Feb. 25, 1930. A. LEACH 1,748,421

TOY AIRPLANE

Filed Nov. 30, 1928 3 Sheets-Sheet 1

Fig. 1

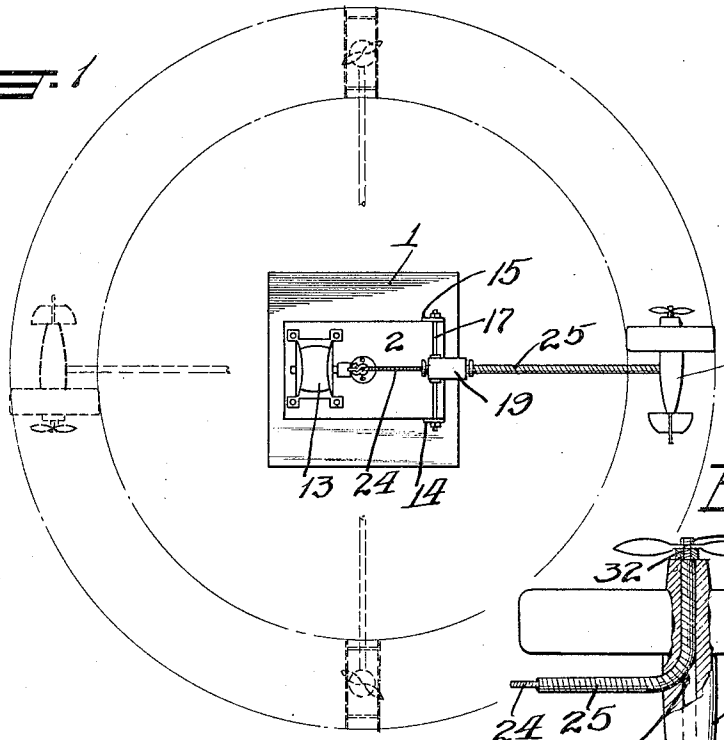


Fig. 3

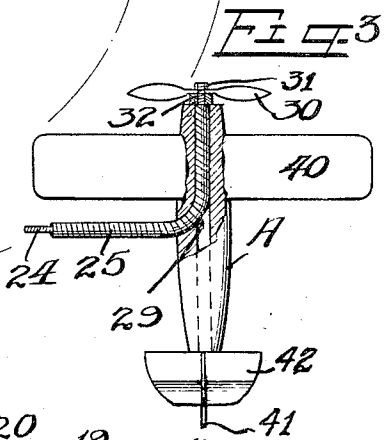
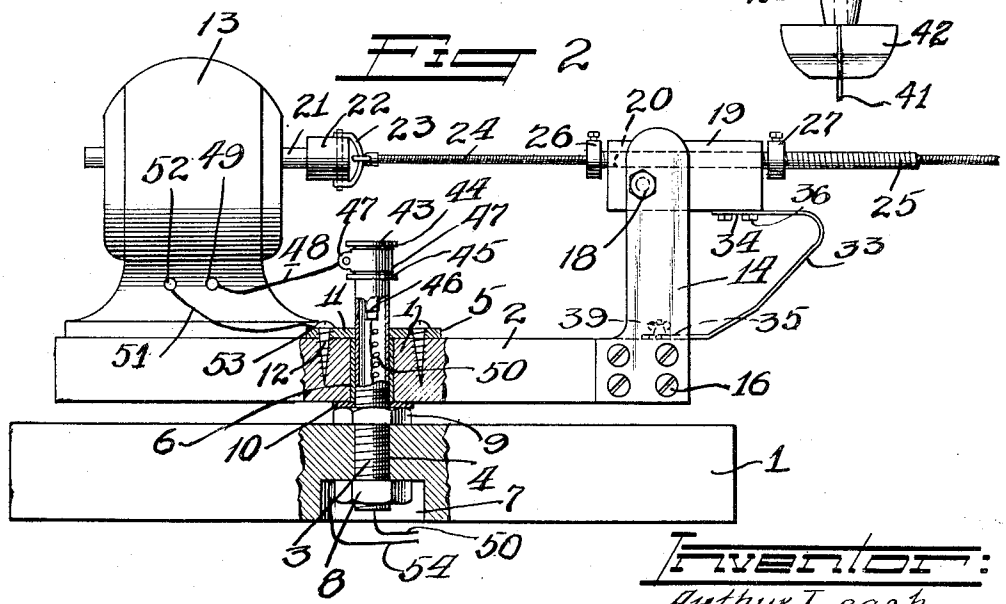


Fig. 2



Inventor:
Arthur Leach

By: Attys.

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Fig. 4

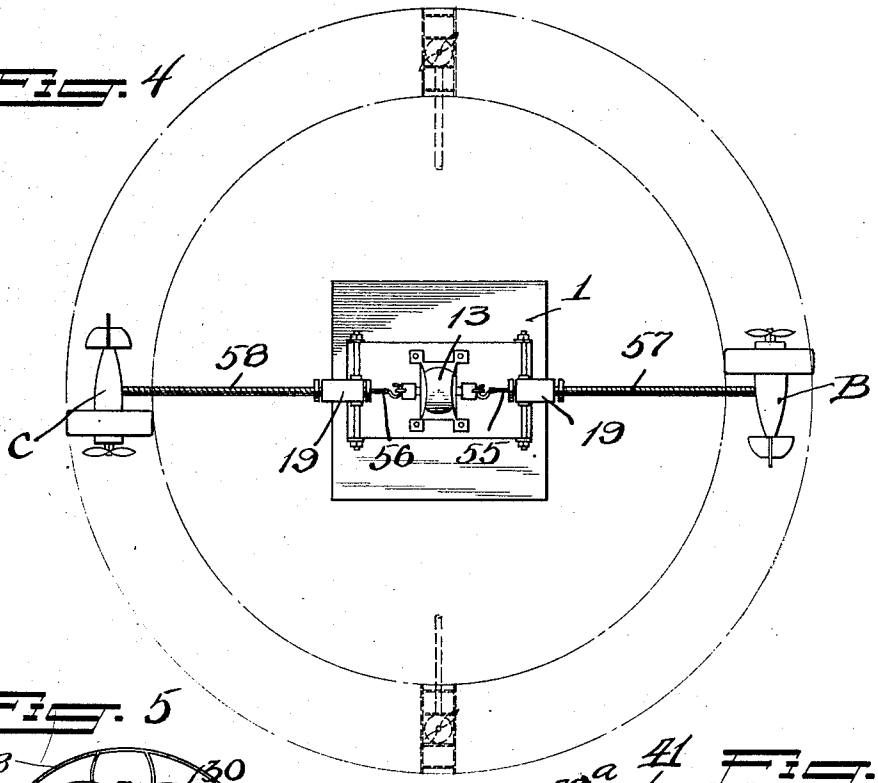


Fig. 5

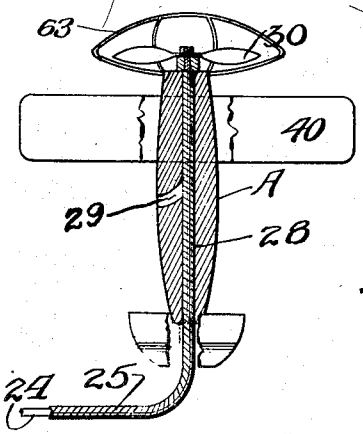


Fig. 6

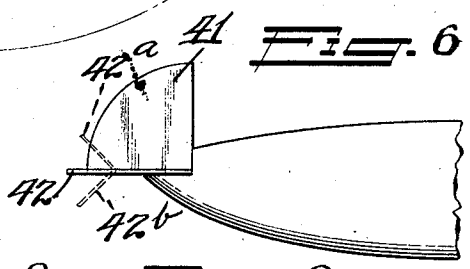


Fig. 7

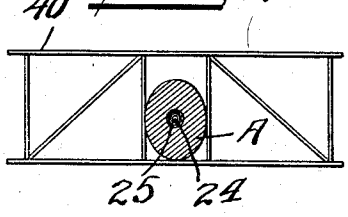


Fig. 8

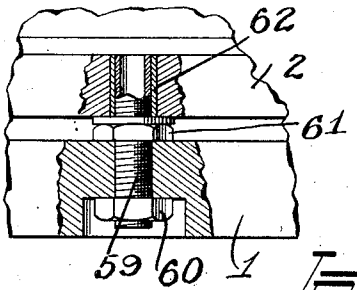
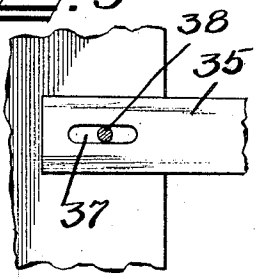


Fig. 9



Inventor:
Arthur Leach

By: Charles Tolley
Atty.

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TOY AIRPLANE

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Fig. 10

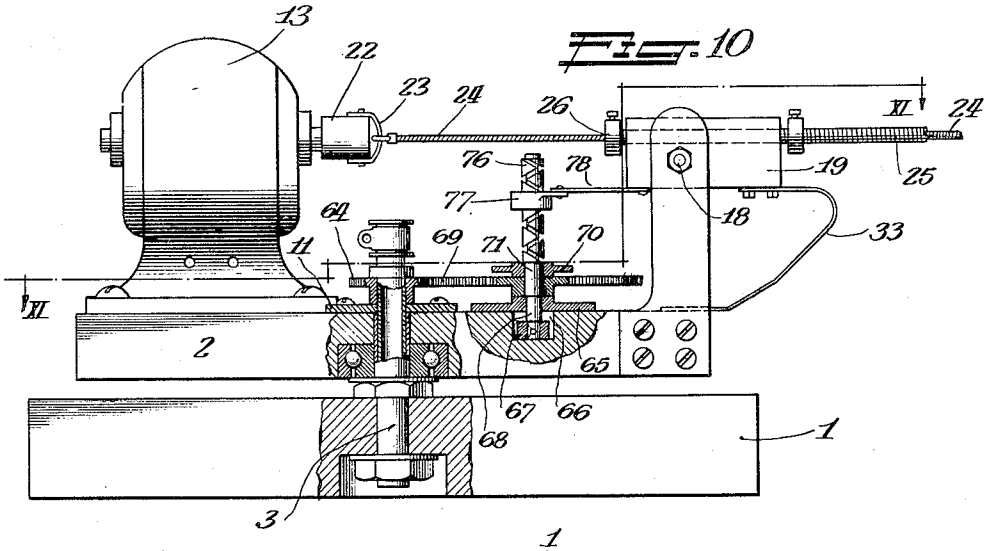
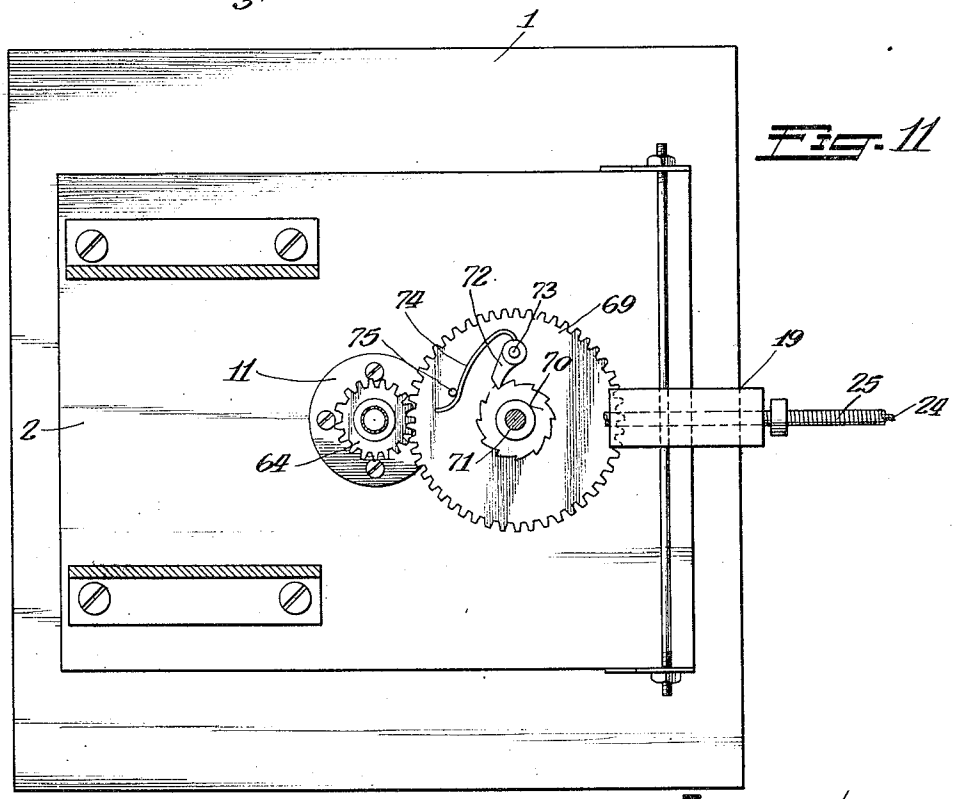


Fig. 11



Inventor:
Arthur Leach,
By: Attys.

Patented Feb. 25, 1930 1,748,421

UNITED STATES PATENT OFFICE

ARTHUR LEACH, OF KENOSHA, WISCONSIN

TOY AIRPLANE

Application filed November 30, 1928. Serial No. 322,638.

This invention relates to a toy airplane and has to do more particularly with an electrically driven airplane which is so supported as to be readily adjusted to travel on even keel, loop the loop, or spiral.

An object of the invention is to provide a toy airplane which is driven by rotation of its propeller and so supported as to be readily adjusted to loop the loop in large or small loops, spiral about its longitudinal axis, fly on an even keel, or in other positions.

Another object of the invention is to provide an electrically driven toy airplane which is carried by a flexible support in such manner as to operate in any of several adjusted positions.

A further object of the invention is to provide an electrically driven airplane in which its propeller is connected by a flexible shaft to the shaft of an electric motor in a manner to fly said plane in any of a plurality of different positions.

A still further object of the invention is to provide a toy airplane in which a plane is supported by a flexible member whereby said plane may loop the loop in great or small loops.

A yet further object of the invention is to provide an electrically driven toy airplane which is of strong and durable construction, economical to manufacture and efficient in operation.

The above, other and further objects of the invention will be apparent from the following description, drawings, and appended claims.

According to the invention, a turntable is supported by a base and an electric motor is carried by the turntable. A flexible shaft connects the motor shaft to the airplane propeller while a bendable member supports said plane outwardly of the turntable and in such manner as to be operated easily by the flexible shaft whereby the airplane may be driven by the motor in any of a plurality of different positions on its bendable supporting member.

One form of the invention is illustrated in the accompanying drawings and the views thereof are as follows:

Figure 1 is a top plan view showing in full lines an embodiment of the invention and in dotted lines the various positions assumed by the airplane in looping the loop while making one circuit of the path of movement of the plane.

Figure 2 is an enlarged side elevational view with parts in section of the turntable, electric motor and a portion of the driving shaft.

Figure 3 is a top plan view partially in section of a toy airplane which may be employed in connection with this invention.

Figure 4 is a view similar to Figure 1, showing two airplanes mounted at diametrically opposite positions on the turntable.

Figure 5 is a longitudinal sectional view through an airplane showing the airplane mounted in a different manner on the flexible member than that shown in Figure 3.

Figure 6 is a side elevational view of the stern of an airplane showing in full lines the rudders and in dotted lines positions to which the horizontal rudder may be moved.

Figure 7 is a vertical section through one of the toy airplanes.

Figure 8 is a fragmental view partially in section of a modified connection between the turntable and its support.

Figure 9 is a fragmental top plan view of a portion of the turntable showing manner of securing the movable end of an adjusting spring which cooperates with the bendable member supporting the airplane and which adjusting spring serves as a shock absorber under certain conditions.

Figure 10 is a side elevational view partially in section of one means for rocking the block which supports the bendable member carrying the airplane to impart vertical movement to the airplane while the same is traveling in a circular path under influence of the motor.

Figure 11 is a sectional view taken on line XI—XI of Figure 10.

As shown on the drawings:

The embodiment of the invention illustrated in the accompanying drawings, comprises a base 1 which may be of wood, metal,

or any other material, and which may be of any suitable size and shape.

A turntable 2 is pivotally supported on the base 1 by a pipe 3 passing upwardly through an opening 4 in the base 1. The turntable 2 has a central vertical opening 5 in which is mounted a bushing 6 through which bushing the upper end of the pipe 3 passes. The under surface of the base 1 is provided with a recess 7 in which may be freely turned a nut 8 on the end of the pipe 3. A second nut 9 on the pipe 3 is screwed against the upper surface of the base 1 so as to securely fasten the pipe 3 in said base. A washer 10 is interposed between the top side of the nut 9 and the under surface of the turntable 2 to reduce friction as said turntable is rotated.

A metallic plate 11 is fastened to the top side of the turntable 2 and surrounds the pipe 3, said plate being secured by screws 12 or other suitable attaching means.

The turntable 2 is shown in the accompanying drawings as being oblong, although of course the shape and size of the turntable may be made as desired.

An electric motor designated generally at 13 is in the present instance fastened at one end of the turntable 2. Spaced uprights 14 and 15 are secured near the other end of the turntable 2 by means of screws 16 or the like. A shaft 17 is supported near the upper end of the members 14 and 15 and is retained in said members by means of nuts 18.

An elongated block 19 is pivotally mounted on the shaft 18 with the pivotal connection near one end of said block. The block 19 has an aperture 20 extending from end to end of said block and arranged above the pivotal connection with the shaft 17.

The motor 13 is provided with the usual motor shaft 21 which in the present instance is shown as having a coupler 22 arranged at one end of said shaft, which coupler carries a stirrup 23 to which is attached one end of a flexible driving shaft 24.

A flexible member or tube 25 passes through the hole 20 in the block 19 and is secured in said block by means of collars 26 and 27 fastened to said tubing at each end of the block 19 so as to prevent longitudinal movement of said tubing while permitting rotation of the same. The collars 26 and 27 are spaced a sufficient distance from the block 19 as to allow rotation of the tubing 25 as will be more fully explained.

A toy airplane A having a body provided with an axial opening 28 extending from end to end of the body and a lateral opening 29 communicating with the axial opening 28.

The airplane A may be arranged on the end of the tube or member 25 in various ways. Figure 3 shows the outer end of the tubing 25 passing through the lateral opening 29 of the airplane A and extending through the axial passageway 28 to the end of the body. The flexible shaft 24 has a solid threaded piece of shaft welded to the end and passes through the tubing 25 and extends beyond the end of said tubing where said shaft 24 is connected to the airplane propeller 30 by nuts 31 and 32 arranged one on each side of the center of said propeller whereby said propeller is securely clamped to the flexible shaft 24. Figure 5 shows the tube in a bent position 25 inserted in the rear end of the axial opening 28 through the body A and projecting at the front end of the airplane to support the propeller 30 and the outer end of the flexible shaft 24 in the same manner as supported in the arrangement of Figure 3.

A flat spring 33 is bent into somewhat U-form in shape with the free ends 34 and 35 thereof parallel. The end 34 is attached to the block 19 by bolts 36. The end 35 of the spring 33 is provided with a slot 37 through which projects a screw 38 on which is arranged a wing nut 39 whereby the end 35 of the spring may be moved inwardly or outwardly with respect to the end of the turntable 2 for adjusting the effect of said spring.

The spring 33 serves as a shock absorber for block 19 as the airplane A is moved in a circuitous path about the pivot pin 3 between the base 1 and the turntable 2. It also serves as an adjustment of the angular longitudinal positioning of the block 19 for effecting the degree of movement of the airplane as will be more fully explained.

The airplane A is provided with the usual wings 40, a vertical rudder 41 and a horizontal rudder 42. The rudders are arranged on the body of the airplane so as to be moved for controlling the directions of movement of the airplane as the same is swung about the pivot 3 of the turntable 2.

The pipe 3 is provided with a cap 43 having preferably top and bottom annular flanges 44 and 45 and with an inwardly extending plug 46. A collar 47 is arranged on the head 43 between the flanges 44 and 45 and is provided with a clamp 47 whereby one end of an electrical conductor 48 is connected to the cap 43. The other end of the conductor is connected to a binding post 49 on the motor. A conductor 50 is electrically connected to the plug 46 of the cap member 43 and passes downwardly through the pipe 3 and connected outwardly of the base 1 to one terminal of a power source. The conductor 50 is insulated as is the cap 43 insulated from the pipe 3.

Another conductor 51 is connected at one end to a motor connection 52 and at the other end to a binding post 53 on the plate 11. A conductor 54 is soldered or welded to the end of pipe 3 so as to form the other side of the electrical circuit which circuit includes the conductor 54, the pipe 3, the plate 11 and a conductor 51 connected between the motor and the plate 11.

Figure 4 of the drawings shows an arrangement of two airplanes supported on the turntable 2 which airplanes are driven by a single motor 13 which is connected to the flexible shafts 55 and 56, connected to the propellers of the airplanes B and C. The flexible shafts 55 and 56 are carried in bendable tubes 57 and 58 supported in blocks similar to block 19 heretofore described in connection with Figures 1 and 2 of the drawings. The operation of the arrangement of Figure 4 is exactly the same as that described with reference to Figures 1 and 2.

Figure 8 of the drawings shows a modified form of connection between the base 1 and the turntable 2. A hollow pipe 59 is fastened to the base 1 by a nut 60 and 61 with the upper end of the pipe terminating flush with the upper surface of the turntable 2. A bushing 62 surrounds the pipe 59 where the same passes through the turntable 2. Electrical connections to the motor may be made in a manner described with reference to Figure 2 or in any other suitable manner.

The airplanes of the invention may be set to operate in any of several manners. The air plane A arranged as shown in Figures 1 and 3 of the drawings may be set to travel on an even keel through a circular path. The rudders 41 and 42 would then be in proper vertical and horizontal position respectively to maintain the airplane on its even keel. The horizontal rudder 42 may be moved to the position 42^a shown in Figure 6 whereupon the airplane A would loop the loop backwardly, that is with the front end moving upwardly and the rear end downwardly. The degree of inclination of the rudder 42 would determine the number of loops the airplane made during one cycle of movement of the same. Movement of the rudder 42 into the position 42^b would cause the airplane A to loop the loop forwardly, that is with the front end going downwardly and rear end going upwardly. The airplane A arranged as shown in Figure 5, that is with the flexible tube passing completely through the axial opening 28 in the plane body, with the horizontal rudder 42 in horizontal position, would cause the airplane to spiral about the forwardly extending portion of the tube 25.

The tube 25 might be bent at an angle to the positions shown in the drawings and the airplane arranged as shown in Figures 1 and 3 whereupon the airplane would loop the loop in loops of greater or less extent depending upon the angular displacement of the end of the tube 25. It will be observed that when the motor is started, the airplane will travel in a circle suspended in the air, the propeller being driven by the motor. Adjustment of the spring 33 serves to adjust the block 19 to aid in the loop the loop movement of the plane. The outer end of the block 19 as viewed in Figure 2 might be raised by moving the end 35 of the spring 33 to the right as shown in Figures 2 and 9 whereupon greater extent would result in the loop the loop movement of the plane. It is of course obvious that the plane can be arranged on the flexible tube 25 to fly in upside down position or might be arranged to fly with the body pointing straight up, in which event the pull of the propeller would act to hold the airplane in its vertical position.

It is desirable that means be provided to move the airplane vertically as the same travels in a circular path so that the air plane will simulate the idea of starting from the ground and rising to a height in the air and returning to the ground.

One form of such means is illustrated in Figures 10 and 11 of the drawings and as there illustrated includes a gear 64 fixed on the upper end of the pipe pivot 3 in such manner as to be non-rotative with respect to said pipe. A base plate 65 is secured to the top side of the platform 2 in any suitable manner. The platform 2 is recessed at 66 to receive a bearing 67 supporting the lower end of a shaft 68. A gear 69 is supported on shaft 68 and in mesh with the gear 65 on the pipe 3, so that when the turntable 2 rotates about its pivot the gear 69 will turn about its shaft 68. A ratchet wheel 70 is arranged on a shaft 71 so as to turn with said shaft when the ratchet is turned. A pawl 72 is pivoted at 73 to the gear 69 and is normally retained in engagement with the ratchet wheel 70 by a spring 74 attached at one end to the pawl 72 and arranged to engage a pin 75 for effecting engagement between the pawl and the ratchet.

The shaft 71 has an upwardly projecting portion 76 in which is cut a compound spiral. A traveler 77 is disposed on this portion of the shaft having a tongue engaging the spiral so as to move vertically when the shaft 71 is rotated. The provision of the compound spiral causes upward and downward movement of the traveler 77 by reason of the engagement between this traveler and the compound spiral. A yieldable member 78 connects the traveler 77 with the block 19 so as to rock said block about its axis 18 thus oscillating the same.

The operation of this oscillating mechanism is as follows. The motor being started, it drives the propeller on the airplane attached at the outer end of the bendable support 25 whereupon said airplane begins its movement in a circular path. The gear 69 turning with the platform 2 about the fixed gear 65 imparts rotation to the shaft 71 thus causing upward and downward movement of the traveler 77 which movement is imparted to the block 19 by the connection 78 thus rocking the block. The spring 33 serves as a dampener in this oscillating movement so that the travel of the airplane is smooth in every respect. Should it be desired to dis-

connect the parts to prevent oscillation of the block, then the spring 74 would be disengaged from the pin 75 whereupon the pawl 72 would be moved out of engagement with the ratchet 70 and continued operation of the motor 13 would not move the block 19 in a manner to oscillate and thus carry the airplane upwardly and downwardly as it does when the pawl is in engagement with the ratchet.

The arrangement of Figure 4 compounds the airplane movement of that described with reference to Figures 1 and 2 of the drawings. It might so happen with an arrangement like Figure 4 that one airplane could be arranged to loop the loop and the other arranged to fly in spiral directions. It is of course obvious that other arrangements of the planes on the flexible tube may be made commensurate with the arrangement, size and style of the parts entering into the device.

The dotted line positions of the airplane shown in Figures 1 and 4 show the same in certain positions in loop the loop movements.

It will be observed that the toy airplane of this invention possesses many excellent features. The construction of the device is sturdy and durable and the parts are made of such materials as will last for a long time under severe conditions of use.

The arrangement of the device as shown in Figure 4 consists in duplication of parts illustrated and described in and with reference to Figures 1 and 2 of the drawings.

It will be observed that with the device arranged as shown in Figures 1 and 2 of the drawings that the motor 13 serves as a counterbalance for the airplane and its supporting tube 25 so that the turntable 2 will operate at all times uniformly and with minimum amount of friction and play.

A screen or like guard 63 may be positioned on the airplane body to prevent breaking the propeller, as well as serving as a protection from injury to anyone playing with the toy.

The tubing which supports the airplane and surrounds the flexible driving shaft 24 has been described herein as a flexible tube and has been shown in the drawings as a spiral tube, but it is to be understood that such term and such drawing is used generally and not by way of limitation as any kind or style of bendable tubing spirally wound or otherwise made may be substituted and used for the purpose of supporting the airplane.

Any type of airplane may of course be used with this invention other than the particular one illustrated.

Rigid tubing might be used for supporting the airplane and enclosing the driving shaft, yet flexible connections would then have to be used to connect short lengths of the rigid tubes for allowing angular adjustment of the airplane.

The invention has been described herein more or less precisely, yet it is to be understood that changes may be made in the arrangement and proportion of parts and that equivalents may be substituted without departing from the spirit and scope of this invention.

I claim as my invention:

1. A toy airplane including a turntable, a flexible member supported on said turntable and extending outwardly thereof, a flexible shaft carried by said member, a toy airplane having a propeller on said member and having its propeller connected to said shaft, and means on said turntable for driving said shaft.

2. A toy airplane including a turntable, a flexible member supported on said table and extending outwardly thereof, a flexible shaft carried by said member, a toy airplane having a propeller mounted on said flexible member and having its propeller connected to said shaft, said plane arranged to be secured to said flexible member in a plurality of positions, and means on said turntable for driving said shaft.

3. A toy airplane device comprising a base, a turntable supported on said base, an electric motor on said turntable, a flexible tube supported on said turntable and extending beyond the same, a toy airplane having a propeller mounted on the end of said member, and a flexible shaft extending through said tube connecting said motor and a propeller of said airplane.

4. A toy airplane device comprising a base, a turntable supported on said base, an electric motor on said turntable, a pivoted block supported on said turntable, a flexible tube having one end rotatably held by said block and extending beyond the turntable, a toy airplane having a propeller carried on the end of said member, and a flexible shaft extending through said flexible tube connecting said electric motor and the propeller of said airplane.

5. A toy airplane device comprising a base, a turntable supported on said base, an electric motor on said turntable, a pivoted block supported on said turntable, a flexible tube having one end rotatably held by said block and extending beyond the turntable, a toy airplane having a propeller carried on the end of said member, a flexible shaft extending through said flexible tube connecting said electric motor and the propeller of said airplane, and a spring connection between said block and said turntable to cushion the movement of said block.

6. A toy airplane device comprising a base, a turntable supported on said base, an electric motor on said turntable, a pivoted block supported on said turntable, a flexible tube

having one end rotatably held by said block and extending beyond the turntable, a toy airplane having a propeller carried on the end of said member, a flexible shaft extending through said flexible tube connecting said electric motor and the propeller of said airplane, and a spring connection between said block and said turntable to vary the angular position of said block within certain limits.

7. An airplane toy comprising a base, a turntable pivoted to said base, a flexible tube supported at one end on said table and extending beyond the same, a toy airplane having a propeller supported by the other end of said tube, a flexible driving shaft extending through said tube and connected at its outer end to the propeller of said airplane, and means on said turntable for operating said drive shaft.

8. An airplane toy comprising a base, a turntable pivoted to said base, a flexible tube supported at one end on said table and extending beyond the same, a toy airplane having a propeller supported by the other end of said tube, a flexible driving shaft extending through said tube and connected at its outer end to the propeller of said airplane, and means on said turntable for operating said drive shaft, said plane arranged to be supported on the end of said tube in a plurality of positions.

9. An airplane toy comprising a base, a turntable pivoted to said base, a flexible tube supported at one end on said table and extending beyond the same, a toy airplane having a propeller supported by the other end of said tube, a flexible driving shaft extending through said tube and connected at its outer end to the propeller of said airplane, an electric motor on said turntable having its shaft connected to said drive shaft, and said tube being flexed to vary the bodily position of said airplane with respect to said motor shaft.

10. An airplane toy comprising a base, a turntable pivotally supported on said base, a flexible tube supported at one end by said turntable and extending beyond the same, a flexible driving shaft extending through said tube, driving means on said turntable for operating said driving shaft, an airplane having a propeller provided with a body member having a plurality of apertures therein for receiving the end of said flexible tube for supporting said airplane thereon in a plurality of positions, and means for connecting the end of said driving shaft to the propeller of said airplane.

11. A toy airplane including a turntable, a member supported on said turntable and extending outwardly thereof, a flexible shaft carried by said member, a toy airplane having a propeller supported on said member and having its propeller connected to said shaft, and means on said turntable for driving said shaft.

12. A toy airplane structure including a turntable, a member supported on said turntable for oscillation, a bendable member carried by said first named member and extending outwardly of the turntable, a toy airplane having a propeller supported by said last named member, a flexible shaft associated with said last named member and connected to the airplane propeller, and means on said turntable for oscillating said first named member.

13. A toy airplane structure including a turntable, a member supported on said turntable for oscillation, a bendable member carried by said first named member and extending outwardly of the turntable, a toy airplane having a propeller supported by said last named member, a flexible shaft associated with said last named member and connected to the airplane propeller, and means including a pawl and ratchet carried by said turntable and connected to said first named member for oscillating the same.

14. A toy airplane structure including a turntable, a member supported on said turntable for oscillation, a bendable member carried by said first named member and extending outwardly of the turntable, a toy airplane having a propeller supported by said last named member, a flexible shaft associated with said last named member and connected to the airplane propeller, and gearing carried by said turntable and including a pawl and ratchet, a shaft having a compound spiral driven by said ratchet, a traveler cooperating with said compound spiral and connected to said first named member for oscillating the same.

In testimony whereof I have hereunto subscribed my name at Kenosha, Kenosha County.

ARTHUR LEACH.