March 4, 1947. N. E. WALKER 2,416,805

MANIPULATABLE TOY AIRPLANE

Filed March 4, 1943 2 Sheets-Sheet 1

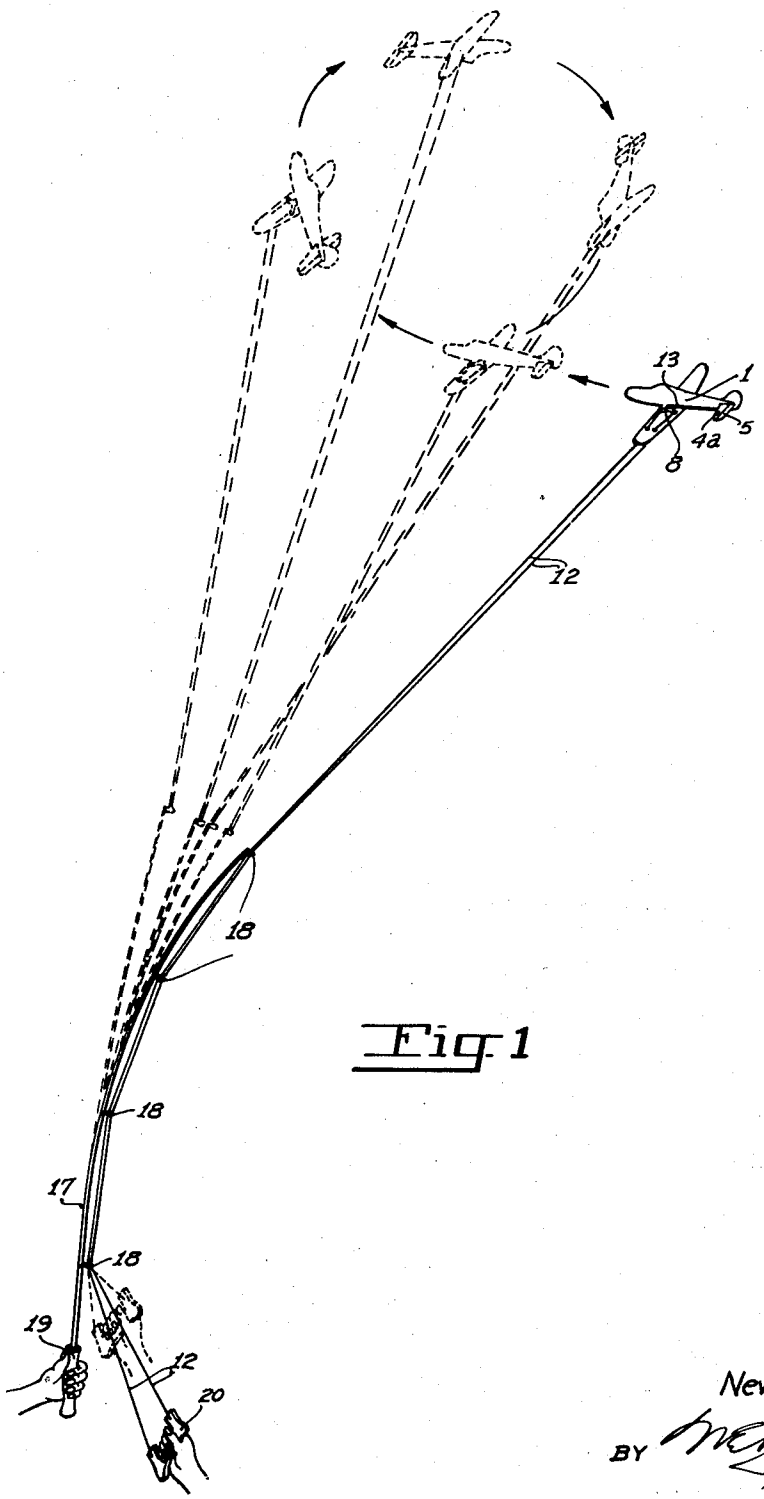


Fig. 1

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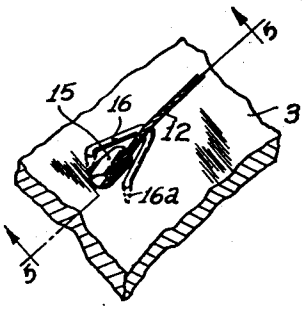


Fig. 4

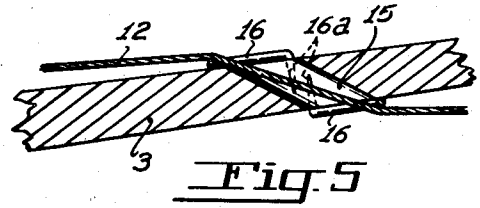


Fig. 5

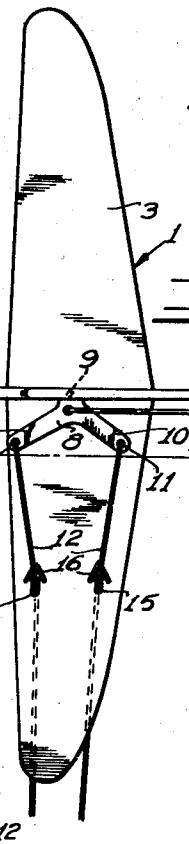


Fig. 2

Fig. 6

Fig. 7

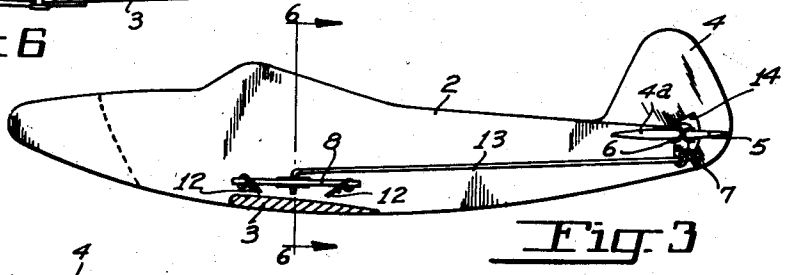


Fig. 3

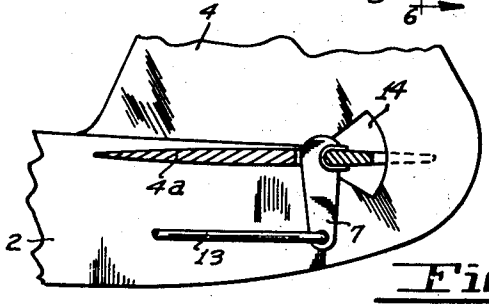


Fig. 8

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UNITED STATES PATENT OFFICE

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MANIPULATABLE TOY AIRPLANE

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Application March 4, 1943, Serial No. 477,949

3 Claims. (Cl. 46—77)

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My invention relates to toy airplanes of that type adapted for flight about a circular course defined more or less by the length of control lines to which said airplanes are secured. I have previously secured patents in this general field. One of said patents is entitled String propelled toy airplane, which issued December 1, 1942, under United States Patent No. 2,303,965. Another patent issued to me August 11, 1942, entitled Controlled captive type toy airplane, which issued as United States Patent No. 2,292,416. The former patent disclosed a toy airplane which was swung by flexible lines secured at the end of an elongated handle. The disposition of said lines, said handle, and said toy airplane was such that substantial control of the elevation of said airplane was secured. That is, the said plane could be swung about and the elevation could be controlled quite accurately throughout a range of several feet but it was not capable of being manipulated to such a degree that it could be looped, for example.

United States Patent No. 2,292,416, covered a different type control for a power propelled airplane and this is capable of being looped, either in inside loops or outside loops, making vertical climbs and vertical dives, but it requires a motor to give it sufficient speed for performing such aerial acrobatics.

The object of my present invention is to provide a toy airplane with controls therefor which permit it to be looped and otherwise flown without the necessity of providing a motor. That is, said airplane can be swung about by a handle and may be controlled to perform such aerial acrobatics. As a matter of fact, it is capable of generating speeds even higher than attainable by motor driven toy airplanes. I have checked the speeds of models in which my present invention is incorporated which have attained operating speeds as high as 90 miles per hour. Said high operating speeds and accurate control therefor are attainable in a relatively simple device by making the handle flexible so that the flexibility thereof permits high looping speeds because of elasticity of the handle; the airplane is constructed in a simple manner and the guides for the flexible control lines are guided through apertures formed in the wings of said plane; and the handle and the control element for regulating the elevation of the plane are separated. I deem this latter feature of my invention quite important. The control element preferably is a handle secured to the ends of the flexible lines and said control element may be moved angularly to

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adjust elevator controls on the plane and at the same time may be pulled in or extended an arm's length to accommodate a change of direction in the course of the airplane's flight in performing said aerial acrobatics.

Further and other details and features of my invention are hereinafter described in connection with the drawings, in which:

Fig. 1 is a more or less diagrammatic view of an airplane, handle, control lines, and a U-shaped control element illustrating the manner in which a toy airplane is flown within a relatively tight loop;

Fig. 2 is a plan view of an airplane embodying my invention;

Fig. 3 is a side elevation thereof taken, however, on the line 3—3 in Fig. 2;

Fig. 4 is an enlarged perspective detail illustrating the manner in which a guideway is formed through the wing and is provided with a wearing member arranged adjacent one margin of said guideway;

Fig. 5 is a sectional detail taken substantially on the line 5—5 in Fig. 4 through said guideway and the guide members arranged above and below said way;

Fig. 6 is an enlarged sectional detail taken substantially on the line 6—6 in Fig. 3;

Fig. 7 is an enlarged sectional view taken on the line 7—7 in Fig. 2; and

Fig. 8 is an enlarged sectional view taken on the line 8—8 in Fig. 2.

My invention is adapted to be incorporated in a toy airplane which preferably comprises a body 2 cut to profile to resemble that of some well known type airplane. A wing element 3 is preferably an integral member secured at its mid line to said body. Said wing element preferably is formed with some dihedral angle as is shown in Fig. 6, but the dihedral angle is kept quite small. The tail assembly 4 preferably includes an elevator member 5 pivotally secured to the fixed portion 4a by hinge members 6. An arm 7 is fixed to said elevator member swinging about an axis coincidental with the axis of said hinge members.

A bell crank lever 8 is pivotally mounted on a pin 9 secured centrally of the body 2 as is shown in Fig. 6. Said bell crank lever 8 is preferably arranged so as to be substantially in alinement with the wing element 3, as is shown most clearly in Figs. 2 and 3. Said bell crank lever is preferably Y-shaped in profile with the main branch secured to the body by pin 9. The two arms 10 and 10a have apertures 11 at their outer ends to which the ends of flexible control lines 12 are

secured. A control rod 13 is pivotally secured to the bell crank lever 8 at a point spaced from the pin 9. Said control rod is relatively stiff and the other end is pivotally secured to the free end of arm 7. Thus as the bell crank lever rotates clockwise about the pin 9 as viewed in Fig. 2, it pulls the control rod 13 and moves the trailing end of the elevator member downwardly so as to cause the plane to descend. When said bell crank lever is rotated counterclockwise, as viewed in Fig. 2, it pushes said control rod 13 and moves said control rod 13 and moves said arm 7 to move the trailing end of the elevator member 5 upwardly as is indicated in dotted outline in Fig. 7, to cause said plane to ascend. An arcuate hole 14 is cut in the vertical tail member to accommodate the movement of said elevator member as is shown in Fig. 8.

The flexible control lines are led through two spaced guideways 15 in the wing element 3. Said guideways preferably are inclined at an oblique angle, as is shown in Figs. 4 and 5. The wing element 3 is preferably made of some fragile material such, for example, as balsa wood. It is not practical to form said guideway to coincide with the general alinement of the control lines 12. Said lines also vary in alinement as the toy airplane moves along its path. Said control lines thus form two bights as they pass into and out of said guideway and because of the softness of balsa wood, said lines would tend to dig into said wood and bind if wearing members were not provided to prevent this from occurring. I thus arrange two V-shaped guide members 16, one on each face of the wing adjacent the guideway and inclined in the direction of the control line passing through said guideway. Said guide members 16 preferably have prongs 16*a* formed upon the divergent ends which may be driven into the wing element to secure them. The convergent portions of said V-shaped guide members thus tend to aline the control lines with the inclination of the guideways, respectively.

I preferably provide an elongated member 17 to which said control lines are slidably held so as to swing said airplane and the guide lines about a generally circular course. I have found that a relatively short, light fishing rod is particularly adapted for this purpose. Said member is preferably provided with one or more guide loops 18 spaced along the length thereof. The control lines are threaded through said guide loops so that the control lines lie alongside said member throughout substantially its entire length. A grip or handle 19 is provided at the end of said elongated member and the operator preferably grips said handle with his left hand as is shown in Fig. 1. A control element 20, preferably U-shaped in profile, is gripped in the operator's right hand preferably with the control element arranged vertically. Said two control lines are secured adjacent the ends of said control element being separated by the span of the operator's hand, that is, they are preferably spaced apart four inches. Thus, when the control element is tipped angularly, it will pay out one of the control lines and will retract the other, thus, to manipulate the elevator member 5 on the toy airplane to a degree corresponding roughly to the angular tipping of the control element 20.

I consider the fact that the control element 20 is separate from the elongated member 17 to be one of the important features of my invention. If said control element is pivotally secured to the handle, as is shown in my previous patent

entitled String propelled toy airplane, then the effective length of the flexible control lines extending from the tip of the elongated member may not be varied substantially, if at all. I have found that when toy airplanes are flown in the manner illustrated in Fig. 1, it is necessary to separate the hands and move them independently over quite a substantial range. This tends to prevent the plane from following a course diving toward the operator or losing its momentum and also permits the plane to be flown outwardly when desired.

I have also determined that it is desirable, if not essential, to provide an elongated member with a substantial amount of flexibility such as is inherent in a fishing rod. As is shown in Fig. 1, the plane may be looped by permitting the end of said rod to flex in forming a relatively close loop. That is, the member 17 resembles a relatively stiff whip and the flexibility and elasticity of said member accommodates looping and diving because of said flexibility. Also, it is impractical to permit any elongation to take place in the control lines and the forces applied through the member 17 frequently vary. The flexibility and elasticity of said member 17 tends to absorb said unequal applications of power to promote relatively smooth flight. If said member was not elastic, then it would be unyielding and would only provide an effective lengthening of the operator's arm.

Said plane can be flown in either of two different ways. The line may be paid out to its ultimate length and an assistant may toss the plane into the air from which point it can be accelerated to fly about a circular path defined by the length of said lines. Another manner of flying is to pull in all of said flexible lines until only a small portion extends out upon the tip guide loop. The plane then can be flown by paying out said lines equally, sliding it through the loops until the entire line is released. This latter manner of flying involves quite a good deal of dexterity. It could not be accomplished except when the lines are unsecured to the member 17 and it would be rendered quite difficult if said member 17 were not flexible. It is also possible to cast said plane with the control lines secured thereto by said member 17 and catch said lines to direct the plane about a circular course. That is, the plane can be cast by said rod in a manner similar to bait casting and the line snubbed when the initial impetus is spent and thereafter flown about a circular course. This requires that both lines be paid out equally and the lines be maintained under control so that the elevator member may be actuated to control the elevation of flight of said airplane.

I claim:

1. In the combination of a toy airplane having adjustable elevator control elements, an elongated handle adapted for manipulating and swinging said plane about a circular course, and remote control means including flexible lines operatively joined to the adjustable elevator control elements, guides extending along said handle, said lines extending through and slidably engaging said guides, and an elongated control member, said control member being separate from said handle, thereby enabling an operator quickly to shorten and lengthen the effective span of said lines extending between said handle and said airplane thereby to vary the effective diameter of the circular course traversed by the latter.

2. In the combination of a toy airplane having

adjustable elevator control elements, an elongated handle adapted for manipulating and swinging said plane about a circular course, and remote control means including a pair of flexible lines operatively joined to the adjustable elevator control elements, guides extending along said handle, said lines extending through and slidably engaging said guides, said handle being flexible to provide whip-like actuation for manipulating said airplane, and an elongated control member, said pair of flexible lines being secured at spaced points on said control member to accommodate pulling in one control line and simultaneously paying out the other line, said control member being separate from said handle, thereby enabling an operator quickly to shorten and lengthen the effective span of said lines extending between said handle and said airplane thereby to vary the effective diameter of the circular course traversed by the latter.

3. A toy airplane comprising a body, a wing element made of relatively fragile material and extending laterally of said body, a lever pivotally mounted upon said body and arranged in substantial lateral alinement with said wing element, said lever having connection elements for relatively long flexible lines joined to said lever and leading laterally for distant manipulation, guideways extending through said wing element for slidably engaging said flexible lines, and pronged V-shaped guide members seated in said wing element adjacent a margin of each of said guideways and defining wearing surfaces for said flexible lines.

NEVILLES E. WALKER.

REFERENCES CITED

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

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Number	Name	Date
1,452,808	Lee	Apr. 24, 1923
2,292,416	Walker	Aug. 11, 1942
2,303,965	Walker	Dec. 1, 1942
2,323,506	Willard	July 6, 1943
2,061,953	Sampson	Nov. 24, 1936