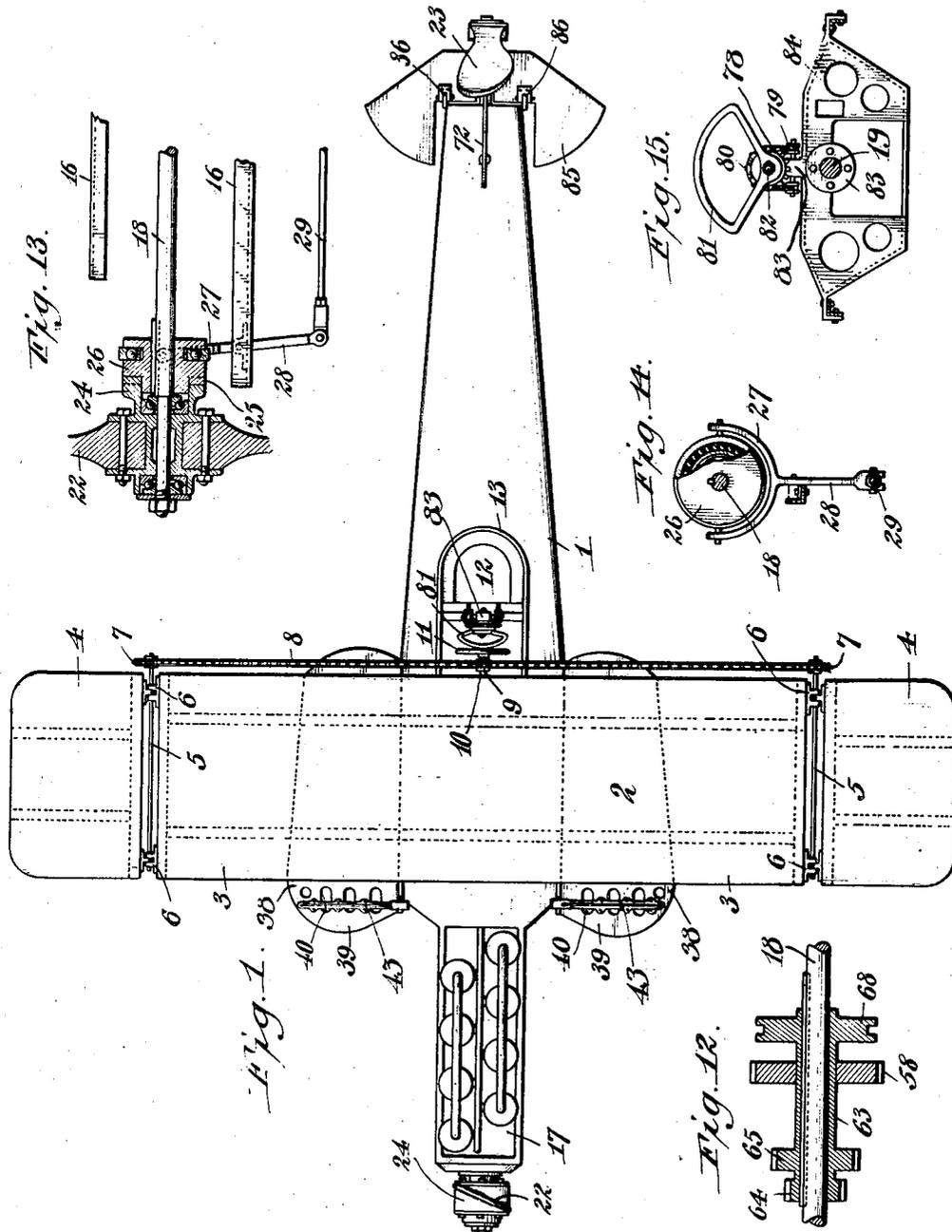


F. J. JUREK.  
 AEROPLANE.  
 APPLICATION FILED MAY 28, 1918.

1,375,297.

Patented Apr. 19, 1921.

4 SHEETS—SHEET 1.



Witness:  
 Jacob Oberst, Jr.

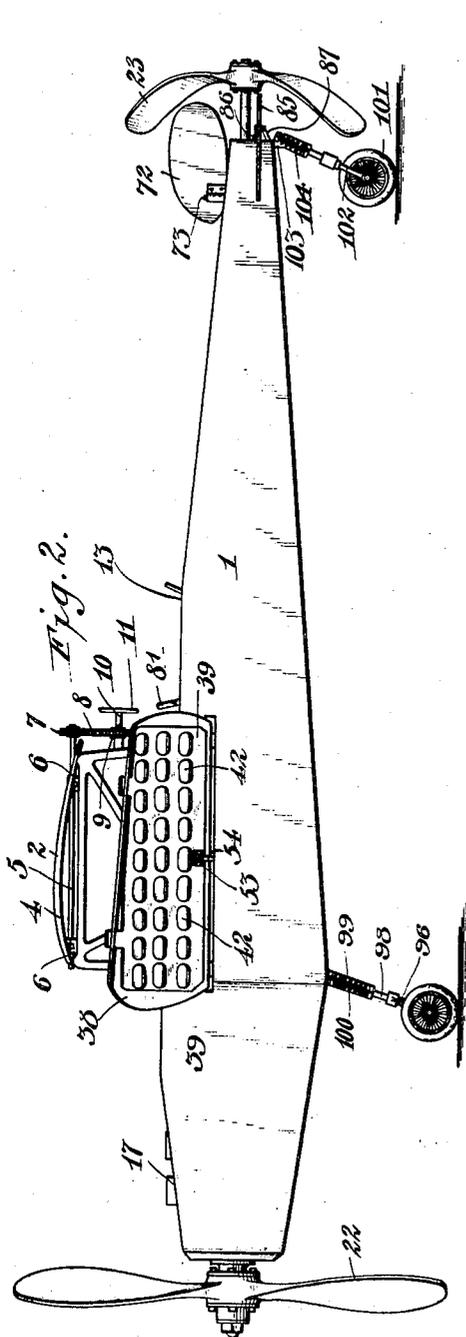
Frank J. Jurek, Inventor.  
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 AEROPLANE.  
 APPLICATION FILED MAY 23, 1918.

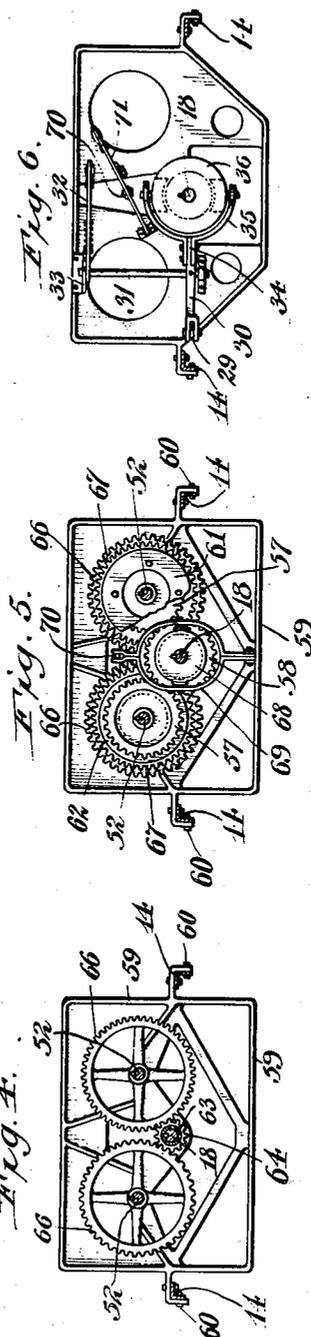
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4 SHEETS—SHEET 2.



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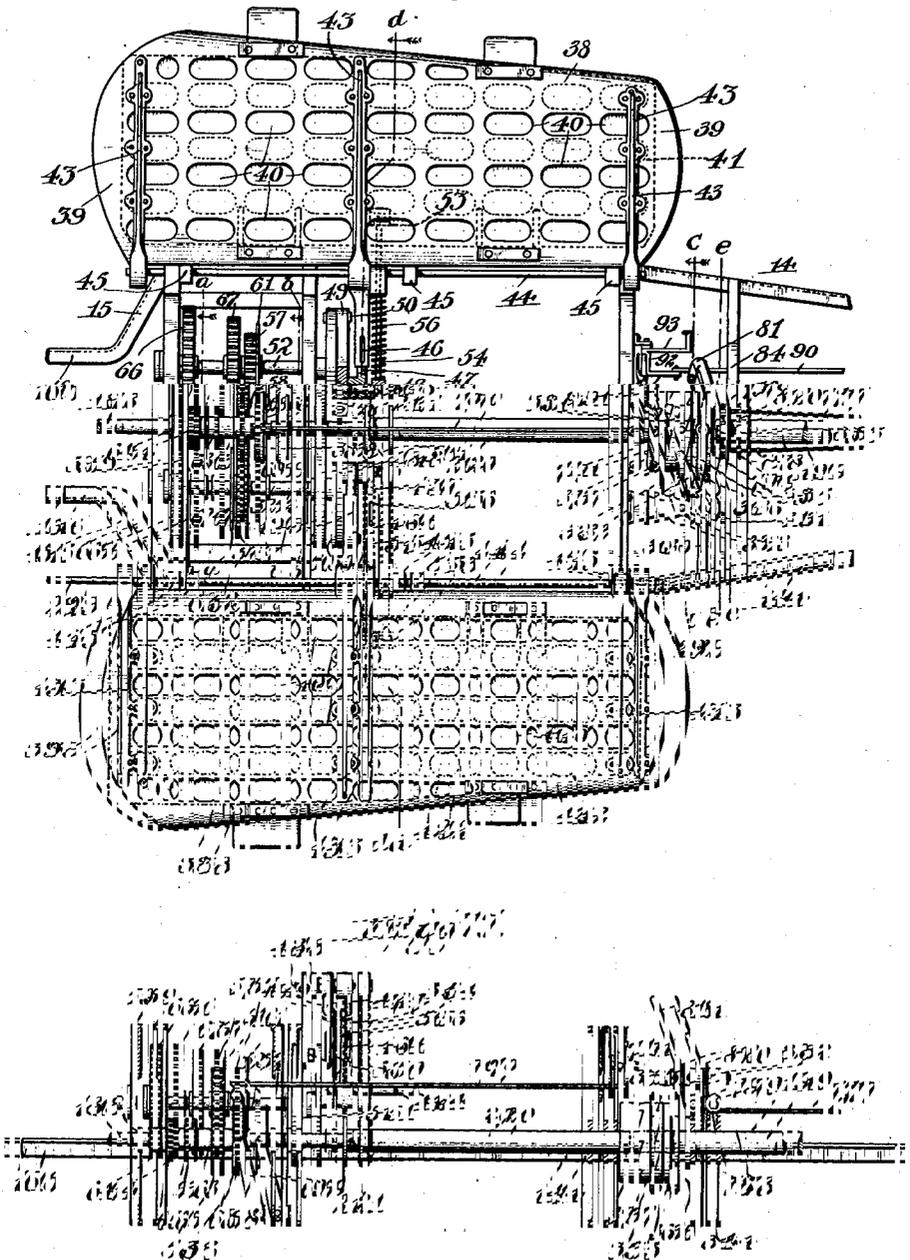
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4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

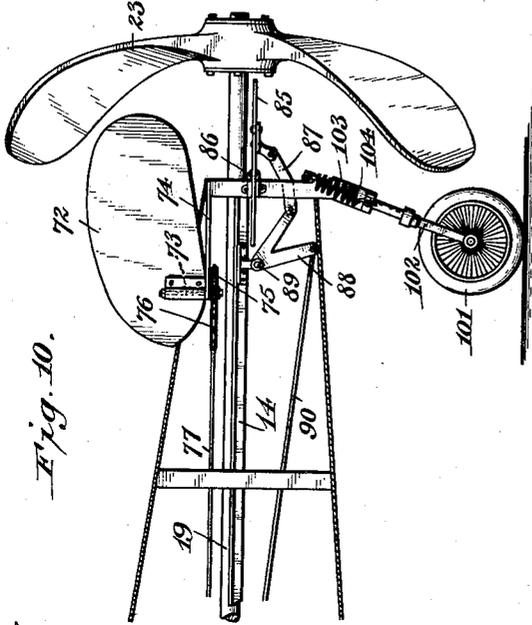


Fig. 10.

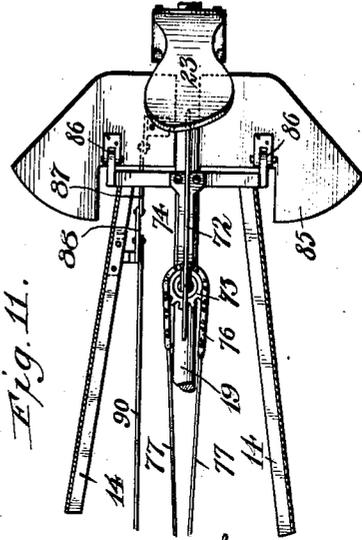


Fig. 11.

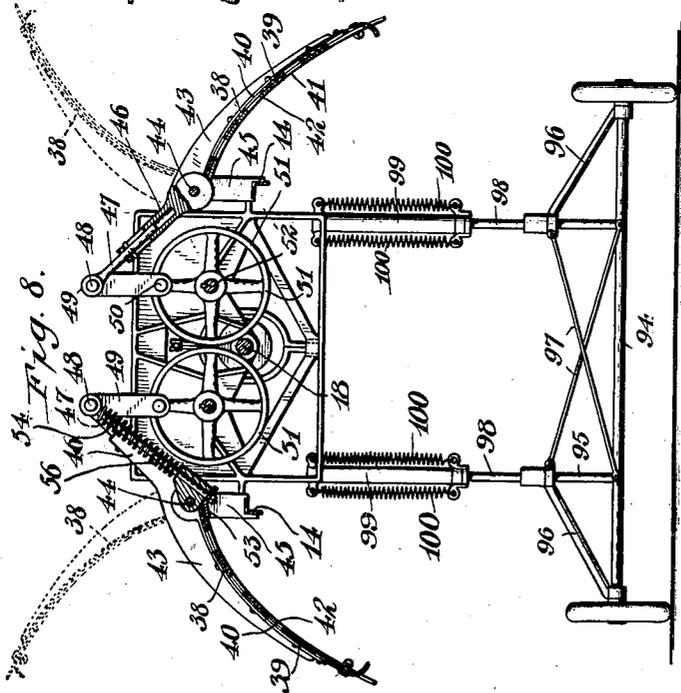


Fig. 8.

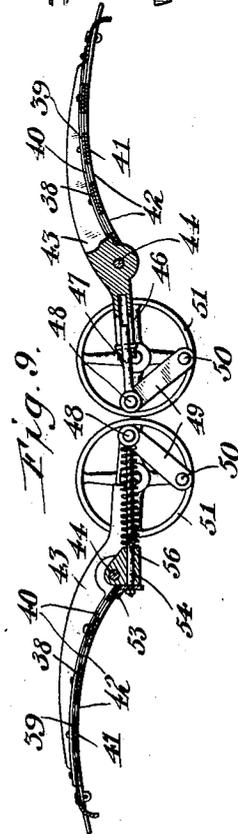


Fig. 9.

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# UNITED STATES PATENT OFFICE.

FRANK J. JUREK, OF BUFFALO, NEW YORK.

## AEROPLANE.

1,375,297.

Specification of Letters Patent. Patented Apr. 19, 1921.

Application filed May 28, 1913. Serial No. 236,974.

*To all whom it may concern:*

Be it known that I, FRANK J. JUREK, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Aeroplanes, of which the following is a specification.

This invention relates to aeroplanes and the broad object in view is to produce a flying machine of the type referred to which will have increased efficiency as to lifting capacity, reduction in head resistance, and a maximum range of speed, the machine being adapted to be propelled rapidly through the air and also being adapted to admit of a reduction of speed to the hovering point, the machine being therefore particularly adapted for military and naval purposes in times of war.

With the above and other objects in view, the invention consists in the novel construction, combination and arrangement of parts, as herein described, illustrated and claimed.

In the accompanying drawings:—

Figure 1 is a plan view of the improved aeroplane.

Fig. 2 is a side elevation of the same.

Fig. 3 is an enlarged plan view of the main frame, omitting the fixed aerial supporting surface and showing the oscillatory or beating wings.

Fig. 4 is a vertical cross section on the line *a—*a**, of Fig. 3, looking in the direction of the arrow crossing said line.

Fig. 5 is a vertical cross section on the line *b—*b**, of Fig. 3, looking in the direction of the arrow crossing said line.

Fig. 6 is a vertical cross section on the line *c—*c**, of Fig. 3, looking in the direction of the arrow crossing said line.

Fig. 7 is a vertical longitudinal section showing the propeller shafts, the changeable speed gearing, and the parts adjacent thereto.

Fig. 8 is a vertical cross section on the line *d—*d**, of Fig. 3, looking in the direction of the arrow crossing said line.

Fig. 9 is a partial section taken on the same line as Fig. 8, showing a different position of the beating wings.

Fig. 10 is a fragmentary side elevation of the empennage, showing the rotor controlling means.

Fig. 11 is a fragmentary plan view of the empennage.

Fig. 12 is an enlarged fragmentary verti-

cal longitudinal section showing the shiftable sleeve forming a part of the changeable speed mechanism.

Fig. 13 is a fragmentary vertical longitudinal section showing the front propeller clutch.

Fig. 14 is a fragmentary vertical transverse section showing the means for shifting the front propeller clutch.

Fig. 15 is a vertical cross section on the line *e—*e**, of Fig. 3.

The aeroplane contemplated in this invention comprises a body or fuselage 1 which, in the main, is of streamline formation, as best illustrated in Fig. 2, but which may be otherwise shaped, if desired. Located above the body 1 is the main supporting surface 2 which projects laterally on opposite sides of the body 1, forming the wings 3. At the outer extremities of the wings 3 there are arranged lateral stabilizing planes or surfaces 4, the inner edges of which are fixedly attached to rock shafts 5, journaled in bearings 6 on the adjacent outer edges of the wings 3. Fast on the rear ends of the shafts 5 are sprocket wheels 7 and around said sprocket wheels extends a sprocket chain 8, the central portion of which is engaged and actuated by a sprocket wheel 9 on the shaft 10 of a hand control wheel 11, by means of which the aviator may swing the lateral balancing surfaces or stabilizing planes 4 to an upward or downward inclination for maintaining and restoring the lateral equilibrium of the machine. The aviator's seat 12 is arranged in a cock pit 13 in the body 1 just in rear of the wheel 11.

The frame of the machine comprises the main longitudinal members or side bars 14 which extend practically the entire length of the body. The forward portions of these side bars 14 are inwardly offset toward each other as shown at 15 to provide engine bearing portions 16, substantially parallel to each other, and upon which is mounted the engine 17 which is conventionally shown in Fig. 1. Extending longitudinally and centrally of the body 1 and inclosed therein is a fore and aft sectional propeller shaft comprising the forward propeller section 18, the rear propeller shaft section 19, and a central section 20 which is connected to the forward section 18 by a coupling 21. Mounted on the forward shaft section 18 is a tractor propeller 22 and mounted upon the rear

end of the rear shaft section 19 is a rear pushing propeller 23, said pushing propeller having its wings or arms curved forwardly and inclined laterally so that while rotating they act with their rear faces against the air and cause a pushing action. The hub 24 of the front propeller has a clutch face 25 at the rear side thereof, with which is adapted to cooperate a shiftable clutch member 26 which is slidable upon and feathered to the front propeller shaft section 18, as shown in Fig. 13. The clutch member 26 is grooved to receive a two-part anti-friction annulus having the fork 27 of a clutch shifting lever 28 secured thereto, from which a rod or connection 29 extends rearwardly to an arm 30 extending laterally from a vertical rock shaft 31 as shown in Fig. 3, the shaft 31 having a thumb latch lever 32 fast thereon, the latch of said lever being adapted to engage an arcuate rack 33, to hold said lever in clutching or non-clutching position. Connected to the shaft 31 is a pivoted arm 34, carrying at its free end a clutch shifting fork 35 which engages a shiftable clutch member 36 slidable upon and feathered to the rear propeller shaft section 19 as indicated in Figs. 6 and 7, the clutch member 36 being shiftable into and out of engagement with another clutch member 37 fast on the intermediate shaft section 20. By means of the construction just described, both the front and rear propellers may be simultaneously thrown into or out of operation by the manipulation of the single hand lever 32.

In addition to the main supporting surface or wings hereinabove described, I employ oppositely-arranged laterally disposed oscillatory or beating wings 38. Each of said wings 38 comprises an upper leaf or plate 39, preferably concavo-convex in cross section, formed with a plurality of ports or openings 40 therein, and an underlying similarly formed plate 41 also formed with a corresponding number of openings 42 movable into and out of registration or partly into registration with the openings in the upper plate, depending on the air resistance which it is desired to offer the wings in their movements. The lower plate forms what may be termed a damper or valve for opening and closing the ports or openings in the upper plate, the object being to have said openings closed during a portion of the upward and downward movements of the beating wings and fully open the remainder of such movements. If desired, said openings may be closed during the entire downward strokes of the beating wings and fully open during the upward or return and inactive strokes of said wings.

Fixedly secured to the upper surface of the upper plate of each wing is a plurality of oscillatory wing carrying arms 43, the inner ends of which are mounted upon a

fore and aft shaft or journal pin 44 mounted in bearings 45 on the main frame of the machine. One of the arms 43 of each beating wing, as shown in Fig. 8, has an extension telescopic-arm comprising a tubular member 46 and an inner telescopic member 47, rendering said arm longitudinally extensible. Each member 47 is connected by a pivot 48 to a link 49 and the other end of said link is connected by a pivot 50 to a rotary wheel 51 journaled on one of a pair of parallel shafts 52, which shafts are positively geared together as will hereinafter appear. As shown in Figs. 8 and 9, the lower plate or valve of each beating wing has projecting therefrom, near its inner edge, a lug 53 to which is attached one end of a rod or plunger 54, the opposite end of the latter being connected by the pivot 48 to the adjacent link 49. A spring 56 surrounds the rod 54 and acts to move the valve plate in one direction by shifting the rod 54 toward the pivot 48.

The shafts 52 have fast thereon gears 57 which mesh constantly with a central pinion 58 journaled in a transversely extending sub-frame 59 secured by fastening means 60 to the main longitudinal frame bars 14. One of the gears 57 has at one side thereof a peripherally projecting flange 61 and the other gear 57 has a similar flange 62 on the opposite side thereof, said flanges 61 and 62 serving to prevent the central pinion 58 from shifting out of mesh with said gears 57, as best illustrated in Fig. 3, the central gear being loose on a shiftable sleeve 63, which sleeve is used for the purpose of changing the speed of the front and rear propellers, as will appear hereinafter. The gears just referred to serve to maintain a certain predetermined relation between the other gears to be described hereafter and located on the shafts 52 in order to facilitate and insure the proper shifting of the changeable speed gears. The sleeve 63 has fast thereon two pinions 64 and 65, the pinion 64 being shiftable into and out of mesh with gears 66 on the shafts 52, and the pinion 65 being shiftable into and out of mesh with the other smaller gears 67 on said shafts 52. By shifting the sleeve to an intermediate position, the gearing, as a whole, is thrown into neutral. The means for shifting said sleeve comprises a grooved wheel or collar 68 on said sleeve which is engaged by a shifting member 69 from which a rod 70 extends rearwardly and is connected to a gear shifting hand lever 71.

The vertical rudder 72 is mounted upon a vertical rock shaft 73 journaled in a support 74 at the rear of the body, the shaft 73 having a sprocket wheel 75 fast thereon around which passes a flexible connection 76, such as a chain. Rods 77 or the like extend from the chain 76 forward to a chain

78 which passes under guide pulleys 79 and upwardly over a sprocket wheel 80 fixedly attached to a wheel segment 81 by means of which the vertical rudder may be turned in either direction for steering to the right or left. The shaft 82 of the wheel segment 81 is journaled in a support 83 extending upwardly from a transverse sub-frame 84 secured to the main-longitudinal frame bars 14.

The horizontal rudder 85 is pivotally mounted at 86 on the rear end of the body of the machine and is connected by means of a pivotal link 87 to a bell crank lever 88 pivotally mounted at 89 on the body and having attached thereto an operating connection 90, such as a rod, which extends forwardly and is attached to an arm 91 of a horizontal rock shaft 92 from which extends a hand lever 93, by means of which the aviator may depress or elevate the horizontal rudder.

The body is supported by means of a landing base, shown as comprising a front axle 94 which is braced by means of struts 95, braces 96, and cross stays or braces 97. Standards 98, the lower ends of which form side struts, extend upwardly from the axle 94 and are slidable in tubular guides 99, which are connected to the main frame of the machine, cushioning springs 100 being employed as shown in Fig. 8 for shock absorbing purposes. The wheel base also comprises a rear trailing wheel 101 journaled in a fork 102 slidable through a bearing 103 at the rear end of the body of the machine, and cushioned by means of a shock absorbing spring 104.

From the foregoing description, taken in connection with the accompanying drawings, it will now be understood that the front and rear propellers and the oscillatory or beating wings may be concurrently used for propelling and lifting purposes, enabling the machine to attain a high altitude in a comparatively short period of time, and to be propelled through the air at high speed. When it is desired to hover over a given point, the front and rear propellers may be simultaneously thrown out of operation by the clutch mechanism hereinabove described, while the oscillatory or beating wings continue to operate and sustain the machine in the air. By the same means, the machine may be safely landed in a small field or inclosure by throttling the engine and reducing the speed of operation of the oscillatory or beating wings. For the same reason, the machine is able to rise from a small field or inclosure and practically in a vertical direction. After the necessary altitude has been attained, the front and rear propellers may be thrown into operation, giving the maximum speed to the machine.

Having thus described my invention, what I claim is,—

1. An aeroplane having oscillatory wings comprising two plate-like members in contact with each other and each having openings therein, and means for moving said members relatively for bringing said openings into or out of registration.

2. An aeroplane having a pair of spaced oscillatory wings pivotally secured at their inner edges, each wing comprising two concavo-convex plates lying in contact with each other and having openings therein, the concaved sides of said plates facing downwardly, said plates being relatively movable to bring the openings therein into or out of registration.

3. In an aeroplane, the combination of a body, a normally fixed supporting surface, directional means, an engine supported by the body, and oscillatory wings mounted for movement and operatively connected with said engine, each of said wings comprising upper and lower plate-like members having openings therein, one of said members being movable relatively to the other so as to cause the openings to close during the active stroke of the wings and open during the return or inactive stroke thereof.

4. In an aeroplane, the combination of a body; a normally fixed supporting surface, directional means, stabilizing means, an engine supported by said body, a pair of horizontal longitudinally-disposed shafts, and oscillatory wings mounted for movement on said shafts and operatively connected with said engine, each of said oscillatory wings comprising two contacting plate-like members having openings therein, one of said members being movable relatively to the other to cause said openings to be opened and closed during the cycle of movement thereof including the active and inactive stroke.

5. In an aeroplane, the combination of a body, a normally fixed supporting surface, directional means, an engine supported by the body, a pushing propeller and a tractor propeller operable by said engine, a pair of spaced horizontally-disposed shafts, an oscillatory wing mounted on each of said shafts and having openings therein and a telescopic and longitudinally-extensible arm thereon, means on said wings for respectively opening and closing said openings during opposite movements of said wings, said means being operated by the engine, and means between each of said arms and the engine for operatively connecting the two together.

6. An aeroplane having an engine, oscillatory wings comprising two plate-like members, each having spaced openings therein, means for operatively connecting each of said wings with said engine com-

prising a rotary member actuated by the engine, an arm extending from said wing and a link connecting said arm and rotary member, and means for shifting one of said  
5 plate-like members relatively to the other member.

7. In an aeroplane, the combination of a body, directional means, stabilizing means, an engine supported by the body, a pushing  
10 propeller and a tractor propeller operable by said engine, means for throwing either or both of said propellers into or out of operative connection with the engine, a sup-

porting surface extending above said body in spaced relation thereto and projecting  
15 on opposite sides thereof, oscillatory wings mounted at opposite sides of said body below said supporting surface and geared to and driven by said engine, said wings having openings therethrough and mechani-  
20 cally operated means for opening and closing said openings.

In testimony whereof I affix my signature.

FRANK J. JUREK.