

March 7, 1939.

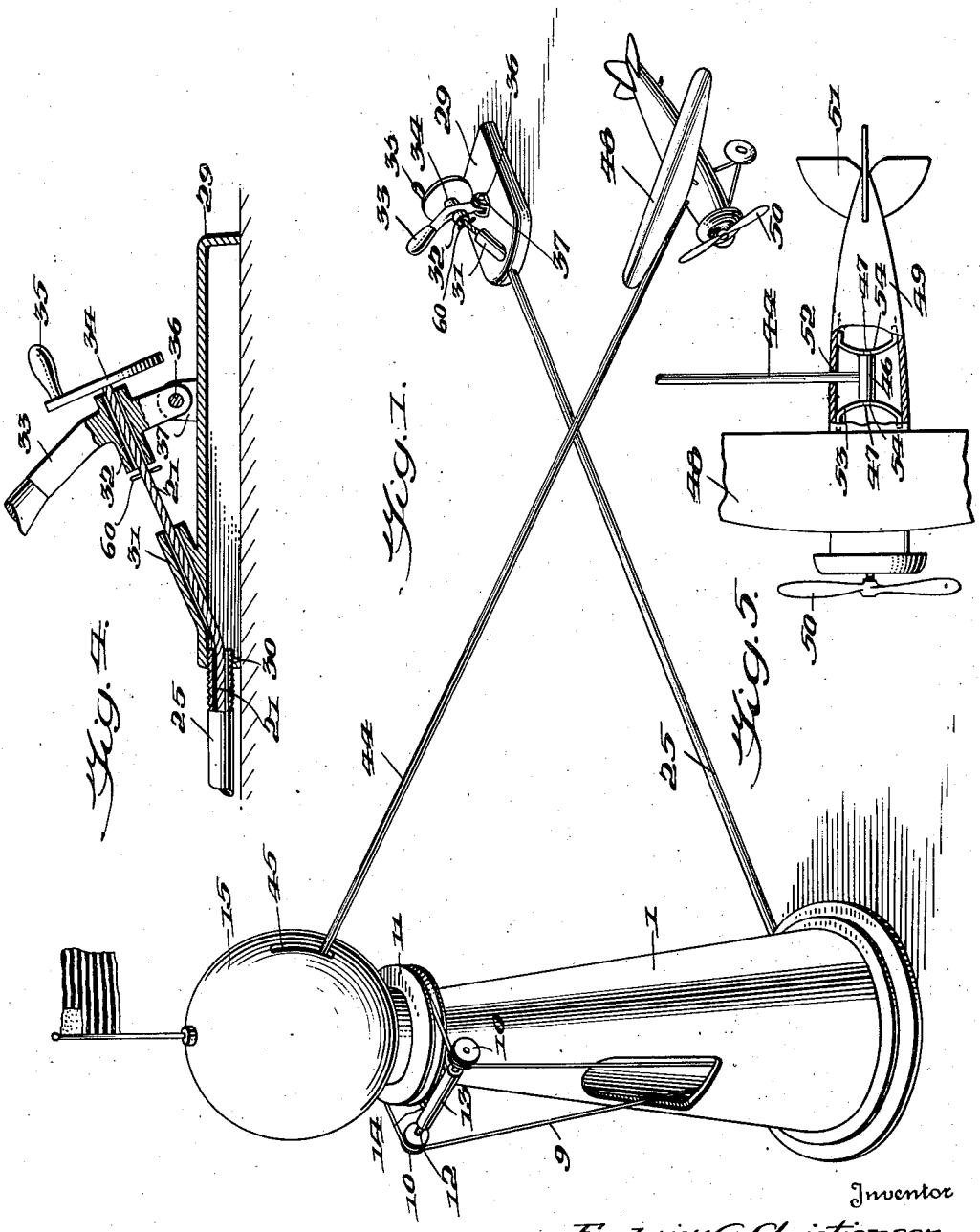
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ELECTRICAL TOY AIRPLANE

Filed May 7, 1937

2 Sheets-Sheet 1



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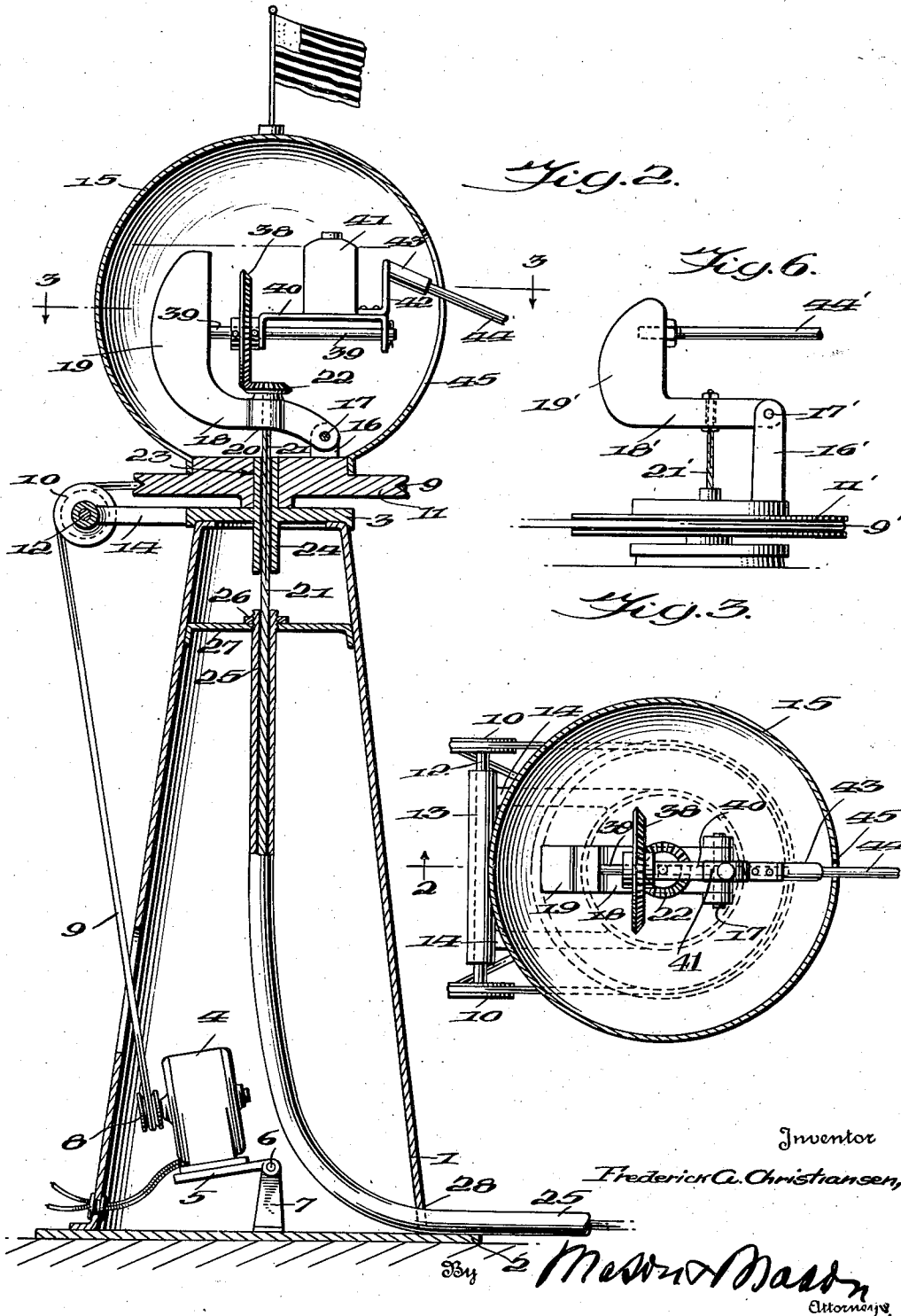
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UNITED STATES PATENT OFFICE

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ELECTRICAL TOY AIRPLANE

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19 Claims. (Cl. 272—31)

This invention relates to a toy airplane apparatus driven preferably by an electric motor.

An object of the invention is to provide an improved and simplified airplane driving construction wherein the parts may be quickly and cheaply constructed.

Another object of the invention is to provide an airplane having the above described characteristics which is sturdy in construction and not liable to get out of order.

Still another object of the invention is to provide an airplane of the above type which will loop the loop, rise from the ground or other supporting surface and fly around a central pylon.

Still another object of the invention is to provide an electric toy airplane which will fly around the central pylon and which may be controlled from a remote point while flying and performing various stunts in the air, and which may be brought to the ground without injury to the plane and in a manner strikingly similar to the landing of a real plane on a landing field.

Other objects will appear hereinafter throughout the specification.

In the drawings:

Figure 1 is an elevation of a device embodying my invention;

Figure 2 is a vertical section through approximately the center of the pylon, with certain parts shown in full lines;

Figure 3 is a horizontal section taken on the lines 3—3 of Figure 2;

Figure 4 is a detail view partly in section of the airplane control mechanism;

Figure 5 is a detail view partly in section of the plane and the means for mounting the same; and

Figure 6 is an elevation of the modified construction of a counterbalancing means for the plane.

Referring to the drawings, my electric toy airplane comprises a pylon 1 mounted on a base 2, and provided with a cap member 3. Located within the pylon is a motor 4 which is mounted on a base 5 hingedly supported at 6 to an upright 7.

The motor 4 drives a pulley 8, which in turn drives a belt 9 that is trained over a pair of small pulleys 10, so as to drive a driven pulley 11, rotatably mounted on the cap 3. The pulleys 10 are turnable on a shaft 12 supported by a bearing 13 and mounted on a bracket 14, which extends to one side of the cap 3.

The driven pulley 11 supports a globe or other decorative member 15 that is rotated by the driven pulley 11 when the motor 4 is running.

Additionally mounted on the rotating driven

pulley 11 is a support 16 having a pivot 17 on which is pivotally mounted an arm 18 having a weighted end 19. The arm 18 is provided with an aperture 20 indicated in dotted lines through which extends a wire 21 preferably of braided construction, having fixed to one of its ends a gear 22. This wire extends down through an aperture 23 in driven pulley 11, through a second aperture 24 in the cap member 3, and into a housing 25, one end of which is affixed by means of a nut 26 to a support 27 located within the pylon 1. The housing and braided wire extend downwardly and out through an aperture 28 to the floor or ground and along the same to a remote control device 29. The housing 25 is attached within an aperture 30 of the remote control device, while the wire continues within a guide 31 and through a second guide 32 located within the handle 33, its end being attached to a rotary control member 34 having a hand grip 35. The handle 33 is pivoted at 36 to an ear 37 mounted preferably on the remote control device substantially mid-way of its length.

Movement of the handle 33 in a clockwise or counter-clockwise direction will pull the wire 21 either to the right or left, as the case may be, while rotation of the rotary control member 34 by handle 35 will cause the wire 21 to rotate, to control the direction of movement of the airplane in a manner hereinafter to be described. The housing 25 and guides 24, 31 and 32 prevent buckling of the wire during endwise movements of the same.

The gear member 22 drives a driven gear 38 preferably in a 3-to-1 driving relation. The gear 38 is mounted on a shaft 39, having one of its ends housed within an aperture (not shown) in the weighted end 19. Attached to the gear 38 is a U-shaped member 40 having a second weight 41 mounted thereon; adjacent one end of the member 40 is also mounted a bracket 42 having an extension 43. Attached to said extension is a rod 44 which extends outwardly through a slot 45 in the globe 15.

The end of the rod has rigidly attached thereto a T-shaped head 46 having trunnions 47 at opposite ends.

The numeral 48 indicates a plane having the usual fuselage 49, propeller 50, and tail 51. The fuselage is provided with a slot 52 through which the rod 44 extends. Bow-shaped supporting members 53 are located in spaced relation on the interior of the fuselage. Each of said members is provided adjacent its middle portion with apertures 54 into which trunnions 47 of the T-shaped

head 46 extends, so that said plane 48 as it travels around the pylon 1, may freely pivot on the trunnions 47.

The operation of the device is as follows:

5 When a switch (not shown) is closed so as to supply current to the motor 4, the belt 9 is driven by said motor so as to rotate the driven pulley 11, which causes all of the parts located thereabove to rotate, and insures the rod 44 and the plane 10 48 supported thereby to travel around the pylon 1. When it is desired to cause the plane to move off the ground, assuming the motor 4 is running, the handle 33 is moved to the right. This causes the arm 18 to move downwardly thus elevating 15 the rod 44 and the plane 48 supported thereon. While in this position or in any position of elevation, a slight distance off the ground, the plane may be caused to describe loops and go through stunts as it is rotated about the pylon, by rotation 20 of the rotary control member 34. The weight of the motor 4 causes sufficient tension to be maintained on the belt 9 to prevent slippage of the same on the pulleys, (except when practically all of the weight of the plane is supported by its 25 wheels, as hereinafter explained), as it will be noted that the motor is supported pivotally at the point 6 to the upright 7, the major part of its weight being supported by the belt which is thus placed under tension.

30 The speed of the motor 4, of course, determines the speed of rotation of the pulley 11, the parts mounted thereon, and the speed of movement of the plane 48. It is to be understood that this speed may be controlled by a suitable rheostat 35 connected to the circuit leading to the electric motor. It will be appreciated that the controls for raising the plane off the ground and causing the same to describe maneuvers, is obtained through manual controls and connections, extending to the remote control device 29, and that 40 these manual controls 33 and 35 will cause the plane to describe various kinds of maneuvers in flight. For instance, upon rotation of the hand grip 35, the wire 21 is caused to rotate in either direction, according to the direction the 45 hand grip is turned. If the rotation is continued the plane will rotate in a clockwise or counterclockwise direction as viewed in Figure 1. It will be further appreciated that by giving the hand 50 grip a portion of a rotation, the plane will be caused to assume a position of upward or downward inclination from a horizontal plane, and will remain in such position until the handle is again adjusted to change the inclination of flight, 55 whilst the airplane is rotating about the pylon 1.

The control wire 21 has two functions, viz., the raising and lowering of the plane from the ground and causing the plane to move about a pivotal axis transverse to its longitudinal axis. This latter function will cause the plane to loop when the 60 handle 35 is continuously rotated or the plane may be held in one position of inclination, either with the nose pointing upwardly or downwardly by partially rotating the handle 35 and maintaining the plane in such position by adjusting 65 the handle 35. The weight 41 is set off-center from the shaft 39 to counterbalance the extra weight at the nose end of the plane due to the rod 44 having been set rearwardly of the center 70 of balance of the plane.

In order to better balance the plane the rod 44 has been mounted on the same side of the spindle 39 as the balancing weight 41.

When the plane is in motion, control wire 21 75 and rotary control member 34 slowly rotate.

During this slow rotation of the wire and control member, the plane does not change its degree of inclination in a horizontal plane, the gear 38 having a planetary movement about the gear 22 but no rotational movement on the shaft 39. 5 Consequently, if the gear continues its planetary movement, the gear 22 rotates causing the wire 21 to rotate.

When the plane is looping and the weight 41 10 turning with the spindle 39, the friction or drag caused by the turning of the spindle 39 tends to stabilize the looping of the plane so that there is little or no increase in speed of turning movement of the plane during portions of the cycle comprising a complete revolution of the plane 15 about its transverse axis. Before the plane takes off and after landing it is unnecessary, in order to have the plane remain stationary, to stop the electric motor as the plane will remain stationary with the pulley 8 slipping with relation to the belt 20 9 which will not be driven until the plane is partially lifted from the ground by movement of the handle 33 and at least some of the weight of the plane transferred from the ground wheels to the rod 44. 25

Assuming that the plane is in the air and it is 30 desired to effect a landing of the same, the handle 33 is gradually moved to the left as viewed in Fig. 4. The plane will move downwardly as it circles the pylon and as the handle is moved further to the left the plane finally lands and thereafter runs around the pylon and in this position is partially supported on the rod and partially 35 supported by the ground. When the handle is moved far enough to the left so that practically the entire weight of the plane is supported by the ground, the frictional resistance to be overcome in driving the belt 9 becomes so great as to cause the pulley 8 to slip on the belt 9. The plane has 40 now come to a stop and will remain in this position until more of the weight is supported on the rod 44 which is accomplished when the handle 33 is again moved to the right. It will be noted therefore that no electrical resistance is needed to control the speed of the motor which may run 45 at the same speed at all times thereby eliminating the need of an electrical resistance and reducing the cost of production of the plane. If desired, however, such a resistance may be provided. 60 indicates an abutment against which 50 arm 33 bears in order that it may push the wire 21 to the left.

In the modified form, shown in Figure 6, the numeral 9' indicates the driving belt. This drives 55 driven pulley 11' upon which is mounted a support 16' having a pivot 17', which pivotally mounts on said support an arm 18' having a weighted end 19'. Into this weighted end is secured by screw-threaded engagement, a rod 60 44' upon whose opposite end is mounted an airplane, as shown in Figure 5. The numeral 21' indicates a wire preferably of braided construction, similar to that used in the preferred construction and indicated at 21.

It will be noted that in the modified construction, only one weight is used. Said weight, of 65 course, rotates on the pylon in the same manner as the weight 19 rotates in the preferred construction. The wire 21' is used for the purpose of control from a remote point by means of a 70 handle 33, such as shown in Figure 4, the rotary control member 34 and handle 35 having been dispensed with in this construction. The handle 33 controls, as in the preferred construction, the elevation of the plane from the ground or other 75

support. As the plane is driven around the pylon, the arm 33 may be moved to the right to pull the arm 18' down, thus elevating the opposite end of the arm 44' to cause the plane to be raised off the floor, and the plane may be lowered by moving the arm 33 to the left, as shown in Figure 4.

In this modified construction, there is no means provided for rotating the wire 21' and rod 44'. This construction may be preferred, however, as it is more easily constructed and consists of a less number of parts. The plane is unable to loop in the modified construction.

In the construction shown in Figs. 1 and 2, wherein both weights 19 and 41 are used, it will be seen that the weight 19 rotates about a pivot in the center of the pylon, and weight 41 does the same, but at the same time this weight may also rotate about the shaft 39. The purpose of weight 19 is to counterbalance the weight of the plane as it is rotated about the pylon as a center, when the plane is off the ground. Weight 41 causes the plane to gracefully describe loops and keeps the nose of the plane up. It will be appreciated that the trunnions 47 permit the plane to gracefully balance itself and to automatically bank after it has risen off the ground, and has reached its flying speed. The turning of the handle 35 three times will cause the plane to describe one complete loop due to the relative size of the gears 22 and 38, but it is to be understood that the gear ratio of gears 22 and 38 may be changed, and that such change is within the scope of the present invention.

The foregoing description and the drawings are understood to be for illustrative purposes only, and it is further understood that the invention is capable of various modifications. I desire to be limited, therefore, in the practice of my invention, only to the extent as defined by the appended claims.

What I claim is:

1. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, means for driving said plane around said center, comprising a motor, driving and driven pulleys, a belt connecting said pulleys, an arm pivotally mounted in an eccentric position on said driven pulley, a weight on the opposite end of said arm, a rod mounted on said weight, and an airplane mounted on the opposite end of said rod.

2. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, means for driving said plane around said center, comprising a motor and driving and driven pulleys, a belt connecting said pulleys, an arm pivotally mounted on said driven pulley, a rod mounted on said arm, and a plane mounted on an end of said rod, and manual means including a connection to said arm for raising and lowering the same to cause the plane to be raised from or to be lowered to a supporting surface.

3. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, means for driving said plane around said center, comprising a motor, and driving and driven pulleys, a belt connecting said pulleys, an arm pivotally mounted on said driven pulley, a rod mounted on said arm, and a plane mounted on an end of said rod, and manual means including a connection to said arm for raising and lowering the same to cause the plane to be raised from or to

be lowered to a supporting surface, and manual means for causing said plane to rotate about an axis transverse to the longitudinal axis of said plane when in flight.

4. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, means for driving said plane around said center, comprising a motor, and driving and driven pulleys, a belt connecting said pulleys, an arm pivotally mounted on said driven pulley, a rod mounted on said arm, and a plane mounted on an end of said rod, and manual means including a connection to said arm for raising and lowering the same to cause the plane to be raised from or to be lowered to a supporting surface, and manual means including a connection extending through said arm for causing the plane to rotate about an axis transverse to the longitudinal axis of the plane when in flight.

5. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, means for driving said plane around said center, comprising a motor, and driving and driven pulleys, a belt connecting said pulleys, an arm pivotally mounted on said driven pulley, a rod mounted on said arm, and a plane mounted on an end of said rod, manual means including a connection to said arm for raising and lowering the same to cause the plane to be raised from or to be lowered to a supporting surface, and manual means including a rotary control member, flexible means connected to said member at one of its ends, and having its opposite end connected to a gear, a second gear in meshed relation to said first gear, and adapted to cause rotation of said plane supporting means, whereby when said control member is rotated said plane will be rotated about an axis transverse to its longitudinal axis when in flight.

6. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, means for causing said plane to rotate about said center, including a motor, a belt, driving and driven pulleys, an arm pivoted on said driven pulley for supporting said plane supporting means, and a single member upon rotation of which said plane will be caused to rotate on an axis transverse to its longitudinal axis in flight, and upon longitudinal movement of which, will cause said plane to be raised from or lowered to a supporting surface.

7. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, means for driving said plane around said center, comprising a motor, a belt, and driving and driven pulleys, a weighted arm mounted eccentrically on said driven pulley, a shaft and gears mounted on said arm, a rod mounted on said shaft, a plane attached to said rod and a single means adapted when rotated to drive said gears and shaft to cause said plane to move about an axis transverse to its longitudinal axis in flight, and when given linear movement to raise and lower said rod and cause said plane to be raised from or lowered to a supporting surface.

8. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, means for driving said plane around said center, comprising a motor, a belt, and driving and driven pulleys, a weighted arm mounted eccentrically

on said driven pulley, a shaft and gears mounted on said arm, a weight mounted on said shaft, a rod mounted on said shaft, a plane attached to said rod and a single means adapted when
 5 rotated to drive said gears and shaft to cause said plane to move about an axis transverse to its longitudinal axis in flight, and when given linear movement to raise and lower said rod and cause said plane to be raised from or lowered
 10 to a supporting surface.

9. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, means for driving said plane around said center, comprising
 15 a motor, a belt, and driving and driven pulleys, a weighted arm mounted eccentrically on said driven pulley, a shaft and gears mounted on said arm, a rod mounted on said shaft, a plane pivotally attached to said rod and a single
 20 means adapted when rotated to drive said gears and shaft to cause said plane to move about an axis transverse to its longitudinal axis in flight, and when given linear movement to raise and lower said arm and cause said plane to be
 25 raised from or lowered to a supporting surface.

10. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, means for driving said plane around said center, comprising
 30 a motor, a belt, and driving and driven pulleys, a weighted arm mounted eccentrically on said driven pulley, a shaft and gears mounted on said arm, a weight mounted on said shaft, a rod mounted on said shaft, a plane pivotally
 35 attached to said rod and a single means adapted when rotated to drive said gears and shaft to cause said plane to move about an axis transverse to its longitudinal axis in flight, and when given linear movement to raise and lower said rod and cause said plane to be raised from or
 40 lowered to a supporting surface.

11. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, means for moving said plane around said center, including
 45 a motor and connections to said plane for rotating the same about said center, and manual means including a rotary and longitudinally movable member for causing said plane to be raised or lowered from a supporting surface, and to
 50 cause said plane to rotate about an axis transverse to its longitudinal axis in flight.

12. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, means for causing said plane to travel around said center,
 55 including a motor, driving and driven pulleys, a belt connecting said pulleys, an arm pivotally mounted on said driven pulley, means for supporting a plane on said arm, a pivotal mounting for said motor, the driving connection between
 60 said motor, pulleys and said belt being such that said driven pulley remains stationary when the weight of the plane is at least partially supported on the ground and with said motor running.

13. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, means for causing said plane to travel around said center,
 65 including a motor, driving and driven pulleys, a belt connecting said pulleys, said supporting means including a rod pivotally mounted on said driven pulley, means for supporting a plane on
 70 said rod, and means for pivotally mounting said plane on said supporting means.

said rod, and means for pivotally mounting said plane on said supporting means.

14. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, means for causing said plane to travel around said center,
 5 including a motor, driving and driven pulleys, a belt connecting said pulleys, said supporting means including a rod pivotally mounted on said driven pulley, means for supporting a plane on
 10 said rod, a pair of bearings in said plane and a pivotal mounting on said rod and extending into said bearings whereby said plane may be pivotally supported on said rod.

15. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, including a motor and a pivotally mounted weight, said supporting means being supported on said weight
 15 and manual means including a single element connected to said weight for causing said plane to be raised or lowered from a supporting surface upon manual actuation of said element.
 20

16. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, including a supporting rod, means for moving said plane around said center, including a motor, driving
 25 and driven pulleys and a weight mounted on said driven pulley, said rod being rigidly attached to said weight, and manual means including a single element for causing said plane to be raised or lowered from a supporting surface upon manual actuation of said element.
 30

17. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, including a rod having one of its ends pivotally attached to said plane, means for moving said plane around
 35 said center including a motor, driving and driven pulleys, and a counterbalancing weight eccentrically mounted on said driven pulley, the opposite end of said rod being rigidly attached to said counterbalancing weight, and manual means for causing said plane to be raised or lowered from
 40 a supporting surface, said manual means being connected to said weight.
 45

18. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, means for causing said plane to travel around said center,
 50 including a motor, driving and driven pulleys, a belt connecting said pulleys, an arm driven by said driven pulley and mounted on said supporting means, means for supporting a plane on said arm, a pivotal mounting for said motor, the drive
 55 between said motor, pulleys and said belt being such that said driven pulley remains stationary when the weight of the plane is at least partially supported on the ground and with said motor running.
 60

19. A toy airplane apparatus comprising a toy plane and including means for supporting and guiding the plane around a center, means for causing said plane to travel around said center,
 65 including a motor, an arm pivotally mounted on said supporting means, means for supporting a plane on said arm, and manually controlled means having rotary and longitudinal movement for causing said plane to stunt while in flight,
 70 said last named means functioning independently of the operation of the motor.

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