H. M. BENSON.

FLYING MACHINE.

APPLICATION FILED AUG. 25, 1909.

1,006,624.

Patented Oct. 24, 1911.

4 SHEETS—SHEET 1.

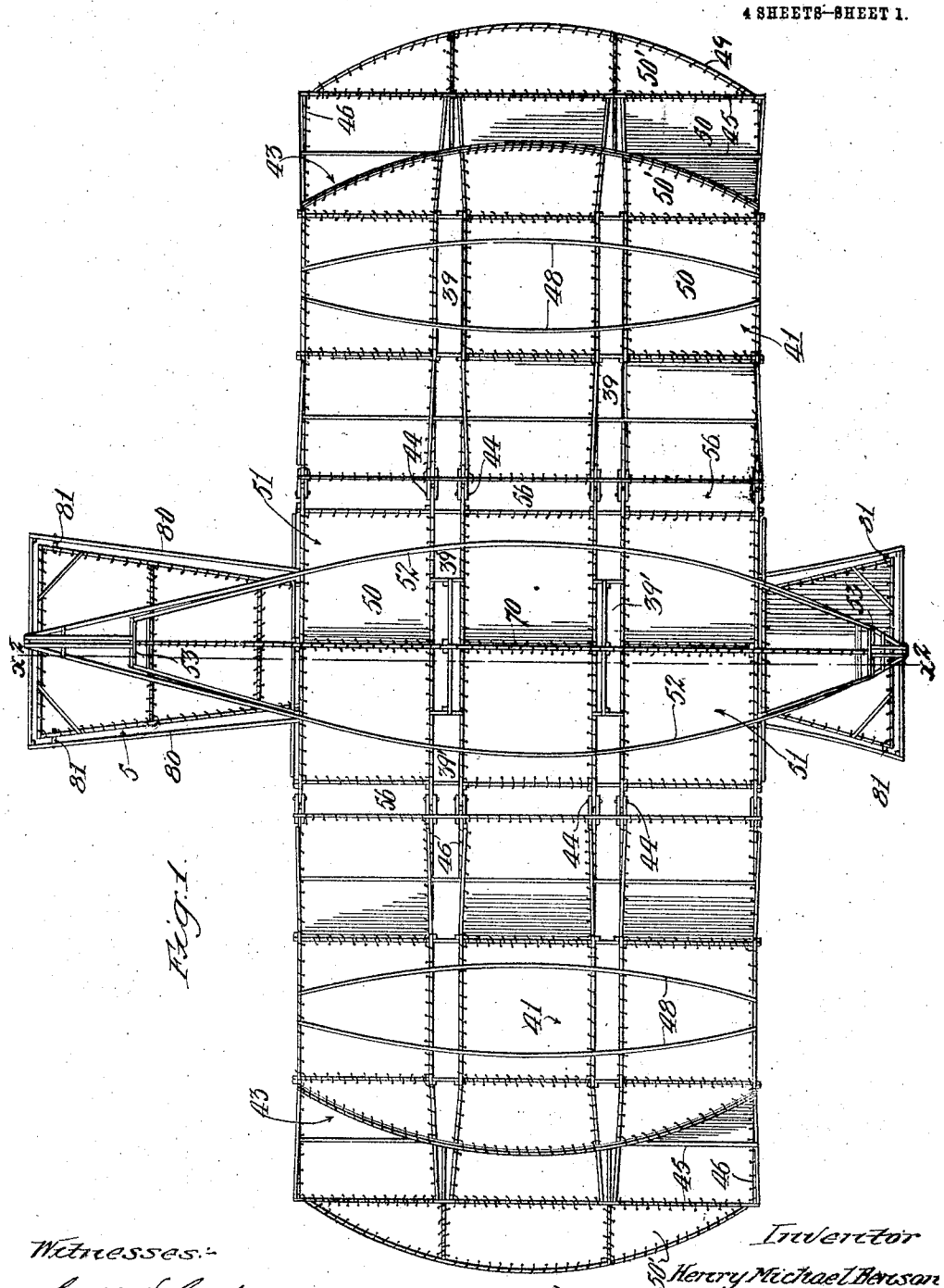

Fig. 1.

Witnesses:-

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Frank L. Markham

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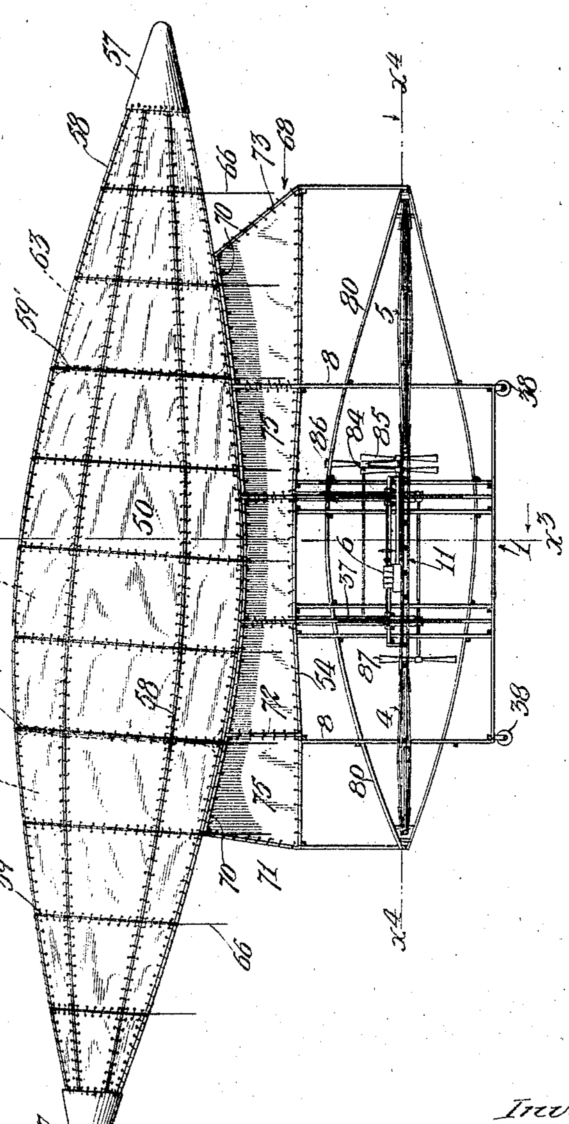
4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

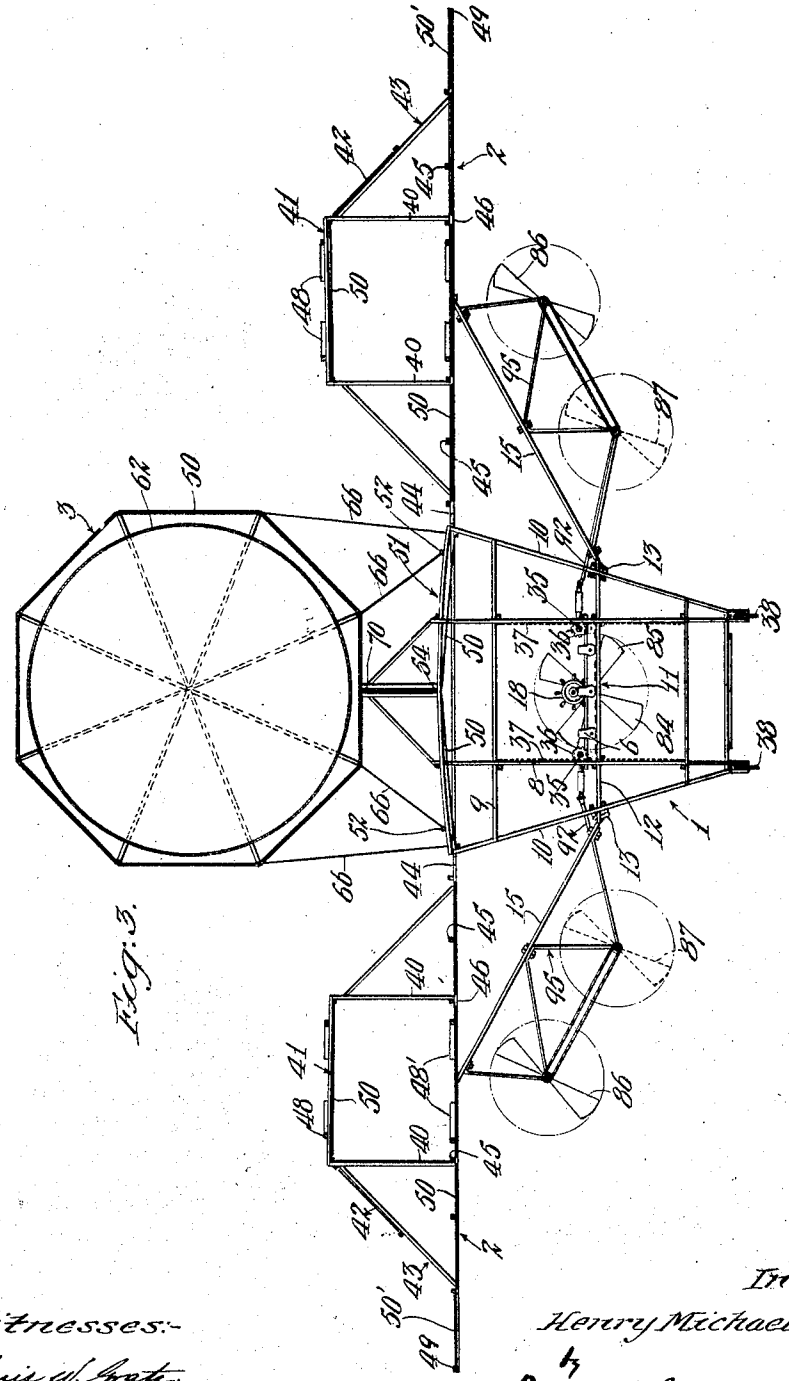

Fig. 3.

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4 SHEETS—SHEET 4.

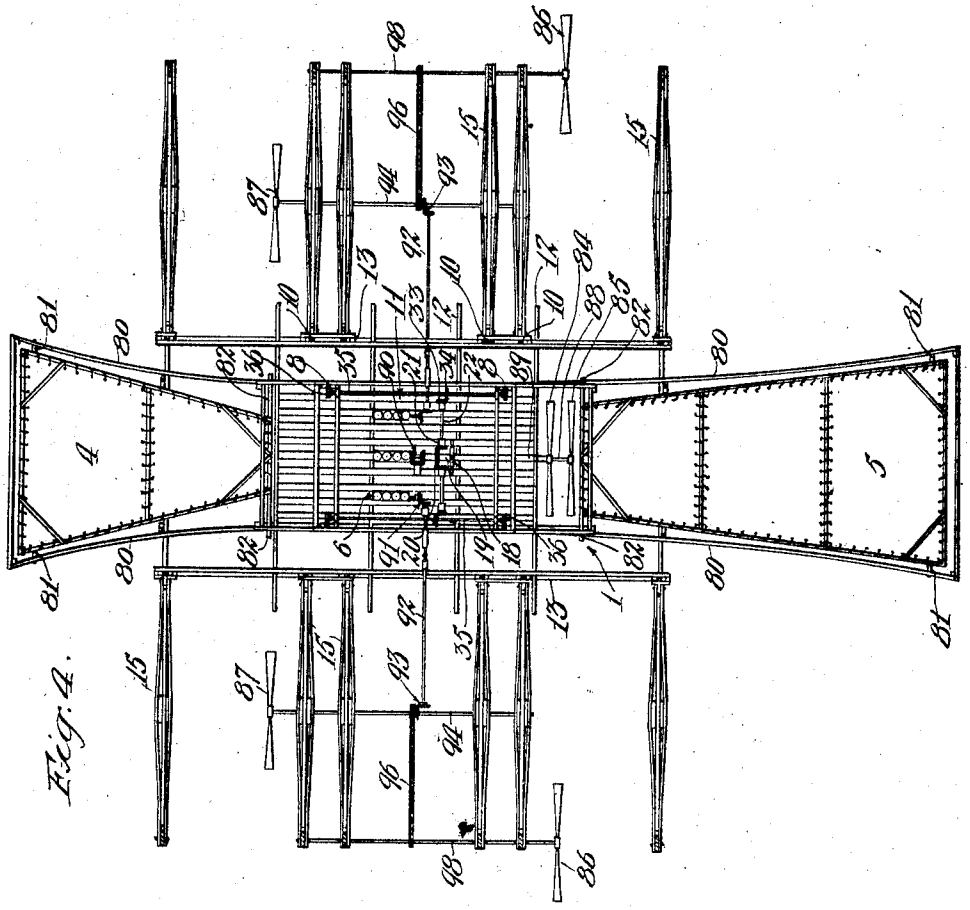

Fig. 4.

Witnesses:—
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UNITED STATES PATENT OFFICE.

HENRY MICHAEL BENSON, OF CRESCENT, NEVADA, ASSIGNOR OF THREE-FOURTHS TO ARTHUR BOYCE AND ONE-FOURTH TO GEORGE WARREN CONDON, BOTH OF LOS ANGELES, CALIFORNIA.

FLYING-MACHINE.

1,006,624. Specification of Letters Patent. Patented Oct. 24, 1911

Application filed August 25, 1909. Serial No. 514,632.

To all whom it may concern:

Be it known that I, HENRY MICHAEL BENSON, a citizen of the United States, residing at Crescent, in the county of Clark and State of Nevada, have invented a new and useful Flying-Machine, of which the following is a specification.

This invention relates to a flying machine depending for its operation partly upon the aeroplane principle and partly upon the lifting action of a gas bag, and the main object of the invention is to provide for efficient application of the pressure due to the movement of the machine in lifting or holding the machine in the air.

A further object of the invention is to provide efficient and easily operated means for controlling the upward and downward movement of the machine.

Another object of the invention is to provide improved means for steering the machine.

Another object of the invention is to provide an improved aeroplane construction for a flying machine whereby maximum strength, together with lightness, is secured.

Another object of the invention is to so connect the gas bag with the aeroplane that the gas bag will exert a lifting tendency or inclination in the forward movement of the machine.

The accompanying drawings illustrate the invention, and referring thereto: Figure 1 is a plan of the machine with the gas bag removed. Fig. 2 is a vertical section on line x^2—x^2 in Fig. 1, showing the gas bag in position. Fig. 3 is a vertical section on line x^3—x^3 in Fig. 2. Fig. 4 is a horizontal section on the line x^4—x^4 in Fig. 2.

The machine comprises a cage or body member 1 with an aeroplane member or wing 2 connected thereto at each side thereof, and a gas bag or container 3 connected to and extending above the body member 1, a forward or head aeroplane member 4 and rear or tail aeroplane member 5 connected respectively to front and rear of body 1, motors 6 supported by the body member 1, and propellers connected to said motors for propulsion and steering of the machine. The body member 1 may be formed as a framework comprising vertical posts 8, horizontal bars 9, and inclined members 10 extending from the bottom of the framework or body member to the top thereof and connected to the horizontal members 9. A platform 11 is mounted to slide vertically on the posts 8, said platform being provided with horizontal bars 12 which slide through frames 13 which in turn slide on the inclined members 10. A trussed connection or thrust means 15 is provided, pivotally connected at one end to the frames 13 on members 10 of the platform and pivotally connected at its upper end to the side aeroplane or wing member 2 so that the vertical position or inclination of the aeroplane or wing is determined or controlled by the vertical position or elevation of the platform 11. A windlass or controlling means 18, mounted on the platform 11, is connected by its shaft 19 and bevel gears 20, 21, cross shafts 22, and bevel gears 33, 34 with shafts 35 extending longitudinally of the platform on each side thereof, said shafts 35 being provided with gear wheels 36 engaging gear racks 37 on the posts 8 of frame or body member 1, so as to raise or lower the platform relatively to the body member by operation of said windlass. Frame 1 is provided with wheels 38 to run on the ground in starting or alighting.

Each aeroplane member or wing 2 comprises a main member formed as an extended flat surface with transverse openings or slots 39 therein, and an upper or supplementary portion supported by truss or frame means 40 extending upwardly from the main portion 2 and formed with a top flat aeroplane surface 41 above the midwidth portion of the member 2, and an inclined portion 42 extending from the top surface 41 obliquely downward and outwardly toward the main portion 2, but leaving a longitudinal space between said portion 42 and 2, said portion 42 being wider in the middle so that the space aforesaid, indicated at 43, is wider at the ends. The members or wings 2 are formed of longitudinal bars or strips 45 and transverse bars or strips 46 extending across one another and secured together at the joints or crossing points to form a reticulate structure, this structure being braced by the truss work 40 which may be further braced by bowed strips or bars 48, 48′ extending longitudinally of the top and main members respectively of the aeroplane and secured to the transverse bars thereof, said strips 48 being bowed in opposite directions. The

member 2 is further braced by a bowed strip 49 secured to the front and rear ends thereof at its outer edge and to transverse bars. The aeroplane surfaces on the members 2, 41 and 42 are formed by sheets 50 preferably of hard fiber or similar material extending in the rectangular spaces between the longitudinal and transverse bars 45, 46 and laced to said bars by lacing 51, so that each of said sheets forms a separate aeroplane unit capable of separate removal, etc. The member 42 and the space within member 49 are similarly provided with sheets 50′ corresponding in shape to the curvature of said members. Aeroplane members 2 are pivoted at 44 to the top of frame or body 1. The wings or aeroplane members 2 and the head and tail aeroplane members 4, 5 all extend horizontally or are horizontally disposed when the machine is in ordinary flight, the term "horizontally disposed" as herein used meaning that their normal disposition is horizontal and the general effect is that of a horizontal aeroplane, subject to variation by the inclinations as controlled by the movement of the platform.

The top of the body or frame member 1 is closed over by sheets 50 laced to the longitudinal and cross bars of the top of the frame so as to form an aeroplane surface between and partially connecting the wings or main aeroplane members 2. This aeroplane surface indicated at 51 is preferably slightly curved so as to be convex on its upper face and concave on its lower face. Curved or bow shaped bars 52 extend fore and aft on the top of the aeroplane surface 51 and extend beyond the same at each end, being united at their forward and rear ends respectively by cross bars 53 to a central longitudinal bar 54. Said aeroplane surface 51 is also provided with transverse slots 39′ in line with the slots or passages 39 through the aeroplane member 2, and longitudinal slots or passages 56 are left between the outside edge of the aeroplane member 51 and the inside edge of the aeroplane member 2.

The gas bag or receptacle 3 is formed as an elongated, elliptical or cigar shaped body having conical caps 57 at the front and rear ends thereof connected by longitudinal strips or bars 58 which are held in position by wires 59 and strips 59′ extending around the gas bag structure to form polygonal frames, sheets 50 of hard fiber or other suitable material extending within the spaces formed by these longitudinal and chord bars and being laced thereto to form a substantially closed receptacle wherein the gas bags proper, indicated at 61, 62, 63, may be contained, said gas bags comprising a forward and rear gas bag 61, 63 and a middle gas bag 62 conforming more or less to the proximate portion of the receptacle 3 and being of any suitable material. The gas bag receptacle 3 is secured to the body or frame 1 by means of wires or suspension means 66 extending from the angles of the polygonal frames around the gas bag to the top members of the frame 1 and by a keel member 68 which is formed as a longitudinal frame provided with top bars 70 which are concavely curved to fit the bottom of the gas bag receptacle 3 and uprights or struts 71, 72, 73 connecting said bars with the central longitudinal bar 54 on top of the frame 1, the spaces between these bars 70, 74, 72, etc., being occupied by vertical sheets 75 of hard fiber or other suitable material laced to said bars. The lifting capacity of the gas bag is preferably sufficient to overcome c a part of the weight of the machine.

An auxiliary frame consisting of bow shaped bars or strips 80, secured to the vertical posts 8 of body 1 and connected at their forward and rear ends, serves to support the outer ends of the head and tail aeroplane members 4 and 5, each of said members being pivoted at its outer end, as indicated at 81, to the frame 80 and pivoted at its inner end, as indicated at 82, to the vertically movable platform 11, so that the said head and tail aeroplane members are upwardly and downwardly deflected in accordance with the adjustment or position of the platform.

Three motors 6 the preferably provided, a central motor for operation of the central propellers 84, 85, and a motor 6 at each side of the central motor for operation of the side propellers 86, 87. The propellers 84, 85 are operated in opposite directions, being mounted on inner and outer concentric shafts 88, 89 driven by bevel gears 90 from the central motor 6. Each outer motor 6 is connected by gears 91, shaft 92 and bevel gears 93 with a shaft 94 extending longitudinally of the thrust frame 15 on that side and journaled thereon, said shaft carrying the propeller 87 which is located at about the middle of said frame on the truss-work or downward extension 95 thereof, so as to be in approximately the same horizontal plane with the central propellers 84, 85. Sprocket wheel and chain connections 96 connect the shaft 94 with a propeller shaft 98 journaled in the outer end of the thrust frame 15 on the downward truss portion 95 thereof below and approximately at the mid width of the aeroplane member 2. The propeller 86 on the shaft 94 is at the forward end thereof, and the propeller 87 on the shaft 98 is at the rear end thereof. Any usual or suitable controlling means may be provided for the several motors to control the operation of each of the motors individually.

The operation of the machine is as follows: In starting, the gas bags are inflated with gas, so as to exert a lifting tendency

on the machine, this tendency being greatest at the forward end on account of the forward offset of the gas bags. The platform 11 is in lowered position, so that the aeroplane wings 2 are tipped outwardly and downwardly and the head and tail aeroplanes 4 and 5 are tipped or inclined outwardly and upwardly. On then driving the machine forward as by operation of the propellers or by other means, the machine rides along on the ground wheels 38 until the lifting tendency due to the action of the gas bags, as stated, in tipping the machine upwardly in front, in conjunction with the lifting effect due to the action of the head and tail aeroplanes when thus tipped upwardly and outwardly, and of the wings 2 when thus tipped outwardly and downwardly, will cause the machine to rise off the ground, this rising motion being continued as long as the aeroplane members are maintained in the inclined position stated and the forward motion is maintained by the action of the propellers. The object of tipping the wings 2 downwardly when the machine is rising, is to increase the compression or reaction on the air tending to lift the machine, it being understood that the lifting action is due to a slight forward and upward inclination of the machine as a whole, so that there is a compression of the air beneath the aeroplane and reactive pressure tending to lift the machine, and the outward and downward tipping of the wings 2 increases this compressive action by confining the air more or less in the space between said wings. When sufficient height has been attained, the platform 11 is moved by the controlling means 18 to bring all of the aeroplane members to horizontal position, as shown in Figs. 2 and 3, this being the condition for normal flight, it being understood that the forward offset of the gas bag will maintain the slight rising tendency under these conditions, compensating for the effect of gravity on the machine as a whole. In descending, the platform will be raised further to tip the wings 2 outwardly and upwardly and the front and rear aeroplanes outwardly and downwardly, the object of so tipping the wings 2 being to reduce the compression in descending, thereby facilitating the descent and also giving greater stability as the acting pressure on the machine is thereby applied further above the center of gravity, and furthermore any lateral tipping of the machine will, under such conditions, bring a greater resistance at the side which is tipped downward, producing thereby a self-righting tendency, causing the machine to descend in a gradual curve. The steering is effected by control of the side propellers by suitably varying the speed of one or both of the side motors, an increase of speed of the motor on one side as compared with the motor on the other side causing the machine to turn in the direction toward the side of the least speed. In this operation the action of the forward propellers 87 in compressing air under the aeroplane surfaces produces an extra lifting effect on the side of greatest speed, so that the machine naturally takes a tilt correspondingly to the circle of curvature. This operation may also be utilized for righting or maintaining the balance or horizontal position of the machine. The forward propellers 87 are a considerable distance in advance of the main propellers 84 and 85 and the side propellers 86 and one effect of the forward propellers is to throw the air into effective working contact with the main propellers and the rear propellers. An advantage of the aeroplane construction shown with the transverse slots 39, 39′ is that the air, as it is compressed and correspondingly heated by the action of the lower aeroplane members 2 and 42, rises through said slots or passages, making way for a fresh supply of cool air enabling more efficient operation.

The upper aeroplanes 41, 42 act as balance means for the machine in its flight for the reason that as the machine passes through the air the air is compressed beneath the gas bag receptacle 3 and forced out under the aeroplanes 41, 42 and through the lateral opening 43 at each side, the resulting pressure on the aeroplanes 41, 42 tending to balance the machine. The central propellers which are driven in opposite directions act as a turbine to drive the air directly rearward.

What I claim is:—

1. An aeroplane comprising a body member, horizontally disposed aeroplane wings pivoted at each side of the body member, horizontally disposed head and tail aeroplanes pivoted to the front and rear ends of the body member, and controlling means for simultaneously and correspondingly varying the inclination of the wings upwardly or downwardly from a horizontal position and for simultaneously and correspondingly varying the inclination of the head and tail aeroplane members, said controlling means being connected to vary the inclination of the wings reversely to the inclination of the head and tail aeroplane members.

2. In a flying machine, the combination with a body member of a gas receptacle extending above the body member and connected thereto, a horizontally disposed aeroplane member pivotally connected at each side to the body member, horizontally disposed head and tail aeroplane members pivotally connected at front and rear ends of the body member, and controlling means for simultaneously and correspondingly varying

the inclination of the wings upwardly or downwardly from a horizontal position and for simultaneously and correspondingly varying the inclination of the head and tail aeroplane members, said controlling means being connected to vary the inclination of the wings reversely to the inclination of the head and tail aeroplane members.

3. In a flying machine, the combination of a body formed with a frame and having an aeroplane top, horizontally disposed aeroplane wings pivoted at each side of said top, horizontally disposed head and tail aeroplanes pivoted at the front and rear ends of the said frame, and controlling means for simultaneously and correspondingly varying the inclination of the wings upwardly or downwardly from a horizontal position and for simultaneously and correspondingly varying the inclination of the head and tail aeroplane members, said controlling means being connected to vary the inclination of the wings reversely to the inclination of the head and tail aeroplane members.

4. In a flying machine, a body formed with an aeroplane, a gas receptacle extending above said aeroplane and tapering forwardly and rearwardly from the middle portion thereof, a side aeroplane pivoted at each side of the aeroplane on the body and provided with an upper aeroplane connected thereto, said upper aeroplane having an outer portion extending obliquely downward toward the side aeroplane, and means for varying the inclination of said side aeroplane.

5. In a flying machine, the combination of a body formed as a frame, a platform vertically movable on said body, means for controlling the height of the platform on the body, a side aeroplane pivoted at each side of the body, and a connection from each side aeroplane to said platform to control the inclination of the side aeroplane by the movement of the platform.

6. In a flying machine, a body, a platform vertically movable thereon, means for controlling the vertical position of the platform, a side aeroplane pivoted at each side of said body, front and rear aeroplanes pivoted at the front and rear ends of said body and connected to said platform, and a connection from said platform to each of the said side aeroplanes whereby the inclination of the side, front and rear aeroplanes is controlled by the movement of the platform.

7. A flying machine comprising a body, an aeroplane pivoted at each side thereof, means connected to said body for controlling the inclination of said side aeroplanes, motor means on the said body, propellers mounted on said body and connected to be driven by said motor means, propellers mounted at each side of said body beneath the aeroplanes and connected to be driven independently by said motor means for driving, balancing and steering the machine.

8. A flying machine comprising a body, an aeroplane pivoted at each side thereof, means connected to said body for controlling the inclination of said side aeroplanes, motor means on the said body, propellers mounted on said body and connected to be driven by said motor means, propellers mounted at each side of said body beneath the aeroplanes and connected to be driven independently by said motor means for driving, balancing and steering the machine, said side propeller means being in advance of the propeller means on the body, an outer propeller means supported at each side of the body and farther out and rearwardly of the first named side propeller means and directly under the side aeroplanes.

9. In a flying machine, a body, wings pivoted to the body, a platform mounted to move vertically on the body, frames connecting said platform with said wings, means controlling the vertical height of said platform to vary the angular position of the wings, propeller means mounted on said frames to move in correspondence with the movement of the wings, and means for driving said propellers.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 23rd day of July 1909.

HENRY MICHAEL BENSON.

In presence of—
ARTHUR P. KNIGHT,
FRANK L. A. GRAHAM.