W. D. VALENTINE.

FLYING MACHINE.

APPLICATION FILED APR. 30, 1907.

911.784.

Patented Feb. 9, 1909.

8 SHEETS—SHEET 1.

Fig. 1.

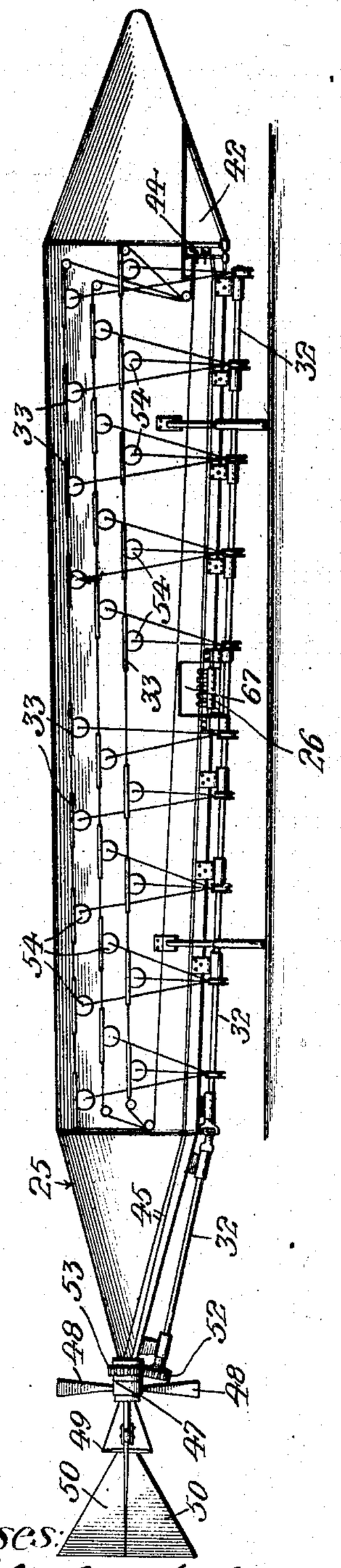
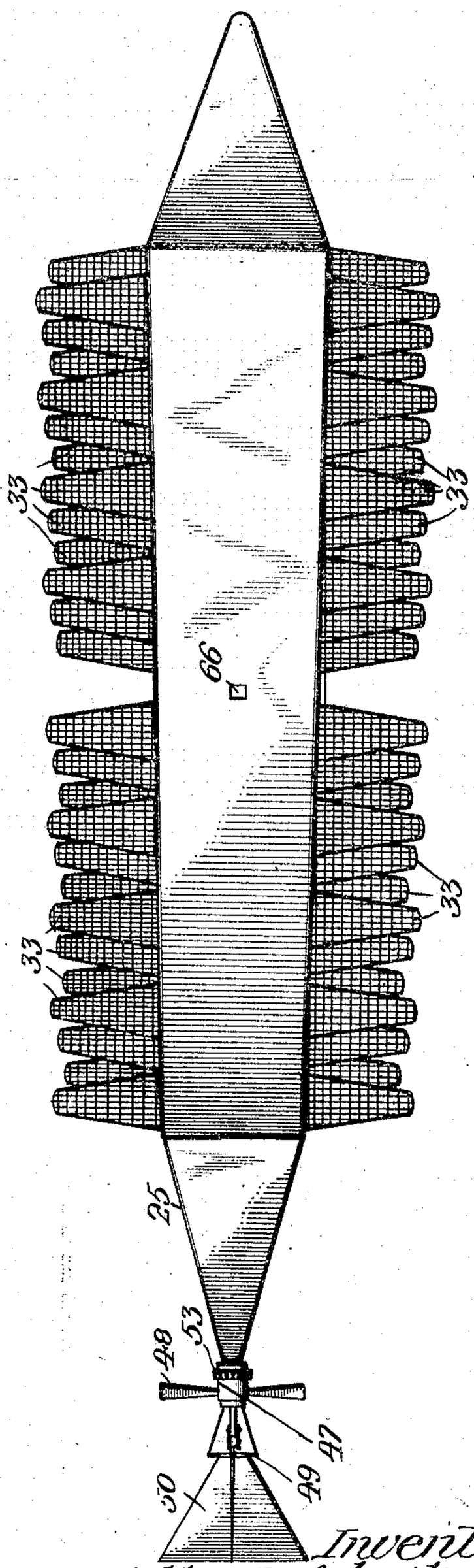


Fig. 2.



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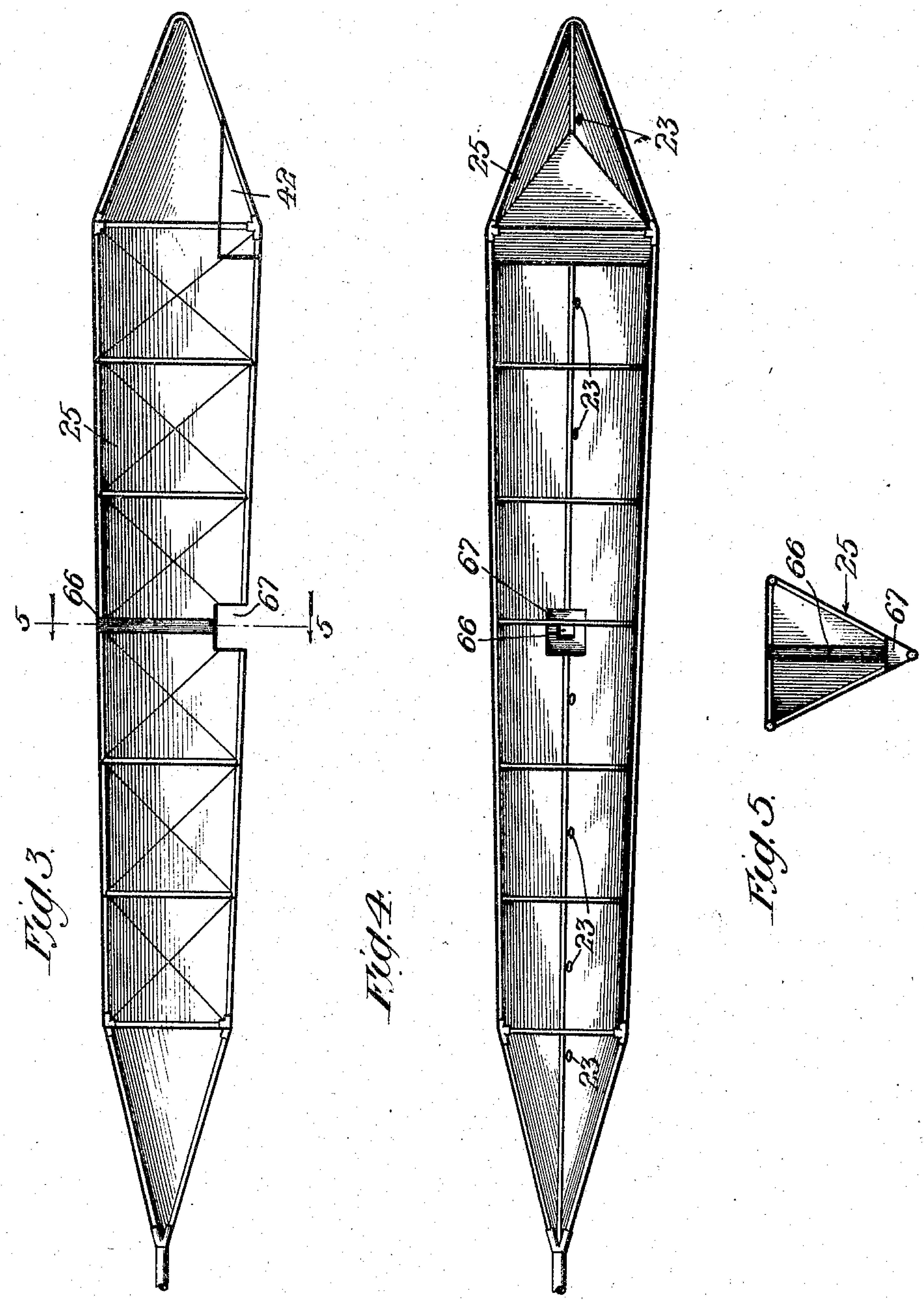

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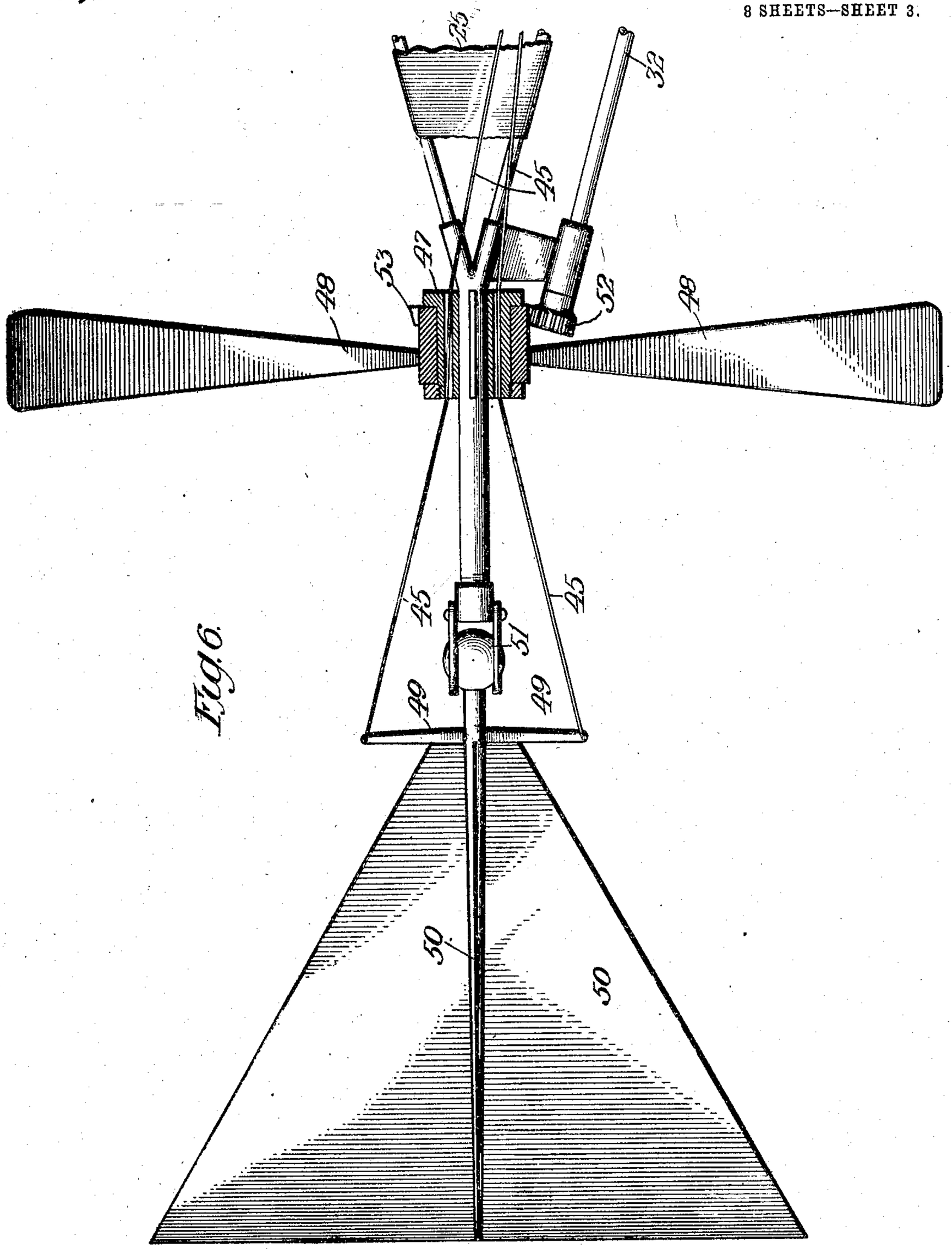

Fig. 6.

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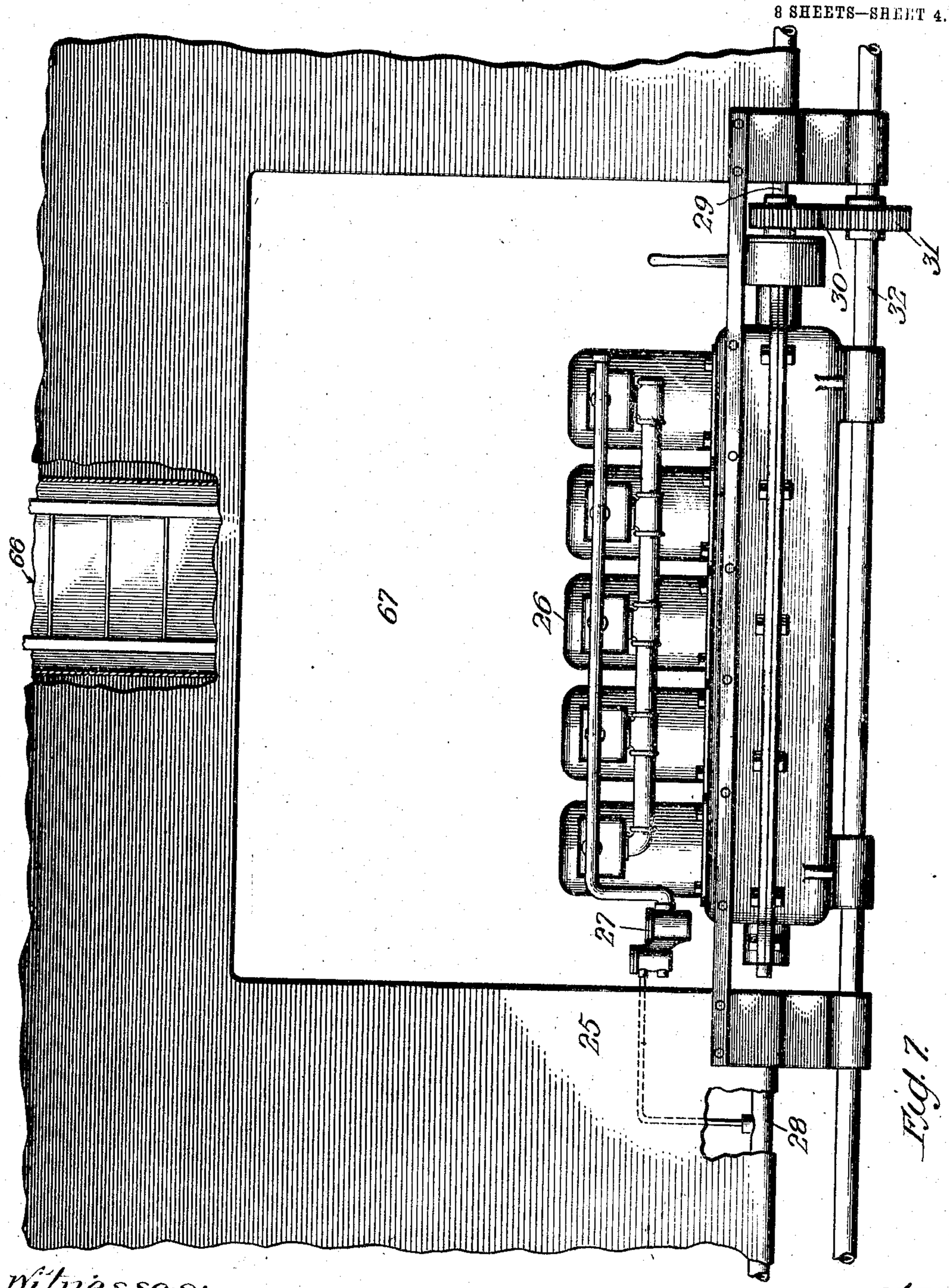

Fig. 7.

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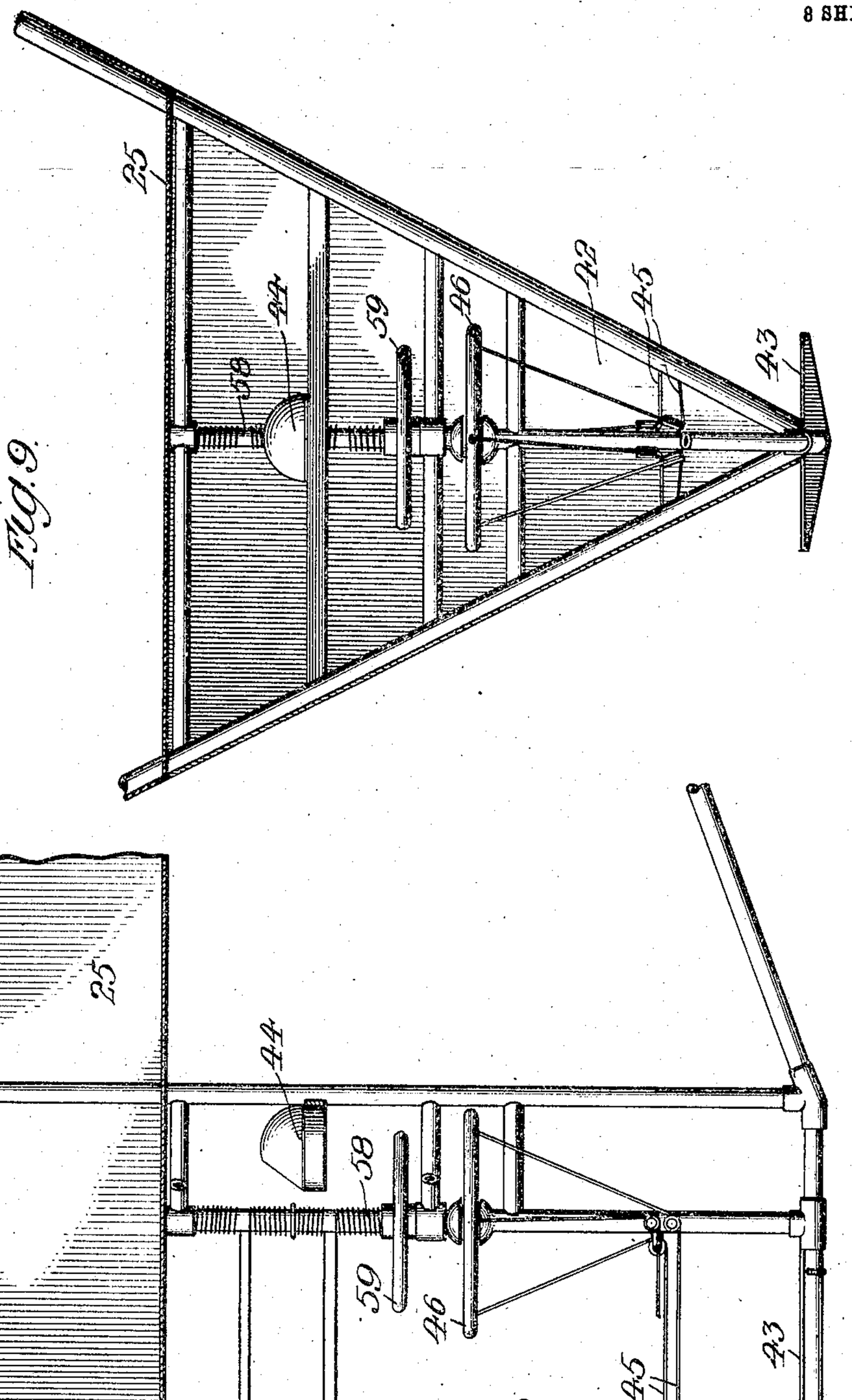

Fig. 9.

Fig. 8.

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8 SHEETS—SHEET 6.

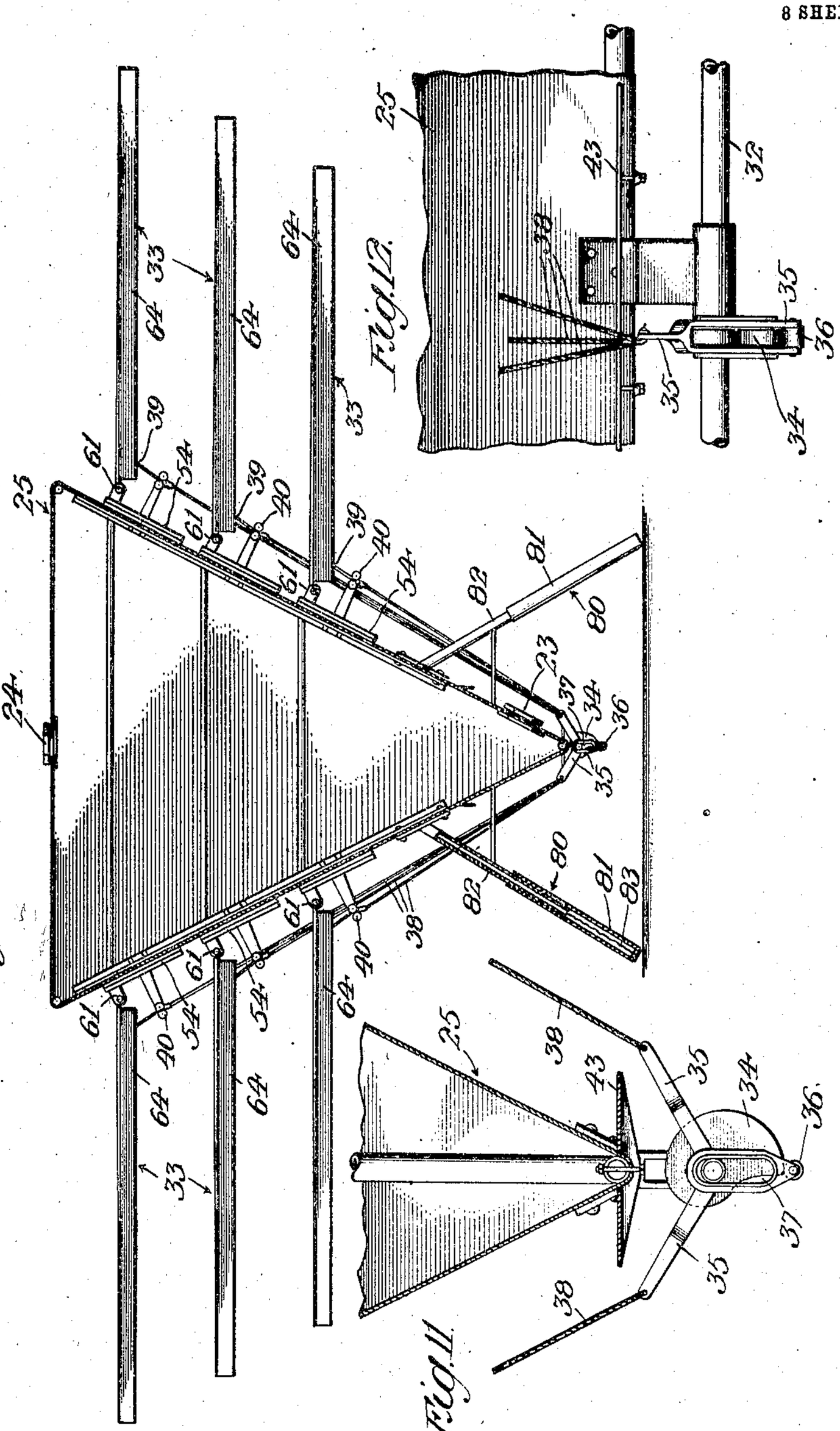

Fig. 10.

Fig. 12.

Fig. 11.

Witnesses:

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8 SHEETS—SHEET 7.

Fig. 13.

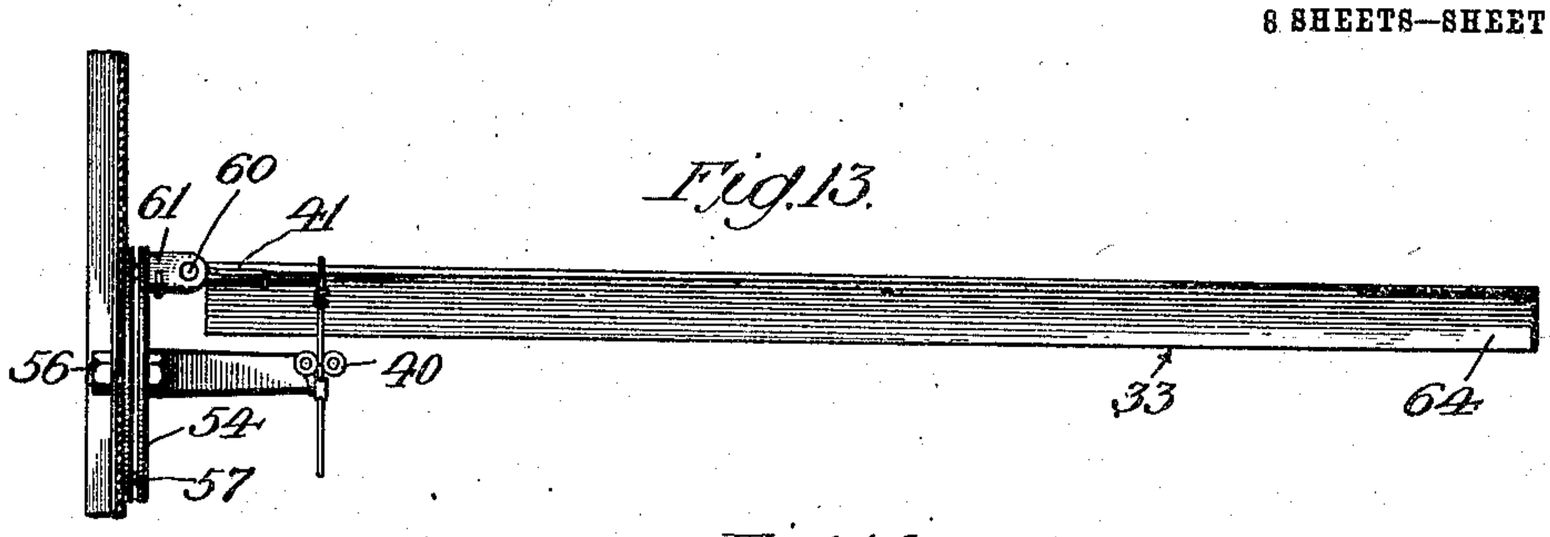


Fig. 14.

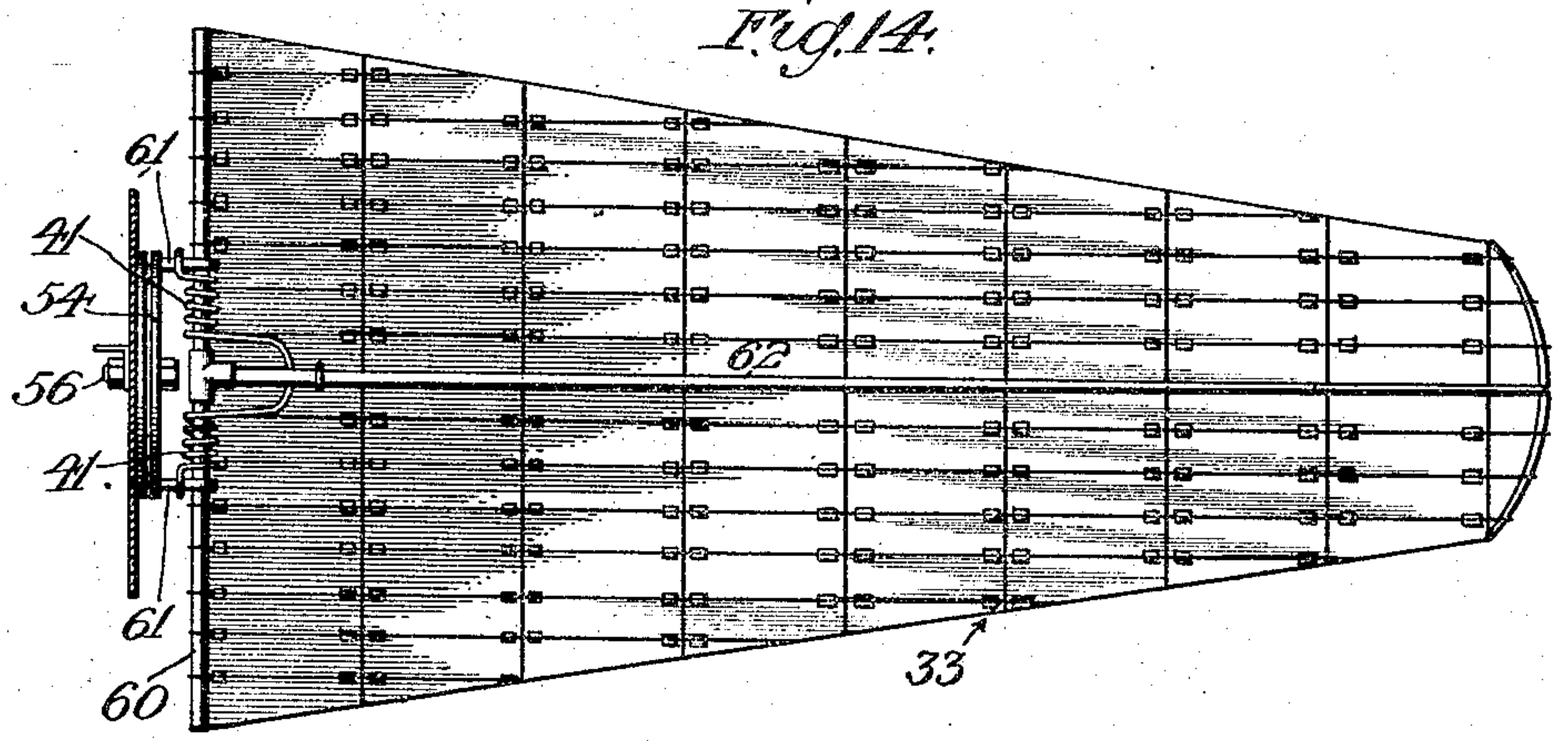


Fig. 15

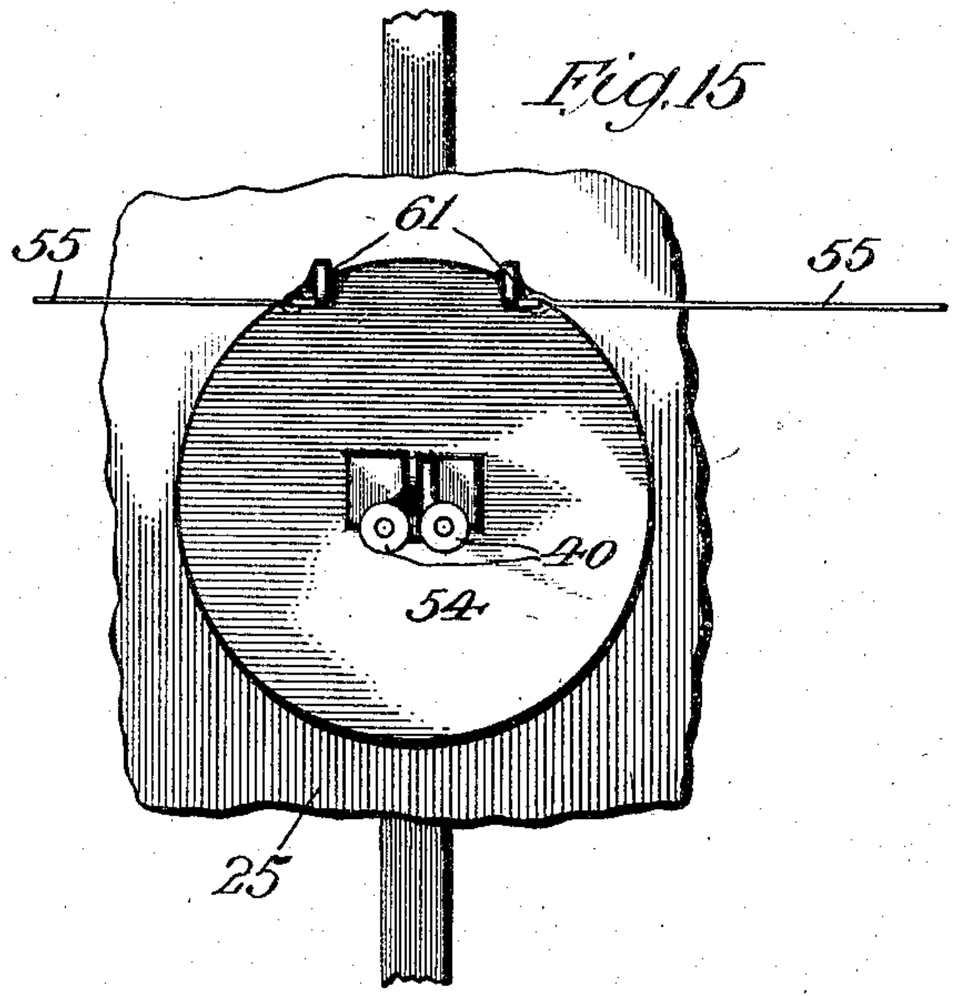
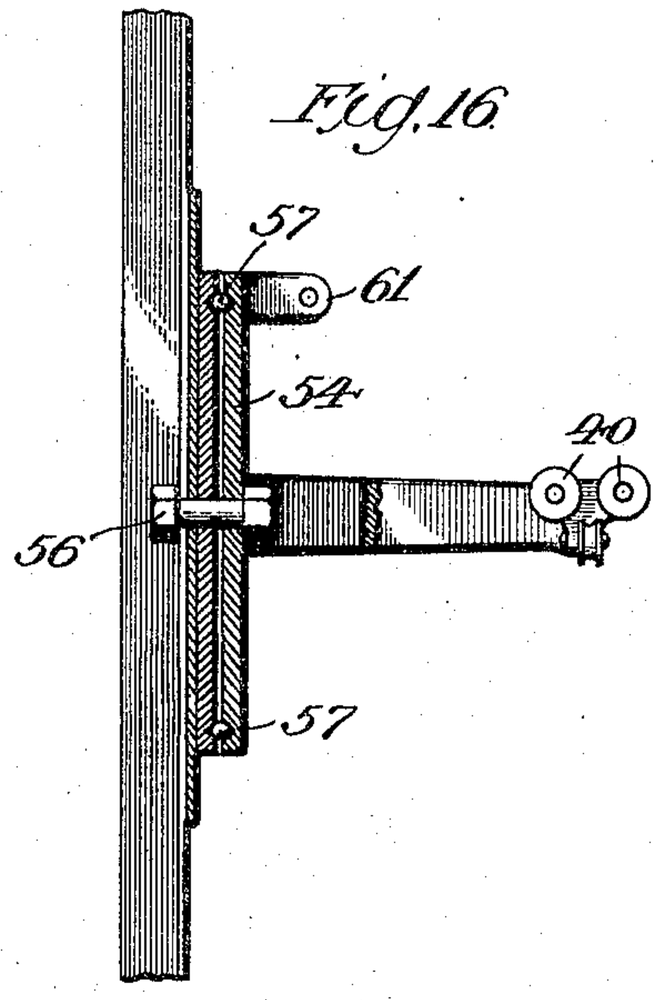


Fig. 16.



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8 SHEETS—SHEET 8.

Fig. 17.

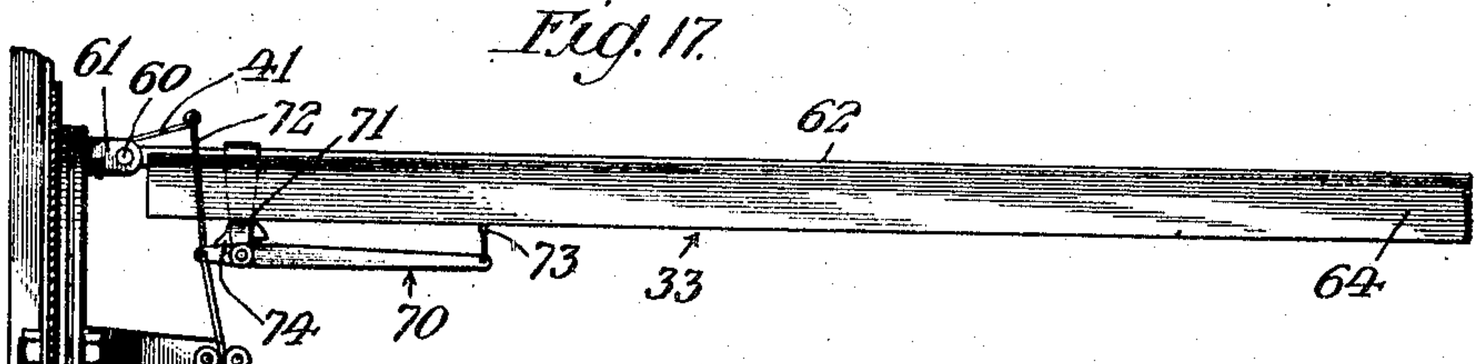


Fig. 18.

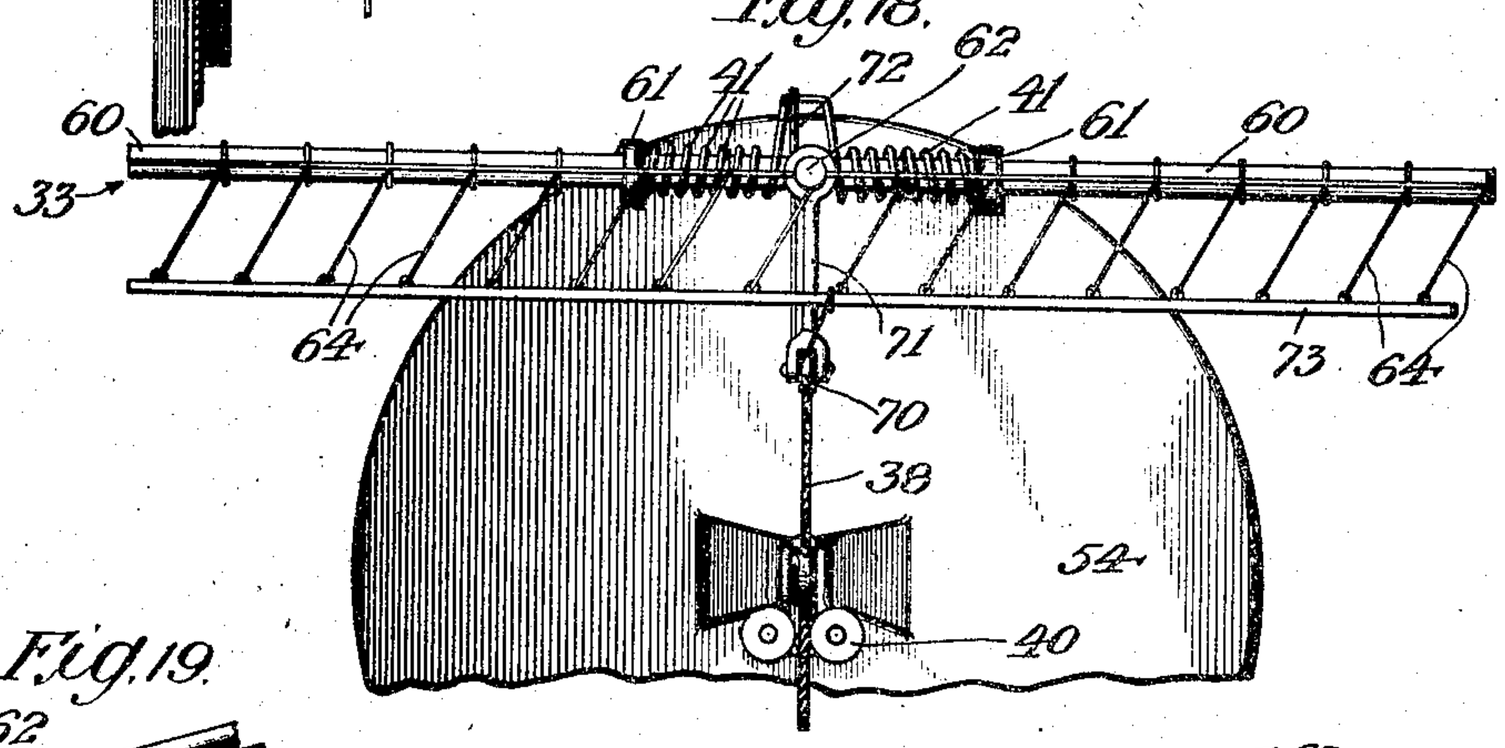
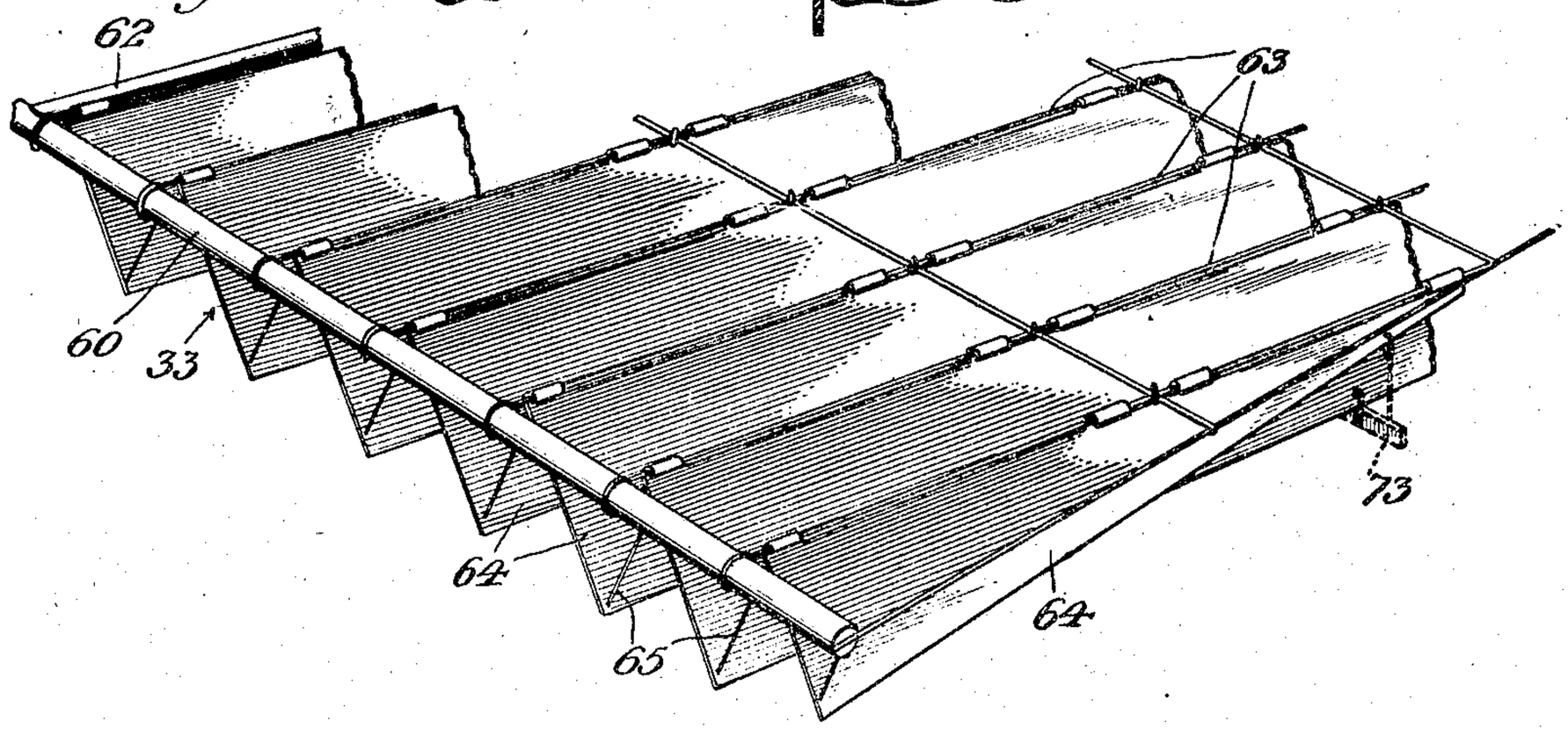


Fig. 19.



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UNITED STATES PATENT OFFICE.

WALTER D. VALENTINE, OF ALTADENA, CALIFORNIA.

FLYING-MACHINE.

No. 911,784. Specification of Letters Patent. Patented Feb. 9, 1909.

Application filed April 30, 1907. Serial No. 371,111.

To all whom it may concern:

Be it known that I, WALTER D. VALENTINE, a citizen of the United States, residing at Altadena, in the county of Los Angeles and State of California, have invented new and useful Improvements in Flying-Machines, of which the following is a specification.

It is the object of my invention to provide a flying machine having a large amount of propelling power compared with the weight thereof, to embody in a flying machine as near as practicable that principle which enables birds to fly through the air with great rapidity and ease. To provide means whereby the movement of the machine in any direction desired may be controlled. This is accomplished by means of the device described herein and shown in the accompanying drawings, in which:—

Figure 1.—is a side elevation of my complete air ship. Fig. 2:—is a plan view of the same. Fig. 3.—is a longitudinal vertical section of the frame of the air ship showing the inside flanges and braces. Fig. 4.—is a longitudinal horizontal section of the same. Fig. 5.—is a vertical cross section taken on line 5—5 of Fig. 3. Fig. 6.—is an enlarged detail partly in section of the propeller and rudder mounted on the rear of the air ship. Fig. 7.—is an enlarged detail in elevation of the central lower section of the air ship showing the motor and the mountings and gearing connections of the same. Fig. 8.—is an enlarged detail of the steering and wing operating mechanism mounted in the pilot's compartment in the forward part of the air ship. Fig. 9.—is a front elevation of the steering and wing operating mechanism. Fig. 10.—is a vertical cross section of the body of the air ship showing the wings attached thereto and also showing the operating mechanism for the wings. Fig. 11.—is an enlarged reproduction of the lower part of Fig. 10. Fig. 12.—is a side elevation of the parts shown in Fig. 11. Fig. 13.—is a side elevation, enlarged, of a wing and the operating mechanism directly connected thereto. Fig. 14.—is a plan view of the same. Fig. 15.—is a front elevation of the wing carrying disk or base. Fig. 16.—is a central vertical section of the same. Fig. 17.—is a side elevation of a modified form of wing and the operating mechanism directly connected thereto. Fig. 18.—is an enlarged view of the modified form showing the wing flaps in their open or inoperative position. Fig. 19.—is a perspective view of a portion of the wings illustrating the mode of attachment of the flaps to the wire which forms the frame of the wing, the parts shown in dotted lines being used only with the modification shown is Figs. 17 and 18.

The configuration of the outer casing or shell 25 of the air ship is shown in Figs. 1, 2 and 3, the shell being triangular in cross section as shown more clearly in detail with the wings in Fig. 10. This shell is preferably made of aluminum, and the body is divided into compartments which are air tight for the reception of the necessary gas to impart the necessary buoyancy thereto. Each compartment is provided with a gas inlet 23, and outlet 24, as shown in Fig. 10.

Centrally disposed under the body is the propelling engine 26, and in the drawings I have shown a five cylinder gasolene engine having the usual carbureter 27 (see Fig. 7), gasolene being fed thereto through the pipes 28. These pipes are of sufficient capacity to carry the necessary gasolene and constitute bracing frame members upon which the engine is also mounted. The usual crank shaft 29 of the engine carries on its outer end a spur gear 30 which is adapted to mesh with and rotate the spur gears 31 keyed on the driving shaft 32 by which rotary motion is imparted to the propeller 50 more particularly hereinafter described. The rotation of the driving shaft will also impart motion to the wings 33 and the manner in which this is done is more particularly shown in Figs. 10, 11 and 12, and is as follows: On the driving shaft are keyed the wing operating cams 34 (a side view of one of these cams is shown in Fig. 11 and an edge view in Fig. 12). Each of these cams is provided with an irregular periphery, the configuration of which is shown in Fig. 11 and is adapted to impart a vertical reciprocating motion to the wing-operating member 35. This member straddles (see Fig. 12) the operating cam and also straddles the operating shaft (see Fig. 11) and carries in the lower extension or arm an anti-friction pulley 36 which is adapted to engage and contact with the periphery of the

cam. To permit a vertical reciprocating motion being imparted to the wing-operating member it is provided with a vertical longitudinal slot 37 (Fig. 11) through which the operating shaft projects. Secured to the upwardly projecting ends of the outwardly extending arms (two in number) are the wire cables 38. These cables extend upwardly therefrom and are secured to the wings at a point 39 close to the inner ends thereof. These cables extend between a plurality of anti-friction rollers 40 and serve to depress the outer ends of the wings, the wing elevating springs 41 will elevate the outer ends and these acting together will cause the outer ends of the springs to move up and down much like the movement of the wings of a bird in flight. The wings are held normally in their upward or elevated position by the wing-elevating springs. The location and configuration of these springs are plainly shown in Figs. 13 and 14. These springs will not only hold the wings in their upwardly and outwardly extended position, but will also keep the wing-operating cables taut.

It will be manifest that upon the rotation of the operating shaft on which the wing-operating cams are mounted these cables will be alternately pulled downwardly by the cam and the slack will be taken up by the wing-operating springs and a flapping motion imparted to the wings thereby. The cams may be arranged on the driving shaft to operate all the wings simultaneously or to operate them alternately so as to impart steady motion to the ship.

In the front end of the apparatus the frame is cut away as at 42 (Fig. 1) to provide space or compartment for the pilot or steersman who stands upon the foot board or runway 43 (see Figs. 1, 8, 9, 10 and 11) extending therefrom to the rear of the ship. In the pilot compartment is mounted a compass 44 in open view of the pilot.

The apparatus is steered as follows: The steering cables 45, of which there are four in number, two on either side of the apparatus, are secured at their forward ends to the tiller 46, the tilting of which will cause the rudder 50 of the machine to work up or down, to the right or left as desired. These cables extend rearwardly along the side of the frame and pass through the journal 47 on which the propeller 48 is rotatively mounted.

The journal in which the propeller shaft rotates is stationary and through it the steering cables extend rearwardly to the projecting ends of the steering spider 49. This spider has four projecting arms to the end of each of which is attached one end of one of the steering cords by means of which the rudder 50 may be thrown into any angle desired to steer the machine by tilting the steering wheel, the rudder being mounted on a universal joint 51, which permits the rudder to be thus thrown into any angle.

Motion is imparted to the apparatus by the rotation of propeller 48 through the main driving shaft 32 which carries on its rear end the beveled gear 52 which meshes with a bevel gear 53 on the hub of the propeller. A reciprocating or flying motion is imparted to the wings, as has been hereinbefore explained, on the rotation of the driving shaft. The wings extend outwardly on each side of the main body and are so mounted on the frame that an angular position can be imparted thereto by the oscillation of the wing-carrying disks 53 (see Figs. 13, 14, 15 and 16), which movement is imparted thereto through the disk oscillating cables 55, secured to the upper periphery of the disk as shown in Fig. 15. These disks are revolubly secured to the frame by the central bolt 56 on ball bearings 57 (Fig. 16). The motion necessary to change the angle of the wings is imparted thereto by the rotation of the vertical shaft 58 disposed in the pilot's compartment (see Figs. 8 and 9) to which the forward ends of these wires are wrapped and secured. This shaft is rotated by the rotation of the wheel 59 keyed thereon by the pilot.

The apparatus is provided with a plurality of wings. In the drawings I have shown three series of wings on each side of the shell. Each series is provided with a plurality of wings 33 staggeringly disposed, one above the other to close as far as possible all intervening space looking downwardly between these wings. Each wing (Figs. 13 and 14) is made up of a base frame member 60 and is pivotally mounted in the wing-securing lugs 61 on the wing-operating base plate 54. Projecting outwardly from the base member to the end of the wing is the central wing stiffening member 62. This stiffening member supports a plurality of flap-supporting members 63 running parallel thereto to which the wing flaps 64 are pivotally secured and hang in a suspended position therefrom. The flaps are prevented from falling into a vertical position by means of the flap-supporting cables 65 (see Fig. 19) which limit the movement downwardly of the free edges of the flaps, the purpose of which is to cause the flaps to close when the wing is thrown downwardly and prevent the passage of air therethrough and to permit the flaps to open on the up motion of the wing and permit the air to pass. An opening 66 extends from the engineer's compartment 67 through the shell to the top of the same for observation purposes. Thus it will be seen that the wings will open and close automatically when an up and down motion is imparted thereto and can be thrown into any angle and therefore act to elevate or depress the ship or to project it ahead or stop it or by giving

a certain angle to the wings provide means to cause the ship to move backwardly. By giving the proper angle of inclination to the wings the ship may be raised and moved forward at the same time, or any other combinations of direction may be effected. Thus I have perfect control and am enabled to land easily and safely.

I have shown a landing device which consists of four telescoping legs 80 attached to the side walls of the ship near the bottom frame, two of these legs being attached near each end. These legs are preferably formed of two pieces of telescoping tubing 81 and 82 which are closed at their outer ends so as to hold an air cushion upon which the ship may rest when landing. The air cushion obviates all unnecessary jars and unequal strains upon the frame of the ship. Wires 83 which are attached to both of the tubings 81 and 82 prevent the lower tubing from slipping entirely off the upper one.

On account of the general rigid construction and its gas tight compartments, the ship will float in water and will even be able to make headway to land as its general triangular cross section will cause it to float uprightly in the water and the propeller and wings will enable it to make headway.

In Figs. 17 and 18 I have shown a modified form of wing in which the flaps are adapted to be closed and opened automatically by the same mechanism which operates the wing. To this end the upper end of cable 38 is secured to the short end of lever 70 which is pivoted on an arm 71 attached to the wing frame. Wing elevating spring 41 is not attached dirctly to the frame of the wing, but is connected by a short rod 72 to the short end of lever 70. The long end of lever 70 is pivotally secured to a transverse bar 73 which is connected by hooks or other convenient means to each of the wing flaps 64. Stops 74 are provided on arm 71 to limit the movement of lever 70 between its positions for opening and closing the flaps: By this arrangement it will be noted that spring 41 will always hold the flaps open except when cable 38 is pulling downwardly when the flaps will be closed. If the wings are held still the flaps will be closed as the weight of the wing frame will hold it against them. When in this position the wings will form aeroplanes upon which the ship may sail under the propulsion of the propeller. When the wing is operating, the flaps will be opened at their lowest point by the wing-elevating spring and closed at their highest point by the wing-operating cable. Thus the flaps are mechanically closed on their downward motion and opened on their upward motion.

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

1. A wing for an air ship comprising a pivoted disk, means to rotate said disk, a wing base frame member pivotally mounted on said disk, a longitudinal frame member extending from said base member, flap supporting wires strung on the frame, wing flaps pivotally mounted on said wires, and an operating cable attached to said flaps and also to said longitudinal frame member.

2. The herein described wing, each wing comprising a base member pivotally mounted on the wing carrying disk, a central wing-stiffening member projecting outwardly from the base member, flap supporting members carried by said stiffening member, flaps pivotally secured to the flap-supporting members, means to limit the downward movement of the flaps and means to impart an up and down movement to said wing and a spiral spring surrounding the base member, the projecting end of said spiral spring adapted to engage projecting lugs on the wing carrying disk and adapted to hold and engage the central stiffening member and hold the same in an elevated position, a wing-depressing cable secured at one end to the stiffening member, and the other end with the wing operating member adapted to be moved up and down by the rotation of the cam mounted on the operating shaft.

3. In an air ship of the character herein described having means for its elevation and propulsion as shown, the herein described means to guide the said air ship in its movement through the air, comprising a rudder having a steering spider with four projecting arms, cords extending from the end of each of the four arms to a guiding tiller in the bow of the ship, said tiller being mounted on a universal joint and adapted to be thrown into angle by the pilot therein and thereby operate the rudder.

4. An air ship comprising a hollow metallic shell of triangular cross-section with the apex thereof lowermost, a motor mounted at the bottom and center of said shell, a longitudinal shaft extending along the lower side of said shell and operated by said motor, cams on said shaft, vibrating wings mounted on said shell, and connecting means between said wings and said cams.

5. An air ship comprising a tubular framework in the form of a skeleton triangular prism having a lateral edge lowermost, a metallic covering for said framework, said covering forming a gas containing receptacle, a motor mounted on said framework, a longitudinal shaft extending along the lower side of said shell and operated by said motor, cams on said shaft, vibrating wings mounted on said shell, and connecting means between said wings and said cams.

6. An air ship comprising a metallic frame and shell, a motor mounted on said frame, a shaft extending longitudinally of said frame and operated by said motor, a series of vi-

brating wings arranged on each side of the frame in tiers and in staggered relation one above the other, and operative connecting means between said shaft and said wings whereby said wings are vibrated.

7. In an air ship construction, a series of vibrating wings arranged in horizontal tiers and in vertical staggered rows.

In witness that I claim the foregoing I have hereunto subscribed my name this 24th day of April, 1907.

WALTER D. VALENTINE

Witnesses:
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TRIMBLE BARKELEW.