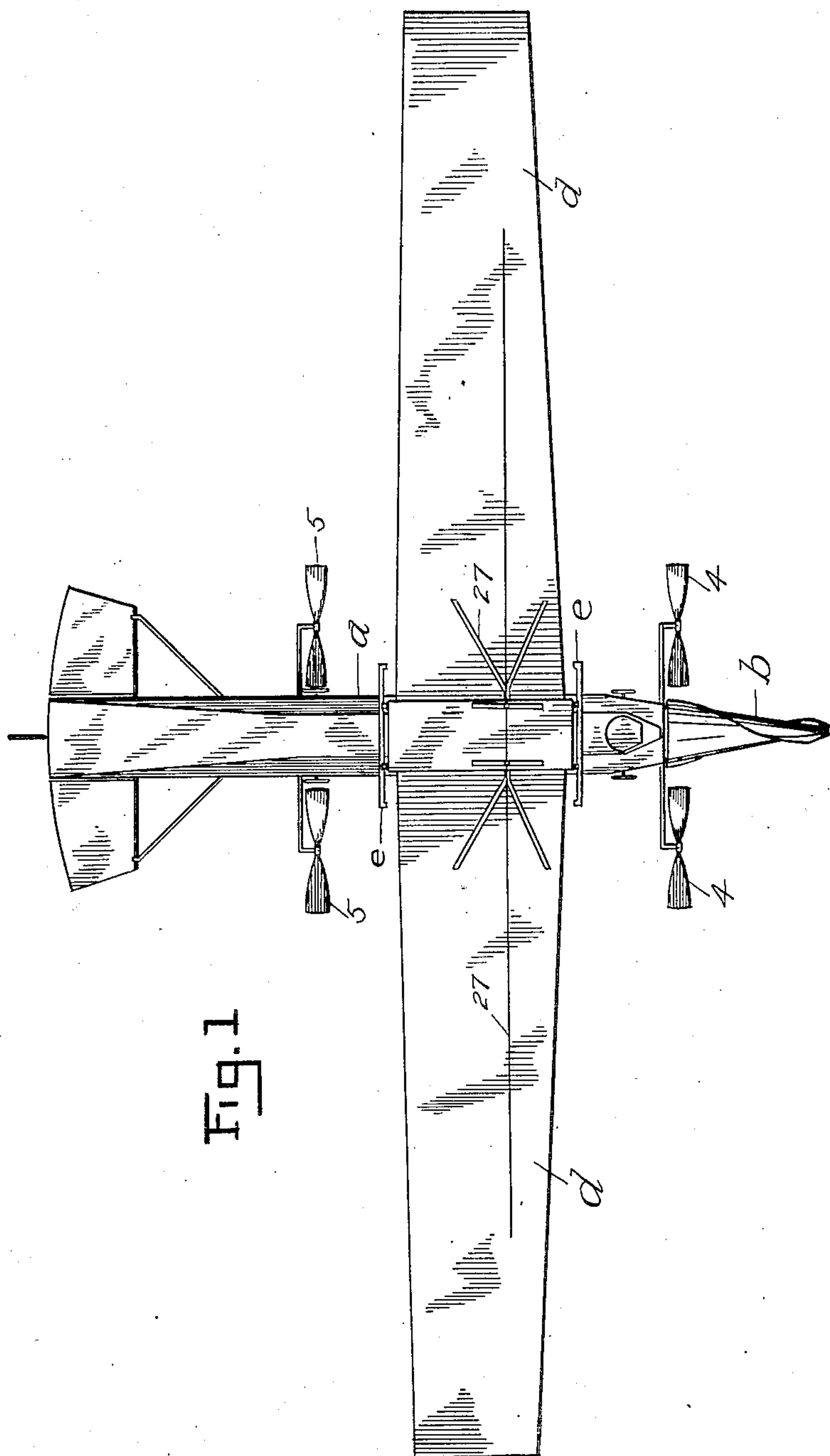


923,936.

4 SHEETS—SHEET 1.



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AEROPLANE FLYING MACHINE.
APPLICATION FILED OCT. 10, 1908.

Patented June 8, 1909.
4 SHEETS—SHEET 2.

923,936.

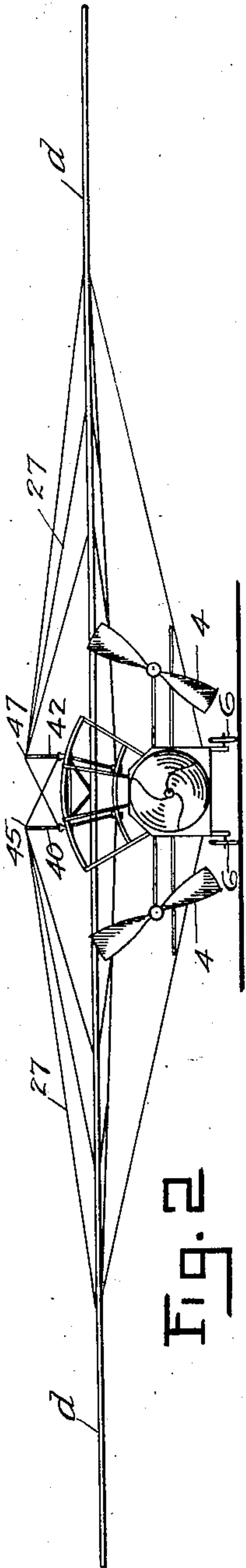


Fig. 2

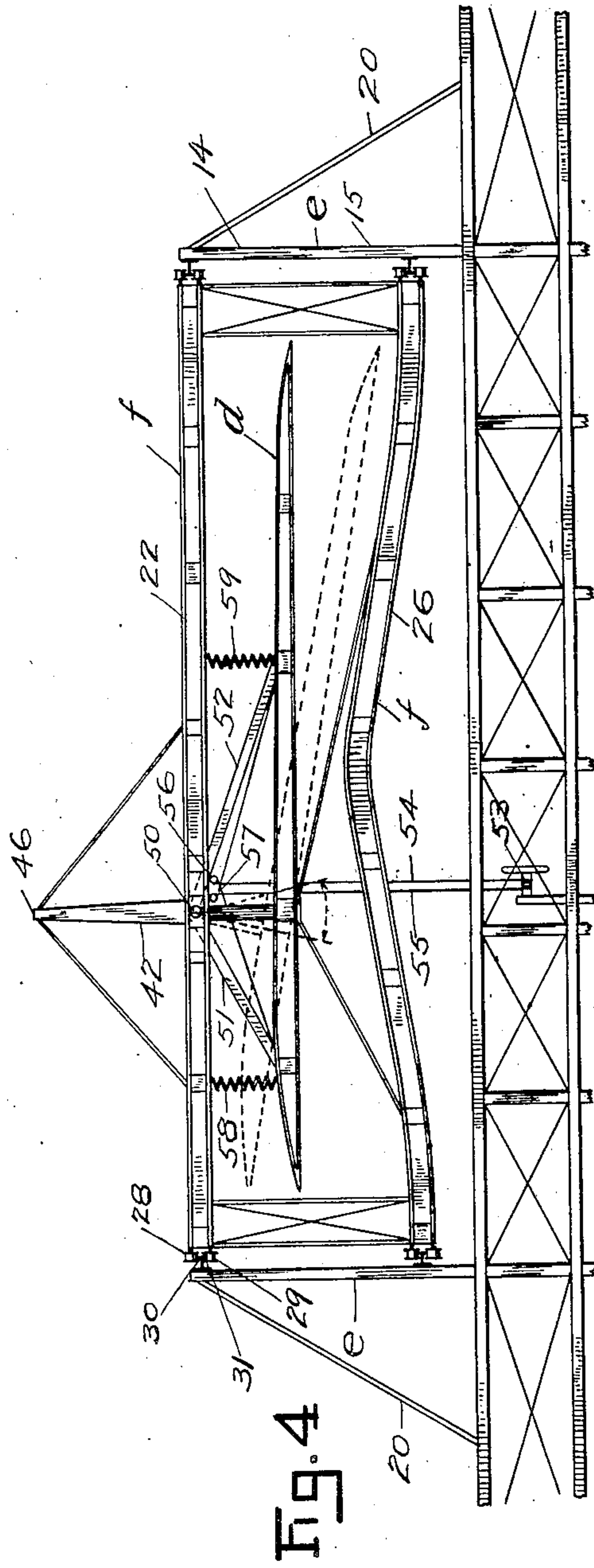


Fig. 4

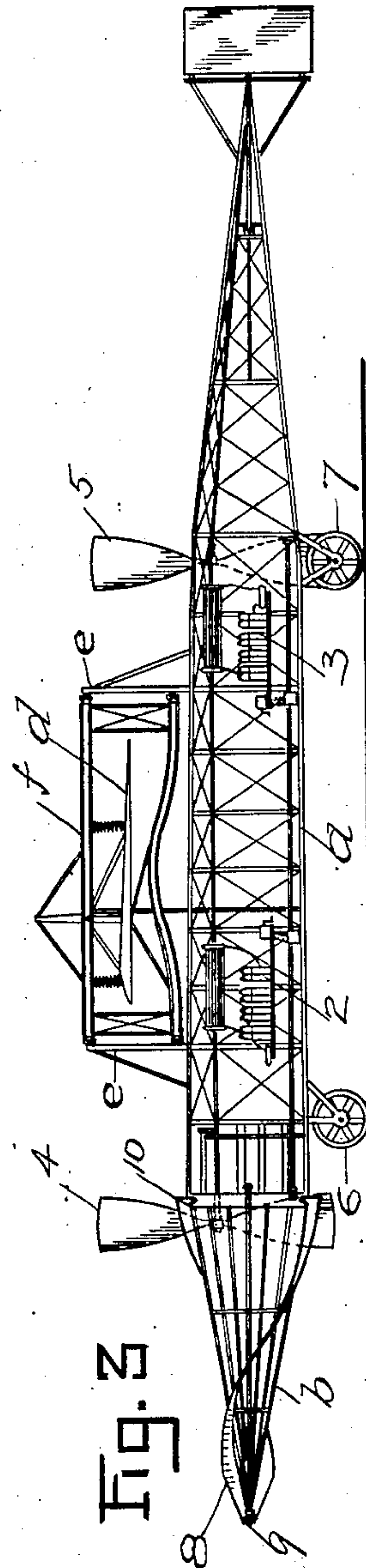


Fig. 3

WITNESSES:
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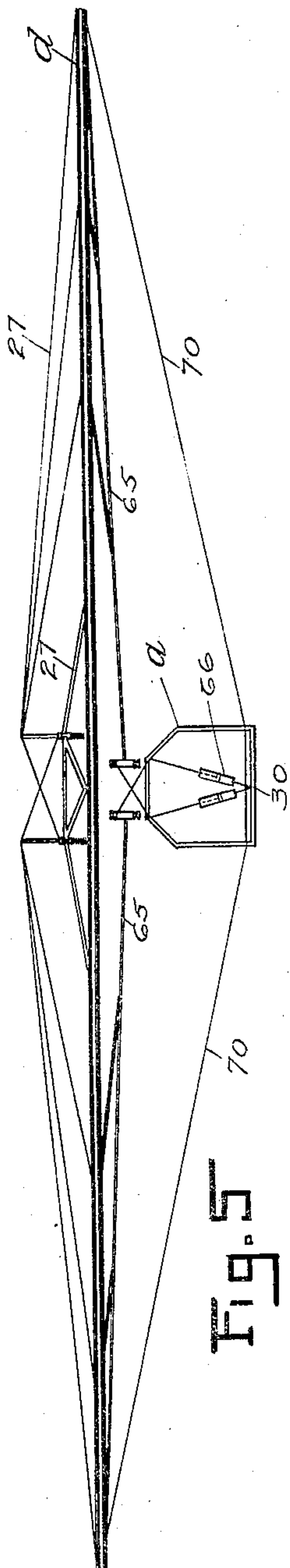


Fig. 5

WITNESSES:
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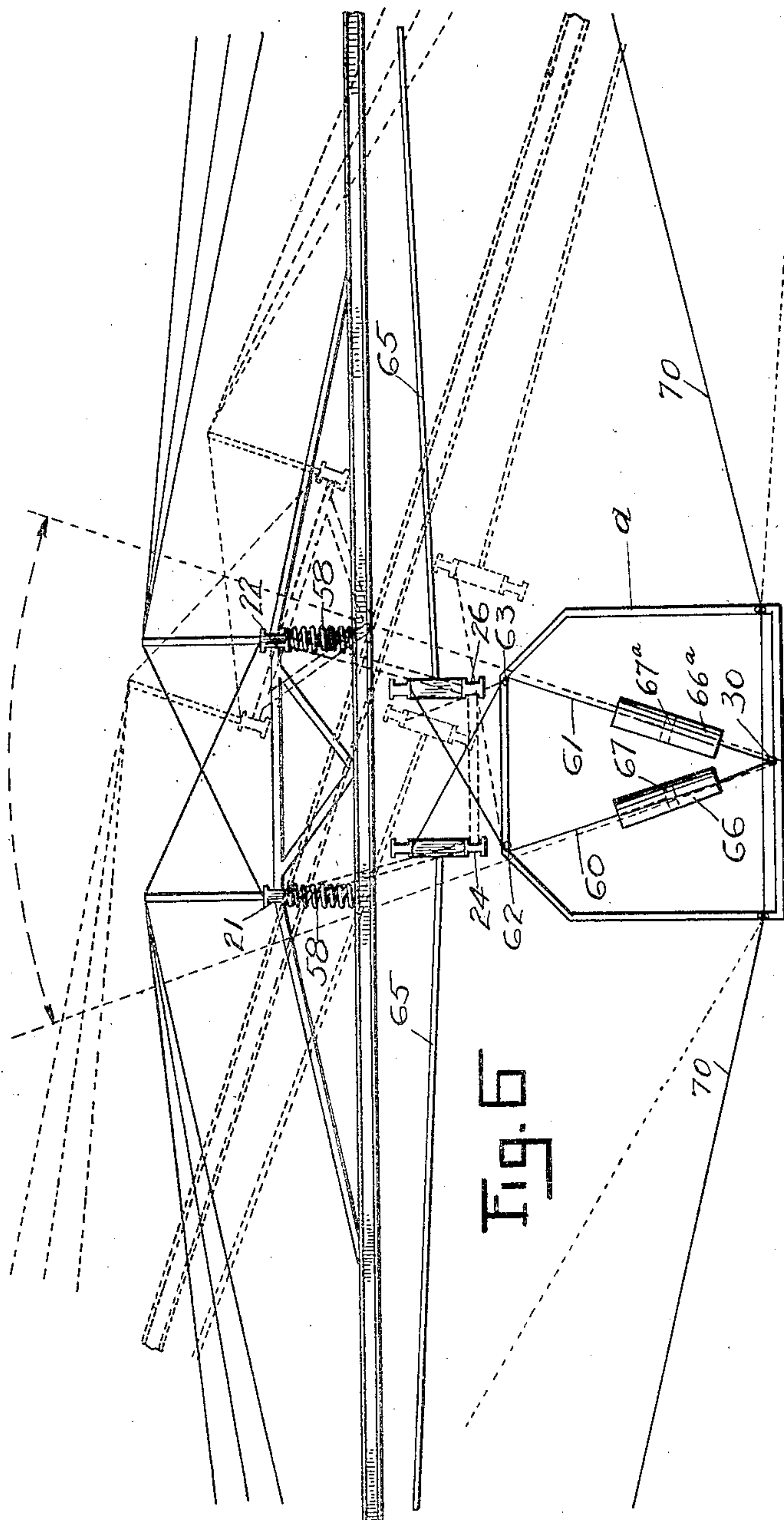


Fig. 6

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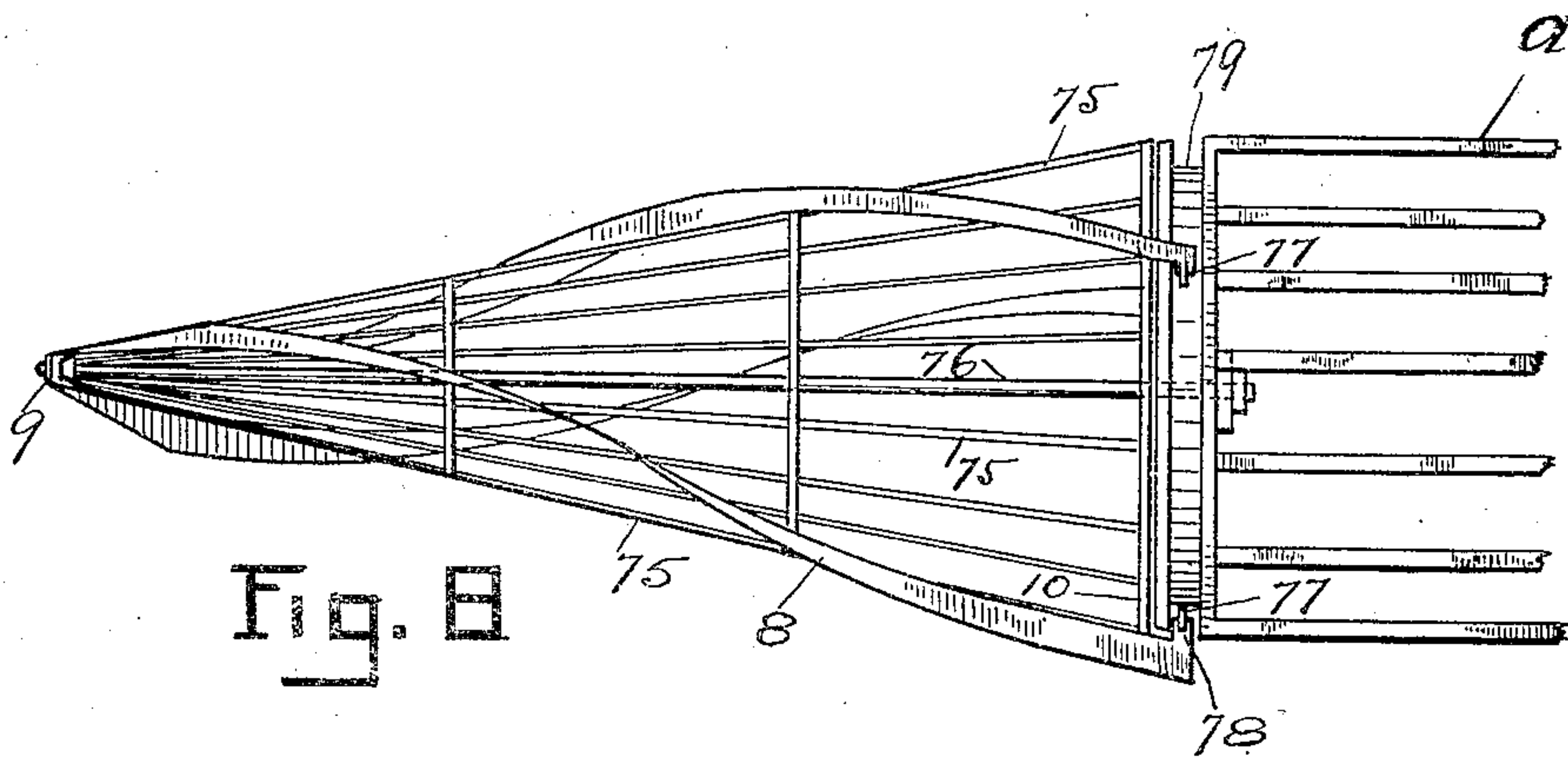
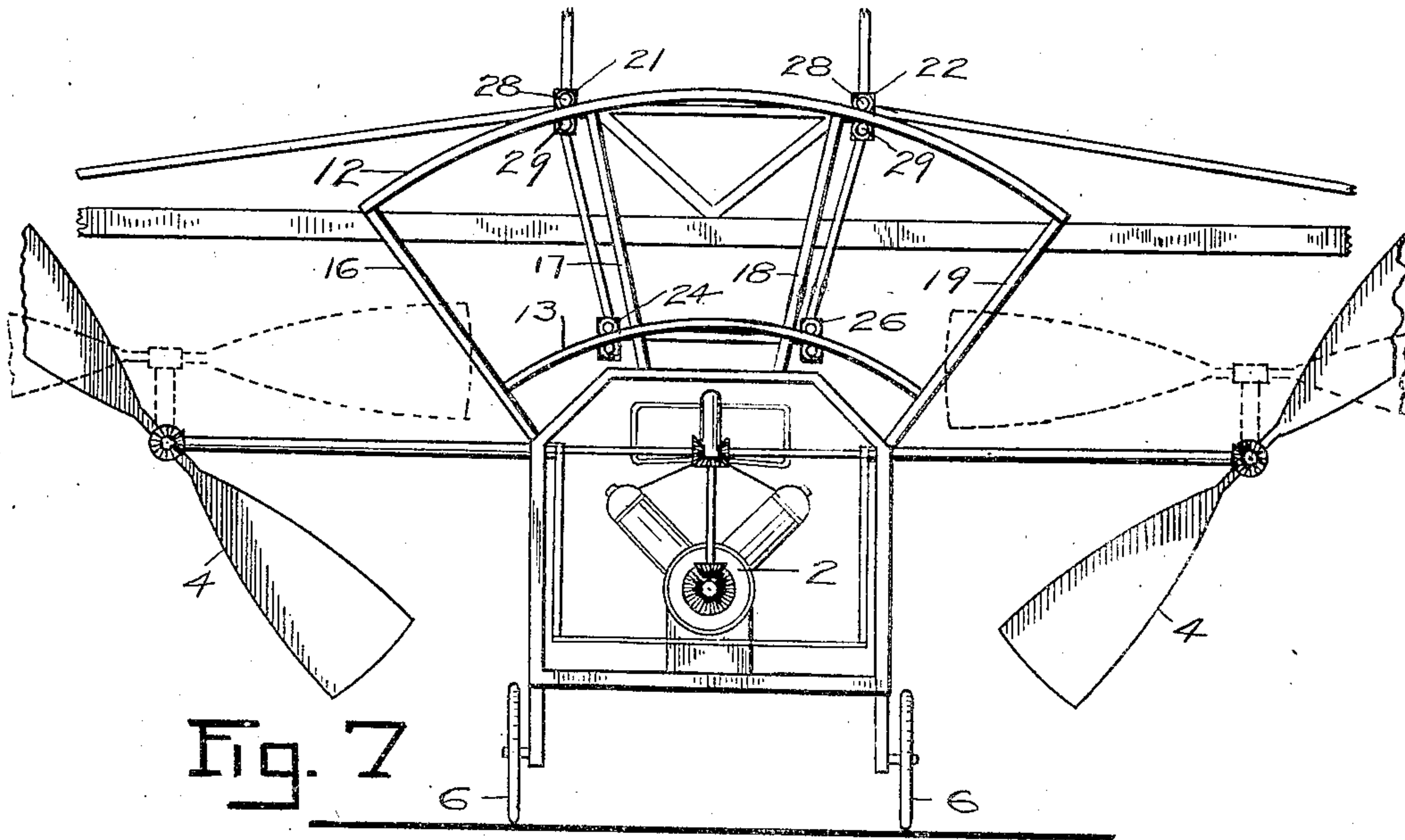
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

AUGUST BERIOZZI, OF SAN FRANCISCO, CALIFORNIA.

AEROPLANE FLYING-MACHINE.

No. 923,936.

Specification of Letters Patent.

Patented June 8, 1909.

Application filed October 10, 1908. Serial No. 457,078.

To all whom it may concern:

Be it known that I, AUGUST BERIOZZI, a subject of the King of Italy, residing in the city and county of San Francisco, State of California, have invented a new and useful Improvement in Aeroplane Flying-Machines, of which the following is a specification.

This invention relates to improvements made in flying machines in which a car or body containing the motive power and provided with propelling devices driven by the motor is sustained in its flight, and the ascending and descending movements are effected and controlled through the medium of wing-like planes termed aeroplanes.

The invention is distinguished thereby from machines or apparatus of the type or description wherein the car or body is sustained by gas-bags or gas-holding compartments.

The improvements have for their object chiefly to provide an aeroplane flying machine in which the plane may be adjusted to different angular positions both longitudinally and transversely with reference to the direction of the movement or travel of the machine, without disturbing the equilibrium of the car or body which maintains always a level position under all changes or variations in the position of the plane.

A further object of the invention is to provide improved means for suspending the car from the supporting plane by virtue of which the plane is rendered adjustable at varying angles and may be caused to assume different angular positions both across or transversely of the body, and also longitudinally without affecting the horizontality of the car.

A further object of the invention is to provide means for reducing or modifying the pressure of the air against the stem or forward end of the car or body, whereby the density of the air in front of the moving car or body will be rendered more nearly normal or uniform in the quality or degree of its resistance to the progress of the car or body.

An aeroplane flying machine of my invention consists of the various parts, features and combination of parts or features hereinafter described and pointed out in the claims at the end of this specification.

In the accompanying drawing is illustrated an aeroplane flying machine embodying the various novel parts and features of my invention and such parts and mechanism

as are considered necessary to a clear understanding of the construction and operation of the invention. But parts and mechanism of well known construction, such for example as the engines or motors for driving the propellers; the belts, pulleys or other connections between the motors and propellers and the steering-gear are generally omitted from the several figures of the drawings and will not be included in the following description except by general reference to such parts.

Figure 1 represents in plan or top-view an aeroplane flying machine embodying the several features of my invention. Fig. 2 is a front-elevation. Fig. 3 is a side-elevation. Fig. 4 is a longitudinal sectional-view on an enlarged scale of the aeroplane, the suspension-frame and track and the plane-carrier together with the adjusting means. Fig. 5 is a front-elevation of the aeroplane, the suspension frame and track and the means by which the plane is suspended in the frame showing the details of construction. Fig. 6 is a transverse view in elevation, showing the suspension frame and track, and the adjusting means for changing the position of the aeroplane. Fig. 7 is a vertical transverse sectional-view, on an enlarged scale, showing more particularly the movable suspension-frame, the track on the car-body on which the suspension frame is adjustably mounted. Fig. 8 is a side-view on an enlarged scale of the revoluble nose on the forward end of the car or body; showing the covering removed.

Referring to the drawings in which the principal parts of the machine—by which is meant the complete structure—are designated by letters, and the parts that enter into their construction are indicated by numerals; *a* designates the body of the machine, containing the motors 2—3, and the necessary working parts and machinery for operating the propellers 4—4, 5—5, and for regulating and controlling the various positions of the body and the aeroplane. The body *a* is mounted on wheels 6—6, 7—7, of which the front pair are pivotally attached to the body for greater convenience in guiding or controlling the course of the machine when starting, and before it has acquired sufficient velocity to rise from the ground. The conical nose *b* that forms the forward end of the body *a* is arranged and loosely fitted to revolve by the action of spiral blades or fins 8 on its surface beginning at the apex 9

of the cone and running back with regularly increasing pitch to the circular rim 10, where the nose and the body *a* are joined.

A novel feature of a flying machine of my invention consists in suspending the car or body from and also connecting it to the aeroplane *d* by means of a suspension-frame *e* on top of the body and a truck *f* movable in the frame laterally or from side to side with an equal extent of movement on opposite sides of the center. Of these parts the suspension-frame is comprised principally of two curved rails 12, 13 in front and two similar rails 14—15 at a distance behind and of equal curvature with the front rails—the two sets of rails rigidly connected together and also firmly secured to the frame-work of the body by radial bars 16—17 and 18—19, and braces 20 so as to be strongly and stiffly joined to the body. On these curved rails as a track the truck or carrier *f* for the aeroplane *d* is movable in an arc of limited length, transversely of the longitudinal axis of the body and to an equal extent on opposite sides of the perpendicular center of the body. As embodied in the present construction, this carrier *f* is composed of the longitudinal top-bars 21—22, and bottom bars 24—26, tied together and braced to form a strong and stiff skeleton truck. On the ends of the longitudinal bars are fixed flanged wheels in sets of two wheels 28—29 on each end of a bar, so arranged that the top-wheels ride on the standing edges 30, and the lower wheel 29 on the depending flanges 31 of the curved rails on the suspension-frame. The rails have each the form or shape of an I-beam, secured by one flange to the posts and the outer end standing clear of the posts, so as to afford room for the wheels 28—29 to travel on the flange 30—31. The wheels being arranged in this manner to grasp the rail from above and from beneath serve to connect the truck and the suspension-frame together, and at the same time permit the truck to oscillate in an arc. The two guide-rails at each end of the frame *e* have the effect to prevent the carrier *f* from binding on the frame, and insure an even movement on the guide-rails under irregularity or excess of wind-pressure against one wing or member of the aeroplane over the other member.

The aeroplane *d* in this machine is a single plane or structure exceeding in length the longitudinal dimension of the car or body and of relatively narrow width in proportion to its length. It is preferably constructed of a light framework covered with silk or other light but strong fabric, the requisite stiffness being secured by truss rods and wires 27 the preferred arrangement of which is illustrated in Figs. 1, 2, 4 and 5, where it will be seen that the truss wires attached to the top side of the plane *d* are secured to the bars 40—42, of the carrier *f* at 45—47. The

plane *d* is also suspended in the carrier between the top-bars 21—22 of the carrier so as to have a limited movement on an axis or center 50 in a limited arc and in a direction at right angle to the oscillating movement on the curved rails of the suspension-frame *e*. As embodied in the present construction this suspending means is composed of a cross-bar 50 extending through apertures in the top-bars 21—22, in which it is movable axially and having the plane *d* secured to it by tie-rods and braces 51—52. On this axle as a pivot the plane is adjustable and is set at varying angles by means of cords or wire-cables the preferred arrangement of which is shown in Fig. 4, where the cords 54—55 attached to the top side of the plane *d* on opposite sides of the axis 50 are carried through sheaves and down to a winding-shaft 53 on the car. The cord 54 passing over the sheave 56 is laid around the winding-shaft 53 in one direction, and the other cord 55 running through the sheave 57 and thence down to the winding-shaft is laid for winding in the opposite direction with the effect to give the plane *d* a greater or less degree of upward inclination by winding up the cord 54, or a contrary inclination by reversing the winding-shaft and winding up the cord 55. In the one case of adjustment the forward edge of the plane *d* is elevated as indicated by the dotted lines in Fig. 4, and in the other case it is depressed. This feathering of the plane, producing or modifying the ascending and descending movements and course of the machine is thus effected and controlled from the car, in all positions of the plane in the suspension-frame. The angular movements of the plane *d* in the two arcs, one transversely of the longitudinal axis of the car and its center situated at the center of gravity of the car, and the other arc having its center above the plane *d*, as above described, are of sufficient length to permit all the various angular positions of the aeroplane that will be found ordinarily necessary to maintain the horizontality of the car and to control ascending and descending movements and its course during flight.

A further feature of my invention in connection with the oscillating carrier and the aeroplane suspended or pivotally mounted thereon consists in coiled springs 58, 59 so placed between the plane and the bars of the carrier as to preserve the balance and take up the shock or strain due to any excessive wind pressure, or impact of the wind against one or the other wing of the plane *d*. In the present construction two springs 58 are interposed between the top side of the plane *d* and the bars 20—22 above in front of the pivotal point 50, and two springs 59 are similarly placed between the plane and the frame of the carrier behind the point 50. These

springs also serve to prevent excessive strain on the cords 54—55 and give the plane more resiliency than it would have if the only controlling means were the cords 5 or cables.

The laterally oscillating movements of the plane in the frame by which the car is suspended beneath it are effected and controlled by means of cords or cables 60—61 attached to the carrier *f* and carried by sheaves 62—63 into the car where they may be within reach and be conveniently handled by the operator.

For adjusting and controlling the angular positions of the plane, I prefer to employ power supplied by compressed air and acting in the cylinder 66 on the piston 67 which is attached to a rail of the oscillating carrier by the wire 60, passing over the sheave 62. The rail on the opposite side of the carrier is connected to the piston 67^a in the cylinder 66^a by the wire 61 passing over the sheave 63. Means, not shown in the drawings are applied to admit compressed air to the cylinders, said means being arranged so that air is admitted behind one piston and in front of the other, with the result of pulling on one wire and letting the other slack, which will cause the oscillating carrier to roll on the guides.

The revoluble cone on the car or body of the machine is a further feature of my invention, and as embodied in the present construction, it consists of a light skeleton frame-work of rods or bars 75 united at the apex 9, and joined at the base of the cone to a ring 10. This frame is covered with some light fabric or material to present a smooth surface to the wind, and on its surface are fixed a number of relatively thin spiral ribs or fins 8 of regularly increasing pitch from the apex of the cone to the base where it joins the body. The means employed to join this cone to the body consists of a rod 76 extending from the apex through the center of the cone and rollers 77 fixed in brackets 78 on the base of the cone placed at intervals around the circumference and fitted to run in a grooved collar 79 on the body. This means of joining the conical nose to the body is adapted to keep the nose in true position with relation to the longitudinal axis of the body, and also allow it to revolve under the pressure of the wind against the spiral blades.

The propelling agents in this machine are designed to effect and control both the progressive movements of travel and the perpendicular ascending and descending movements at varying angles as well as perpendicularly—for which purpose propellers adjustable at varying angles to the propeller-shaft and also capable of being set in a horizontal or a vertical plane and at different angles with reference to such planes are arranged on the sides of the body as illus-

trated in Figs. 2, 3 and 7. My invention, however, not being limited or confined to the employment of any particular propelling means the same is not described or illustrated in detail.

I claim:—

1. In a flying machine, the combination of an aeroplane, a car and means for suspending the car beneath the aeroplane, comprising a suspension-frame on the car having curved rails and a truck adapted to move on said rails and in which the aeroplane is suspended.

2. In a flying machine the combination of a car, a suspension-frame on the car having curved rails and an aeroplane carrier adapted to move on said rails and having wheels embracing the rails and movable thereon from side to side of the suspension-frame.

3. In a flying machine the combination of a car, a suspension-frame thereon having curved track-rails, a carrier movably attached to the suspension-frame and having carrying wheels adapted to embrace the rails from above and from beneath, and traveling thereon, and an aeroplane pivotally mounted in the carrier.

4. In a flying machine the combination of a car, a suspension-frame thereon having curved concentrically set track-rails, a carrier movable on said rails in an arc at right angles to the longitudinal axis of the car, and having wheels so arranged as to embrace the curved rails from opposite sides, an aeroplane pivotally suspended in said carrier and means for moving the carrier in the suspension-frame.

5. In a flying machine, the combination of an aeroplane, a car and means for suspending the car beneath the aeroplane comprising a suspension-frame having curved rails, a carrier movable on said rails having wheels arranged to embrace the rails from above and from beneath, and adapted to travel on said rails and having the aeroplane pivotally attached to the carrier for movement in an arc at right angles to the arc in which the carrier is adapted to move in the suspension-frame.

6. In a flying machine the combination of a car, a suspension-frame on the car including curved track-rails, a truck movable in said frame and an aeroplane suspended in the carrier for angular movement in an arc at right angles to the angular movements of the carrier as controlled by the suspension-frame.

7. In a flying machine the combination of an aeroplane, a car, means for suspending the car and maintaining it horizontally under varying angular positions of the aeroplane, comprising the suspension-frame on the car having curved track-rails, and the carrier in the suspension-frame movable on the track-rails in an arc across the longitudinal axis of the car, the aeroplane being pivotally supported in the carrier for angular movement at right angles to the movement

of the carrier in the suspension-frame, means for moving the carrier on the rails in the suspension-frame and means for varying the angular position of the aeroplane in the carrier.

5 8. In a flying machine the combination of an aeroplane, a car, means connecting the car to the aeroplane including a suspension-frame and an aeroplane carrier laterally

movable in the said frame, means for shifting the carrier in the suspension-frame and propelling devices on the car. 10

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Witnesses:

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