No. 882,189. PATENTED MAR. 17, 1908.

E. L. DRAKE.

FLYING MACHINE.

APPLICATION FILED MAR. 25, 1907.

3 SHEETS—SHEET 1.

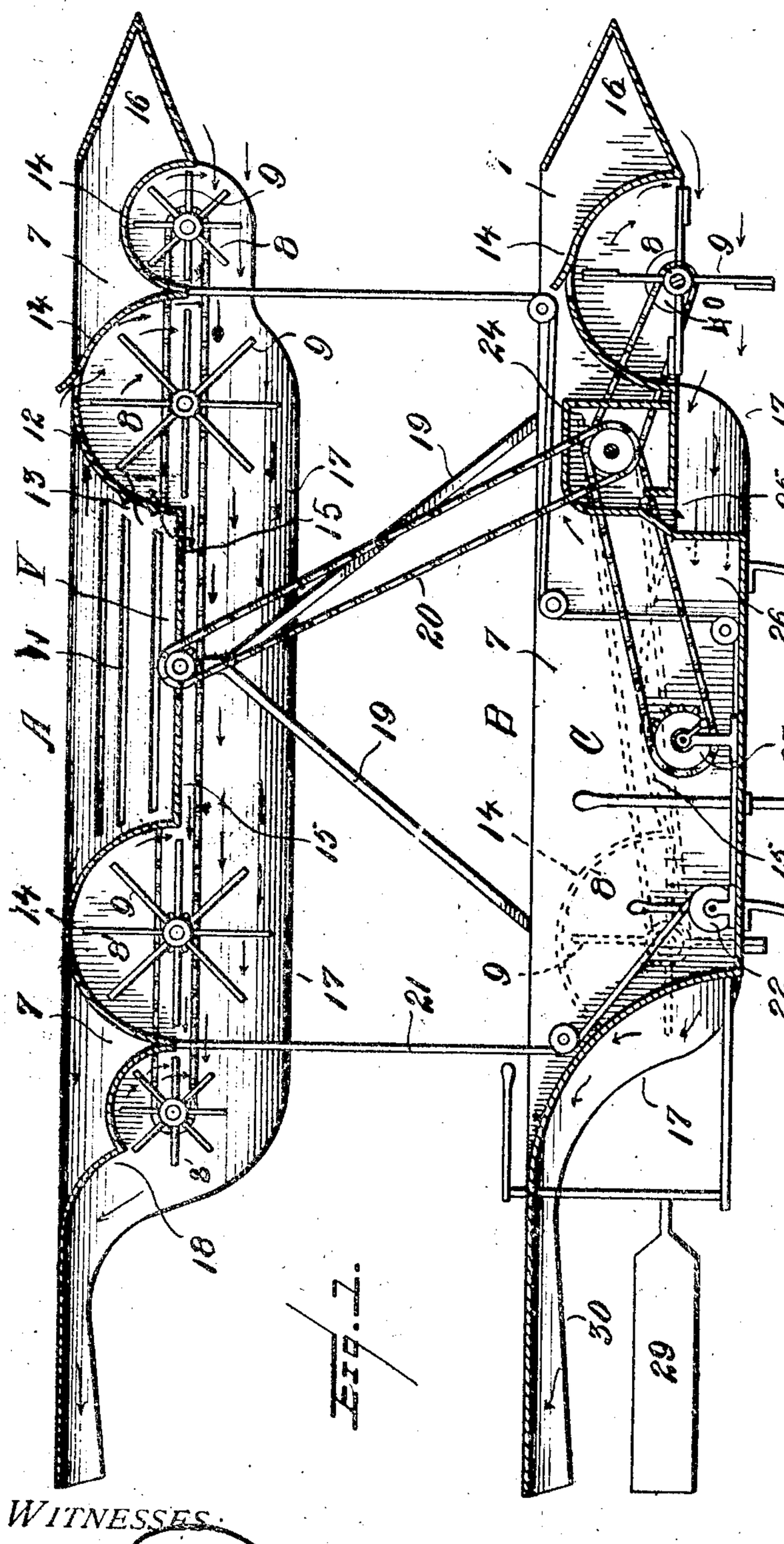

Fig. 7.

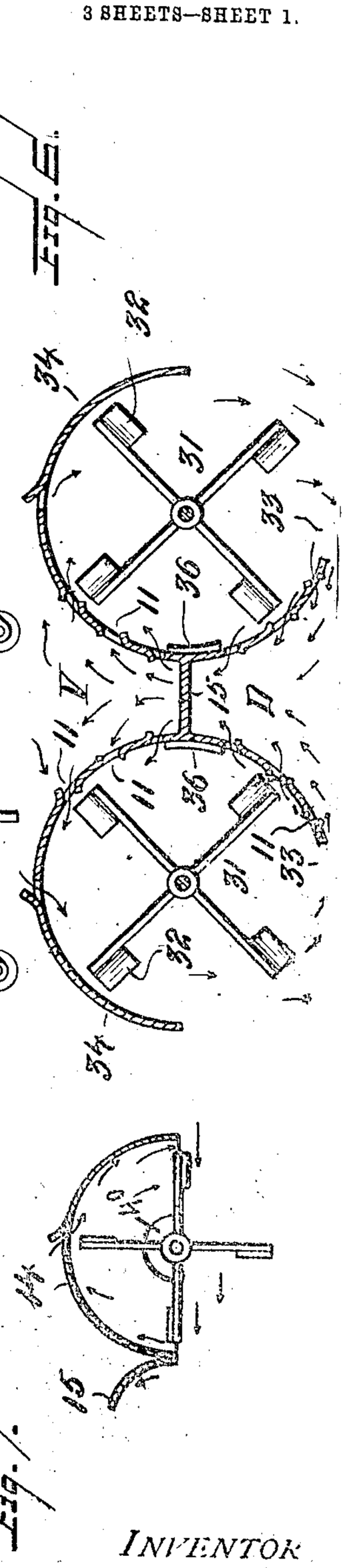

Fig. 5.

Fig. 7.

WITNESSES:

Wm. F. Hoge.

E. R. Ruppert.

INVENTOR

Edwin L. Drake

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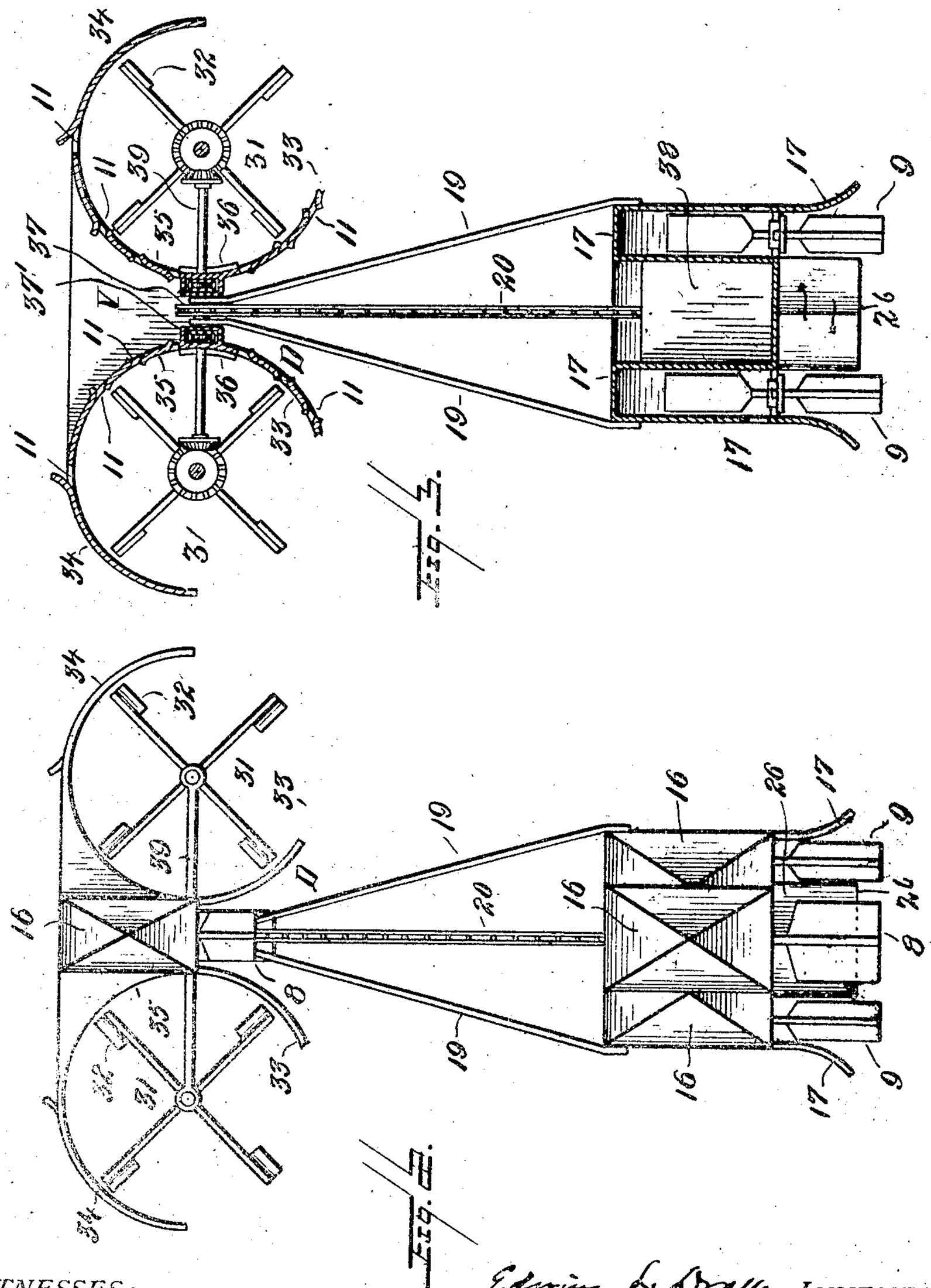

Fig. 2.

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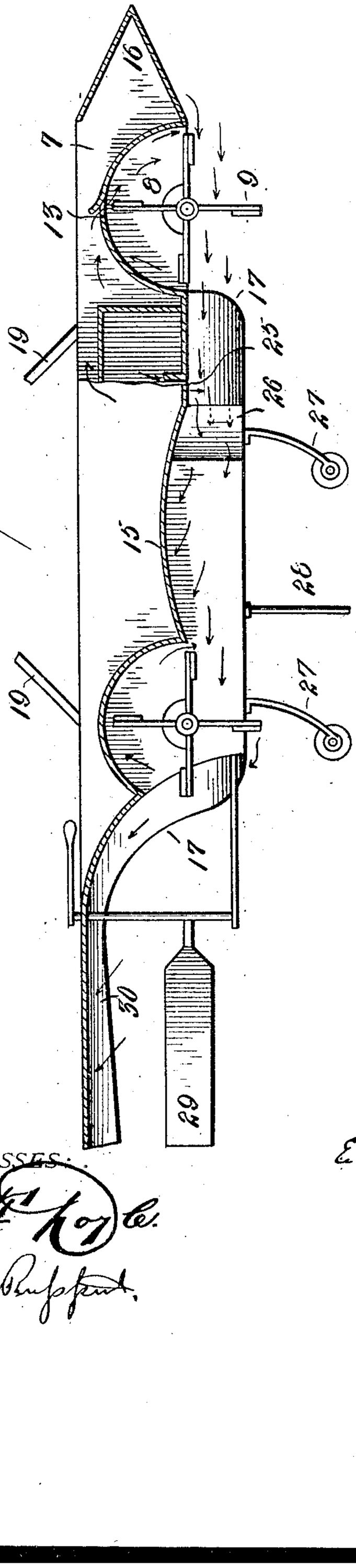

Fig. 4.

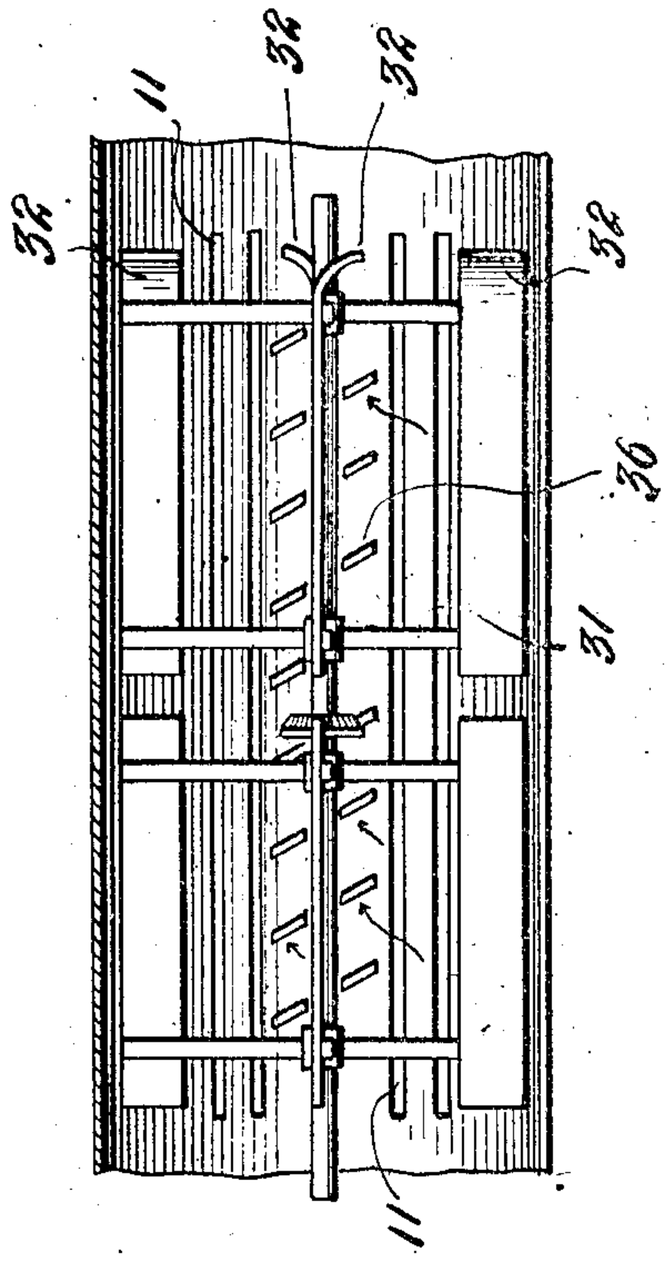

Fig. 5.

WITNESSES:

Wm. F. Hoge.

E. R. Burkhardt.

Edwin L. Drake, INVENTOR

UNITED STATES PATENT OFFICE.

EDWIN L. DRAKE, OF WINCHESTER, TENNESSEE.

FLYING-MACHINE.

No. 882,189. Specification of Letters Patent. Patented March 17, 1908.

Application filed March 25, 1907. Serial No. 364,240.

To all whom it may concern:

Be it known that I, EDWIN L. DRAKE, citizen of the United States, residing at Winchester, in the county of Franklin and State of Tennessee, have invented certain new and useful Improvements in Flying-Machines, of which the following is a specification.

My invention relates to aerial navigation and has for its object to provide a flying machine, capable of lifting itself into the air and maintaining an elevation without the use of a gas bag or extended aeroplanes, and of being propelled on any desired course. To attain these objects my machine is built on trim lines, being of reduced size and presenting only a small surface to frontal friction or lateral drift, and is thereby enabled to attain high speed, which, as is well known, is a potent factor in reducing gravic pressure on a body, in the air or on the ground, by distributing the gross weight over great lengths of line, the attenuation being extreme in swift flying birds and gun projectiles—the average gravic pressure to the yard on an ounce rifle ball, for instance, at full range, being only one seventh of a grain and on a thousand pound ball about five ounces.

For effecting uplift and propulsion the machine is provided with a combination of fan wheels capable of developing currents of high velocity and directing them with unabated force within channels, specifically adapted, on impact with the currents, to bear the vessel strongly upward and at the same time impart to it an active forward motion. Coincidently with this operation and directly due to it a decided reduction of the normal atmospheric pressure is effected above the vessel, with corresponding compensatory up pressure from below to restore the disturbed equilibrium. If, for instance, the reduction of pressure above the vessel amounts to one pound to the square inch over an area of 6x36 inches the up pressure developed therefrom is 216 lbs. Reduction of atmospheric pressure over the back, in birds and beetles, is accomplished by the quick out and down stroke of the wings, and is an important factor in the process of their flight, especially in the act of rising from the ground—enabling eagles and other such birds, in conjunction with the momentum of propulsion, to lift twice or thrice their own weight into the air.

The operation and mechanical values of the forces I employ are well known and they are in common use in nature and art, and there will be no difficulty in applying them effectively to the production of artificial airflight in the present state of constructive art.

Other objects and advantages will be manifest from the following description, and it is understood, that I do not desire to be limited to the exact details of construction here shown and described, for obvious modifications will occur to one skilled in the art.

In the drawings forming a portion of this specification and in which like numerals of reference indicate similar parts in the several views: Figure 1 is a longitudinal section of the present invention, parts of the mechanism being shown in the dotted lines. Fig. 2 is a front elevation. Fig. 3 is a detail cross section, showing a different form of chamber wall. Fig. 4 is a detail longitudinal section of the car portion of the vessel, showing the motor and fore and aft wheel movement. Fig. 5 is a side view of a longitudinal fan and part of a chamber wall containing back slanted flanges. Fig. 6 is a cross section of the longitudinal fans and chambers V and D. Fig. 7 is a diagram of a fan and its hood.

Referring now to the drawings:—The present invention consists structurally of two parts united by hangers, the upper part A being a special lifting and propelling apparatus, and the lower part B a dependent car, for carrying the operator, motor, sets of fans, steering and starting devices. A and B are each provided with a reduced head. The upper structure A comprises a pair of longitudinal parallel fans 31, chambers V and D, located between fan wheels, 31, 31, at their sides and between fans 8, 8′, at their ends, fore and aft fans 8, 8′, reduced head 16, current ducts 18 and gearing and hangers for attachment to part B. The walls of chambers V and D form the body portion of the structure and will be so designated and referred to. They furnish support and points of attachment for various parts of the mechanism.

The longitudinal fans 31, 31, Fig. 3, are journaled on arms 39, 39 secured to the body portion, and are provided with beveled gearings, which are adapted to revolve the said fans at high speed and direct their currents radially and inward and upward against the presenting wall-faces of V and

D and outward and downward against the presenting arches of 34, 34, and then inward under the out curving walls 33, 33, of chamber D and upward into its cavity. The paddles 32, 32 of fans 31, 31, are mounted on radial arms from the axles in the usual manner and may be of any of the usual forms that are adapted to develop active currents and discharge them radially. But the form I prefer is like that shown, the forward end of the paddle blade, or plate, being curved to favor intake of air from the front but not to interfere materially with the direction of the radial discharge. As seen the curves promote propulsion.

Chamber V is, practically closed at sides, ends and bottom, but open superiorly. Its side and end walls curve upward and outward, conforming to the orbits of their respective fans. The walls may be imperforate, as shown in Fig. 2, but I prefer to have the walls provided with a series of longitudinal openings, 11, 13, which are overlapped superiorly by the inward and downward projection of the upper adjacent plate of the wall, so as to promote the out draft of air from the chamber cavity by the passing paddles of fans 31, 31. As will be seen the paddle orbit is tangential to the axis of the apertures, which looks upward and outward, and the effect is to draw strongly on the content of air in the chamber V and thereby lessen its density accordingly. It is apparent, that the strata of air near the floor of the cavity will have the lowest density, being farthest removed from the influence of the normal compensatory efforts from above to restore the equilibrium. I further conserve the current energy of the paddle after it has cleared the chamber wall proper at 11 by providing an extension of the wall, 34, outward and downward covering in the upper outer quadrant of the paddle orbit and conforming thereto, and giving distinct uplift from the current and at its discharge a rocket effect. The interspace, 11, is large to favor free intake of air from V and an active outflow of air from over the chamber.

Chamber D is the converse of chamber V, and the transverse plate 15, forming the floor of chamber V, can conveniently form the roof of chamber D. The walls, 33, 33, of chamber D may conveniently be formed by the downward and outward extension of the walls of V and be integral therewith. As it has no end walls chamber D is practically a conduit and will be so referred to. As will be seen, the conformation of the conduit thus formed adapts it to readily receive currents into its interior and make them actively uplifting from moment of entrance until they discharge, by their upward convergence and increasing density as they approach the roof 15, which is further intensified by any tendency to lowering the plane of the vessel, as will be seen, the effect being that of a parachute. In order to neutralize the downbearing action of the rising paddles on entrance into the lower inner quadrant I provide slots or openings 11, 11 in walls, 31, 31 adapted to direct the currents from these paddles into the cavity of D, which become at once uplifting, with the effect stated. I also provide back slanting flanges 36, on the presenting wall face between the respective series of slots 11 in V and D, the said flanges being adapted by their lines to promote uplift from the rising paddles and also propulsion.

It will be noted, that the full paddle energy of fans, 31, 31, throughout the greater extent of the lower quadrants is directed into conduit D, condensing its content of air accordingly forming a strong undertow by the up trend of air from below, which is of itself supportive. At the same time the centrally placed fore fans, 8, 8 direct strong currents backward into and under conduit D and, as these fans can develop a current velocity of 2 to 4 miles, or more, per minute, they furnish a substantial support under the descending blades of the successive fans and at the same time actively promote propulsion, which is also supporting, as explained. When to these influences is added that of the several fans throughout their upper orbits which is strongly upbearing, together with that from the vacuum formation, it will be seen that their conjoint action is ample for raising the vessel from the ground maintaining it at an elevation.

The fore and aft fans, 8, 8′ are in file and in line with conduit D and revolve forward and downward. It is noted that each of these fans is provided with an incasing hood 14, which cover in its upper orbit, leaving the paddles in the lower orbit exposed. The forward end wall of V can conveniently form the rear portion, or arch, of the hood rim 14 and the extension of this wall forward and downward can form the front rim of the hood. The rear arch of the hood is provided with apertures 13 similar to those in the lateral walls of V and serve also to promote exhaustion of the air in chamber V. The side casings of the hood are provided with apertures, 40, Fig. 7, for the intake of air by the paddles. The front wall of the chamber V is provided with apertures 13 similar to those in its lateral walls, to further promote exhaustion of the air in its cavity.

The function of hood 14 is to protect the paddle against exterior influences and confine their currents within channels to promote uplift and propulsion and on their discharge downward to give a distinct rocket effect. After the paddles pass out of the hood their work is actively propelling through their lower orbit and lifting in the forward quadrant. In their rising orbits

their action would be normally downbearing, but as they discharge a strong current backward and upward against plate 15 and also against the presenting rear arch of the hood, the effect is to neutralize the normal action, thus freeing the descending blades of the normal antagonism and making their action wholly uplifting.

It will be noted, that as the vessel moves forward the current from the under plate of head 16 is directed under the descending paddles of the first fan, furnishing thereby a more substantial support for their down stroke, but as the velocity of the currents from this fan are greatly increased a yet more substantial base of support is formed under the blades of the second fan; and so with each succeeding fan until the currents are discharged upwardly against terminal plate 18.

By reducing the diameter of the front fan of the machine to half that of its adjacent rear fan it will be seen, that I reduce the head friction area by one half; and by using a succession of fans forwardly, each reduced accordingly, I can in a manner efface frontal air resistance and promote usefulness of the invention accordingly.

Part B is suspended from part A by arms 19, 19, secured to part B and pivotally attached to part A. The motor chain 20 and cable 21 form additional means of attachment to the two parts.

C, Fig. 1, is the apartment for the operator, 24 the motor, 23 a pedal geared to the motor and also to the several fans of the car, 22 the ratcheted drum for moving cable 21, and 29 the steering devices. The forward fan 8 of part B is single and placed centrally as in A. I provide also a set of side fans 9, 9 placed near the rear end of the car C, which with the fore fan 8 form an additional motive equipment of the vessel and adapted, in case of failure of the motor or accidental disability of the A fans, to navigate the vessel and secure its safety. The fore fan 8 has its casing 14, but the rear fans 9, 9 are housed in exteriorly by plates 17, Fig. 2 and interiorly by the sides of apartment C, forming a conduit, similar to that of D in A. I ordinarily use an explosive motor 24 and direct the discharge pipe downward, both to get the benefit of the rocket effect and riddance of the offensive odors and the heat, which are carried under the car and discharged to the rear. The motor 24 is set so as to have free access of air to all its sides and by providing one or more of the apertures 11 in the hood, 14, the radiated heat is drawn into the fan and through ventilation of the motor is secured and coolness promoted. The exposed front portion of the car apartment C, shown .. 26, is V shaped so as to divide the fan currents by its presenting edge and direct them equally into the conduits and under the descending blades of the rear fans, which in turn direct the currents upward against the terminal conduit 30.

For pitching the plane of flight of the vessel I provide drum 22, with ratcheted lever, which moves cable 21 back or forth and raises or lowers the plane of flight accordingly. The use of rudder 29 is obvious and it need not be described.

The wheeled spring brackets 27 are secured to the car and projected downwards in pairs fore and aft, and are designed to diminish shock on contact of the vessel with the ground and also to bear the vessel up by rebound in the act of starting. The ground-engaging bars, 28, 28, are held by clips on the sides of the car, so as to be readily detached. The bars furnish a simple but useful means for facilitating the clearance of the vessel from the ground in the act of starting. For this purpose the operator grasps the bars by a full upward reach and their lower ends being in contact with the ground he lifts himself bodily upward, thereby diminishing by that much the vessel's burden and assisting materially the work of the fans, which are in active operation at the same time. The plane of A is inclined upwardly and the moment the vessel clears the ground it springs forward under the propulsive efforts of the fans, mounting on the inclined plane, precisely as the bird does in the act of rising. If needed the operator can repeat the maneuver with the bars from time to time until sufficient momentum is attained to effect clearance of the vessel from the ground and sustain it at an elevation. When once well under way the gravic pressure is so greatly reduced from the effect of momentum there will be no difficulty in keeping the vessel afloat with a moderate expenditure of motor energy.

The machine can be light and trim for coursing or the number and dimensions of the wheels can be increased to any desired extent for burden carrying. All the parts of the machine that will so admit are made preferably of light sheet metal tempered to retain form and give resiliency. Flat or irregular surfaces are sedulously guarded from frontal friction by heads with symmetrical faces to cover such parts and deflect currents equably, thereby insuring a true line of flight and furnishing a fixed and definite point, from which to govern the vessel, without which its course would be erratic or put undue strain on certain parts in holding it to a course.

The connecting parts of the machine are suitably strengthened by braces and stays, and its lines are made with view to symmetry and equable distribution of weight. The means I employ for reducing the normal frontal air resistance greatly promote the efficiency of the mechanism, by lessening

strain on the motor and developing speed, which as explained is an important factor in diminishing the effect of gravity.

As stated, the operation and mechanical values of the forces I employ are well known and in common use, in nature and in art, and it is evident the mechanical construction here shown for developing and combining these forces will furnish ample powers for sustaining the machine in the air and propelling it on a course.

I claim:

1. In a flying machine the combination with its body portion, of fan wheels, mounted thereon and adapted to develop high speed currents, and means for directing the said currents to make them effective for uplift and propulsion of the vessel.

2. In a flying machine the combination with its body portion of fan wheels mounted thereon and adapted to develop high speed currents, and means for directing these currents against portions of the body adapted to receive them and on impact therewith to bear the vessel upward and forward.

3. In a flying machine the combination with its body portion of revolving fans and a forward and downward extended plate, said plate being adapted to receive currents from its fan and direct them downward, with motor connections for the fans.

4. In a flying machine the combination with its body portion of, forward and downward revolving fans, a casing covering the upper orbit of each fan and a longitudinal plate connecting the adjacent casings, with means for revolving the said fans.

5. In a flying machine the combination with its body portion of, longitudinal parallel fans and of a chamber located between said fans, the said chamber being substantially closed, except superiorly, and said fans being adapted to revolve inwardly and upwardly from below and direct their currents against the presenting chamber walls, and on their discharge outwardly to draw air from the chamber and diminish the density of its content of air accordingly, with motive connections for said fans.

6. In a flying machine the combination with its body portion of fans and a chamber located therebetween, said chamber being open superiorly and having its opposite walls curved upward and outward, the said walls being provided with apertures to facilitate draft of air from the chamber cavity by the said fans, with means for operating the fans.

7. In a flying machine the combination with its body portion of revolving fans and a chamber located between the lower fan orbits, said chamber opening inferiorly and forming a conduit adapted to receive currents from the fans and make them upbearing and propulsive, with motor connections for the fans.

8. In a flying machine the combination with its body portion of revolving fans, chambers located between the fans and means for moving the fans.

9. In a flying machine the combination with its body portion of a fan and a forwardly reduced head, said head being disposed in front of said fan and covering its presenting plate, with means for operating the said fan.

10. In a flying machine the combination with its car of lifting means connected with the car, steering devices, spring brackets secured to the car and provided with journaled wheels, and ground-engaging bars, removably attached to the car and adapted to be grasped by a person within the car.

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

EDWIN L. DRAKE.

Witnesses:
D. T. KIRBY,
E. B. FOX.