Jan. 12, 1937 F. A. CHRISTIANSEN 2,067,258

TOY AEROPLANE

Original Filed Nov. 4, 1935 2 Sheets-Sheet 1

Fig. 1

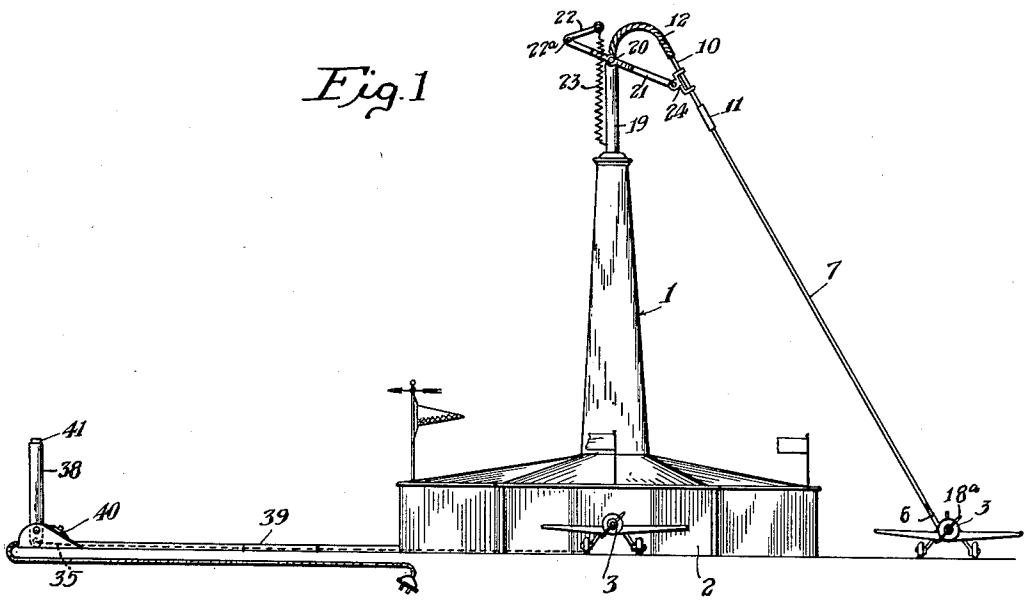


Fig. 2

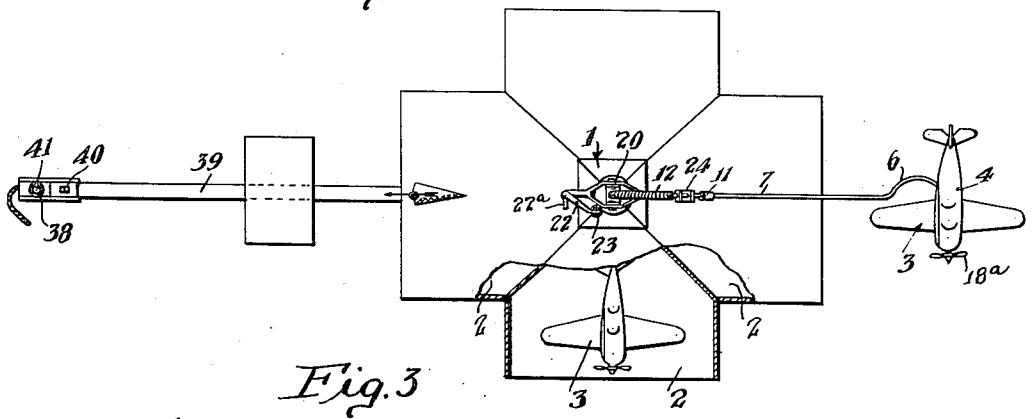


Fig. 3

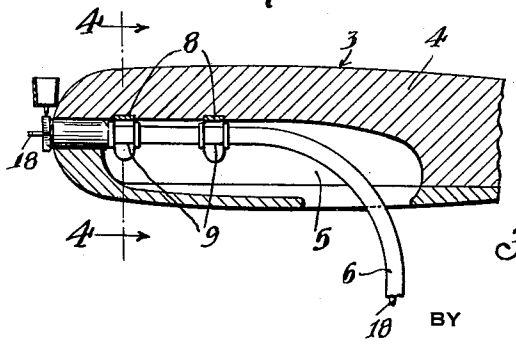
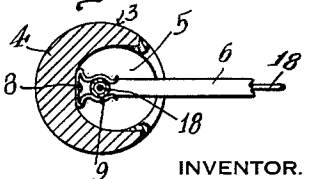


Fig. 4



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Fig. 5

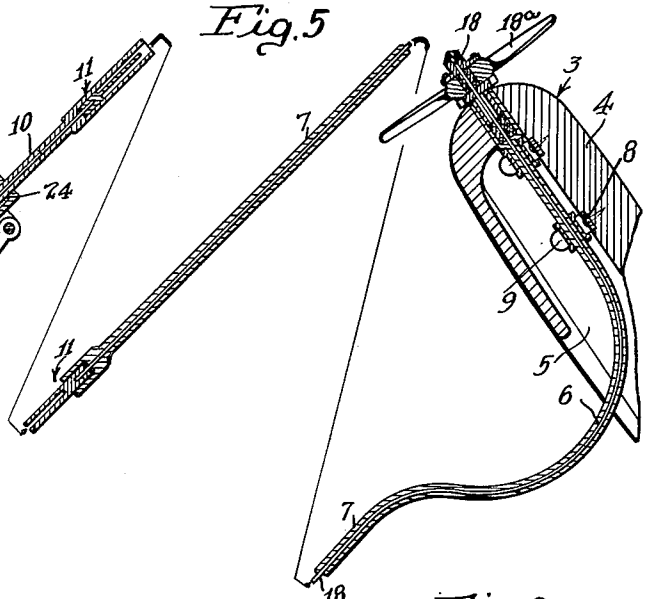


Fig. 9

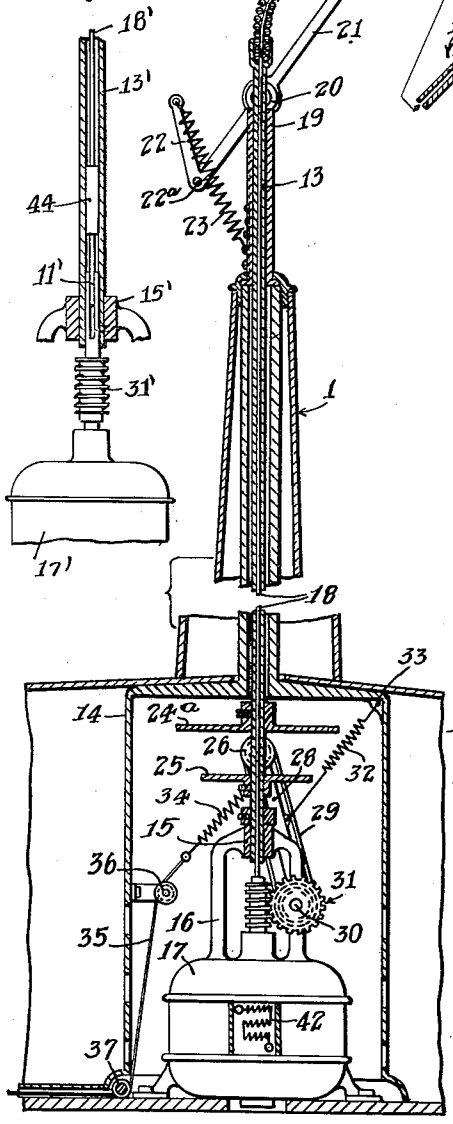


Fig. 8

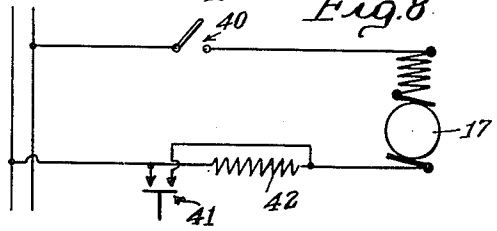


Fig. 7

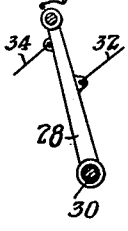
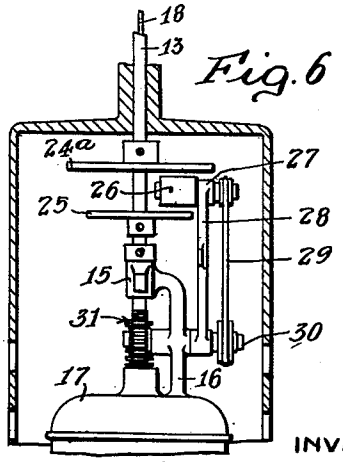


Fig. 6



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Patented Jan. 12, 1937 2,067,258

UNITED STATES PATENT OFFICE

2,067,258

TOY AEROPLANE

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Application November 4, 1935, Serial No. 48,151
Renewed November 23, 1936

11 Claims. (Cl. 272—31)

This invention relates to a toy aeroplane apparatus.

It is the general object of the invention to provide a toy aeroplane apparatus, in which the flight of the aeroplane can be manually controlled by an operator so as to cause the aeroplane to pass through different flight maneuvers while in operation.

More specifically, it is the general object of the present invention to provide an aeroplane which can be caused to fly around a supporting standard through an electrically driven aeroplane propeller, the speed of which is subject to variation during flight of the aircraft, and to associate with an aeroplane toy of this class means by which the angle of flight of the aeroplane may be controlled manually during its flight, permitting the operator to cause the aeroplane to rise or descend, loop, or pass through other fanciful flight maneuvers.

Various further objects and advantages of the present invention will be apparent from a description of the preferred form or example of an aeroplane toy embodying the invention. For this purpose, I have hereinafter described one form or example of an apparatus embodying the invention, in which,—

Figure 1 is an elevation of the toy.

Figure 2 is a plan view.

Figure 3 is a fragmentary section, taken longitudinally through the axis of the aircraft.

Figure 4 is a section on the line 4—4 of Figure 3.

Figure 5 is an enlarged elevation, mainly in vertical section with a supporting tube elevated from the position shown in Figure 1 and with the different sections separated.

Figure 6 is a fragmentary elevation of the motor enclosing standard.

Figure 7 is a view of an arm employed in the controlling mechanism.

Figure 8 is an electrical diagram showing the electrical circuits used in the apparatus.

Figure 9 is a fragmentary sectional elevation of a modified form of connection between the motor and shafting.

Referring to the drawings, the toy aeroplane apparatus comprises a standard 1, the lower end of which is shown as enlarged and provided with a number of toy aeroplane stalls 2, in which different toy aeroplanes 3 to be attached to the apparatus may be placed. Each toy aeroplane is provided with a fuselage member 4, which has an opening 5 for receiving the curved end 6 of a tube 7, and within the opening 5 a curved end 6 of the tube is provided with attaching devices 8, by means of which the end thereof may form a bearing for the propeller shaft disposed longitudinally with respect to the aircraft. The attaching means 8 have grip jaws 9, as illustrated in Figure 4, by means of which the curved end of the tube 6 may be readily disconnected from the toy aeroplane, and another aeroplane of similar construction but different ornamentation or form may be substituted therefor.

The tubular rod 7 may be coupled to a further tubular rod 10 by means 11. The tubular rod portion 10 is connected, in turn, by a flexible coil spring section 12 to a vertically rising tube 13. The tube 13, in turn, extends through the standard 1 of the apparatus and enters a motor housing 14, where it is provided with a bearing 15 on a bracket 16 arising from the frame of electric motor 17.

The electric motor 17 is shown as having its shaft connected with the flexible shaft drive 18, which extends through the tubes 13, 12, 10 and 7 to the toy aeroplane, where such flexible shaft is connected to a propeller 18a.

Means are provided for substantially balancing the weight of the flexible shaft drive and tubular supports therefor, said means comprising a tube 19 telescoped over the tube 13 and provided at its upper end with a bearing 20 for a crank arm 21. The crank arm 21 is provided with the upwardly bent portion 22, the upper end of which is attached to one end of the spring 23, the other end of the spring 23 being attached to the tube 19. The opposite end of the crank arm 21 is pivotally connected to a slide 24 engaging the tube 10. It will be seen by reference to Figure 1, the spring 23 moves over closer to the post when the aeroplane is resting on a surface, that is, when it is in its lowest position. As the aeroplane rises from the ground the upper end of the spring 23 moves away from the bearing 20 and when the arm 7 reaches a substantially horizontal position the upper end of the spring is furthest away from the bearing 20 and exerts in this position a stronger pull on the arm 22 than in any other position. It will be noted that the spring has moved back some with the parts in the position shown in Figure 5 and in which position the tubular rod 11 and rod 7 are in a position above the horizontal. At this point the pin 22a comes in contact with the spring 23 and restrains the further upward motion of the plane in order to prevent any substantial movement beyond the point at which the plane is now elevated. These various parts act as a counterbalancing means

for the weight of the plane. The plane is counterbalanced by these parts in all of its positions, that is, in the position shown in Figure 1 and in other positions the plane assumes as it rises from its supporting surface until it reaches the position it will assume with the tubes 10 and 7 in the position shown in Figure 5. As shown in Figure 1 a minimum leverage is imposed on the arm 21 by the spring 23. As stated above this leverage increases until the arm 7 and plane are in substantially horizontal position, the leverage decreasing as the parts 10 and 11 approach the position shown in Figure 5, thus compensating for the weight of the plane and supports therefor in all positions of the plane. In operation, the spring 23 normally provides a pressure seeking to elevate the tubes 7 and 10 until the line of the spring 23 passes the center point defined by the bend 22 in the lever 21, at which time, due to a past center effect, the spring prevents the rods 7 and 10 from flying upwardly. The net effect of this arrangement is to normally apply a force tending to balance the weight of the mechanisms connected with the toy aeroplane, so that the propeller 18a is capable of applying air forces to the wing surfaces of the toy aeroplane, which will permit the toy aeroplane to move upwardly or downwardly substantially unhampered by the weight of the supporting mechanism. In case, however, the flight of the aircraft reaches too high a point, the spring 23 provides a control timing to prevent further upward motion.

Within the motor housing 14 of the apparatus the tube 13, which encloses the flexible shaft drive 18, is provided with two spaced apart controlling flanges 24a and 25. These flanges, together with means hereinafter pointed out, provide a mechanism by which the shaft 13 which drives shafts 10 and 7 may be rotated in either direction from the source of the motor 17 while the aircraft is in motion, the control of the operation being manual. The effect of rotating the shaft 13 is due to the curved connection between the shaft 7 and the aeroplane to the curved portion 6 over tubular shaft 7 to tilt the angle of the aeroplane relative to the horizontal in such a way that the propeller 18a is capable of causing the aircraft to seek an upward or downward direction of travel, depending upon the direction of rotation of the shafts 13, 10 and 7. All sorts of fancy flight maneuvers may thus be caused to take place by the operator, including loop-the-loop, etc. The control means associated with the friction disks 24a and 25 include a friction clutch roller 26, which is journalled in one end 27 of a control lever 28 (see Figure 7). The roller 26 is provided with a pulley drive 29 to a shaft 30, supported by the frame of the motor 17, which shaft is provided with a worm wheel drive 31 connecting with the shaft of the motor 17. The lever 28 near its center is attached to one end of the spring 32, the other end 33 of which is attached to the upward and outward portion of the motor housing 14. The spring 32 thus provides a course normally tending to press the friction drive or clutch roller 26 in engagement with the upper disk 24a. Near the upper end of the lever 28 is attached a second spring 34, the other end of which is attached to a control line 35 passing over rollers 36 and 37 and, hence, to a manually controlled lever 38. The manually controlled lever 38 is mounted at the end of sectional rods 39 attached to the housing of the apparatus. Near the control lever 38 an electrical switch 40 is shown, and within the top of the lever 38 a further push button switch 41 is formed. These switches are electrically connected with the motor 17 of the apparatus in the manner shown in Figure 8. The main switch 40 is connected to the electrical motor, diagrammatically indicated at 17, and, hence, through a resistance 42, which is adapted to be shorted by the push button 41.

With the apparatus thus described, the operations are as follows:

When the switch 40 is closed, the motor 17 commences to operate, but at a reduced speed. By closing the switch 41, a higher speed of operation may be secured through shorting the resistance 42. These two speeds of operation clearly facilitate control of the aeroplane in different motions of flight.

The motor 17 drives the aeroplane propeller 18a, which causes the aeroplane to be driven forward, flying a circular path around the standard. By moving the control lever 38 forward or backward, the roller 26 may be caused to make friction drive with either the friction disks 24a or 25. Engagement with one of these disks tips the aeroplane upwardly by proper rotation of tubes 13, 19, 10 and 7, while engagement with the other disk tips the aeroplane downwardly by reverse rotation of such tubes. In this manner, the operator of the aircraft has complete control over both the speed of the aircraft and its flight motion, being able to cause the toy aeroplane to go through many intricate maneuvers.

Referring to Figure 9 in the modified form illustrated, the motor 17' is shown provided with the worm gear 31' as before and with its shaft leading through a bearing 15' and there telescoped into the tube 13'. The flexible shaft drive 18' is shown as provided with the rubber tube 44 and with a slip joint connection 11', by means of which the flexible drive 18' and the motor shaft are rotatably locked together, but some axial play is permitted.

While the particular form of the aeroplane herein described is well adapted to carry out the objects of the invention various modifications and changes may be made without departing from the invention and the invention includes all such modifications and changes as come within the scope of the appended claims.

I claim:

1. A toy aeroplane apparatus including a motor, a flexible shaft drive from said motor to the propeller of a toy plane, a tube enclosing a portion of said flexible shaft drive and attached to said plane in such manner that the rotation of said tube will change the angle of flight of said plane, friction clutch means connected with said tube and with said motor, said friction means being manually adjustable into three operating positions—one a neutral position, the other operative to rotate the tube in one direction and the third operative to rotate the tube in the opposite direction.

2. A toy aeroplane apparatus including a motor, a flexible shaft drive from said motor to the propeller of a toy plane, a tube enclosing a portion of said flexible shaft drive and attached to said plane in such manner that the rotation of said tube will change the angle of flight of said plane, friction clutch means connected with said tube and with said motor, said friction means being manually adjustable into three operating positions—one a neutral position, the other operative to rotate the tube in one direction, and the third operative to rotate the tube in the op-

posite direction, and manually controlled means for creating a variation in power supply to the propeller of said plane during maneuvers thereof.

3. A toy aeroplane apparatus having a tubular plane supporting member, a flexible drive shaft extending through said member and connected to a propeller, motor means for driving said flexible shaft and for turning said tubular member in either direction to vary the angle of flight, and manually actuated clutch means for connecting the motor means to said tubular member.

4. A toy aeroplane apparatus comprising a toy plane and propeller, a motor, a flexible drive shaft from said motor to the propeller of the toy aeroplane for driving said propeller, a hollow tube means enclosing the flexible drive shaft including a plane supporting means rotatable about an axis, and manually controlled means for turning said tube means for varying the angle of flight of said plane.

5. A toy aeroplane apparatus comprising a toy plane and propeller, a motor, a flexible drive shaft from said motor to the propeller of the toy aeroplane for driving said propeller, a hollow tube means enclosing the flexible drive shaft including a plane supporting means rotatable about an axis, and manually controlled means for turning said tube means for varying the angle of flight of said plane, and means acting to counterbalance the weight of the plane until it reaches a certain elevation including means to restrain the upward motion of the plane beyond said certain elevation.

6. A toy aeroplane apparatus comprising a toy plane and propeller, a motor, a flexible drive shaft from said motor to the propeller of the toy aeroplane for driving said propeller, a hollow tube means enclosing the flexible drive shaft including a plane supporting means rotatable about an axis, and manually controlled means for rotating said tube means for varying the angle of flight of said plane, and means acting to counterbalance the weight of the plane until it passes above a certain elevation including means to restrain the upward motion of the plane beyond said certain elevation, said counterbalancing means acting to exert variable leverage to compensate for the weight of the plane with respect to said axis at any position of the plane.

7. A toy aeroplane apparatus comprising a toy plane and propeller, a standard, a motor, a flexible drive shaft from said motor to the propeller of the toy aeroplane for driving said propeller, a hollow tube means enclosing the flexible drive shaft including a plane supporting means connected to said standard and rotatable thereabout as an axis, and manually controlled means for turning said tube means for varying the angle of flight of said plane.

8. A toy aeroplane apparatus comprising a toy plane and propeller, a motor, a flexible drive shaft from said motor to the propeller of the toy aeroplane for driving said propeller, a hollow tube means enclosing the flexible drive shaft and adapted to support said plane, manually controlled means for turning said tube means for varying the angle of flight of said plane, and spring gripping jaws attached to the interior of said plane for detachably gripping said hollow tube, means whereby the plane may be detachably mounted thereon.

9. A toy aeroplane apparatus having a tubular plane supporting member, a flexible drive shaft extending through said member and connected to a propeller, motor means for driving said flexible drive shaft and for turning said member in either direction to vary the angle of flight, and manually actuated clutch means for connecting the motor means to said member, said clutch means comprising a plurality of disks, driving means located between said disks, and means driven by said motor means for rotating said driving means.

10. A toy aeroplane apparatus having a tubular plane supporting member, a flexible drive shaft extending through said member and connected to a propeller, motor means for driving said flexible drive shaft and for turning said member in either direction to vary the angle of flight, and manually actuated clutch means for connecting the motor means to said member, said clutch means comprising a plurality of disks, a friction clutch roller located between said disks, and means driven by said motor means for rotating said friction clutch roller.

11. A toy aeroplane apparatus comprising a toy plane and propeller, a motor, said motor having a rigid shaft, a flexible drive shaft from said motor shaft to the propeller of the toy aeroplane for driving said propeller, a hollow tube means enclosing the flexible drive shaft including a plane supporting means rotatable about an axis, and manually controlled means for turning said tube means for varying the angle of flight of said plane, a connection between said motor shaft and flexible drive shaft permitting axial play between said shaft and flexible drive shaft.

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