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2,825,562

CONTROLS FOR TOY AIRPLANES

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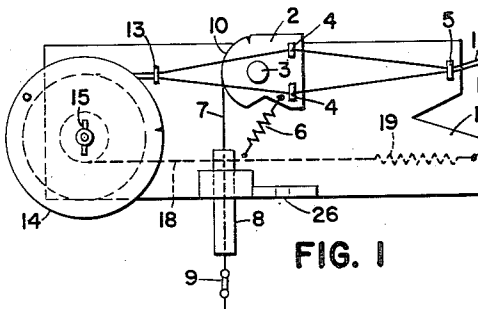


FIG. 1

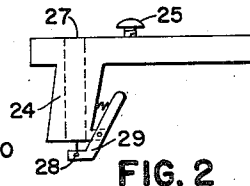


FIG. 2

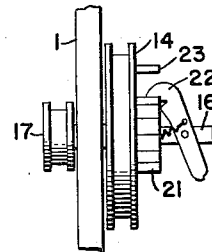


FIG. 5

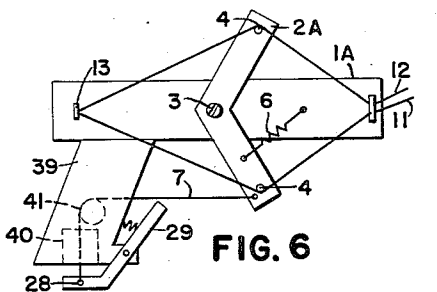


FIG. 6

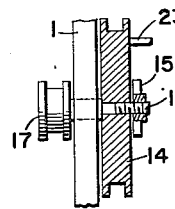


FIG. 4

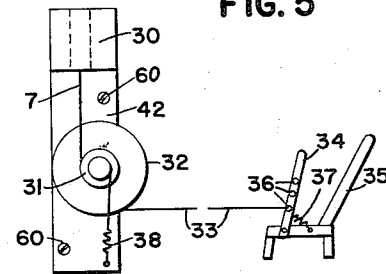


FIG. 3

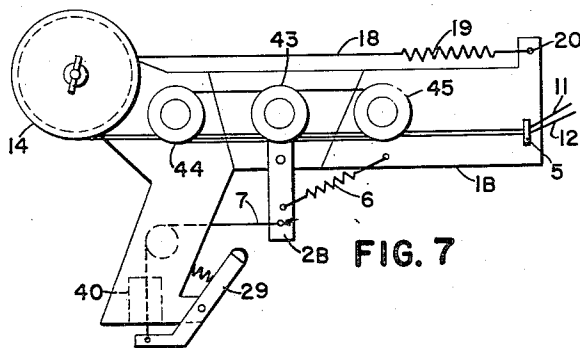


FIG. 7

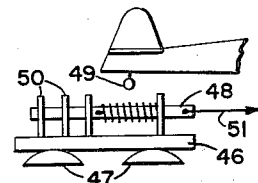


FIG. 8

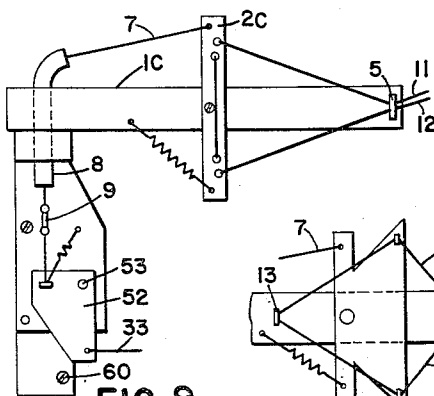


FIG. 9

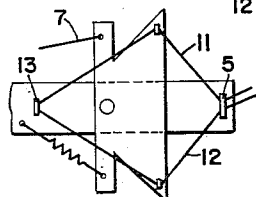


FIG. 11

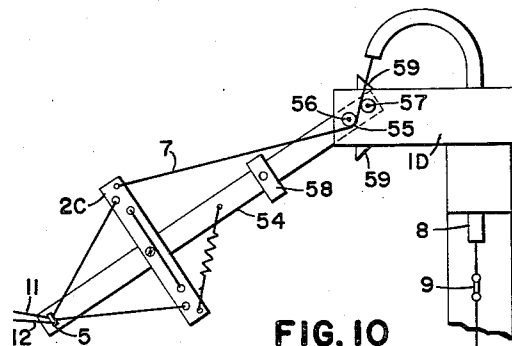


FIG. 10

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CONTROLS FOR TOY AIRPLANES

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1 Claim. (Cl. 272—31)

My invention relates to controls for toy airplanes of the captive power driven type.

As is well known, such planes have heretofore been flown with the pilot operator in the center of the circle of flight. This requires a substantial radius of flight, usually 30 to 60 feet for small planes, in order to avoid dizziness on the part of the pilot operator who must turn with the plane, as well as to give time for his reaction as he tries to turn, watch the plane and avoid undesired arm action at the same time. Among other drawbacks, this requires a large space for a flying area and such space is seldom available in urban areas except at a considerable distance from home.

Moreover, such method of flying commonly requires that an assistant be available to launch the plane. A further objection to such control is the inability to fly satisfactorily in windy weather, as slackening of the control lines when the plane is forced towards the pilot requires running quickly backwards to take up the slack and in that instant control of the plane may be lost, either by slowness or involuntary arm movement of the control. The result is broken propellers, often cracked planes, and frequently discouragement and expense.

The object of my invention is to overcome all of these obstacles and to make it possible to fly from outside the circle which may be as little as 10 feet or less in radius. This permits both backyard flying and indoor flying in halls and gymnasiums. My invention permits control of the plane at all times and automatic taking up of slack in the control lines, thus allowing flight in windy areas and on windy days.

Moreover, my invention permits one man operation as the plane is launched from the circle perimeter, the diameter of which may be varied during flight of the plane, and the operator is outside the perimeter and thus available for the launching operation. Further, because the pilot operator may be as far outside the circle of flight as he desires, in a fixed position and with good vision, and has only to concentrate on control of the path of the plane, stunt flying of a nature heretofore unknown in small plane flight, including close loops, square loops, wing overs and substantial hoverings are readily performed after only a comparatively few minutes of experience, no footwork being required and the control being fixed and not subject to chance arm movement. The only action required is merely the rocking back and forth of a joy stick with the pilot operator standing, sitting or even lying down.

With the foregoing objects in view and other objects, as will be apparent to those skilled in the art as the description proceeds, my invention resides in the combination and arrangement of parts and in the details of construction described in this specification and particularly pointed out in the appended claim, it being understood that changes may be made within the scope of what is claimed without departing from the spirit of the invention. I intend no limitation other than those of the claims

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when fairly interpreted in the light of the full disclosure and the present state of the art.

Referring now to the drawing illustrative of a preferred embodiment of my invention and modifications thereof,

Fig. 1 is illustrative of a preferred embodiment of my invention for mounting on either a hand or fixed center support; Fig. 2 illustrates a form of hand support for the device of Fig. 1; Fig. 3 indicates a preferred form of center support for the device of Fig. 1 and shows a preferred arrangement for control from outside the circle; Figs. 4 and 5 illustrate details of construction; Figs. 6 and 7 illustrate other forms of control for either hand or center post support, embodying features of my invention; Fig. 8 is illustrative of a preferred form of launching device for one man operation; Figs. 9 and 10 are further modifications of the device of Fig. 1 and Fig. 11 is a detail of alternate construction.

Similar reference characters relate to similar parts in all the views.

In Fig. 1, an arm 1 is provided with a spreader or rocker member 2, pivoted as at 3 on the arm 1 and provided with guides 4, 4, positioned on opposite sides of the pivot 3 and forming a triangle therewith and with a guide 5 at the outer end of the arm 1. Rocker member 2 is tensed in one direction by a spring 6 and is pulled in the other direction by an operative control 7 attached thereto and extending through a hollow pivot or shaft 8 and including a swivel 9. Preferably the control 7 is a line fastened to the rocker member and engaging a curved surface 10 thereon having a center at the pivot 3 so that equal travel at any angular position is given by equal take up of the line 7 as spreader 2 is rocked on the pivot 3.

Flexible control lines 11 and 12 are secured to the airplane in the usual manner well known in the art and constitute the connection to define the path traversed by the airplane, one of said lines 11 being an elevator line and the other 12 being a depressor line. Both these control lines pass through the guide 5 and then diverge and pass through guides 4, 4, and may be secured at the guide or point 13 (see Fig. 6) or continue through said guide to the reel 14 rotatably mounted on the arm 1, the discharge point of the reel 13, the pivot 3 and the outer guide 5 preferably being in a straight line in order that the action of guides 4, 4, on the control lines 11, 12, will equalize them, one being taken up and the other payed out in equal amounts.

Reel 14 may be mounted on a shaft 16 (Fig. 4) on the other end of which is a small reel 17 on which a line 18 (Fig. 1) is fixed and engages a spring 19 affixed to the rotating arm 1 at 20. Thus unwinding of the control lines 11, 12, from the reel 14 is opposed by the line 18 winding up on reel 17 against the pull of spring 19 and, likewise, any slackening of the lines 11, 12, results in instant take-up on the reel 14 by the spring 19 rotating that reel.

In operation, the spring 19 is tensed to the desired initial amount by loosening the thumbnut 15 and permitting reel 14 to revolve independently as the control lines 11, 12, are payed out towards the launching position. At the proper point the nut 15 is tightened again to permit tensing of spring 19 to the desired extent as the control lines 11, 12, are pulled further to hook on the plane at the launching point. Then when the plane takes to the air, centrifugal pull may extend lines 11, 12, still further and tense spring 19 to equalize the pull of the plane in normal full flight. As the plane slows down, is maneuvered, or is blown towards the control, the tension of spring 19 keeps the control lines always tight and operable by the action of the rocker arm 2.

By making the reel 14 of substantial effective diameter, say four inches, a single turn will give a takeup of over a foot and by making reel 17 of effective diameter of, say, a third of an inch, the length of line 18 may be kept to

small proportions and yet reel up many feet of slack in the lines 11, 12. Actually in practice, there is no slack in lines 11, 12, as the spring action on the reel 14 keeps such lines tight at all times. Thus there is provided a method of flying captive power driven planes with control lines tight at all times so as to give instant response at all times to the pilot's direction.

A preferred mounting of reel 14 is shown in Fig. 5 wherein the reel 14 is provided with a clutch arrangement consisting of a gear type or toothed member 21 engaged by a spring pressed locking member 22 pivoted to shaft 16, which serves to permit reel 14 to turn with the spring reel 17 but by manual pressure by the pilot will release the toothed member, permit reel 14 to turn independently and pay out control lines 11, 12, together, even when the plane is in flight, and yet serve to hold the tension of spring 19. After paying out of the control lines, release of the locking member 22 to re-engage member 21 will permit flight at a greater radius and still under the tension of spring 19 on the control lines 11, 12. Also, if desired, the lock 22 being released and held, the lines 11, 12, may be drawn in to decrease the circle flown, by winding up the reel manually, a handle 23 being provided for that purpose. At the end of the flight the control lines disconnected from the plane may be wound up on the reel for storage, tension on spring 19 being released at the same time.

If it is desired to fly from the center of the circle by hand control, the device of Fig. 1 may be set in the support 24 of Fig. 2, being fastened thereto by the screw 25 placed through a suitable opening 26 in arm 1, the hollow pivot 8 being inserted in the tubular opening 27 and the operative control line 7 fastened as at 28 to a spring pressed control trigger 29 which is grasped by the fingers of the hand holding the support 24, pressure thereon or release of pressure therefrom acting to control the path of the airplane by the operation of the rocker member 2 tensing one of the guide lines 11, 12.

Preferably, however, the device of Fig. 1 is rotatably mounted in a suitable socket 30 of a support 42 (Fig. 3), which support is positioned in the center of the flying circle. Screws 60, 60, are provided to secure the support 42 to a rigid stake, a tool box, weight, fence post or other fixed object available. The control line 7, with the swivel 9, may be fastened to a small wind up reel or segment 31 for the same technical reasons as impel the use of the curved surface 10 on the rocker arm.

The reel or segment 31 is connected to turn with an operating line reel 32, the operating line 33 itself extending from reel 32 to a joy stick 34 pivoted on a seat 35 or otherwise mounted, holes 36 being positioned to give various leverages, the lesser leverage on the operating line with line 33 fastened at the upper opening, being for skilled operators while the greater movement of the hand for slight line movement with the line fastened at the lower opening, is for beginners. A spring 37 may be provided to hold the joy stick in neutral against tension on the line 33. Spring tension may be applied to reel 32 by a spring 38, if desired.

A simple hand control arm 39 (Fig. 6) may be provided for either center or outside circle flying. Designed to be grasped in the hand, a tubular recess 40 is provided so that it may be mounted with a hollow pivot or shaft on the support 42 (Fig. 3). In this modification, the control lines 11, 12, are fastened at the point 13; the rocker member 2A is actuated by a control line 7 passing over a guide pulley 41 with a spring pressed operating trigger 29 actuated as in the device of Fig. 2. In this instance the relative positions of the elevator and depressor lines are reversed from their position in Fig. 1 so that pressure on trigger 29 serves, as before, to bring tension on the elevator line.

In all cases shown spring action on the rocker arm serves to tense the depressor control line to restore the plane to level flight or send it into a dive while manual

pressure on the trigger or other pull on the operative control line 7 serves to cause the plane to rise. In all cases, also, when a rotating arm is used a swivel is provided for the control line 7.

A modification of my preferred device is illustrated in Fig. 7. In this instance the rocker arm 2B carries two guides 43, 43, comprising separate superimposed pulleys on the same axis. Fixed guides or pulleys 44, 45, are fixedly positioned on the arm 1B. The action of the rocker arm control 7 and mounting arrangement 40 is the same as in the device of Fig. 6. The airplane control lines 11, 12, are threaded, however, in a different manner. Both are wound on the reel 14 and both go through the guide 5. The reel action is identical with that shown in Fig. 1. The action of the rocker arm has the same result as that of the rocker arm in Fig. 1, as will be set forth.

In the modification shown in Fig. 7, one of the airplane control lines passes from the reel 14 around one of the pulleys 43, back around the fixedly located pulley 44 and out through guide 5. This is the elevator control line tensed by any pull on line 7. The depressor control line goes from the reel 14 around the fixedly positioned pulley 45, back around the other rocker arm pulley 43 and then out through guide 5. This line is tensed when the spring 6 actuates the rocker arm 2B. As is apparent, in each case the take up of one line is balanced by a release of the other line and both lines are kept tight by the spring tension of spring 19 on the reel 14.

In order that the pilot operator, when using a flying control, may launch the plane himself by means other than tossing it in the air from outside the circle, there may be provided a release (Fig. 8) comprising a base 46 fastened down in any manner, as by suction cups 47, 47, or otherwise, having a spring pressed plunger 48 riding in guide posts 50, 50. The tail of the plane may be provided with a hook or ring 49 positioned between posts 50, 50 and held by the plunger 48 while the engine is started and other preparations made. Then the operator pulls the plunger 48 directly or by a line 51 extending to the pilot's position and the plane is released for flight. Obviously the release may be positioned on the floor, ground, or a raised platform.

Further modifications embodying my invention are shown in the devices of Figs. 9, 10, and 11. In these devices there is a rotatable arm 1C (Fig. 9) and a similar but divided arm 1D of Fig. 10, both rotated by the plane on a hollow pivot member 8. In each case a rocker member or spreader 2C is pivoted on the arm.

In each case the control lines 11, 12, pass through an outer guide 5 but may (Figs. 9 and 10) be continuous through the rocker arm guides so that the respective lengths of the two lines may be equalized. They may be passed through the guides, however, and held at point 13 (Fig. 11) as previously described in the device of Fig. 6.

In each case, also, the rocker arm control line 7, with swivel, passes through the hollow pivot member and extends to a spring pressed member 52 pivoted below the hollow pivot member 8, as at 53 and actuated by an operating line 33, as in Fig. 3.

In the device of Fig. 10, however, the rotatable arm 1D is divided to provide an outer section 54 pivoted for vertical movement at 55 with a guide, preferably a pulley 56 over which line 7 passes, located at the pivot point and a guard pulley 57 adjacent thereto. The bending point of the line 7 is thus made at the pivot point of the arm to keep it as near as possible to the same length, regardless of the position of arm 54.

An adjustable weight 58 may be positioned along the arm as desired and stops 59, 59, provided to limit the up and down swing of the section 54. This weighted section 54 thus provides a take up to prevent slack in lines 11, 12, equal in amount to the path described by the guide 5 at the outer end. The plane in full flight, with weight 58 properly positioned, will raise the arm to point towards the plane and the weight 58 will drop the arm

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as slack threatens, thus acting to an extent limited by the length of the arm in a similar manner to the reel and spring shown in Fig. 1.

What I claim is:

A control device for captive power driven toy airplanes comprising a pivoted rotating arm and a fixed support therefor, a rocker member pivoted on said arm forward of said arm pivot, flexible control lines connected at one end to the captive airplane, one of said lines being an elevator line and the other a depressor line, a single guide on the end of said arm forward of said rocker member through which both said lines pass together, said lines then diverging and passing through separate guides on said rocker member and together through a single stationary guide on said arm behind said rocker member, said separate guides being spaced apart and on opposite sides of the pivot of said rocker member and forming a triangle therewith, a reel posi-

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tioned behind said single guide and rotatably supported by a shaft journaled in and extending through said arm, on which said lines are wound, a pulley fixed to said shaft on the reverse side of said arm from said reel, a flexible member wound on said pulley and engaging a longitudinally extending spring means fixed to said arm on said reverse side, said spring means providing tension for said reel and a control line engaging said rocker member and passing through the pivot of said arm.

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