Aug. 26, 1947. F. A. CHRISTIANSEN 2,426,259

TOY AIRCRAFT

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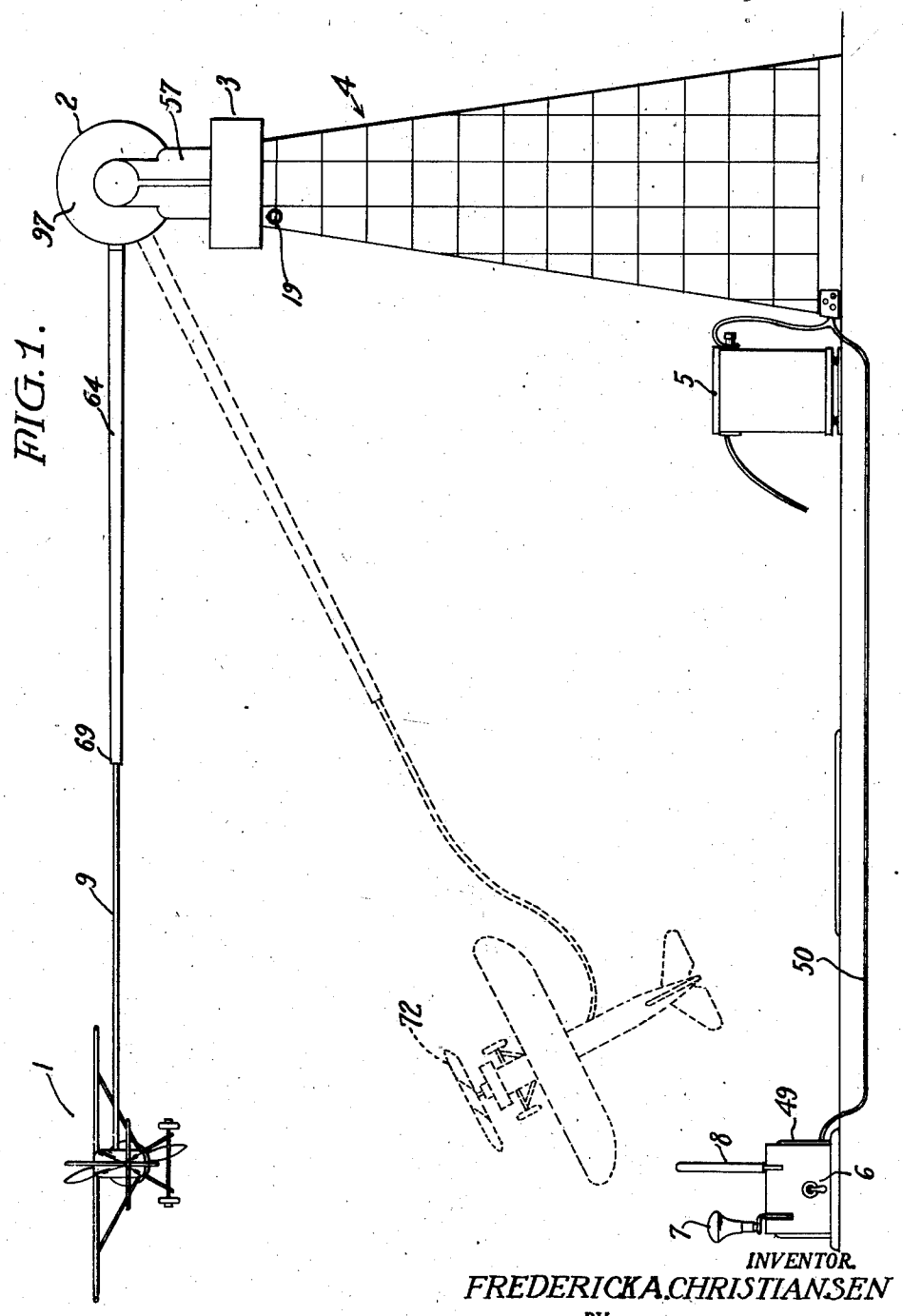


FIG. 1.

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FIG. 2.

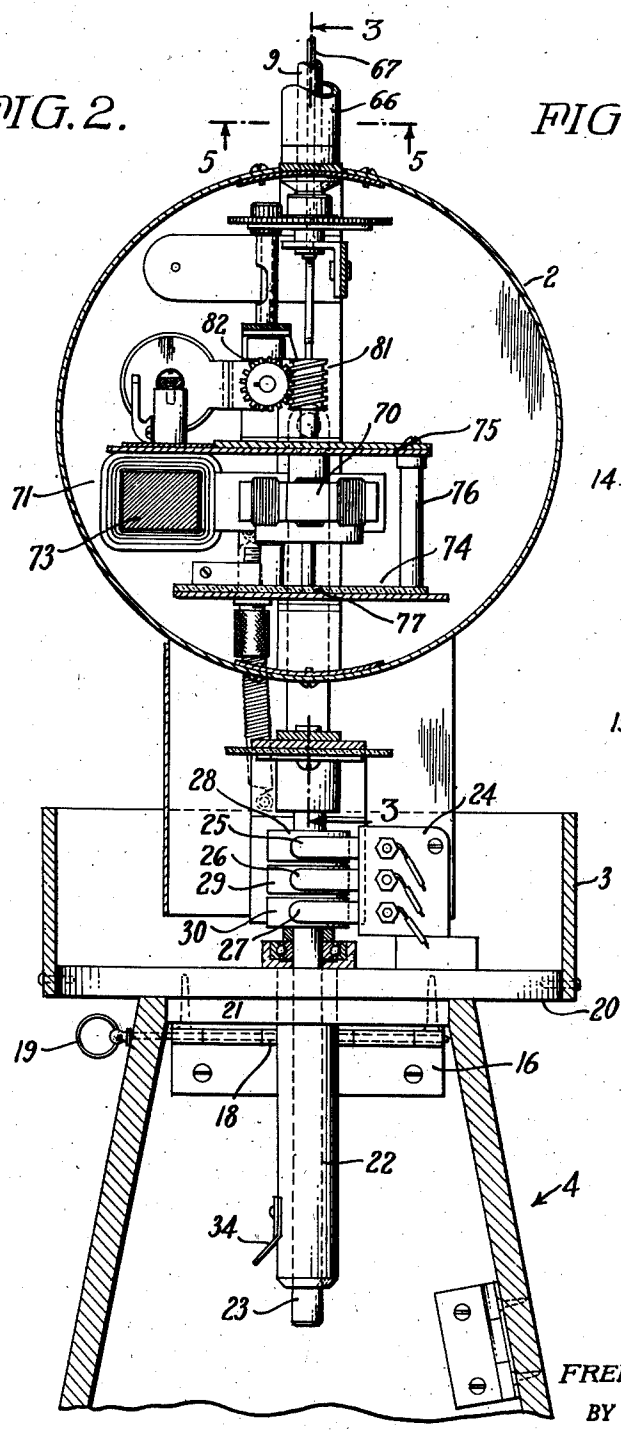


FIG. 6.

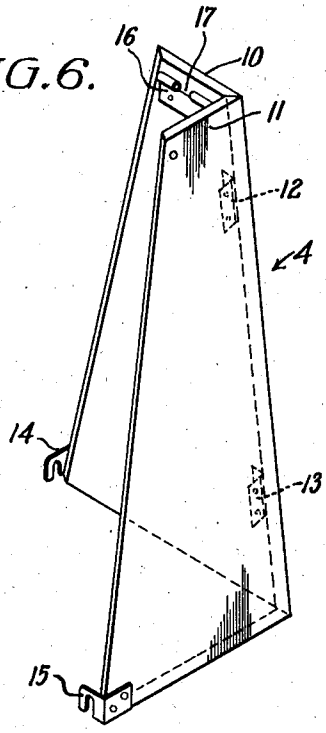
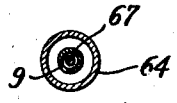


FIG. 5.



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FIG. 3.

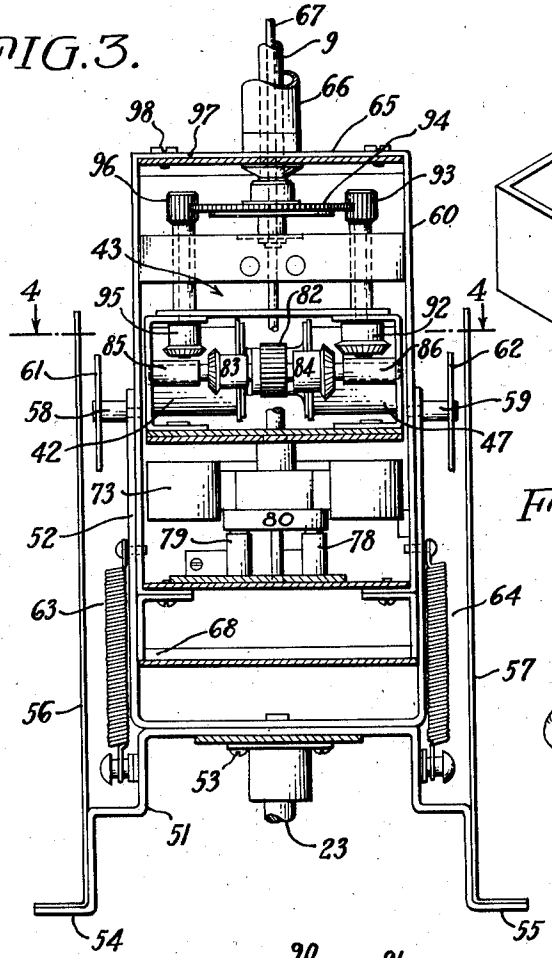


FIG. 7.

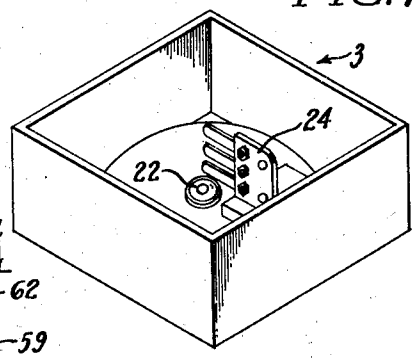


FIG. 8.

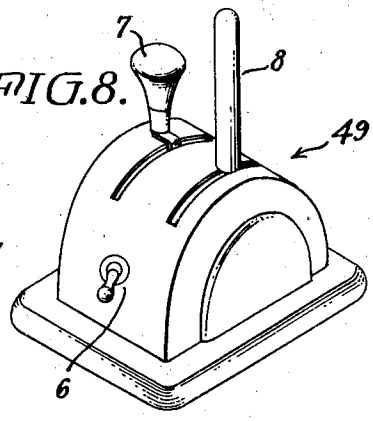
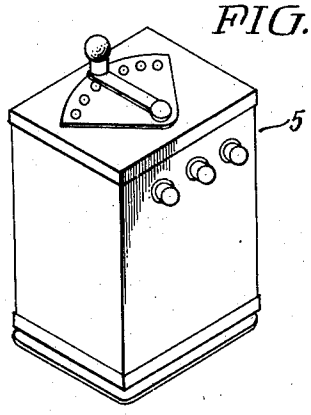


FIG. 9.



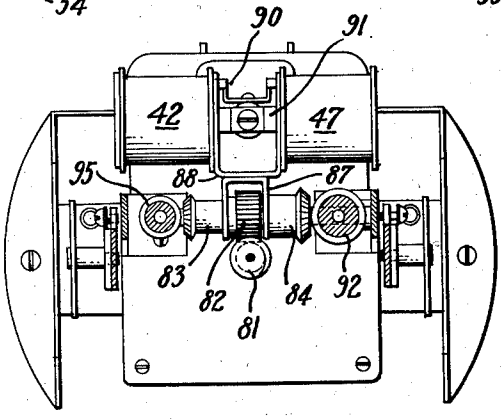


FIG. 4.

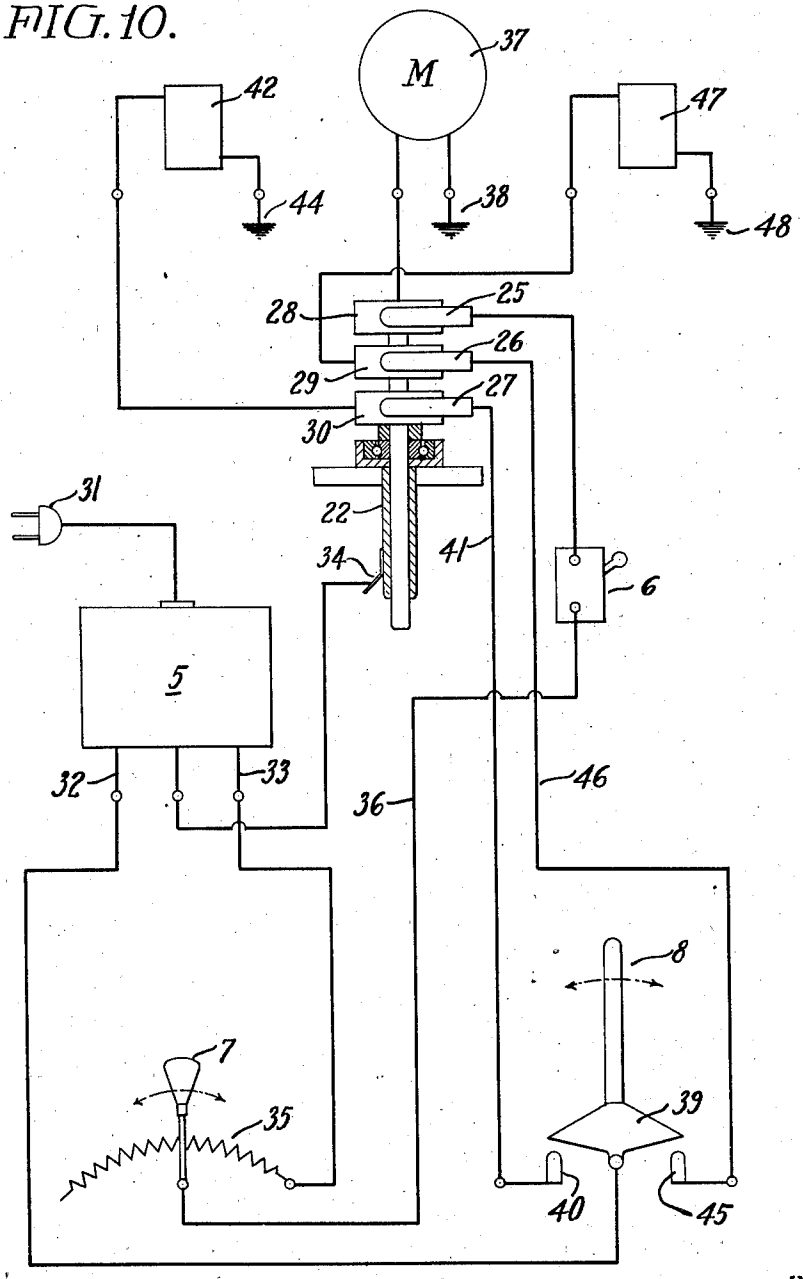
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FIG. 10.



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Patented Aug. 26, 1947 2,426,259

UNITED STATES PATENT OFFICE

2,426,259

TOY AIRCRAFT

Frederick A. Christiansen, Beverly Hills, Calif., assignor of fifty per cent to Lane Rhodes, Santa Monica, Calif., and fifty per cent to William H. Hammer, Beverly Hills, Calif.

Application August 17, 1945, Serial No. 610,999

9 Claims. (Cl. 272—31)

1

The present invention relates to improvements in toy airplanes of the type covered by my U. S. Patent 2,067,828, patented January 12, 1937, wherein an airplane is tethered to a pylon, with means under control of the operator for varying the speed of the airplane and for causing it to perform various stunts such as loops.

It has heretofore been proposed to support the toy aircraft by a hollow tube containing a flexible shaft connected to the propeller. The support tube is oscillated in one direction or the other by connecting it to a reversible drive actuated by the motor, and under control of a control handle or stick. Heretofore the reversible drive has been operated mechanically, usually by means of a sliding wire mounted in a flexible sheath. Such mechanical operating means cannot be freely moved about and in some cases has proven unsatisfactory as the sheath is apt to kink and retard or stop the operation of the sliding wire.

An object of the present invention is to overcome the above defect and this has been accomplished by providing electrical means for actuating the reversible drive, and by arranging contacts under control of the control handle for energizing the electrical actuating means. In this way, an electrical circuit, instead of a mechanical drive is connected between the control handle and the motor unit and such control handle and its electrical circuit may be moved about with considerable freedom and without interfering with the proper operation of the reversible drive. Kinks which would render the mechanical control inoperative, do not interfere with the flow of control current in the electric circuit.

Another object of the present invention is to facilitate packaging the airplane and associated parts and for this purpose the invention provides an improved construction wherein the whole apparatus is sub-divided into a number of units which may be readily taken apart for packaging or assembled for use.

Other objects of the invention are to provide an improved motor unit for the airplane, and to increase the vertical angle through which the airplane and its support may be tilted, thereby increasing the range of movement of the airplane.

For further details of the invention reference may be made to the drawings wherein Fig. 1 is a front view in elevation of the improved airplane toy according to the present invention.

Fig. 2 is an enlarged vertical sectional view, with parts broken away of the motor unit and associated parts of Fig. 1.

Fig. 3 is a sectional view on line 3—3 of Fig. 2.

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Fig. 4 is a sectional view on line 4—4 of Fig. 3.

Fig. 5 is a sectional view on line 5—5 of Fig. 2.

Fig. 6 is a perspective view of one-half of the collapsible pylon of Fig. 1.

Fig. 7 is a perspective view of the bearing and electrical coupling unit of Fig. 1.

Fig. 8 is a perspective view of the propeller speed and stunt controller of Fig. 1.

Fig. 9 is a perspective view of the transformer of Fig. 1.

Fig. 10 is a schematic wiring diagram of the circuits for the motor and reversible drive.

Referring in detail to the drawings, the improved toy aircraft apparatus comprises a toy aircraft 1 operated by a motor unit 2 removably supported by a bearing and electrical connector unit 3 which in turn is removably supported by a collapsible pylon 4. The current for operating the motor unit 2 may be taken from a transformer 5 in circuit with which is a switch 6 for turning the motor on and off, a control handle 7 for varying the speed of the motor, and a stick 8 controlling a circuit later described for oscillating the tube 9 to which the aircraft 1 is connected, in one direction or the other to cause the aircraft to perform various stunts such as loops.

The pylon 4 is collapsible into a flat package and as illustrated in Fig. 6, the pylon is in the shape of a pyramid made in two parts as illustrated, the sides 10 and 11 of one part being hinged together as indicated at 12 and 13 and the other two sides, not shown, being similarly hinged together, the two parts being removably connected together by catches 14 and 15 cooperating with companion pins, not shown, on the other part.

The top of one of the pylon sides such as 10 is provided with a socket member 16 which is broken away at its central portion 17 to receive a companion socket member 18 shown in Fig. 2, carried by the and depending from the bearing and coupling unit 3. A pin 19 may be passed through the sockets 16 and 18 to removably lock the bearing unit 3 on top of the pylon 4. The bearing unit 3 has a base 20 secured to the underside of which is a square block 21 which fits the inside of the top of pylon 4. Depending form the center of base 20 is a sleeve bearing 22 which removably receives and supports a spindle 23 on the motor unit 2, so that the motor unit and its attachments including the aircraft 1 may revolve on a vertical axis. Above the top of bearing 22 and suitably secured to the base 20 is a brush assembly 24 having a vertical array of three horizontal brushes 25,

26 and 27 each of which makes sliding contact with one of the slip rings 28, 29, 30 mounted on the top of spindle 23.

The slip rings 28—30 are brought into and out of register with their companion brushes 25—27, by the simple act of mounting motor unit 2 into or removing it from its supporting relation on the bearing unit 3, as shown in Fig. 2.

The control circuits for the motor unit 2 are taken through the slip rings and brushes 25—30 over circuits shown in Fig. 10 as follows: The transformer 5 may be plugged into the usual lighting circuit by the plug 31. The line 32 from transformer 5 supplies one potential and line 33 supplies another potential. Line 33 is connected at one side through the transformer to a suitable ground 34 on sleeve 22 and the other side includes a variable resistance 35 controlled by the speed control handle 7, resistance 35 being connected over line 36 with an on or off switch 6 connected through brush 25 and slip ring 28 to motor 37 in the motor unit 2, to ground 38 on the motor frame, in circuit with spindle 23.

Line 32 is grounded at one side at 34 and the other side terminates in a blade 39 on handle 8 which may be moved to the left to close the circuit through contact 40 connected over line 41 to brush 27, slip ring 30 to solenoid 42 which operates a reversible drive 43 shown in Fig. 3 to oscillate support tube 9 in one direction, to ground 44, on the motor frame.

When stick 8 is moved to the right, blade 39 supplies the current in line 32 over contact 45 to line 46, brush 26, slip ring 29, to solenoid 47 to oscillate the support tube 9 in the opposite direction, to ground 48, on the motor frame.

As shown in Fig. 1, the speed control handle 7, the stunt control handle 8 and switch 6 may be mounted in a single control unit 49 and the lines 36, 41 and 46 leading from these elements may be connected in a common cable 50 which, of course, is reasonably flexible whereby the control unit 49 may be moved about at will without interfering with the proper operation of the reversible drive 43.

The spindle 23 is fixed to the bight of an inverted fork 51 and to the bight of an upright fork 52 by means such as screws or bolts 53. The fork 51 has outwardly projecting arms 54 and 55 to which are secured spaced parallel upright guard and decorative plates 56—57, one of which appears also in Fig. 1.

The upper ends of fork 52 carry pivot pins 58 and 59 which provide a horizontal tilt axis for the motor unit 2. These pins are secured to and project through the upper ends of the fork 52 to pivotally support the motor frame 60. The fork 52 may be made of sheet metal which is flexible and the motor frame 60 may be removed from fork 52 by springing out the fork 52 with the pivot pins 58, 59, by pulling out on disks 61, 62 secured to the pins 58, 59, respectively.

A counterbalance for the motor frame 60 and its attachments is provided in the form of two tension springs 63, 64 which are connected at one end to fork 51 and at the other end to the motor frame 60 on the near side of the tilt axis through the pins 58, 59, as the aircraft 1 is connected to motor frame 60 on the other side of that tilt axis.

When the aircraft 1 is on the floor, it may be tilted through a vertical angle from that position up to horizontal and 90° beyond to a vertical position indicated in Fig. 3, by reason of the fact that the inner end 68 of motor frame 60 on that

side of tilt axis through pins 58, 59 opposite the motor frame's outer end 65 where support tube 66 and tilt tube 9 and propeller shaft 67 project, is shorter than the distance between the tilt axis through pins 58, 59 and the bight of fork 52, whereby the inner end 68 of the motor frame can swing through the desired wide angle within the fork 52.

The support tube 66 is secured at its inner end to the motor frame end 65 and at its outer end 69 it provides an outboard bearing or support for the tilt tube 9. Within the tilt tube 9 is the propeller shaft 67 which is connected at its inner end to the armature 70 of the motor 71 and is connected at its outer end to the propeller 72 of the toy aircraft 1. Around the armature 70 is a U shaped field magnet 73, which lies within the motor frame 60 and hence is narrower than the width of the fork 52. The motor has end plates 74, 75 held by posts like 76. Plate 75 rotatably supports the upper end of the armature as seen in Fig. 2 and its lower end is rotatably supported in plate 74 as indicated at 77. Plate 77 also supports the brushes 78, 79 for the commutator 80.

Secured to the armature shaft and to propeller shaft 67 is a worm 81 meshing with a worm wheel 82 fixed to and centrally disposed between two bevel gears 83, 84. The worm wheel 82 and gears 83, 84 are slidingly supported by spaced bearings 85, 86. Around worm wheel 82 as shown in Fig. 4 is a fork 87 secured to an oppositely extending fork 88 connected to two solenoids 42, 47 slidingly mounted on a fixed core 91 of magnetic material. The gear shift unit including worm wheel 82, gears 83, 84 and solenoids 42, 47 are held in neutral position by means of a U shaped spring 90. When stick 8 is moved in one direction, solenoid 42 is energized over the circuit above described in connection with Fig. 10, and gear 84 is moved to the right to engage and drive bevel gear 92 connected to which is a pinion 93 engaging a gear 94 connected to the tilt tube 9, to tilt the aircraft 1 in one direction. When stick 8 is moved in the opposite direction to energize solenoid 47, gear 84 is disengaged and gear 83 meshes with gear 95 which is connected to pinion 96 meshing with gear 94, to tilt the tilt tube 9 and aircraft 1 in the other direction.

The motor unit 2 is provided with a suitable cylindrical casing 97 removably held in position by means of screws such as 98.

Assuming that the counterbalance springs 63, 64 are adjusted so that the aircraft 1 will remain on the floor when the apparatus is idle, the operator may operate handle 7, assuming switch 6 is closed, to increase the current to the propeller 72 to obtain a speed sufficient so that the aircraft 1 will rise from the floor and circle about the vertical axis of the pylon 4. Also the stick 8 may be moved in one direction or the other to tilt the tube 9 and the aircraft 1 in one direction or the other to cause the aircraft to perform various stunts or loops.

It will be apparent that various modifications may be made in the invention without departing from the spirit of the following claims.

I claim:

1. Toy aircraft comprising a motor unit, means supporting said motor unit for rotation on a vertical axis, means supporting said motor unit for tilt movement on a horizontal axis, a propeller shaft connected to said motor unit, an oscillating aircraft support tube, a reversible drive actuated by said motor unit, electro-magnetic means for

shifting said reversible drive, and a control handle and contacts controlled thereby in circuit with said electro-magnetic means.

2. Toy aircraft according to claim 1 wherein said electro-magnetic means comprises a fixed core, a pair of magnetic coils slidable thereon, and spring means biasing said coils to neutral position.

3. Toy aircraft according to claim 1 comprising slip rings and brushes associated with said motor unit and said first supporting means, and circuit connections from said control handle contacts to said electro-magnetic means through said slip rings and brushes.

4. Toy aircraft according to claim 1 comprising three sets of sliding contacts, each set having a brush and slip ring, a manual speed control and circuits therefor through one of said sets to said motor unit, and circuits between said control handle contacts and two of said sets to said electro-magnetic means.

5. Toy aircraft according to claim 1 wherein said first supporting means comprises a spindle on said motor unit, and a bearing member therefor, a plurality of slip rings on said spindle, a plurality of brushes therefor on said bearing member, a rheostat in circuit with one of said brushes and its slip ring being in circuit with said motor unit, circuit connections between said handle contacts and two of said brushes with their slip rings in circuit with said electro-magnetic means, and ground connections for said motor unit and said electro-magnetic means.

6. An airplane toy comprising the combination of a bearing and electrical connector unit, and a motor unit having a removable rotatable support with the top of said bearing and connector unit, said bearing unit having three electrical contacts for a power line and a reversing switch, and said motor unit having three cooperating motor electrical contacts connectible with and disconnectible from said corresponding contacts on said bearing unit on moving said motor unit into or out of supporting relation with said bearing unit, said motor unit having a hollow arm for supporting the aircraft and a reversible drive for said arm, a rotatable motor shaft in said arm for the propeller, and controllers operable at will for varying the speed of said propeller shaft and for reversing the rotation of said hollow arm over circuits including said contacts on said bearing unit and said contacts on said motor unit.

7. Toy aircraft comprising a substantially U shaped yoke, a rotary support on the bight of said yoke, a motor frame pivotally connected to the outer ends of and between said yoke for tilt movement on a tilt axis at right angles to the axis of said rotary support, the periphery of one end of said motor frame over a wide angle being shorter than the height of said yoke whereby said motor frame may be tilted over a corresponding wide angle, a motor in said motor frame, a reversible drive associated with said motor, a support tube carried by the other end of said frame, an airplane tube in said first tube and connected to said reversible drive, and a propeller shaft in said last tube connected to said motor.

8. Toy aircraft apparatus comprising a substantially U shaped yoke, a spindle projecting outwardly from the bight of said yoke, a frame pivotally connected on a tilt axis to the outer ends of and between the arms of said yoke, a motor and reversible drive at opposite ends of said frame, said motor and the motor end of said frame extending from the tilt axis a distance less than the distance between the tilt axis and the bight of said yoke and said reversible drive extending from said frame on the other side of said tilt axis, and a counterbalance spring means between said frame and said yoke.

9. Toy aircraft comprising a substantially U shaped yoke, a spindle projecting outwardly from the bight of said yoke, a cylindrical motor casing concentric with a tilt axis through the outer ends of said yoke, a frame, a pivotal support on said axis between said frame and the outer ends of said yoke, a motor in said frame at one side of said tilt axis and a reversible drive in said frame connected to said motor and extending on the other side of said tilt axis, and a tilt tube and propeller shaft extending from said frame and said casing and connected to said reversible drive and said motor respectively.

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REFERENCES CITED

The following references are of record in the file of this patent:

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