J. SUTER.

AERIAL VESSEL.

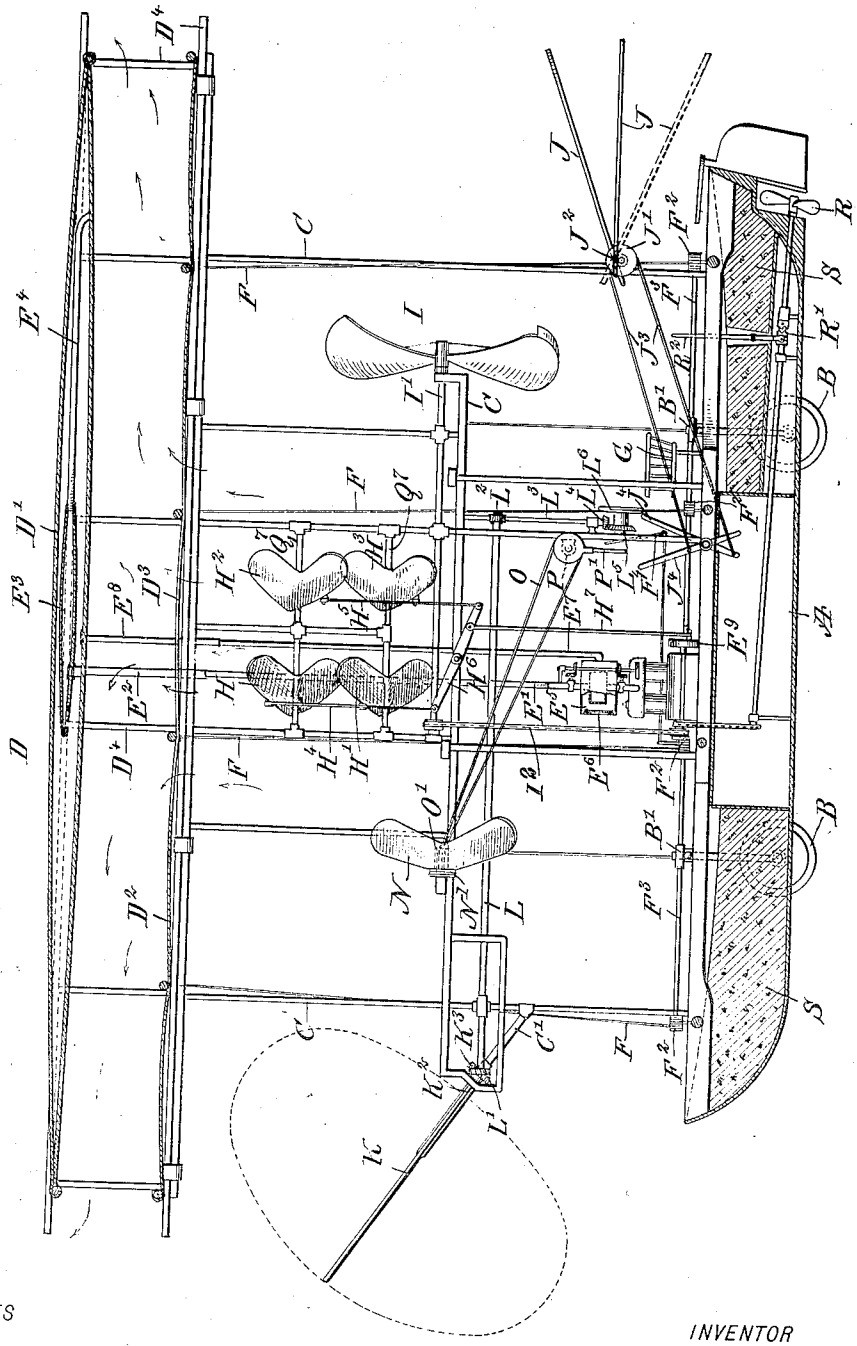
APPLICATION FILED NOV. 27, 1908.

941,896.

Patented Nov. 30, 1909.

3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

Geo. W. Mayer

Rud. J. Hoffmann

INVENTOR

Jacob Suter

BY Munn & Co

ATTORNEYS

J. SUTER.

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3 SHEETS—SHEET 2

Fig. 2.

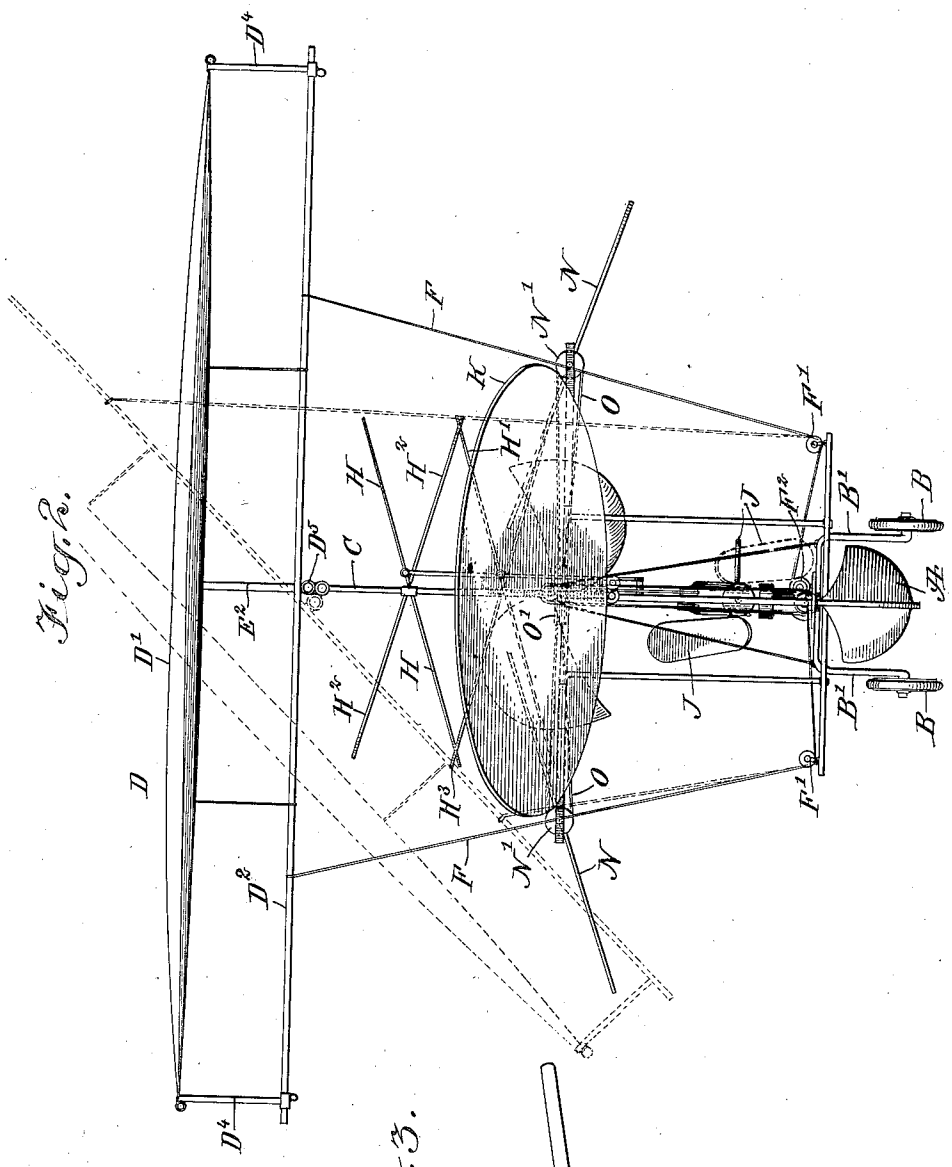
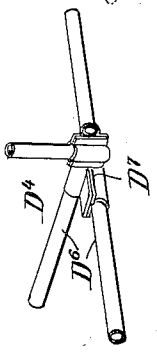


Fig. 3.



WITNESSES

Geo. W. Naylor

Rud. Hoskins

INVENTOR

Jacob Suter

BY Munn & Co

ATTORNEYS

J. SUTER.

AERIAL VESSEL.

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3 SHEETS—SHEET 3.

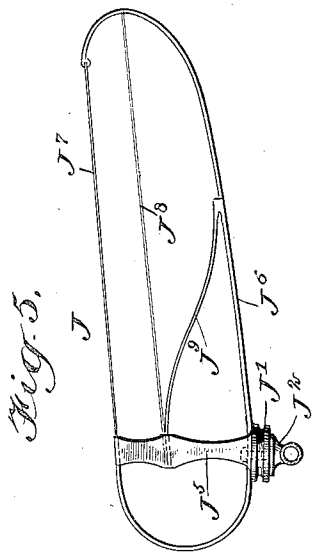

Fig. 5.

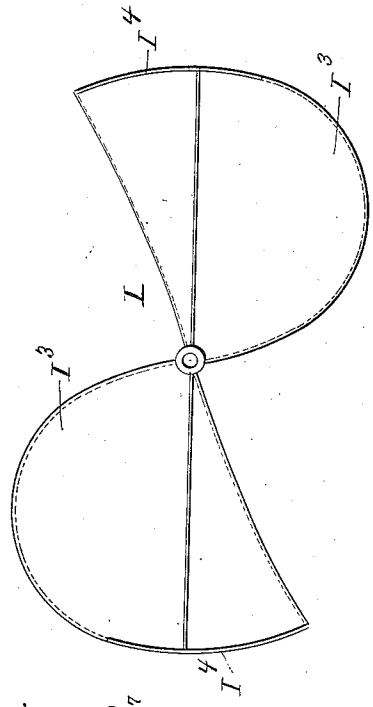

Fig. 6.

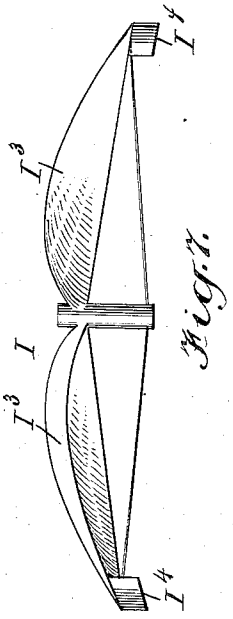

Fig. 7.

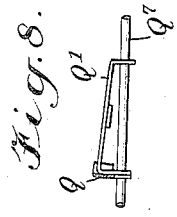

Fig. 8.

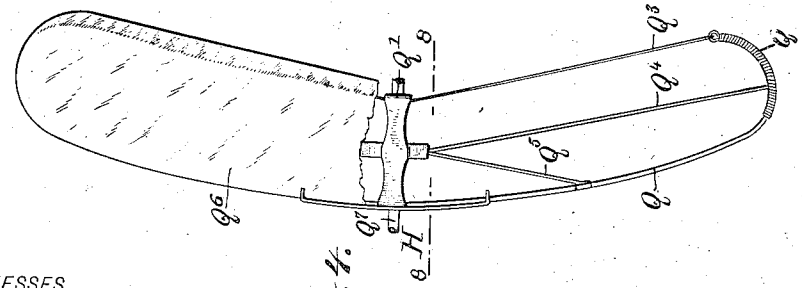

Fig. 4.

WITNESSES

Geo. W. Naylor

Rud. J. Hoster

INVENTOR

Jacob Suter

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

JACOB SUTER, OF JERSEY CITY, NEW JERSEY.

AERIAL VESSEL.

941,896. Specification of Letters Patent. Patented Nov. 30, 1909.

Application filed November 27, 1908. Serial No. 464,688.

To all whom it may concern:

Be it known that I, JACOB SUTER, a citizen of the United States, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented a new and Improved Aerial Vessel, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved aerial vessel or aeronef, arranged to present a large sustaining surface, and provided with means for conveniently causing the aerial vessel to rise, descend and travel in the desired direction, the aerial vessel being also capable of traveling on the water or land.

The invention consists of novel features and parts and combinations of the same, which will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a sectional side elevation of the improvement; Fig. 2 is a front elevation of the same; Fig. 3 is a perspective view of part of the framework for the double aeroplane; Fig. 4 is an enlarged plan view of one of the power wings, part of the covering being broken out; Fig. 5 is a plan view of one of the rudder wings, the covering being removed; Fig. 6 is a face view of the propeller; Fig. 7 is a plan view of the same; and Fig. 8 is a sectional side elevation of one of the power wings, the section being on the line 8—8 of Fig. 4.

The body A for the accommodation of the operator and passengers is preferably in the form of a power boat of non-sinkable construction, to permit the boat to float and be propelled on the water, and on the said boat A are mounted wheels B, to allow the body A to run on land, the wheels B being mounted on axles B′ mounted to swing on the body A, to allow of swinging the wheels B out of the way and folding them on top of the body A when not needed. On the body A is erected a frame-work C, on the upper end of which is arranged a double aeroplane D, having an upper inflatable aeroplane D′ and a lower aeroplane D^2, the latter having a central opening D^3 for the passage of air to and from the space between the spaced aeroplanes D′ and D^2. The upper aeroplane D′ is made hollow for the reception of a gas, preferably, heated and expanded by the heat from the exhaust gas from the motor E located on the body A, and having its exhaust pipe E′ connected by a hose E^2 with a chamber E^3 arranged within the said inflatable aeroplane D′, the chamber E^3 having an outlet pipe E^4.

In case gas is not available for filling the aeroplane D′ then use can be made of heated air, and for this purpose an air-heating chamber E^5 is arranged adjacent to the motor E and through which extends the exhaust pipe E′ to heat the air in the chamber E^5. Atmospheric air can pass into the chamber E^5 by a valved inlet E^6 and a pipe E^7 leads from the chamber E^5 to connect by a hose E^8 with the interior of the aeroplane D′, as indicated in Fig. 1. Suitable valves may be arranged in the exhaust pipe E′ to control the passage of the exhaust gas from the motor to the chamber E^3 and to the atmosphere.

The aeroplanes D′ and D^2 are mounted on a suitable frame-work D^4, pivoted at D^5 on the frame-work C, to permit of swinging the double aeroplane D sidewise into an angular position, such as indicated in dotted lines in Fig. 2, it being, however, understood that normally the double aeroplane D extends horizontally and is held in this position by cords F extending from opposite sides of the frame-work D^4, down around guide pulleys F′ to drums F^2 secured on a shaft F^3, journaled in suitable bearings arranged on the body A, which also carries the guide pulleys F′. The shaft F^3 is adapted to be turned by suitable mechanism actuated from a lever F^4 under the control of the operator seated on the seat G held on the body A. By the arrangement described, the operator on manipulating the lever F^4 can turn the shaft F^3, so as to wind up the cords F on one side and to unwind the cords on the opposite side, with a view to tilt the aeroplanes into the angular position above referred to and shown in dotted lines in Fig. 2.

The frame-work D^4 is preferably made of tubing D^6 provided with sockets D^7, to allow convenient assembling and disassembling of the frame-work D^4 (see Fig. 3). The upper aeroplane D′ is made of two sheets of fabric material, of which balloons are usually made, but the sides and ends of the two fabrics are fastened together on the frame-work D^4, to allow inflation of this upper aeroplane to

the greatest extent at the middle, and diminishing at the sides and ends, as indicated in Figs. 1 and 2. By arranging the aeroplane D in the manner described a large buoyant sustaining surface is provided.

Directly below the central opening D^3 in the lower aeroplane D^2 are arranged sets of beating wings H, H′, H^2, H^3, adapted to swing up and down on the frame-work C and connected by rods H^4, H^5 with the opposite ends of a walking beam H^6, fulcrumed on the frame-work C, and the said walking beam H^6 is connected by a pitman H^7 with a crank disk E^9 on the main shaft of the motor E, so that when the latter is running a rocking motion is given to the walking beam H^6, to impart a swinging motion to the sets of beating wings H, H′, H^2, H^3. As shown, the wings H and H^2 are arranged one behind the other and rock in opposite directions, and the wings H′, H^3 are similarly arranged, but the wings H and H′ swing parallel with each other but in opposite directions to the wings H^2, H^3, which also swing in unison with each other. By the use of the beating wings H, H′, H^2 and H^3, the aerial vessel is caused to ascend, and the portion of the air forced upward by the beating of the said wings passes through the central opening D^3 into the space between the aeroplanes D^2, D′, to exert an upward pressure against the under side of the aeroplane D′, to assist in lifting the aerial vessel.

In order to propel the vehicle forward, a propeller wheel I is provided, secured at the rear end of a longitudinally-extending shaft I′, journaled in suitable bearings on the frame-work C, and the propeller shaft I′ is connected by sprocket wheels and a sprocket chain I^2 with the main shaft of the motor E, so that when the latter is running a rotary motion is given to the propeller wheel I, to propel the aerial vessel forward.

In order to assist in steering the vessel up or down or sidewise, use is made of rudders J, J, arranged above the rear end of the body A, and the said rudders J are attached to wheels J′ mounted to turn on studs J^2 attached to the frame C (see Figs. 1 and 5). The wheels J′ are connected by cords J^3 with hand levers J^4, fulcrumed on the body A and within convenient reach of the operator seated in the seat G, to allow the operator to swing the rudders J simultaneously up or down into a desired position for steering the aerial vessel up or down. Normally the rudders J extend longitudinally, that is, when the vessel travels forward and when it is desired to steer to the right or left the operator actuates the corresponding lever J^4, to swing the corresponding rudder J up and down, while the other rudder J remains horizontal.

In order to permit of causing the vessel to rise and to steer it sidewise, use is made of a front rudder K, in the form of a disk, and secured on a shaft K^2 extending diametrically of the disk K and in an upward and forward direction, as plainly indicated in Figs. 1 and 2. The shaft K^2 is journaled in a suitable bearing C′ arranged on the frame-work C, and on the said shaft K^2 is secured a gear wheel K^3 in mesh with a gear wheel L′ attached to a longitudinally-extending shaft L, connected by worm and worm wheel L^2 with a vertical shaft L^3, journaled on the frame-work C, as shown in Fig. 1. The lower end of the shaft L^3 is provided with a bevel gear wheel L^4 in mesh with a bevel gear wheel L^5 held on a hand wheel L^6, mounted to turn on the frame-work C and under the control of the operator seated in the seat G. Now when the operator turns the hand wheel L^6, a turning motion can be given to the shaft K^2 to turn the disk rudder K into an angular position, so as to cause the aerial vessel to travel to the right or left, according to the direction in which the disk rudder K is set. The rudder K is vertical when the vessel travels forward, as shown in dotted lines in Fig. 1, and when the rudder is in the position shown in full lines, the vessel is caused to rise.

In case the motor E or the connections to the wings H, H′, H^2 and H^3 should accidentally become out of order, then use is made of auxiliary beating wings N, mounted to swing on the frame-work C at the sides thereof, each wing N being provided with a pulley N′, around which passes a cord O extending over guide pulleys O′ to a wheel P (see Fig. 1), journaled on the frame-work C, and having a handle P′ under the control of the operator seated on the seat G. Now by the operator moving the handle P′ forward and backward, the wings N are caused to swing up and down, so as to permit the operator to descend easily in case of accident to the machinery, as previously mentioned.

Each of the wings H, H′, H^2, H^3 and N is preferably made of the construction shown in Figs. 4 and 8, that is, is provided with a front supporting rod Q, having an arm Q′ at its middle, and connected at its ends by springs Q^2 with links Q^3 attached to the arm Q′, and a brace Q^4 extends from the arm Q′ to the spring Q^2, and a brace Q^5 extends from the arm Q′ to the rod Q, to strengthen the same, and the skeleton frame thus formed is covered by a fabric material Q^6, such as silk or the like. Now by the use of the springs Q^2 the rear or marginal end of the fabric covering is rendered flexible to yield to the air both on the upward or downward stroke of the wing. The arm Q′ is inclined upward from the rear to the front to incline each wing upward relatively to the shaft or pivot Q^7 on which the arm is mounted to swing, the pivot being held on the frame-work C.

Each of the rudders J is preferably in the form of a flexible wing similar to the wings H or N (see Fig. 5), that is, the rudder J is provided with a frame-work having an arm J^5 projecting from the pulley J′ and having a rod J^6 curved at its rear end to connect by a link J^7 with the arm J^5, thereby rendering the rear marginal end of the wings flexible, the frame-work also having braces J^8, J^9 extending from the arm J^5 to the rod J^6, and from the arm J^5 to the rear curved end of the rod J^6, as shown in Fig. 5.

The propeller wheel I, shown in detail in Figs. 6 and 7, is provided with two buckets I^3 of hemispherical shape and having their outer ends provided with flanges I^4, for directing the air to the buckets, so as to render the latter very effective when rotated, as previously explained.

The propeller R for the body A is driven from the engine E, and its shaft is provided with a suitable clutch R′ having a clutch lever R^2, to permit of throwing the clutch R′ into active position whenever it is desired to rotate the propeller R at the time the body A strikes the water. The body A, as previously stated, is preferably in the form of a boat, made of aluminum, filled at the front and rear with a buoyant material S, such as cork or the like, to render the boat non-sinkable.

It is understood that on turning the double aeroplane D to one or to the other side the air current helps in lifting the vessel.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. An aerial vessel, comprising a body, a frame-work rising from the said body, spaced aeroplanes supported on the said frame-work one above the other, the lower one having a central opening, a motor on the said body, and inclined wings mounted to swing on the said frame-work below the opening in the said lower aeroplanes, the wings being actuated by the said motor.

2. An aerial vessel, comprising a body, a frame-work rising from the said body, spaced aeroplanes supported on the said frame-work one above the other, the lower one having a central opening and the upper one being inflatable, a motor on the said body, wings mounted to swing on the said frame-work below the opening in the said lower aeroplane, means for operating the wings from the said motor, a heating chamber in the said upper aeroplane, and a pipe connecting the exhaust of the said motor with the said heating chamber.

3. An aerial vessel, comprising a body, a frame-work rising from the said body, spaced aeroplanes supported on the said frame-work one above the other, the lower one having a central opening, a motor on the said body, wings mounted to swing on the said frame-work below the opening in the said lower aeroplane, and a propeller wheel mounted on the rear of the said frame-work and driven from the said motor for propelling the vehicle.

4. An aerial vessel, comprising a body, a frame-work rising from the said body, spaced aeroplanes supported on the said frame-work one above the other, the lower one having a central opening, a motor on the said body, wings mounted to swing on the said frame-work below the opening in the said lower aeroplane, a propeller wheel mounted on the rear of the said frame-work and driven from the said motor for propelling the vehicle, and manually-controlled up and down swinging rudders on the rear of the frame-work for directing the aerial vessel up or down.

5. An aerial vessel, comprising a body, a frame-work rising from the said body, spaced aeroplanes supported on the said frame-work one above the other, the lower one having a central opening, a motor on the said body, wings mounted to swing on the said frame-work below the opening in the said lower aeroplane, a propeller wheel mounted on the rear of the frame-work and driven from the said motor for propelling the vehicle, and a manually-controlled disk rudder held turnable on the front of the said frame-work.

6. An aerial vessel, comprising a body, a frame-work rising from the said body, spaced aeroplanes supported on the said frame-work one above the other, the lower one having a central opening, a motor on the said body, wings mounted to swing on the said frame-work below the opening in the said lower aeroplane, a propeller wheel mounted on the rear of the said frame-work and driven from the said motor for propelling the vehicle, a disk rudder having a diametrical shaft extending upwardly and forwardly on the front end of the said frame, and manually-controlled means for turning the said rudder shaft.

7. An aerial vessel, comprising a body, a frame-work rising from the said body, spaced aeroplanes supported on the said frame-work one above the other, the lower one having a central opening, a motor on the said body, inclined wings mounted to swing on the said frame-work below the opening in the said lower aeroplane, means for operating the said wings from the said motor, a propeller wheel mounted on the rear of the said frame-work and driven from the said motor for propelling the vehicle, a disk rudder provided with a diametrical shaft extending upwardly and forwardly from the front end of the said frame-work, and manually-controlled means for turning the said rudder shaft.

8. An aerial vessel, comprising a boat-

shaped body, buoyant means in connection with the boat, a frame-work rising from the said body, spaced aeroplanes supported on the said frame-work one above the other, the lower one having a central opening, a motor on the said body, and wings mounted to swing on the said frame-work below the opening in the said lower aeroplane.

9. An aerial vessel, comprising a vehicle body, a frame-work rising from the said body, spaced aeroplanes supported on the said frame-work one above the other, the lower one having a central opening, a motor on the said body, wings mounted to swing on the said frame-work below the opening in the said lower aeroplane, means for operating the said wings from the said motor, and a set of auxiliary and manually-controlled wings mounted to swing up and down on the said frame-work.

10. An aerial vessel provided with a body, a frame-work rising therefrom, and spaced aeroplanes mounted to swing to either side of the said frame-work, the aeroplanes being spaced apart and the lower one having an opening in its middle.

11. An aerial vehicle, provided with spaced aeroplanes, the upper one of which is inflatable and the lower provided with a central opening, heating means supported by the aeroplanes, and delivering to the upper plane.

12. In an aerial vessel, a wing provided with a rigid front rib and rear rib of lesser length than the front rib, and a flexible connection between the ends of the ribs.

13. In an aerial vessel, a wing provided with a rigid front rib and rear rib of lesser length than the front rib, a flexible connection between the ends of the ribs and a center brace connected with the end of the front rib.

14. In a device of the class described, a wing comprising a rigid front rib and rear rib of lesser length than the front rib, a brace connected with the end of the front rib, a second brace connected with the center of the front rib, and a flexible connection between the ends of the front and the rear rib.

15. In a device of the class described, a pair of wings comprising a central arm, a front rib and a rear rib of lesser length than the front rib, braces extending from the arm to the end and center of the front rib respectively, and a flexible connection between the ends of the front and the rear ribs.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JACOB SUTER.

Witnesses:

EMIL SCHUMANN,

CARL G. A. SCHUMANN.