951,615.

L. C. KINCANNON.

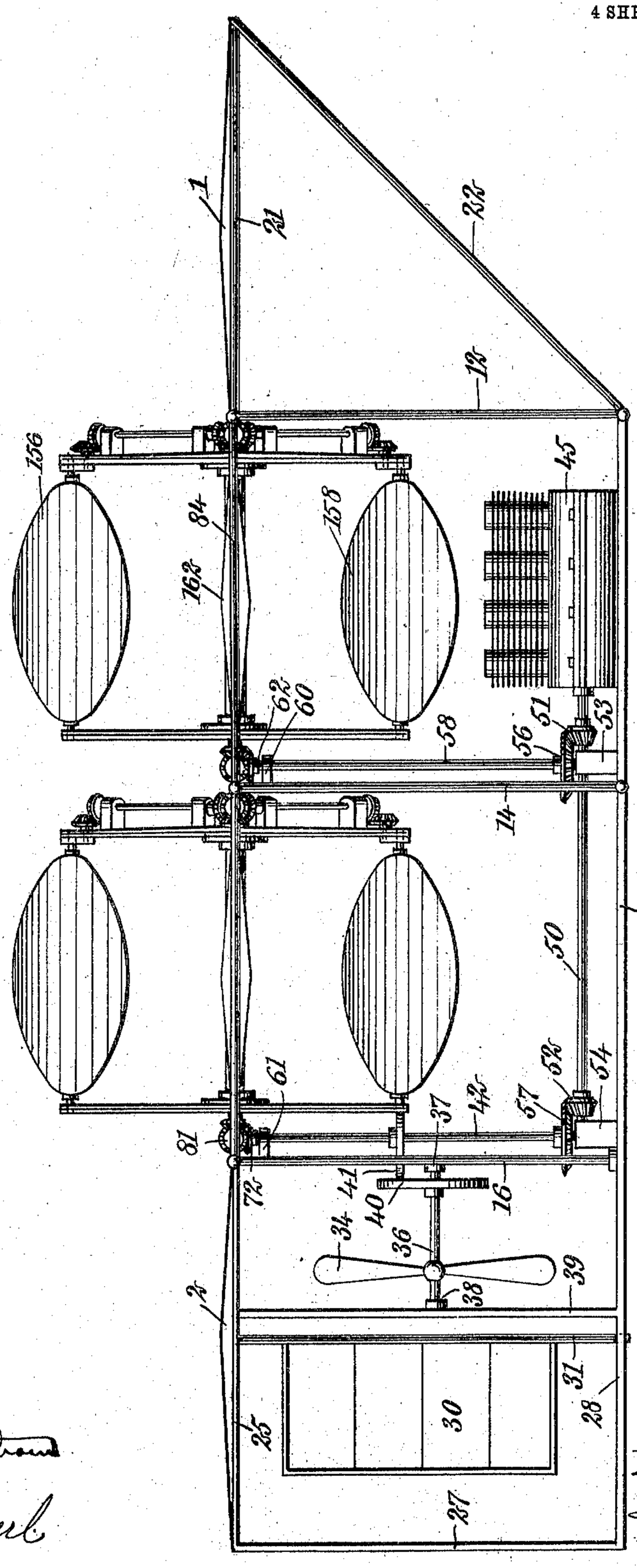
FLYING MACHINE.

APPLICATION FILED DEC. 30, 1908.

Patented Mar. 8, 1910.

4 SHEETS—SHEET 1.

Fig. 1.

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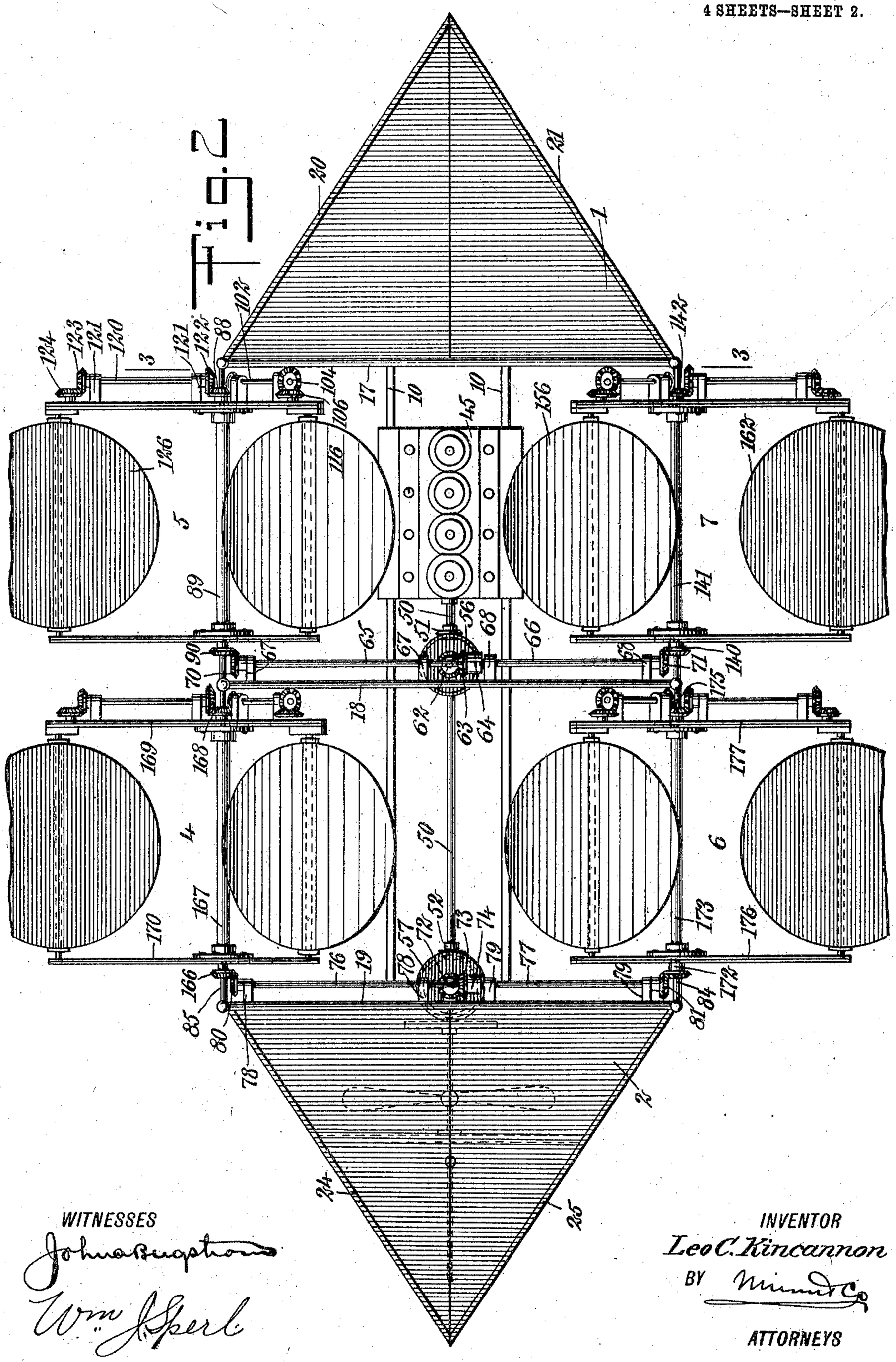
4 SHEETS—SHEET 2.

Fig. 2

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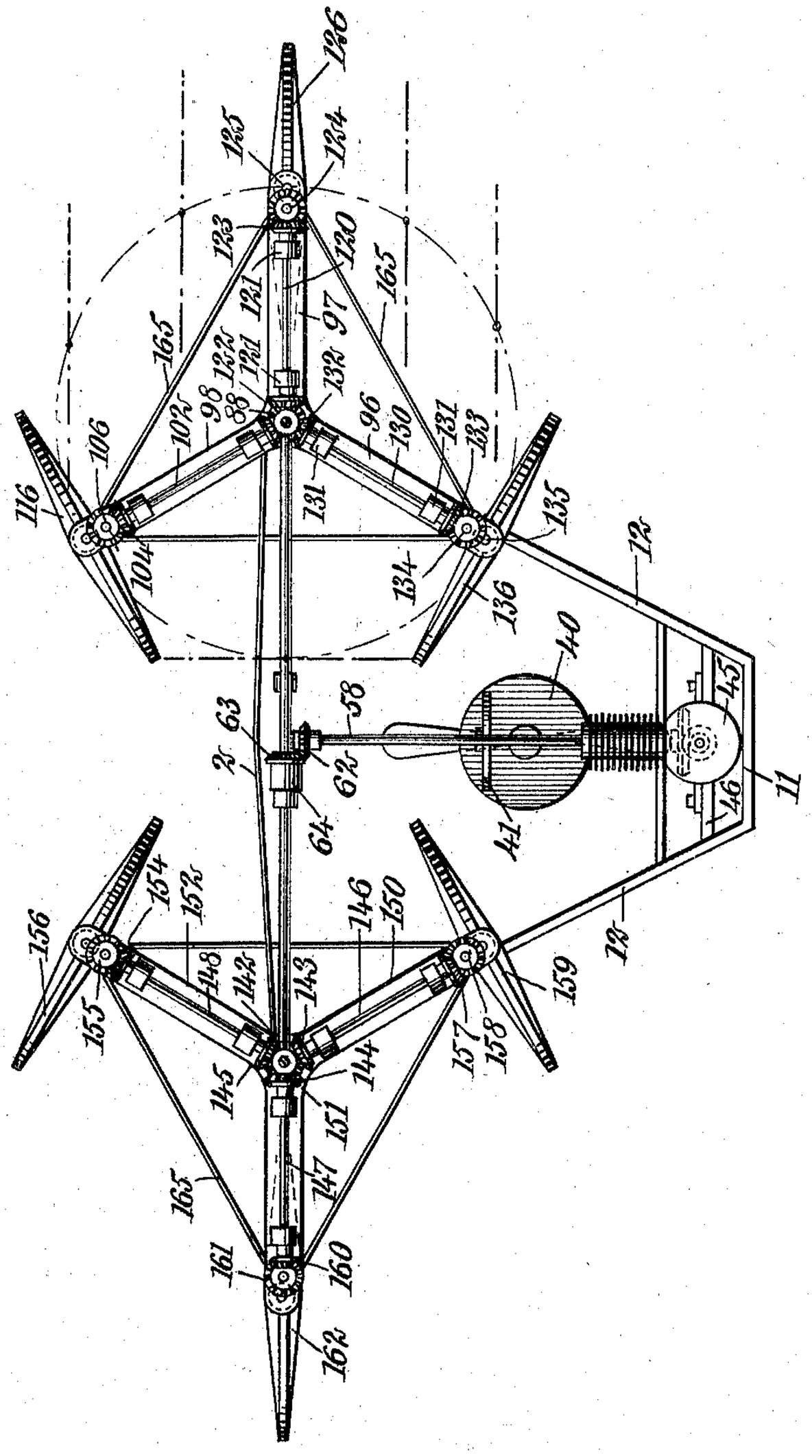
4 SHEETS—SHEET 3.

Fig. 3

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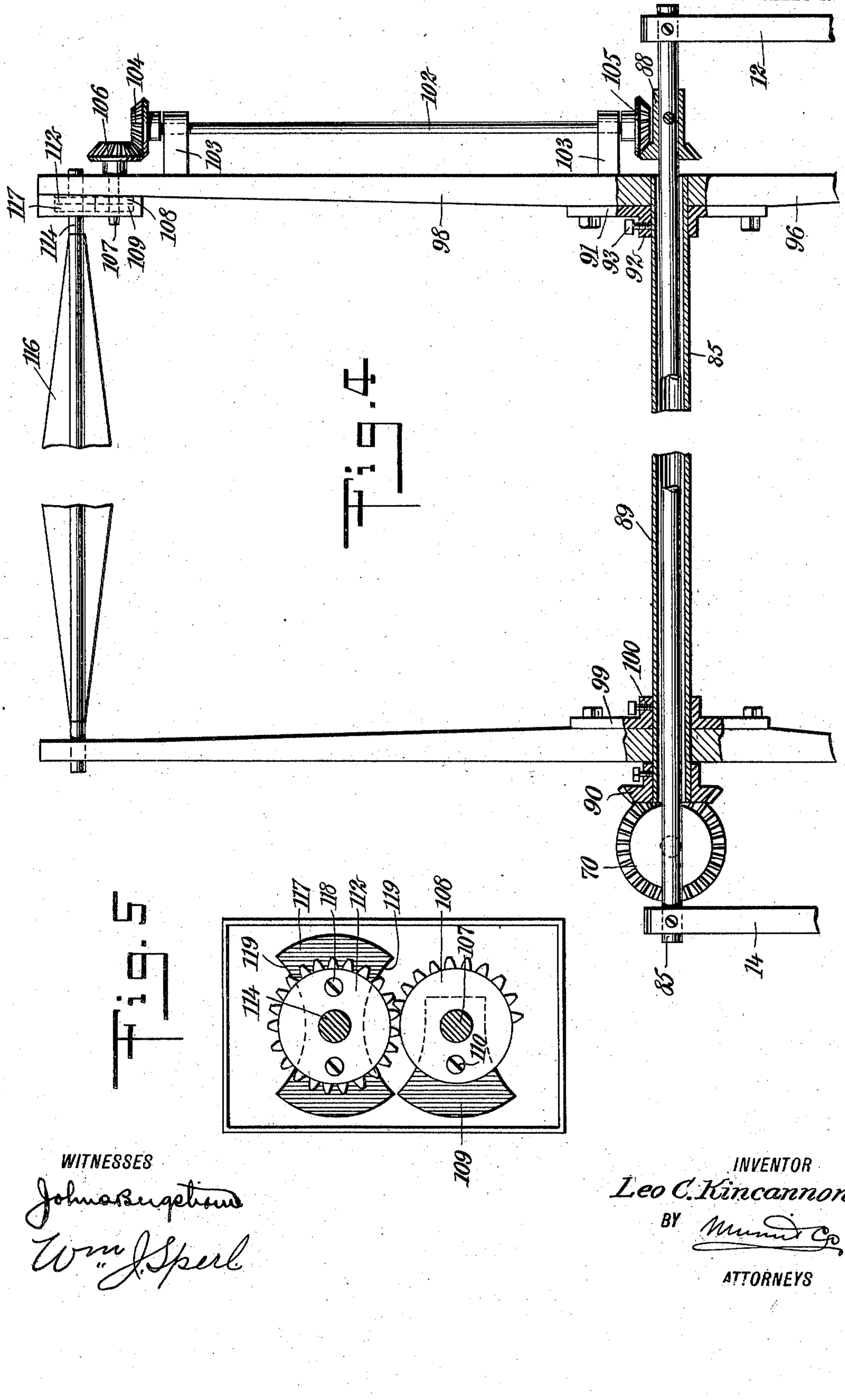


Fig. 5.




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# UNITED STATES PATENT OFFICE.

LEO COVINGTON KINCANNON, OF SEABRIGHT, CALIFORNIA.

## FLYING-MACHINE.

951,615. Specification of Letters Patent. Patented Mar. 8, 1910.

Application filed December 30, 1908. Serial No. 469,926.

*To all whom it may concern:*

Be it known that I, LEO C. KINCANNON, a citizen of the United States, and a resident of Seabright, in the county of Santa Cruz and State of California, have invented a new and Improved Flying-Machine, of which the following is a full, clear, and exact description.

This invention relates to flying machines.

The object of the invention is to provide an improved flying machine of the so-called rotary-wing type. In the present embodiment, it comprises two or more pairs of wings, each pair being composed of six separate wings. The wings are mounted to revolve about an axis and also caused to be intermittently rotated, so that for a portion of their travel, they will be in a plane parallel with the general plane or direction of motion of the flying machine.

The invention consists in the construction and combination of parts to be more fully described hereinafter and pointed out in the appended claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views, and in which—

Figure 1 is a side elevation of the flying machine; Fig. 2 is a plan view of the same; Fig. 3 is a sectional elevation, taken on the line 3—3 in Fig. 2; Fig. 4 is a broken sectional view on an enlarged scale, showing the means of driving one set of wings; and Fig. 5 is a detail view, on an enlarged scale, of the intermittent gears.

The flying machine in its present embodiment comprises two triangular stationary planes 1 and 2, and four sets of rotating wings 4, 5, 6 and 7. These wings may also be considered as composing two pairs, of six wings each, one-half of the pairs being located on each side of the flying machine. It is to be understood that the number of wings and the number of pairs may be varied as desired, without departing from the scope of my invention. The planes 1 and 2, and the rotating wings may be supported from a frame-work composed of steel tubing. Said frame comprises two parallel bottom members 10, which may be united by a cross member 11. Inclined upwardly from the members 10 are side frame supports 12, 14 and 16. The upper ends of these side supports may be united by upper horizontal members 17, 18 and 19 respectively. The member 17 forms one end of the plane 1, and the two sides of said plane may be formed by inclined rods 20 and 21. A rod 22 connects the junction point of the rods 20 and 21 with the bottom member 11. The rod 19 forms one end of the plane 2. Said plane is constructed similar to the plane 1 and is formed by side members 24 and 25, which are inclined toward each other, and their junction point is supported by a rod 27. Said rod is connected at its upper end to the junction of the rods 24 and 25, and at its lower end to a horizontal rod 28, which may form a suitable extension to the bottom members 10. The top of the planes 1 and 2 is formed of canvas or any other suitable material, and the bodies of the rotating vanes are also formed of similar material. A rudder 30 is provided at one end with a shaft 31, having its upper end suitably supported within the plane 2, and its lower end suitably supported from the rod 28.

In order to propel the flying machine, I provide a propeller 34, mounted upon a shaft 36, which shaft is journaled at one end in a bearing 37 supported by the rod 16, and at its other end in a bearing 38, supported by the rod 39, which extends between the plane 2 and the rod 28. Mounted to rotate with the shaft 36 is a disk 40, adapted to cooperate with a horizontal disk 41, which is mounted upon a shaft 42. The disks 40 and 41 constitute a friction drive, and by varying the vertical position of the disk 41, the speed with which the propeller 34 is driven may be varied.

In order to drive the wings, a suitable motor or internal combustion engine 45 may be provided, which is supported upon a base 46 suitably connected to the framework of the flying machine. The main shaft 50, which is connected to said engine, is provided with bevel pinions 51 and 52, said shaft being also journaled in bearings 53 and 54, which are suitably supported and connected to the frame-work of the flying machine. The bevel pinions 51 and 52 mesh with the bevel gears 56 and 57, which are mounted to rotate with vertical shafts 58 and 42 respectively. The shaft 58 is journaled at its upper end in a bearing 60, and the shaft 42 is journaled at its upper end in a bearing 61, both bearings being suitably connected to the framework of the machine. A bevel gear 62 is mounted upon the upper

end of the shaft 58, and is adapted to rotate therewith. Said gear meshes with a similar gear 63, forming a part of a differential gear 64. These gears 63 and 64 are mounted to drive shafts 65 and 66, journaled in bearings 67 and 68, which are suitably connected to the framework of the machine. It will be understood by this construction that the shafts 65 and 66 are to be rotated in opposite directions. A bevel gear 70 is secured to the shaft 65, and a bevel gear 71 is secured to the shaft 66. A bevel gear 72 is secured to the upper end of the shaft 42 and adapted to rotate therewith, said gear 72 meshing with a bevel gear 73, which is connected to a differential gear 74, said gears operating to drive the shafts 76 and 77 simultaneously in opposite directions. Said shafts 76 and 77 are journaled in bearings 78 and 79 respectively. A bevel gear 80 is secured to the outer end of the shaft 76, and a bevel gear 81 is secured to the outer end of the shaft 77. Rotating wings are mounted so as to revolve about the shafts 84 and 85, which form the side members of the upper plane of the framework of the machine.

For the purpose of description, the construction of one set of wings, as for example number 5, will be described, and it will be understood that the other wings are merely duplicates of the same construction. Said construction is shown in detail in Fig. 4.

The stationary shaft 85 is supported in the vertical members 12 and 14. A bevel gear 88 is pinned to the shaft 85, and said shaft forms a core for a hollow shaft 89 having a bevel gear 90 secured to one end thereof. A plate 91, having a central boss 92, is secured to the hollow shaft 89 by means of a set-screw 93, and said plate forms a means of support for the inner ends of the side arms 96, 97 and 98. A similar plate 99, having a central boss 100, is secured to the opposite end of the hollow shaft 89, and forms a means of support for the inner ends of a similar set of side arms. A shaft 102 is journaled in bearings 103 mounted upon the side arm 98, and said shaft is provided at its ends with bevel gears 104 and 105. The bevel gear 105 is adapted to mesh with the gear 88 on the stationary shaft 85, and the gear 104 is adapted to mesh with a gear 106, journaled near the upper end of the side arm 98, and provided with a stem 107, upon which a mutilated gear 108 and a locking disk 109 are secured. The disk 109 and the gear 108 may be fastened together by means of a screw 110. The gear 108 is adapted to mesh with a gear 112, mounted upon a shaft 114, which shaft forms a support for the wing 116. A locking disk 117 is secured to the shaft 114 and fastened to the gear 112 by means of screws 118. It will be understood that by the rotation of the shaft 107, the teeth of the gear 108 mesh with the teeth of the gear 112 during a portion of the revolution, and for the remainder of the revolution, the disk 109 engages one of the recesses 119, formed on opposite sides of the disk 117, and thereby prevents rotation of the shaft 114 until said disk 109 passes out of said recess. A shaft 120 is journaled in bearings 121 upon the side frame 97, and said shaft is provided at its ends with bevel gears 122 and 123. The gear 122 meshes with the gear 88, and the gear 123 meshes with a gear 124, which coöperates with a set of intermittent gears similar to those described above, and operates to control the shaft 125 upon which the wing 126 is mounted. A shaft 130 is journaled in bearings 131 mounted upon the side arm 96, and said shaft is provided at its ends with bevel gears 132 and 133. The gear 132 meshes with the gear 88, and the gear 133 meshes with a gear 134, which also is connected by means of a set of intermittent gears, to a shaft 135, upon which a wing 136 is mounted.

A gear 140, meshing with the gear 71, is secured to the outer end of a hollow shaft 141, which is mounted to rotate about the stationary shaft 84. A gear 142 is pinned to the stationary shaft 84, and co-acts with the bevel gears 143, 144 and 145, which are mounted upon shafts 146, 147 and 148 respectively. Said shafts are journaled in bearings which are supported by side arms 150, 151 and 152 respectively. A bevel gear 154 is mounted upon the outer end of the shaft 148, and meshes with a bevel gear 155, which controls the motion of the wing 156 through interlocking gears, such as described above. A bevel gear 157 is mounted on the outer end of the shaft 146, and co-acts with a bevel gear 158, which controls the motion of the wing 159. A bevel gear 160 is secured to the outer end of the shaft 147, and meshes with a bevel gear 161, which controls the rotation of the wing 162 by means of intermittent gears. The side arms of the various wings are further supported by means of stays 165. A bevel gear 166 is mounted upon the outer end of the hollow shaft 167, which rotates about the stationary shaft 85. A bevel gear 168 is pinned to the stationary shaft or rod 85, and co-acts with bevel gears mounted upon side arms 169 and 170 belonging to the wings of the set 4. A bevel gear 172 is fastened to the hollow shaft 173, which rotates about the stationary shaft 84. A bevel gear 175 is pinned to the shaft 84, and co-acts with bevel gears mounted upon the shafts which are supported by the side arms 176 and 177, of the set of wings 6. It will be understood that the operation of the bevel gears in the sets 4 and 6 are the same as those set forth above.

The operation of the flying machine is as follows:—The power generated in the motor

45 is transmitted by means of the shaft 50 and the gears 52 and 57 to the shaft 42, and from thence by means of the friction drive 40 and 41 to the propeller shaft 36 which rotates the propeller 34. The machine may be steered by means of the rudder 30, which may be controlled in any suitable manner.

In order to raise and lower the machine, the wings are caused to rotate intermittently, so that they are maintained in succession in planes parallel to the general direction of the flying machine. The rotation of the shaft 50 causes the bevel gear 51 to rotate the gear 56, and thereby the shaft 58 and the gear 62 at the upper end thereof. The gear 62, meshing with the bevel gear 63 which is connected to the differential gear 64, causes the shafts 65 and 66 to be rotated in opposite directions. The rotation of the shaft 65, together with the gears 70 and 90, causes the hollow shaft 89 to be rotated and therewith the side arms connected thereto. The rotation of the shaft 89 causes the bevel gears located upon the inner ends of the side arms to travel about the stationary gear 88. By thus traveling about the gear 88, they are in turn caused to rotate and drive the shafts 102, 120 and 130. The rotation of these shafts causes the rotation of the bevel gears at their outer ends which control the intermittent gears mounted upon the outer ends of the side arms. The period of rotation of these gears is such that the wing 126 as viewed in Fig. 3, is maintained in a substantially horizontal position during the rotation of the set of wings from a point above the center to a point below the center of revolution; whereas, the wings 116 and 136 are located at substantially right-angles to their side arms and therefore travel in the arc of a circle so as to create as little resistance as possible against the air.

It will be understood that all of the sets of wings are operating in a similar manner simultaneously; that is, the outermost wing is maintained in a substantially horizontal position or in a plane parallel with the general plane of the machine during the revolution from the point above its center to the point below its center, and the remaining wings are held at right-angles to their side arms.

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

1. In a flying machine, a supporting frame-work, a stationary horizontal plane at each end thereof, a motor supported by the frame-work, a longitudinal shaft at each side of the frame-work, each of said shafts being provided with spaced pairs of radial arms, a shaft journaled between the members of each pair and parallel to the longitudinal shaft, wings upon the shafts, each of said shafts having a driving connection at its end with the longitudinal shaft, a motor, a transverse shaft operated by the motor and having a differential gear interposed therein and a connection between the ends of the transverse shaft and the longitudinal shafts.

2. In a flying machine, a supporting frame-work, a longitudinal shaft at each side of the frame-work, a plurality of series of short shafts supported by each of said longitudinal shafts, at equal radial distances therefrom, and at equal angular distances from each other, each of said shafts having spaced radial arms, wings journaled between the arms, a motor, a transverse shaft operated by the motor and having a differential gearing interposed therein, and a connection between the ends of the transverse shaft and the longitudinal shafts.

3. In a flying machine, a supporting frame-work, a longitudinal shaft at each side of the frame-work, a plurality of series of short shafts supported by each of said longitudinal shafts, at equal radial distances therefrom, and at equal angular distances from each other, a motor, a transverse shaft operated by the motor, and a connection between the ends of the transverse shaft and the longitudinal shafts.

In witness whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LEO COVINGTON KINCANNON.

Witnesses:

HORACE R. ROBINSON,

W. S. WARD.