

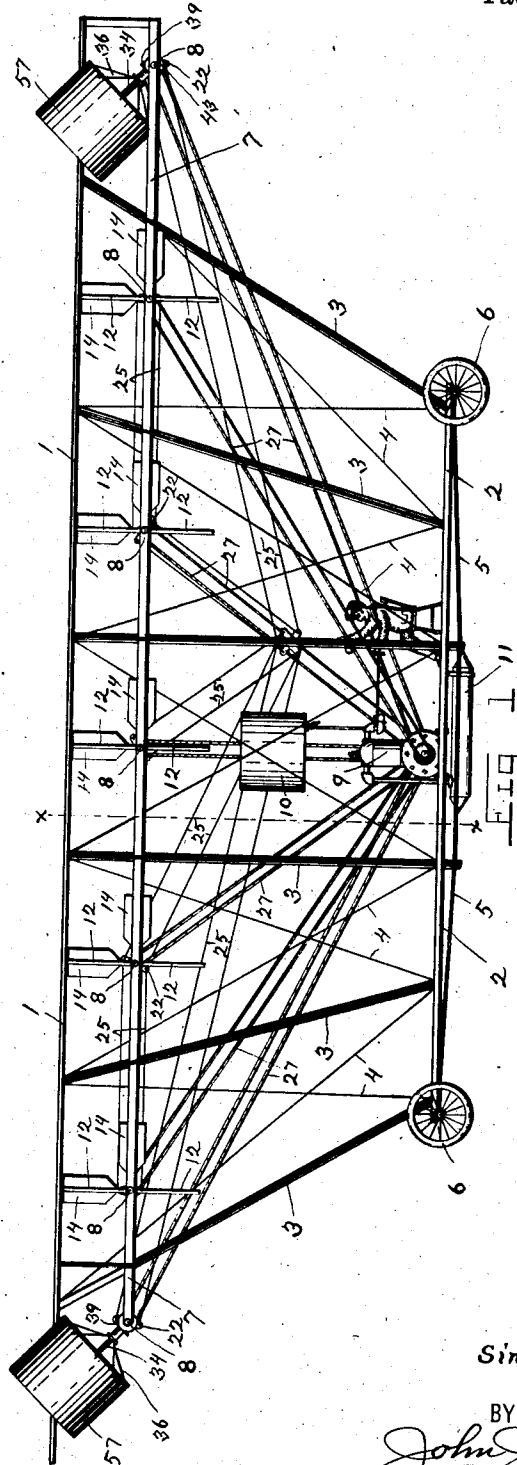
S. B. MINNICH.
FLYING MACHINE.

APPLICATION FILED AUG. 31, 1909.

1,010,443.

Patented Dec. 5, 1911.

6 SHEETS—SHEET 1.



WITNESSES:

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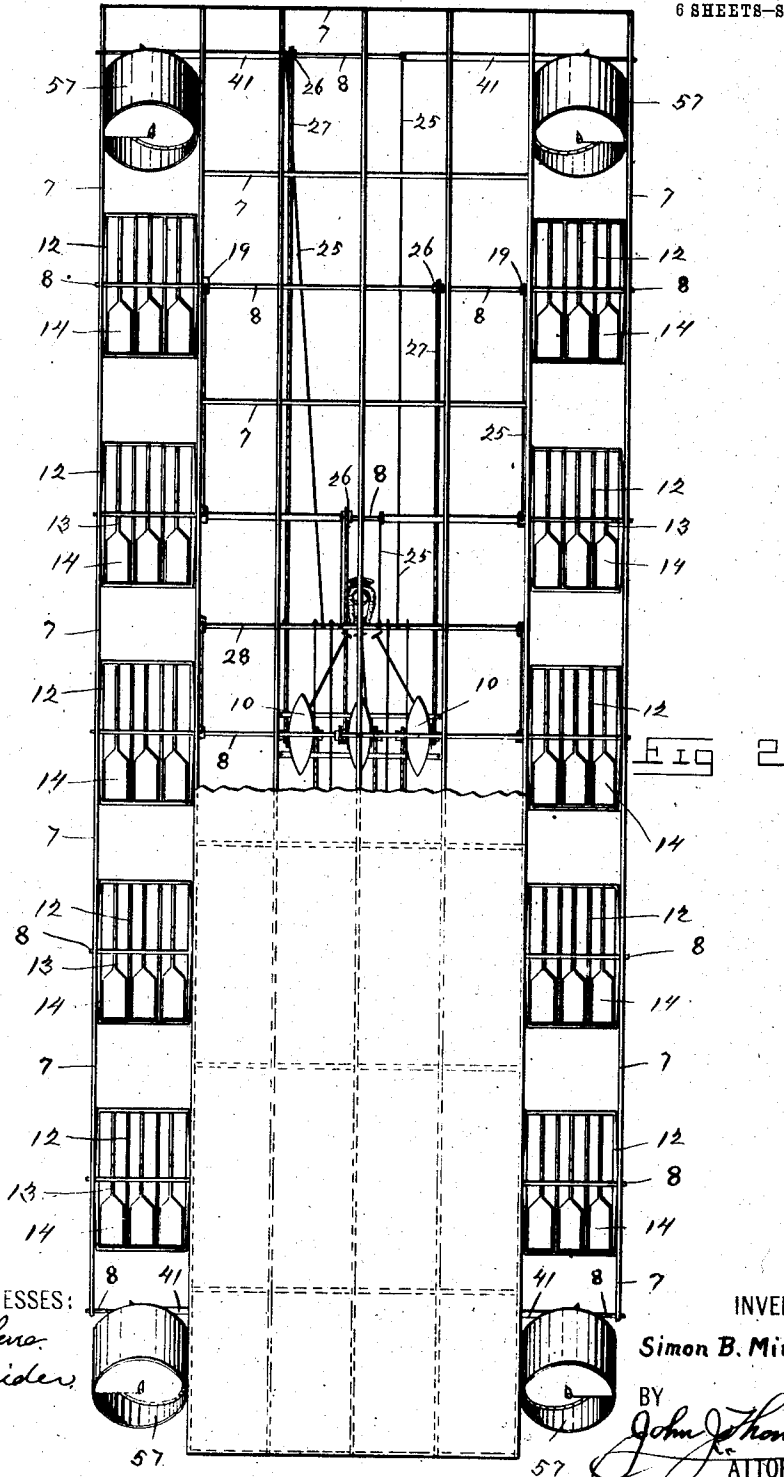
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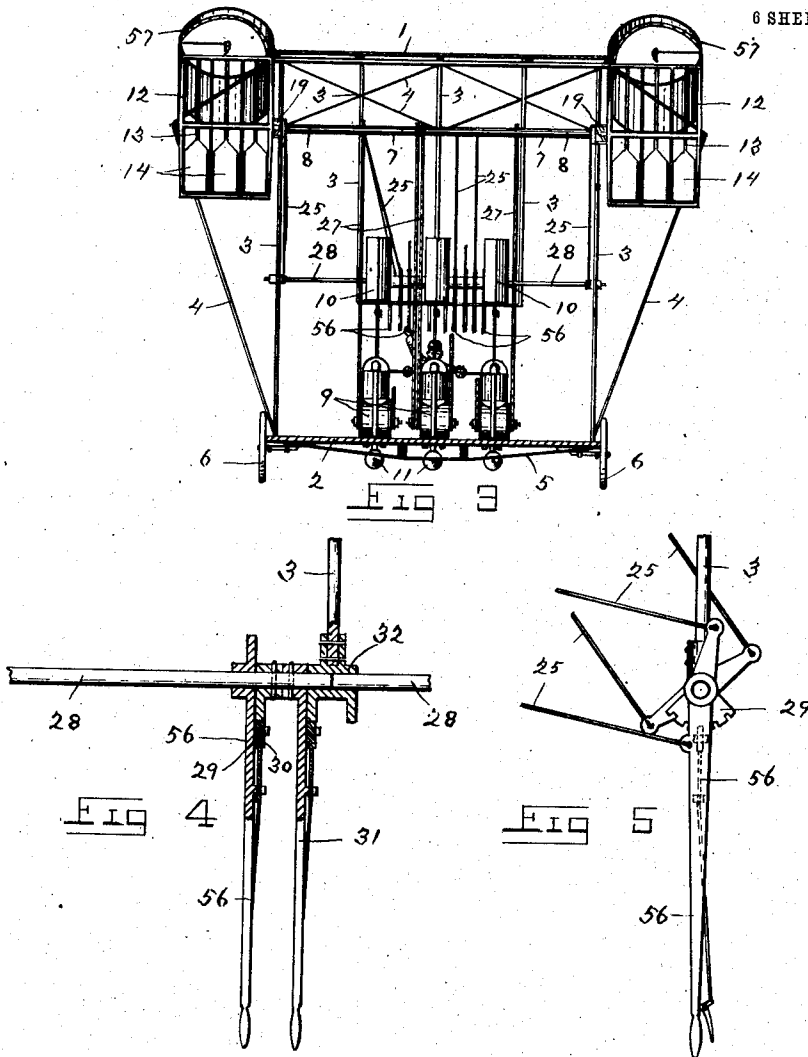
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6 SHEETS-SHEET 3.



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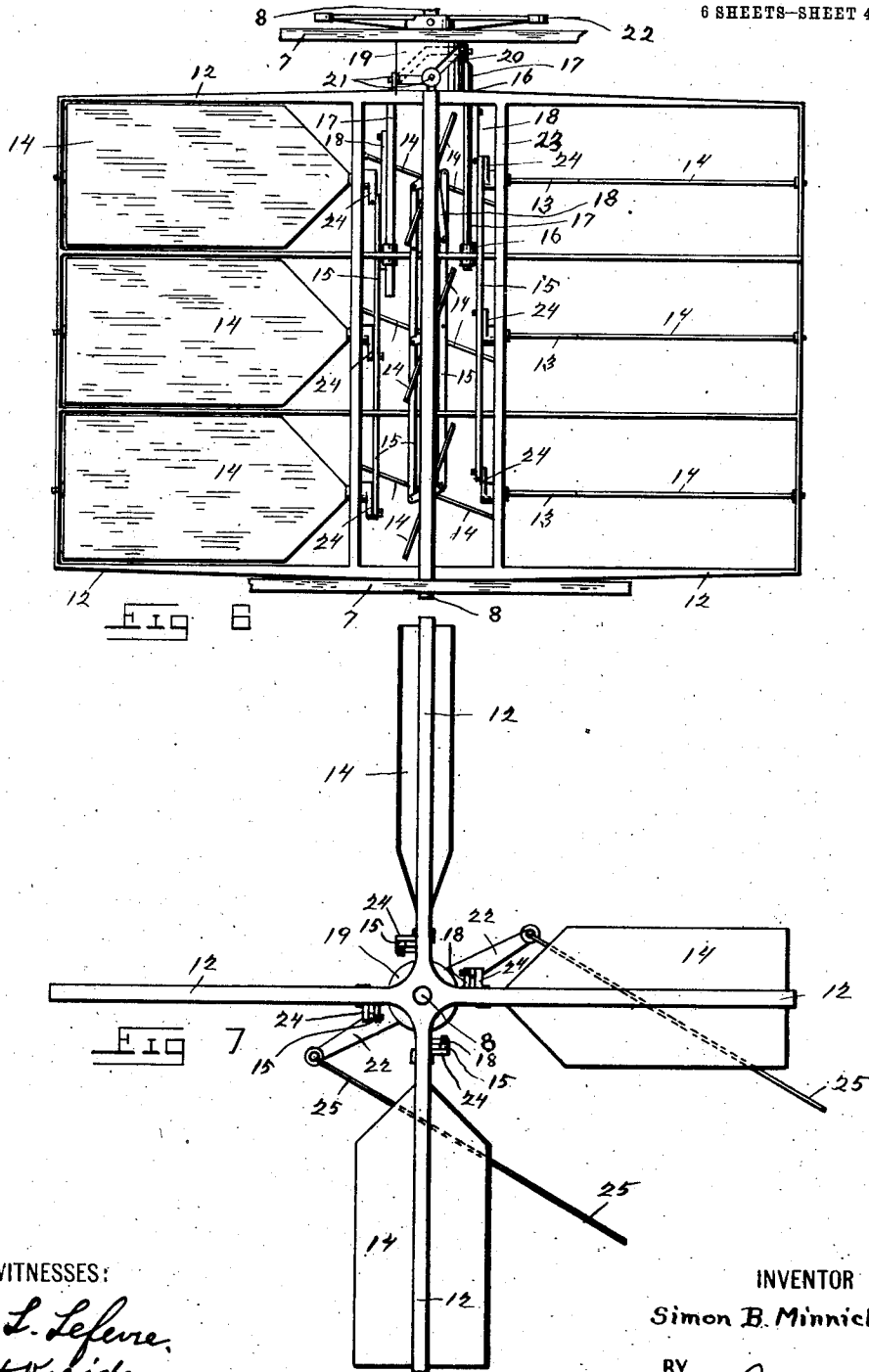
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6 SHEETS-SHEET 4.



WITNESSES:

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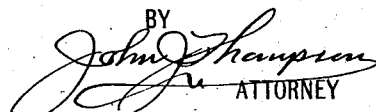
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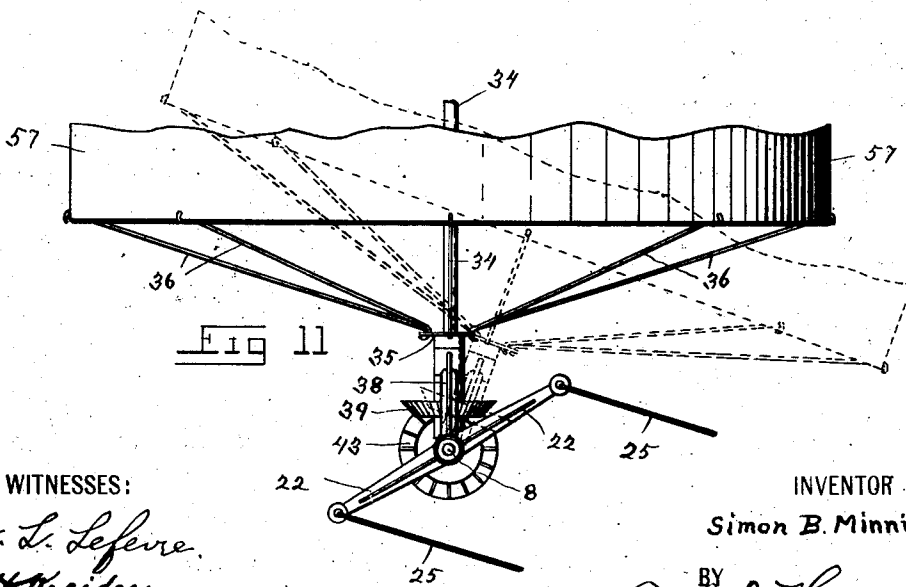
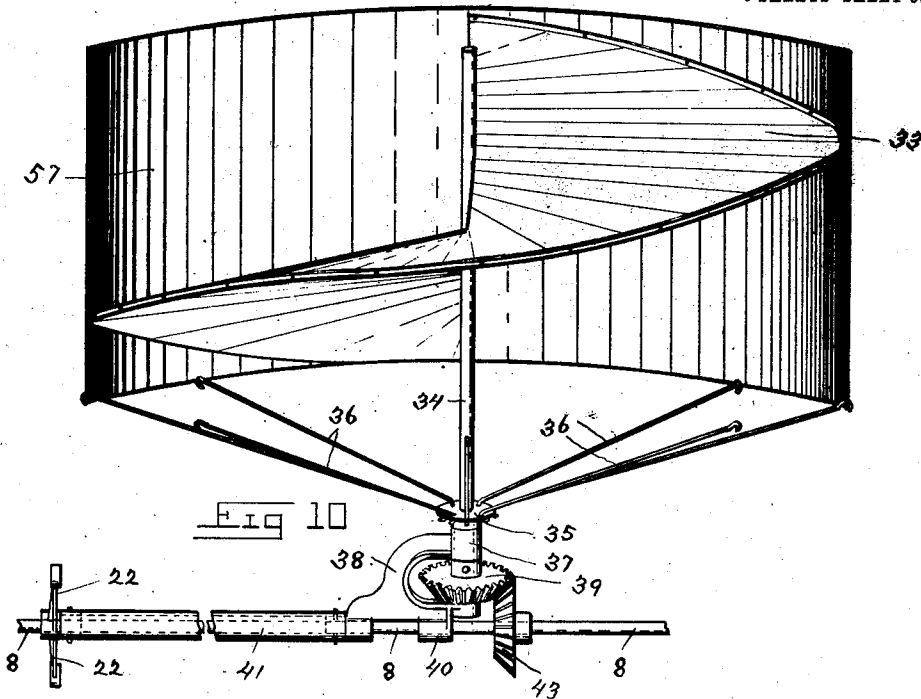


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6 SHEETS—SHEET 6.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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FLYING-MACHINE.

1,010,443.

Specification of Letters Patent.

Patented Dec. 5, 1911.

Application filed August 31, 1909. Serial No. 515,516.

To all whom it may concern:

Be it known that I, SIMON B. MINNICH, a citizen of the United States, residing at Landisville, in the county of Lancaster and State of Pennsylvania, have invented certain new and useful Improvements in Flying-Machines, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to aerial navigation and has for its object to provide a flying-machine, of that class known as "heavier than air" or aeroplane, and to so construct and equip the same with a plurality of separate power plants and propelling and up-lifting means that in case all but one of said power plants become defective and cease to operate, the machine will still have sufficient power to sustain itself from falling and thus will constitute a safety flying machine.

Another object is to provide propellers of such a novel form and construction that they may be instantly adjusted to raise, propel and steer the machine without the use of a rudder, although a rudder may be used if required.

It may also be noted that while I employ the use of one or more aeroplanes for the purpose of floating or helping to sustain the machine in the air, I do not depend upon them for entirely sustaining the machine, as this is effected by my novel form of propeller. And further, it may be noted, that while in the accompanying drawings I have illustrated my machine as having an aeroplane in the center with a row of propellers placed on either side thereof, that I am not confined to this construction, as a single or double row of propellers may be placed in the center with an aeroplane on either side without departing from the spirit of the invention.

With these and other objects in view my invention consists in certain construction and combination of parts as will hereinafter be fully described and claimed and illustrated in the accompanying drawings, which form a part of this application, and in which like figures of reference refer to corresponding parts in all of the views; but it is fully understood, that while I have described my invention as herewith shown, that I do not confine myself to the exact design as shown, as slight changes may be made in the construction and arrangement of the several

parts without departing from the spirit of the invention.

In the drawings:—Figure 1, is a side elevation of the flying-machine, showing the propellers set to raise and propel forward. Fig. 2, is a plan view of the same, with part of the aeroplane removed. Fig. 3, is a vertical cross section taken on the line X—X of Fig. 1, looking toward the rear. Fig. 4, is a detail sectional view of the controlling hand-levers. Fig. 5, is a detail side view of the same. Fig. 6, is a detail top plan view of the side propellers, shown in Fig. 1. Fig. 7, is a side elevation of the same. Fig. 8, is a detail top plan view of another form of propeller. Fig. 9, is a detail side view of the same. Fig. 10, is a detail view of one of the cylindrical propellers with part of the side removed. Fig. 11, is a further detail view of the same, showing the operating mechanism.

Referring to the drawings, the machine comprises a rectangular aeroplane 1, from which is suspended a platform 2, by the supporting rods 3, and the truss-wires 4, the platform being further braced by the truss-rods 5, and provided with the wheels 6, which are for the purpose of supporting the machine when resting upon the ground.

At a suitable distance below the aeroplane 1, and attached to the supporting rods 3, is a frame 7, in which are journaled the propeller-shafts 8, on the ends of which are mounted the propellers which will hereinafter be described.

Upon the platform 2, are mounted a series of motors 9, which are each independently connected to a sufficient number of propellers to balance and sustain the machine in the air; while each of said motors is independently supplied from an independent fuel tank 10, situated at a convenient place above the motors and a water-cooling tank 11, placed under the platform; or if air-cooled motors are employed the fuel tanks may be placed below the platform and pumps be used to raise the fuel to the motors.

The propellers are independently or jointly controlled by a set of levers and connecting-rods (which will hereinafter be fully described) in such a way that the operator will have perfect control of each propeller, for the purpose of timing their action and changing their direction to raise, propel and guide the machine.

While in the accompanying drawings I have shown three forms of propellers, I prefer to use one form on the corners of the machine and another form on the sides, but the machine will operate equally as well with all of the propellers of either form, as their action is controlled in the same manner, which will be later fully described.

Referring to the Figs. 6, and 7, of the drawings which illustrate the form of propeller shown in Fig. 1, the propellers comprise the blades or shutter frames 12, which are placed at right angles to each other and which are rigidly secured upon the shafts 8, and within which are journaled the radial shutter-shafts 13, upon which are secured the shutters 14, which may be of fabric or other suitable material, such as sheet aluminum; the outer ends of said shafts being journaled in the frames 12, and the inner ends journaled in and extending through the cross-bar 23, and having secured thereon the cranks 24, which are joined together by a connecting-rod 15; while slidably mounted in suitable bearings 16, in the frame 12, and parallel with the shaft 8, is a reciprocating rod 17, which is connected at a suitable point to said connecting-rod 15, by a link 18, in such a manner that by the reciprocation of the rod 17, the shutters will be given a quarter turn, thus presenting a flat or an edge surface to the air in the direction of their stroke as the propeller is revolved by the shaft 8. For automatically operating said shutters 14, and opening and closing them once in every revolution of the propeller, I provide a sleeve 19, mounted upon the shaft 8, between the propeller frame 12, and the main frame 7, which is formed with a cam-race 20, in the face thereof, within which runs a roller 21, attached to the end of the reciprocating rod 17; the cam-sleeve 19, being retained in position and from revolving upon the shaft 8, by the levers 22, attached thereto and the operating-rods 25, (hereafter more fully described); the rollers 21, running in the cam-race 20, will reciprocate the rods 17, forcing them in and out during every revolution of the propeller about the shaft 8; the timing of said action and the opening and shutting of the shutters being controlled by the position of said cam-sleeve 19, as controlled by the levers 22, in such a manner that the shutters 14, close on the forward and down stroke of the propeller blades for the purpose of elevating the machine, as shown in Fig. 7, or close at a quarter of a revolution later or on the down and backward stroke to propel the machine forward, or as still changed by the position of the cam-sleeve 19, to propel the machine rearwardly; the action of the shutters 14, being the same as the feathers of a bird, which feather on the upward stroke thus

presenting no resistance to the air and on the downward stroke present a flat surface and having their full effect; and it will thus be seen that by this novel construction the opening and closing of the shutters 14, can be so timed as to propel the machine in any direction or at any angle, and by setting the propellers upon one side of the machine to propel the machine forward and upon the other side of the machine to propel rearwardly, the machine may be steered and turned around in a short space; while by setting the propellers to elevate the machine, it will rise vertically upward from the ground and require no starting or launching apparatus, thus enabling the operator to rise upward amidst trees or buildings and descend in the same manner. Also by setting some of the propellers toward the front of the machine to propel forward and upward, and some of the propellers near the rear to propel rearwardly and upward, or in other words, counteract each other, the machine may be made to hover above a certain object like a humming-bird; the end propellers being set to overcome any drift caused by the wind.

The propeller-shafts 8, are operated by a sprocket wheel 26, secured thereon and driven by a sprocket chain 27, from one of the motors (or may be driven by shafts and bevel gears), each motor being connected to enough of the propellers placed at suitable places to effect the balance of the machine for propelling and guiding the same. As here shown, I have used three motors, the central one driving the end and central propellers on each side, one side motor driving the next propellers on either side of the central pair and the other motor driving the remaining ones, so that if either one or two motors stop, the machine can still be operated with the remaining one, the stoppage causing a loss of power and rendering some of the propellers idle, but still keeping the machine afloat and under control.

The control and operation of the cam-sleeves 19, is effected by the rods 25, which are attached at one end to the levers 22; and at the other end to the hand-levers 56, which are mounted on the cross-shaft 28, which is in a convenient location for the operator; said shaft 28, having rigidly secured thereon, adjacent to each hand-lever 56, a notched segment 29, to which the hand-lever can be locked by the dog 30, in such a manner that each lever may be operated independently from each other; one lever being supplied for each cam-sleeve 19, and one lever operating each of the end propellers; one the center cam-sleeves and one the intermediate pair, as shown in the drawings. The shaft 28, being divided in the center and each half supplied with a master lever 31, secured to the shaft and engaging

a notched segment secured to the central bearing 32, so that all of the levers 56, upon either half of the shaft 28, and the connected cam-sleeves upon that side of the machine may be shifted by the master lever 31, and thus the end propellers may be readily set to guide the machine; while the other propellers are set to propel it in the desired direction. The motor control is effected in the usual way, any variation in the speed of the various motors being corrected by the timing of the opening and shutting of the shutters.

The end or corner propellers are of different form and are illustrated in detail in Figs 10, and 11, and comprise a cylinder 57, open at both ends, and within which is secured the screw-propeller blade 33; while through the center thereof and in axial relation thereto, is the shaft 34, which has secured thereon the flanged collar 35, to which are secured the radial stay-rods 36, which help to support the cylinder 57; and it may here be stated that the cylinder and stay-rods 36, may be omitted and the screw-propeller secured directly upon the shaft 34. The shaft 34, is rotatably mounted within the bearings 37, formed in the swing-bracket 38, and has secured thereon the bevel gear 39. The bracket 38, is swingably mounted upon the end of one of the shafts 8, the shaft passing through the bearing 40, and the tube 41. The end of the tube 41, being provided with the levers 22, and rods 25, thus inclining the axis of the propeller forward or backward, as may be desired. The propeller being driven by the bevel gears 43, which is secured upon the shaft 8, and in mesh with the gear 39; while the shaft 8, is rotated in the before mentioned manner as used with the other style of propeller.

Referring to Figs. 8, and 9, of the drawings, I show another form of propeller 44, which is similar to that shown in Figs. 6, and 7, except that the shutters 45, are slightly concavo-convex in form and are pivoted in a parallel relation to the shaft 8, with their shafts 46, extended through the frame 47, and supplied with the cranks 48, which are connected together by the connecting-rod 49; while the reciprocating rod 50, is mounted in bearings 51, in the frame 47, and is connected to the rod 49, by the link 52; while the end of said rod 49, is supplied with a roller 53, which runs in a cam-race 54, in the face of a cam 55, which is

mounted on the shaft 8, and operated by the levers 22, in the same way as that form shown in Figs. 6, and 7. The advantage of this style of shutter being that the curve of the shutter being struck with a radius equal to the distance between the shutter and the center of the shaft 8; as the propeller is revolved and the shutter is opened, it presents no resistance to the air, while in a closed position its cup-shaped form presents the greatest resistance to the air.

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

1. In a flying machine of the class described, in combination with a main frame, a platform having brace rods and provided with ground wheels suitably suspended from said frame, transverse parallel propeller-shafts mounted upon said frame, propellers provided with a series of blades adapted to open and close placed at right angles to each other, suitably secured upon said shafts, a sleeve provided with a cam mounted upon said shaft for opening and closing said blades, lever connected to said sleeve, hand operating levers mounted upon said frame, and rods connecting said sleeve operating lever to said hand levers for timing the opening and shutting of said blades.

2. In a flying machine of the class described, a supporting frame provided with a transversely extending propeller shafts suitably mounted on said frame, propellers provided with radial shutters at right angles to each other forming blades, a cam sleeve mounted upon said propeller shaft and provided with a cam-race way, means for holding said cam sleeve from rotating on said shaft, a reciprocating rod having a roller suitably secured thereto, said roller adapted to move in said race-way of the cam, sleeve cranks secured to said shutters, connecting rods between said cranks and reciprocating rods, hand operating levers mounted upon said frame for the purpose of operating said cam sleeve and timing the opening and shutting of said shutters, substantially as described.

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

SIMON B. MINNICH.

Witnesses:

WM. J. COULTER,
MABEL L. LEFEVRE.