S. H. BENOIST, DEC'D.

M. E. BENOIST, ADMINISTRATRIX.

FLYING MACHINE.

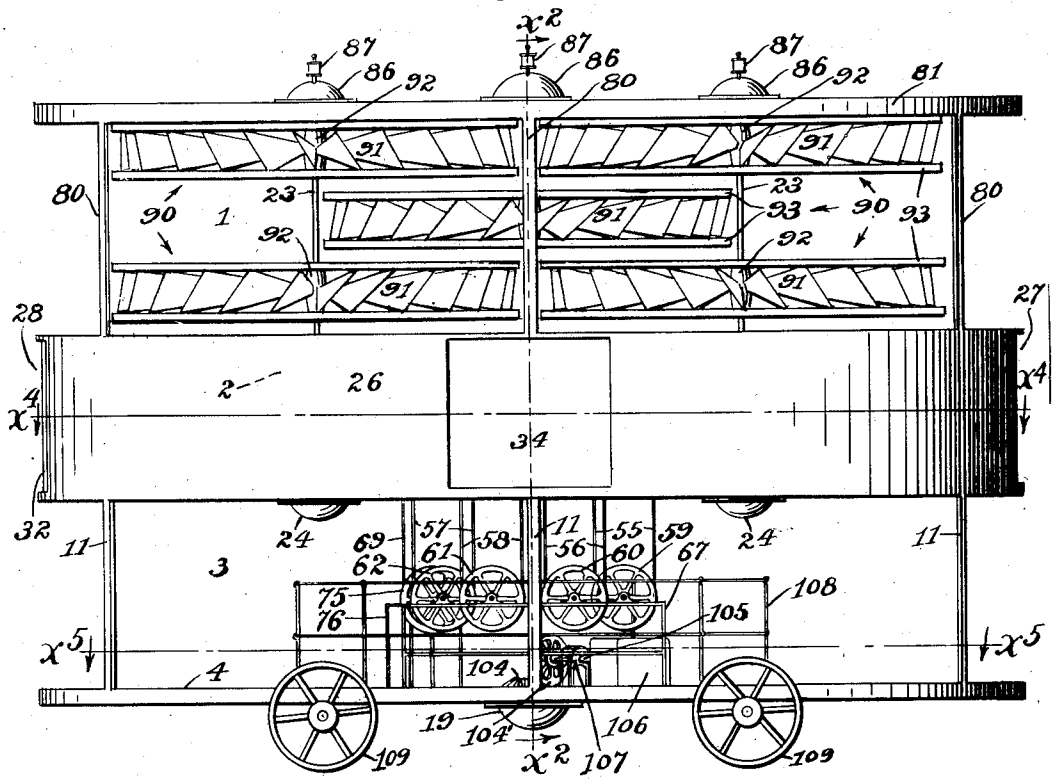
APPLICATION FILED JAN. 20, 1910.

1,038,073.

Patented Sept. 10, 1912.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

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3 SHEETS—SHEET 2.

Fig. 2.

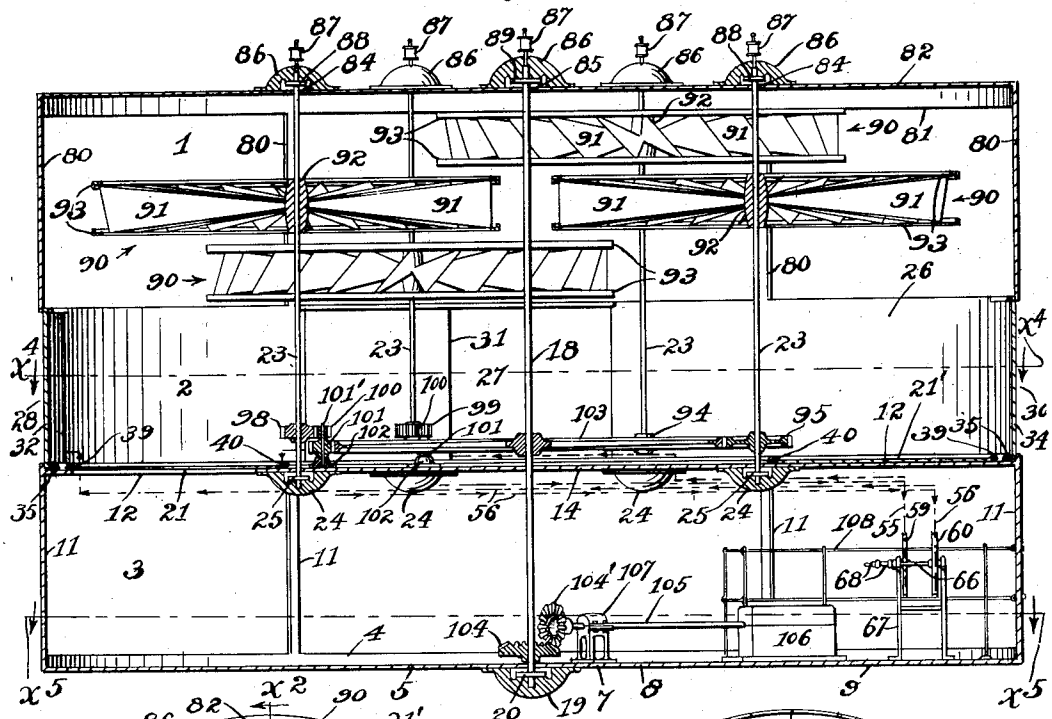


Fig. 3.

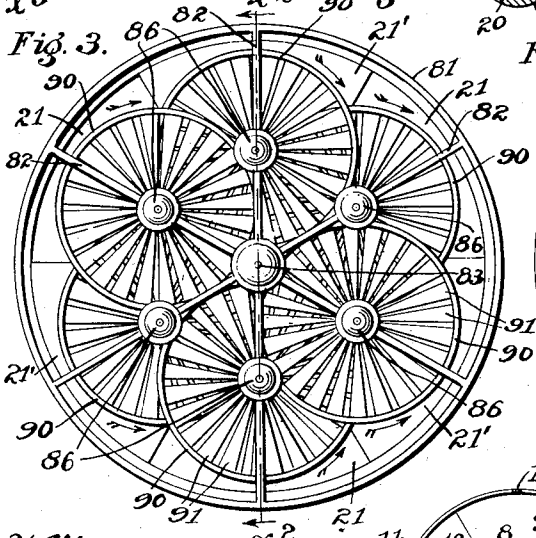


Fig. 4.

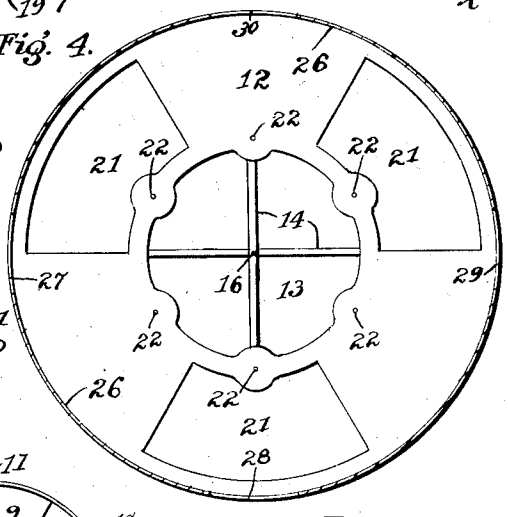
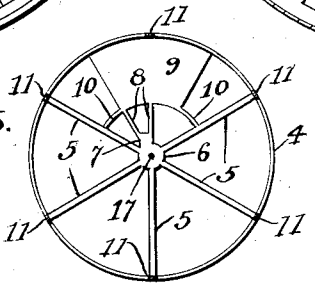


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 6.

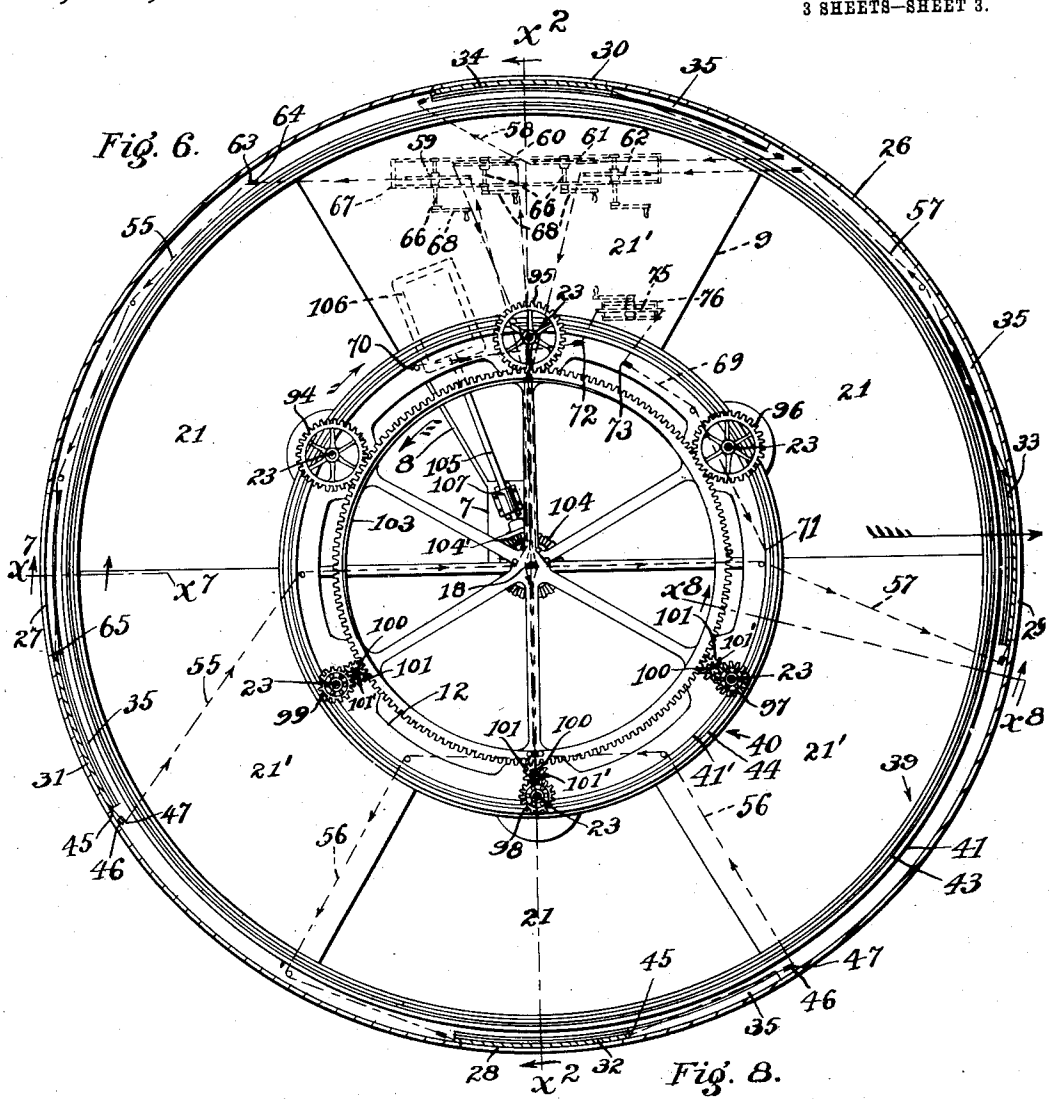
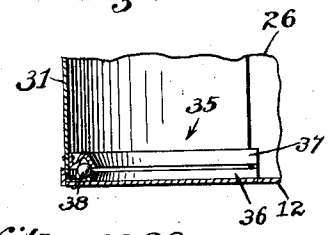
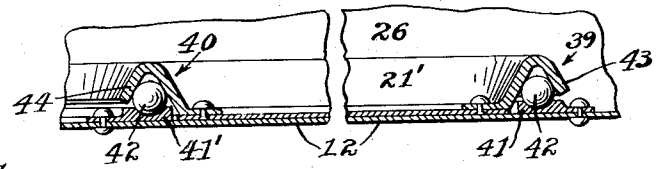


Fig. 8.

Fig. 7.





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UNITED STATES PATENT OFFICE.

SANGUINET H. BENOIST, OF LOS ANGELES, CALIFORNIA; MARIE EUGENIA BENOIST ADMINISTRATRIX OF SAID SANGUINET HUBERT BENOIST, DECEASED.

FLYING-MACHINE.

1,038,073. Specification of Letters Patent. Patented Sept. 10, 1912.

Application filed January 20, 1910. Serial No. 539,201.

To all whom it may concern:

Be it known that I, SANGUINET H. BENOIST, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Flying-Machine, of which the following is a specification.

The object of my invention is to produce a machine, which, though heavier than air, can raise itself from the ground, without a running start, to any desired height, to remain, as a humming bird, hovering over any given spot, at any desired altitude, in spite of the strongest wind; to raise or lower itself, at will, while in the air; and to propel itself in any desired direction; all at a rate of speed entirely under the control of the operator.

Other objects may appear from the accompanying plans and specifications.

I attain these objects by means of the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of the entire flying machine; Fig. 2 is a vertical mid-section on line x^2, Figs. 1, 3, and 6; Fig. 3 is a plan view, with all parts in place; Fig. 4 is a plan section on line x^4, Figs. 1 and 2, with driving machinery removed; Fig. 5 is a plan section on line x^5, Figs. 1 and 2, with engine and driving machinery removed; Fig. 6 is a plan section on line x^4, Figs. 1 and 2; Fig. 7 is an enlarged fragmental detail of a side port-hole cover, sectioned on line x^7, Fig. 6; and Fig. 8 is an enlarged fragmental detail, sectioned on line x^8, Fig. 6.

Direction of sight is indicated by arrows on the several views.

Similar numbers refer to similar parts throughout the several views.

The framework of the flying machine consists of three compartments; the upper, or lifting compartment (1); the middle, or propelling compartment (2); and the lower, or operating compartment (3). The upper and lower compartments (1 and 3) are virtually open, while the middle compartment (2) is almost completely inclosed, save for the top thereof, which is entirely open.

The three compartments just mentioned are described in detail, in order, commencing with the lowest, as follows: The base of the lower compartment (Fig. 5) consists of a circular rim, (4) with radial arms (5) connecting the central nucleus (6), which is circular, save for the rectangular projection (7), that is connected by the arms (8) with a platform (9). The platform (9) is joined to the inclosing rim (4) and forms a part thereof. Bracing arms (10) extend to the arms (5). The nucleus (6) is pierced at its center by a hole (17), through which passes the shaft (18). On the under side of the nucleus (6) is a thrust bearing (19), within which rotate the end of the shaft (18) and its collar (20). Equidistant struts (11), of equal height, extend upward to and depend from the middle compartment (2), suspending the rim (4) therefrom.

The base of the middle compartment (2) consists of a circular plate (12), shown in plan in Fig. 4, in which there is a large central opening (13), traversed by diametrical arms (14). The center of these arms (14) is pierced by a hole (16), through which the shaft (18) also passes. Other openings (21) occur in the bottom plate, the purpose of which will appear hereafter. The openings (22) pierce the plate (12), and through them pass the lower ends of the shafts (23) into the thrust bearings (24). Collars (25) are also provided for the shafts (23). The entire base of the middle compartment (2) is surrounded and surmounted by a cylindrical wall (26), forming, with the base (12), a tank, entirely open at the top, but closed on the side, save for the openings, or port holes (27, 28, 29, and 30), and closed on the bottom (12), save for the openings therein already described. Each of the port holes (27, 28, 29, and 30) is provided with a sliding cover (31, 32, 33, and 34), of the same shape as the port holes, and a trifle larger, so as to completely cover the same when drawn over them. Ball races (35) are provided, of suitable length to allow each cover (31, 32, 33, and 34) to be drawn completely to one side of the port holes (27, 28, 29, and 30), thus allowing the port holes (27, 28, 29, and 30) to be partially or entirely opened. In Fig. 6, the cover (31) is shown to one side of its port hole (27), while the covers (32, 33, and 34) are over their respective port holes (28, 29, and 30). The structure of the ball races (35) is shown in Fig. 7. To the bottom plate (12) is fastened the flange (36) whose cross section is shown in said figure just below the ball (38); and

to the cover (31) is fastened the flange (37), the cross section of which is also shown in said drawing or figure just above the ball (38.) Between these two plates (36 and 37) are balls (38) of proper size and number to cause the plate (37) to roll over the plate (36) without grazing or wabbling. The openings (21) are also provided with sliding covers (21′), of the same shape as the openings (21) and a trifle larger, so as to completely cover the same when drawn over them. These covers are attached to the ball races (39 and 40), as shown in Fig. 8. The two ball races (39 and 40) form complete concentric circles. To the bottom plate (12) of the middle compartment (2) are fastened the plates (41 and 41′) grooved to fit the balls (42). Fitting over these is the plate (43) for ball race (39), and the plate (44) for ball race (40). The balls (42) are of sufficient number and so distributed, and the various other parts of the ball races just described, are of such proper size as to insure the rolling of the upper plates (43 and 44) without grazing any other part, or wabbling. By fastening the covers (21′) rigidly to the upper plates (43 and 44) of the ball races (39 and 40), practically a one-piece cover is formed for the openings (21). In Fig. 6, the covers (21′) are shown to the right from over the openings (21), leaving said openings entirely open.

To move the covers (31, 32, 33, and 34) back and forth, each of them is provided with a rope or chain (55, 56, 57, and 58 respectively) and sheaves (59, 60, 61, and 62 respectively), by which the covers (31, 32, 33, and 34) are separately drawn over or from over the port holes (27, 28, 29, and 30). The manner of and mechanism for controlling these movements of the cover (31) will explain that of the covers (32, 33, and 34) also. The rope or chain (55) is fastened to the cover (31) at its side (45), and passes over a pulley (46) through a small opening at (47) in the plate (12), to the under side thereof; thence, in the direction indicated by arrows, underneath the plate (12), and along and under the cross arms (14), as indicated, to the sheave (59); thence, continuing in the direction indicated by arrows, through an opening at (63) in the plate (12) to the upper surface of said plate, and over the pulley (64), as indicated, to the edge (65) of the cover (31), to which it is also attached. Pulleys, not shown in the drawings, support the rope or chain (55) at points where a change of direction is indicated. The sheave (59) is mounted on a horizontal axle (66), mounted on the support (67), which, in turn, rests on the platform (9). A crank (68) causes the axle (66) and sheave (59) to rotate to right or left, as desired. The sheave (59) is provided with a grooved rim to guide the rope or chain (55), and the rope or chain (55) is drawn taut, so that any motion of said sheave to right or left will be communicated to said rope. By turning the crank (68) to the right, the cover (31) is drawn from over the port hole (27); and by turning the crank (68) to the left, the cover (31) is drawn over the port hole (27). The sheaves (59, 60, 61, and 62) are all mounted on the same support (67).

The plates (21′) are drawn over or from over the openings (21) by a device similar to the one just described, consisting of a rope or chain (69), fastened to the upper plate (44) of the ball race (40) at points (70 and 71) of location suitable to allow the requisite amount of motion. This rope or chain (69) passes above the plate (12), through openings at (72 and 73), and thence over the sheave (75), of construction similar to (59, 60, 61, and 62) and mounted on the support (76), which, in turn, rests upon the platform (9). A turning of the sheave (75) to the right opens; and to the left, closes the openings (21).

Arrows on every rope or chain shown in all the drawings indicate the direction in which the particular rope or chain is to be drawn to open a port hole or other opening.

The upper compartment consists of equidistant, upright arms, or struts (80), surmounting the cylindrical wall (26), and supporting the circular rim (81), from which radial arms (82) seek the common center (83). The arms (82) are pierced by holes (84), and the center is pierced by a hole (85). At the points where holes (84 and 85) occur, the arms (82) and the center (83) are enlarged, as shown in the drawings, to support the thrust bearings (86). These thrust bearings (86) are each provided with oil cups (87). The shafts (23) pass through the holes (84) and end in the thrust bearings (86), which are directly over them. Collars (88) are provided for each of the shafts (23). The shaft (18) passes through the hole (85) into the thrust bearing (86), in which it ends. A collar (89) is also provided for the shaft (18).

Upon each of the shafts (23) is a horizontal fan wheel (90), so mounted as to rotate with the shafts (23). These fan wheels are of the ordinary kind, having thin blades (91) for spokes, tilted forward at an angle approximating 45°, and radiating from a central hub (92). These fan wheels are supplied with strengthening rims (93).

Near the lower end of each of the shafts (23) is a cog-wheel (94, 95, 96, 97, 98, and 99), three of which (97, 98, and 99) are smaller than the others, and mesh with the pinions (100), mounted on shafts (101′). Mounted on the same shafts as the pinions (100), and directly below them, are other pinions (101), the pinions (100) and the

pinions (101) being rigid on the same shafts (101'). These last mentioned pinions and shafts are mounted directly upon the plate (12), as shown in the drawings, bearings (102) being provided for the shafts (101').

Upon the shaft (18) is a large cog-wheel (103), so mounted as to rotate with it, which engages the cog-wheels (94, 95, and 96) and the pinions (101). Near the lower end of the shaft (18) is a rigidly mounted beveled gear wheel (104), which engages the beveled gear wheel (104') The wheel (104') is rigidly mounted on the end of the engine shaft (105), to which power is directly communicated from the engine (106).

(107) is an outboard bearing for the shaft (105), and is mounted on the projection (7).

(108) is a railing surrounding the platform (9) as a protection to the operator, who stands upon this platform.

The wheels (109), of which there are two more on the opposite side, not shown in Fig. 1, are added for convenience in moving the flying machine from place to place along the ground. These wheels are shown in Fig. 1 only.

The lifting power is in the fan wheels (90), which are set in motion by the mechanism already described, as follows: The shaft (105) and wheel (104') are set in motion by the engine (106) and this motion is communicated to the wheel (104) and shaft (18), which rotates the wheel (103). This, in turn, through the cog wheels (94, 95, and 96) and the pinions (100) and (101), set rotating the shafts (23), and consequently the fan wheels (90). The fan wheels (90) rotate in the directions indicated by the arrows in Fig. 3, three of them to the right, and three of them to the left. It will be noted that the fan wheels (90) are mounted in pairs on three different levels, and that the fan wheels (90) of each horizontal pair rotate in opposite directions. This is what makes necessary the pinions (100 and 101), *i. e.* the cog wheels (94, 95, and 96) must rotate in a direction opposite to the cog wheels (97, 98, and 99), which is accomplished through the intermediate pinions (100 and 101) giving the cog wheels which engage them a different direction than those which do not, but which get their motion directly from the wheel (103). The cog wheels (94, 95, 96, 97, 98, and 99) and the pinions (100 and 101) are made with such a number of gear teeth each as to cause the shafts (23) to rotate at the same speed, though three of them rotate to the right, and three of them to the left. The fan wheels (90) when in motion as described, cause powerful downwardly directed air currents, and the setting of the air thus in motion causes a tendency upward which is sufficient to raise the entire flying machine from the ground into the air to any desired height, at a speed which may be varied by varying the speed of rotation of the fan wheels (90).

The placing of the fan wheels (90) upon three different levels, as shown in the drawings, allows the over-lapping arrangement shown in Fig. 3; and by placing said fan wheels so that the center of each wheel occupies the angle of a regular hexagon, as shown in Fig. 3, I obtain the most compact arrangement possible; and each higher pair of fans in motion cause downward currents of air, which act upon the next lower pair, giving them an added lifting power. By arranging the fan wheels in pairs, there is also a tendency to draw the air toward a point midway between their centers, thus also giving an added lifting power.

The powerful air currents which are set in motion in a downward direction by the whirling of the fan wheels (90) are forced into the middle compartment (2) through its open top, and meet resistance to their free passage downward in the bottom plate (12) and the side wall (26), and only a part of the air is allowed to escape through the opening (13). The rest of the air is imprisoned in the middle compartment (2), and the force of the continuous currents from above, caused by the fan wheels (90), as described, raises the pressure of the air within the middle compartment (2) above that of the surrounding atmosphere, and it seeks escape through whichever of the port holes (27, 28, 29 and 30) or the openings (21) may be, for the time, left open. That which escapes through one of the port holes (27, 28, 29, and 30) forms a horizontal jet, which re-acts upon the flying machine, causing an equal and opposite reaction, thus furnishing power to propel the flying machine from right to left, or from back to front, or vice versa, according to which of the openings or port holes (27, 28, 29, and 30) are opened. The speed may be regulated by varying the extent to which the desired port hole (27, 28, 29, and 30) are opened. The opening and closing of these port holes is, of course, effected by the mechanism already described in connection therewith. To cause the flying machine to move forward, the port hole (28) at the rear of the flying machine is opened; to cause it to move backward, the port hole (30) at the front of the machine is opened; to cause the flying machine to move to the right, the port hole (27) at the left of the flying machine is opened; and to cause the flying machine to move to the left, the port hole (29) at the right of the machine is opened. By opening these port holes two at the same time, directions intermediate to those just indicated may be accomplished. The speed of travel may also be partly regulated by cutting off or increasing the flow of air through

the port holes (27, 28, 29, and 30), by drawing the covers (21′) from over, or by drawing the covers (21′) over the holes (21), thus allowing more or less (as the case may be) air to escape through the bottom openings (21) instead of through the port holes (27, 28, 29, and 30), the former motion of the covers (21′) reducing the horizontal speed, and the latter motion of the covers (21′) increasing the horizontal speed.

The middle compartment (2), together with the covers (31, 32, 33, 34, and 21′) and all the mechanism for controlling their movements, may be dispensed with, and the flying machine be propelled by means of a vertical rotating fan wheel, and the direction of motion from right to left be controlled by a rudder.

I do not confine myself to the circular form of the flying machine, or any of its compartments (1, 2, and 3), or the circular arrangement or assembling of fan wheels shown in the drawings.

I claim:

A flying machine having a vertical lifting power by means of downwardly directed air currents generated by a system of horizontally rotating fans, and having a compartment extending some distance below said fans, into which said air currents are forced through the motion of said fans, said compartment being provided with side and end ports, adjustable covers for said ports, and means for operating said covers, said flying machine accomplishing its horizontal movements by means of the lateral discharge of said air currents through said ports.

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Witnesses:
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