J. C. HANSEN-ELLEHAMMER & N. W. AASEN.

AERIAL MACHINE.

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1,155,485.

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Fig. 1.

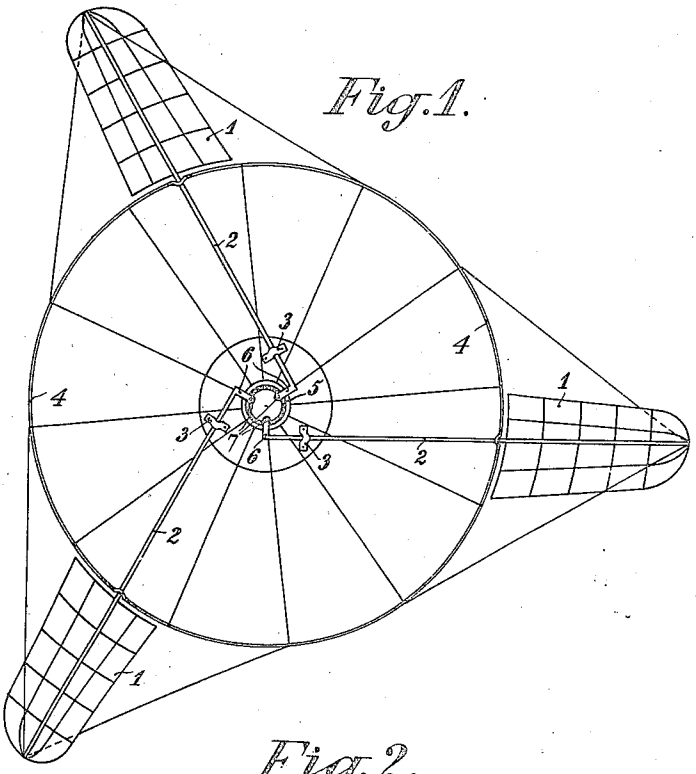


Fig. 2.

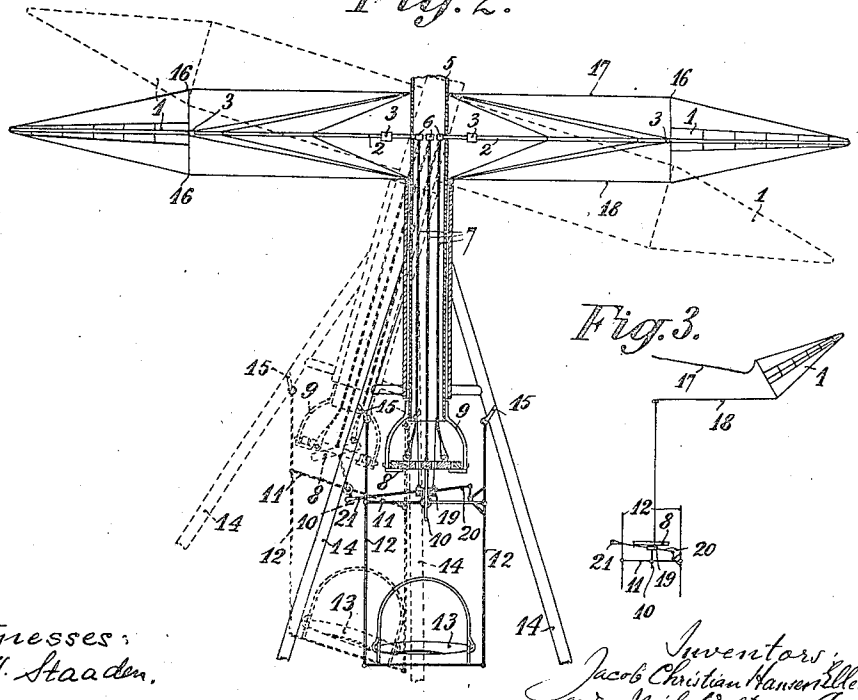


Fig. 3.

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UNITED STATES PATENT OFFICE.

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AERIAL MACHINE.

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To all whom it may concern:

Be it known that we, JACOB CHRISTIAN HANSEN-ELLEHAMMER and NIELS WALTERSEN AASEN, both subjects of the King of Denmark, and respectively residing at Istedgade, 119, Copenhagen, and Kochsvej, 15, Copenhagen, in the Kingdom of Denmark, have invented new and useful Improvements in Aerial Machines, of which the following is a specification.

Our invention relates to an aerial machine which is driven by means of a number of aeroplane-like wings or blades which surround a parachute and are rotated by means of an engine mounted on the frame of the machine.

The wings of the apparatus are furthermore rotatable in relation to the plane of the parachute, and the invention consists in the feature that the turning of the wings is effected automatically by means of a special device, whereby the stability of the apparatus is secured, and whereby the apparatus can be steered.

One construction according to our invention is illustrated in the accompanying drawing, in which—

Figure 1 is the aerial machine seen from above, the parachute fabric itself not being shown. Fig. 2 shows the same in side elevation, and Fig. 3 is a detail view.

The drawing shows three wings 1, each secured to a spindle 2 which can be turned in bearings 3 secured to the frame 4 of the parachute. The wings 1 are adjusted in the normal position to a suitable inclination.

The spindles 2 are provided at that end which is nearest to the axis of rotation 5, with fixed angles parts 6 pivoted to the rods 7 which project down into a hollow axis of rotation. To the other end of said rods is connected a disk 8 which is connected by means of a Cardan joint to the lower end of the hollow axis of rotation 5 which terminates at the bottom in a bracket 9. Normally to the disk 8 is secured a rigid rod 10, the lower end of which passes through a hole in a cross rod 11 which connects together the supporting rods 12 for the seat 13 of the driver.

The supporting rods 12 are suspended by means of eyes 15 from the frame 14 of the machine, and the cross rod 11, which is pivotally connected with rods 12, can also slide on the said rods 12, so that the action of the oscillation of the pendulum on the rod 10 can be regulated. The seat 13 with the driver forms the pendulum body proper.

When the rods 12 with the seat 13 oscillate sidewise, that is to say, when the axis of rotation is brought into oblique position, the cross rod receives a corresponding movement which is transmitted by the rod 10 and the disk 8, to the rods 7, some of which are in that way given an upward, and some a downward movement, and thereby the wings 1 are controlled in a direction from the normal position outward, as shown in full lines in Fig. 2, in the following manner:—The wing, which at the time is in the highest position (to the left in Fig. 2), will have an inclination which is less than the inclination of the wings in the normal position, the rod 7 of the said wing drawing the inner end of its cross rod 6 downward. When the inclination of this wing decreases, the action of the air on it also decreases with the result that the buoyancy in the left hand part of the apparatus is not decreased. The wing which is at the time in the lowermost position (to the right in Fig. 2) will have an inclination which is larger than the inclination of the wings in the normal position, the rod 7 of the said wing pressing the inner end of its cross rod 6 upward. When the inclination of this wing increases, the action of the air on it is likewise increased, with the result that the buoyancy in the right hand part of the apparatus increases. The apparatus will accordingly automatically assume such a position that the inclination of all the wings is the same, *i. e.* the normal position, as shown in full lines in Fig. 2. Consequently, the axis of rotation will always automatically assume a vertical position. Whereas the vertical position of the axis of rotation serves for steadying the machine, it will be necessary—for steering the machine in a desired direction—to make the axis of rotation assume an oblique position corresponding to the required direction. The latter can be effected by the driver, for instance, getting hold of the frame 14 and swinging his seat in the desired direction, or by the driver, either directly, or by means of a handle or the like, actuating the rod 10. It is obvious that the rods 7 can be replaced by cords, or the rotary movement transmitted in some other way from the disk 8 to the spindles 2.

In addition to this arrangement, which is used for steadying the apparatus during flight, the apparatus is provided with a second steadying device which may be used when the engine stops or is stopped, the said device being used for keeping the axis of the apparatus in vertical position, and for avoiding oscillations of the apparatus during a gliding or downward movement through the air. This device or arrangement consists in the wings 1 being pivoted to the spindles 2, each wing being provided with a cross bar 16 to which are secured the shrouds 17 and 18. These shrouds are secured at one end to the top of the hollow shaft 5, and with their other end introduced into the said shaft 5, and through the same downward, then through holes in the disk 8 and are finally secured to the sleeve 19 mounted on the rod 10. The sleeve is held in position by means of lever 20. The sleeve 19 must rotate with the shaft 5 and there must accordingly be some connection between said sleeve and the rod 20. This is carried out in practice by forming the sleeve 19 as a circular disk to which the shrouds are fastened and which on its periphery is surrounded with a semi-circular groove. The sleeve is surrounded by a ring provided on the inner side with a corresponding groove and secured to the rod 20. Balls are arranged between the two grooves, and the inner circular disk or sleeve 19, thus partakes of the rotation of the shaft 5, while the outer ring only follows the up and down movements of the rod 20. This arrangement acts as follows: When the engine is stopped during flight, whether intentionally or unintentionally, the wings can be brought to turn upward around the members or hinges by means of which they are attached to the ends of the spindles 2, and brought into the position shown in Fig. 3. This is effected by releasing the rod 20 and the sleeve 19 by means of the handle 21, whereby the shrouds 18 are slackened, the wings being then forced upward by the air pressure.

The engine from which the motive power is obtained for the apparatus is supported on the rigid frame 14, but is not shown in the drawing in order to avoid unnecessary complication of the drawing. The engine can be of any suitable type, and the transmission from the engine shaft to the rotating shaft 5 can be effected by any suitable known means, as the frame 14 always keeps the same position relative to the axis of the shaft 5 and does not itself participate in the oscillatory movement. As the problem of transmitting the motive power from the engine to the rotating shaft does not present any special difficulties to the expert, it will not be necessary to either show or describe the arrangement.

We claim as our invention:

1. In an aerial machine the combination with a rotating parachute and a hollow shaft therefor, of a plurality of adjustable aeroplanes located on the circumference of said parachute, movable spindles supporting said aeroplanes, a pendulum structure comprising the seat of the operator adapted to automatically vary the inclination of said aeroplanes and connecting means between said pendulum structure and said spindles for transmitting the swinging movements of said pendulum structure to said spindles.

2. In an aerial machine the combination with a rotating parachute and a hollow shaft therefor, of a plurality of adjustable aeroplanes located on the circumference of said parachute, movable spindles supporting said aeroplanes, a frame, a pendulum structure comprising the seat of the operator, adapted to automatically vary the inclination of said aeroplanes, rods for loosely suspending said pendulum structure from said frame, a cross bar pivotally and slidably mounted on said rods and connecting means between said cross bar and said aeroplanes for transmitting the movements of said pendulum structure through said cross bar to the said aeroplanes.

3. In an aerial machine the combination with a rotating parachute and a hollow shaft therefor, of a plurality of adjustable aeroplanes located on the circumference of said parachute, movable spindles supporting said aeroplanes, a frame, a pendulum structure comprising the seat of the operator adapted to automatically vary the inclination of said aeroplanes, rods for loosely suspending said pendulum structure from said frame, a cross bar pivotally and slidably mounted on said rods, a movable disk (8) suspended from the lower end of said hollow shaft by means of a Cardan joint, connecting means between said disk and said movable spindles, and a rod projecting from said disk and passing through an opening in said cross bar for transmitting the swinging movement of said pendulum structure to the disk and through said disk and connecting means to said aeroplanes.

In testimony that we claim the foregoing as our invention, we have signed our names in presence of two subscribing witnesses.

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Witnesses:
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