

J. HUMPHRIS.
AERIAL MACHINE.
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983,233.

Patented Jan. 31, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

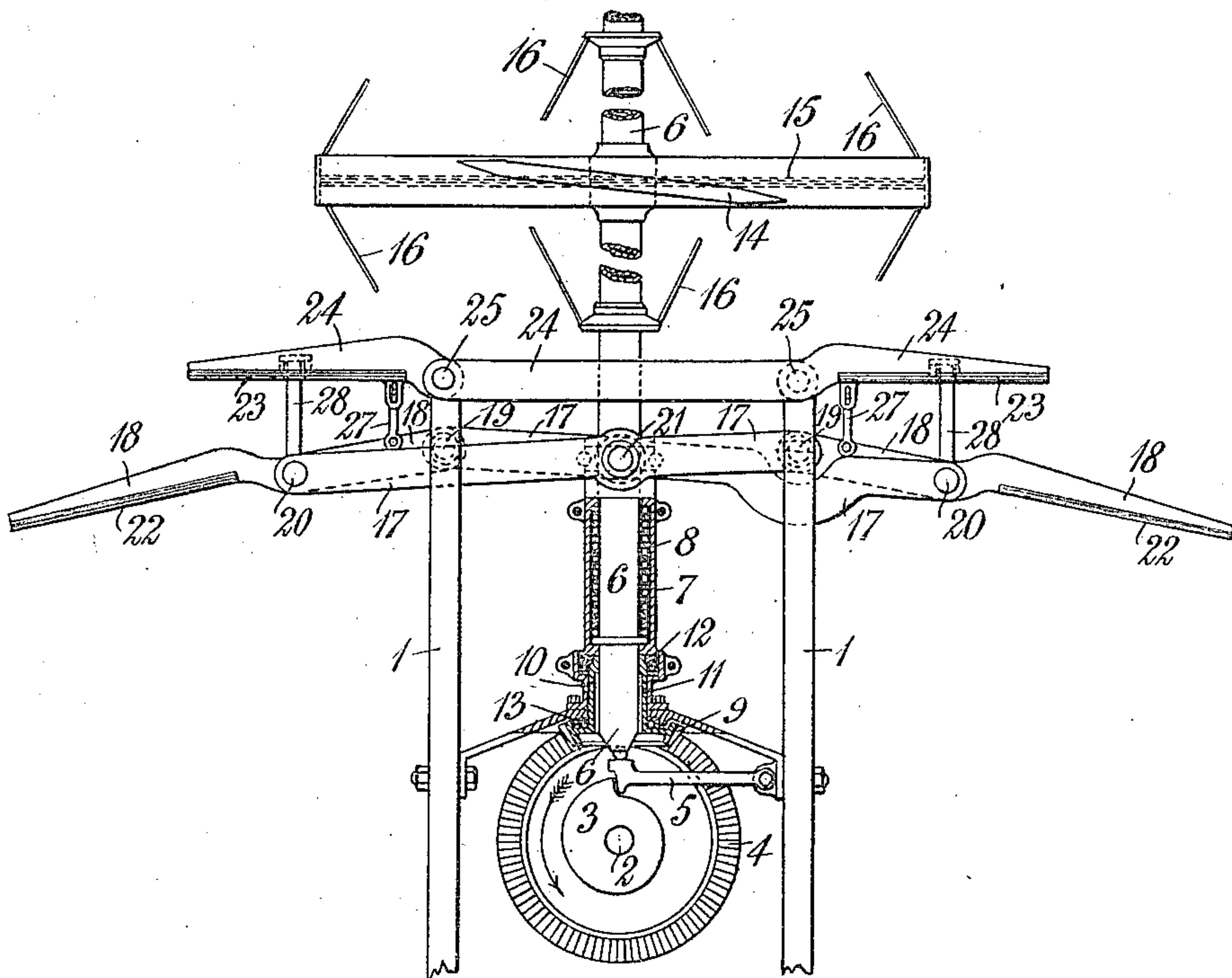
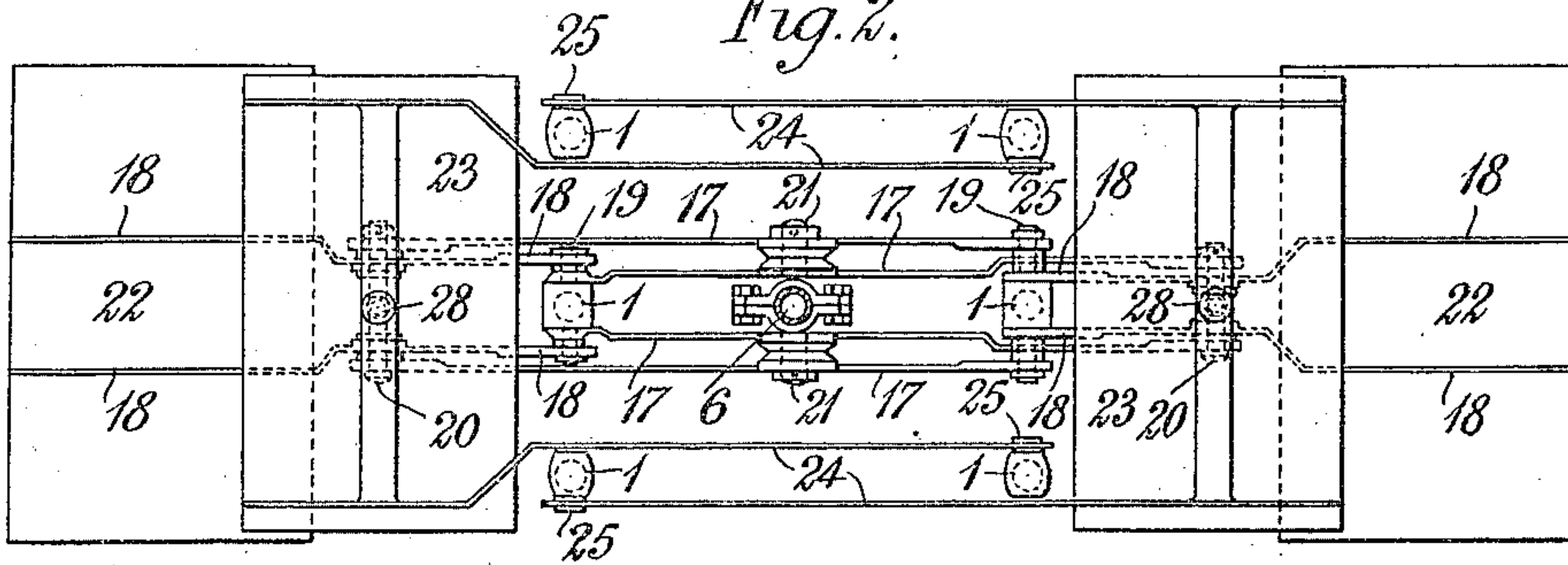


Fig. 2.



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To all whom it may concern:

Be it known that I, JAMES HUMPHRIS, a subject of the King of Great Britain, residing at Johannesburg, Transvaal, South Africa, have invented new and useful Improvements Relating to Aerial Machines, of which the following is a specification.

According to this invention a rigid surface preferably flanged at its edge with which the aerial machine is provided is struck with a quick and sudden downward blow.

The weight of the heavy portion of the machine including the car is counteracted by making the machine in two separate sections the one working within the framework of the other and placing within the frame which supports the rigid plane or planes but unattached to it except by guides a preferably vertical member whose movement causes a base which may be attached to moving wings to be struck by a downward blow, the said member being free to rebound. By repeating this stroke at intervals of time as brief or less than it takes for the pull of gravity to reassert itself the attraction of gravity on the engine and its attached weight will be overcome.

Figure 1 is an elevation partly in section of a portion of an aerial machine constructed in accordance with this invention. Fig. 2 is a plan of the same, Fig. 3 is an elevation of a modification and Fig. 3^a is a detail view showing the manner in which the sleeve 30 is supported on the collar 31 carried by the sleeve 6.

In carrying out my invention I construct the improved aerial machine with a strong rigid but light main framework 1. Secured to this framework is a horizontal main shaft 2 which is revolved by suitable motive power attached to the aerial machine. The main shaft 2 aforementioned has attached to it a lifting cam wheel 3 and a gear wheel 4 which are keyed to it and revolve with it.

Hinged to the framework at one of its ends and with the other end resting unattached on top of the lifting cam wheel 3 is an arm 5. Each time the lifting cam wheel 3 revolves it lifts the end of the arm 5 till it reaches the highest point on the lifting cam wheel 3 and then allows it to drop again suddenly over the highest point on cam wheel to the lowest point on the cam wheel 3.

Above the arm 5 but with its extreme lower end resting on it is a vertical shaft 6. The vertical shaft 6 revolves rapidly within a casing 7 attached securely to the main framework 1 but is not itself attached thereto except with the necessary guides but is free to move up and down as well as revolve within the rigidly attached casing 7.

Within the casing 7 and encircling the vertical shaft 6 is a coiled spring 8. The upper end of the spring 8 presses against the inside of the upper end of the casing 7 and its lower end presses against a collar on the vertical shaft 6. Thus when the lifting cam wheel 3 revolves it lifts the arm 5 which in turn lifts the vertical shaft 6 and as the vertical shaft 6 rises it compresses the spring 8 until the lifting cam wheel 3 reaches its highest point when it is suddenly let free and gives the vertical shaft 6 a sudden and powerful downward thrust. This movement is repeated with each revolution of the lifting cam wheel 3.

In order to effect the revolution of the vertical shaft 6 the vertically revolving gear wheel 4 is geared into a horizontally revolving gear wheel 9. An extension on the upper side of the gear wheel 9 forms a casing 10. The gear wheel 9 and its grooved shaft 6. Keys projecting from the sides of the vertical shaft 6 enter long slots grooved in the inner side of the gear wheel casing 10. The gear wheel 9 and its grooved upward extension 10 revolve freely but are held in position and prevented from making any up and down movement by the ball bearings 12 and 13 which take their end thrust or up and down pressure. The gear wheel 9 and the vertical shaft 6 revolve together; the vertical shaft 6 being allowed to move freely up and down by having its projecting keys slide in the grooves 11 of the gear wheel casing 10.

To the top end of the vertical shaft 6 and revolving with it is attached centrally a surface 15 of several square feet area, and this surface is incased with a rim of light material which is made substantially rigid. The surface 15 carries two or more projecting propeller blades 14 which constitute a lifting screw. When the spring 8 gives the vertical shaft 6 its sudden and downward thrust hereinbefore described the vertical shaft 6 carries the lifting screw 14 with it.

The incased central surface 15 and the projecting lifting propeller blades 14 are guyed above and below by wires 16 to the vertical shaft 6 in a manner to give sufficient strength and rigidity.

5 Above the spring 8 and below the lifting screw 14 and its guy wires 16 are placed a pair of moving wings. The wings each have a pair of arms 17 one passing on
10 each side of the vertical shaft 6 and a second pair of arms 18. Each arm of the first pair of arms 17 of the wing is hinged at its inner end to a journal 19 fixed near to the top end of the main frame 1 from which
15 it projects past the vertical shaft 6 and past the edge of the main frame 1 on the opposite side to a point 20 where it is attached to one of the second pair of arms 18. The second or outer section 18 of the wing arms
20 is hinged to a journal 19 at the opposite side of the main frame 1 as compared to the point 19 at which the first portion 17 of the wing arm is hinged. The arms 17
25 and 18 of the wings thus pass each other or run parallel to each other to opposite sides of the main frame 1. The vertical shaft 6 penetrates between the arms 17 of each wing. At the point where the vertical shaft 6
30 and the inner arms 17 of the wings cross, the vertical shaft 6 is incased with a trunnion coupling from which the trunnions 21 extend and engage the arms 17. The trunnion coupling is held in position by being journaled but held against lateral longitudinal
35 movement on the vertical shaft 6. When the vertical shaft 6 moves up and down by the action of the lifting cam wheel 3 and of the main spring 8 the arms 17 and 18 are moved up and down with it by means
40 of the trunnions. The slow upward movement of the vertical shaft 6 as the cam wheel 3 is raising it gives a comparatively slow upward movement to the arms 17 and 18 and the quick downward movement of
45 the vertical shaft 6 under the powerful expansion of the main spring 8 gives a comparatively quick downward movement to the arms 17 and 18. The air striking surface 22 on the arm 18 may be either flat or concave on the under side. If flat its surface
50 will be in the plane of a line drawn from the center of the journal from which it rocks; viz: 19; if concave then the deepest point will be so placed that it will be in the position at which the air pressure will naturally
55 focus when the downward stroke is made.

60 Above the arms 17 and 18 are placed two air striking surfaces or planes 23 which according to this invention are struck with a quick and sudden downward blow. These planes 23 should preferably move parallel to themselves at all points but for stability and convenience they have each a pair of arms 24 attached which pass the width of
65 the main frame 1 and are hinged to jour-

nals at 25 to the top end of the main frame 1 the inner ends thus pass and run parallel to each other for the width of the main frame. The air striking surface 23 is raised very slowly by means of an arm 27 pivoted
70 to the journal 20 at the extreme outer end of the arms 17 of each wing and projecting upward therefrom is a bolt or rod 28 which penetrates the center of the air striking surface 23. While the arms 17 and 18 rise, the
75 rod 28 moves upward much faster than the air striking surface 23 and the result is that it projects some distance above it when the arm 17 is at its highest position. The rod 28 has an enlarged head and when the arm 17 strikes downward the rod 28 passes freely
80 down through the air striking surface 23 again till the enlarged head of rod comes in contact with the upper side of the air striking surface 23 when the rod 28 gives the air striking surface 23 a sudden downward
85 blow.

Another method of performing the sudden blow is shown in Fig. 3. In this case
90 the rigid air striking surface 29 is attached to a sleeve 30 which penetrates the center of its plane. The sleeve 30 incases the main shaft 6 but does not revolve with it. The main shaft 6 passes freely up and down
95 through the sleeve 30 to the full extent of its movement. The shaft 6 has upon it a fixed collar 31 upon which the lower end of the sleeve 30 rests. When the shaft moves upward the collar 31 raises the sleeve 30 and
100 therefore also raises the air-striking surface 29 attached to it. The air-striking surface 29 is struck a downward blow by rods 32 in a similar manner to that described with reference to Fig. 1. The air-striking surface
105 29 is guyed by wires 33 from the top and bottom ends of the sleeve 30.

The usual propellers and aeroplanes for assisting to lift or steer the machine may be added.

110 The form of my aerial machine described and illustrated in Fig. 1 provides air striking surfaces 22, an air striking surface 15 and lifting screw propeller 14, which acting together by their movement practically overcome the downward pull of gravity on the
115 entire machine and when thus lightened the sudden blow by the rod 28 on the air striking surface 23 gives the entire machine a tendency to rebound upward from the air resistance. By repeating these movements
120 more frequently than the pull of gravity can overcome the effect of each rebound an accelerated upward movement is secured. The lifting screw propeller keeps a continuous pressure on the air thus hindering gravity from speedily reasserting itself while
125 the moving surfaces 22 and the air striking surface 23 are getting back to position for a new blow. The method of hinging and of 130

engaging and moving the surfaces 22 is intended to imitate the movement of a bird's wing.

In the form of my aerial machine illustrated in Fig. 3 I aim to overcome the downward pull of gravity on the heavier portion of the machine by means of the sudden blow on the air striking surface 29 and to secure the upward movement of the thus lightened machine by the lifting power of the lifting screw propeller 14.

The aerial machine may be propelled forward in any direction by the aviator changing his position in the car in a manner to throw the aerial machine off the perpendicular.

What I claim is:—

1. In an aerial machine, the combination with a movably supported substantially rigid air-striking surface, of an operating mechanism therefor embodying a reciprocatory power member movable independently of but arranged to strike said surface a downward blow and means for raising said air-striking surface.

2. In an aerial machine, the combination with a movably supported substantially rigid air-striking surface, of a rod, movable upwardly through said surface, a head on the rod for imparting downward movement to the surface, power mechanism for reciprocating the rod through the surface a distance limited in a downward direction by the head on the rod whereby the surface is struck a downward blow and means for raising said air-striking surface.

3. In an aerial machine, the combination with a movably supported rigid air-striking surface and an oscillatory wing, of power mechanism for oscillating the wing, a rod connected with the wing and cooperating with said rigid surface to move the same downwardly, said rod being movable upwardly independently of the surface and adapted to strike the surface a downward blow and means for raising said air-striking surface.

4. In an aerial machine, the combination with a movably supported rigid air-striking surface and a reciprocatory wing, of a driving mechanism for the wing embodying means for imparting relatively slow upward and rapid downward movements to the wing, a rod moved by the wing and loosely connected with the rigid surface to strike the surface a downward blow during the downward movement of the wing and means for raising said air-striking surface.

5. An aerial machine embodying a rigid movably supported air-striking surface, a longitudinally movable vertical shaft, means for normally holding said shaft down with a yielding pressure, power mechanism for elevating and releasing said shaft when ele-

vated, connections intermediate said shaft and air-striking surface whereby said surface is struck a downward blow when said shaft is released and means for raising said air-striking surface.

6. An aerial machine embodying a rigid movably supported air-striking surface, a spring pressed vertical shaft, power mechanism for moving said shaft against the tension of the spring and for releasing the shaft when the spring is under tension, connections intermediate said shaft and surface whereby the surface is struck a downward blow when the shaft is released and means for raising said air-striking surface.

7. An aerial machine embodying a rigid movably supported air-striking surface, a reciprocatory driving member, a lever engaged by the driving member intermediate its axis and free end, a second lever engaged by the first lever intermediate its axis and free end, connections intermediate the second lever and air-striking surface for striking said surface a downward blow and means for raising said air-striking surface.

8. An aerial machine embodying a rigid but movable air-striking surface, means for striking said surface a forcible downward blow to overcome the attraction of gravity, means to support the machine during the recovery of the air-striking surface after delivering a blow and means for raising said air-striking surface.

9. An aerial machine embodying a rigid but movable air-striking surface, means for striking said surface a forcible downward blow to overcome the attraction of gravity, a screw propeller simultaneously rotated and reciprocated for supporting the machine during the recovery of the air-striking surface after delivering a blow and means for raising said air-striking surface.

10. An aerial machine embodying a rigid but movable air-striking surface, a reciprocatory power member cooperating therewith to strike the same a downward blow, a screw propeller adapted to be simultaneously rotated and reciprocated for supporting the machine during the recovery of the air-striking surface after delivering a blow and means for raising said air-striking surface.

11. An aerial machine, comprising a rigid but movable air-striking surface, a vertical shaft adapted to be simultaneously rotated and reciprocated, a screw propeller located at the upper end of said shaft, means operated by said shaft for striking said rigid surface a downward blow and means for raising said air-striking surface.

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Witnesses:

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