P. S. WOODS.

AEROPLANE.

APPLICATION FILED APR. 11, 1910.

989,681.

Patented Apr. 18, 1911.

2 SHEETS—SHEET 1.

FIG. I

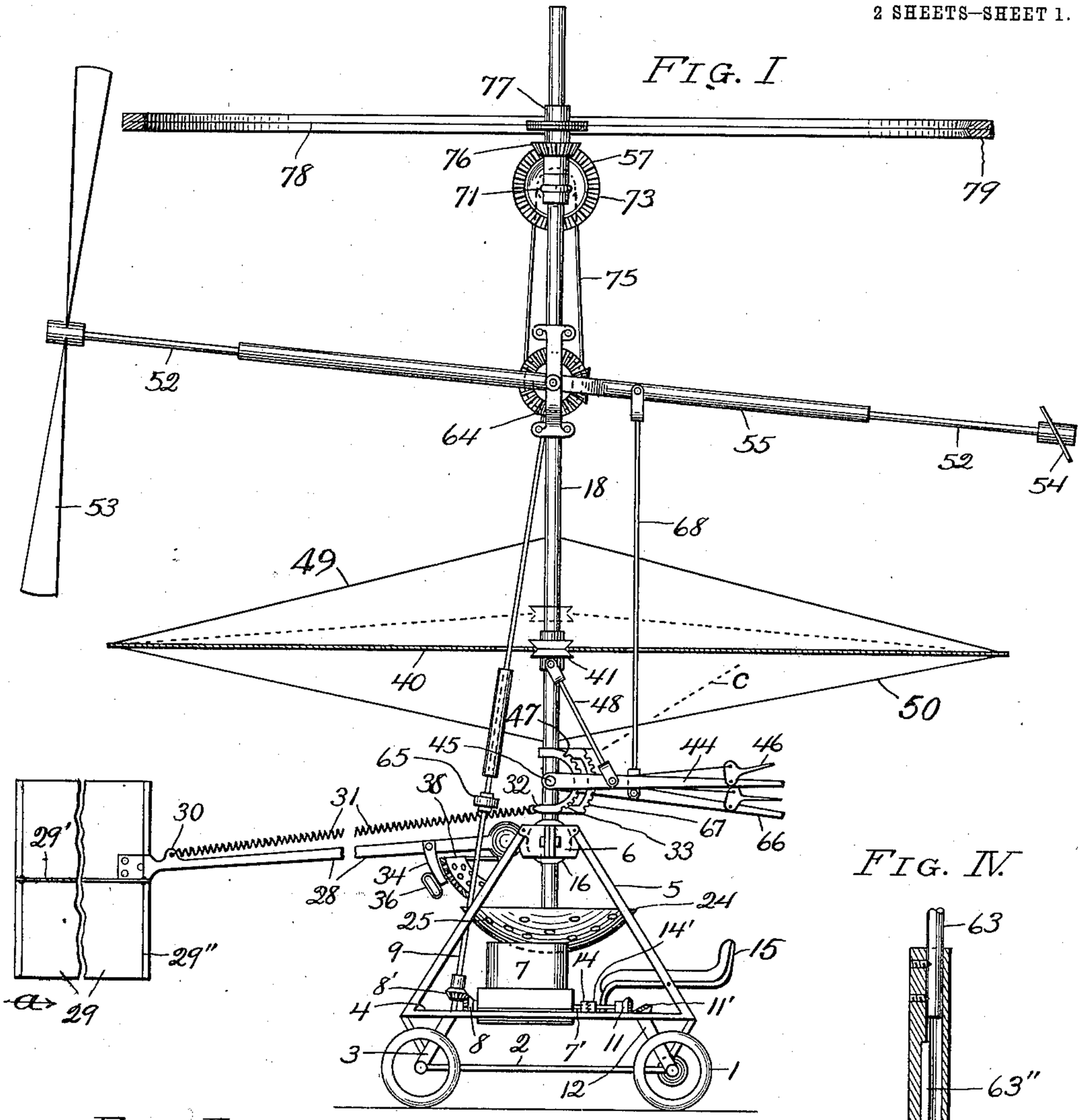
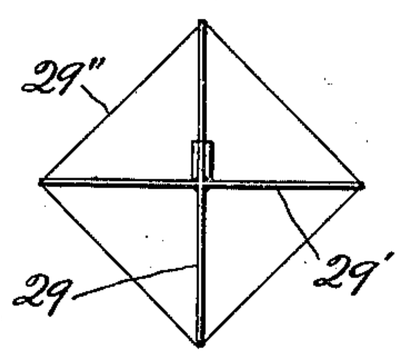


FIG. II.



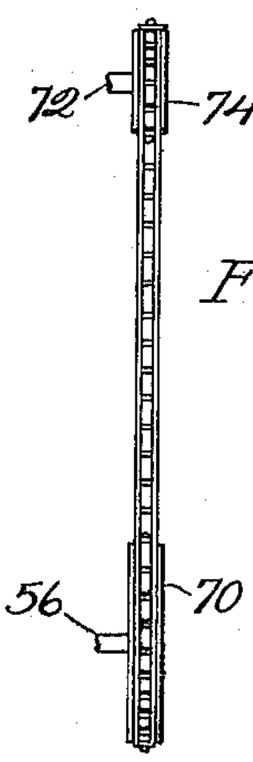
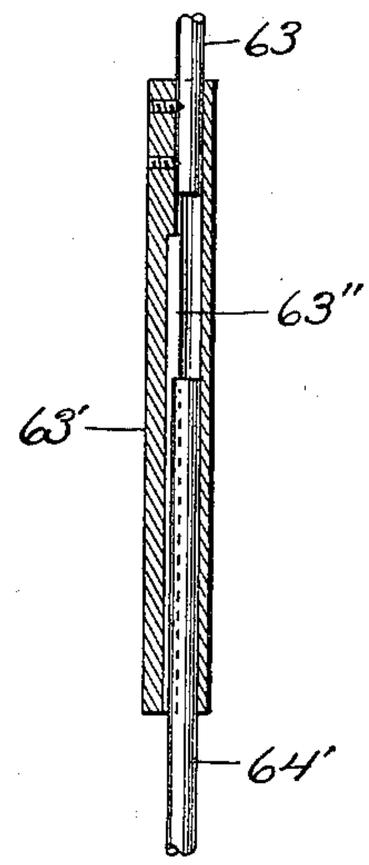


FIG. III.

FIG. IV.



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2 SHEETS—SHEET 2.

FIG. XI.

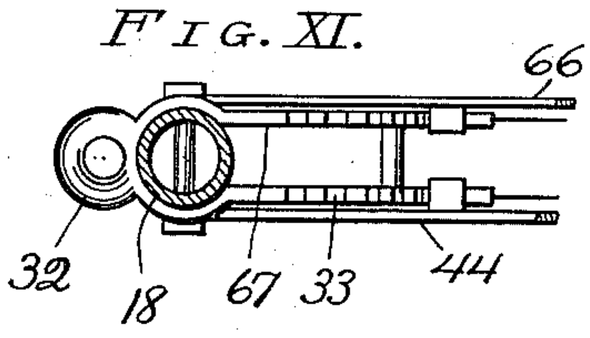

FIG. V.

FIG. VI.

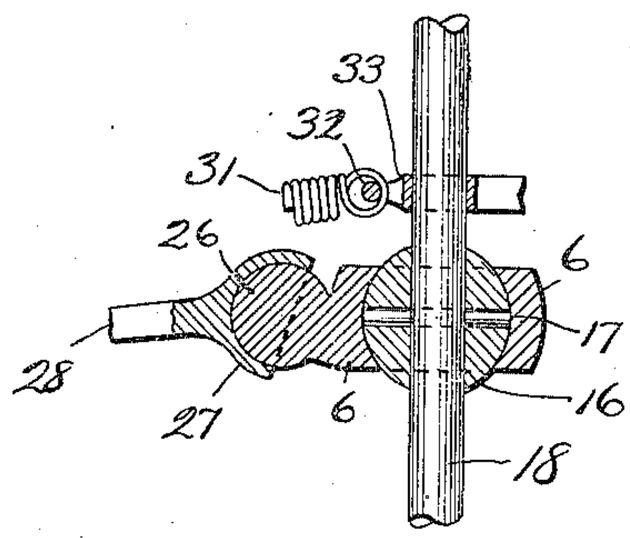

FIG. IX.

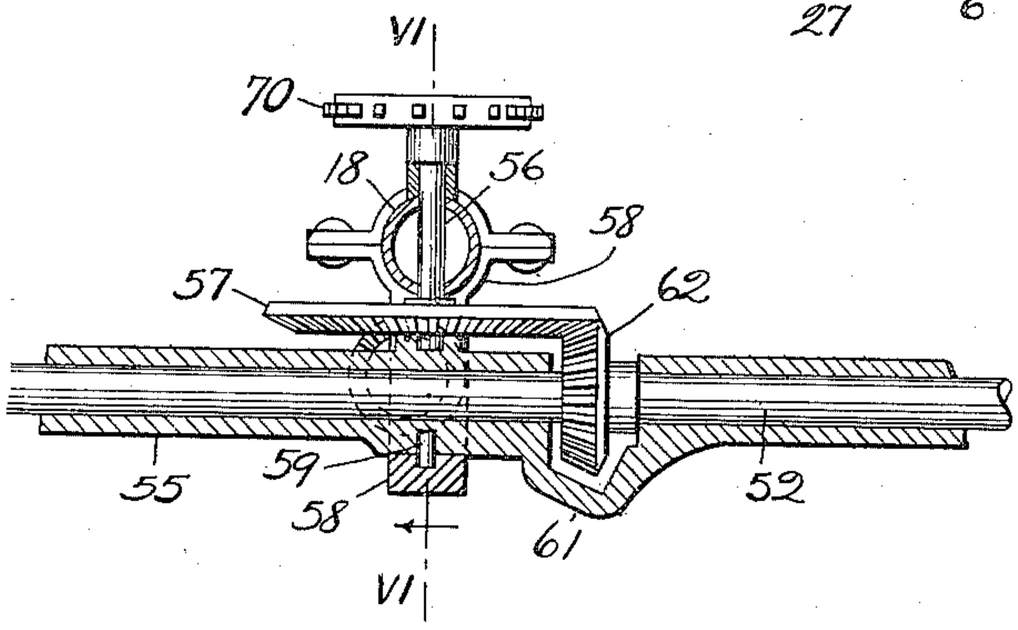

FIG. VII.

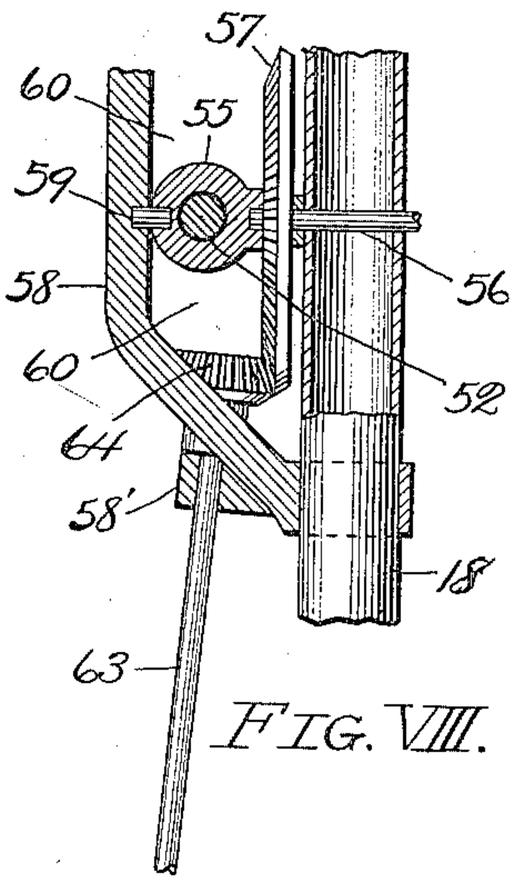

FIG. VIII.

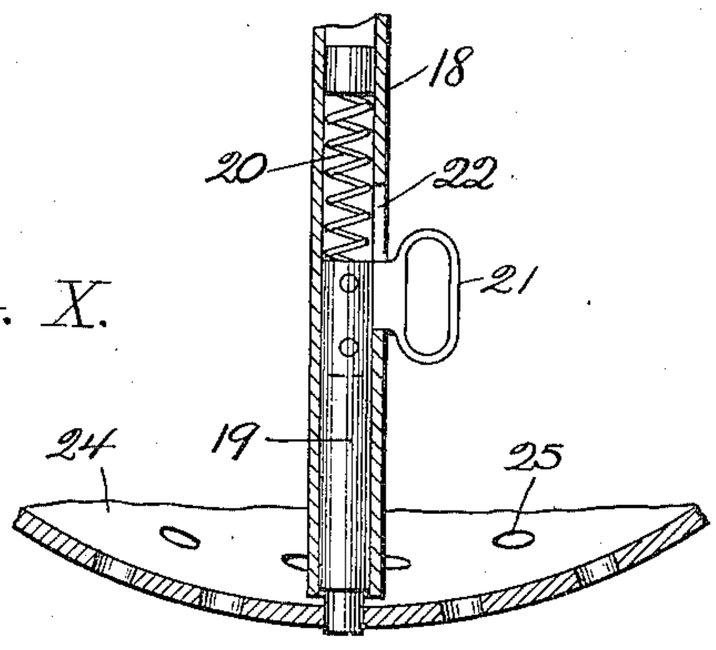

FIG. X.

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UNITED STATES PATENT OFFICE.

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AEROPLANE.

989,681. Specification of Letters Patent. Patented Apr. 18, 1911.

Application filed April 11, 1910. Serial No. 554,619.

To all whom it may concern:

Be it known that I, PHINEAS S. WOODS, a citizen of the United States, residing at Smithville, in the county of Clay and State of Missouri, have invented certain new and useful Improvements in Aeroplanes; and I do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to aeroplanes, and has for its principal objects to provide an aeroplane wherein the propeller shaft is movable in a vertical plane and may be set at different angles by the operator; to provide means for converting the planes into parachutes by the simple movement of a lever, so as to increase the safety of descents; to obtain gyroscopic effects, preferably by rotating one of the planes about its axis; to provide means for varying the relative angle of the mast, which carries the planes and propeller shaft, to the car which carries the operator; to vary the elevation or direction of travel of the craft; and to provide novel means for shifting the rudder in any direction and locking same in position.

A further object is to provide the improved details of construction herein described, and illustrated in the accompanying drawings, in which:—

Figure I is a side elevation of an aeroplane constructed according to my invention, the rudder and its rod being shortened to permit large scale drawing, the plane being in section. Fig. II is a front elevation of the rudder, viewed on arrow *a* of Fig. I. Fig. III is a rear elevation of the sprocket wheels and the link belt. Fig. IV is a sectional detail view of the spline coupling. Fig. V is a detail plan view of the mast mounting and the rudder arm mounting, the mast and socket being in section. Fig. VI is a detail view of the rudder arm lock, partly in section. Fig. VII is a sectional top view of the propeller shaft pivots and gears. Fig. VIII is a vertical section viewed on the line VIII—VIII of Fig. V, omitting the sprocket wheel. Fig. IX is a vertical sectional detail view of the mast pivot and the rudder arm pivot. Fig. X is a sectional detail view of the mast lock. Fig. XI is a top view of the levers and latches, showing the mast in section.

Referring more in detail to the parts:— The car upon which the machine rests when on the ground, comprises rubber tired wheels 1, a reach 2, braces 3, and a four-cornered frame, consisting of a base 4, upwardly converging arms 5, and a ball socket 6, supported by said arms.

7 designates a plural-cylinder internal combustion engine, the shaft of which is provided with a bevel gear 8, and a clutch member 14. Bevel gear 8 is geared with a bevel gear 8′ on a shaft 9. On shaft 7′ is a movable clutch 14′, also a bevel gear 11, meshing with gear 11′ on a shaft 12, geared to the axle of wheel 1.

The operator's seat 15 is preferably located in the rear of the car, as shown.

The socket 6 is open at both top and bottom, and loosely supports a ball 16. Passing vertically through said ball, and fixed therein by a cotter 17, is a mast 18 which is preferably tubular for the sake of lightness. Said mast extends upwardly and supports the parts to be presently described, and also extends downwardly, from the ball 16. In the lower end of the mast is mounted a bolt 19, which is pressed downwardly by a spring 20 and has a handle 21 that projects through a slot 22, in the mast 18.

Secured to the arm 5 in any suitable manner, is a bowl shaped or segment-spherical plate 24, the curvature of which is concentric with that of the pivot ball 16, and in which are numerous openings 25 each of which is adapted to receive the end of the bolt 19, so that the mast 18 may be held at any desired angle by inserting the bolt 19 in the proper opening 25.

Integral with the socket 6 is a ball 26, on which is mounted a socket 27 that is carried on the end of the forwardly extending rudder arm 28. On arm 28 is a rudder 29 which is vertically disposed and is used for steering. The rudder is composed of a vertical wing 29 and a horizontal plane 29′, rigidly secured together, and stayed by wires 29″. The rudder arm is provided with an eye 30, to which is connected a tension spring 31 whose opposite end is connected to an eye 32 on quadrant 33 on the mast 18, said spring being adapted to balance the weight of the arm and rudder, and aid in supporting them. Secured to said arm is a lock-arm 34 in which is

slidably mounted a bolt 35, having a handle 36 and a spring 37 for projecting the bolt. Secured to two of the standards 5 is a curved locking plate 38 which is concentric with the ball 26, and has a number of bolt openings 39 for receiving the bolt 35, so that the rudder arm may be held positively at a desired angle.

Slidable upon the mast 18, at the height of the lower plane 40, is a collar 41, having an annular groove as shown. A lever 44 is fulcrumed at 45 on the mast, and has a latch, operated by a hand-grip 46, adapted to work in a notched quadrant 47, which is secured to the mast. Lever 44 is connected with the collar 41 by a rod 48, so that the collar 41 may be raised and lowered thereby.

40 designates the lower plane, which has a central circular opening which surrounds the groove of said collar 41. The edges of this plane are supported by upper and lower guy wires 49 and 50 which are attached to the mast 18.

When the lever 44 is in a certain position the plane 40 will be flat, as shown in full lines. If said lever be raised to the angle shown by dotted line C, the collar 41 will rise and will lift the central portion of the plane therewith, so that the plane will become convex above and concave below, as indicated by the dotted lines. When in this form, the plane is adapted to act as a parachute and offer increased resistance to the air when the car is descending.

52 designates the propeller shaft which rotates in a sleeve 55, which is pivotally mounted on the mast 18 in any suitable manner and has the propellers 53 and 54 on its opposite ends. These propellers are preferably set at right angles to each other, as shown.

I have illustrated and shall describe in detail the preferred mounting of the propellers, but it is to be understood that I do not limit myself thereto.

Rotatable in the mast 18 is a shaft 56 which projects at both ends and has mounted thereon a rotative gear wheel 57, also a sprocket wheel 70. Secured to the mast is a D-shaped bracket 58 which bears a pivot stud 59, in alinement with shaft 56. The shaft sleeve 55 is provided with alined sockets (Fig. VII), into which the shaft 56 and stud 59 project, there being a space 60 within the bracket 58 which permits the sleeve 55 to be pivotally turned in a vertical plane. Said sleeve is formed with an offset 61, to receive a bevel gear 62 which is fixed upon the shaft 52 and meshes with gear 57.

Integral with bracket 58 is a bearing 58′ for a shaft 63, on which is a bevel pinion 64, that meshes with gear 57. On shaft 63 is fixed a coupling sleeve 63′, in which is a feather 63″. Projecting into sleeve 63′ is a shaft section 64′ having a spline groove in which the feather is slidable. Section 64′ is connected by a universal joint 65 with a shaft 9, on which is a bevel gear 8′, driven by gear 8 on the engine shaft.

Pivoted on the mast 18 is a second lever 66, provided with a latch, that is retained by a notched quadrant 67, which is secured rigidly to the mast. Lever 66 is connected by a rod 68 with the sleeve 55, as shown, so that when the lever is latched, the sleeve is held against vertical movement. By moving said lever up or down, the angle of the propeller shaft may be correspondingly changed.

Fixed upon the mast 18 above the bracket 58, is a bearing 71 for a shaft 72, on which are a bevel gear 73 and a sprocket 74. Sprocket 74 is driven by a link belt 75 from sprocket 70 on shaft 56. Rotatable on the mast above bearing 71, is a bevel pinion 76 meshing with bevel gear 73. Secured to pinion 76 is a hub 77, which carries a circular plane disk 78, whose periphery may be weighted as shown at 79. This disk 78 acts both as a plane, (having the usual function thereof) and as a gyroscopic wheel, which when in rapid revolution tends to hold the entire machine steady, regardless of the angle at which the mast 18 is set by the operator.

The operation of starting an ascent from the ground consists in starting the engine 7, closing the clutch 14—14′, and speeding up the engine until the car is running at a sufficient speed to cause the machine to rise. The rising or lifting force may be provided by setting the propellers at the angle shown, or by tilting the mast so as to incline the planes upwardly in front. As soon as the car leaves the ground, the clutch 14 may be opened to break the connection with the ground wheels, so that the entire force from the motor may be applied to the propellers.

The manner in which the plane 40, the propeller shaft, and the rudder, are operated has been hereinbefore described and it is apparent that the machine may be steered higher, lower or on a level, by proper adjustment of the planes and the propeller shaft.

The upper plane 78, being geared up as shown, will be rotated at high speed, acting as a gyroscope and therefore tending to hold the entire frame of the aeroplane steady, in any angle at which the mast 18 may be set. Said plane will also operate in the same way as though it were non-rotative, by providing auxiliary support to the car.

When the mast is turned upon its pivot, the shaft 64′ will slip within the coupling sleeve 63′, but will continue to drive the shaft 63, gears, propellers, and gyroscope plane 78.

Having thus described my invention, what

I claim as new therein and desire to secure by Letters-Patent is:—

1. In an aeroplane, a car, a spherical disk mounted on the car, a frame mounted on the car, a mast having universal mounting on the frame, and locking means carried by the mast and engaging said disk.

2. In an aeroplane, a car, a bowl shaped disk mounted on the car and provided with a plurality of apertures, a frame mounted on the car, a mast having universal mounting on the frame and having a lower portion terminating adjacent to said disk, and a bolt carried by said mast and adapted for projection into the bowl apertures, substantially as and for the purpose set forth.

3. In an aeroplane, a suitable frame, a member on said frame having a ball socket for a vertical member and a ball socket for a lateral member, a mast having a ball member located in the vertical frame socket, a plane carried by the mast, means for locking the mast to the frame, a rudder having a ball socket in its lateral frame socket, and means for controlling said rudder.

4. An aeroplane comprising a mast, a horizontal plane mounted thereon, guys connecting the edges of the plane to the mast, and means vertically movable upon the mast for raising the central portions of said plane.

5. An aeroplane comprising a mast, a horizontal plane mounted thereon, guys connecting the edges of the plane to the mast, a grooved collar slidable upon the mast, said collar being engaged by the plane, a lever fulcrumed on the mast, a latch for said lever, and a connection between said collar and said lever.

6. In an aeroplane, a vertically extending mast, a plane rigidly mounted upon the mast, a gyroscopic plane rotatably mounted upon the mast, and means for varying the angle of the mast to the mast-supporting parts.

7. In an aeroplane, a mast, a rotary hub thereon, a rotary plane or disk supported by the hub, a gear wheel fixed to said hub, a gear wheel mounted on the mast and meshing with the first gear wheel, a shaft parallel to the shaft of the second gear wheel, a bevel gear on said shaft, gearing between said second gear wheel and last named gear wheel, a bevel pinion meshing with said last named gear wheel, a shaft for driving said pinion, a motor, and gears between the last named shaft and the motor shaft.

8. In an aeroplane, a frame, a mast pivotally mounted on the frame, a motor secured upon said frame, a propeller driving gear mounted on the mast, a drive pinion meshing with said gear, a shaft 9 geared to the motor shaft, a universal joint connected to shaft 9, a shaft section connected to the universal joint, a shaft for said drive pinion, and a spline coupling between said shaft section and the drive pinion shaft.

9. In an aeroplane, a mast, a transverse shaft 56 passing through the mast, a sleeve pivoted upon the mast, the pivot of said sleeve being alined with said shaft, a gear on the shaft 56, a propeller shaft through said sleeve, a gear on the propeller shaft, meshing with said first gear, a sprocket wheel on shaft 56, a shaft 72 and sprocket 74 above shaft 56 and its sprocket, a chain connecting said sprockets, gearing driven by sprocket 74, and a rotary plane disk mounted upon the mast and driven by the last named gearing.

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

PHINEAS S. WOODS.

Witnesses:

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E. A. CAHILL.