

N. L. MAYHEW.  
AERODROME.  
APPLICATION FILED JULY 15, 1910.

994,417.

Patented June 6, 1911.

4 SHEETS—SHEET 1.

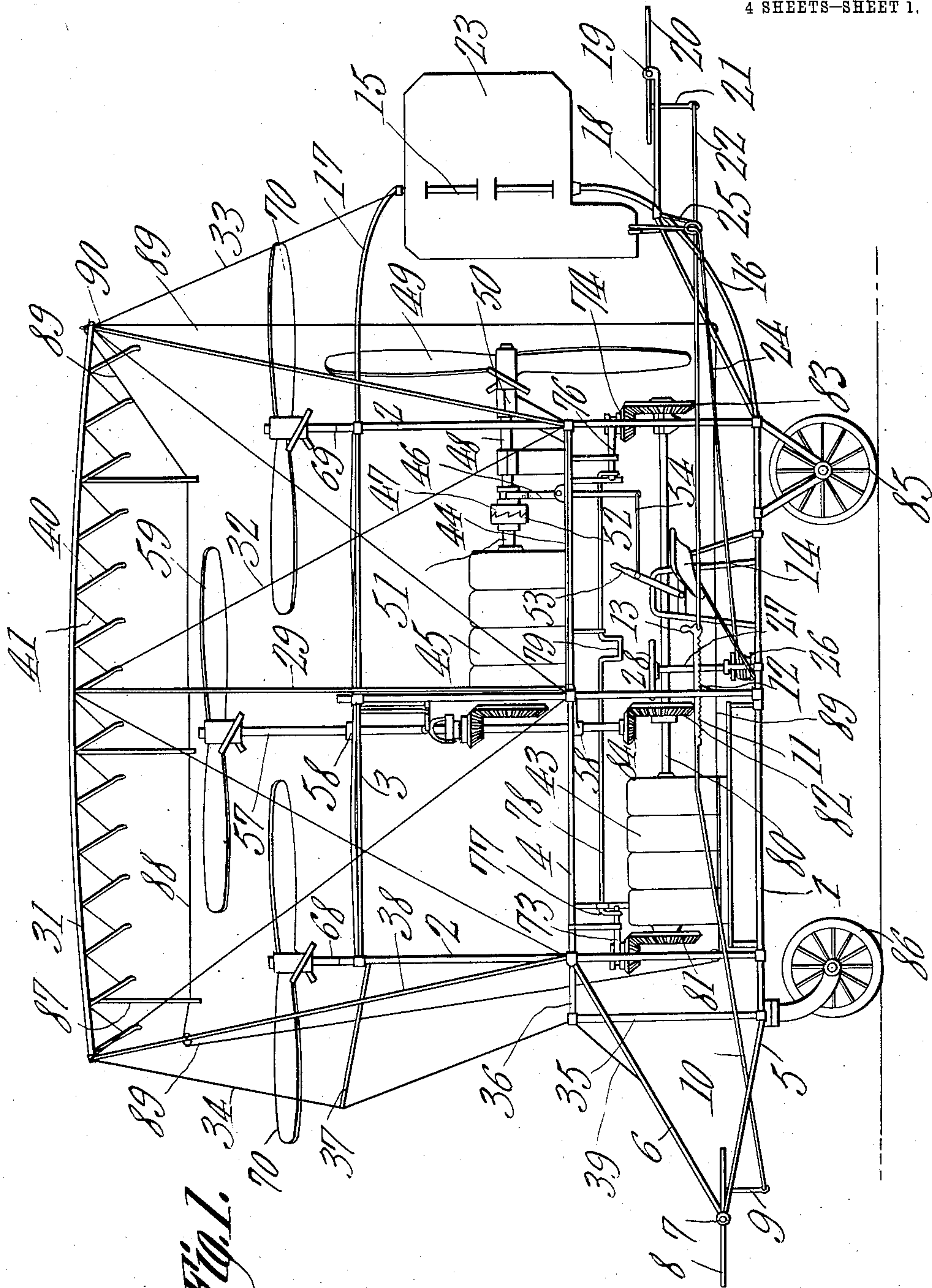


Fig. 1.

Witnesses

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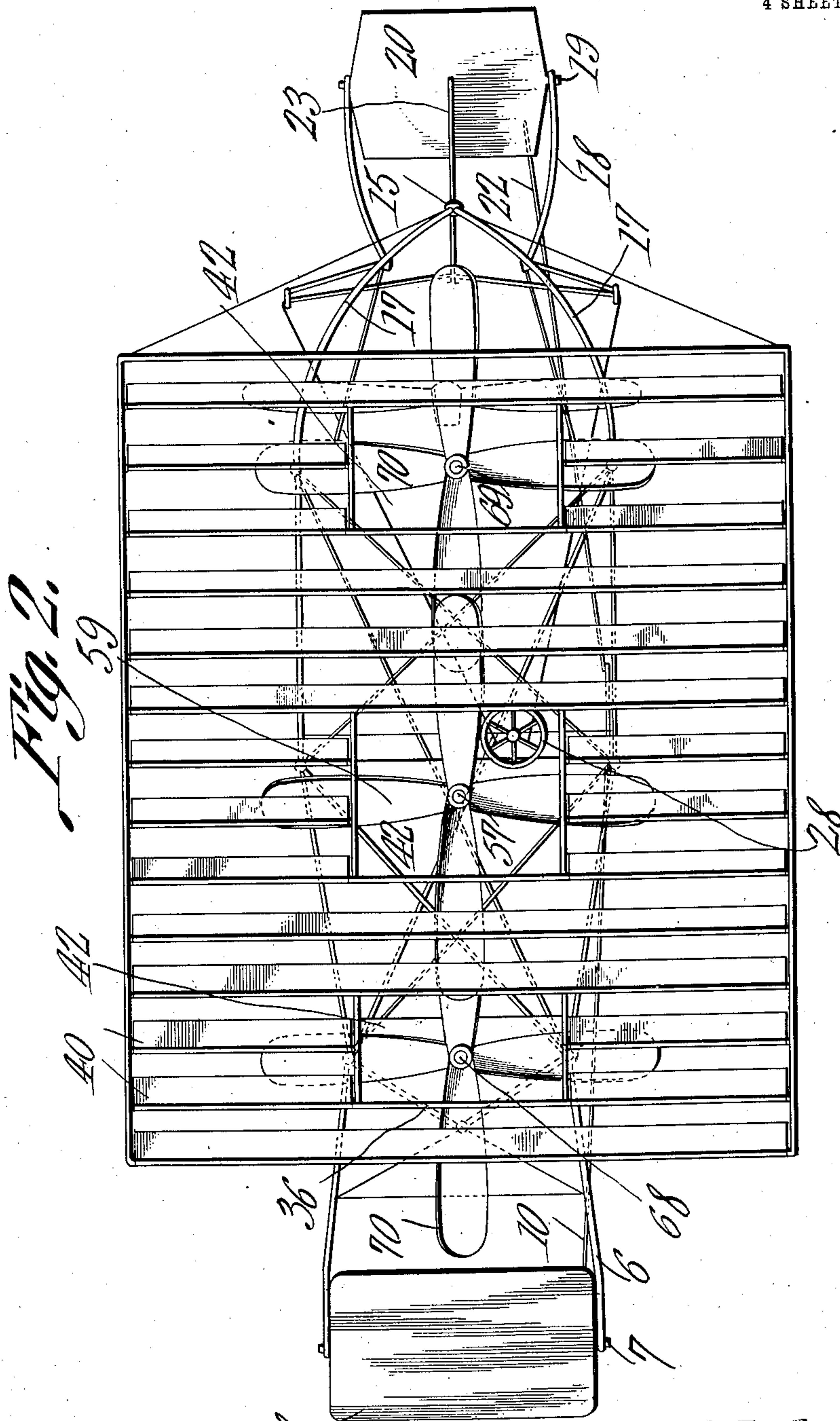
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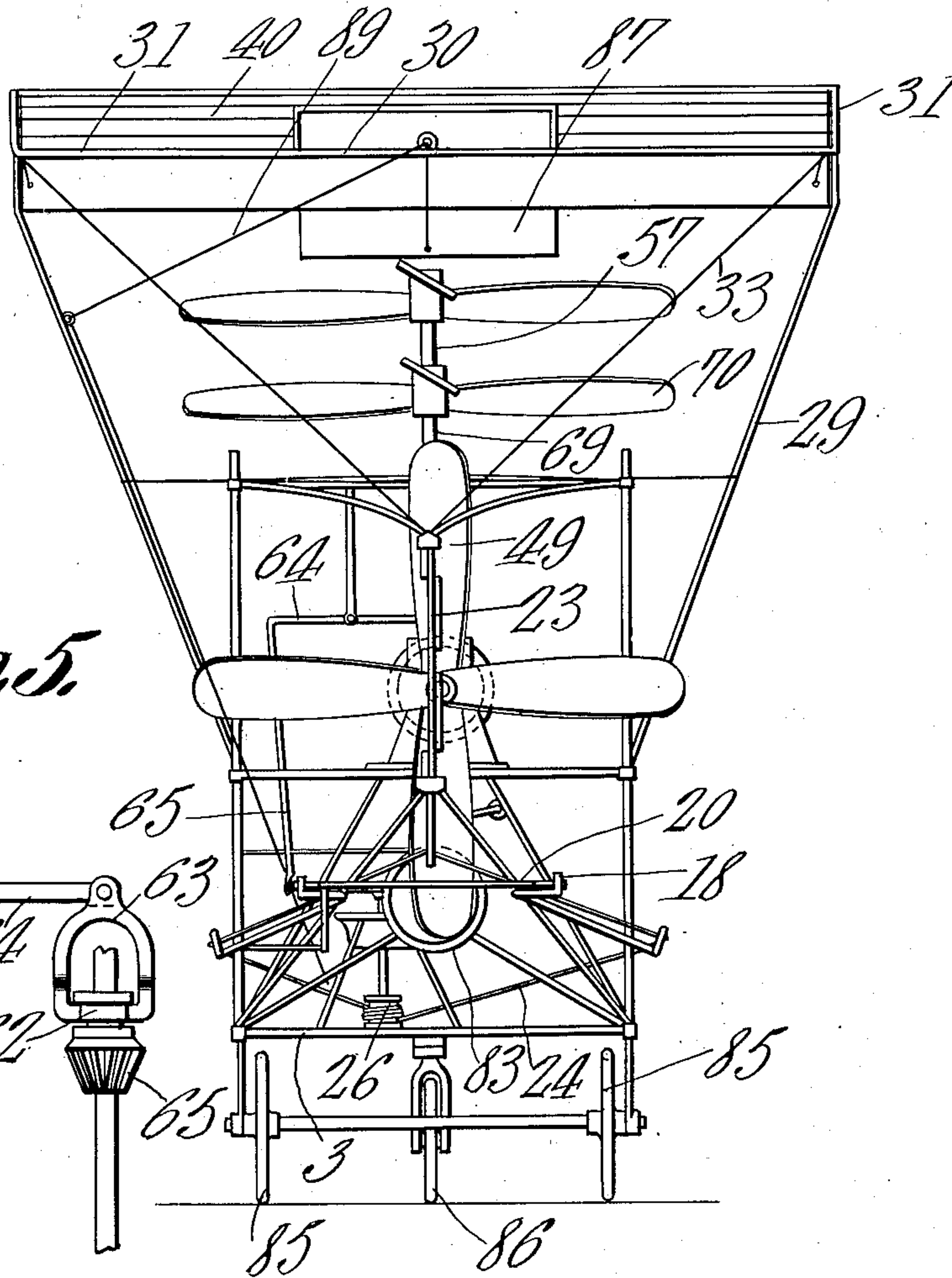
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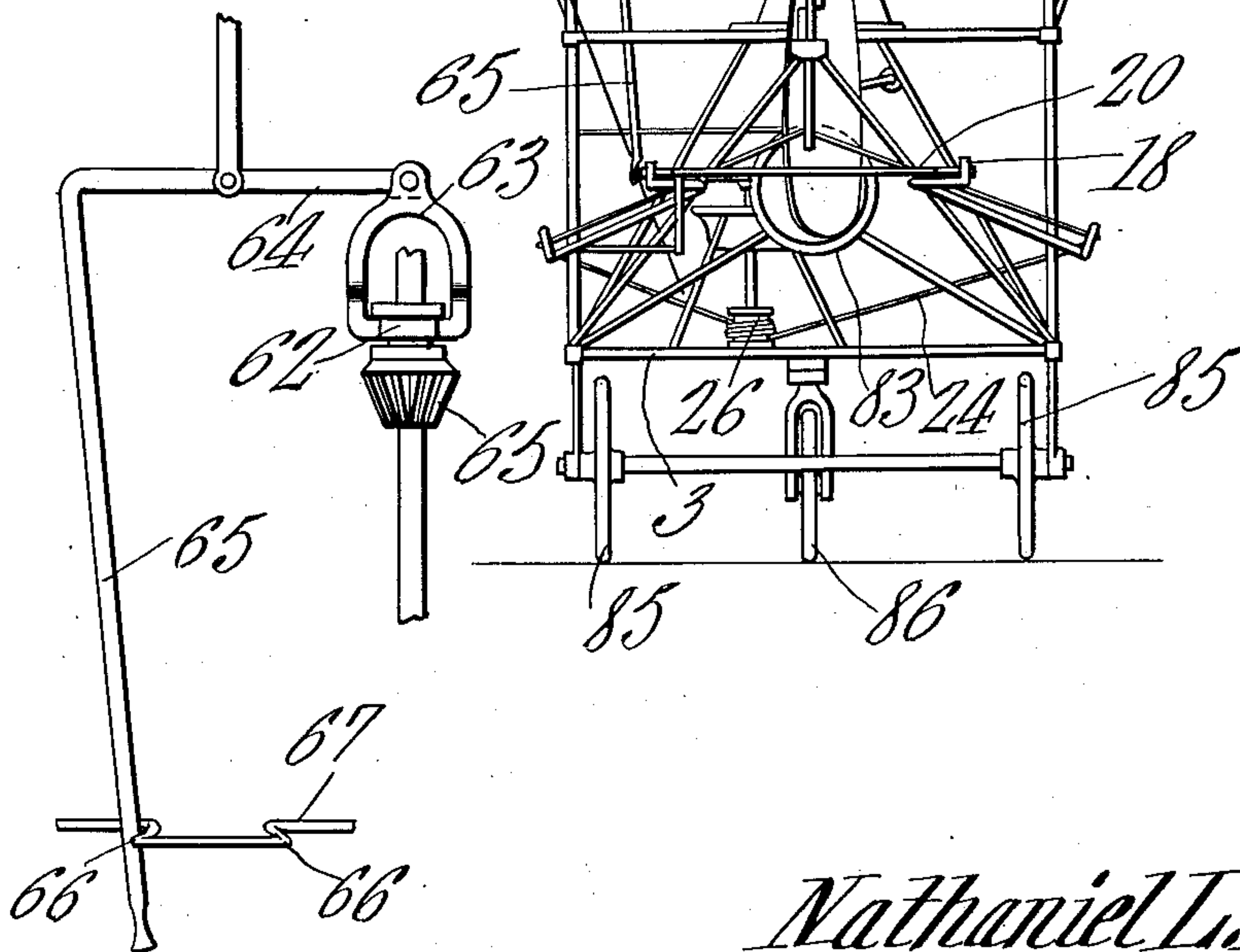
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4 SHEETS—SHEET 3.

*Fig. 3.*



*Fig. 5.*



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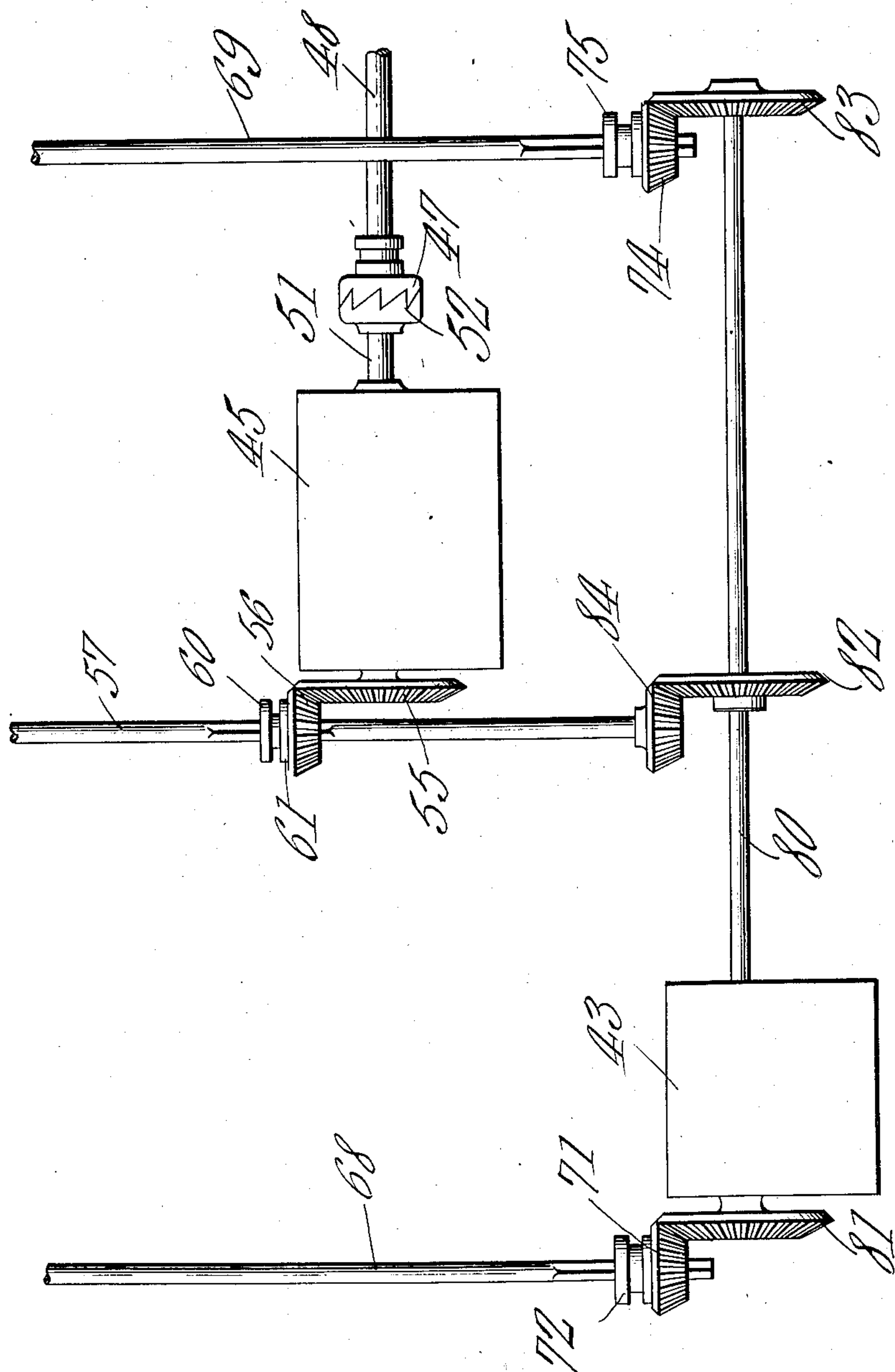


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4 SHEETS—SHEET 4.



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# UNITED STATES PATENT OFFICE.

NATHANIEL L. MAYHEW, OF BEAUMONT, TEXAS.

## AERODROME.

994,417.

Specification of Letters Patent.

Patented June 6, 1911.

Application filed July 15, 1910. Serial No. 572,096.

### *To all whom it may concern:*

Be it known that I, NATHANIEL L. MAYHEW, a citizen of the United States, residing at Beaumont, in the county of Jefferson and State of Texas, have invented a new and useful Aerodrome, of which the following is a specification.

This invention relates to aerodromes or flying machines of the heavier than air type, and its object is to provide a machine of the class better known as a helicopter wherein rotating elevating wheels are utilized to raise the machine to a desired elevation.

Another object is to provide a helicopter utilizing a plurality of elevating wheels all of which may be driven by one or more motors, there being a novel arrangement of gearing for transmitting motion from the motors to the wheels.

A still further object is to provide a propeller so mounted as to be driven by either or both of the motors, there being separate means adapted to be operated by the aviator for placing the propeller or any one of the elevating wheels into or out of operative relation with the motor or motors.

Another object is to provide a novel arrangement of vertical and horizontal rudders for controlling the direction of flight.

A still further object is to provide a sustaining plane which is mounted upon the upper portion of the machine and serves to prevent the machine from descending at an undesirable speed should the elevating wheels be inadvertently broken or stopped while the machine is in flight.

Another object is to so construct the sustaining plane that it will not interfere with the supply of air to the elevating wheels.

With the foregoing and other objects in view the invention consists of certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claims.

In the accompanying drawings, the preferred form of the invention has been shown.

In said drawings,—Figure 1 is a side elevation of the complete machine. Fig. 2 is a top plan view thereof. Fig. 3 is a rear elevation. Fig. 4 is an enlarged detail view of the gearing employed for transmitting motion from two motors to the elevating wheels and to the propeller. Fig. 5 is a detail view of one of the gears and its shifting mechanism.

Referring to the figures by characters of

reference 1 designates the bottom frame of the car and may be made of any material desired and of any suitable shape, there being standards 2 upstanding from the sides thereof and connected at their upper ends by side and end strips 3 and, at points adjacent their centers, by side and end strips 4.

Upwardly inclined spars 5 extend from the front end of the bottom frame of the car and are connected, at their front ends, to forwardly and downwardly inclined braces 6 extending from the front standards 2. A rod 7 is journaled in the forward ends of the braces 6 and spars 5 and has a horizontal rudder 8 mounted upon it. An arm 9 extends downwardly from this rudder and is connected by a rod 10, to a rack bar 11 which is slidably mounted upon a holding strip 12 located within the car and which, when engaging the rack bar, serves to hold it against longitudinal movement. A handle 13 extends from the rack bar and close to the seat 14 to be occupied by the aviator.

A vertical pivot rod 15 is supported in rear of the center of the machine by means of upwardly curved converging supporting members 16 and by downwardly curved rearwardly converging members 17, these members 17 being extended rearwardly from the upper side strips 3 while the members 16 are extended rearwardly from the lower side strips of the bottom frame 1. Arms 18 extend rearwardly from the lower members 16 and support a pivot rod 19 on which is mounted the rear horizontal rudder 20 of the machine. An arm 21 extends downwardly from this rudder and is connected, by a rod 22, with the rack bar 11 so that, when said bar is shifted longitudinally, motion will be transmitted therefrom through the two rods 10 and 21 to the front and rear horizontal rudders and thus cause them to be tilted in unison and to lie at all times either in the same or in parallel planes.

A vertical rudder 23 is pivotally mounted on the rod 15 and actuating cords 24 are extended therefrom toward opposite sides of the machine, these cords being mounted on guide arms 25 extending laterally from the members 16. Cords 24 extend forwardly and are wrapped about and secured to a drum 26 located upon the bottom portion of the car and secured to an upstanding shaft 27 having a hand wheel 28 which is located close to the seat 14 so that it can be conveniently reached and operated by the



aviator. Obviously by rotating the drum 26 the vertical rudder can be swung to either side so as to control the lateral flight of the machine.

5 Supporting members 29 are secured to the side strips 4 of the car frame and extend upwardly therefrom, all of these members being inclined upwardly away from the standards 2 and extending a considerable distance  
10 above the standards, the upper ends of the supporting members being connected by cross strips 30. These strips constitute members of a frame 31 extending over and beyond the ends and sides of the car and which  
15 is connected to the car not only by the members 29 but also by means of cross braces 32 arranged diagonally at the sides of the car and attached to the side strips 4, and by means of downwardly converging braces  
20 33 and 34. The braces 33 are attached to the outer ends of the members 17 while the braces 34 are attached to the upper end of a standard 35 projecting upwardly from the front end of the bottom frame 1 and the  
25 upper end of which is attached to the side strips 4 by means of forwardly converging rails 36. Braces 37 extend from the front corner standards 2 to the braces 34, these parts thus cooperating to form trusses whereby  
30 displacement of the frame 31 in a rearward direction is prevented. The various supporting members 29 may be tied, at intermediate points, to the standards 2, by means of tie wires 38 or the like and the braces 6  
35 may be similarly connected, as by means of tie wires 39, to the upper end of the standards 35.

The frame 31 is adapted to be practically closed, under certain conditions, by trans-  
40 versely extending wings 40 which are hingedly connected to the frame and are limited in their downward movement relative to said frame, by means of cords 41 or the like. These cords serve to hold the wings normally inclined upwardly and forwardly below the frame 31 and the wings are so proportioned and located that, when the machine descends, the pressure of air in an upward direction against the wings, will  
50 cause said wings to swing shut and close the frame 31 which will thus act as a sustaining plane or parachute to prevent the machine from descending at an undesirable speed. Preferably three openings are formed in this  
55 sustaining plane when the shutters are closed, these openings being located above the center and end portions, respectively, of the car and being produced by cutting away certain of the shutters, as clearly indicated  
60 in Fig. 2.

The elevating and propelling mechanism is under the control of two motors, one of these motors being mounted in the front portion of the car and close to the bottom  
65 frame 1, as indicated at 43 while the other

motor is preferably located within the rear portion of the car and upon a deck 44 supported by the side strips 4, this upper motor being shown at 45. Said deck extends over the seat 14 and supports a lever 46 one end  
70 of which loosely engages a clutch member 47 which is feathered on the shaft 48 of the propeller 49. Said shaft is journaled in suitable bearings 50 supported by the deck and it aligns with the drive shaft 51 of the  
75 motor 45, there being a clutch member 52 upon said drive shaft. A controlling lever 53 is mounted close to the seat 14 and is connected by a rod 54 to the lever 46 so that, by shifting the lever 53, the lever 46 may  
80 be actuated so as to move clutch 47 into or out of engagement with the clutch member 52.

The shaft 51 has a gear 55 secured to it and adapted to mesh with a gear 56 which  
85 is feathered on a vertical shaft 57 arranged centrally within the car and journaled within bearings 58 suitably supported within the car. This shaft 57 is located directly under the center of the central opening 42 and has  
90 an elevating wheel 59 secured to its upper end. Gear 56 has a collar 60 integral therewith and formed with an annular groove 61 which is engaged by a ring 62 loosely mounted in the groove and connected by a  
95 link 63 to one end of a lever 64. This lever has an integral arm 65 extending downwardly therefrom to a point close to the seat 14 and said arm is adapted to be shifted laterally into engagement with either of two  
100 shoulders 66 formed upon a transversely extending locking strip 67 supported in the car. By placing the arm 65 in engagement with one of the shoulders, gear 56 can be secured in mesh with the gear 55 and, by moving  
105 the arm 65 into engagement with the other shoulder 66, the gear 56 can be disengaged and held away from the gear 55. Front and rear vertical shafts 68 and 69 are mounted within bearings suitably supported  
110 in the car, each of these shafts being located directly below the center of one of the end openings 42. An elevating wheel 70 is secured to the upper end of each shaft 68 and 69, these wheels being preferably located  
115 in a plane extending below the wheel 59. A gear 71 is feathered upon the lower end of the shaft 68 and has an integral grooved collar 72 engaged by one end of a lever 73. Another gear 74 is feathered on  
120 the lower end of shaft 69 and has an integral grooved collar 75 loosely engaged by a lever 76. The two levers 73 and 76 are loosely engaged by arms 77 extending from the end portions of an actuating rod 78  
125 which is mounted for rotation within the car and has a handle 79 located close to the seat 14 and by means of which the said rod can be partly rotated so as to simultaneously shift the two levers 73 and 76 and thus si-  
130



multaneously move the gears 71 and 74 upwardly or downwardly upon their respective shafts.

The motor 44 has its drive shaft 80 extended longitudinally within the car and provided with gears 81, 82 and 83. The gear 81 is adapted to mesh with gear 71 and gear 83 is adapted to mesh with gear 74. The intermediate gear 82 constantly meshes with a gear 84 which is secured to lower end of the central shaft 57.

In order that the machine may travel easily over the ground when starting or when alighting, supporting wheels 85 are located under the rear portion of the frame 1 and a caster wheel 86 is arranged under the front standard 35.

In order that the openings 42 may be closed during the descent of the machine, flaps 87 are secured to the frame 31 along the front edges of said opening. These flaps normally hang vertically from the frame and are connected by cords 88 or the like attached to the lower portions thereof. An operating cord 89 extends from the rear flap 87 and upwardly over a guide 90 from which it extends downwardly to and through the car and thence upwardly to the front flap 87. It is to be understood that this cord is provided with guides wherever necessary and it passes close to the seat 14 so that it can be readily grasped and actuated by the aviator.

In using the machine the cord 89 is first secured so as to prevent the flaps 87 from swinging rearwardly and upwardly during the forward movement of the machine. Gear 56 is disengaged from gear 55 by means of the lever 64 and its arm 65 and the motor 43 is started. Gears 71 and 74 are shifted simultaneously into mesh with gears 81 and 83 by means of the rod 78 and motion will therefore be transmitted from the motor and through the several gears and shafts to the elevating wheels 59 and 70. Air is displaced downwardly by these wheels and the wings 40 will open automatically so that there will be practically no interference with the upward movement of the machine by the frame 31 and the parts connected thereto. Should the motor 43 become disabled, the gear 56 can be shifted into mesh with gear 55 and the motor 45 thus utilized to operate all of the elevating wheels. This motor also serves to drive the propeller shaft 48 the movement of which can be controlled by means of the clutch members 47 and 52.

As has heretofore been stated the machine

can be steered upwardly and downwardly by manipulating the horizontal rudders and can be steered laterally by means of the vertical rudder, the mechanisms utilized for these purposes being easy of access. Should the elevating mechanism become disabled, the flaps 87 can be drawn upwardly so as to extend across the openings 42 and the sustaining plane formed by the frame 31, wings 40 and flaps 87 will thus act as a parachute to retard the downward movement of the machine.

It is to be understood that the various parts of the machine can be braced wherever it is deemed desirable and that there is no limitation as to the material which may be employed in the construction of the various parts. Various changes can of course be made in the construction and arrangement of the parts without departing from the spirit or sacrificing any of the advantages of the invention, as defined in the appended claims.

What is claimed is:—

1. An aerodrome including a car, elevating wheels thereabove, a sustaining plane supported above the wheels and including a frame and transversely extending pivoted wings, there being apertures within said plane and directly above the wheels, said apertures being open under normal conditions, flaps depending from the frame, and means for simultaneously swinging the flaps forwardly or rearwardly to partly or entirely open or close the openings respectively.
2. An aerodrome including a car, elevating wheels thereabove, a sustaining plane supported above the wheels and including a frame and transversely extending wings, said wings being movable automatically to open and to closed position relative to the frame, there being apertures within said plane and directly above the wheels, said wings being arranged around the apertures, flaps suspended from the frame and adjacent the apertures, flexible means extending into the car for swinging the flaps simultaneously to close the apertures, and means extending into the car for swinging the flaps simultaneously to open the apertures.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

NATHANIEL L. MAYHEW.

Witnesses:

WILLIAM CRICHTON CLARKE,  
GEO. B. PITTS.