No. 860,447. PATENTED JULY 16, 1907.

# W. H. COOK.

## FLYING MACHINE.

APPLICATION FILED MAR. 6, 1906.

3 SHEETS—SHEET 1.

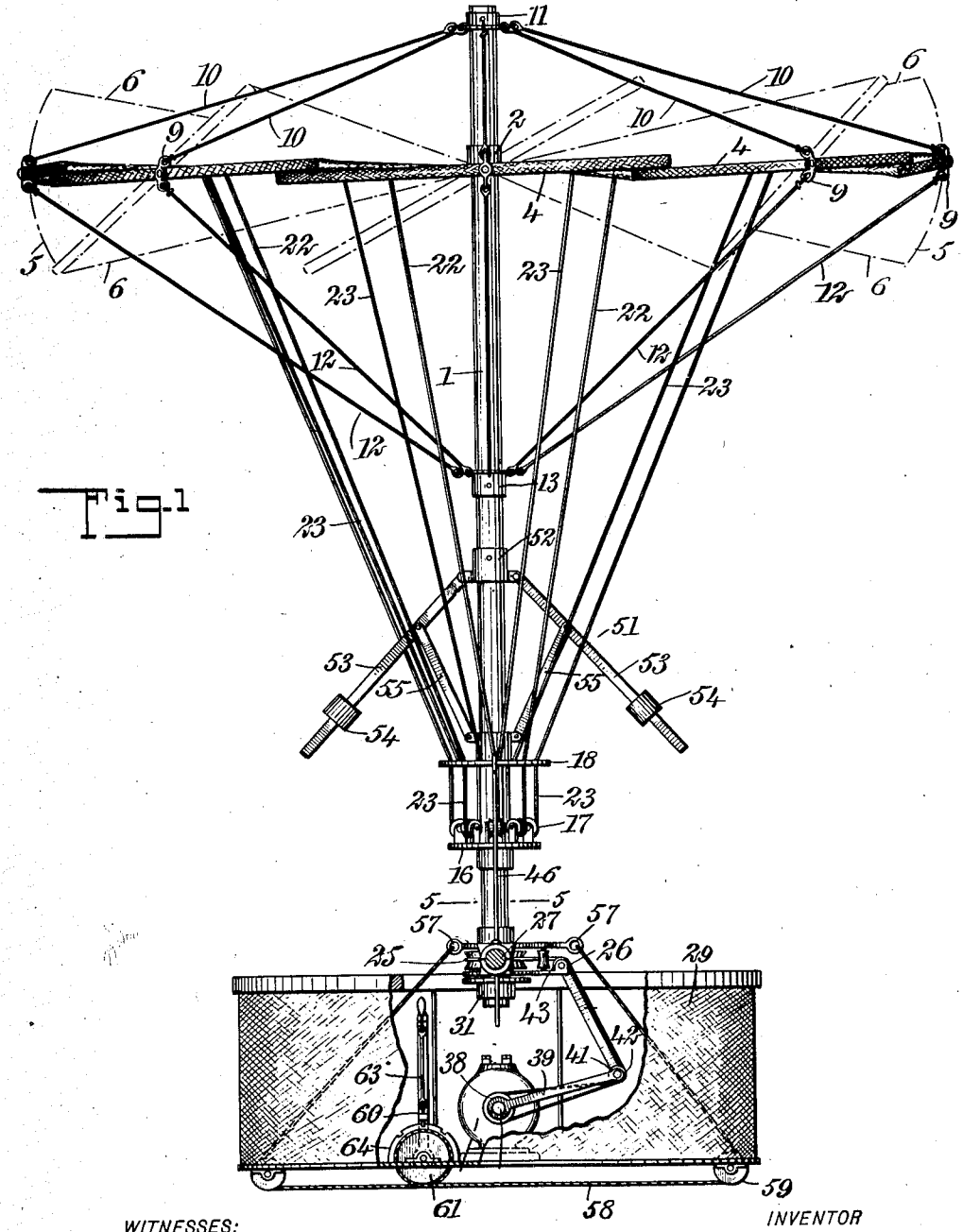



Fig. 1

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3 SHEETS—SHEET 2.

Fig. 2

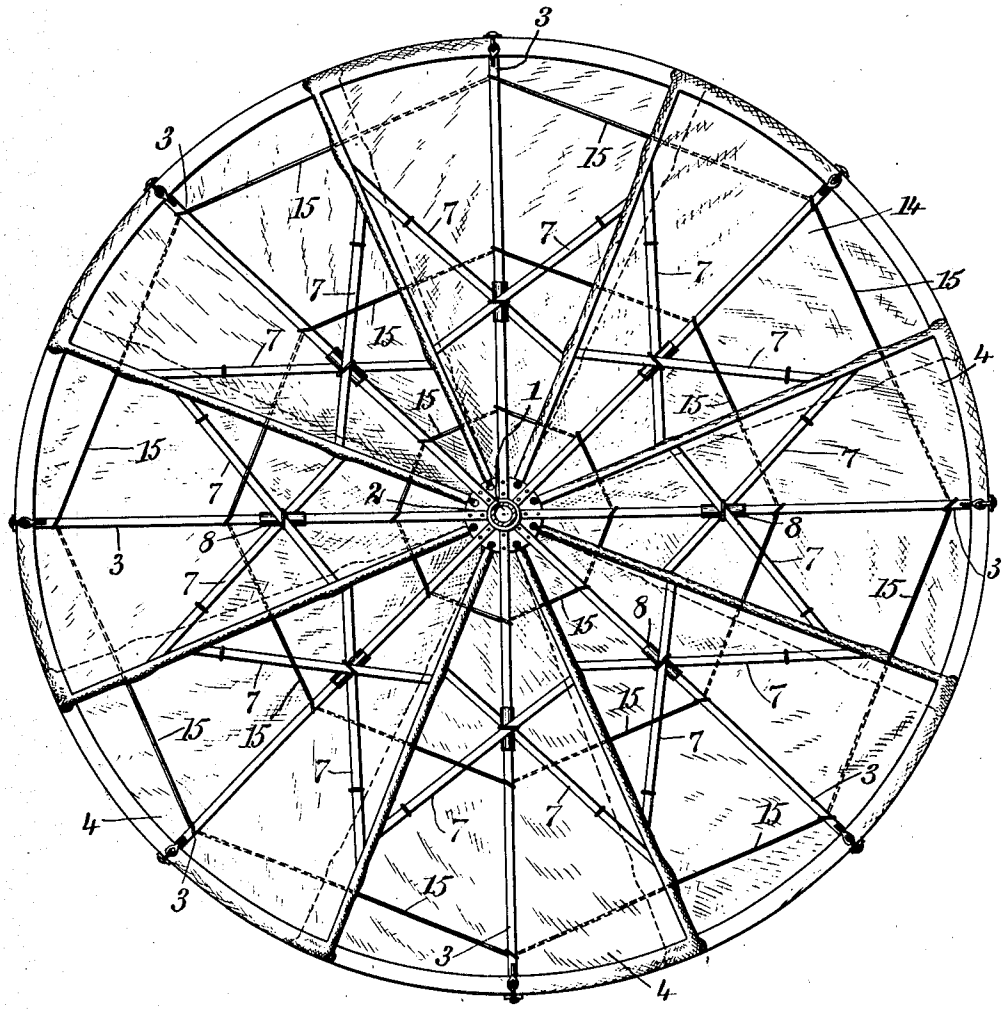
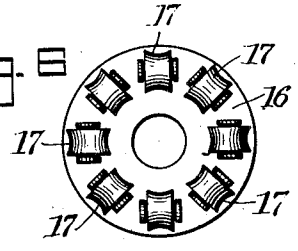



Fig. 8




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3 SHEETS—SHEET 3.

Fig. 3

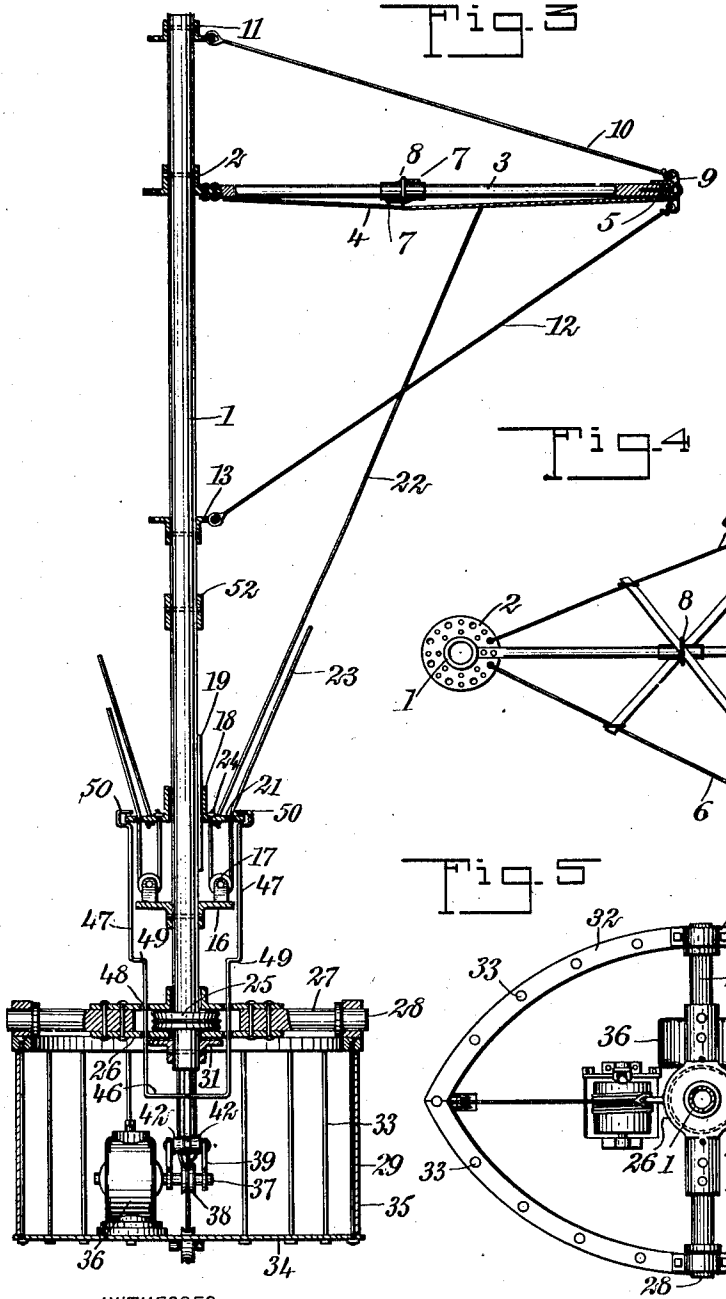



Fig. 4




Fig. 5




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# UNITED STATES PATENT OFFICE.

WILLIAM HARVEY COOK, OF EDMONDS, WASHINGTON.

## FLYING-MACHINE.

No. 860,447. Specification of Letters Patent. Patented July 16, 1907.

Application filed March 6, 1906. Serial No. 304,470.

*To all whom it may concern:*

Be it known that I, WILLIAM HARVEY COOK, a citizen of the United States, and a resident of Edmonds, in the county of Snohomish and State of Washington, have invented a new and Improved Flying-Machine, of which the following is a full, clear, and exact description.

This invention relates to flying machines, the object being to construct a flying machine having an aeroplane capable of raising and supporting a car or basket, without the agency of a gas bag or balloon.

The invention consists of the construction and combinations of parts to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the flying machine, a portion of the basket thereof being broken away; Fig. 2 is a horizontal section taken through the shaft of the machine, just above the aeroplane; Fig. 3 is a central vertical section illustrating the construction of the aeroplane together with the cage, and means for controlling and operating the machine; Fig. 4 is a plan of one of the vanes of which the aeroplane is composed; Fig. 5 is a plan of the cage or basket, and is a horizontal section taken on the line 5—5 of Fig. 1; and Fig. 6 is a plan of a collar which is attached to the shaft, and constitutes a feature of the invention.

Referring more particularly to the parts, 1 represents a central vertical shaft, near the upper extremity whereof a collar or head 2 is rigidly attached; to this head I attach a plurality of radial arms 3 which are preferably disposed an equal distance apart as indicated. Upon each of these arms there is constructed a vane 4 as illustrated in Fig. 4; in order to do this I provide a frame for the vanes, which comprises the arm 3, to the outer extremity whereof a bow 5 is pivotally attached as shown. The extremities of this bow 5 are connected by cords or wires 6 with the head 2, and these wires are connected by cross-braces 7 which are connected together and to the arms, by a suitable loose sleeve 8 facilitating the rotation of the vanes on the arms 3.

At the extremities of the arms 3, bracket-plates 9 are respectively attached, and these bracket-plates are connected by guy-wires 10 with a fixed collar 11 carried by the upper extremity of the shaft 1, as shown in Fig. 3; in this connection it should be understood that the shaft projects well above the position of the vanes, as indicated. Similar guy-wires 12 are provided, which lead from the lower sides of the brackets 9 to a fixed collar 13 which is carried by the shaft 1 at a suitable point below the vanes.

As shown in Fig. 2, the vanes are arranged so that they overlap at their edges, the arrangement being such that the forward edge of each vane overlaps the rear edge of the vane next in advance, with respect to the direction of rotation, it being understood that rotation takes place upon the axis of the vertical shaft; in this way the vanes 4 unite to form a circular aeroplane 14. The fixed angular arrangement of the arms 3 is maintained by means of cords or tie-wires 15 which are preferably arranged in three sets, as shown, and extend continuously around the aeroplane so as to form polygons. These ties or tie-wires 15 pass between the overlapping edges of the adjacent vanes, their forward half portions being disposed above the rear half portions of the vanes in advance, while their rear portions are disposed under the forward portions of the vanes to the rear; in this way these ties 15 in no way obstruct the rotary movement of the vanes upon the arms 3. I provide means for rotating the vanes upon the arms as suggested, so that they may occupy the position in which they are indicated in dotted lines in Fig. 1; for this purpose, near the lower portion of the shaft 1, I provide a fixed collar 16, the construction of which is clearly shown in Fig. 6. The body of this collar consists of a circular plate, upon the upper side whereof a plurality of pulleys 17 are attached, the same being arranged so as to correspond respectively with the vanes 4, there being one pulley for each vane. At a suitable distance above this collar 16 I attach a slidable collar 18 which is locked against rotation with respect to the shaft, by means of a suitable key or spline 19; this collar 18 has a body 20 which is substantially a circular disk provided with a plurality of openings 21 which correspond in number and angular position to the vanes 4.

From a point near the rear edges of the vanes 4, cords 22 lead downwardly and attach to the collar 18 as indicated most clearly in Fig. 3, and from points near the forward edges of the vanes 4, similar cords 23 pass downwardly, and these pass through the guide-openings 21 referred to above, and pass downwardly therefrom so as to run around the pulleys 17 referred to, whence they pass upwardly and are anchored at points 24 on the collar 18. From this arrangement it should be understood that if the collar 18 is pulled downwardly, the cords 22 will be drawn in upon while slack will be given out to the cords 23. This movement of the cords operates to rotate the vanes into inclined positions such as indicated in dotted lines in Fig. 1; thus the forward edges of the vanes will become elevated, while the rear edges become depressed.

Near its lower extremity, the shaft 1 is provided with a rigid pulley or sheave 25, and this sheave is suitably incased in a block 26, to the opposite sides whereof,

stub shafts 27 are attached; the extremities of these shafts are formed into trunnions or gudgeons 28 from which a cage or basket 29 is hung, the said basket being provided at its upper edge with brackets or hangers 30 which are received over the trunnions 28, as shown; in this way the basket is suspended from the block. On the under side of the block, a collar 31 is received, which is rigidly attached to the shaft 1, to assist in supporting the block upon the shaft, as will be readily understood. The shaft is rotatable in the block 26.

The cage 29 preferably comprises an oval frame 32, from which a plurality of bars 33 support a bottom or floor, 34; between the frame 32 and the bottom, a wall or shell 35 of suitable material is placed, thus inclosing the interior of the cage.

On the floor 34 of the cage or basket, a motor 36 is carried, the same being of any suitable type. The shaft 37 of this motor is extended as shown most clearly in Fig. 3, and carries a rigid driving pulley 38; at opposite sides of this driving pulley, links 39 are loosely carried by the shaft and these extend outwardly in an inclined position as shown in Fig. 1, attaching their extremities to similar links 40 which extend upwardly and attach at their upper extremities to the block 26 as indicated most clearly in Fig. 1. At the joint 41 which connects the links 39 with the links 40, guide pulleys 42 are provided as shown in Figs. 3 and 5, and similar guide pulleys 43 are provided at the point of connection between links 40 and the block 26. Near the guide pulleys 43 (which it will be understood have a horizontal axis of rotation) I provide guide pulleys 44 which are mounted in the block 26 and have a vertical axis of rotation; these guide pulleys 44 are in substantial alinement with the pulley 25 referred to above as rigidly attached to the shaft 1. Around all of these pulleys passes a driving cord or rope 45 as indicated very clearly in Fig. 1; in this way the driving pulley 38 of the motor operates to rotate the shaft 1 through the medium of the pulleys and the rope.

I provide means for raising and lowering the collar 18 for the purpose of controlling the position of the vanes 4, from the cage or basket; for this purpose I provide a draw-frame 46 which preferably comprises three vertically-disposed rods 47 which are attached together in any suitable manner and are guided in a vertical direction through the block 26, passing as illustrated in Fig. 3, through suitable guide openings. At a suitable point these rods are provided with offsets or shoulders 49 which are adapted to engage the upper side of the block to limit the downward movement thereof. At their upper extremities, the arms 47 are bent over to form claws 50 which engage the periphery or edge of the collar 18. From this arrangement, evidently, a person within the basket may raise or lower the collar 18 as desired.

I further provide a governor 51, illustrated in Fig. 1, the purpose of which is to control the opening out of the vanes automatically, thereby tending to close them should the machine tend to rotate at too great a velocity. This governor comprises a collar 52 which is rigidly attached to the shaft and provided with oppositely projecting governor arms 53 which incline downward as shown, carrying weights 54. From suitable intermediate points on the arms 53, links 55 extend downwardly and attach pivotally at their lower extremities to the upper portion of the collar 18. From this arrangement, evidently, if the shaft 1 tends to rotate at too high a velocity the centrifugal force operating on the weights 54 will throw the arms 53 outwardly, and pull the collar 18 upwardly, which will move the vanes back toward their folded position, in which position they are shown in full lines in Fig. 1.

I prefer to construct the body of the vanes 4 of suitable cloth 56 attached to the under side of the frame of the vanes as shown; but in practice, these vanes may be made of light sheet metal if desired. I prefer to construct the vanes so that the arm 3 of each vane does not constitute an axis of symmetry for the vane; in this way the arm of each vane divides the same into two sections $4^a$ and $4^b$, the section $4^a$ being of a smaller area than the section $4^b$. I arrange the vanes with the smaller sections $4^a$ disposed forwardly, with respect to the direction of rotation, from which arrangement, when the machine is not running the vanes will hold themselves normally in their closed position by reason of the pressure of the air on the under and rear sides thereof. In this way the areoplane performs the functions of a parachute as well as those of a propeller, operating as a propeller when the machine is rising and as a parachute when the machine is floating in the air. This arrangement just referred to is especially desirable because in case of accident to the driving gear or vane controlling mechanism the device quickly transforms itself into a parachute.

I provide means for directing the course of the areoplane so that it can make progress across the sky in a substantially horizontal direction. This is accomplished by holding the shaft in an inclined position. To the forward or rear sides of the block 26 by means of suitable eyes 57 the ends of a cord 58 are attached and the cord passes down in an inclined direction to the ends of the cage passing around guide pulleys 59 and running along under the bottom of the cage as indicated. In the bottom of the cage a windlass 60 is mounted having a drum 61 about which one or more coils of the cord 58 are made as indicated. The drum 60 is provided with a lever 62 having a locking mechanism coöperating with a segment 64. By locking this lever in a forward or rearward position the shaft will be moved into an inclined position, moving upon the stub-shafts 27 as a tilting axis. The machine will, of course, tend to move in the direction toward which the upper end of the shaft 1 inclines.

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

1. In a machine of the class described, in combination, an aeroplane having a plurality of vanes with axes of rotation, a shaft depending from said aeroplane, cords attached to said vanes on the rear sides of said axes of rotation, other cords attached toward the forward edges of said vanes, a slidable collar on said shaft attached to said first cords, said collar affording means for guiding said other cords therethrough, and a fixed collar on said shaft having means for guiding said other cords.

2. In a machine of the class described, in combination, an aeroplane having a plurality of vanes with axes of rotation, a shaft depending from said aeroplane, a sliding collar mounted on said shaft, a set of cords connecting said sliding collar with said vanes on one side of the axes thereof, a second set of cords attached to said vanes on the opposite side of the axes thereof, said sliding collar having

means for guiding said second set of cords therethrough, a fixed collar on said shaft adjacent to said first collar, having guiding means for said second set of cords, said second set of cords being attached at their extremities to said first collar, and means for actuating said sliding collar to control said cords.

3. In a machine of the class described, an aeroplane comprising a plurality of vanes having axes of rotation, a depending central shaft supported by said aeroplane, means for rotating said shaft, and a governor carried by said shaft, and means for connecting said governor with said vanes to control the position thereof.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM HARVEY COOK.

Witnesses:
J. N. OTTO,
L. C. ENGEL.