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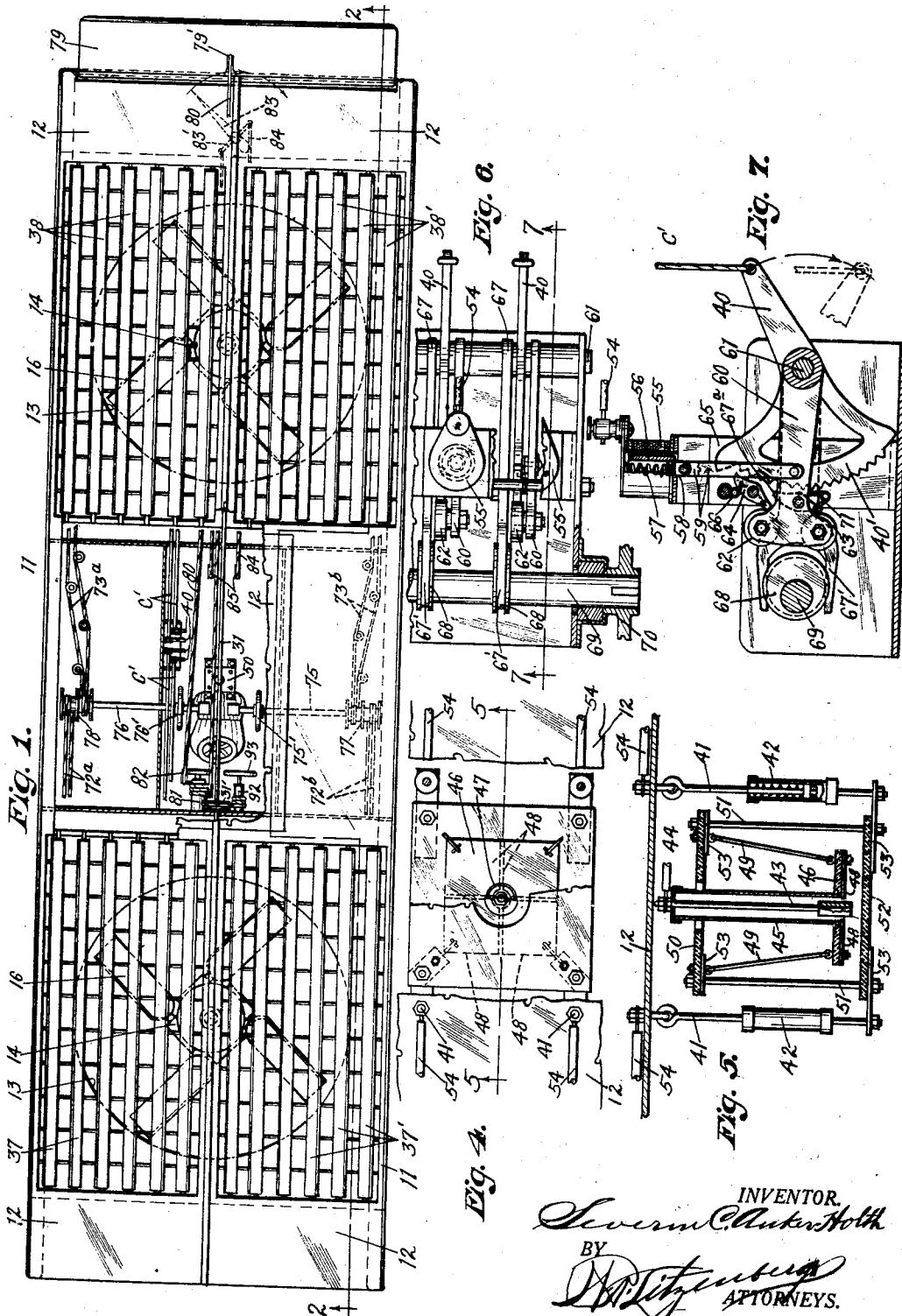
S. C. ANKER-HOLTH

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FLYING MACHINE

Filed Sept. 25, 1928

2 Sheets-Sheet 1



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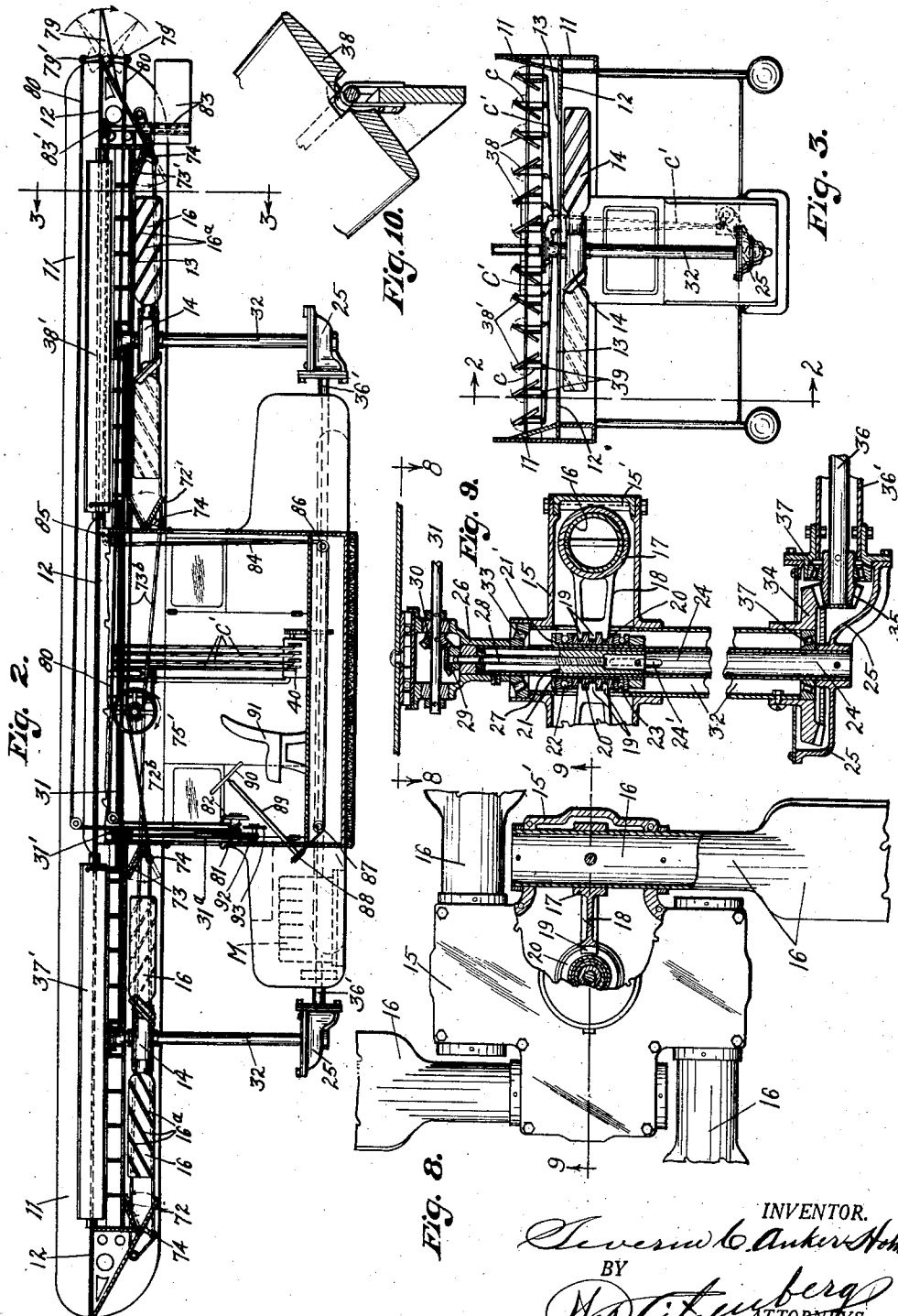
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INVENTOR.
Severin C. Anker-Holth
BY
H. Litzberg
ATTORNEYS.

UNITED STATES PATENT OFFICE

SEVERIN C. ANKER-HOLTH, OF LOS ANGELES, CALIFORNIA

FLYING MACHINE

Application filed September 25, 1928. Serial No. 308,230.

My invention relates to flying machines, and more particularly to a heavier-than-air type of flying machine which also embodies something of the helicopter principle with propellers turning about vertical axes, with shutters above the same and with baffle members forwardly and rearwardly of said propellers, whereby air forced against said baffle members will move said flying machine forwardly or rearwardly, depending upon the adjustment of said baffle members.

Among the salient objects of my invention are: to provide a flying machine of the character referred to with a minimum of head resistance, thus making it possible to attain greater speed with less power; to provide a construction and arrangement in which air is drawn from above the machine and delivered underneath said machine, thus producing a suction from above the machine and creating a pressure on the underside thereof; to provide in connection with such a machine specially designed propellers capable of adjustment for the purpose of changing the pitch of the propeller blades; to provide in connection with propeller blades a series of sub-blades or vanes forming a part thereof for forcing the air in a direction at right angles to the axes of said propellers; to provide means for automatically operating the shutters used in connection with the propellers, and, in general, to provide an improved, practical and efficient flying machine of the general character referred to. In order to more particularly describe my invention, I have illustrated the same on the accompanying sheet of drawings, which I will now describe.

Figure 1 is a top plan view of a flying machine embodying my invention, with a middle portion broken away;

Figure 2 is a vertical, longitudinal sectional view thereof, taken on line 2—2, of Figs. 1 and 3;

Figure 3 is a vertical, transverse sectional view taken on line 3—3 of Fig. 2;

Figure 4 is a top plan view of an automatic control mechanism;

Figure 5 is a vertical sectional view thereof, taken on line 5—5 of Fig. 4;

Figure 6 is a plan view of a mechanism electrically controlled for opening the shutters;

Figure 7 is a side view thereof, partly in section, on line 7—7 of Fig. 6;

Figure 8 is a fragmentary view of the propeller, partly in section and with the ends of the blades broken away;

Figure 9 is a vertical sectional view thereof, taken on line 9—9 of Fig. 8 and Figure 10 is an enlarged fragmentary view showing the shutter mounting.

Referring now more in detail to the drawings, my invention in its general form is rectangular as to its upper portion, with a middle depending cabin or housing. The upper portion includes two outer side members 11, 11, extending longitudinally of said structure, and shown in section in Fig. 3, with a floor member 12, having openings 13, 13, over the propellers designated as a whole, 14, 14, there being two propellers shown, one forwardly and one rearwardly. The propeller construction is shown more in detail in Figs. 8 and 9. Each comprises a central web or body portion 15, with four bearing boxes, as 15', arranged around the edge of said body 15, at right angles to each other. Within these bearing boxes are mounted the cylindrical ends of propeller blades, 16, 16, mounted to be revolved about their axes. Each is provided around its cylindrical portion within the bearing box with a collar 17, having an arm 18, with gear teeth 19 at its inner end, in mesh with a round rack 20, mounted on a sleeve 21, having at its upper end an annular flange 21', with ball bearings 22 and 23 above and below said round or sleeve rack 20. Said sleeve 21 fits over a tubular member 24, having longitudinal slots in its opposite sides, said slots being designated 24'. Said sleeve 24 is fixedly supported in a box 25, at its lower end and in a bearing 26, at its upper end. A slide block 27, is placed within said sleeve 24, with a screw rod 28, provided at its upper end with a beveled gear 29, meshing with another beveled gear 30, on an operating rod 31, whereby when said operating rod 31 is turned, through its connections, the slide block 27, sleeve 21,

and sleeve rack 20, will be moved axially, with the result that the propeller blades 16, will be turned about their axes simultaneously to change the pitch of said blades. The web or body 15, is mounted on the upper end of a tubular member 32, with roller bearings at the upper end, designated 33, and at its lower end, said tubular member 32 is provided with a driving beveled gear 34, in the box bearing 25, meshing with small beveled gear 35, on drive shaft 36. Suitable roller bearings, as 37, are used where anti-friction devices can be placed. It is to be understood that the four propellers are the same and are operated as a unit by the drive shaft 36, which connects with the motor M at one end; and at its other end, through the gears 35, 34 and sleeve or tubular member 32, drive said propellers 16, 16. The arms 18, 18, and the round or sleeve rack 20, turn together on the sleeve 21, the ball bearings 22 and 23, and a relatively loose fit of said sleeve or round rack on said sleeve 21 making this possible and practical, and thus providing means for turning the propeller blades about their axes through the connections from the rod 31, as before described. The drive shaft 36 is enclosed in a fixed tube 36'.

Mounted above the propellers and the propeller openings 13, 13, are four series of shutters 37 and 37' in front and 38 and 38' at the opposite sides in the rear. The detail of said shutters is designated in Fig. 10. It will be seen that three shutters of each series incline in one direction and three incline in the opposite direction, when open, as shown in Fig. 3. Said shutters are opened and closed by means of cables, C, from the upper edges of said shutters, over pulleys 39, to a single or master cable for each series, said master cable being designated C', and there being one for each series of shutters, said master cables, four in number, being extended down into the cabin where they are each connected to an operating lever 40, Fig. 7, said operating levers being automatically controlled and operated in a manner which I will now describe, referring particularly to Figs. 4, 5, 6 and 7.

Suspended from the upper floor member 12, by four bolts, 41, 41, with interposed cylinder and spring shock absorbers, as 42, is an electric control mechanism including a swinging contact pendulum 43, with circuit wire 44, said pendulum swinging in a tube 45, supported at its lower end on a base 46, having an open center 47, with four contact plates 48, 48, on its underside, as shown in light broken lines, Fig. 4, with their corners extended slightly in the open center 47, whereby the swinging pendulum element 43, in swinging will contact with one or two of said contact plates 48, 48. The base 46 is of insulating material. Said base and contact plates are supported by four bolts 49, 49, from

a member 50, of insulating material and supported at the upper end of rods 51, 51, secured in a member 52, of insulating material, but with metal plates, 53, 53, connecting bolts 51 and 41 for circuit purposes, just as plates 53, 53, on the underside of member 50, make circuit connection between rods 49 and 51. The corner rods or bolts 41, 41, at their upper ends are connected with circuit wires 54, 54, to a source of electric energy. Thus as the pendulum swings by the tilting of the flying machine it contacts with the plates 48, 48, and completes a circuit through one or two of the wires 54, 54, as hereinafter referred to.

The four circuit wires 54, 54, connect in circuit with four electromagnets, 55, 55, one of which is shown in Fig. 7, and two of which are indicated in Fig. 6. Moving in said magnets are armatures, as 56, spring returned to normal position, the spring being designated 57, and bearing against the top of the magnet and against the armature 56, by means of a screw plug 58, connected by means of a link 59, with a lever 60, pivotally mounted on a shaft 61, and provided at its free movable end with upper and lower rollers 62 and 63. The operating lever 40, to which master cable C' connects, is provided at its other end with a toothed segment 40'. A holding pawl 64, is mounted on the frame member 65, and normally moved out away from said segment by means of a spring 66. A pawl operating lever 67 is pivotally mounted at one end on said shaft 61, and at its opposite end is provided with a fork 67', over a grooved, eccentrically mounted cam 68, on a shaft 69, with drive wheel 70. It will be understood that there are four of these groups of mechanisms, one for each of the four master cables from the four series of shutters 38, 38. A pawl 67^a is mounted on and moves with the lever 67, and is normally spring-pressed to engage the ratchet segment 40' by a spring 71, but is held out of operating position by the roller 63, when the lever 60 is down. When the electromagnet 55 is energized, however, and the armature 56 is raised, through link 59, lever 60 is also raised, whereupon roller 62 moves pawl 64 into holding engagement with the segment 40' and permits spring 71 to move pawl 67^a into operating position for operating said ratchet segment 40' and the lever 40 for pulling on the cable C'. As said shaft 69 is running constantly, and lever 67 is oscillating, its operating pawl 67^a will continue to raise said ratchet segment 40' and lower its lever 40 so long as said electromagnet is energized. Said magnet is energized through circuits completed by the contacts made by the swinging pendulum 43, in the mechanism shown in Figs. 4 and 5 and previously described. The four master cables C' are shown in Fig. 2, running down into the cabin, and on the floor of

which is the mechanism just described for automatically operating the shutters 38, as the flying machine tilts one way or the other sufficiently to swing the pendulum contact member 43 into contact with one or more of the contact plates 48, 48, as before described. When the magnets are deenergized, the lever 60 drops and the rollers 62 and 63 thereon disengage the pawls 64 and 67' and the shutters open by gravity to the positions shown in Fig. 3.

I will now describe the means for causing the flying machine to move forwardly or backwardly, and referring to Fig. 2. At the opposite ends of each group of shutters, and forwardly and rearwardly of the propellers, are mounted swinging wings or pocket-forming members, 72, 72', 73 and 73', each with a cable attaching lever, as 74.

Two operating shafts 75 and 76 are mounted in the upper part of the cabin, over the head of the pilot, and provided with hand wheels 75' and 76', respectively at their adjacent ends, near the pilot, and at their outer ends are provided with cable-operating drums 77 and 78, over which run the operating cables for the pocket-forming members 72, 72', 73 and 73'. Said drums are double and each has an endless cable running back and connecting with the cable levers 74 on the pocket forming members and returning to its drum, whereby as said drum is turned in one direction or the other, a forward and backward pocket forming member will be moved together, one being opened and the other closed. Referring to Fig. 2, it will be seen that the pocket-forming members 72 and 72' are open for forward propulsion of the flying machine, while pocket-forming members 73 and 73' are closed and air discharged from the propellers rearwardly will pass under said members, while air forced forwardly will impact in said pockets at 72 and 72' and move said machine forwardly. The propeller blades are provided on their undersides with diagonally positioned fins or angle members 16^a for forcing air horizontally as the propellers are driven about their vertical axes. The four endless cables for operating the pairs of pocket-forming wings or members 72, 72', 73 and 73', are designated 72^a, 72^b, 73^a and 73^b. When hand wheel 76' is turned in one direction, the members 72 and 72' will be opened, as shown in Fig. 2, and members 73 and 73' will be closed through cable connections 72^a and 73^a on drum 78, forming pockets forwardly of the propellers. When turned in the opposite direction, members 72 and 72' will be closed and members 73 and 73' will be opened to form pockets rearwardly of said propellers, as will be clear from Fig. 2. There are two pocket-forming members for each group of shutters, one at the forward end and one at the rearward end, that

is, the pockets are made in sections, rather than as continuous pocket-forming members extending entirely across the plane.

A horizontal rudder 79 is pivotally mounted at the rear end of said machine, with upper and lower arms 79' to which is connected a cable 80, extended to and around a drum 81, with operating hand wheel 82, in front of the pilot.

A vertical rudder 83, is also pivotally mounted at the rear of the machine, under the rearward end thereof, as indicated in Figs. 1 and 2, with arms 83' at opposite sides to which connect operating cable 84, extended forwardly to pulleys at 85, and downwardly under the floor of the cabin and around pulleys at 86, 87, and thence around a drum or pulley 88, on the lower end of a steering rod 89, with hand wheel 90, in front of the pilot's chair 91, for operation for steering the flying machine right or left.

In describing the propellers, I have shown mechanism for adjusting the propeller blades about their longitudinal axes, as shown in Fig. 9, with an operating rod 31. This rod is shown extended over the pilot's head, in the upper part of the cabin, and is provided with a pulley 31', over which runs an operating cable 31^a extended down to a drum 92, in front of the pilot, with operating hand wheel 93. Thus by the operation of said hand wheel 93, through the connections up to rod 31, the pitch of the propeller blades can be changed through the mechanism shown in Fig. 9, showing how said rod 31 connects with gears 29 and 30, and the screw rod 28 for turning said propeller blades without interfering with their revolving motion.

Thus by the operation of the hand wheel 90, with its connections to the vertical rudder 83, the machine can be steered to right or left. By the operation of the hand wheel 82, with its connections to the horizontal rudder 79, the machine can be directed upwardly or downwardly. By the operation of the hand wheels 75' and 76' the pocket-forming members 72, 72', 73 and 73' can be moved to open pockets forwardly or rearwardly of the propellers to receive the impact of the air blast from said propellers for moving the machine forwardly or rearwardly. The equilibrium of the machine is maintained as it is rising or flying by means of the automatic electric control mechanism which closes the different groups of shutters over the propellers and down through which air passes in the upward movement of the machine on an even keel. Should the machine tilt at either side or forwardly or rearwardly, said automatic mechanism would operate to restore it to proper horizontal position. There are four groups of shutters, at the four corners of the machine and these are operable as needed to control that corner of the flying machine. These shutters control the suction of air down

through the machine by the propellers as the machine rises, while the air impact against the pockets moves the machine horizontally.

I do not limit the invention to the details of construction and arrangement shown for illustrative purposes, realizing that many changes can be made therein without departing from the spirit thereof, and it is my intention to limit the invention only by broad interpretation of the hereto appended claims.

I claim:

1. In a flying machine, a body, a cabin carried thereby, a propeller mounted therein to turn about a vertical axis, a motor for driving said propeller, shutters above said propeller and adjustable to regulate the suction of air downwardly by said propeller, and adjustable members to form pockets in horizontal alinement with said propeller, whereby air from said propellers laterally will impact in one of said pockets and move said flying machine horizontally.

2. In a flying machine, a body, a cabin carried thereby, a propeller mounted therein to turn about a vertical axis, a motor for driving said propeller, shutters above said propeller and adjustable to regulate suction of air downwardly by said propeller, means for forming impact pocket in horizontal alinement with said propeller, whereby air from said propeller laterally will impact in said pocket and move said flying machine horizontally, and means on the blades of said propeller for causing a lateral discharge of air therefrom.

3. In a flying machine, a body, a cabin carried thereby, two propellers mounted to turn about vertical axes, one of said propellers being forwardly and the other rearwardly of said cabin, a motor for driving said propellers, shutters in said body above said propellers and adjustable to regulate the suction downwardly through said body by said propellers, means forming impact pockets forwardly and rearwardly of said propellers, said means being adjustable to open or close said pockets, whereby air discharged laterally from said propellers will move said flying machine horizontally.

4. In a flying machine, a body, a cabin carried thereby, two propellers mounted to turn about vertical axes, one of said propellers being forwardly and the other rearwardly of said cabin, a motor for driving said propellers together, a group of horizontal shutters in said body above each propeller for controlling the suction downwardly through said body by said propellers, means forming impact pockets in horizontal alinement with said propellers to receive air forced laterally by said propellers to move said flying machine horizontally, means for opening and closing said pockets at will, and means on said propellers for causing lateral discharge of

air against said pockets for moving said flying machine horizontally.

5. In a flying machine, a body, a propeller turning about a vertical axis to lift said body, adjustable shutters in said body above said propeller, means for forming impact pockets in horizontal alinement with said propellers, means on said propellers blades for causing a lateral discharge of air therefrom to impact said pockets, and a motor for driving said propeller.

6. In a flying machine, in combination, a horizontal body structure, two propellers mounted to turn about vertical axes, one forwardly and the other rearwardly in said body structure, a motor for driving said propellers together to lift said flying machine, means forming impact pockets in horizontal alinement with said propellers, forwardly and rearwardly thereof for moving said flying machine horizontally, means on said propeller blades for causing a lateral discharge of air to impact said pockets, and means for adjusting said pocket forming means at will to determine the direction of movement horizontally of said flying machine.

7. In a flying machine, in combination, a horizontal body structure, two propellers mounted to turn about vertical axes, one forwardly and the other rearwardly in said body structure, a motor for driving said propellers together to lift said flying machine, means forming impact pockets in horizontal alinement with said propellers, forwardly and rearwardly thereof for moving said flying machine horizontally, means on said propeller for causing a lateral discharge of air to impact said pockets, means for adjusting said pocket-forming means at will to determine the direction of movement horizontally of said flying machine, and adjustable shutters in said body structure above said propellers to control the suction down through said body caused by said propellers.

8. In a flying machine, a horizontal body structure having four groups of horizontal shutters therein, two propellers mounted in said body structure to turn about vertical axes, one forwardly and the other rearwardly in said body structure, said shutters being adapted to control the suction of air downwardly through said body by said propellers, motor means for driving said propellers, means for forming impact pockets forwardly and rearwardly of said propellers and positioned to receive impact of air forced laterally by said propellers, said propellers being designed to force air laterally therefrom, and means for moving said shutters to control the suction of air downwardly through said body, whereby to regulate the rise of said flying machine and to maintain the same on an even keel.

9. In a flying machine, a horizontal body structure, two propellers therein to turn

about vertical axes, groups of shutters in said body associated with said propellers to control the suction of air down through said body structure by said propellers, said propellers being driven together, motor means for driving the same, means for forming impact pockets forwardly and rearwardly of said propellers for moving said flying machine horizontally, means for opening and closing said impact pockets, and means for automatically opening and closing said shutters, said means being controlled by the tilting of said flying machine from its horizontal flying position.

10. In a flying machine, a horizontal body structure, two propellers therein to turn about vertical axes, motor means for driving said propellers together, means for forming impact pockets forwardly and rearwardly of said propellers to receive the impact of air discharged laterally from said propellers, means for adjusting said pocket-forming means at will, and means for adjusting said propellers to change the pitch thereof, said propellers being designed to discharge air laterally.

11. In a flying machine, a horizontal body structure, two propellers therein to turn about vertical axes, motor means for driving said propellers together, means for forming impact pockets forwardly and rearwardly of said propellers to receive the impact of air discharged laterally from said propellers, means for adjusting said pocket-forming means at will, means for adjusting said propellers to change the pitch thereof, said propellers being designed to discharge air laterally, and shutter means associated with said propellers for controlling the suction down through said body structure by said propellers.

12. A flying machine comprising a horizontal body structure, a plurality of horizontal propellers mounted therein to turn about vertical axes, motor means for driving said propellers, groups of shutters associated with said propellers to control the suction downwardly through said body structure by said propellers, means for automatically adjusting said shutters to maintain said flying machine in horizontal position, means for forming impact pockets forwardly of said propellers to receive the impact of air discharged laterally from said propellers, means for opening and closing said impact pockets to determine the horizontal movement of said flying machine, and rudder means for steering said flying machine.

13. A flying machine comprising a horizontal body structure, a plurality of propellers therein, turning about vertical axes, motor means for driving said propellers together to lift said flying machine, groups of shutters associated with said propellers for controlling the suction of air down through said

body structure, means for automatically controlling shutters, said means being electrically controlled and by a swinging contact element, whereby tilting of said flying machine causes said mechanism to automatically operate some of said shutters, means forming impact pockets forwardly of said propellers, whereby air discharged laterally from said propellers moves said flying machine horizontally.

14. In a flying machine, a horizontal body structure, a plurality of propellers mounted to turn about vertical axes, each propeller blade being adjustable axially to change its pitch, manually operable mechanism for turning said blades to change its pitch, said mechanism being operable while said propeller is revolving, said propeller blades being designed to force air laterally therefrom, motor means for driving said propellers, pocket forming means forwardly of said propellers to receive the impact of air discharged laterally for moving said flying machine horizontally, shutters horizontally related to said propellers to control the suction of air down through said body structure, and means for automatically operating said shutters to maintain horizontal position of said flying machine.

15. In a flying machine, horizontal propellers for lifting said machine, motor means for driving said propellers together, shutters associated with said propellers for controlling the down suction caused by said propellers, said shutters being adapted to open and close, means for automatically moving said shutters, said means including electromagnets and circuit connections, and a swinging pendulum contact member adapted to automatically close said circuits by swinging into contact therewith as said flying machine tilts from a horizontal position, and pocket forming means horizontally positioned relative to said propellers to receive air forced laterally by said propellers, and means forming a part of said propellers for forcing air laterally as they operate.

Signed at Los Angeles, Los Angeles County, California, this 19 day of Sept., 1928.

SEVERIN C. ANKER-HOLTH.