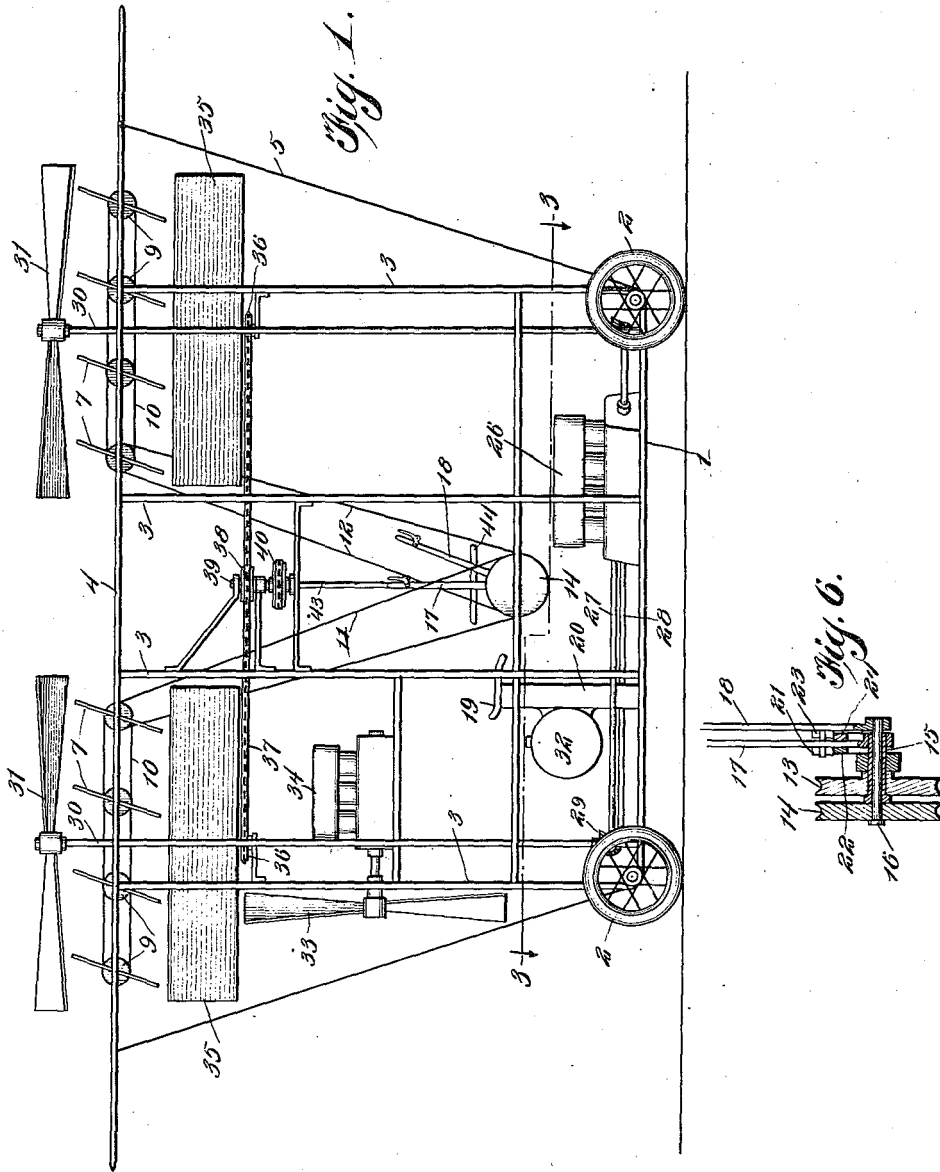


B. B. STUBBLEFIELD.
 FLYING MACHINE.
 APPLICATION FILED JAN. 19, 1912.

1,046,895.

Patented Dec. 10, 1912.

4 SHEETS—SHEET 1.



Inventor
Bernard B. Stubblefield

Witnesses
Louis R. Heinrichs
C. C. Hines

By *Victor J. Evans*
 Attorney

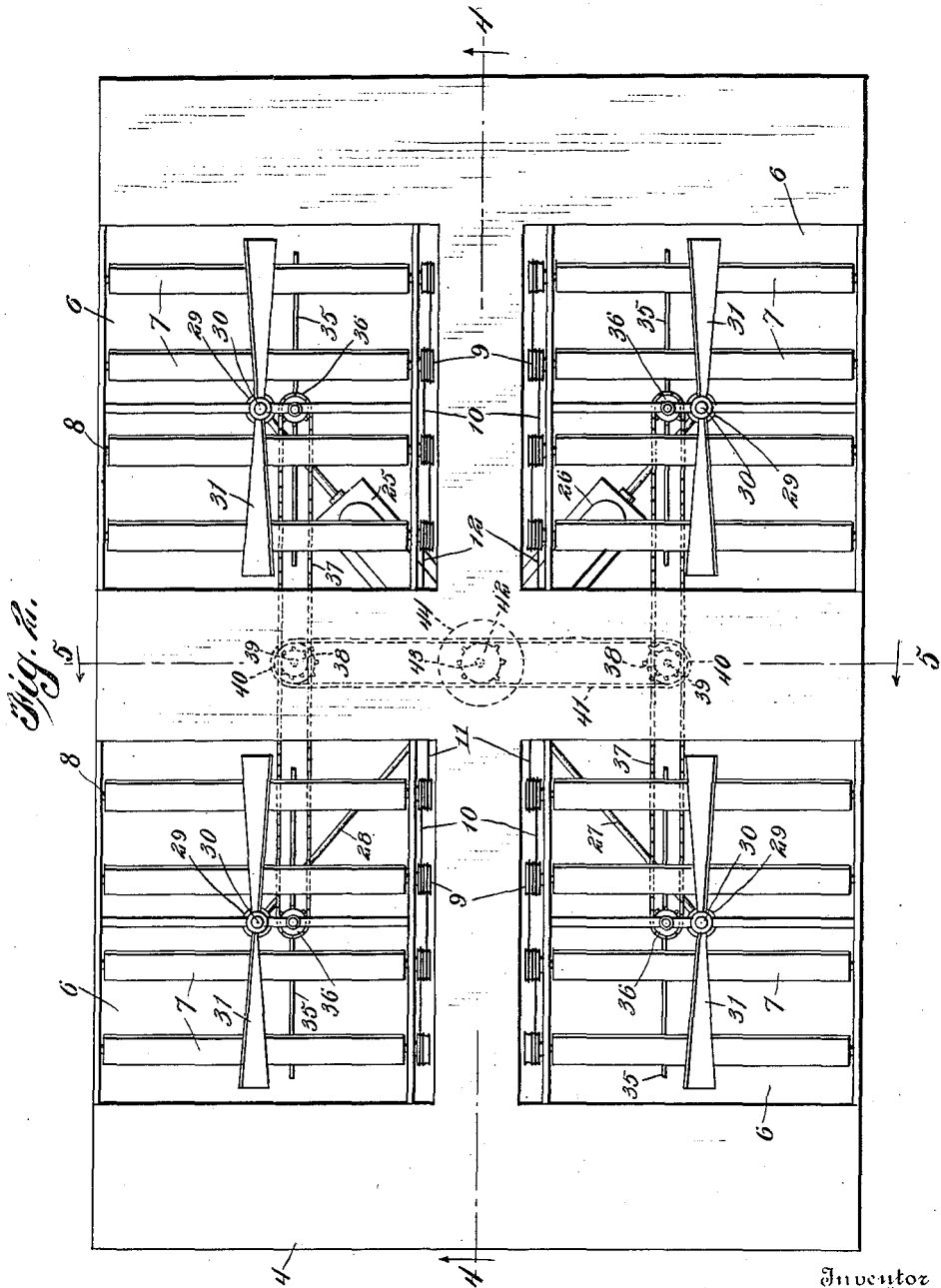
B. B. STUBBLEFIELD.
FLYING MACHINE.

APPLICATION FILED JAN. 19, 1912.

Patented Dec. 10, 1912.

4 SHEETS—SHEET 2.

1,046,895.



Inventor
Bernard B. Stubblefield

Witnesses

Louis R. Heinrichs
a. c. Hines

By *Victor J. Evans*
Attorney

B. B. STUBBLEFIELD.
 FLYING MACHINE.
 APPLICATION FILED JAN. 19, 1912.

1,046,895.

Patented Dec. 10, 1912.

4 SHEETS—SHEET 3.

Fig. 3.

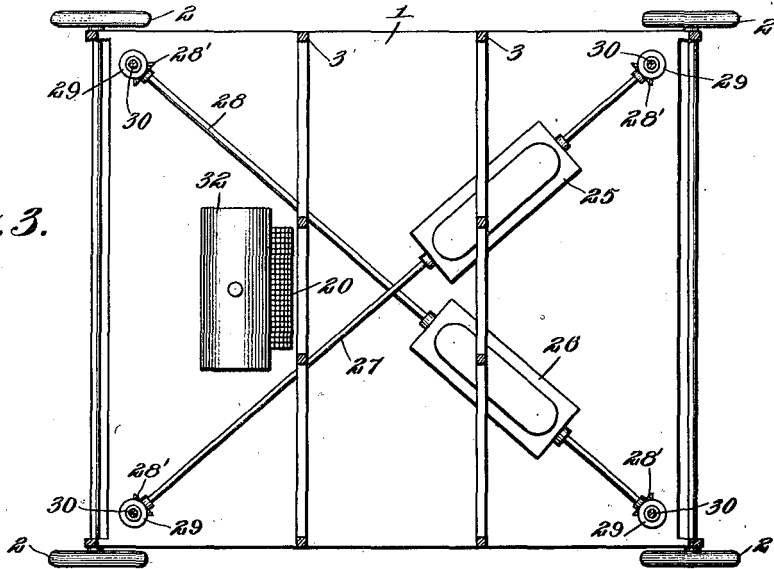
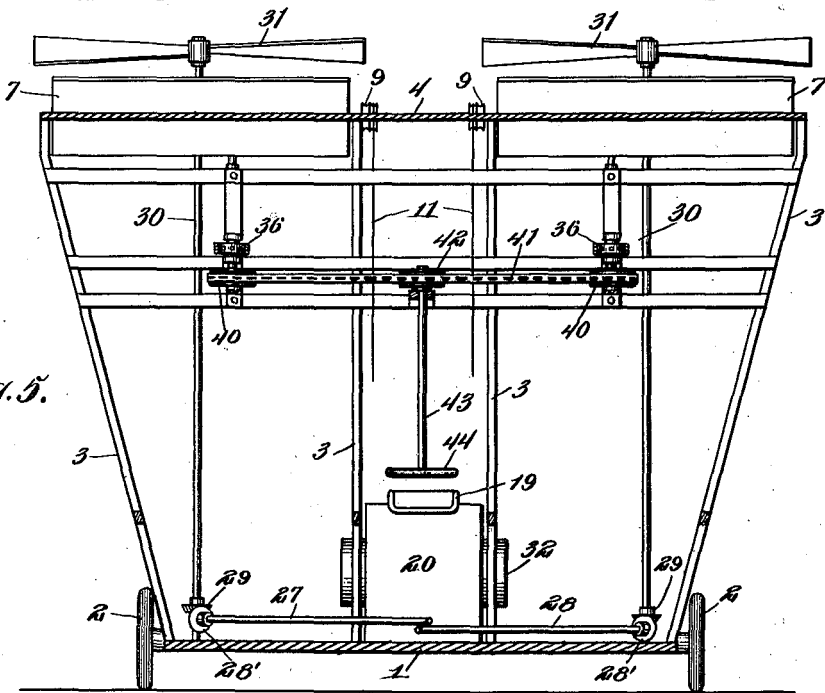


Fig. 5.



Inventor
 Bernard B. Stubblefield

Witnesses

Louis S. Heinrichs
 C. C. Ames.

By Victor J. Evans

Attorney

B. B. STUBBLEFIELD.
 FLYING MACHINE.
 APPLICATION FILED JAN. 19, 1912.

1,046,895.

Patented Dec. 10, 1912.

4 SHEETS—SHEET 4.

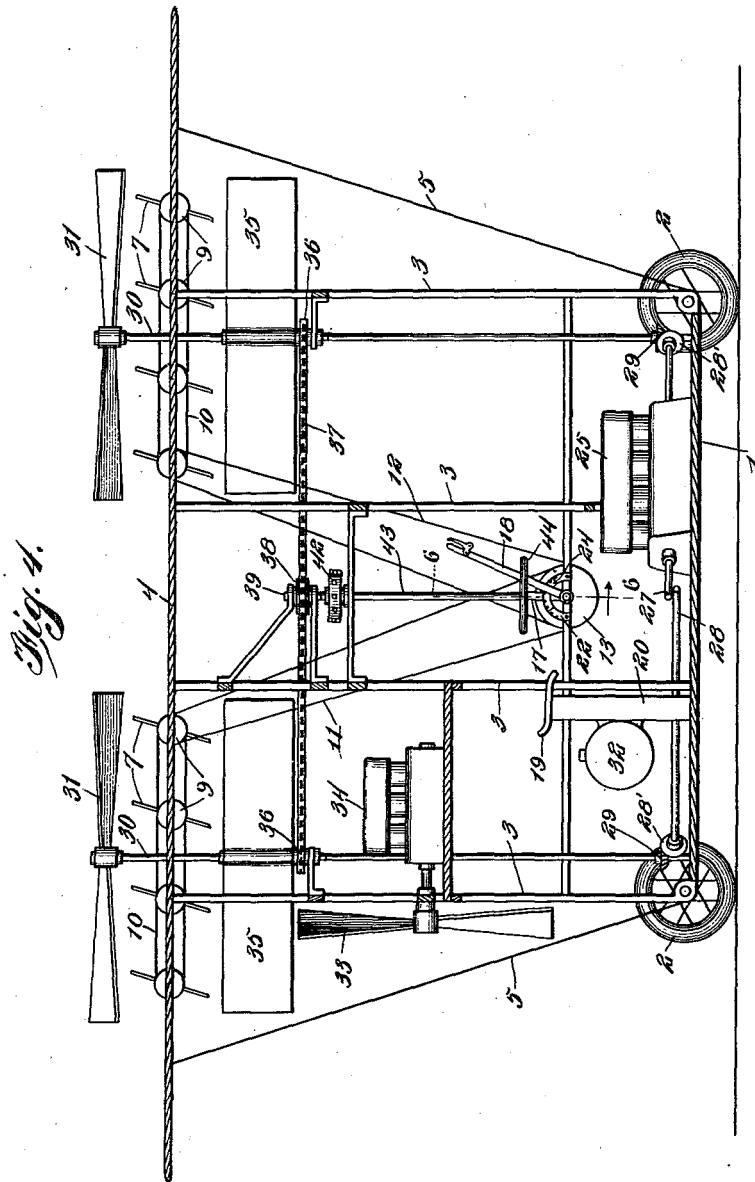


Fig. 4.

Inventor
 Bernard B. Stubblefield

Witnesses

Louis R. Heinrichs
 C. C. Hines

By Victor J. Evans
 Attorney

UNITED STATES PATENT OFFICE.

BERNARD B. STUBBLEFIELD, OF NASHVILLE, TENNESSEE.

FLYING-MACHINE.

1,046,895.

Specification of Letters Patent.

Patented Dec. 10, 1912.

Application filed January 19, 1912. Serial No. 672,062.

To all whom it may concern:

Be it known that I, BERNARD B. STUBBLEFIELD, a citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented new and useful Improvements in Flying-Machines, of which the following is a specification.

This invention relates to flying machines of the heavier-than-air type, the main object of the invention being to provide a machine which is adapted to rise directly from the ground and to descend in a substantially straight path without the usual gliding action, and which is further adapted to be supported in a substantially stationary position above any given point, so that observations of the surface below may be readily and conveniently made.

A further object of the invention is to provide a novel construction and arrangement of motors and propelling and steering gear, whereby safety in the operation of the machine is secured, and the machine is adapted to be balanced and controlled in a ready and efficient manner.

The invention consists of the features of construction, combination and arrangement of parts, hereinafter more fully described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a side elevation of a flying machine constructed in accordance with my invention. Fig. 2 is a top plan view of the same. Fig. 3 is a sectional plan view on the line 3—3 of Fig. 1. Fig. 4 is a vertical longitudinal section on the line 4—4 of Fig. 2. Fig. 5 is a vertical transverse section on the line 5—5 of Fig. 2. Fig. 6 is a detail section on the line 6—6 of Fig. 4.

The frame of the machine may be of any preferred type, but is shown in the form of a substantially oblong rectangular car or platform 1, mounted at its four corners upon launching and landing wheels 2, which may be constructed and mounted in any suitable manner. Rising from the platform are suitable uprights 3, carrying a supporting plane or surface 4, reinforced from the said car or platform by suitable stays 5, the construction being such as to secure the requisite strength, durability and rigidity. The supporting plane or surface 4 is of the same general form as the car or platform 1, but of preferably greater dimensions, so as to provide a sustaining surface of proper area.

This supporting plane or surface comprises a suitable frame having a covering of any desired fabric. Formed in the plane adjacent its respective corners are openings 6, and arranged within these respective openings are series of propelling, steering and stabilizing vanes or small planes 7. In the present instance, I have shown four vanes or small planes in each series, each of which extends at right angles to the line of flight and is mounted to tilt vertically on a shaft or axis 8 journaled in the frame structure of the supporting plane or surface 4.

The inner ends of the shafts 8 of each series of vanes 7 carry double grooved pulleys 9, which pulleys are connected for movement in unison by cables 10, said cables being connected with the pulleys in such manner as to adapt the vanes 7 to move simultaneously in the same direction within an arc of 90°, more or less, so that the vanes may be turned from a horizontal to a substantially vertical position, and vice versa. The pulleys upon the shafts of the innermost vanes at each side of the longitudinal center of the machine are engaged by controlling cables 11 and 12, which pass at their lower ends around grooved controlling and operating pulleys 13 and 14, mounted upon concentrically journaled shafts 15 and 16, fitted to turn in bearings upon one of the standards or uprights 3, the shaft 15 being hollow to receive the shaft 16 which extends therethrough. The shafts 15 and 16 of the controlling devices on opposite sides of the longitudinal center of the machine are provided with operating handles or levers 17 and 18, arranged in juxtaposition to the aviator's seat 19, which is preferably supported upon the radiator 20, but may be located behind the radiator or in such relation to the motors as to provide for the proper balancing of the machine. The lever 17 is provided with a spring actuated pawl or dog 21 to engage and interlock with a rack 22 on the adjacent standard 3, while the lever 18 is provided with a similar pawl or dog 23 to interlock with a rack 24 on the lever 17. It will be observed that the two sets of levers, controlling the fore and aft series of vanes 7 on opposite sides of the longitudinal center of the machine, are arranged at opposite sides of the aviator's seat, in a convenient position to be simultaneously or independently operated by the hands of

the aviator. Hence it will be understood that the vanes at either the right or left hand side of the machine may be independently adjusted, or adjusted in unison, and that the vanes on both sides of the machine may be operated in conjunction for the adjustment of all the vanes in the same direction or some of the vanes in one direction and others in the reverse direction at will. In practice, the said vanes 7 normally lie at an angle of 20° more or less to the line of flight within the openings 6 and form a part of the supporting plane or surface 5, and it will be understood that by tilting to a greater angle of incidence either the two front sets of vanes in advance of the transverse center of the machine, or the two following sets of vanes in rear of the transverse center of the machine, the machine may be balanced in a fore and aft direction or steered either upward or downward, and that, on the other hand, by adjusting the vanes on opposite sides of the longitudinal center of the machine in opposite directions the machine may be steered to the right or left or balanced to maintain its lateral equilibrium. By the described normal arrangement of the vanes beneath the propellers 31 the air impelled downward by the propeller blades passes through the spaces between the vanes and exerts pressure on the rear inclined surfaces of the blades to impart a forward pushing or propelling effect. Arranged at a suitable point upon the car or platform 1, preferably in advance of the radiator and aviator's seat, is a pair of motors 25 and 26, arranged at an angle or in V formation. The shafts 27 and 28 of these motors extend in front and rear thereof and diagonally or obliquely to the line of flight of the machine, said shafts thus being arranged in crossing relation and having their ends terminating respectively beneath the centers of the openings 6 and provided with beveled gears 28'. The gears 28' mesh with corresponding gears 29 on the lower ends of vertical transmission shafts 30, suitably journaled on the frame and main plane and preferably extending at their upper ends through the openings 6 above the sets of vanes 7. Upon the upper ends of the shafts 30 are mounted lifting and sustaining propellers 31, which are thus arranged to rotate above the respective sets of vanes 7. The shafts 27 and 28 revolve in opposite directions, and it will be seen that by the described arrangement of the gearing the forward propeller driven by each shaft is arranged above the front set of vanes at one side of the machine, while the other propeller driven by said shaft is arranged above the rear set of vanes at the opposite side of the machine. The respective sets of front and rear propellers are thus disposed to revolve in opposite direc-

tions so that the side thrust of each will be counteracted by the other. It will thus be seen that if the motor of one power series or either of the propellers thereof should become inoperative from any cause, the propellers of the other series will serve to sustain the machine, and by their described arrangement, in which the propellers of each series have a counteracting working thrust, will maintain the machine in a straight course and prevent lateral deflection thereof.

As before described, the aviator's seat 19 is preferably mounted upon or in rear of the radiator 20, which is disposed in advance of the fuel supply tank 32 and in rear of the motors, so as to reduce the liability of an explosion or conflagration from overheating of the tank or in the event of fuel leakage. Preferably a driving propeller 33 is employed for direct forward propulsion, and this propeller may be arranged at either the front or rear of the machine. In the present instance I have shown said propeller arranged at the rear of the machine and driven in any suitable manner from a motor 34, but it may be driven from the motors 25 and 26 through suitable clutch-controlled gearing or suitable direct clutch connections. While the vanes 7 may be employed to steer the machine horizontally, I may provide a series of pivoted laterally swinging vertical rudders or steering planes 35, located beneath the openings 6 and sets of steering and stabilizing vanes in order to lie within the zone of the air deflected downward therefrom, in order that said rudders may act upon condensed or compressed air to increase their thrust efficiency. These rudders 35 may be operated in any preferred manner. In the present instance I have shown their shafts or axes provided with sprocket pinions 36, the pinions of the rudders at each side of the longitudinal center of the machine being connected by a chain 37, the stretches of which are in engagement at an intermediate point with a pinion 38 on a vertical transmission shaft 39, which also carries a sprocket wheel or pinion 40. The sprocket wheels or pinions 40 of the gearing of each longitudinal set of vanes are connected by a transverse chain 41, the stretches of which engage a sprocket wheel or pinion 42 on a control shaft 43 arranged adjacent the aviator's seat and provided with a steering or controlling wheel 44. Through this system of gearing the vanes of each set may be simultaneously turned in the same direction and the two sets of vanes simultaneously turned in opposite directions to steer the machine to the right or left at will, as will be readily understood.

From the foregoing description, the construction and mode of operation of my improved flying machine will be readily understood, and it will be seen that the invention

provides a machine which is adapted to ascend directly from the ground, to descend with any desired speed by regulating the speed of the propellers 31, and to be sustained so as to hover in the air over any given point for making observations, etc. It will, of course, be apparent that the altitude of the machine may be controlled by the propellers 31, and that when the desired altitude is reached the speed of said propellers may be reduced simply to sustentation speed, so that the machine may be driven forward in a straight horizontal line by the propeller 33 in conjunction with the vanes 7 when said vanes are set at the proper angle for forward propulsive effect.

It is evident that the arrangement of the propellers 31 causes increased safety, while the vanes 7 permit effective longitudinal and lateral control and that, in the event of the complete stoppage of the motive power, the vanes may be adjusted so that the supporting surface will perform the function of a parachute, allowing a safe landing to be made.

Having thus described the invention, what I claim as new is:

1. A flying machine embodying a frame, a supporting surface provided with openings at or near the corners thereof, sets of vertically tilting vanes mounted in said openings, connections between the vanes of each set for operating the same in unison, and sets of controlling devices for operating the fore and aft sets of vanes on each side of the longitudinal center of the machine independently or in unison.

2. A flying machine embodying a supporting frame, a supporting surface provided with openings at or near the four corners thereof, sets of vertically tilting vanes arranged within the respective openings, connections between the vanes of each set to adapt them to tilt in unison, concentrically journaled shafts at each side of the longitudinal center of the frame, and operating connections between said shafts and the corresponding side of the machine, controlling devices connected with said shafts, and

means for securing said controlling devices in adjusted position.

3. A flying machine embodying a frame, a supporting surface carried thereby and provided with openings at or near its four corners, sets of vertically tilting vanes arranged within the said openings, means for controlling said vanes, direction rudders mounted below the respective sets of vanes, and means for simultaneously operating said rudders.

4. A flying machine embodying a supporting frame, a supporting surface carried by the frame and provided with openings at or near its four corners, sets of vertically tilting vanes movable within said openings, means for adjusting said vanes, front and rear pairs of oppositely rotating propellers disposed above the sets of vanes, means for driving said propellers, direction rudders disposed below the vanes, and means for adjusting said rudders in unison.

5. A flying machine including a supporting frame, a supporting surface provided with openings at or near the four corners thereof, vertical shafts extending upwardly through and above said openings, propellers mounted upon the upper ends of said shafts, sets of vertically tilting vanes arranged within the respective openings, means for tilting the vanes of each set in unison, a pair of motors arranged below the supporting surface in V-relation, the shafts of said motors being diagonally arranged, gearing between the respective motor shafts and the respective vertical propeller shafts, whereby the front propeller of each pair is coupled to the rear propeller of the other pair, and means for adjusting the tilting vanes on each side of the longitudinal center of the machine independently of the tilting vanes at the opposite side of the longitudinal center thereof.

In testimony whereof I affix my signature in presence of two witnesses.

BERNARD B. STUBBLEFIELD.

Witnesses:

**A. C. FERRISS,
LOUIS FELDMAN.**