J. L. TUCKER.

FLYING MACHINE.

APPLICATION FILED AUG. 12, 1911.

1,052,986.

Patented Feb. 11, 1913.

4 SHEETS—SHEET 1.

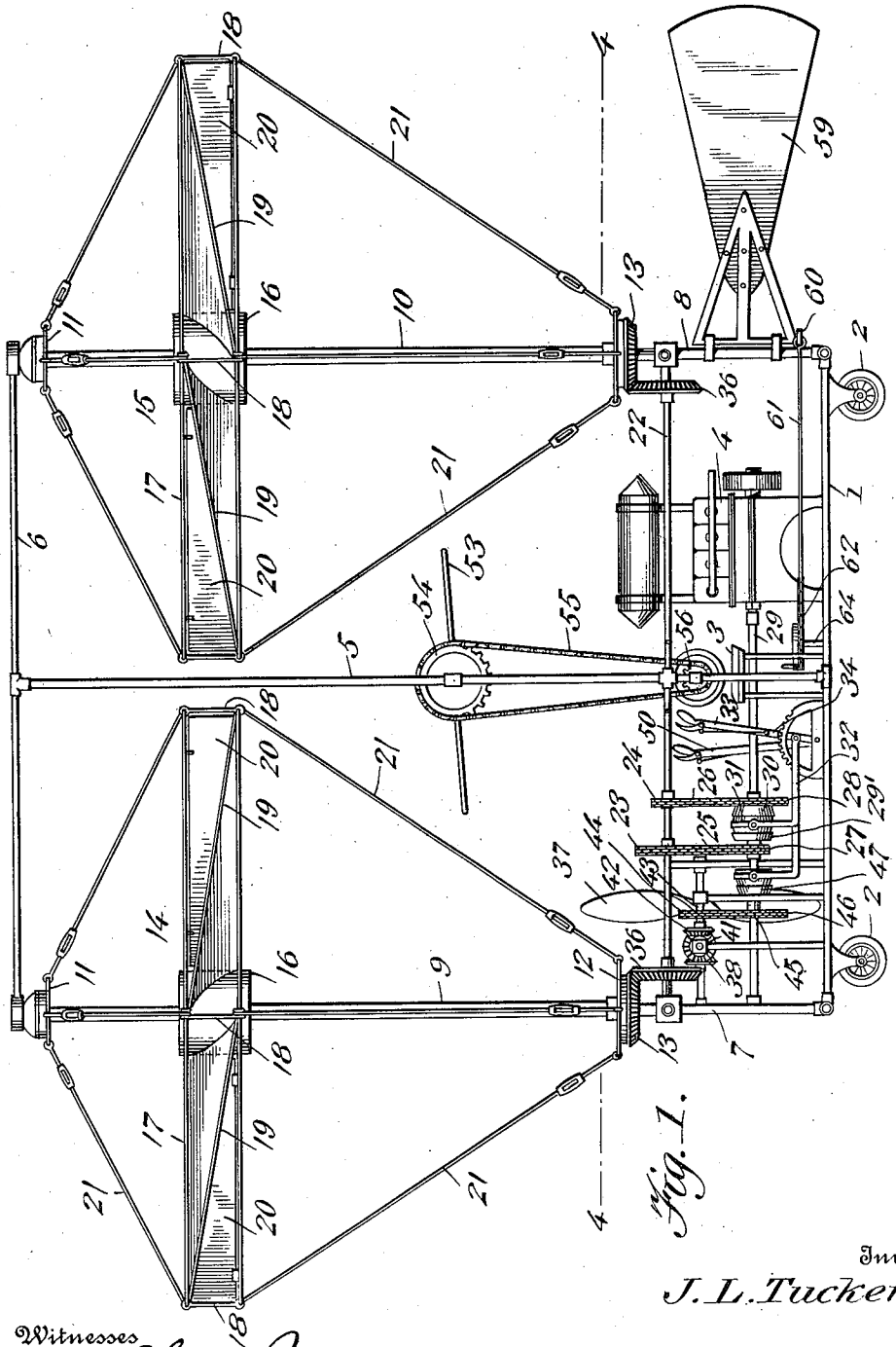

Fig. 1.

Witnesses

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4 SHEETS—SHEET 2.

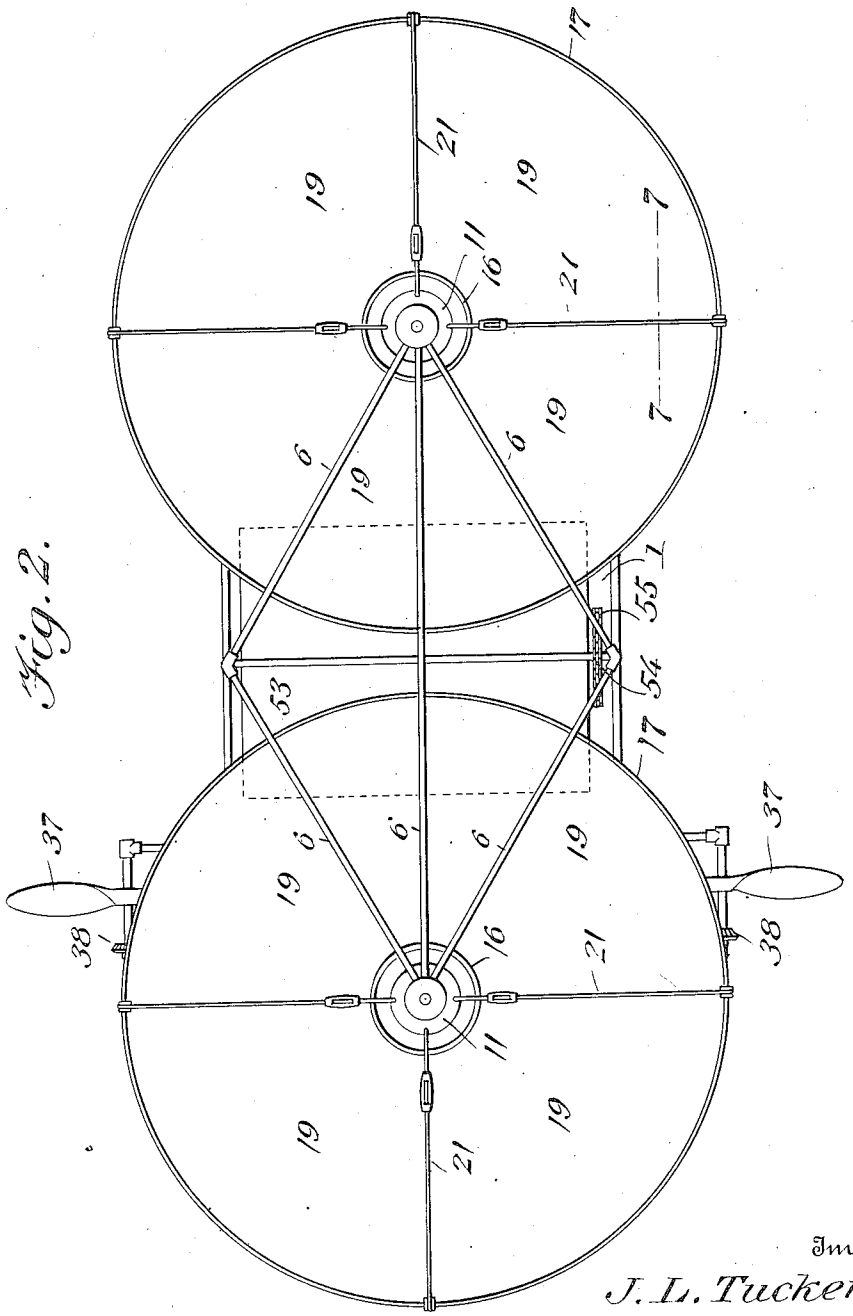

Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 5.

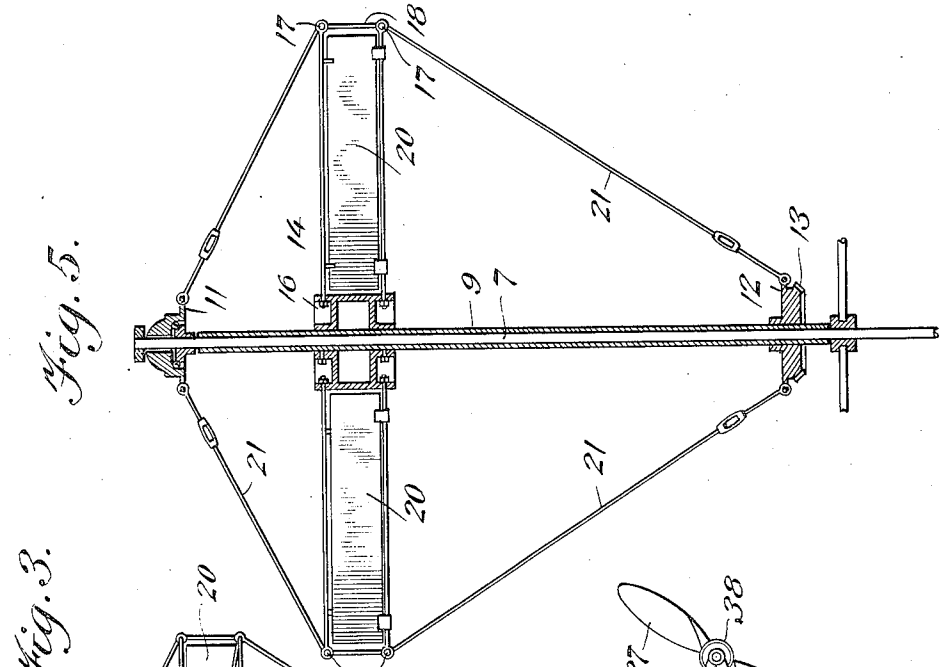
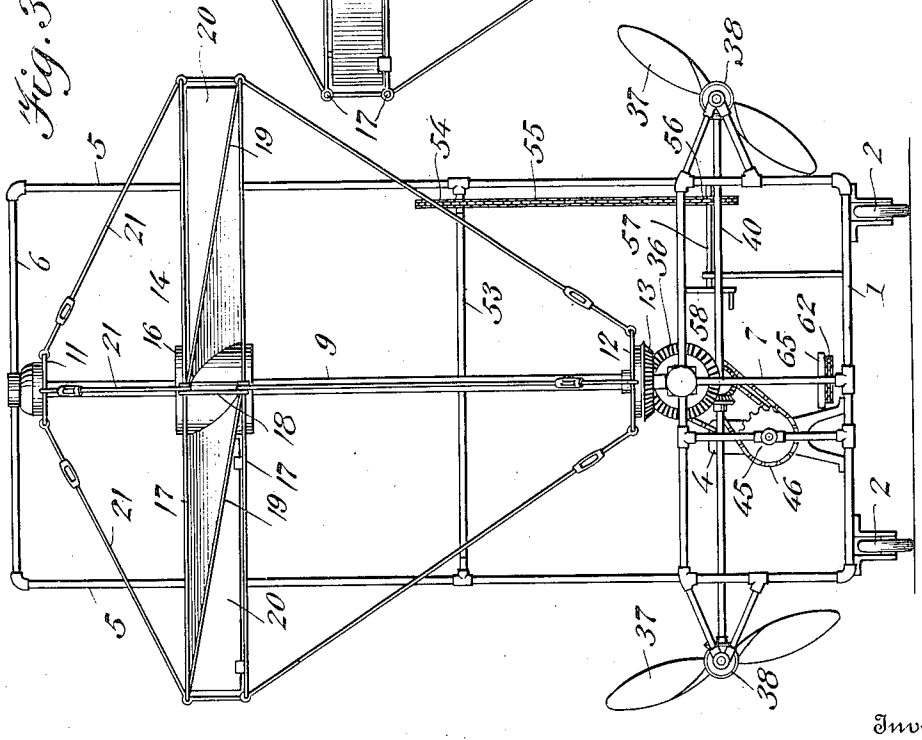


Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 7.

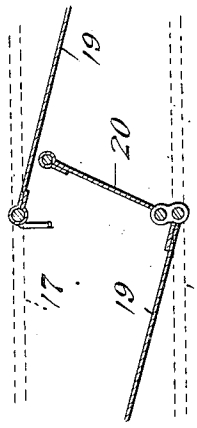
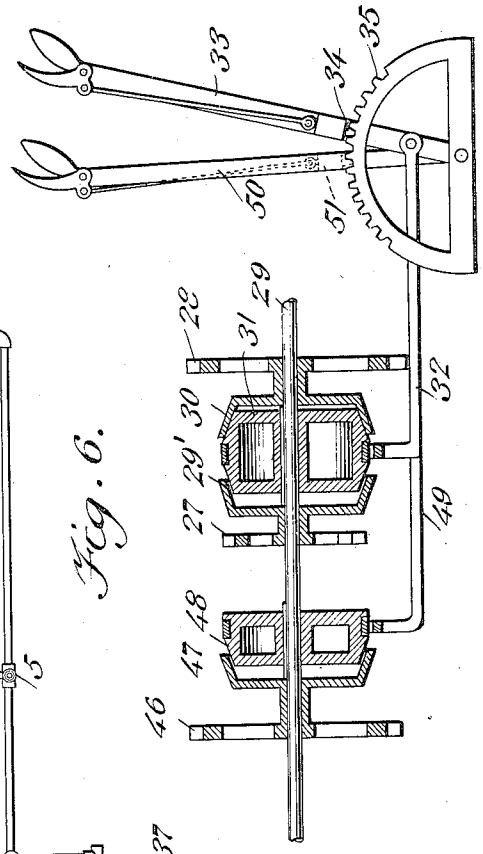


Fig. 4.

Fig. 6.



Witnesses

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UNITED STATES PATENT OFFICE.

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FLYING-MACHINE.

1,052,986. Specification of Letters Patent. Patented Feb. 11, 1913.

Application filed August 12, 1911. Serial No. 643,751.

To all whom it may concern:

Be it known that I, JOSEPH L. TUCKER, a citizen of the United States, residing at Helena, in the county of Shelby and State of Alabama, have invented new and useful Improvements in Flying-Machines, of which the following is a specification.

This invention relates to flying machines, the object of the invention being to provide a machine which will ascend or descend in a vertical path, and hence may be started in flight straight from the ground or a landing station; which is capable of "hovering" or standing still in the air so that observations, etc., may be made; which is simple of construction and reliable and efficient in action; and in which the lifting wheels employed are adapted, in the event of accident, to act as parachutes, to insure a safe descent to the ground.

The invention consists of the novel features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:

Figure 1 is a side elevation of a flying machine constructed in accordance with my invention. Fig. 2 is a top plan view of the same. Fig. 3 is a front elevation. Fig. 4 is a horizontal section on line 4—4 of Fig. 1. Fig. 5 is a vertical section through one of the lifting wheels and its supporting means. Fig. 6 is a sectional elevation of the drive gearing. Fig. 7 is a detail section of one of the lifting wheels.

Referring to the drawings, 1 designates a car or platform provided with suitable launching and landing wheels 2 and supporting the aviator's seat 3 and driving motor 4. From this car rises a frame formed of vertical and horizontal rods, bars or tubes 5 and 6 properly connected and braced to form a staunch and rigid structure.

Arranged centrally at the front and rear of the machine and supported by the frame are masts 7 and 8 on which are revolubly mounted tubular shafts 9 and 10, each provided at its upper and lower ends with disks or heads 11 and 12, the lower head 12 carrying a beveled gear 13. Supported by the tubular shafts are lifting wheels 14 and 15, each comprising a hub 16, spaced superposed rims 17, braces 18 connecting the rims and an annular series of blades 19.

The blades 19, into any number of which the wheel may be divided, are of segmental form and fixed to the hub and rim in any suitable manner. In the present instance I have shown each wheel formed of four blades, and, as shown, each blade is inclined downwardly and rearwardly from its leading or front edge to its trail or rear edge so as to present the necessary angle of incidence to the air for supporting effect. The leading edge of each blade alines with or slightly overhangs the trail edge of the preceding blade and its trail edge has hinged or otherwise movably connected therewith a flap 20. This flap 20 normally lies in the plane of the blade for the free passage of the air between the juxtaposed edges of the blades. When, however, the motion of the wheel is arrested, as from the sudden stoppage of the motor, or the speed of the wheel decreases below sustentation limit and the machine begins to fall, the pressure of the air from below forces the flaps into position to close the air passages between the blades, by which the wheel is converted into a parachute. As a result, the two lifting wheels will support the machine and allow it to descend slowly to the ground, thus insuring a safe landing. Braces 21 stay and support the frame of each lifting propeller from the disks or heads 11 and 12.

Extending longitudinally of the machine is a driving shaft 22 carrying large and small sprocket wheels 23 and 24. These sprocket wheels are respectively connected by chains 25 and 26 with small sprocket wheels 27 and 28 loosely mounted on the motor shaft 29. The sprocket wheels 27 and 28 have friction faces adapted to be engaged by the cone surfaces 29′ and 30 of a double friction clutch 31 slidably keyed on the shaft and shiftable by a sliding shipper bar 32 connected with a controlling lever 33 carrying a locking pawl 34 to engage a rack 35. When the lever is in neutral position the cones will be out of engagement with both sprocket wheels, thus disconnecting the shaft 22 from the shaft 29, the said shaft 22 being provided with bevel gears 36 engaging the bevel gears 13 on the shafts of the lifting wheels, whereby when said shaft 22 is driven the lifting wheels or propellers will be simultaneously rotated in opposite directions at the same rate of speed.

By adjusting the clutch so as to engage the friction face 29′ with the sprocket wheel 27, motion will be communicated

through the chain 25 and sprocket wheel 23 to drive the shaft 22 at a relatively low rate of speed, whereby the lifting wheels will be rotated at a sufficient velocity only to sustain the machine in the air, allowing the machine to hover whenever desired. This rate of speed may be such as to cause the machine to gradually descend, so that landings may be easily made. When the clutch is adjusted to throw its friction face 30 into engagement with the sprocket wheel 28, motion will be communicated through the chain 26 and sprocket wheel 24 to the shaft 22 to drive said shaft and the lifting wheels at a higher rate of speed, or at a sufficient velocity to elevate the machine, so that it may be caused to ascend straight up from the ground or other support on which it rests.

Suitably journaled on the frame at either the front or rear of the machine are driving propellers 37, to the hub of each of which is secured a bevel gear 38, the said gears 38 meshing with gears 39 on the ends of a transverse drive shaft 40. This shaft 40 carries a bevel gear 41 meshing with a bevel gear 42 on a short longitudinal shaft 43, which carries a sprocket wheel 44 connected by a chain 45 with a sprocket wheel 46 loose on the motor shaft 29. The sprocket wheel 46 has a friction face adapted to be engaged by the cone surface 47 of a clutch 48 slidably keyed on the shaft and shiftable by a sliding shipper rod 49 which rod is connected with an operating lever 50 having a locking pawl 51 to engage a rack 52, through which clutch mechanism the propeller drive gearing may be thrown into and out of action at will. These levers 33 and 50 are arranged so as to be conveniently operated by the aviator from his position in the seat 3.

For the purpose of balancing and steering the machine, vertically, a balancing and steering plane 53 is pivotally mounted to swing vertically on a horizontal axis at a point about midway of the length of the frame. The axis of this plane carries a pulley or sprocket wheel 54 which is connected by a rope or chain 55 with a pulley or sprocket wheel 56 on a shaft 57 to which is connected a controlling wheel 58, whereby the plane may be conveniently adjusted. A vertical rudder 59 is disposed at the rear of the machine to swing laterally for horizontal steering, said rudder being provided with laterally extending crank arms 60 connected by links 61 with a short chain section 62 passing around a sprocket pinion 63 on a shaft 64 carrying a tiller or hand wheel 65, whereby the rudder may be adjusted.

Having thus described the invention, what I claim is:

A flying machine comprising a frame structure, vertical shafts carried thereby and provided with beveled gears, rotary lifting and sustaining propellers carried by said shafts, a motor having a longitudinally extending shaft, a longitudinally extending drive shaft provided at its opposite ends with beveled gears meshing with the beveled gears on the vertical propeller shafts, high and low speed gearing connecting the motor shaft with the drive shaft, clutch devices operative to connect said shafts through either set of gearing, a third longitudinally extending shaft in gear with the motor shaft, a transverse shaft in gear with said third longitudinally extending shaft, longitudinally extending propeller shafts on opposite sides of the aforesaid longitudinal shafts and in gear with said transverse shaft, and driving propellers on said longitudinally extending propeller shafts.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPH L. TUCKER.

Witnesses:

J. D. RUFFIN,

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