June 8, 1948. E. F. McCOY 2,443,144

HELICOPTER TOY

Filed Aug. 7, 1944

2 Sheets-Sheet 1

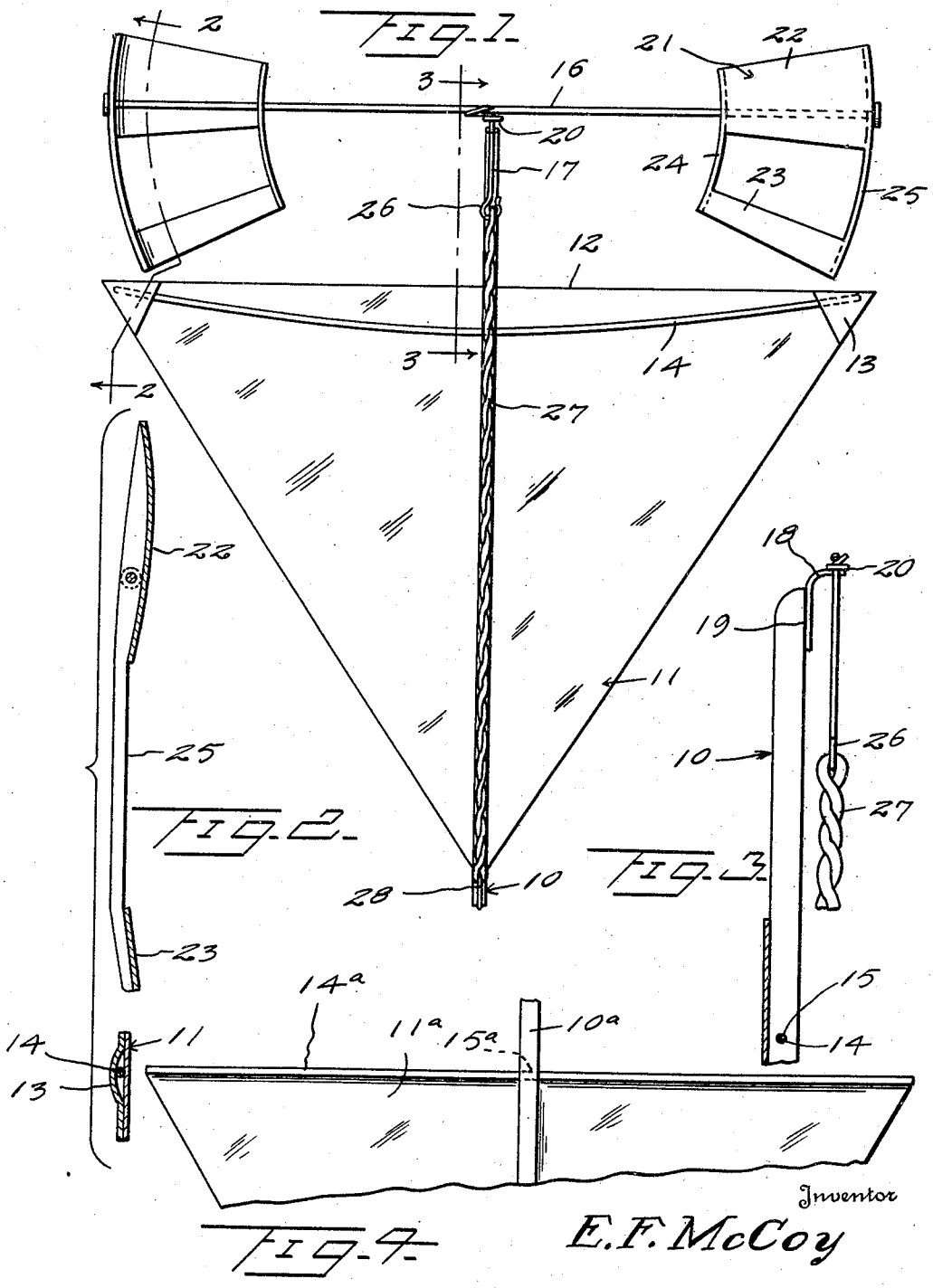


FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

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June 8, 1948. E. F. McCOY 2,443,144

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2 Sheets-Sheet 2

Fig. 5.

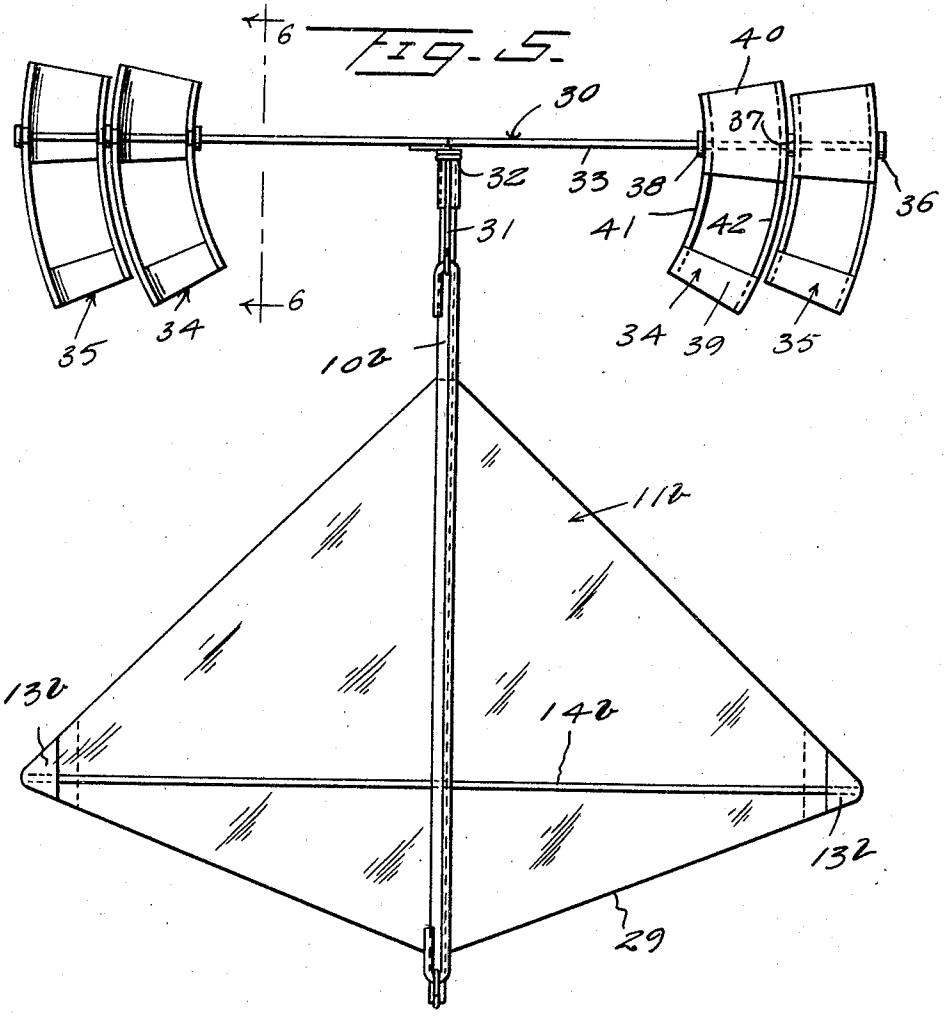


Fig. 6.

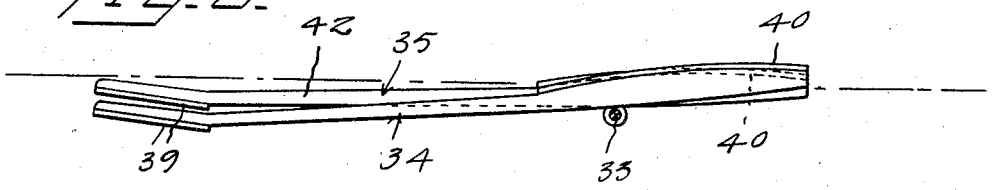
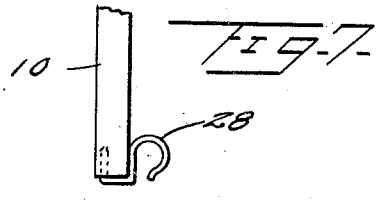


Fig. 7.



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HELICOPTER TOY

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Application August 7, 1944, Serial No. 548,371

1 Claim. (Cl. 46—75)

1

This invention relates to a helicopter toy.

An object of this invention is to provide an improved helicopter including a body and a wind wheel, and means for holding the body against reverse rotation as the wind wheel rotates.

Another object of this invention is to provide an improved blade structure for a helicopter wherein the blades are pivotally carried by a swinging shaft so that the pitch of the blades will automatically vary in proportion to the speed of rotation.

A further object of this invention is to provide in a device of this character an improved means for holding the body against reverse rotation wherein the body is provided with laterally projecting flexible wings which form the necessary drag to resist reverse rotation.

A further object of this invention is to provide a helicopter of this kind which is of simple construction so that it can be made at low cost and will withstand rough treatment.

With the foregoing objects and others which may hereinafter appear, the invention consists of the novel construction, combination and arrangement of parts as will be more specifically referred to and illustrated in the accompanying drawings, wherein are shown embodiments of the invention, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawings:

Figure 1 is a detail side elevation of a helicopter constructed according to an embodiment of this invention,

Figure 2 is a sectional view taken on the line 2—2 of Figure 1,

Figure 3 is a sectional view taken on the line 3—3 of Figure 1,

Figure 4 is a fragmentary side elevation of a modified form of this invention,

Figure 5 is a detail side elevation partly broken away of another modification of this invention,

Figure 6 is a sectional view taken on the line 6—6 of Figure 5, but showing the propeller blade members in operative position, and

Figure 7 is a fragmentary side elevation of the lower end of either Figures 1 or 5.

Referring to the drawings, the numeral 10 designates generally a body which is of elongated construction and which has secured thereto a substantially triangularly shaped flexible member 11. The flexible member 11 extends laterally from opposite sides of the body 10 and has the apex thereof lowermost and secured by cement or

2

other suitable fastening means to the body 10. The upper edge 12 or base of the triangularly shaped member 11 is straight and uppermost and is positioned at a point spaced downwardly from the upper end of the body 10.

The flexible member 11 constitutes a brake for resisting reverse rotation of the body 10 during the operation of the device. The flexible member 11 at the upper opposite corners thereof is formed with a pair of pockets 13 within which the opposite ends of a bendable strip 14 are adapted to engage. The bendable strip 14 is extended through an opening 15 formed in the body 10, and preferably, the strip 14 is of such length that when the ends thereof are positioned within the pockets 13, the strip 14 will be longitudinally bowed, as shown in Figure 1.

A propeller shaft 16 disposed at the upper end of the body 10, is positioned at right angles to the length of the body 10 and is secured by suitable fastening means to a drive shaft 17 which is journaled in a bearing 18 fixed as at 19 to the upper end portion of the body 10. A thrust washer 20 is interposed between the shaft 16 and the bearing 18, as shown in Figures 1 and 3.

The shaft 16 has rockably mounted thereon at a point outwardly from the medial center thereof a pair of propeller members generally designated as 21. The propeller members 21 are of like construction and each includes a longitudinally curved leading blade member 22 and a substantially flat trailing blade member 23. The two blade members 22 and 23 are spaced apart and are fixedly connected together by means of a pair of arcuate connecting bars 24 and 25. Preferably, the shaft 16 extends through the connecting bars 24 and 25 at a point whereby the blade 21 is overbalanced in the direction of the trailing end thereof so that when the blade assembly is stationary the trailing ends 23 thereof will be lowermost.

As shown in Figure 2, the angle of the leading blade member 22 is opposed to the angle of the trailing blade 23. This opposing of the angles between the two blade members 22 and 23 provides a means whereby each blade member will be substantially horizontal when the assembly is rotating and the arrangement of the angles of these blade members is such as to provide for maximum lift.

The drive shaft 17 at its lower end is formed with a hook or open eye 26 with which one end of a flexible or elastic motor member 27 is adapted to be engaged. The opposite end of the flexible member 27 is engaged with a lower hook 28 fixed

in any suitable manner to the lower end of the body 10. In practice the motor 27 is in the form of an endless rubber band which is twisted in order to provide the desired rotary movement of the drive shaft 17.

Referring now to Figure 4 there is disclosed a slight modification of this invention, wherein the body 10a has associated therewith a flexible triangularly shaped member 11a which prevents reverse rotation of the body 10a. In this form the flexible member 11a has cemented or otherwise fixed to the upper edge thereof a transversely extending supporting strip 14a. The strip 14a extends through an opening 15a formed in the body 10a or if desired the strip 14a may be cemented or otherwise firmly secured to the adjacent side of the body 10a.

Referring now to Figures 5 and 6, there is disclosed another modification of this invention. In this latter form, there is provided an elongated body 10b which has secured thereto the upper end of a flexible triangularly shaped member 11b. The flexible member 11b is held taut by means of a transversely extending strip 14b which is extended through the body 10b adjacent the lower portion thereof and the lower portion thereof and the opposite ends of the strip 14b are engaged in pockets 13b formed in the opposite lower corners of the flexible member 11b. The flexible member 11b has a pair of angularly disposed lower edge portions 29, the apex of which is lowermost and is secured by cement or other fastening means to the adjacent side of the body 10b.

A propeller assembly generally designated as 30 is secured to the upper end of a drive shaft 31, journaled through a bearing 32 fixed to the upper end of the body 10b. The assembly 30 includes a propeller shaft 33 fixed to the upper end of the drive shaft 31 and extending at right angles to the latter. A pair of blade members 34 and 35 are rockably mounted on the shaft 33 adjacent one end thereof and a similar pair of these blade members are mounted on the opposite end of the shaft 33. A washer or collar 36 is fixed to the outer end of the shaft 33, and the outermost blade 35 is adapted to engage against the collar 36.

A washer 37 is interposed between the adjacent edges of the two blade members 34 and 35 and an inner washer or collar 38 is mounted on the shaft 33 and holds the inner blade member 34 against endwise movement inwardly on the shaft 33. The two blade members 34 and 35 are of like construction, and each includes a flat trailing blade member 39 and a longitudinally curved leading blade member 40. The two blade members 39 and 40 are secured to a pair of arcuate connecting bars 41 and 42, the bars 41 and 42 having as an axis the medial center of the shaft 33.

In operation of the construction shown in Figure 5, the blades 34 and 35 will assume different angles with respect to the horizontal, the innermost blade member 34 being inclined at a greater angle with respect to the horizontal than the outermost blade 35. This is caused by reason of the fact that the outermost blade 35 travels a greater distance in each rotation of the assembly. By providing outer pairs of these blade members a greater lift will be effected than where only one blade member at each end of the shaft 30 is provided.

In the use and operation of this helicopter, the motor 27 is wound to the desired degree by rotating shaft 16 in a counterclockwise direction. The device is then held in a substantially vertical position and when shaft 16 is released, motor 27 will rotate the propeller blade assembly in a clockwise direction and the blade members 21 will assume a substantially horizontal position. As the shaft 16 rotates, the blade members 21 will lift the body 10 vertically and during this rotation of shaft 16 the wing or brake construction 11 will rotate with the body 10 in a reverse direction with respect to the rotation of shaft 16. However, due to the wing construction 11 extending laterally of the body 10, this wing construction will form a drag resisting reverse rotation of the body 10, the flexible member 11 bagging out so as to contain air in the bag or bowed portion, thereby forming a pocket which will serve to prevent rotation of the body 10 except at a very slow speed. In this manner the force generated by the motor 27 will be communicated substantially entirely to the drive shaft 17 and the shaft 16 will be rotated in a horizontal plane.

What I claim is:

A helicopter toy comprising an elongated body, a propeller drive shaft carried by said body at one end thereof, an elongated resilient motor for said propeller, a triangular shaped flexible member carried by said body and extending laterally therefrom for resisting the torque of said propeller and motor, said member fixed at the apex thereof to the other end of said body, a longitudinally bowed bendable member engaging said body intermediate the length thereof at the upper end of said flexible member engaging the other corners thereof, a propeller blade supporting shaft on said drive shaft at right angles thereto, a propeller blade on each end of said latter shaft, each of said blades including spaced apart blade members, and connecting bars between said blade members, and means rockably securing said connecting bars to said propeller blade supporting shaft for rockably securing said blades on said shaft.

ERNEST F. McCOY.

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