is loosely engaged by rod 80 close to the lever 83 and this rod 92 is pivotally connected to a bell crank lever 93 located adjacent the pivot 84. A rod 94 connects the lever 93 with an actuating lever 95 located near the front end of the machine.

It will be apparent from the foregoing that by actuating the lever 91, the lever 83 can be swung in a vertical plane so as to tilt the rod 80 in a vertical plane, the ball 79 and socket 78 constituting the fulcrum of the said rod 80. It will also be seen that by manipulating the lever 95 the rod 80 can be shifted longitudinally of the slot 82 and thus swung laterally.

When the rudder is swung to the right or to the left it is desirable that the same be tilted to a slight extent. This is to be done in order that the surfaces of the rudder may be maintained practically in the same relation to the horizontal at all times during such lateral swinging movement and irrespective of the tilting of the body of the machine which occurs during the turning thereof. In order that this tilting of the propeller may be effected, a rod 96 is preferably pivotally attached to rod 80 at a point between the blades 81 and the socket 78; the lower end of the rod 96 being slidably mounted within a guide eye 97 provided for that purpose. The rod 96 inclines upwardly and rearwardly from the guide eye and as it is only capable of swinging in a plane extending longitudinally of rod 80, it will be apparent that when the blades 81 are shifted to one side, the rods 96 will operate to tilt the same to a slight extent.

In using the machine the shaft 19 is first shifted into a vertical position by means of the lever 38 and the parts connected thereto and the blades 27 are then tilted. The blades

of the wheels 75 are also correspondingly tilted and the motor can then be started. The two wheels will be rotated at a high speed by the motor and will operate to lift the machine from the ground and, when a desired elevation has been attained, the shaft 19 can be swung downward without however stopping the rotation thereof. The wheels on said shaft will thus act to draw the machine forward and, by closing the wheel 75 the same will cooperate with the blades 1 and 2 to sustain the machine during this forward flight. Additional sustaining surfaces can be presented to the air by releasing the lever 13 and permitting the springs 8 to automatically shift the rods 6 longitudinally. The various arms 5 will thus be swung laterally into position at right angles to the sides of the body and the fabrics 10 connected to these arms will therefore be stretched and each act as an auxiliary sustaining plane. By throwing either or both of the clutches 53 into engagement with the sprockets 43, either or both sets of disks 50 can be rotated and the wings controlled by said disks will be flapped in the manner heretofore set forth. It will thus be seen that the machine embodies all of the advantages of the aeroplane, helicopter, and orthoptera.

The steering of the machine is effected by means of the rudder and the mechanism controlling it, it being possible to swing the rudder in a vertical plane so as to direct the machine either upwardly or downwardly and to also swing said rudder in a horizontal plane to effect turning of the machine.

As shown particularly in Fig. 5, the pitmen 56 can be extended downwardly below the arms 57 and connected, as by ball and socket joints 98, with longitudinally extending coupling rods 99. These rods are connected to cranks 100 formed upon a rock shaft 101. This shaft extends transversely of the machine and has a lever 102 whereby it can be readily actuated and obviously, when the shaft 101 is rocked, the rods 97 will be shifted longitudinally in either a forward or a backward direction so as to cause all of the pitmen 56 to swing either forwardly or backwardly and thus swing the arms 57 horizontally. In this way all of the wings may be simultaneously shifted by the operator without interfering with the flapping movement of the wings.

It is of course to be understood that various changes may be made in the construction and arrangement of the parts without departing from the spirit or sacrificing any of the advantages of the invention as defined in the appended claims.

What is claimed is:—

1. An aerodrome including a body having upper and lower planes, arms pivotally connected to the body and extended laterally there beyond, said arms being arranged in series, a fabric secured to each series of arms and constituting a supplemental plane, elastic means for holding the arms extended laterally beyond the body, and means for folding the arms against the body to collapse the supplemental planes.
2. An aerodrome including a body, arms extending through the sides thereof and mounted for swinging movement, a motor for oscillating the arms in vertical planes, a stationary guide device, means movable with the arms and within the guide device for rocking the wings from side to side during the oscillation thereof, to move the tip of each wing in an endless path.
3. An aerodrome including a body, arms mounted for swinging movement in the sides thereof, a motor, means actuated by the motor for oscillating the arms in vertical planes, wings upon the outer ends of the arms, stationary guide members upon the body and having opposed curve guide-ways communicating at their ends, an element movable with each arm and within the adjoining guide-way, and switch devices within the guide way for directing said elements in the proper path during the oscillation of the arm.
4. An aerodrome including a body, non-rotatable arms projecting therebeyond, a wing carried by the outer end of each arm, means for operating each arm in a vertical direction, cooperating means upon each arm and upon the body for rocking the arm and wing during the oscillation thereof to move the tip of the wing in an endless path, and means for simultaneously shifting the wing horizontally independently of such movement.
5. In an aerodrome, the combination with a controlling wing and means for actuating the same, of a wing guide including curved guide-ways communicating at their ends, and switch devices in the end portions of the guide-ways, and means connected to and movable with the wing for traveling within the guide-ways.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

DAVID A. ALBRIGHT.

Witnesses:

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