No. 857,166. PATENTED JUNE 18, 1907.

F. E. FELTS.

FLYING MACHINE.

APPLICATION FILED FEB. 19, 1906.

2 SHEETS—SHEET 1.

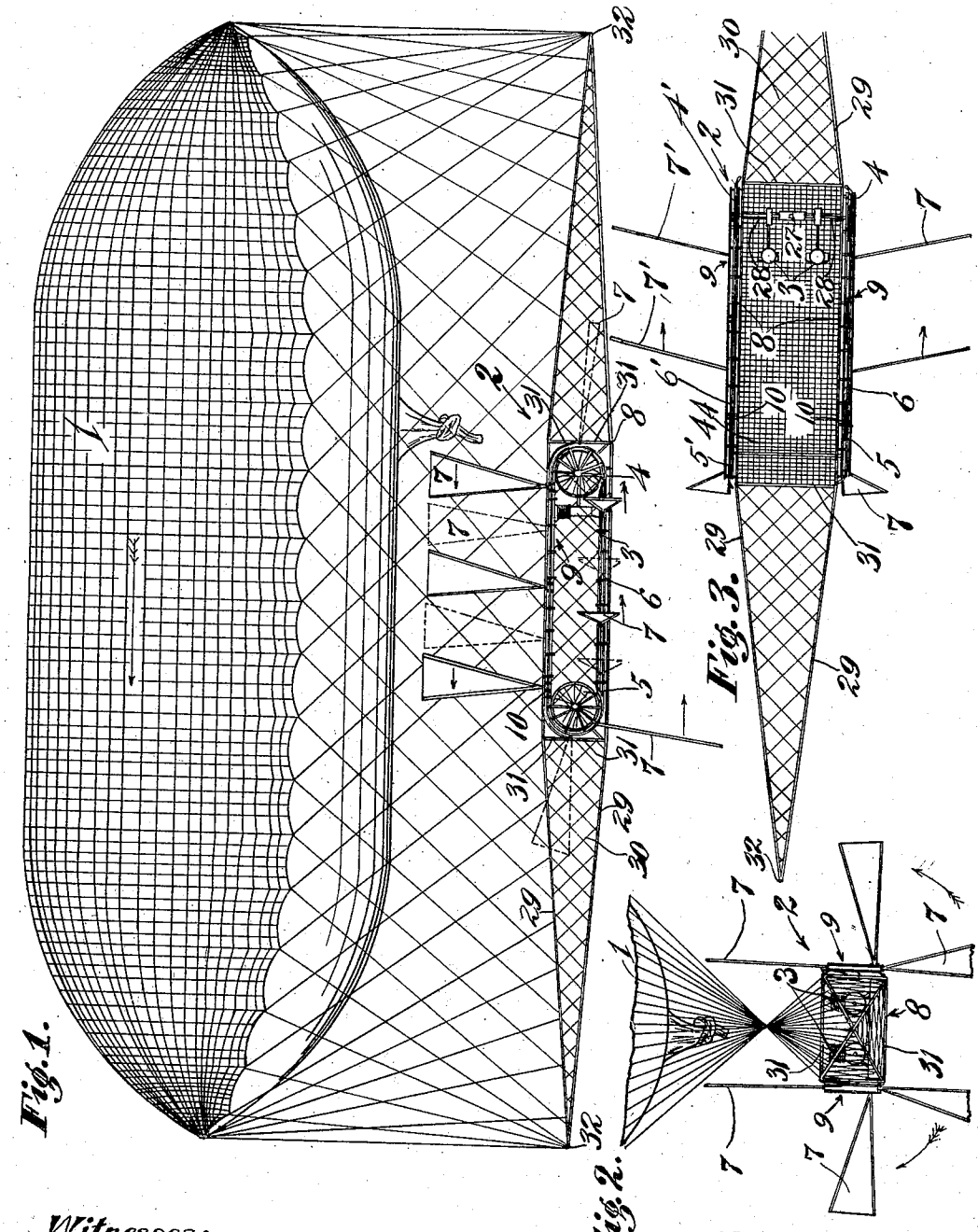


Fig. 1.

Fig. 3.

Fig. 2.

Witnesses:

Custer H. Rooks.

J. Townsend

Inventor

Fletcher E. Felts

by James R. Townsend

his atty.

No. 857,166. PATENTED JUNE 18, 1907.

F. E. FELTS.

FLYING MACHINE.

APPLICATION FILED FEB. 19, 1906.

2 SHEETS—SHEET 2.

Fig. 4.

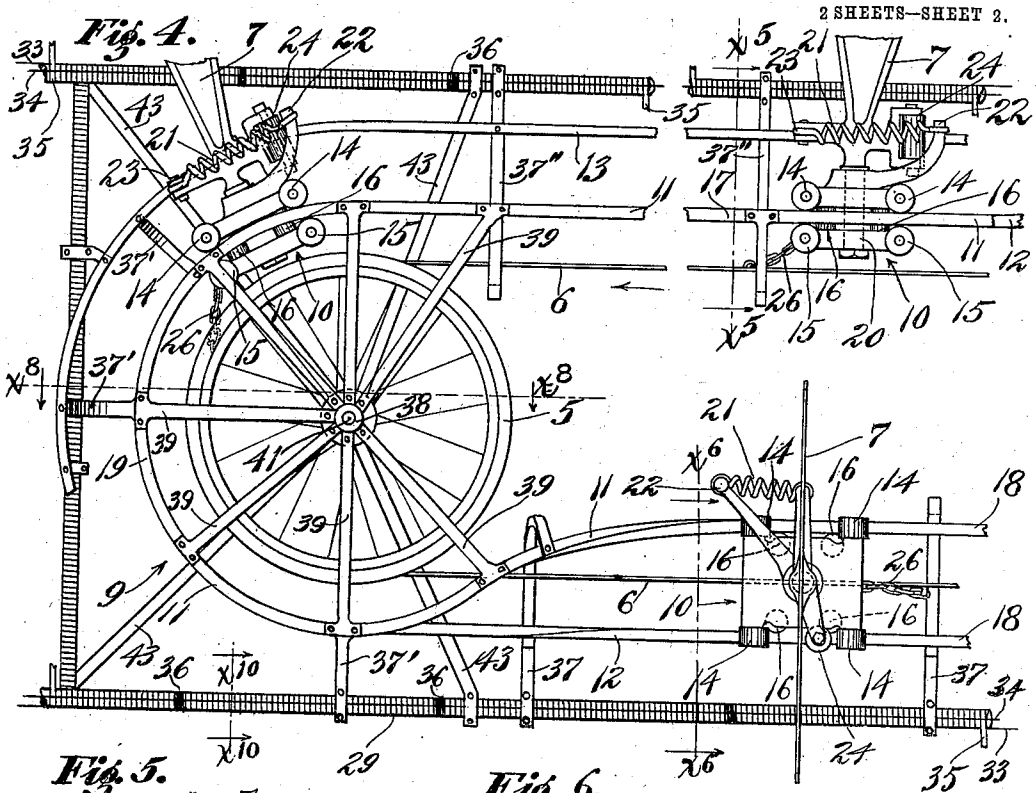


Fig. 5.

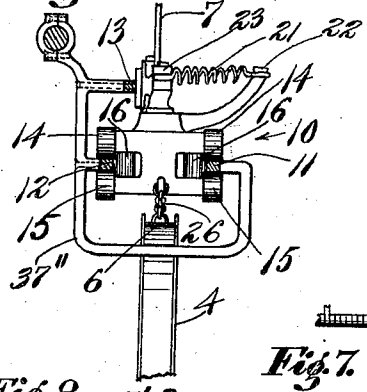


Fig. 6.

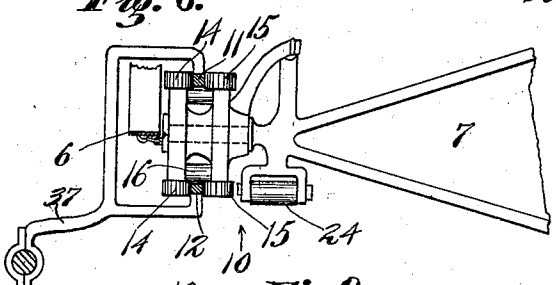


Fig. 7.

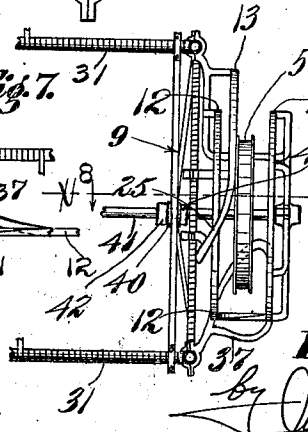


Fig. 8.

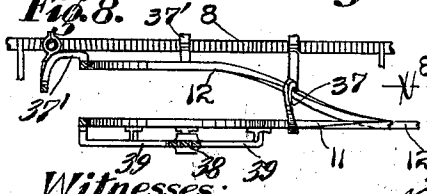


Fig. 9.

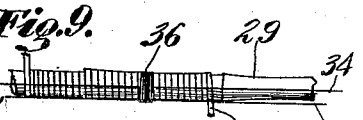
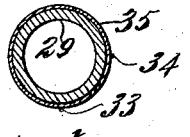


Fig. 10.



Witnesses:

Chester H. Roake.

J. Townsend.

Inventor

Fletcher E. Felts.

by James R. Townsend

his Atty.

UNITED STATES PATENT OFFICE.

FLETCHER EDWARD FELTS, OF LOS ANGELES, CALIFORNIA.

FLYING-MACHINE.

No. 857,166. Specification of Letters Patent. Patented June 18, 1907.

Application filed February 19, 1906. Serial No. 301,742.

To all whom it may concern:

Be it known that I, FLETCHER EDWARD FELTS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Flying-Machine, of which the following is a specification.

An object of this invention is to provide a flying machine capable of propulsion through the air, both with and against the wind, thus making it possible to navigate the air in a practical manner for patrol and signal duty in time of war, for traveling over rugged country in direct lines, and for other purposes that can be accomplished only by a successful air-ship.

The accompanying drawings illustrate the invention:

Figure 1 is a side elevation of a flying machine embodying this invention in practical use. Dotted lines indicate different positions of the wings in operation. Arrows applied to the several parts indicate the direction of motion of the same. Fig. 2 is a fragmental end elevation. Fig. 3 is a fragmental plan view showing the driving mechanism and a portion of the frame. Fig. 4 is a fragmental detail of the front end of one side of the driving mechanism, fragments of wings being shown. It is to be understood that the frame and tracks are alike in their construction front and rear on both sides of the machine. Fig. 5 is a section on line x^5—x^5, Fig. 4, looking in the direction of the arrow. Fig. 6 is a section on line x^6—x^6, Fig. 4, looking in the direction of the arrow. Figs. 5 and 6 show different positions of the base of the wing and its carriage. Fig. 7 is a fragmental detail showing in end elevation the structure (at one side of the machine) on which the wing carriages and their driving belt travel. This view is a fragmental elevation from the left of Figs. 1 and 4, omitting the wings and the belt which drives the same. This view shows the track-bracket and braces for holding the track. It also shows the pulley which carries the wing-carrying belt. Fig. 8 is a plan indicated by line x^8, Figs. 4 and 7, omitting the wheel. Fig. 9 is a detail illustrating bamboo ribs, cane wrapper, and reinforcing wires. Fig. 10 is a cross section of the rib on line x^{10}, Fig. 4.

1 is the gas-bag which will be of appropriate capacity for lifting the machine and its load.

2 indicates the driving apparatus in which 3 is the motor which may consist of one or more engines of the heat or other type of engines.

4 is a driving pulley.

5 is a belt wheel, and 6 a belt trained around the driving pulley and belt wheel.

7 designates wings driven by the driving belt 6 and arranged to feather on the forward stroke, and arranged to strike the air for propelling the machine as the wings move backward relative to the frame 8 of the machine.

9 in a general way designates the track for the wing carriages 10. The track 9 comprises the main rails 11 and 12, and a third rail 13. The main rails 11 and 12 extend entirely around the pulley wheels 4 and 5, and encircle the driving belt 6 to which the carriages 10 are attached, and by which they are propelled along the track formed by the rails 11, 12.

The carriages 10 are provided with antifriction wheels which run along the track rails 11 and 12 and hold the carriages in determined position relative to the track. In the drawings, each carriage is shown provided with twelve antifriction track wheels 14, 15, 16, for the top, bottom, and inside engagement with said rails 11 and 12.

The opposite sides of the machine are complements of each other, and each is provided with a track and with a set of wings. In the drawings, the complementary parts on the opposite sides of the machine are designated by like characters, the characters on one side of the machine being distinguished from those on the other side of the machine by an index.

The endless tracks are constructed with an upper and a lower portion or way, respectively, marked 17 and 18, united at the ends by semicircular portions 19 and 20 at front and rear, respectively. The rails of the upper portion or way 17 of the track are arranged in a horizontal plane, and the rails of the lower portion or way 18 are arranged in a vertical plane, and the tracks are twisted at the front and rear ends of the lower way to make connection between the semicircular ends of the track and the intermediate portion of the lower way, and to allow the carriages to run along the track and turn to horizontal, vertical, and other positions as they follow therealong.

The carriages 10 are held flatwise of the track and turn therewith as they travel around the same, so that on the upper portion of the track the carriages stand horizon-

tally, and when the carriages travel along the lower portion or way of the track they extend vertically.

The wings 7 are swiveled to their respective carriages by a suitable connection 20, said wings consisting of non-collapsible fans which are always maintained in an extended position, the feathering of said wings being accomplished by turning the same on their swivels to meet the air in an edgewise manner as hereinafter more fully described.

21 designates springs for normally holding the wings in operative position, said springs being fastened at one end to a bracket 22 of the carriage, and at the other end to an arm 23 which projects from the wing.

It is to be understood that the swivel bearing and all the other bearings and the frictional parts are to be provided with ball or roller bearings wherever the same is practicable.

24 designates antifriction rollers for the wings respectively, each being rigidly connected with its wing and arranged to engage the third rail 13 when the wing moves upward at the rear end of its stroke, thus to turn the wing into feathering position shown at the top of Fig. 4, and as the wings move forward the rollers 24, by engagement with the third rail 13, hold the wings in feathered position during the upward and forward stroke and during a portion of the downward stroke at the front end of the machine.

The springs 21 are arranged to turn their wings respectively into operative position as soon as the roller 24 escapes from the third rail 13. Said third rail 13 is bent away from the path of the roller 24 at each end, as indicated at 25 in Fig. 7, which figure may be regarded as representing either the front or the rear end of one side of the frame of the track of the machine.

26 represents yielding connections between the belt and the carriages, respectively; said connections may be made of any suitable form of material, the same being fastened to the belt and adapted to propel the carriages as the belt moves forward.

27 represents a clutch connecting the shafts 28 of the driving wheels 4, allowing the motors or engines 3 to operate simultaneously or alternatively to drive the wings on the opposite sides of the machine, the purpose being to allow one set of wings on one side of the machine to be driven while the other set remains stationary, or vice versa; or by throwing the clutch appropriately, both engines and both sets of wings will be made to run simultaneously.

The number of wings appropriate to the machine will be determined by the constructor or designer. In the machine shown, six wings are provided at each side, the same being arranged so that there will be always half that number in operation whenever the belt pertaining to that side is in operation. When both belts are driven there will always be six wings in operation for driving the machine forward, and whenever one belt is slowed down below the speed of the other belt the effect is to turn the course of the machine, three wings on one side serving to retard and the three wings on the other side serving to propel the machine, thus turning the machine rapidly from the side on which the wings are operated to propel the machine forward.

The frame of the machine may extend forward and rearward to a point, the same being formed of ribs 29 preferably made of bamboo reinforced by piano wire 30.

In practice, the buoyancy of the gas-bag will be sufficient to lift the machine into the air to the required height and after the machine has been lifted from the ground the engines may be put into operation at any time to propel the wings, and the operator in the usual manner may move to the rear of the frame in order to slant the machine upward forwardly so that the wings produce an upward flight.

When the appropriate height is reached, the machine may be brought to a level and the operation of the wings will then be effected to drive the machine forward. To descend, the machine may be tilted for downward flight by the operator walking forward to the front of the machine.

The action of the wings upon the air is continuous so long as the belts pertaining thereto are being driven, the wings of a machine constructed according to this invention being so arranged that at least one wing is always in operation.

In order to apply the propelling power in the most effective manner the driving mechanism is mounted on opposite sides of a frame constructed with ribs 29 spread apart at the middle of the frame and held apart by braces 31. Said frame may be rectangular in cross section as clearly shown in Fig. 2, and the ribs 29 are brought to a point at the ends 32 of the frame; there being four ribs, one at each corner of the frame, extending the full length of the machine. Said ribs are reinforced at bottom and side by strands 33, 34 of piano wire along the outer sides of the ribs. 35 represents a cane wrapping around the bamboo ribs 29 to prevent the bamboo from splitting. The piano wires 33 and 34 are preferably arranged outside the cane wrapping and are secured in place at intervals by fastenings 36 of piano wire or some other suitable appliance.

Each outer track rail 11 is supported by brackets 37 that are between the driving pulley 4 and the wheel 5 out of the path of the carriages and their wings; and is also supported by the bearings 38 and braces 39 carried by the shafts of the pulleys and wheels

4 and 5. 40 designates bearings carried by the frame and in which the shafts 41 of the pulleys and wheels are mounted. 42 designates collars fastened to the shafts 41 on each side of all the shaft bearings to hold the shafts rigid in the frame. By this means a firm support is provided for the continuous outer rail 11 of the track.

43 designates the frame arms that support the bearings 40. The structure must be made sufficiently rigid to support the strain of the wings while in operation.

44 designates a floor in the central rectangular frame portion 9, the same being made of piano wire mesh interwoven with cane wrapper like the wrapper 35 used for wrapping the ribs 29.

37′ designates the brackets or arms that secure the inner track rail 12 to the frame and 37″ designates bracket arms that secure both inner and outer track rails to the frame and to each other along the upper limbs of said rails.

Owing to the wings being of an elongated form and being swiveled to turn on an axis extending lengthwise through the mid width thereof, said wings are quickly rotated from operative to inoperative position and vice versa. The wings at all times extend longitudinally outward from the circuit through which they move forwardly and rearwardly, and for this reason said wings reach well out into the atmosphere and act thereon in an advantageous manner.

I do not intend to limit the device to specific construction of the belt or other parts and the same may be varied within the skill of the constructor without departing from the invention.

What I claim is:—

1. A flying machine provided with traveling wings, means for propelling said wings, and means constructed to feather the wings to move edgewise in extended position on their forward stroke, and to hold the wings in operative position to move flatwise on their rearward stroke.

2. A flying-machine provided with wings, means for propelling the wings, means to feather the wings and to hold them upright on the forward stroke, and means to turn the wings into operative position at the beginning of the rearward stroke, and to hold them extended laterally during the rearward stroke.

3. A flying machine provided with swiveled wings, a belt connected with said wings to operate the same in extended position, means for driving the belt, and means for turning the extended wings on their swivels into edgewise non-operative position as they move forward and into operative position as they move backward.

4. A flying machine provided with elongated wings swiveled to turn on swivels having their axes extending substantially in line with the mid length of said wings, means for advancing said wings forwardly and rearwardly through a circuit in which the wings at all times extend longitudinally outward from said circuit and at right angles to the direction of advancement, and means for turning said wings on their swivels from operative to inoperative position and vice versa.

5. A flying machine provided with elongated wings, means for advancing said wings forwardly and rearwardly through a circuit in which the wings at all times extend longitudinally outward from said circuit and at an angle to the direction of advancement, swivels for said wings extending in the direction of the length thereof, and means for automatically turning said wings on their swivels to feather the same.

6. A flying machine provided with elongated wings; means for advancing said wings forwardly and rearwardly through a circuit lying in a vertical plane, means for holding said wings vertical throughout their upper run, and means for holding said wings horizontal during their lower run.

7. A flying machine provided with wings, an endless track, means for propelling the wings along said track, said track holding said wings upright on the forward stroke, and being twisted at the end to move the wings into laterally extended position during the rearward stroke.

8. A flying machine provided with frame, two endless tracks on said frame, a belt, means for driving the belt, two sets of wings, one set for each track, carriages on said tracks, means connecting the belt with the carriages for driving the same, and means connecting the wings with the carriages respectively for propelling said wings.

9. A flying-machine provided with a frame, two endless twisted tracks on said frame, a belt, means for driving the belt, two sets of wings,—one set for each track; carriages on said tracks, means connecting the belt with the carriages for driving the same, and means connecting the wings with the carriages respectively for propelling said wings.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 10th day of February 1906.

FLETCHER EDWARD FELTS.

In presence of—
JAMES R. TOWNSEND,
JULIA TOWNSEND.