Jan. 17, 1928.

1,656,468

R. S. BRAUGH

FLYING MACHINE

Filed Feb. 5, 1926

5 Sheets-Sheet 1

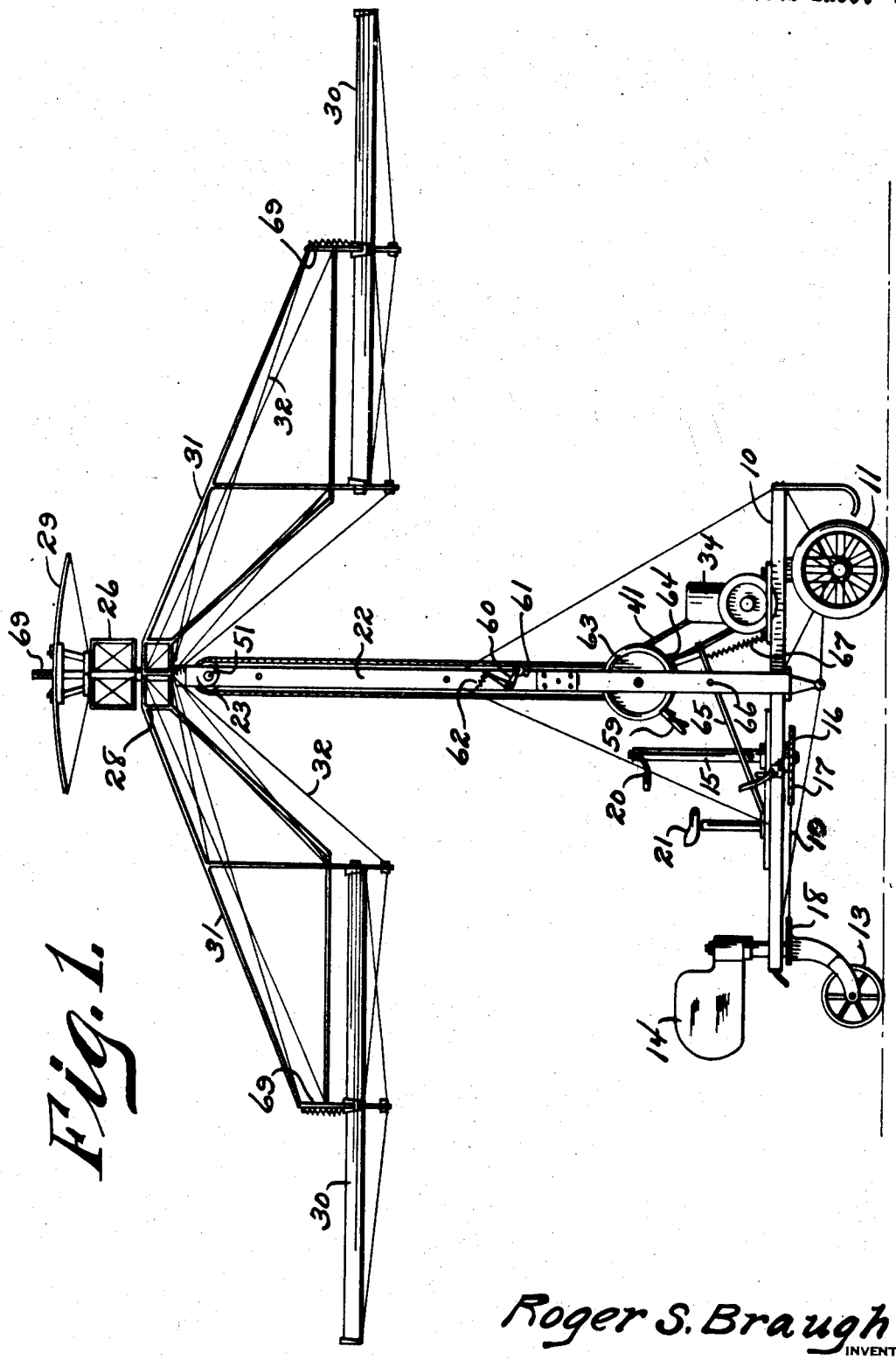


Fig. 1.

Roger S. Braugh
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WITNESS: John Donovan

Jan. 17, 1928.

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5 Sheets-Sheet 2

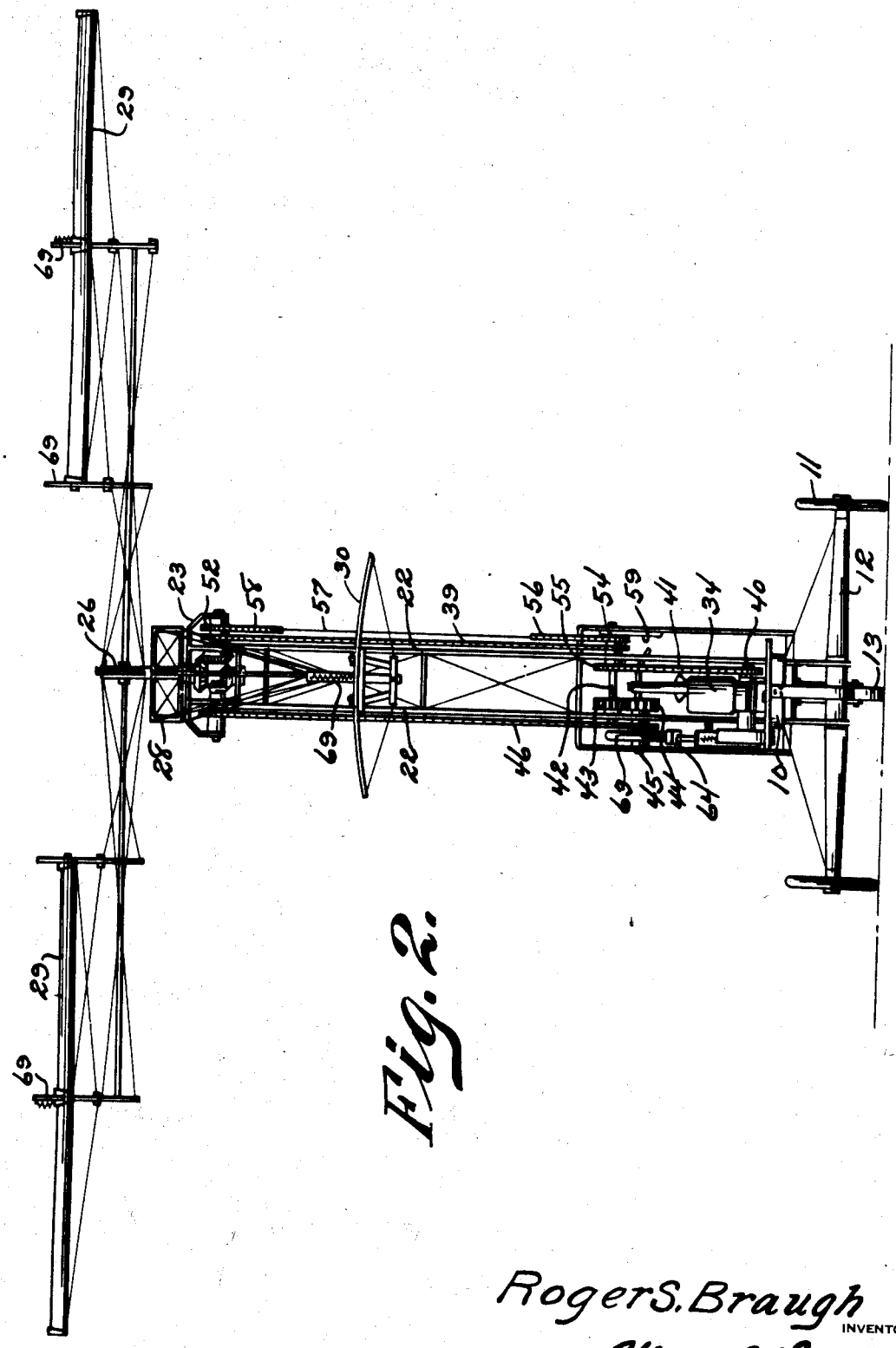


Fig. 2.

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FLYING MACHINE

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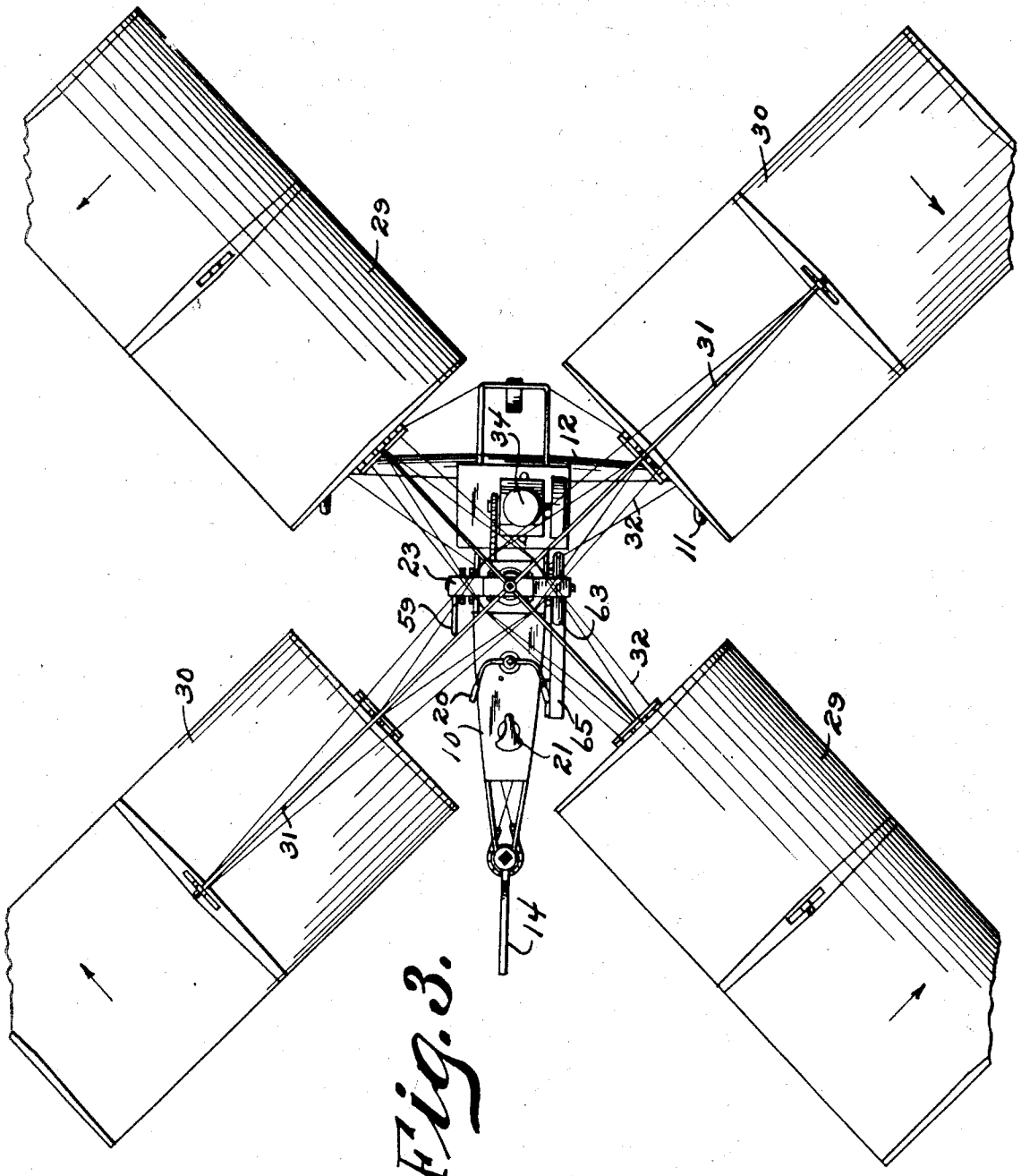


Fig. 3.

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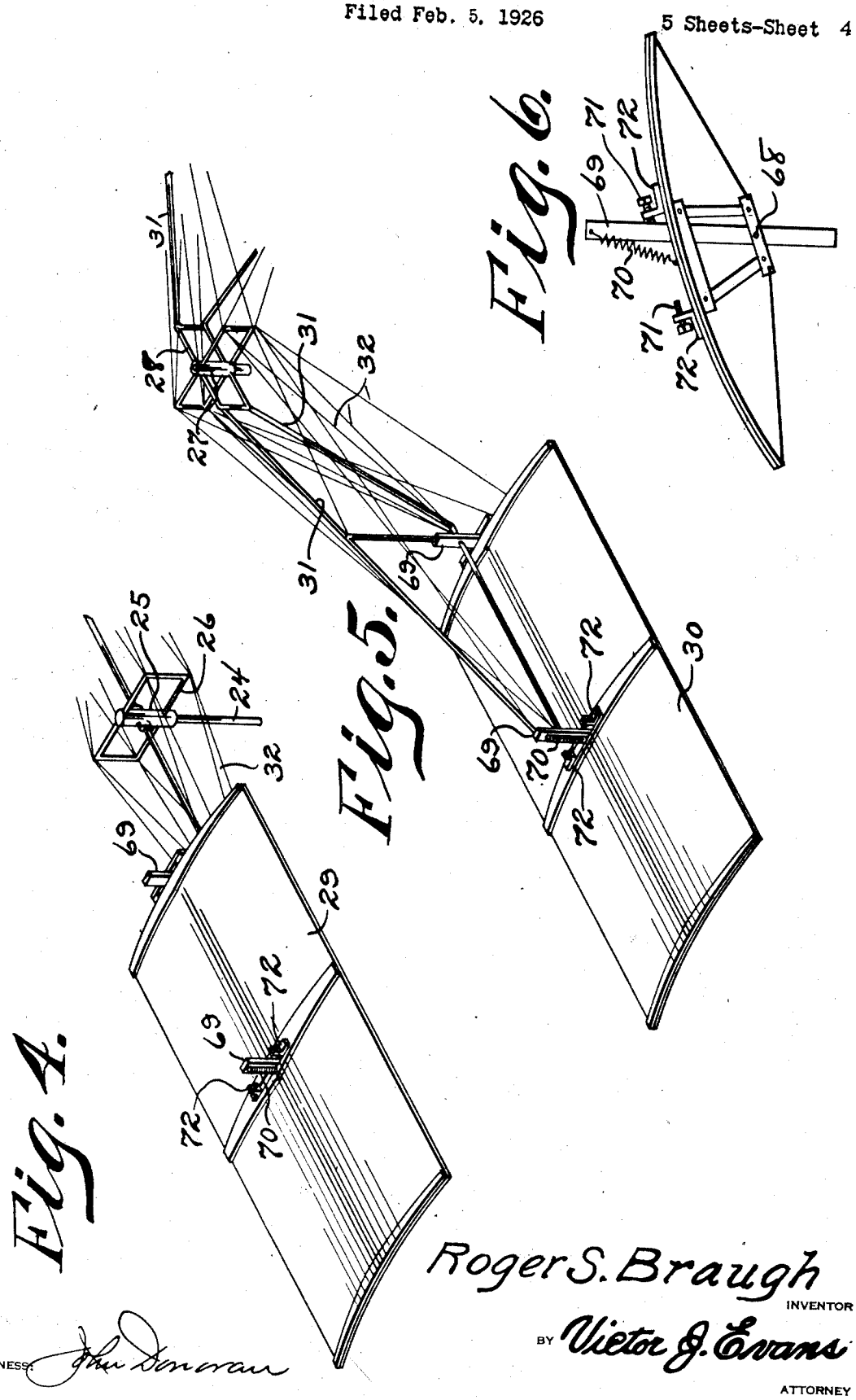
1,656,468

R. S. BRAUGH

FLYING MACHINE

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5 Sheets-Sheet 4



Roger S. Braugh
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1,656,468

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FLYING MACHINE

Filed Feb. 5, 1926

5 Sheets-Sheet 5

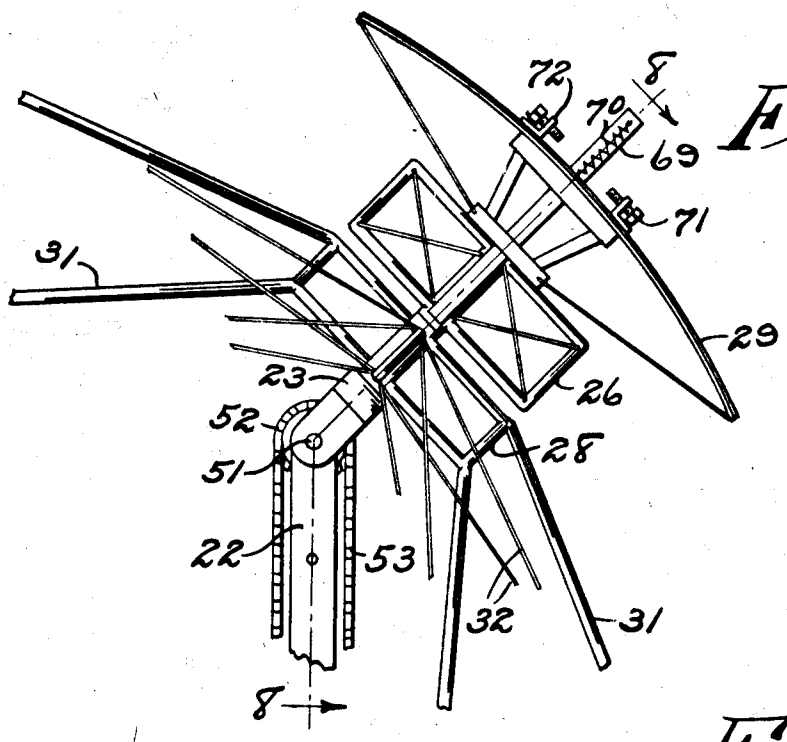
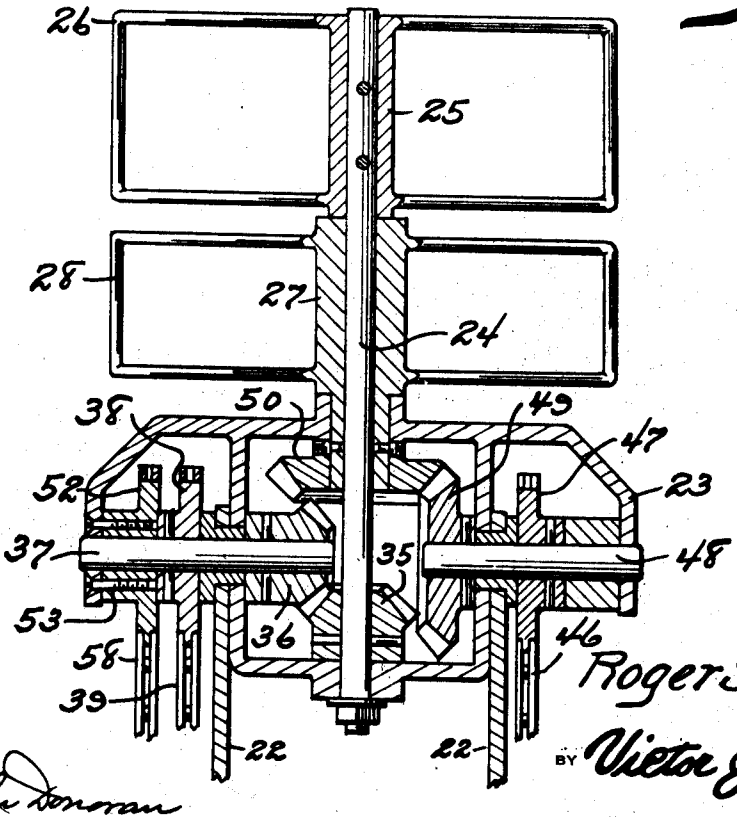


Fig. 7.

Fig. 8.



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BY Victor J. Evans

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WITNESS: John Donovan

Patented Jan. 17, 1928. 1,656,468

UNITED STATES PATENT OFFICE.

ROGER S. BRAUGH, OF SEATTLE, WASHINGTON.

FLYING MACHINE.

Application filed February 5, 1926. Serial No. 86,325.

This invention comprehends the provision of a combined airplane and helicopter, wherein upper and lower pairs of wings are mounted for rotation in horizontal planes, and capable of being quickly and conveniently adjusted as a unit to occupy the desired angle with relation to the body of the machine, while each wing is capable of tilting movements within certain limits to properly position themselves with the change of air currents.

The nature and advantages of the invention will be readily apparent when the following detailed description is read in connection with the accompanying drawings, the invention residing in the construction, combination and arrangement of parts as claimed.

In the drawings forming part of this application, like numerals of reference indicate similar parts throughout the several views, and wherein:

Figure 1 is a side elevation of the machine constituting the subject matter of the invention.

Figure 2 is a front elevation.

Figure 3 is a top plan view.

Figure 4 is a perspective view of one of the upper wings.

Figure 5 is a similar view of one of the lower wings.

Figure 6 is a detailed view showing how each wing is capable of tilting under the influence of air currents.

Figure 7 is a view showing how the wing structure is capable of assuming an angular position with relation to the vertical.

Figure 8 is a sectional view on line 8—8 of Figure 7.

Referring to the drawings in detail, 10 represents a wheeled frame or body of the machine, the front wheels being indicated at 11 and mounted on an axle arranged in a housing 12. The rear wheel is indicated at 13 and is mounted on the frame so that it can be easily turned together with the rudder 14 for the purpose of steering the machine under any and all circumstances. For this purpose I make use of a steering post 15 which has associated therewith a sprocket wheel 16 over which and a smaller sprocket wheel carried by the standard of the wheel 13 are trained chains 17 and 18, respectively, the corresponding extremities of these chains being connected by rods or wire elements 19. A pair of handle bars 20 is associated with the steering post 15, and in convenient reach of the operator when occupying the seat 21, so that the wheel 13 and rudder 14 can be easily turned for the purpose above stated.

Rising from the body of the machine are standards 22, and pivoted on these standards is a casing-like head 23 upon which the wing structures are supported. Journaled in this head and projecting above the latter is a shaft 24 to which is keyed or otherwise suitably secured the hub 25 of the supporting bracket 26 for the upper pair of wings, while below the hub 25 is the hub 27 of the support 28 for the lower pair of wings, thus hub 27 being mounted for rotation upon the shaft 24. The wings of the upper pair are indicated at 29, while the wings of the lower pair are indicated at 30, and it will be noted upon inspection of Figures 4 and 5 that the wings 29 project horizontally from the shaft 24, while the wings 30 of the lower pair are dropped to a plane beneath the wings 29 by the rods 31 forming part of the supporting structure therefor. The wires for the wings in each instance are indicated at 32. These wings are mounted for rotation in horizontal planes, the wings of the upper pair being rotated in a direction opposite the direction of rotation of the wings of the lower pair. The wings are rotated by means of a motor 34 which is connected with the wings in a manner to be presently described.

Upon reference to Figure 8 it will be noted that the shaft 24 has keyed or otherwise suitably secured thereto a bevelled gear 35, which meshes with a similar gear 36 keyed upon a shaft 37, while also keyed upon this shaft is a sprocket wheel 38 over which is trained an endless chain 39. The motor operated shaft 40 has secured thereto a sprocket wheel over which is trained an endless chain 41, the chain also being trained over a sprocket wheel carried by the driven shaft 42, while the chain 39 above referred to is also trained over a sprocket wheel carried by the same shaft 42. Consequently, when the motor is in operation, rotation of the shaft 42 operates the chain 39, the latter in turn rotating the shaft 37 which imparts rotary motion to the shaft 24, thereby operating the upper pair of wings 29. The shaft 42 carries a gear 43 which meshes with a gear 44 carried by a shaft 45, and mounted on this shaft is a sprocket wheel over which is trained an endless chain 46. This chain

46 is also trained over a sprocket wheel 47 fixed upon a shaft 48 journaled in the head 23, and in axial alinement with the shaft 37, as clearly illustrated in Figure 8. This shaft 48 is provided with a beveled gear 49 which meshes with a similar gear 50 keyed or otherwise suitably secured to the hub 27 of the lower wing supporting structure, so that when the shaft 48 is rotated simultaneously with the rotation of the shaft 37, the hub 27 is operated to rotate the lower pair of wings.

As above stated, the head 23 is pivoted as at 51 upon the standards 22, so that the wing structure in its entirety can be tilted to any desired angular position with relation to the standards 22, as illustrated in Figure 7, depending upon the course to be pursued by the machine. To accomplish this, I provide a sprocket wheel 52 which is journaled on the shaft 37 and secured to the head 23 in any suitable manner, preferably by fastening elements 53, as shown in Figure 8. Also carried by the shaft 42 is a hub 54 which is provided with a sprocket 55 over which is trained a chain 56, the terminals of which are connected by rods 57 with the corresponding terminals of a chain 58 trained over the sprocket 52 above referred to. The hub 54 is actuated by means of a lever 59, and it is manifest that when the hub is rotated in one or the other direction, the chains 56 and 58 are called into use to tilt the head 23, and the wing structures as a unit, to position the latter in any desired angle with relation to the standards 22, as shown in Figure 7.

As shown in Figure 1, I make use of a chain tightener in the nature of a bell crank lever 60, one end of which has associated therewith a wheel 61 cooperating with the adjacent chain to hold the latter taut, while the other end of this lever is connected with a coiled spring 62 for maintaining the lever in an active position. It will also be noted upon inspection of this figure and Figure 2 that the shaft 45 is provided with a brake wheel 63 against which a brake shoe 64 operates to retard the rotation of the wings as the occasion may require. This shoe is carried by a foot treadle 65 pivoted on the standards as at 66 and connected with a spring 67 which normally holds the shoe spaced from said wheel and the treadle 65 elevated. The treadle, of course, is adapted to be depressed by the foot of the operator to move the shoe 64 into active position.

As hereinabove stated, each wing is capable of tilting movements within certain limits, to properly adjust themselves under the influence of the air currents, and the structure for this purpose is clearly illustrated in Figures 4, 5 and 6. Each wing is pivoted as at 68 upon spaced uprights 69, the latter being stationary and always maintained in parallelism with the shaft 24, while each wing is connected with one of the standards by means of a spring 70, which under normal conditions maintains the wing in a true horizontal position. When influenced by the air currents, should the latter be strong enough to overcome the tension of the spring 70, the wing is permitted to tilt as shown in Figure 6, but limited by stop screws 71 supported by suitable brackets 72, which stops are adapted to contain the adjacent standard 69 as will be readily understood. It is manifest that by reason of the arrangement of the upper and lower pairs of wings, the machine can be used in the capacity of a helicopter, and that when the machine has been elevated to the desired altitude, the wings can be tilted as a unit with relation to the body of the machine as the occasion may require, and the wings themselves tilted with relation to each other by air currents as described.

While it is believed that from the foregoing description the nature and advantages of the invention will be readily apparent, I desire to have it understood that I do not limit myself to what is herein shown and described, and that such changes may be made when desired as fall within the scope of what is claimed.

Having thus described the invention, what is claimed as new, is:—

1. A machine of the character described comprising a wheeled frame, a standard rising therefrom, a wing structure including spaced upper and lower pairs of wings pivotally mounted on said standard, means for tilting said wing structure with relation to said standard, said upper and lower pairs of wings being mounted for rotation in horizontal planes, and means for rotating said wings, the means last named and the means for tilting the wing structure including elements movable about alined axes.

2. A machine of the character described comprising a wheeled frame, standards rising therefrom, spaced upper and lower pairs of wings mounted for rotation in horizontal planes, means for rotating said wings, means for supporting said wings for tilting movement as a unit with relation to said standards, frames carried by the under sides of the wings, supports on which the frames are mounted for pivotal movement, the wings being slotted and the supports extending thru the slots, springs tending to hold the wings in horizontal position, and adjustable stops mounted on the wings and adapted to engage the supports on opposite sides thereof for limiting tilting movement of the wings under air pressure and against the action of the springs.

3. A machine of the character described comprising a wheeled frame, standards rising therefrom, a wing structure including

spaced upper and lower pairs of wings mounted for rotation in horizontal planes, means for supporting said structure for tilting movement on said standards, means for tilting said structure to any desired angle, means for rotating said wings in opposite directions, and means for supporting each wing for tilting movements under the influence of air currents, said means last named including an element extending upwardly thru each wing and pivotally connected with the wing, and a spring for maintaining the normal position of each wing on the supporting means.

4. A machine of the character described comprising a wheeled frame, spaced upper and lower pairs of wings mounted for rotation in horizontal planes, means including a motor for rotating one pair of wings in a direction opposite the direction of rotation of the other pair of wings, means for supporting all of said wings for tilting movement with relation to the standards as a unit, means for tilting said wing structure to any desired angle with relation to said standards, and braking means for retarding the rotation of said wings and retaining them in fixed position, the tilting means being operative about an axis in alinement with the axis of one of the elements for imparting rotation to the respective pairs of wings.

In testimony whereof I affix my signature.

ROGER S. BRAUGH.