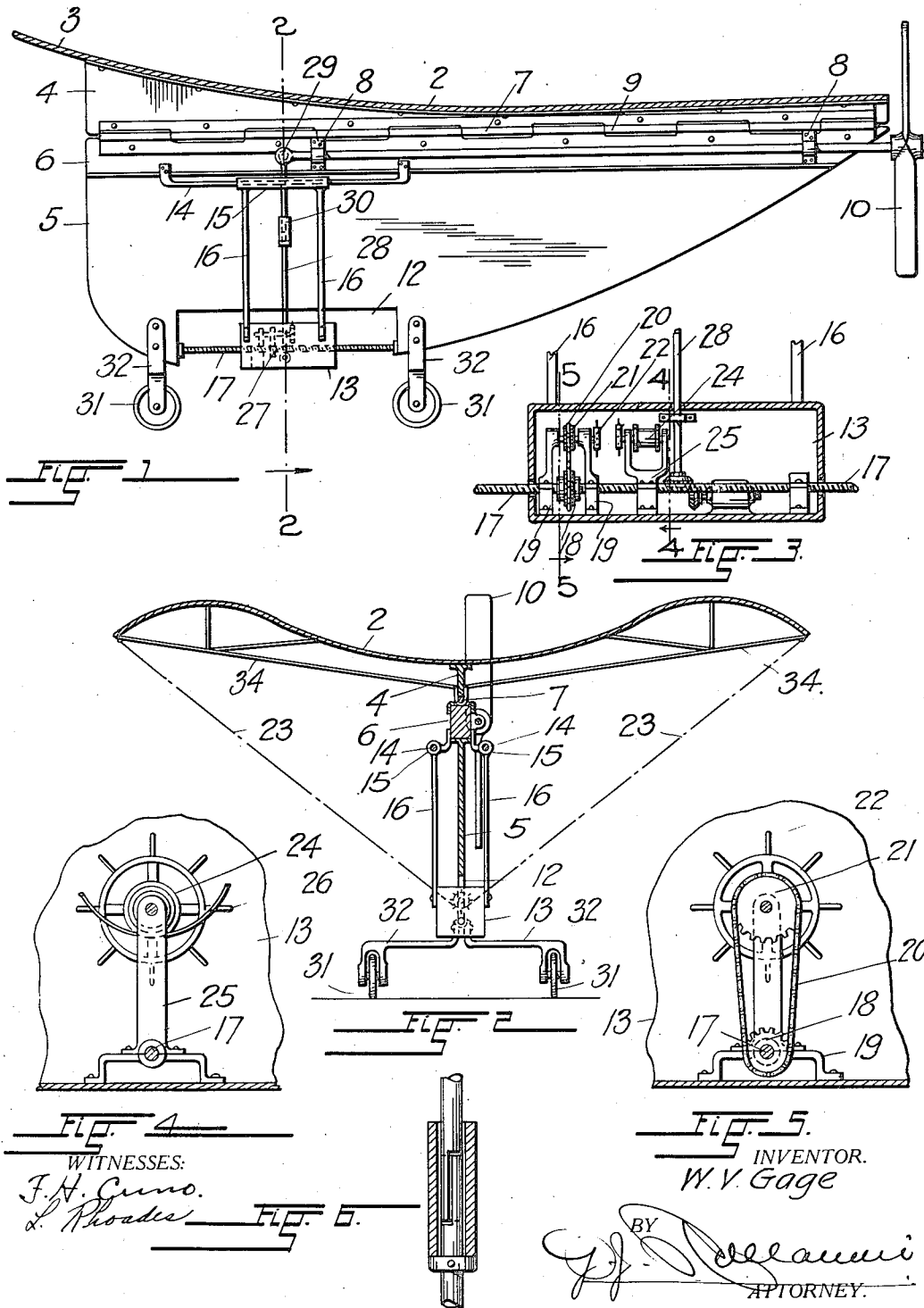


1,151,172.

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UNITED STATES PATENT OFFICE.

WILL V. GAGE, OF PRIMERO, COLORADO.

AEROPLANE.

1,151,172.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILL V. GAGE, a citizen of the United States, residing at Primero, in the county of Las Animas and State of Colorado, have invented certain new and useful Improvements in Aeroplanes, of which the following is a specification.

My invention relates to improvements in flying machines and its primary object resides in the provision of an aerial vessel of the monoplane type which is stabilized and governed by the adjustment of its single supporting plane with relation to a keel plane with which it is pivotally connected and by the adjustment of a carrier which is longitudinally movably mounted at the lower portion of the keel.

The carrier which provides a seat for the aviator contains the steering apparatus and the motor of the vessel, and the propeller which is operatively connected with the motor is rotatably supported on the keel beyond the rear end of the supporting plane.

Simple means are provided for adjusting the position of the supporting plane to any selected angle with relation to the keel plane and for moving the carrier forward or rearward on the latter at the will of the aviator, who thereby controls every movement of the machine while in flight, and constantly maintains its equilibrium without the use of rudders, elevating planes, ailerons or other governing devices employed on the majority of flying machines at present in use.

The operation of my improved machine is in consequence simplified to an extent that but little training is required to manage it under all conditions, and the danger of its "turning turtle" by adverse air currents or other causes, is reduced to the minimum, it being observed that the keel which normally extends at right angles to the supporting plane, and the position of the carrier at the lower end of the same, tend to constantly maintain the machine in an upright position.

The peculiar construction of the supporting plane and the arrangement of the other parts with relation thereto, render the machine capable of rising readily from the ground without any adjustment except the position of the carrier on the keel plane, while after the vessel has reached the desired elevation and its weight is supported on the air below it, but slight adjustment of

the supporting plane and the carrier with relation to the keel are required to perfectly control its movements in any desired direction.

The provision of the keel which counteracts the effect of wind forces tending to disturb the equilibrium of the machine by their effect on the supporting plane, and the low position of the center of gravity on the keel together with the simple and highly effective steering means, render the machine exceptionally safe and permit of its continued operation during a long period of time and its safe landing in case of breakage of its operative parts, or other accident.

I attain the above described objects by the means illustrated in the accompanying drawings in the various views of which like parts are similarly designated and in which,

Figure 1 is a side elevation of my improved flying machine with the supporting plane shown in longitudinal section, Fig. 2, a transverse section taken along the line 2—2, Fig. 1, Fig. 3, a longitudinal section through the carrier drawn to a larger scale, Fig. 4, a transverse section along the line 4—4, Fig. 3, Fig. 5, a similar section taken along the line 5—5, Fig. 3, and Fig. 6, an enlarged elevation of the motor shaft at the points at which it is longitudinally extensible.

The reference numeral 2 designates in the drawings the supporting plane, the characteristic features of which are its upwardly curved end 3 which is of great advantage in handling the machine when landing or when rising from the ground, and its reversely curved, transverse form which resembles that of a bird in flight, and greatly increases the sustaining qualities and the stability of the plane when the machine is in action. In transverse section the plane is centrally curved downwardly and its outer portions are curved reversely as shown in Fig. 2.

Secured at the under side of the supporting plane in its longitudinal axis is a rib 4 which extends at right angles to the plane for its reinforcement as well as for the provision of means for connecting it with the keel plane which in the drawings is designated by the numeral 5, the two parts being furthermore strengthened and braced by the proper application of truss-rods 34. The keel consists of a flatplate which at its upper rectilinear edge is reinforced by a longitudinally extending beam 6 and the lower edge

of which curves from its front end upwardly to its pointed rear end. The beam 6 being disposed parallel to and in close proximity to the lower edge of the rib on the supporting plane, is secured thereto by means of a
 5 suitable hinge-joint 7 and it is provided at one of its sides with bearings 8 to rotatably support the longitudinally extending shaft 9 of the propeller 10 which is positioned be-
 10 yond the rear end of the two planes. The keel plane has in its lower portion adjacent its front end, a recess 12 to receive the preferably boat-shaped carrier 13 in which the motor and the steering apparatus of the
 15 flying machine are mounted and which is slidably suspended from longitudinally extending guide rods 14 on opposite sides of the beam 6 by means of sleeves 15 connected at the upper ends of hangers 16 which at
 20 their opposite extremities are attached to the sides of the carrier. The carrier thus mounted for longitudinal adjustment on the keel, serves to change the direction of the machine up or downwardly by varying the
 25 position of its center of gravity in the vertical plane of its longitudinal axis. To effect the adjustment of the carrier for this purpose, a screw 17 is provided, which at its ends is fixed in the recess of the keel and
 30 which extends lengthwise through the carrier.

A nut rotatably mounted in a bearing 19 on the floor of the carrier as shown in Fig. 5, is fitted upon the screw, and formed in
 35 the center of a sprocket-wheel 18 which by means of a chain 20 is connected with a similar wheel 21 of larger diameter rotatably mounted on the bearing at a point of higher elevation, in connection with a steering
 40 wheel 22. By rotating the wheel, the nut may be moved along the screw in either direction and the position of the carrier on the keel correspondingly varied for the purpose of tilting the machine up or down-
 45 wardly as hereinbefore described. To change the course of the vessel laterally, the angle of the supporting plane with relation to the keel plane is varied by tilting it about its pivotal axis on the beam 6. This move-
 50 ment may be accomplished by means of a rope or cable 23 which at its ends is attached at points adjacent the longitudinal edges of the supporting plane and which is looped around a winding drum 24 mounted in a
 55 bearing 25 on the carrier as shown in Fig. 4. A steering wheel 26 on the shaft of the drum is provided to rotate the latter in either direction for the purpose of tilting the supporting plane to any desired angle with relation to the keel and thereby change the direc-
 60 tion in which the vessel is propelled by the action of the propeller at its rearward end.

The motor for operating the propeller, which in the drawings is designated by the
 65 numeral 27, is operatively connected with

the propeller shaft on the beam by means of an upright shaft 28 which is connected with the ends of the propeller shaft by a universal joint 29 and which is rendered longitudinally extensible by being made in two
 70 axially alined parts, slidably connected by a sleeve 30, best shown in Fig. 6. The wheels 31 which support the vessel on the ground when not in flight, are mounted at the ends of laterally extending arms 32 which project
 75 oppositely from the lower portion of the keel at opposite ends of the recess in which the carrier is movably disposed.

It will be observed that the adjustment of the carrier and the planes are equally effective for restoring the equilibrium of the machine when disturbed by adverse wind forces or other causes, as for changing the direction of its course when in flight, and I desire it
 80 understood that the construction and arrangement of the means whereby these adjustments are effected may be varied from those shown in the drawings within the spirit of my invention as defined in the following claims:
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I claim—

1. In a flying machine, a supporting plane curving upwardly at its front-end, and in transverse section, curving centrally downwardly, and reversely at its outer portions.
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2. A flying machine comprising a supporting plane curving upwardly at its front-end, and in transverse section, curving centrally downwardly, and reversely at its outer portions, and a keel plane connected
 95 at right angles to the supporting plane, in the plane of the longitudinal axis of the same.

3. A flying machine comprising a supporting plane curving upwardly at its front-end and, in transverse section, curving centrally downwardly, and reversely at its outer portions, a rib connected at right angles to the supporting plane, in the longitudinal axis of the same, truss rods between said rib
 105 and said plane, and a keel plane pivotally connected with said rib.

4. A flying machine comprising a supporting plane, a keel plane connected to extend in a plane of an axis thereof, a screw
 110 mounted on the keel-plane, a carrier, and a nut rotatably mounted on the carrier and fitted on the said screw.

5. A flying machine comprising a normally vertical keel-plane, a supporting plane
 115 laterally tiltably connected therewith, a carrier mounted on the keel plane to move longitudinally with relation thereto, and appliances for the adjustment of said supporting plane and said carrier.
 120

6. A flying machine comprising a normally vertical keel-plane, a supporting plane laterally tiltably connected therewith, a carrier mounted on the keel plane to move
 125 longitudinally with relation thereto, and ap-
 130

pliances on said carrier for its own adjustment and that of the said supporting plane.

7. A flying machine comprising a normally vertical keel-plane, a supporting plane laterally tiltably connected therewith, a carrier mounted on the keel plane to move longitudinally with relation thereto, a propeller at an end of the supporting plane, a motor mounted on the carrier, a self-adjusting operative connection between said motor and said propeller, and appliances on said carrier for its own adjustment and that of the supporting plane.

8. A flying machine comprising a normally vertical keel-plane, a supporting plane laterally tiltably connected therewith, a carrier mounted on the keel plane to move longitudinally with relation thereto, a propeller rotatably mounted on the keel plane at an end of the supporting plane, a motor mounted on the carrier, a self-adjusting operative connection between said motor and said propeller, and appliances on said carrier for its own adjustment and that of the supporting plane.

9. A flying machine comprising a supporting plane and a keel plane normally at right angles to each other and relatively adjustable for varying the angles between them, and a carrier mounted on the keel-plane, to be moved longitudinally with relation thereto.

10. A flying machine comprising a supporting plane and a keel plane normally at right angles to each other and relatively adjustable for varying the angles between them, a carrier mounted on the keel plane, to be moved longitudinally with relation thereto, and appliances on said carrier for effecting its own adjustment and that of said planes.

11. A flying machine comprising a keel-plane, a supporting plane laterally tiltably connected therewith, a weight mounted on the keel plane to move longitudinally with relation thereto, means for the adjustment of the said supporting plane, and means for the adjustment of the said weight.

12. In a flying machine comprising a supporting plane curving upwardly at its front end and in transverse section curving centrally downwardly and reversely at its outer portions, a keel plane pivotally connected with said supporting plane in a plane of the longitudinal axis thereof, a carrier on said keel plane, and means for the adjustment of the supporting plane by moving it about its pivotal axis.

13. A flying machine comprising an oblong supporting plane, a keel plane having a pivotal connection with the supporting plane in a plane of the major axis thereof, a carrier on the keel plane, and means for the adjustment of one of the planes to vary the angles between them.

14. A flying machine comprising an oblong supporting plane, a keel plane of similar length having at its upper longitudinal edge a pivotal connection with the supporting plane in a plane of the major axis thereof, a carrier on the keel plane, and means for the adjustment of one of the planes to vary the angles between them.

15. A flying machine comprising three plane-surfaces of substantially equal length which diverge from a common axis extending longitudinally of the said surfaces, a carrier, on one of said surfaces, and means for varying the angles between the last-mentioned surface and the other surfaces.

16. A flying machine comprising a supporting plane, a keel plane having a pivotal connection with the supporting plane, in a plane of the fore-and aft axis thereof, a carrier on the keel plane, and means for the adjustment of one of the planes to vary the angles between them, the said keel plane presenting a resistance surface extends fore and aft of the carrier and between the carrier and the supporting plane.

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

WILL V. GAGE.

Witnesses:

THOMAS CARARRAS,
LOUIS PALLAYE.