F. A. MENG & L. G. SCHRADER.

FLYING MACHINE.

APPLICATION FILED JUNE 2, 1916.

1,229,114.

Patented June 5, 1917.

4 SHEETS—SHEET 1.

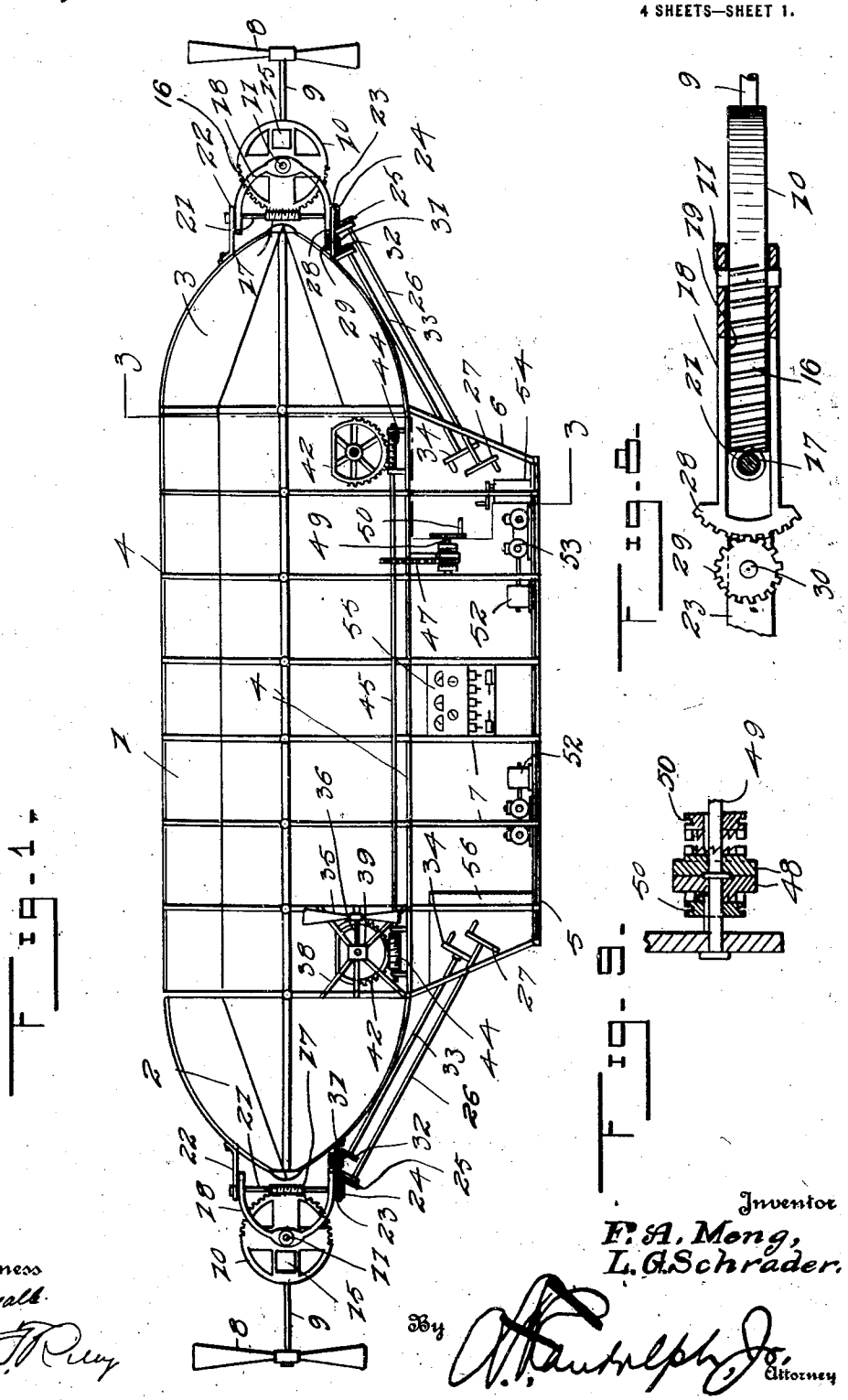


Fig. 1.

Fig. 2.

Fig. 3.

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4 SHEETS—SHEET 2.

Fig. 2.

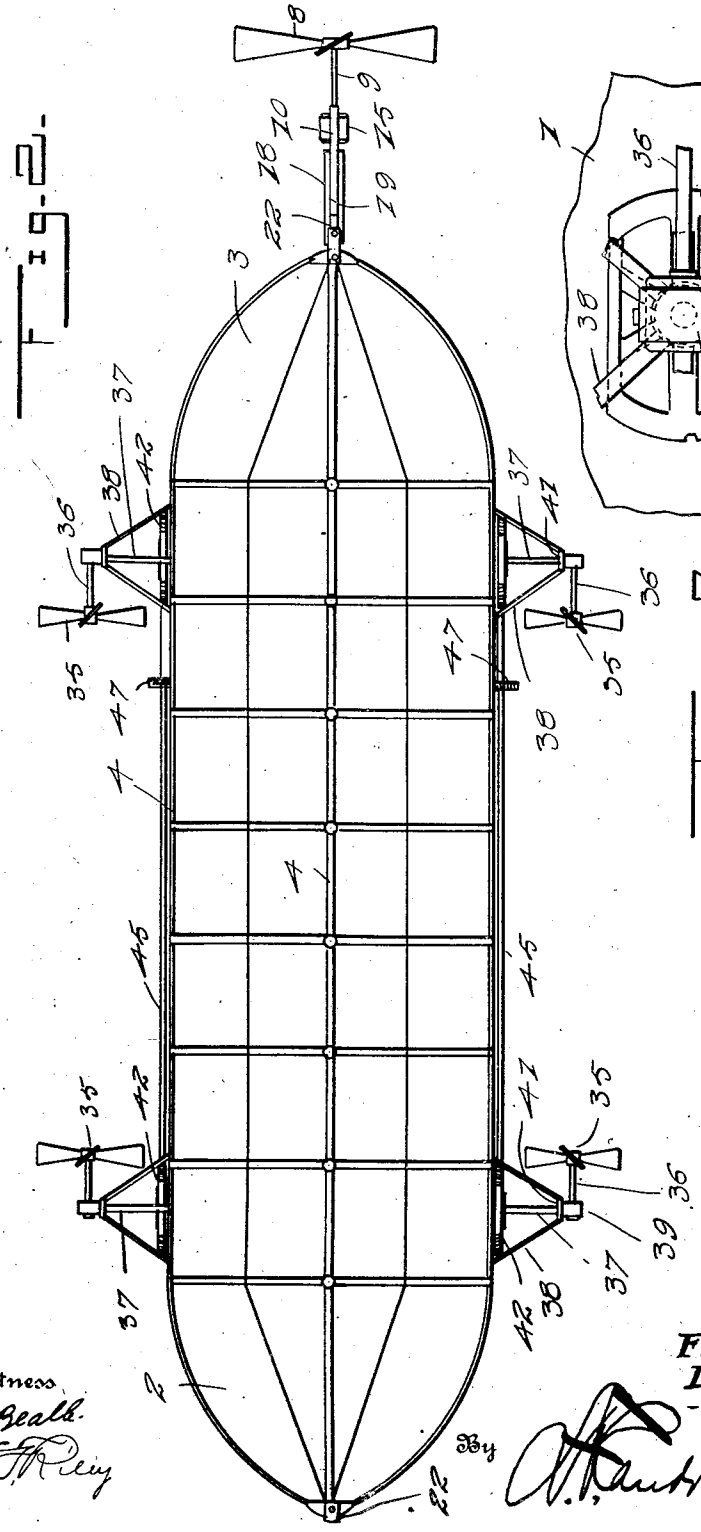
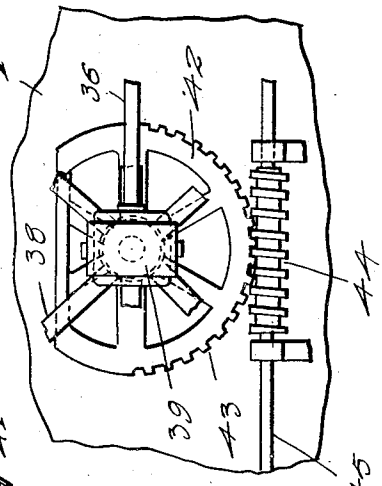


Fig. 7.



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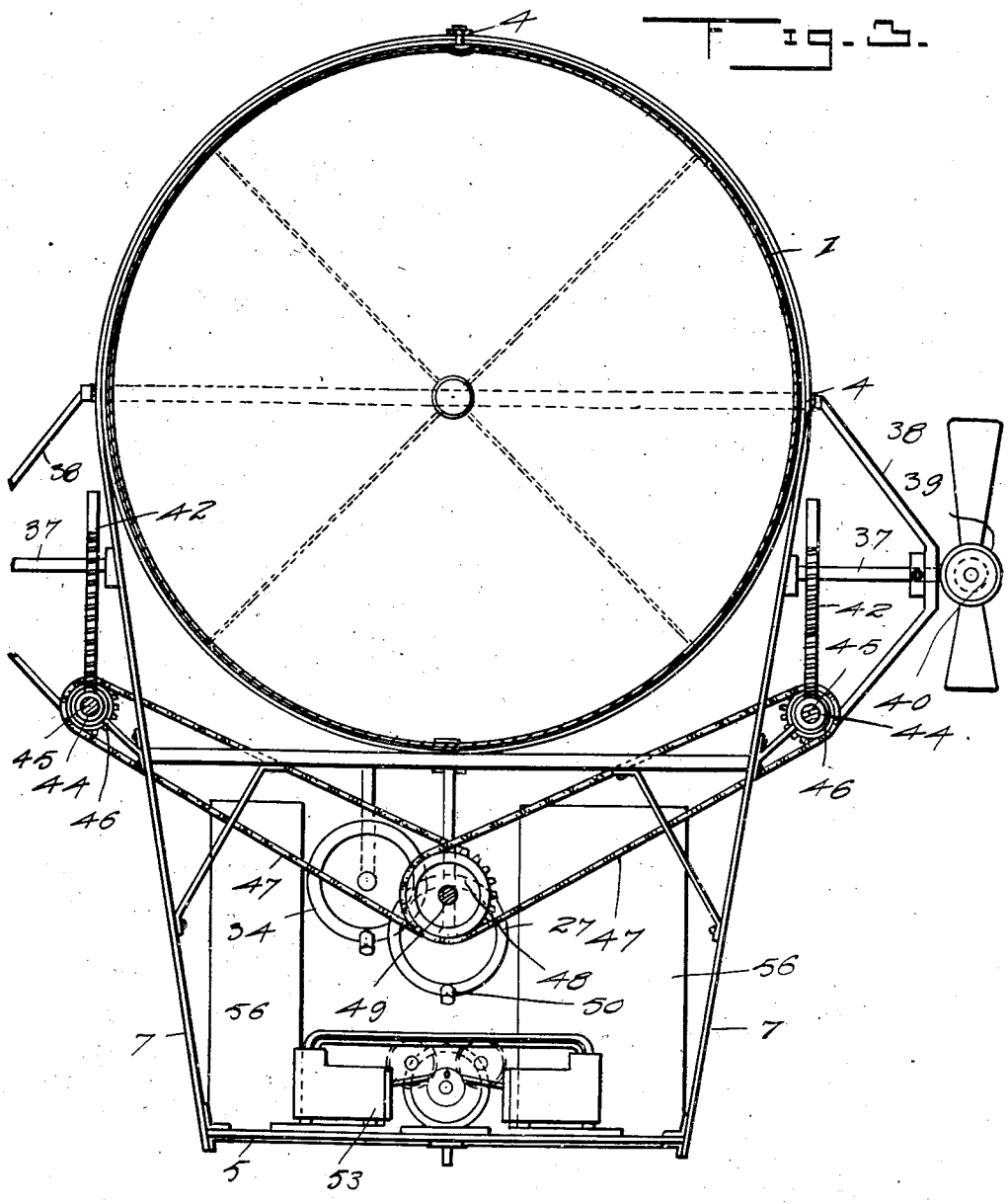
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4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 4.

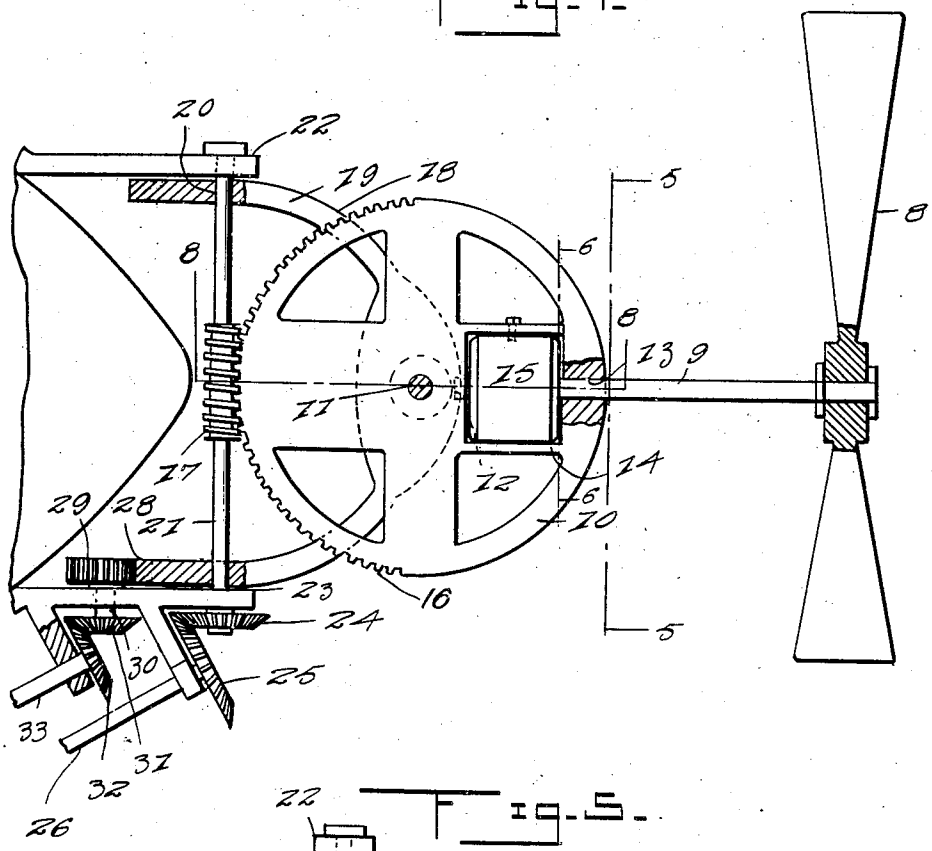


Fig. 5.

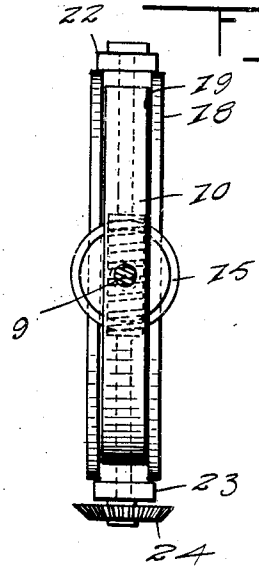
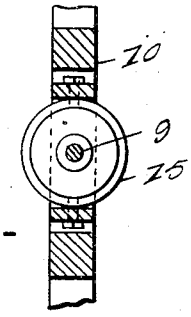


Fig. 6.



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UNITED STATES PATENT OFFICE.

FREDERICK A. MENG AND LEE G. SCHRADER, OF FLINT, MICHIGAN; SAID SCHRADER ASSIGNOR TO SAID MENG.

FLYING-MACHINE.

1,229,114. Specification of Letters Patent. Patented June 5, 1917.

Application filed June 2, 1916. Serial No. 101,322.

To all whom it may concern:

Be it known that we, FREDERICK A. MENG and LEE G. SCHRADER, citizens of the United States, residing at Flint, in the county of Genesee and State of Michigan, have invented certain new and useful Improvements in Flying-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to improvements in flying machines.

The object of the present invention is to improve the construction of flying machines and to provide a simple, practical, and comparatively inexpensive flying machine of the dirigible type equipped at its sides and ends with propellers and means capable of enabling the terminal propellers to be set in any direction for guiding the machine and simultaneously propelling the same in the direction in which it is desired that the machine shall travel and capable also of tilting the side propellers either forwardly or rearwardly from a vertical position simultaneously or independently to enable the side propellers to operate as stabilizers and maintain the equilibrium of the flying machine.

With these and other objects in view, the invention consists in the construction and novel combination of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended; it being understood that various changes in the form, proportion, size and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings

Figure 1 is a side elevation of a flying machine constructed in accordance with this invention,

Fig. 2 is a plan view of the same,

Fig. 3 is a transverse sectional view on the line 3—3 of Fig. 1,

Fig. 4 is an enlarged vertical sectional view of the rear end of the machine partly in elevation illustrating the construction for adjusting the rear propeller,

Fig. 5 is a transverse sectional view on the line 5—5 of Fig. 4,

Fig. 6 is a similar view on the line 6—6 of Fig. 4,

Fig. 7 is an enlarged detail elevation illustrating the construction for adjusting the side propellers,

Fig. 8 is a horizontal sectional view on the line 8—8 of Fig. 4,

Fig. 9 is a detail sectional view illustrating the arrangement of the slidable clutch members for connecting the sprocket wheels with the central operating or controlling shaft.

Like numerals of reference designate corresponding parts in the several figures of the drawings.

In the accompanying drawings in which is illustrated the preferred embodiment of the invention, the flying machine comprises in its construction, a gas bag 1 designed to be constructed of suitable material such as fabric and rubber and consisting of a cylindrical body portion and tapered or conical terminal portions 2 and 3 which are preferably curved longitudinally or slightly rounded instead of a true conical configuration. Silk, canvas, or any other material may be employed in connection with the rubber and the bag is preferably made in sections and is arranged within a frame 4 of aluminum or other suitable material having a lower supporting portion 5 depending below the body of the gas bag and constituting a car. The end walls 6 of the car are preferably inclined and the car is also preferably tapered laterally to form inclined sides but the car or carrying portion of the frame work may be of any other desired construction as will be readily understood.

The gas bag is preferably composed of four sections but any desired number of sections may of course be employed and the flying machine is provided at each end of the gas bag or buoyant element with a propeller 8 mounted on a longitudinal propeller shaft 9 carried by a movable propeller support 10 which is mounted for rotary movement about a horizontal axis and is also adapted to swing horizontally about a ver-

tical axis. By this construction, the longitudinal propeller shaft may be arranged in a horizontal position or inclined upwardly and downwardly and set at any lateral adjustment at either side of a central position. The front propeller is adapted to draw the machine forwardly or upwardly and downwardly and the rear propeller will supplement the action of the front propeller and insure a positive propelling and guiding of the machine in various kinds of weather and under all conditions.

The propeller support which is circular is mounted on a horizontal shaft or pivot 11 and is provided with inner and outer radially alined bearings 12 and 13 for the reception of the propeller shaft 9 and it also has an opening 14 located intermediate of the inner and outer bearings 12 and 13 for the reception of an electric motor 15 which is adapted to drive the propeller shaft 9 for rotating the propeller.

The movable propeller support 10 which is provided at its periphery with worm teeth 16 meshes with a worm 17 and is mounted in a horizontal oscillatory bearing bracket 18. The bearing bracket 18 which is of substantially semi-circular form is provided with an opening 19 for the circular propeller support and it is provided at its terminal portions with vertically alined bearing openings 20 in which is arranged a vertical pivot shaft 21. The vertical shaft 21 which carries the worm 17 is journaled in upper and lower bearing arms 22 and 23 which extend outward longitudinally of the frame of the flying machine as clearly illustrated in Fig. 4 of the drawings, the lower end of the vertical shaft 21 is connected by bevel gears 24 and 25 with the upper end of an inclined operating shaft 26 journaled in suitable bearings of the frame and the lower arm 23 and provided at its lower end with an operating device 27 located within the car of the flying machine and preferably consisting of a crank wheel but any other suitable operating means may of course be employed, and when the shaft 26 is rotated, rotary motion will be communicated to the vertical shaft 21 and the propeller support which forms a worm wheel will be rotated on a horizontal axis to raise or lower the outer end of the propeller shaft according to the direction in which the operating shaft is rotated.

The horizontally movable pivotally mounted bearing bracket 18 is provided at the bottom with a laterally extending arcuate rack 28 which meshes with a spur pinion 29 mounted on a short vertical shaft 30 and located at the upper face of the lower bearing arm. The shaft 30 which extends below the arm 23 also carries a bevel pinion 31 which meshes with a bevel pinion 32 of an inclined operating shaft 33. The operating shaft 33 is journaled in suitable bearings of the frame of the machine and the lower bearing arm 23 and it is equipped at its lower or inner end with an operating device 34 located with the frame of the machine and preferably consisting of a crank wheel. When the inclined operating shaft 33 is rotated motion is communicated through the gearing at the upper end of the said shaft 33 to the arcuate rack which will be moved laterally of the machine to cause a horizontal swinging of the bearing bracket 18. By means of the horizontal swinging movement of the bearing bracket and the rotary adjustment of the propeller support, the propeller may be arranged at any angle within the range of the adjustment of the said mechanism either centrally of the machine or laterally of the same.

The flying machine is equipped with side propellers 35, a pair being shown at each side of the flying machine but the number of side propellers may of course be varied as will be readily understood to adapt the means for the propulsion of the machine to the character of the latter. Each of the propellers 35 is secured to the rear end of a longitudinally disposed propeller shaft 36 which is carried by a laterally extending adjusting shaft 37. The shaft 37 which is mounted in a bearing bracket 38 is equipped at its outer end with a collar or band 39 in which is mounted an electric motor 40 that is connected with and adapted to rotate the propeller shaft 36. The bearing brackets or supports 38 which are tapered outwardly are in the form of spiders and the inclined arms or braces thereof are suitably secured at their inner ends to the frame of the machine and they are connected at their outer ends with a bearing head 41. Each of the laterally extending pivots or adjusting shafts 37 is equipped at its inner end with a segmental gear 42 provided with worm teeth 43 which meshes with a worm 44 of a longitudinal shaft 45. The machine is provided at each side with a longitudinal shaft 45 and each longitudinal shaft carries a pair of worms for meshing with the worm wheels or gears 42 of the laterally extending shafts.

Each of the longitudinal shafts 45 is adapted to be operated independently of the other and has keyed or otherwise secured to it a sprocket wheel 46 which meshes with a sprocket chain 47 and the sprocket chains of the side longitudinal shaft extend downwardly and inwardly to the center of the rear portion of the car and are arranged on sprocket wheels 48 of an operating shaft 49. The operating shaft 49 which is journaled in suitable bearings is keyed or otherwise slidably interlocked with a pair of clutch members 50 which are movable into

and out of engagement with the sprocket wheels 48. The sprocket wheels 48 are loose on the shaft 49 and either or both of the sprocket wheels are adapted to be locked to the shaft for enabling the side propellers to be adjusted simultaneously or independently. When the centrally located operating shaft 49 is rotated, rotary motion will be communicated to the side longitudinal shafts and the laterally extending shafts will be partially rotated to swing the side longitudinal propeller shafts upwardly and downwardly. By this adjustment the side propellers may be arranged to operate either in a vertical plane or in an inclined plane and any tendency of the flying machine to roll may be counteracted by the adjustment of the side propellers and the flying machine may thereby be maintained in a stable position and its equilibrium may be quickly restored in event of any rolling motion of the machine. Any suitable means may be employed for shifting the slidable clutch members into and out of engagement with the lower centrally arranged sprocket wheels. The centrally arranged operating shaft 49 is equipped at its rear end with a suitable operating device 51 which preferably consists of a crank wheel as shown but any other suitable means may be employed for this purpose and it will be clear that the worm gearing of the several propellers will operate as locks for holding the propellers in their adjustment without the necessity of employing separate locking devices for this purpose.

The electric motors of the propellers are designed to be arranged in circuit with dynamos 52, which are operated by a suitable engine 53 preferably of the internal combustion type and having oppositely arranged cylinders as clearly illustrated in Fig. 3 of the drawings. Two sets of engines and dynamos are employed, one set being used in case of emergency and in practice the machine will also be equipped with suitable storage batteries. The current to the electric motors will be controlled by suitable controllers or rheostats 54 of the usual construction to enable the propellers to be driven in the desired direction and at the desired speed. A suitable switch board 55 will be employed and the flying machine will be equipped with one or more fuel tanks 56 and the usual accessories.

What is claimed is:—

1. A flying machine of the class described including a vertical shaft, means for mounting the same, a horizontally swinging bracket mounted on the shaft, a propeller support carried by the bracket and mounted for rotary movement on a horizontal axis, gearing connecting the vertical shaft with the support to swing the same vertically, a propeller shaft mounted on the propeller support and separate operating means connected with the bracket for imparting horizontal rotary movement to the same.

2. A flying machine of the class described including a vertical shaft provided with a worm, means for mounting the shaft, an oscillatory bracket mounted on the said shaft, a propeller support carried by the said bracket and consisting of a worm wheel meshing with the said worm, a propeller carried by the said support, means for rotating the propeller and adjusting means including an operating shaft, and gearing for connecting the same with the said vertical shaft.

3. A flying machine of the class described including a vertical shaft provided with a worm, means for mounting the vertical shaft, a horizontally movable oscillatory bearing bracket pivoted on the said shaft, and provided with a horizontal arcuate rack bar, a vertical worm wheel mounted for rotary movement in the bearing bracket and meshing with the said worm, operating means including gearing for rotating the vertical shaft to turn the worm wheel, separate operating mechanism including a pinion meshing with the arcuate rack bar to swing the bearing bracket horizontally and a propeller carried by the worm wheel.

4. A flying machine of the class described including a vertical shaft provided with a worm, means for mounting the vertical shaft, a horizontally movable oscillatory bearing bracket pivoted on the said shaft, and provided with a horizontal arcuate rack bar, a vertical worm wheel mounted for rotary movement in the bearing bracket and meshing with the said worm, operating means including gearing for rotating the vertical shaft to turn the worm wheel, separate operating mechanism including a pinion meshing with the arcuate rack bar to swing the bearing bracket horizontally, a propeller shaft mounted on the worm wheel, an electric motor also carried by the worm wheel and connected with the propeller shaft and a propeller mounted on the propeller shaft.

5. A flying machine of the class described including horizontal shafts extending laterally from the flying machine, propeller shafts carried by the outer portions of the laterally extending shafts and arranged at an angle to the same, propellers carried by the propeller shafts, means for rotating the propeller shafts independently of the laterally extending shafts, side longitudinal shafts and means for transmitting motion from the side longitudinal shafts to the laterally extending shafts having worm gearing, and means for adjusting the longitudinal shafts independently or simultaneously.

6. A flying machine of the class described

including horizontal shafts extending laterally from the flying machine, propeller shafts carried by the outer portions of the laterally extending shafts and arranged at an angle to the same, propellers carried by the propeller shafts, means for rotating the propeller shafts independently of the laterally extending shafts, side longitudinal shafts, means for transmitting motion from the side longitudinal shafts to the laterally extending shafts having worm gearing, an operating shaft, gearing connecting the operating shaft with the side longitudinal shafts and means for throwing either longitudinal shaft into or out of operation.

7. A flying machine of the class described including a frame, spiders located at opposite sides of the frame and having inclined arms or braces, horizontal laterally extending shafts journaled in the spiders and in the frame, angularly related propeller shafts carried by the laterally extending shafts, means for rotating the propeller shafts independently of the laterally extending shafts, worm wheels mounted on the laterally extending shafts, side longitudinal shafts having worms meshing with the said worm wheels and means for imparting rotary movement to the longitudinal shafts for adjusting the laterally extending shafts.

8. A flying machine of the class described including a frame, spiders located at opposite sides of the frame and having inclined arms or braces, horizontal laterally extending shafts journaled in the spiders and in the frame, angularly related propeller shafts carried by the laterally extending shafts, means for rotating the propeller shafts independently of the laterally extending shafts, worm wheels mounted on the laterally extending shafts, side longitudinal shafts having worms meshing with the said worm wheels, an operating shaft, sprocket wheels mounted on the operating shaft and on the longitudinal shafts, said sprocket wheels being fixed to the longitudinal shafts and loose on the operating shaft, clutches for connecting the sprocket wheels of the operating shaft with the latter and sprocket chains connecting the sprocket wheels of the operating shaft with those of the longitudinal shaft.

In testimony whereof we affix our signatures in presence of two witnesses.

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Witnesses:
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