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AERIAL APPARATUS.

APPLICATION FILED OCT. 12, 1908. RENEWED SEPT. 29, 1917.

1,264,712.

Patented Apr. 30, 1918.

2 SHEETS—SHEET 1.

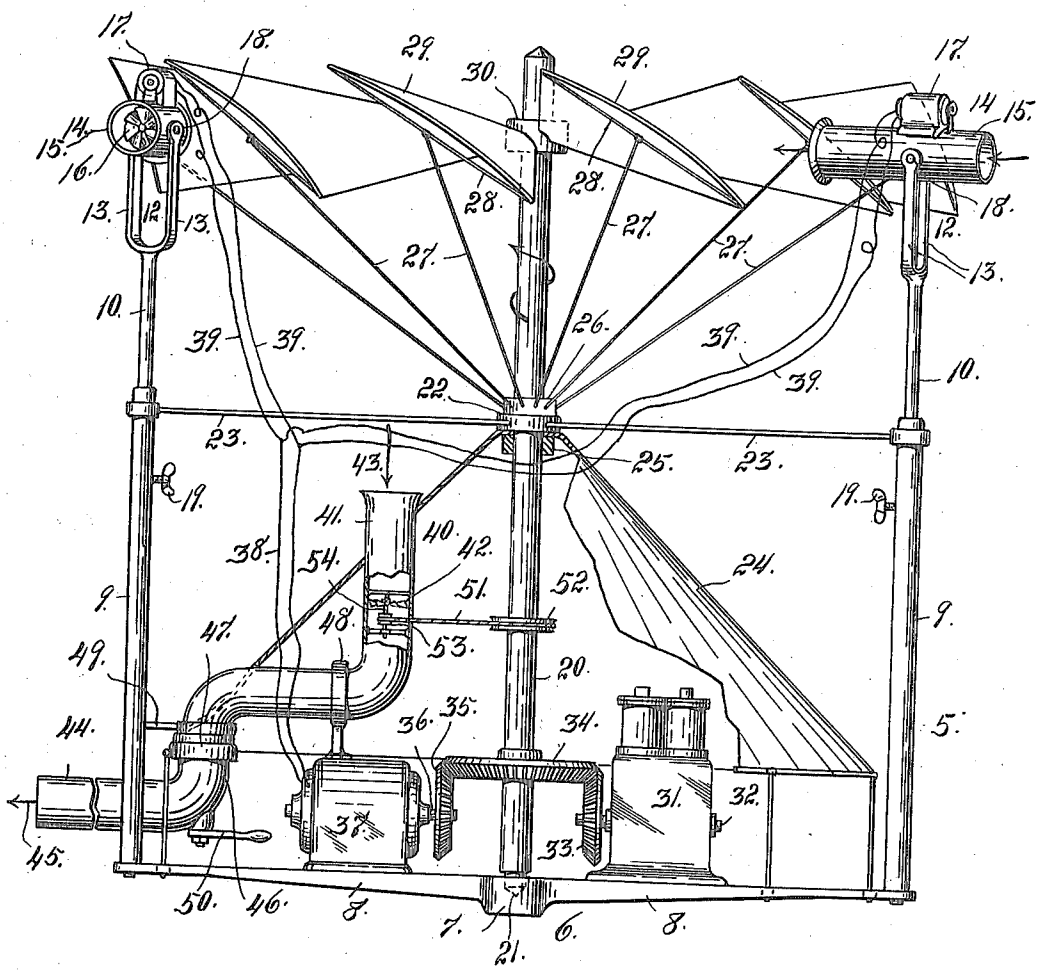



Fig. 1.

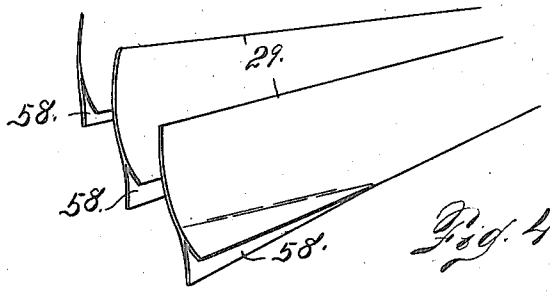



Fig. 4.

Witnesses

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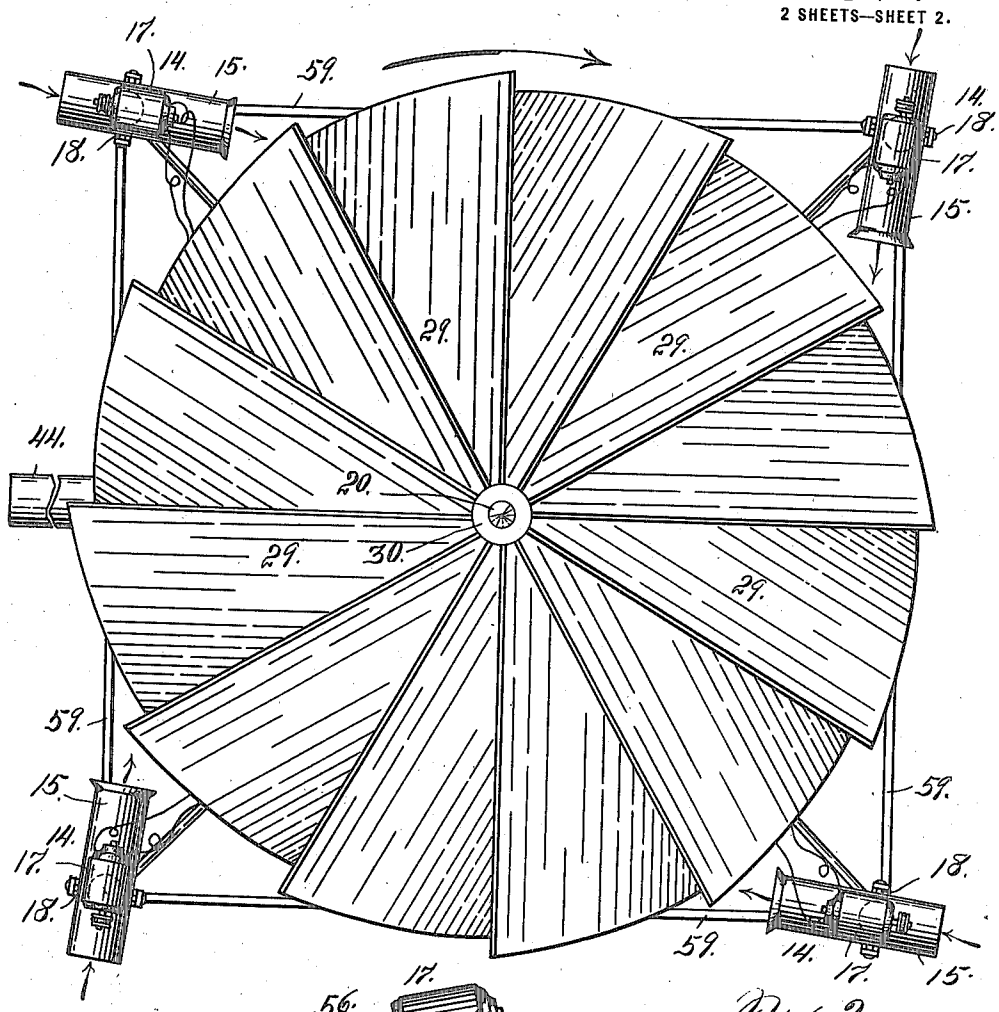



Fig. 2.

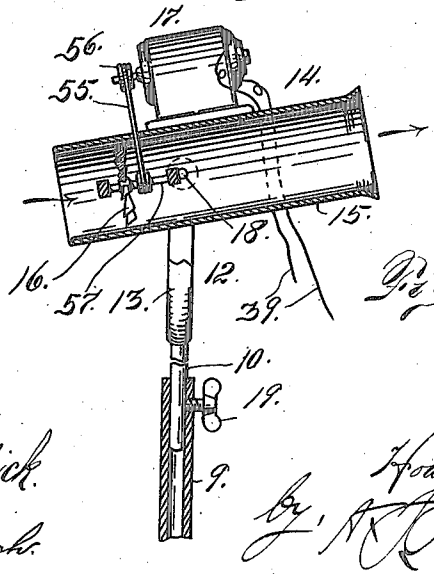



Fig. 3.

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# UNITED STATES PATENT OFFICE.

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## AERIAL APPARATUS.

1,264,712. Specification of Letters Patent. Patented Apr. 30, 1918.

Application filed October 12, 1908, Serial No. 457,289. Renewed September 29, 1917. Serial No. 194,084.

*To all whom it may concern:*

Be it known that I, HOWARD P. TWEED, a citizen of the United States, residing at the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Aerial Apparatus; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in aerial apparatus, my object being to provide a construction equipped with a lifting propeller, or a propeller rotating on a substantially vertically disposed axis, and equipped with a series of blades shaped to cause the apparatus to rise when the blades, or the wheel of which they are composed, are given a rotary motion in the proper direction.

My improved construction includes a suitable frame-work, a shaft vertically disposed, journaled in the frame work and equipped with propeller blades. Upon the frame-work of the structure is mounted suitable means for developing the necessary power for rotating the shaft and propeller blades. Furthermore, blowers are mounted upon the frame-work and arranged to discharge jets or currents of air upon the rotating propeller blades in such a manner as to facilitate the rotary action of the blades, thus increasing the lifting capacity of the propeller. The apparatus is also equipped with an open-ended conduit having one extremity extending upwardly and the other projecting from one side of the apparatus. A blower is located in this conduit and rotated to produce a down-draft and an outward current for the purpose of causing the apparatus to travel laterally or in a direction intersecting the vertical, at a suitable angle. As the air is discharged from the outer extremity of the conduit, the reaction due to the resistance of the atmosphere produces the desired result. The natural down-draft due to the upward motion of the apparatus serves to increase the air current through the said conduit.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawing in which is illustrated an embodiment thereof.

In this drawing,

Figure 1 is a side elevation partly in section of my improved aerial apparatus.

Fig. 2 is a top plan view of the same.

Fig. 3 is a detail view illustrating one of the blowers arranged to act upon the propeller, serving as auxiliary devices for imparting the rotary movement thereto.

Fig. 4 is a perspective view in detail illustrating a modified form of propeller blade.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a suitable frame-work which as shown in the drawing is composed of a bottom spider 6, consisting of a hub 7 and arms 8 radiating therefrom. The outer extremities of these arms are connected with vertically disposed posts 9 which as shown in the drawing are hollow, for the reception of telescoping rods 10 whose upper extremities are bifurcated as shown at 12. The arms 13 of the upper extremities of these rods extend on opposite sides of blowers 14 consisting of tubes 15 in which are located rotary fans 16 connected in operative relation with motors 17. The tubes or casings 15 are trunnioned on the arms 13 as indicated at 18.

As shown in the drawing there are four of these blowers, one arranged at each corner of the apparatus. The rods 10 are vertically adjustable within the tubes 9 and are secured in any suitable position of adjustment by set screws 19.

Centrally located and journaled in the frame-work of the apparatus, is a main shaft 20 whose lower extremity is journaled in the spider hub 7 as shown at 21. Intermediate its extremities, the shaft passes through and is journaled in a collar 22 which is connected with the posts 9 by rods 23. This collar is located immediately above the top of a cone-shaped housing 24 which incloses the power

mechanism of the structure. Below the collar 22, the shaft is equipped with a collar 25 which is fast thereon. The top of the housing 24 is located between the collars 22 and 25. Above the collar 22 the shaft is equipped with a collar 26 from which extend rods 27 to transverse rods 28 applied to the outer extremities of propeller blades 29, whose inner extremities are connected with a collar 30 fast on the shaft 20.

Inclosed within the housing 24 and mounted upon the frame-work of the structure is an engine 31 preferably of the explosive or internal combustion type. Upon the power shaft 32 of this engine, is mounted a gear 33 meshing with a similar gear 34 fast on the shaft 20. The gear 34 in turn meshes with a gear 35 fast on the armature shaft 36 of an electric generator 37 from which current is carried by means of conductors 38. From these conductors lead branch conductors 39 to the various motors 17 for operating the blowers 14.

Mounted upon the frame-work is an open-ended conduit 40 which as shown in the drawing has an upwardly directed portion 41 in which is located a rotary fan 42 for producing a down-draft as indicated by the arrow 43, and causing a current to escape from the laterally directed portion 44 of the conduit into the atmosphere, as indicated by the arrow 45.

The portion 44 of the conduit contains an elbow 46 which is swiveled on the body of the conduit as shown at 47. This body portion of the conduit is made stationary on the frame by means of suitable supporting or fastening devices 48 and 49.

The swiveled section 44 is provided with a lever arm 50 connected with the lower portion of the elbow 46, for the purpose of changing the position of the part 44 according as it is necessary to change the direction of travel of the apparatus.

As shown in the drawing the fan blower 42 is operated by a belt 51 running from a pulley 52 mounted on the main shaft 20, to a relatively small pulley 53 fast on a spindle 54 of the fan. In this manner the fan is actuated for the purpose of developing an air current in the direction indicated by the arrows 43 and 45, as heretofore explained.

As shown in the drawing, each motor 17 is connected with the fan of a blower 14 by means of a belt 55 leading from a pulley 56 on the armature shaft to the spindle 57 of the fan.

When the apparatus is in use motion is transmitted from the engine 31 to the shaft 20 through the medium of gears 33 and 34, resulting in the rotation of the shaft together with the propeller blades 29 connected with the shaft as aforesaid. The rotation of the propeller is in a direction to cause the apparatus to rise acting on the atmosphere which constitutes a resisting medium. Each blower 14 delivers a current of air upon the propeller blades in a proper direction to facilitate their rotary action, thus increasing the lifting capacity of the mechanism. In the form of construction shown in Fig. 4 each blade is bifurcated near its outer extremity to form a V-shaped pocket 58 which receives the air from the blower. This particular construction of blade is believed to facilitate the action of the air thereon.

Any suitable frame work may, of course, be employed. That illustrated in the drawing is skeleton in character and not intended to make provision for the carrying of passengers. My only object, in this particular instance, is to illustrate mechanism which is adapted to rise in the atmosphere under the influence of a propeller equipped with blades rotating around a substantially vertical axis. The frame-work is, however, provided with tie-rods 59 which connect the posts 9.

Having thus described my invention, what I claim is:

1. Aerial apparatus comprising a frame work, a propeller mounted to rotate and equipped with blades bifurcated near their outer extremities to form pockets, and means for discharging air currents directly upon the pocket portions of the blades whereby the rotation of the latter is accomplished.

2. In aerial apparatus, the combination with a suitable frame work and a propeller equipped with blades, of means for operating the propeller and independent means adjustably mounted on the frame work and lying between parallel planes cutting the zone of rotation of the blades at right angles to the axis of the propeller, for mechanically discharging air currents into the path of rotation of the propeller blades for creating auxiliary atmospheric resistance.

3. Aerial apparatus comprising a suitable frame work, a propeller consisting of a vertically disposed shaft and a series of blades connected therewith, operating means connected with the shaft, and auxiliary operating means lying between parallel planes cutting the zone of rotation of the blades and arranged to act directly upon said blades, substantially as described.

4. Aerial apparatus of the class described, including a propeller equipped with blades, means for operating the propeller and auxiliary operating means located beyond the circumference of the zone of rotation of the propeller, and between parallel planes cutting said zone, the said auxiliary means being operable independently of the first

named means and arranged to act directly upon the blades of the propeller at right angles to the axis of the said propeller, substantially as described.

5. Aerial apparatus comprising a suitable frame work, a propeller consisting of a vertically disposed shaft and a series of blades connected therewith, operating means connected with the shaft and independently operable, auxiliary operating means located beyond the circumference of the zone of rotation of the propeller blades and between parallel planes cutting said zone, and arranged to act directly upon the blades of the propeller at right angles to the axis of rotation of said propeller, substantially as described.

6. Aerial apparatus comprising a suitable frame work consisting of a vertically disposed shaft journaled in the frame, propeller blades mounted upon the shaft, an engine, a suitable connection between the engine and the shaft for transmitting motion to the latter, and blowers mounted upon the frame work of the structure, located beyond the circumference of the zone of rotation of the propeller blades and between parallel planes cutting said zone, and arranged to act directly upon the blades of the propeller at right angles to the axis of the latter, substantially as described.

7. Aerial apparatus comprising a frame work, a propeller mounted to rotate, operating means connected with the propeller, a plurality of auxiliary operating means located beyond the circumference of the zone of rotation of the propeller and between parallel planes cutting said zone, and arranged to act directly and continuously upon the blades of the propeller, substantially as described.

8. Aerial apparatus comprising a frame work, a propeller mounted to rotate, the propeller being equipped with blades, operating means connected with the propeller, and independent auxiliary operating means arranged beyond the circumference of the zone of rotation of the propeller blades and between parallel planes cutting said zone for mechanically discharging air currents into the zone of rotation of the propeller blades for creating auxiliary atmospheric resistance, substantially as described.

9. In aerial apparatus, the combination with a suitable frame work, and a propeller equipped with blades, of means for operating the propeller, and independent means mounted on the frame work, located beyond the circumference of the blade zone, and between parallel planes cutting the zone of rotation of said blades for discharging air currents into the path of the propeller blades for creating auxiliary atmospheric resistance for the purpose set forth.

10. In aerial apparatus, the combination with the propeller equipped with blades, of means for operating the propeller, and independent means mounted on the frame work located beyond the circumference of the blade zone and between parallel planes cutting the zone of rotation of said blades, and arranged to mechanically discharge air currents into the zone of rotation of the propeller blades at right angles to the axis of the propeller, for creating auxiliary atmospheric resistance, substantially as described.

11. In aerial apparatus, the combination with the propeller equipped with blades, and independent means for discharging air currents from positions beyond the circumference of the zone of rotation of the propeller blades, and between parallel planes cutting said zone, into the path of the propeller blades and toward the axis of rotation of the propeller for creating auxiliary atmospheric resistance.

12. Aerial apparatus comprising a suitable framework, propelling means mounted thereon and an open-ended conduit having a vertically disposed upper member and a horizontally disposed lower member protruding beyond the framework and adjustable in a horizontal plane and means for passing air currents through the conduit in a direction to be discharged by the lower member into the atmosphere, substantially as described.

13. In aerial apparatus, the combination with the propeller equipped with blades, of means for operating the propeller, and independent means mounted upon the frame work exteriorly of the blade zone and located between parallel planes cutting the zone of rotation of said blades and arranged to mechanically discharge air currents in unconfined volume into the path of travel of the propeller at right angles to the axis of rotation of the propeller for creating auxiliary atmospheric resistance, substantially as described.

14. In aerial apparatus, the combination with a propeller equipped with blades, of means for operating the propeller, and independent means arranged exteriorly of the propeller's zone of rotation and lying between parallel planes cutting said zone for discharging air currents in unconfined volume into the path of travel of the propeller in a direction at right angles to and toward the axis of rotation of the propeller for creating auxiliary atmospheric resistance, substantially as described.

15. The combination of propeller blades initially operated by any suitable power, with means independent of the blades themselves and lying between parallel planes cutting the zone of rotation of said blades for delivering resistance fluid to the zone

of rotation of the propeller blades for the purpose set forth.

16. The combination with propeller blades initially operated by any suitable power, of means independent of the blades themselves and lying between parallel planes cutting the zone of rotation of said blades for delivering resistance fluid continually to the outward extremities of the latter from a plurality of points external to the path of rotation of the propeller blades.

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

HOWARD P. TWEED.

Witnesses:
A. J. O'BRIEN.
A. EBERT O'BRIEN.