Oct. 24, 1950 H. T. McINTYRE 2,527,274

RATIO CONTROL FOR CAPTIVE AIRPLANES

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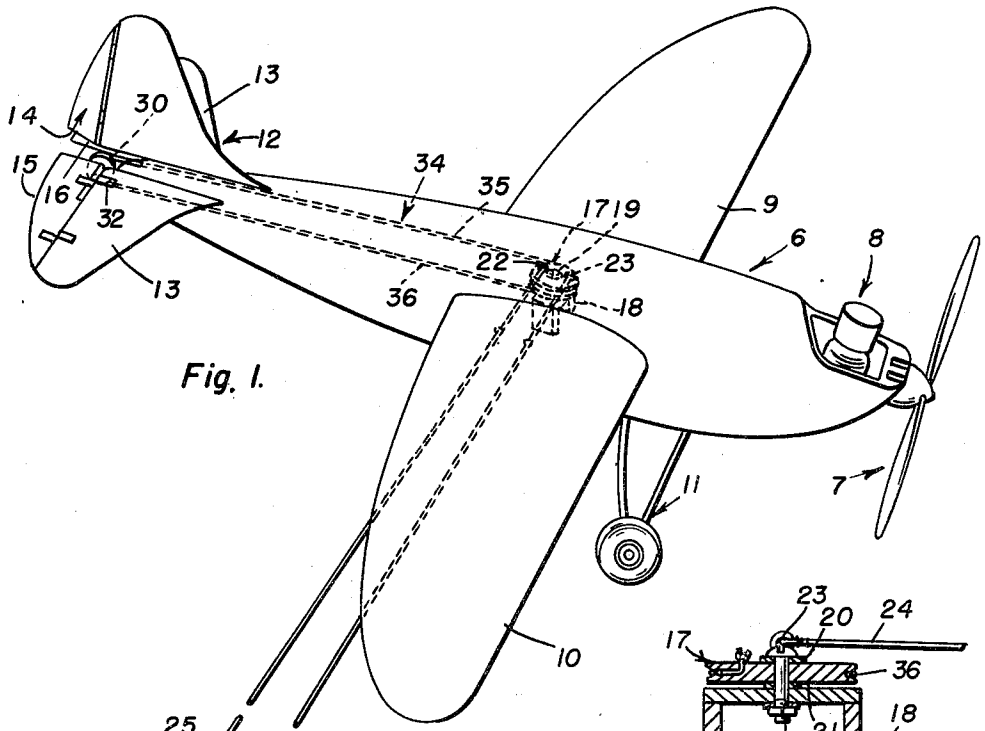


Fig. 1.

Fig. 3.

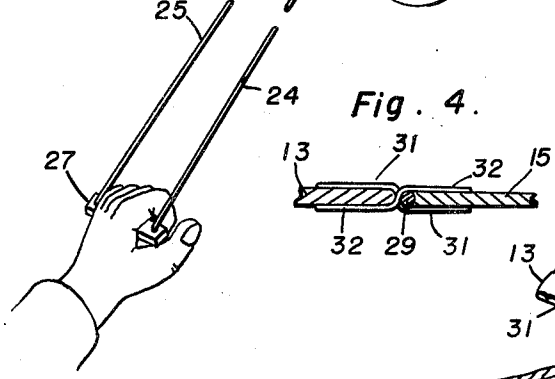


Fig. 4.

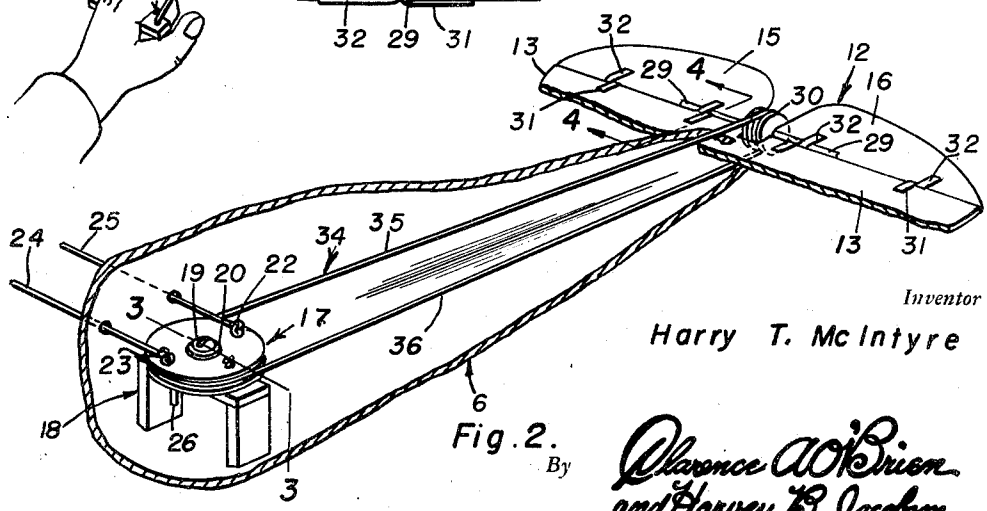


Fig. 2.

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RATIO CONTROL FOR CAPTIVE AIRPLANES

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4 Claims. (Cl. 46—77)

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The present invention relates to captive-type airplanes such as are power-propelled and commonly referred to as toy and/or model airplanes, and has reference, more particularly, to remote regulated control means for the elevators embodied in the tail structure of the airplane.

It is a matter of common knowledge to those familiar with prior developments in this line of endeavor, that many and varied types of controller devices are currently in use for maneuvering toy airplanes during a course of customary circular path flight. Generically comprehended, prior controller devices within my range of knowledge employ manually manipulated cord means actuable by the attendant, while standing on the ground, said cord means being operatively associated with additional cord means on or in the fuselage of the plane, whereby miniature airplanes are controlled through the medium of elevators incorporated in the tail structure.

Without attempting to describe, in detail, structural adaptations employed in prior art construction, it will be seen, when comprising the instant invention with such constructions, that I aim to generally, specifically and otherwise, improve upon same and do so by way of a novel structural assemblage which is capable of accomplishing desired ends with precision-like sensitivity and smooth operability.

More specifically, expected results are realized through the medium of fore and aft sheaves or pulleys, these being turnable on axes at right angles to each other, the first named pulley being of a diameter considerably greater than the diameter of the remaining or rear pulley, whereby to bring about the desired ratio of operation between coacting parts and to thus properly govern the operation of the elevators and consequently, the flight of the airplane.

Another object of the invention, construed essentially on a structural basis, has to do with a simple and expedient fore or front pulley, which is so mounted that coacting cords and associated parts may be satisfactorily rigged in place.

A still further object has to do with the mounting of the elevators on a simple rocker shaft, the latter serving to accommodate a centrally fastened rear pulley, whereby to attain desired balancing and equalized actuation of the elevators.

Other objects, features and advantages will become more readily apparent from the following description and the accompanying illustrative drawing.

Referring now to the drawing, wherein like numerals are employed, with customary lead

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lines, to designate like parts throughout the views:

Figure 1 is a perspective view of a toy or captive-type airplane, equipped with my invention.

Figure 2 is a fragmentary perspective view which serves to appropriately detail and illustrate the essential elements of the invention.

Figure 3 is a detailed vertical sectional view, taken approximately on the plane of the line 3—3 of Figure 2.

Figure 4 is an enlarged fragmentary sectional view on the line 4—4 of Figure 2.

Reference being had first to Figure 1 of the drawing, it will be seen that the airplane comprises, broadly visualized, a suitable fuselage 6, a propeller 7 on the nose thereof and driven by an appropriate prime mover 8, such as an engine or the like. The main wings are denoted by the numerals 9 and 10. The landing gear is denoted at 11. The tail structure, on the rear of the fuselage, is denoted, generally, by the numeral 12 and comprises tail vanes 13, rudder means 14 and elevators 15 and 16 on the trailing edges of said vanes 13. As is obvious, these are all well-known parts. What is more, I have not attempted, in disclosing the invention, to bring out other complemental parts which go to complete the airplane.

The invention is essentially disclosed in Figures 2, 3 and 4. Taking Figure 2, the front sheath or pulley is denoted by the numeral 17, and is mounted in a horizontal plane atop a suitable stand or base 18. In accomplishing this, a bolt, forming a vertical hub pin or axle 19, is secured to the stand, as shown in Figure 3, there being a washer 20 interposed between the pulley and head of the bolt to cooperate with a second washer 21 between the pulley and stand, thus, insuring smooth operation of the pulley. Eye bolts or screws 22 and 23 are secured eccentrically to marginal portions of the pulley, and these serve to accommodate the hand-regulated pull and tensioning cords 24 and 25 respectively. The shank 26 of the eye screw 23 depends below the top-piece of the stand 18 and constitutes a stop, whereby to prevent so-called overcontrol. The lower ends of the cords 24 and 25 are connected together by a suitable handle or grip 27, as shown in Figure 1.

The elevators are of suitable size, shape and proportion, and are rigidly secured to a round 29, as shown in Figure 4, and are swingably mounted on the vanes 13 as shown in Figure 2. The inner ends of the elevators are spaced apart to accommodate the smaller vertically disposed sheath or

pulley **30**. The round **29** functions as a rocker shaft and is obviously rocked by the oscillation of the pulley **30**. By using simple tapes or equivalent elements **31** and **32**, the forward edge portions of the elevators **15** and **16** are hingedly attached to the fixed vanes **13**. An endless actuator cord **34** is employed as an operating connection between the pulleys. The runs **35** and **36** of said cord are wrapped around the grooved peripheral portions of the respective pulleys **17** and **30**, whereby to obtain the desired frictional driving connection between said pulleys. I have found it expedient and practical to employ pulleys instead of other mechanical elements, and to arrange same in the relationship depicted in Figure 2, to insure proper distribution of stress and strain, equalized control results and the desired smoothness of operation by varying the ratio of said pulleys, by trial and error, to gain desired sensitivity of control from the handle **27** and remote pull cords **24** and **25**. It is perhaps unnecessary to dwell, at this stage, on the mode of handling miniature and captive planes in flight, since, as previously stated, controller cord means, similar to that herein shown and described, are well-known to persons skilled in the art. What is more, the method by which the interconnected pulleys **17** and **30** impart desired up-and-down angling of the elevators **15** and **16** appears to be substantially self-evident.

A careful consideration of the foregoing description in conjunction with the invention as illustrated in the drawings will enable the reader to obtain a clear understanding and impression of the alleged features of merit and novelty sufficient to clarify the construction of the invention as hereinafter claimed.

Minor changes in shape, size, materials and rearrangement of parts may be resorted to in actual practice so long as no departure is made from the invention as claimed:

Having described the invention what is claimed as new is:

1. In a toy airplane of the class described, a fuselage, a pair of complemental elevators, a rocker shaft, said elevators being secured to said rocker shaft in spaced relation, means hingedly mounting said elevators on said fuselage, and a cord controlled pulley secured to the intermediate portion of said rocker shaft and situated between adjacent spaced ends of said elevators, said pulley being vertically disposed and thus rotatable on a horizontal axis, a second and larger pulley mounted in the fuselage in spaced longitudinal alignment with said first-named pulley, said second-named pulley being disposed in a horizontal plane and at right angles to the first pulley and being rotatable on a vertical axis, and an endless control cord having its end-portions partially wrapped around the respective pulleys, eye screws secured eccentrically to marginal portions of said second pulley and at points diametrically opposite to one another, the shank of one of said screws constituting a stop element, and a pair of pull-cords having their inner ends connected respectively to said eye screws.

2. In a toy airplane of the class described, a fuselage, a pulley supporting stand mounted in said fuselage, a relatively large horizontally disposed pulley, a vertical hub pin mounting said pulley for rotation on said supporting stand, eye screws diametrically disposed and mounted in marginal portions of said pulley, the shank of one of said screws depending and coacting, as a stop, with an adjacent portion of said supporting stand.

3. In a toy airplane of the class described, a fuselage, a pulley supporting stand mounted in said fuselage, a relatively large horizontally disposed pulley, a vertical hub pin mounting said pulley for rotation on said supporting stand, eye screws diametrically disposed and mounted in marginal portions of said pulley, the shank of one of said screws depending and coacting, as a stop, with an adjacent portion of said supporting stand, and a pair of pull cords connected at their inner ends to said eye screws.

4. In a toy airplane of the class described, a fuselage, supporting means in the rear portion of said fuselage, a rocker shaft, a pair of spaced complemental elevators secured to said rocker shaft, said elevators being hingedly mounted on said supporting means, a relatively small pulley on the intermediate portion of said rocker shaft and located between adjacent spaced ends of said elevators, a supporting stand in the fuselage in advance of and in alignment with said supporting means, a vertical pin on said stand, a relatively large pulley mounted for rotation on said pin and stand, said pulley being provided with diametrically opposite eccentrically arranged eye screws to accommodate the pull cords, one of the eye screws constituting a stop element, and an endless controller cord having end-portions trained around the respective pulleys for operating same.

HARRY T. McINTYRE.

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