3 Sheets—Sheet 1.

E. OAKES.

AERIAL CAR.

No. 106,862. Patented Aug. 30, 1870.

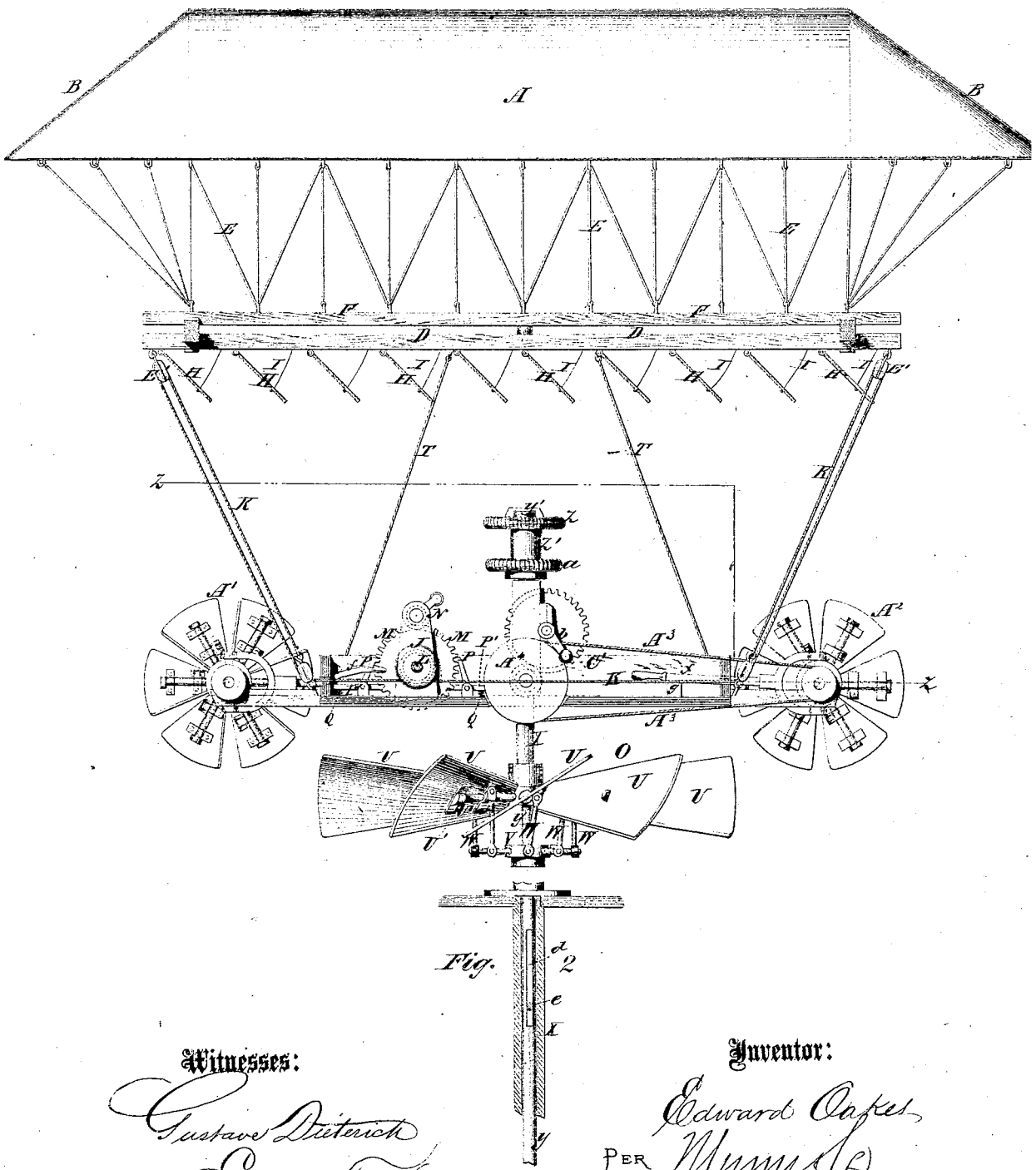

Fig.

Witnesses:

Gustave Dieterich

Edgar Tate

Inventor:

Edward Oakes

Per Munn & Co

Attorneys.

3 Sheets—Sheet 2.

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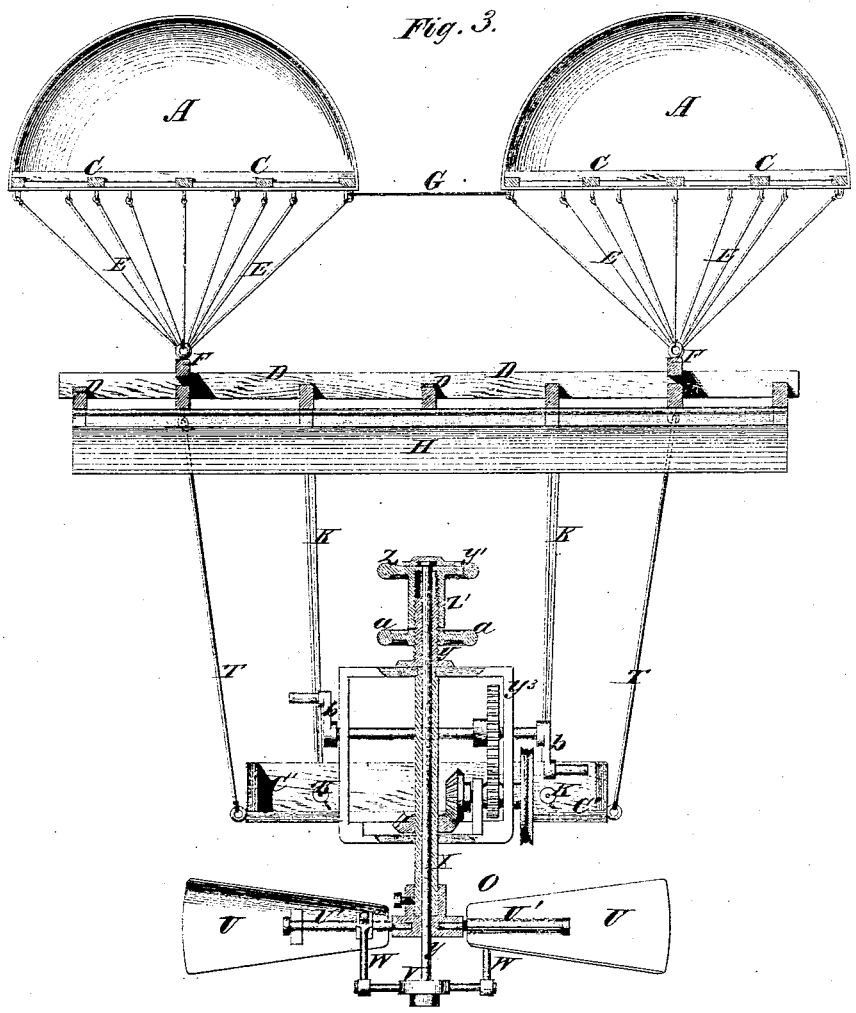
Fig. 3.



Witnesses:
Gustave Dietenich
Edgar Tate.

Inventor:
Edward Oakes
Per Munn & Co
Attorneys.

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Fig. 4.

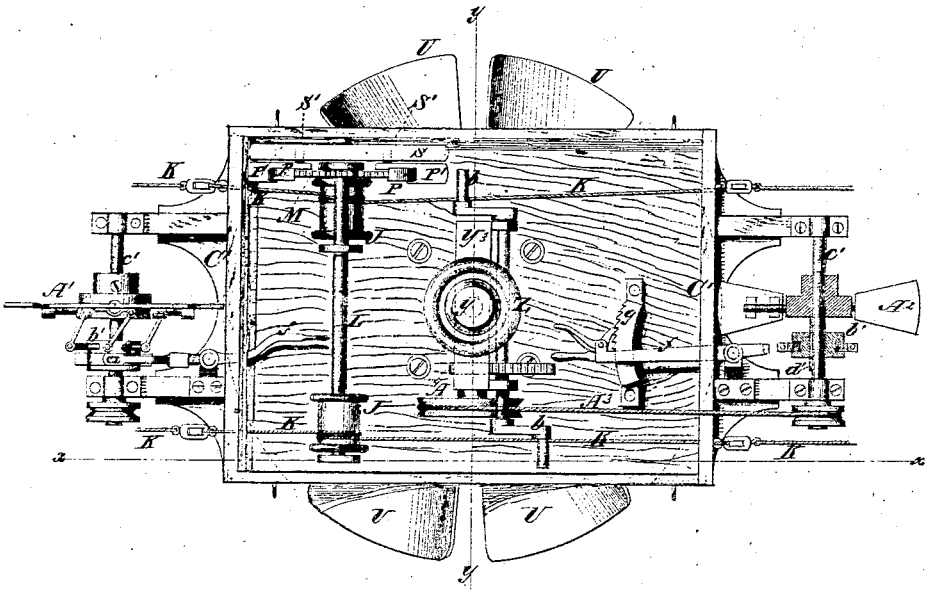


Fig. 5

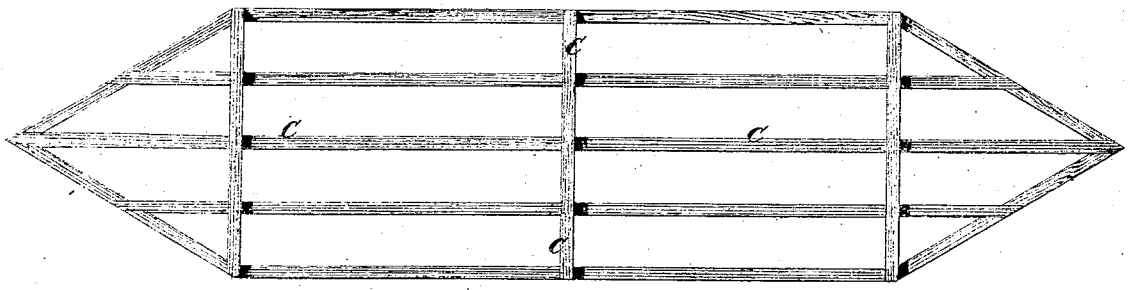
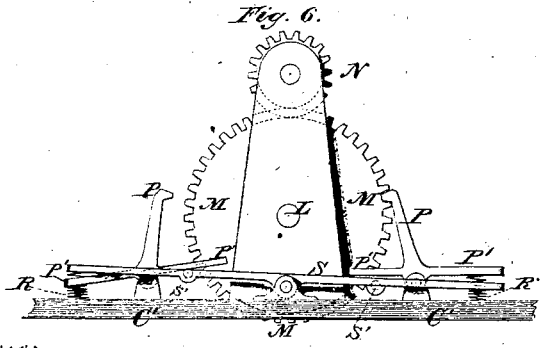


Fig. 6.



Witnesses:

Gustave Dieterich

Edgar Tate

Inventor:

Edward Oakes

Per Munn & Co

Attorneys.

United States Patent Office.

EDWARD OAKES, OF RICHMOND, INDIANA.

Letters Patent No. 106,862, *dated August* 30, 1870; *antedated August* 25, 1870.

IMPROVEMENT IN AERIAL CARS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, EDWARD OAKES, of Richmond, in the county of Wayne and State of Indiana, have invented a new and improved Flying Ship; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification.

This invention relates to improvements in vessels or ships for navigating or sailing through the air while suspended in it by balloons.

The invention consists in the combination, with one or more semi-cylindrical balloons, preferably with pointed ends and flat bottoms, of a sail of peculiar construction, a pair of adjustable guiding-wheels or propellers, and one or more lifting and depressing-wheels, under an improved arrangement, calculated to enable the operator to so guide and control the ship as to cause it to ascend and descend when required, and to move through the air in ascending or descending planes, in any required direction, as hereinafter specified.

Figure 1 is a side elevation of my improved flying ship;

Figure 2 is a detail view of a part of the adjusting apparatus for the lifting and lowering-wheel;

Figure 3 is a transverse sectional elevation of the ship;

Figure 4 is a plan view of the car and propelling apparatus;

Figure 5 is a plan of the frame of the plane sides of the balloons; and

Figure 6 is a side elevation of the operating and holding-gear for the drum for holding and adjusting the cords by which the car is suspended from the sail or balloons.

Similar letters of reference indicate corresponding parts.

I employ two or more balloons, A A, alike in construction and form, as the means for lifting the ship. They are, preferably, semi-cylindrical, with pointed ends, B, and flat bottoms, but I may employ cylindrical forms, with pointed ends, with good results.

The covering of the balloon may be of varnished silk, (as shown in this example,) rubber cloth, or any of the materials ordinarily used for that purpose, except upon the bottom, which is covered by a plate of aluminum, or a thin plate of other suitable metal may be used, the same being attached to frames C, made use of to insure the flatness of the bottom of the balloon, and to prevent its collapsing when pressure is thrown upon it during a descending movement of the ship.

The balloons are attached to a sail, D, by cords E E, which extend from the edge of the balloon to longitudinal bars F, or stiffening-ribs, which form part of the frame-work of the sail, and they are coupled together by cord G.

The sail D consists of a light rectangular frame of wood and metal, to the under side of which is attached a series of wind-vanes or flaps, H, made of vulcanized India rubber, or such other material as may be suitable for the purpose.

The flaps H H are hinged at their forward edges to the frame, and their rear or free edges are attached to the frame by cords I I, which are intended to prevent the flaps dropping too far.

The cords are intended to be of such length as to hold the flaps at an angle of forty-five degrees with the frame of the sail during an ascending movement of the ship.

The car C^1 is suspended to the sail D by ropes and pulleys, in such manner as to allow it to swing backward and forward, or to suspend either end at a greater or less distance from the sail, at the option of the operator, the balloons and sail assuming inclined directions in such cases.

The devices used to effect this movement are shown in figs. 1 and 4, and partly in detail in fig. 6.

J J are drums, around which the ropes K K are coiled a sufficient number of times to prevent slipping.

The drums are rigidly attached to the shaft L, which bears upon one end the toothed wheel M, which engages with the pinion N, rotated by means of a crank.

The drums, being rotated, take on the rope at one side and pay it off on the other, thus causing the car to travel along the rope, approaching one end of the sail and receding from the other end, thus changing the center of gravity and controlling the position of the sail D and balloons A A in a way to cause the elevation or depression of either end of the sail and balloons, the car remaining level.

To hold the drums in place, and prevent their turning from accidental causes, pawls B B, fig. 6, are so placed as to engage with the teeth of the wheel M on either side.

Each of these pawls has a projection, P^1, formed upon it, which answers the purpose of a treadle, by means of which it may be disengaged by the foot of the operator, the pawls being held to the face of the wheels by spiral springs R, placed underneath the treadle.

A supplementary treadle, S, enables the operator to disengage the pawls upon both sides at once when required, the treadle S having projections, S^1, which

engage with the treadles P, P, so as to raise the treadle P at the side of the wheel opposite to the end on which the foot is placed.

The cords T T, figs. 1 and 3, are intended to assist in supporting the car. They are attached to the said car and sail at such relative points as not to effect the horizontal position of the car in the various changes of position which may be given to the sail D and balloons A A by changing the cords K.

O represents the lifting-wheel.

The fans U U are pivoted upon radial arms, U^1, so as to turn freely.

A spider or spangle, V, having a number of arms corresponding with the number of fans, is placed underneath the vanes.

A pitman, W, connects each of these arms with its appropriate fan.

The shaft X is hollow, and the rod Y passes through it.

This rod has a head, Y^1, formed upon its upper end, which runs in a socket provided for it in the hand-wheel Z.

Said hand-wheel Z has a projection upon the under side, within which a screw-thread is cut, which engages with a corresponding screw-thread formed upon a projecting part of the frame Y^2, which supports the wheel.

The hand-wheel Z, being turned to the right or left, moves up or down, carrying the rod Y, and spangle attached, with it, and thus changes the pitch or lay of the fans upon the air.

A lock-nut, *a*, is placed beneath the hand-wheel, to secure it in any desired position.

Two cranks, *b*, and suitable gear-wheels, are added in this example to give motion to this wheel; also, to the guiding-wheels.

The rod Y turns with the shaft X, to insure its rotation.

A slot, *d*, is cut in the rod, which works upon a pin, *e*, passed through the shaft X.

A^1 and A^2 represent the steering and guiding-wheels. These wheels are of the same character as the lifting-wheel, already described, but governed in a different manner.

The spangles *b'* are made to slide back and forth upon the shafts O^1, and feathers *d'* are formed upon the shafts, and work in slots cut in the spangle-hubs, and cause the spangles to revolve with the shaft.

The position of the spangles upon the shafts is governed by levers *f*, and latches upon the levers engage with a toothed segment, *g*, and hold them in any desired position. In the drawing only one of the levers is completed.

The guiding-wheels A^1 A^2 are propelled by belts A^3, from a pulley, A^4, connected to the driving-gear for the lifting-wheel O.

This machine is planned upon the supposed principle that bodies suspended in the air will move in the direction of the least resistance.

In accordance with this theory, I have endeavored to so construct it as to give the greatest possible horizontal surface with as little lateral and end surface as may be practicable.

It is intended to propel the machine in the same manner as sailing birds propel themselves, viz., by first working up to a height and then sailing down.

The sail D is the principal agent relied upon to communicate a forward motion to the ship. It is constructed so as to present its entire surface to oppose the passage of air during a descending movement of the ship, but to allow the air to pass freely through during an ascending movement.

The flaps or wind-vanes, covering the under side of the sail, are hinged to it so as to be opened and closed by the action of the air.

An ascending movement opens these doors as much as the length of the cords will allow, and the action of the air upon their upper surfaces tends to move the ship forward. The effect is the same as though the entire frame had been turned to the same angle with the horizon. The upper surfaces of the flaps, impinging against the air, tend to convert the upward movement of the ship into a forward motion, and the result is an oblique motion upward and forward.

From this it will be seen that the wind-vanes answer a double purpose:

First, their opening reduces the surface of the sail, and enables the ship to ascend with a less expenditure of power than would otherwise be required.

Second, their oblique position tends to move the ship forward during an ascent.

The semi-cylindrical balloons, with pointed ends and perfectly flat bottom, are intended to act as sails during a descending movement, and, in connection with the sail D, impart a forward motion to the ship.

By reason of the arrangement of the suspending devices of the car O^1, the operator is enabled to move it forward or backward at will, changing the center of gravity, and thereby controlling the lay of the sail and balloons upon the air, so as to allow either end of the balloon and sail to be elevated or depressed.

The lifting-wheel O is constructed in such manner as to enable the operator to suspend or reverse its action upon the air without stopping it or changing its direction of rotation.

The object of this construction of the lifting-wheel would be more apparent in a ship having two or more such wheels. It is to enable the ship to contend successfully with adverse currents of air, as all these changes can be made in the wheel while it is running at a high speed.

The steering-wheels A^1 A^2, attached to the front and rear ends of the car, are also adjustable by a movement of the governing-lever, to be made to work into the air in either direction, or their action may be modified or entirely suspended, without stopping or reversing them, or interfering with the the power.

The balloons are not intended to be of such size as to lift the entire weight of the machine, but are to be of such power only as may be necessary to enable the machine to rise when the lifting power of the wheel O is added thereunto, so that, when this wheel is not running, the ship will descend of its own weight; but, in effect, the power of the wheel can be considerably increased, because it can be made to work downward in a descent, thus nearly doubling its power.

The balloons being properly filled with gas, the engine or other propelling medium is started, and the power applied to the lifting-wheel, whereby the ship rises gradually in the air, until, having reached an altitude sufficient for his purpose, the operator sets the sail and balloons, attached at a bold angle to the plane of the horizon, reverses the wheel, and begins to descend rapidly, converting altitude into velocity, precisely as sailing birds do.

When sufficient momentum in acquired, he changes the sail and balloons to a position more nearly horizontal, and leisurely sails along until his momentum is expended, or until too near the ground, or, when under headway, he may set the sail properly and re-ascend.

When it is desired to change the direction of flight, the steering-wheels must be run in a direction corresponding with the effect desired.

Having thus described my invention,

I claim as new and desire to secure by Letters Patent—

1. The combination of the balloons, sail, car, lifting and propelling-wheels, substantially as herein described.

2. The combination, with the balloons A and car C', of a sail constructed and arranged substantially as specified.

3. Cords K and T and the adjusting-drums J, operating-gears and holding-pawls P, for suspending the car from the sail for adjustment relatively thereto, substantially as specified.

4. The combination with the pawls P and gear-wheel M, of the treadle S, substantially as specified.

5. The arrangement, with the vanes, of the lifting and guiding-wheels, of the spiders, and the adjusting-rods Y or levers *f*, substantially as specified.

EDWARD OAKES.

Witnesses:
GEO. S. DURFEE,
J. K. WARREN.