This invention appertains to model or toy vehicles and more particularly to a powered model airplane.

One of the primary objects of my invention is to provide means for automatically controlling the maneuvers of powered model airplanes, especially in free flight, or any steerable contrivance.

Another salient object of the invention is to provide means whereby a device, through the use of a novel mechanism, can be caused to follow automatically a predetermined pattern of maneuvers.

A further object of this invention is to provide a rotatable spiral cam track operated from a spring or other motor having a spring pressed lever engaging the same and operatively connected to the control surface of the airplane or other device; the peripheral contour of the cam track causing the lever to actuate against the tension of its spring and bring about the movement of the control surface and thus causing the airplane to follow a predetermined maneuver or maneuvers.

A further important object of my invention is to provide a spiral cam track made up of one or more sections of a predetermined peripheral configuration, the sections being detachably associated together on a common drive shaft, so that cam track sections of different configurations can be readily substituted for other sections on the shaft and thereby bring about any desired selected pattern of controlled movement.

A still further object of my invention is to provide a novel and simple device for controlling the movements of a powered model airplane and the like, which will be durable and efficient in use and one that can be incorporated with a model airplane at a small cost.

With these and other objects in view, the invention consists in the novel construction, arrangement and formation of parts, as will be hereinafter more specifically described, claimed, and illustrated in the accompanying drawings, in which drawings:

Fig. 1 is a fragmentary perspective view of a powered model airplane having my novel control mechanism incorporated therewith, parts of the figure being shown broken away and in section to illustrate structural detail.

Fig. 2 is a longitudinal fragmentary sectional view through the body or fuselage of the airplane, illustrating my novel cam mechanism and one of the operating levers.

Fig. 3 is a fragmentary transverse sectional view taken substantially on the line 3—3 of Fig. 2 looking in the direction of the arrows, illustrating the novel cam and the mounting and drive motor therefor.

Fig. 4 is an edge elevational view of one of the cam track sections; and

Fig. 5 is an enlarged fragmentary detail sectional view taken on the line 5—5 of Fig. 3 looking in the direction of the arrows, illustrating the means of detachably mounting the cam track sections on the square drive shaft.

Referring to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter A generally indicates a model airplane which can be powered by a miniature internal combustion engine 6. The method of powering the airplane forms no part of my present invention and, hence, will not be described in detail.

The airplane itself can be of the model type now found in the open market and it is to be noted that the same includes the fuselage or body 1, wings 2, and landing gear 8. The wings 8 are provided with pivoted ailerons 10. The tail of the plane carries the vertical rudder 11, which is pivotally mounted for swinging movement, and the elevators 12. These elevators are also mounted on a horizontal pivot for swinging movement. The control surfaces 10, 11, and 12 are operated through my novel mechanism 13, which will now be described.

This mechanism 13 includes a spiral cam track 14 preferably made up of a plurality of cam track sections 15. These cam track sections have their periphery provided with a predetermined contour and the same is provided with cam lobes 16 and valleys 17. The exact pattern of these lobes and valleys can be made to suit varying conditions and the surface to be controlled and the sections are made to interfit so that a continuous cam track will be provided when the same are associated together. The axial centers of the cam track sections are provided with square or polygonal shaped openings 18 so that the same can be detachably mounted upon a square or polygonal shaped shaft 19.

The shaft 19 is externally threaded at its corners, as at 20, and is rotatably mounted in a supporting bracket 21. Hence, when the shaft is rotated, the cam track will be turned therewith.

The bracket 21 includes a base plate 22 and an upstanding rigid supporting arm 23 through which the shaft rotatably extends. An adjustable supporting bearing arm 24 is provided for the end of the shaft remote from the end supported by the rigid arm 23, and this arm 24 is likewise
provided with an opening for rotatably receiving the shaft. The lower end of the arm 24 is of a hooked shape, as indicated by the reference character 25, and this hooked end is adapted to be inserted in a selected slot 26 formed in the base plate 27. It is to be noted that there is a plurality of these slots 26 extending along the length of the base plate.

The shaft 19 is adapted to be operated from a suitable motor and I preferably provide a spring motor 28 for this purpose. The motor can be of the type generally employed for driving mechanical toys and the spring can be wound by a suitable key (not shown). The winding shaft for the spring motor is indicated by the reference character 28. The shaft 19 is driven from the spring motor and the bracket 21 can be connected to the arm 24 so that the motor and cam track can be handled as a unit, if such should be desired. The spring motor 27, the cam 14 and the bracket 21 are all rigidly secured in the body 7 at the desired point, for balance and the like. The spring motor itself can be wound and set in motion by a suitable grip lever (not shown), and the lever can be tripped either manually or by a timing mechanism (not shown).

In order to operate the control surfaces 10, 11, and 12, from the cam track, I employ a plurality of levers 29, 30, and 31. The lever 29 is employed for operating the ailerons 10. The lever 30 is employed for operating the rudder 11 and the lever 31 is employed for operating the elevators 12. All of these levers are of the bell crank type and, hence, include angularly related short arms 32 and long arms 33. All of the levers are rockably mounted at their angles by elongated grooves on a pivot pin 34 and this pivot pin can be carried by a bracket 35 secured inside of the fuselage in rear of the cam track. The bracket 35 is provided with upstanding guide arms 36 for the levers and the levers are located between these guide arms.

Attention is called to the location of these levers and it is to be noted that the mounting is such that the levers can rock on the pivot pin 34 and also have a limited swinging movement in a horizontal plane for a purpose which will later appear.

The forward ends of the long arms 33 of the levers each carries a rotatable grooved roller 37 and these rollers ride on the periphery of the spiral cam track 14. A contractile coil spring 38 is provided for each lever and the coil springs function to hold the long arms of the levers down with the rollers 37 in contact with the cam. Hence, the rollers will follow the undulations in the cam track and the levers will rise and fall according to the shape of the cam track. Obviously the rollers will follow the spiral cam track during the rotation thereof and the cam track can carry a stop arm 39 so that when one roller reaches the end of the cam track, further rotation of the cam track will be stopped. This will prevent the riding of the rollers off of the cam track.

In order to bring about the movement of the ailerons 10, I mount in the wings 8 rock shafts 40. The outer ends of the rock shafts carry radially extending operating arms 41 which are anchored in their respective aileron. Hence, when the rock shafts are turned, the ailerons will be moved up or down according to the direction of rotation of the rock shafts. The inner ends of the rock shafts carry cranks 42 and each crank has operatively connected thereto a link 43 and these links are, in turn, operatively connected to the upper end of the short arm 32 of the lever 29. The rudder 11 has secured thereto an outwardly projecting rudder arm 44 and this rudder arm has pivotally and operatively connected thereto a depending extending link or rod 45, which is pivotally and operatively connected to the short arm of the lever 30. The elevators 12 each have connected thereto a depending elevator operating arm or crank 46. Pivoting and operatively connected to each arm 48 is an operating rod or link 49. These operating rods or links 43, 45, and 47 are pivotally and operatively connected to the short arm of the lever 31.

At the start of the flight of the airplane, selected cam track sections are assembled on the shaft 19 and the levers are swung over on the cam tracks to their initial starting position and so that the carriers carried thereby can follow along the spiral cam track a certain desired distance and until the stop arm 39 is reached. Obviously, the undulations in the cam track will move the levers up and down and this movement will be transmitted to the control surfaces 10, 11, and 12 by the operating rods or links 43, 45, and 47.

In actual practice, the cam track sections have portions which represent neutral or normal positions for the ailerons, rudder and elevators, and the tips and lobes are such as to cause these control surfaces to move up and down or to the right or left, as the case may be. After the desired cam track has been inserted and the levers initially adjusted or set thereon, the airplane is ready for flight in the ordinary method now pursued in handling toy or model airplanes.

It is to be also understood that the cam track sections are coordinated so that the control surfaces will move at the proper time, direction and distance taking into consideration the flight characteristics of the model being used. The pattern of travel by the model will be made without any attention on the part of the operator, as the spiral cam track rotates as the model travels on its course.

While I have specifically shown by attachment 13 applied to a motor powered airplane, it is to be understood that the principles of my invention can be used for steering boats, other toy vehicles, or appliances.

Changes in details may be made without departing from the spirit or the scope of my invention, but what I claim as new is:

1. A toy vehicle having a pivoted control surface, a spiral cam track provided on its periphery with lobes and valleys, means for rotating said cam track, a pivoted spring pressed lever engaging said cam track and movable therelong during the rotation thereof, said lever being adapted to rise and fall different distances during its travel on said cam track by said lobes and valleys, and means operatively connecting the lever to the pivoted control surface for swinging the same, said cam track including a plurality of detachable cam track sections of different peripheral configurations.

2. In a toy vehicle having at least one pivoted control surface, a spiral cam track including a plurality of detachable and interconnected sections, a rotatable common shaft for said sections for turning the same, means for rotating the shaft to a bell crank rockably mounted at its angle, a grooved roller on said bell crank receiving and engaging the cam track, and means operatively connecting the lever...
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