W. L. GREEN.

AERODROME.

APPLICATION FILED MAY 31, 1910.

1,039,384.

Patented Sept. 24, 1912.

3 SHEETS—SHEET 1.

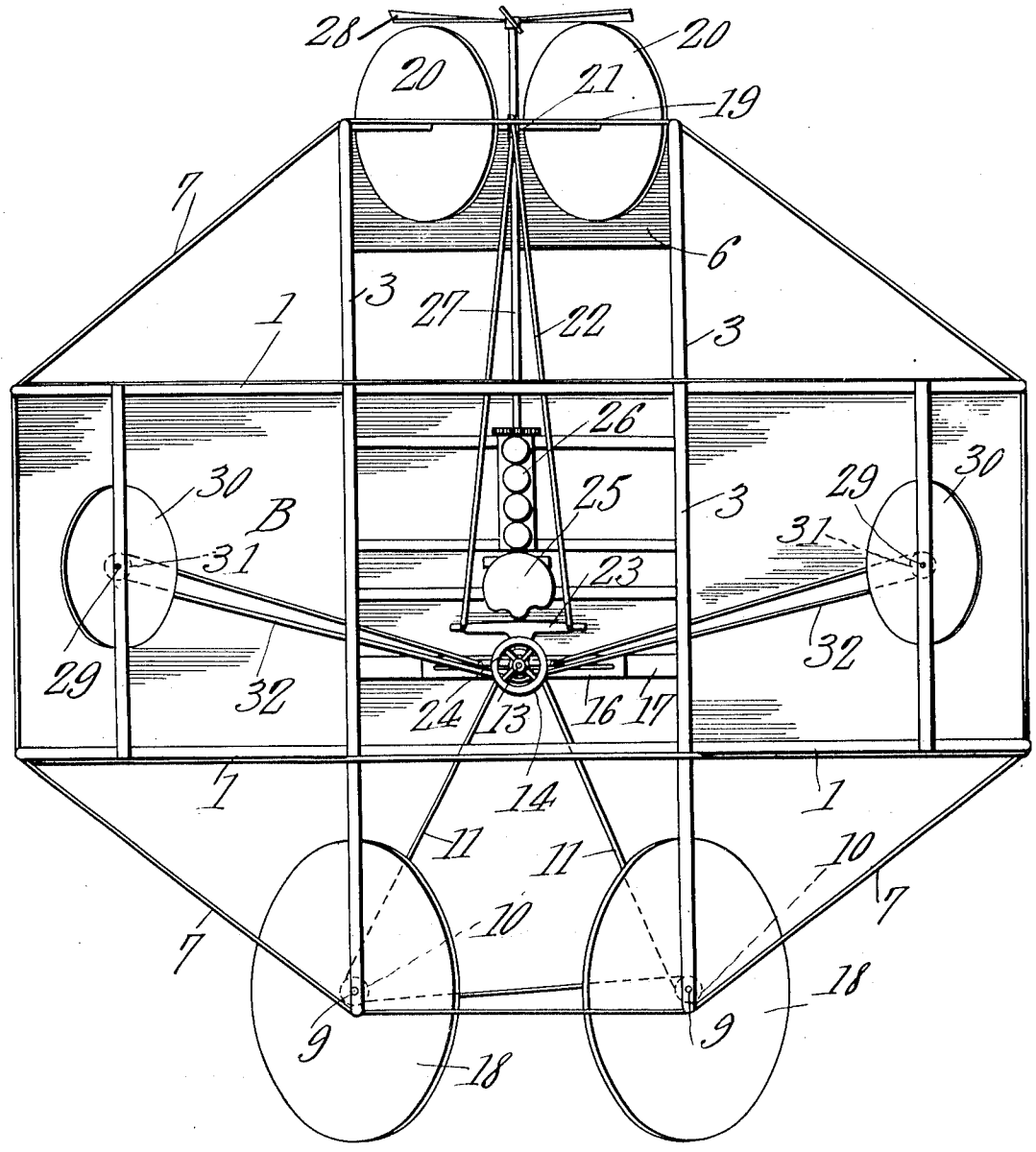

Fig. 1.

Witnesses

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3 SHEETS—SHEET 2.

Fig. 2.

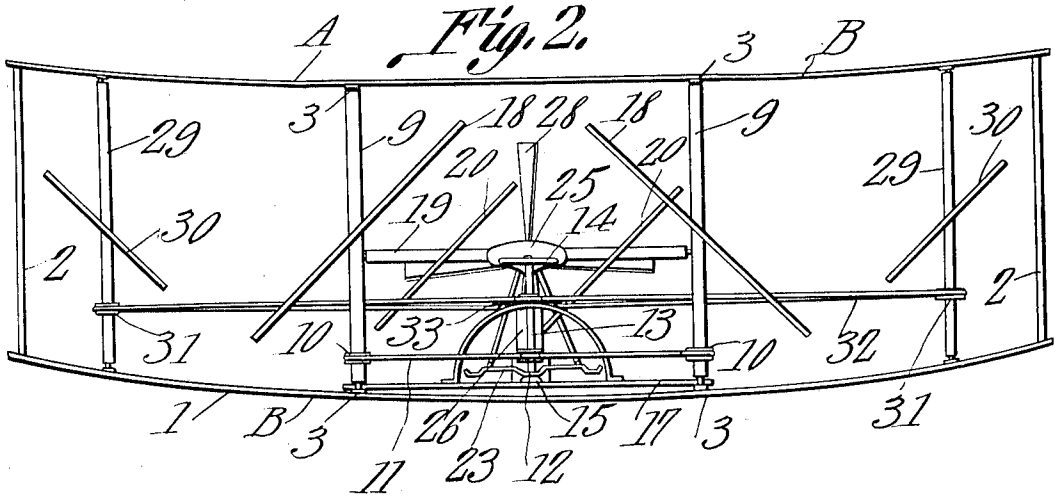
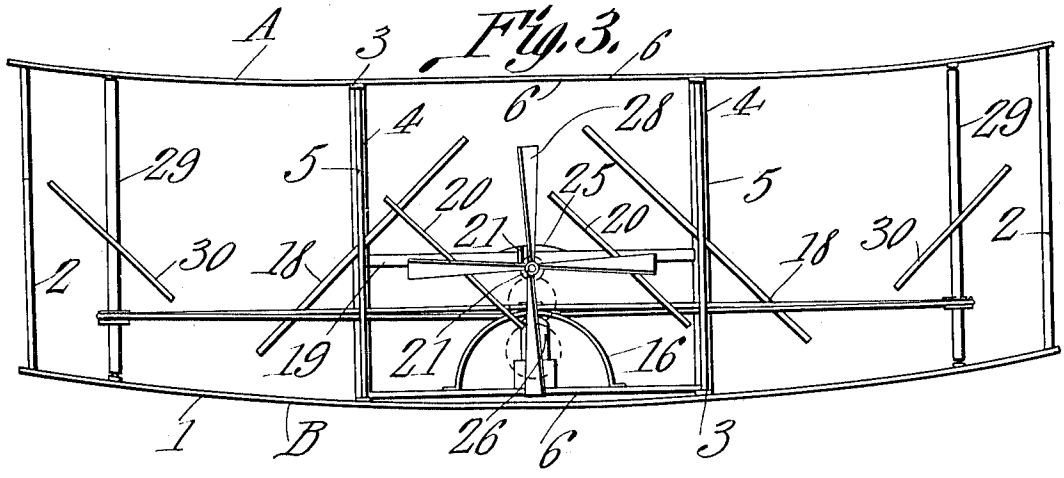


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

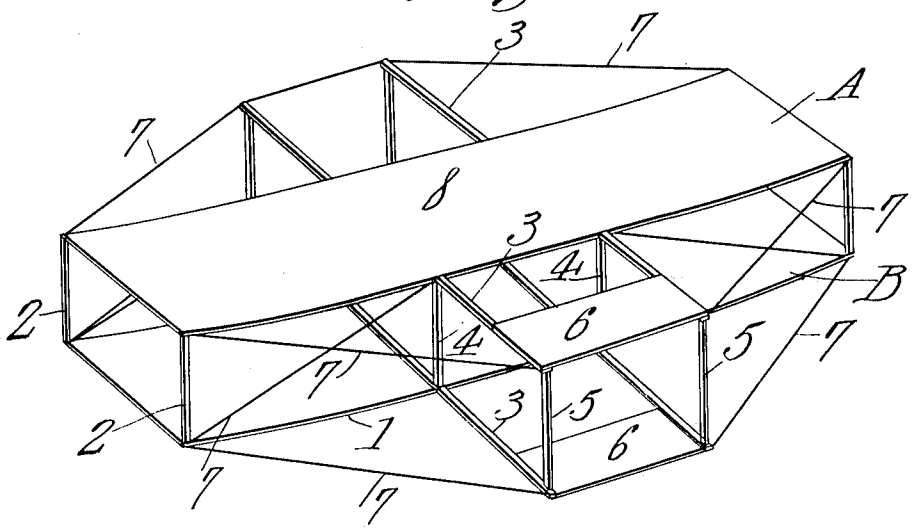
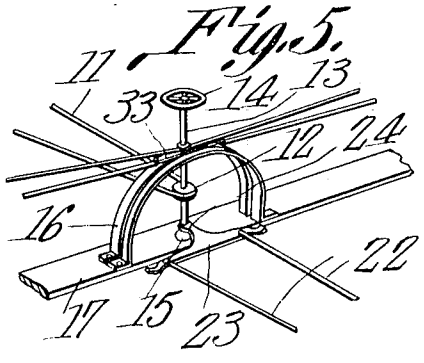


Fig. 5.



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UNITED STATES PATENT OFFICE.

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AERODROME.

1,039,384. Specification of Letters Patent. Patented Sept. 24, 1912.

Application filed May 31, 1910. Serial No. 564,235.

To all whom it may concern:

Be it known that I, WILLIAM L. GREEN, a citizen of the United States, residing at Monroe City, in the county of Monroe and State of Missouri, have invented a new and useful Aerodrome, of which the following is a specification.

This invention relates to aerodromes or flying machines of the heavier than air type and has reference more particularly to means whereby the machine may be readily controlled while in flight so as to soar upwardly or downwardly and tilt laterally so as to maintain its balance under varying atmospheric conditions.

Another object is to provide a machine of this character utilizing controlling elements in the form of disks mounted in such relation to the path of movement of the machine as to positively control the action of the machine.

A further object is to provide an arrangement of equalizing or balancing disks adapted to be shifted so as to cause the machine to assume and maintain its equilibrium, the said disks constituting improvements upon the warping wings which have heretofore been employed for this purpose and being advantageous because of the simplicity of construction and the ease with which they may be operated.

A still further object is to provide steering means including disks adapted to be rotated about a transversely extending axis, the said disks being pitched at acute angles to said axis so that, upon partly rotating the same in either direction, the machine may be guided as desired.

With these and other objects in view the invention consists of certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claim.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings:—Figure 1 is a plan view of the machine, the upper sustaining plane being removed and the controlling disks being in the positions to which they are shifted while the machine is being propelled straight forward. Fig. 2 is a front elevation of the machine, with the parts arranged as shown in Fig. 1. Fig. 3 is a rear elevation. Fig. 4 is a perspective view, on a reduced scale, of the main or body portion of the machine, the disks, propeller, etc., being removed. Fig. 5 is a perspective view of the disk controlling mechanism.

Referring to the figures by characters of reference A and B designate the upper and lower sustaining planes, each of which is made up of longitudinally extending front and rear spars 1 bowed longitudinally with their concave faces uppermost. The corner portions of these frames are connected by upstanding corner posts 2 and upper and lower longitudinally extending bars 3 are secured transversely on the frames 1, there being upstanding braces or posts 4 interposed between the lapping portions of the spars 1 and 3. The spars 3 are equidistant from the centers of the upper and lower planes A and B and project beyond the front and rear edges of said plane, the rear ends of the spars 3 being connected by upstanding braces or posts 5 while supplemental upper and lower sustaining planes 6 are mounted on the upper and lower spars 3 at the rear ends thereof. Bracing wires 7 preferably connect the ends of the spars 1 and 3 and are also extended diagonally from the upper ends of the lower spars 1 to the upper ends of the posts 4. It is to be understood of course that the spars 1 are to be provided with coverings of oiled silk, or any other suitable light and durable fabric meeting the requirements of a sustaining plane. This fabric has been indicated at 8 and the planes 6 hereinbefore referred to are preferably formed of the same kind of material.

Parallel shafts 9 are journaled within the front ends of the spars 3 and are preferably parallel with the posts 4 each of these shafts being provided with a wheel 10 preferably located adjacent the lower end thereof and which is engaged by a cord 11 or other suitable flexible actuating element, the said cord being extended back to and around a wheel 12 secured to a controlling shaft 13. This shaft has a hand wheel 14 or the like at its upper end and is provided, at its lower end with a bearing 15 permitting rotary and swinging movement of the shaft. The said shaft is interposed between arcuate guide strips 16 mounted on a base 17 and which is provided for the purpose hereinafter set forth.

The cord 11 is continuous or endless and

is wrapped in one direction about one of the wheels 10 and in the opposite direction about the other wheel 10 so that, when the shaft 13 and wheel 12 are rotated, the two shafts 9 will be simultaneously rotated in opposite directions. Each of the shafts 9 has a controlling disk 18 secured thereto preferably at the center thereof, the said disk lying in a plane at 45 degrees to the longitudinal axis of the shaft and the two disks being oppositely pitched so that, under normal conditions to wit, when the machine is set to travel straight forward, the one horizontal diameter of each disk will be extended parallel with the spar 3 above which the disk is located. With the disks thus arranged the front portions of their peripheries will be presented to the atmosphere and the disks will cut through the air and thus meet with practically no resistance therefrom. By turning the shaft 13 in one direction, however, the disks will be simultaneously rotated in opposite directions so that either the lower faces or the upper faces thereof will be presented to the atmosphere as the machine moves forward. Should the lower faces be thus presented, the disks will operate to ride upwardly by reason of the pressure of air upon the lower faces thereof whereas, should the disks be turned so as to incline downwardly and forwardly, the action thereof will be the reverse and the machine will be directed downwardly. By arranging the disks in the manner described the air resistances become equalized and there is no danger of the machine being shifted laterally as the result of a manipulation of said disk. For example when the two disks are simultaneously shifted 45 degrees about their axes, the air displaced thereby during the forward flight of the machine will be directed toward the center of the machine and in equal quantities and at the same velocity. When the disks are rotated 90 degrees so as to bring their horizontal diameters in alinement and transversely of the path of the machine, their elevating power becomes greater than when the disks assume intermediate positions.

Instead of providing the usual form of vertical rudder for steering the machine, a novel form of disk rudder is utilized in the present machine. This rudder includes a transversely extending shaft 19 journaled within the rear braces or posts 4 and to which are secured flat disks 20 pitched at 45 degrees to the longitudinal axis of the shaft and mounted in parallel planes. When the two disks are disposed with their horizontal diameters extended parallel with the spars 3, the said disks are without force because their edges are thus presented to the atmosphere and cut through it. By rotating the disks, however, one face or the other of each disk will be brought to an angle with the path of movement so as to be more or less retarded by the air, which, acting upon the said face, will operate to swing the disk, and, consequently, the entire machine, toward either the right or the left, according to the direction in which the disks are turned. As the two disks are arranged in parallel planes, it will be understood that the action of the air will be the same upon both of them.

The means employed for rotating the steering disk 20 preferably includes a wheel 21 secured to the shaft 19 and engaged by a cord 22 or other suitable flexible device the ends of which are attached to the end portions of a foot lever 23. This lever may have a central arm 24 extended therefrom and pivotally engaging the shaft 13 or any other suitable structure. Lever 23 is located close to and in front of the seat 25 to be occupied by the aviator and by swinging the lever upon its fulcrum the shaft 19 can be rotated so as to shift the disks 20 in either direction desired.

The motor 26 employed for driving the machine is preferably mounted directly back of the seat 25 and the propeller shaft 27 extends therefrom and below the shaft 19, the propeller 28 being secured to the rear end of the shaft 27 and back of the steering disks 20.

In order that the lateral poise or equilibrium of the machine may be maintained under adverse weather conditions as, for example, when the machine encounters sudden gusts of wind or sudden changes in the direction of the wind, lateral controlling means are employed for the purpose of varying the atmospheric resistance at the sides of the machine and thus enable the aviator to either elevate or lower either side of the machine.

Shafts 29 are interposed between the end portions of the planes A and B and are parallel with and preferably equidistant from the adjoining corner posts 2. Each shaft extends through and is secured to the center of a flat disk 30 fixed at an angle of forty-five degrees to the longitudinal axis of the shaft, the said disks, under normal conditions, being oppositely disposed, as shown in the drawings, these positions of the parts being assumed when the machine is moved straight forward. A wheel 31 is secured to each of the shafts 29 and a cord 32 or the like is wrapped about each wheel and has its ends secured to arms 33 extending in opposite directions from the shaft 13. It will thus be seen that when the shaft is swung laterally upon its bearing 15, the two shafts 29 and disks 30 will be simultaneously rotated in the same direction and, as the two disks are oppositely pitched, it will thus be seen that the bottom face of one disk and the top face of the other disk will be sub-

jected to the resistance of the air in the path thereof and one of said disks will therefore be given an upward impulse while the other disk will be directed downwardly. The corresponding movement of the entire machine will be produced. Obviously therefore the machine can be readily tilted laterally and its equilibrium can be maintained under varying conditions simply by shifting the controlling member 13 laterally so as to rotate the shafts 29 and disks 30 in the proper direction.

It has been found that by utilizing sustaining planes which are bowed from one side to the other of the machine, the convex faces being lowermost, that the machine is held steadier while in flight than where flat planes are utilized, this being due to the fact that the convex lower surface displaces the air downwardly and laterally along downwardly diverging lines. Instead of utilizing two steering disks, it is to be understood that a single disk may be employed, the same to be located at the center of its shaft.

Importance is attached to the fact that, by reason of the peculiar arrangement of the planes, equal amounts of air will be displaced by the planes of each pair and the atmospheric resistance will thus be equalized at both sides of the machine and the said machine will therefore be held in its course unless steered therefrom by means of the rudder which has been described.

Although it is preferred to use circular disks for the elevating and balancing planes, it is to be understood that said planes may be of any other contour desired, such, for example, as hexagonal, rectangular, or any other polygonal form.

Various other changes can be made in the construction and arrangement of the parts without departing from the spirit or sacrificing any of the advantages of the invention as defined in the appended claim.

What is claimed is:—

In an airship, a sustaining plane, a revoluble controlling shaft mounted for swinging movement, arcuate guides for the shaft, upstanding shafts mounted for rotation at the sides of the sustaining plane, upstanding shafts arranged beyond one end of the plane, controlling planes mounted on and revoluble with the said upstanding shafts and inclined relative thereto, means operated by the rotation of the controlling shaft for simultaneously rotating the upstanding shafts beyond one end of the plane, said shafts being revoluble in opposite directions respectively, and means operated by the swinging movement of the controlling shaft for simultaneously rotating the other upstanding shafts and their planes in the same direction.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

WILLIAM L. GREEN.

Witnesses:
ROBT. MERIWETHER,
ROY B. MERIWETHER.