June 28, 1960 J. O. BENNETT 2,942,880

TOY HELICOPTER

Filed Dec. 15, 1955 2 Sheets-Sheet 1

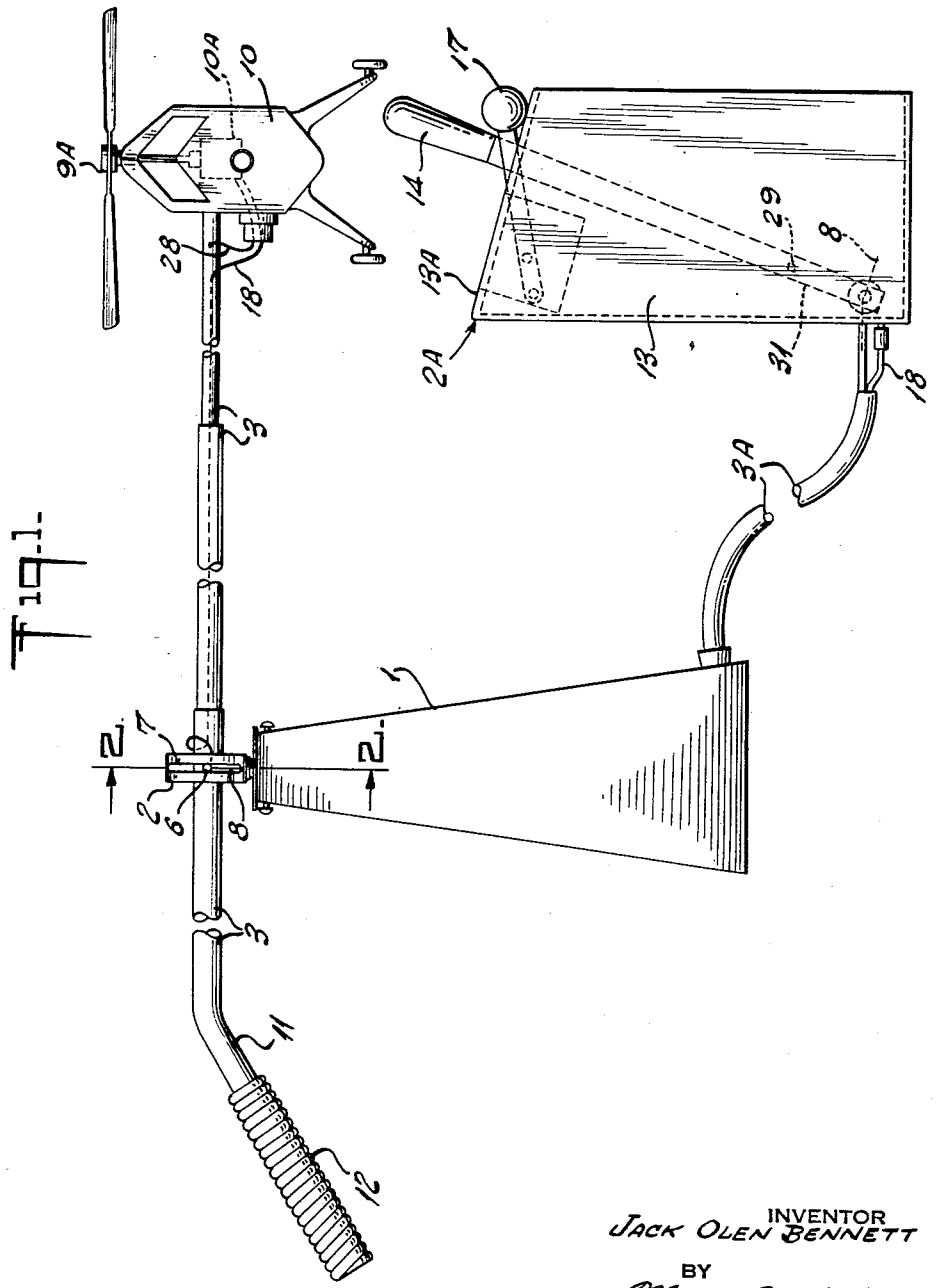


Fig. 1.

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Fig. 2.

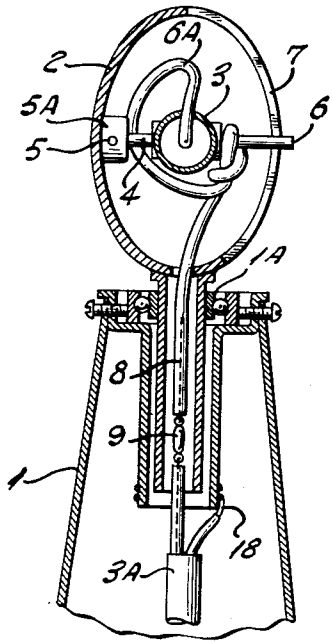
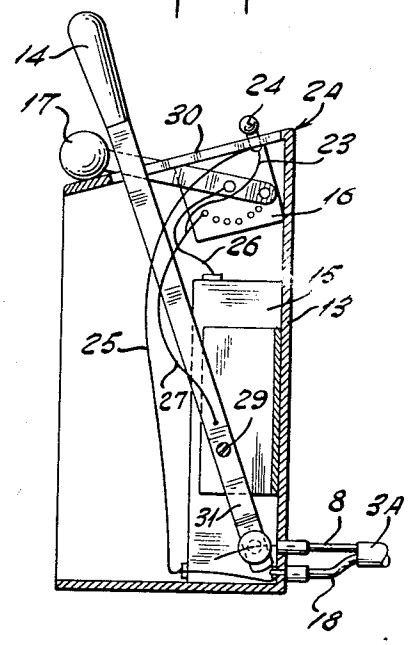


Fig. 3.



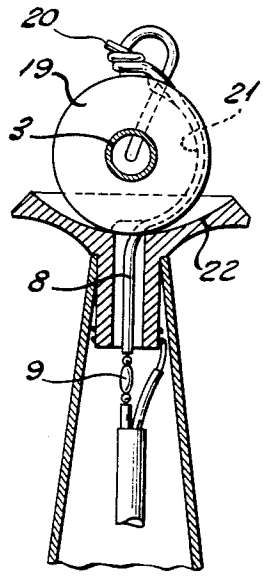
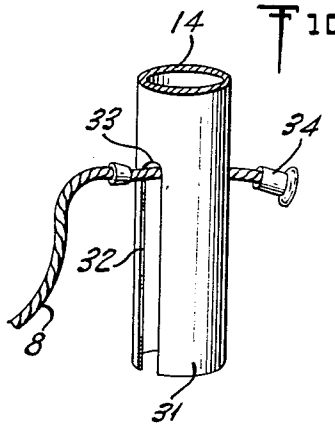


Fig. 4.

Fig. 5.



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10 Claims. (Cl. 272—31)

This invention relates to aeronautical toys, and particularly to a toy helicopter.

The main object of my invention is to produce a powered toy helicopter in combination with control means therefor.

An ancillary object of my invention is to provide a toy helicopter with controlled electric drive in order to cause ascent or descent of the helicopter at will by controlling current supply to the drive means thereof.

Another object of the invention is to include a jointed support for retaining the helicopter captive while allowing the same to rise and lower and also fly about the support.

A further object of this invention is to have a support upon which a balancing arm is pivotally and rockably mounted with the helicopter supported upon one end of the arm and a counterbalance mounted upon the other end.

Still another object is to have such a helicopter toy which is made in two main units, one of which includes a supporting tower for universally supporting the balancing arm with the helicopter thereon, while the other unit includes a control device for effecting dual control of the helicopter, and with these units connected by cables.

It is more specifically an object of the invention with respect to the control unit, to have two distinct control members for regulating the current supply to the helicopter and for mechanically controlling its position.

It is even an object of the invention to provide the balancing arm with an intermediate support upon the supporting tower which may take various forms for allowing two degrees of motion to the arm and thus to the helicopter.

A practical object herein is also to have a toy helicopter assembly which has the control unit so designed and disposed that it will simulate the controls upon a full scale helicopter and bring the whole into the range of use for training helicopter pilots in flying helicopters.

It is, of course, a definite object to have such a helicopter toy apparatus which is relatively simple to make and use and reasonable in cost in order to encourage wide distribution on the market.

An object featuring economy in design and in the use of parts is to have such a toy apparatus supplied to the market knocked down, while using the control box or casing as the packing box for the rest of the parts of the helicopter and its support means.

Other objects and advantages of my invention will appear in greater detail as the specification proceeds.

In order to facilitate ready comprehension of this invention for a proper appreciation of the salient features thereof, the invention is illustrated on the accompanying drawings forming part hereof, and in which:

Figure 1 is an elevation of a helicopter toy made according to my invention and embodying the same in a practical form;

Figure 2 is an enlarged fragmentary view of a modified form of a vertical section of the supporting tower;

Figure 3 is a vertical section of the control box of the invention serving to disclose interior details not shown in Figure 1;

Figure 4 is a section similar to that of Figure 2, but showing a modification of the tower mounting for the balancing arm supporting the helicopter proper;

Figure 5 is a fragmentary perspective view of the connection between a cable and the lower end of the control stick of Figures 1 and 3 on an enlarged scale.

Throughout the views, the same reference numerals indicate the same or like parts and features.

In the toy field, airplanes and helicopters are of current interest, and while airplanes are well represented, helicopters are not so well known, principally because they have heretofore not been highly developed. The reason for this is that helicopters are themselves more recent in development than the standard airplane. In order to provide a novel toy helicopter that will simulate in control and feel, as well as operation, a modern helicopter, I now propose to support a small model helicopter upon a balancing arm having an adjustable counterbalance, and controlling the model electrically and mechanically in position from a remote control box through a cable and conductors interconnecting the helicopter and control box, along the lines already indicated, which will now be described in detail in the following, due reference being had to the drawings.

Hence, in the practice of my invention, a supporting tower or stand 1 has in its upper portion a ball bearing structure 1A upon which is mounted a guide ring 2 through which extends a balancing arm 3, preferably of reinforced or double construction. This arm is itself mounted within the ring 2 upon a short arm 4 pivoting upon pin 5 supported in lug 5A secured in the ring, while the outer extension 6 of arm 4 is slidable in a vertical plane in slot 7 in ring 2 during angular or semi-rotary movement of the balancing arm 3.

In the tower 1, a preferably insulated Bowden cable 8 extends upwardly into ring 2 and is knotted about arm extension 6 and continued in a loop 6A that extends through arm 3 to the helicopter 10 secured upon the outer end of this arm. This cable is interrupted by an inserted coupling 9 allowing rotation of the ring 2 and arm 3 about the vertical axis of ball bearing structure 1A without twisting the cable which extends down through a protecting sheath 3A together with a conductor 18, of which more later. It is evident that if the cable 8 is released upward, arm extension 6 will raise as a result of torque on arm 3 as a result of weight 12, and if the cable is subjected to a downward pull it will lower extension 6, correspondingly partially rotating or angularly shifting balancing arm 3 with the helicopter thereon. The weight 12 thus acts not only as a counterweight for the helicopter, but by virtue of its positioning on offset arm 11 to extend laterally to the left of pin 5 as seen in Fig. 2, weight 12 acts also as a counterweight producing the above-mentioned torque on arm 3.

The blade rotor 9A is driven by a motor 10A within the fuselage of the helicopter 10 and is capable of raising or lowering it by respectively rapid or slow rotation, while balancing arm 3 balances on short arm 4 and extension 6. The other end 11 of arm 3 is bent downward and provided with a tight frictionally retained, cheaply produced, coil of heavy metal wire 12 which may be twisted on or off sufficiently to accurately counterbalance the helicopter 10.

Thus far, the active operating unit which includes the helicopter and its support means has been outlined, this unit being connected to the control unit about to be described, by the Bowden cable 8 and conductor 18 within sheath 3A. This control unit, generally indicated at 2A primarily includes a control box 13 (Figures 1 and 3)

having a sloping top 13A printed to represent a helicopter instrument panel, through which extend a control stick 14 resembling a control stick upon an aircraft, and a throttle arm 17 which is virtually a rheostat arm for the resistance unit 16 within the box 13 connected to a battery source of current in battery case 15. One conductor 23 extends from the resistance device 16 to a lamp 24 which shows thereby current intensity or roughly r.p.m. of motor from which another conductor 25 extends down to continue externally as 18 with cable 8 in sheath 3A as already mentioned. The battery source 15 is grounded at one pole, while the other has conductor 26 connected to the throttle arm 17, and a further conductor 27 extends down from unit 16 to the control stick 14, the Bowden cable 8 serving as a return conductor inasmuch as the battery is grounded. In this connection it should be stated that upon the helicopter, one conductor 28 to the motor 10A is grounded and the other is conductor 18 extending to this motor to provide the driving current as controlled by throttle arm 17.

In any event, the control stick has the Bowden cable 8 connected to the lower end thereof, the stick being pivoted in box 13 on a pin or bolt 29 and extending upward through top 13A by way of a slot 30. As shown in detail in Figure 5, the stick 14 is hollow at its lower end 31 and has a pair of bottom slots 32 (one shown) with an enlargement 33 at the upper closed end for receiving and retaining the Bowden cable therein, as this cable is under tension, either by spring action or by the weight of counterbalance 12 on arm 3. The cable has a stop 34 adapted to seat in the enlargements in the slots, so that a quick connection between cable, control stick and arm 3 is stable. While the throttle arm 17 controls speed of rotation of motor 10A, the control stick mechanically provides for angular rotation of arm 3.

The control unit 2A is thus a dual control unit and the helicopter operating unit controlled thereby is capable of variable motor operation and rotation of balancing arm 3 or angular adjustment thereof with the helicopter body 10 supported thereby.

The rotation of balancing arm 3 is effected by cable 8 upon the upper end or top of supporting tower 1 in obedience to shifting of control stick 14, and in the form just described by rocking of the arm 3 on pin or shaft 5, but as shown in Figure 4, other means surmounting the tower will also serve. For example, in Figure 4, the tower has a metal bowl 22 supporting a ball 19 provided with a groove 21 in which the cable lies and terminates in a top knot 20, balancing arm 3 being fitted in this ball so as to turn therewith if a pull is exerted upon cable 8, the bowl 22 serving as an anti-friction mounting therefor.

In each form, the dual control unit serves as the control device for controlling the angular position of arm 3 and the rotation of the rotor 9A by motor 10A by throttle arm 17 and control stick 14, as already intimated.

Although certain modifications have been shown and described in the foregoing, it is evident that further modifications and variations are possible and form part of my invention which includes all such variations within its purview and useful scope.

Naturally, various materials such as wood, plastic and light metals and alloys may be used for the construction of the parts of the helicopter and its supporting structure, and in any event, the control box 13 is preferably made so strong and durable that it will serve well as the packing container for the entire apparatus when sold in knock-down form, ready to be assembled by the purchaser.

The Bowden cable-opposing weight or spring idea is ideal in that it serves to bind the control box to the tower under constant tension, avoiding their vibrating or "dancing" apart. The flexibility of the arrangement allows the tower to be placed almost anywhere and remotely, respective to the control box.

The control box is open upon one side as shown in Fig. 3 to permit the insertion of the operator's feet to give the impression of being in the machine. The weight of the feet stabilizes the box.

Having now fully described my invention, I claim:

1. A toy helicopter of the character described, including a supporting tower provided upon the top thereof with a pivot mounting with two degrees of freedom, an elongated balancing arm having the intermediate portion thereof supported upon the pivot mounting, a helicopter proper secured upon one end of the balancing arm and a counterweight upon the other end, a blade rotor mounted upon the helicopter with means for driving the rotor, manually operated means for remotely causing angular movement of the balancing arm with respect to its axis to tilt the helicopter, said other end of the balancing arm carrying the counterweight being bent laterally toward the pivot mounting to produce a torque on the balancing arm in opposition to said last mentioned means and manually controlled means for controlling the drive of the rotor, said manually operated means including a flexible connection to the tower for enabling the manually operated means to be variably positioned relative to the tower.

2. A toy helicopter according to claim 1, wherein the means for driving the rotor is an electric motor and the manually controlled means includes a variable resistance and a source of current.

3. A toy helicopter according to claim 2, wherein the manually operated means for causing angular movement of the balancing arm includes a control box having a pivoted control stick, a Bowden cable interconnecting the end of the latter and the intermediate portion of the balancing arm through the supporting tower and the pivot mounting thereon.

4. A toy helicopter according to claim 3, wherein the resistance is located within the control box with a contact lever upon the box making variable contact with said resistance, said control box with its control stick and contact lever forming a dual control unit for the helicopter.

5. A toy helicopter according to claim 3, wherein the pivot mounting for the balancing arm includes a shaft extending transversely through the balancing arm and rockable means for supporting the shaft.

6. A toy helicopter according to claim 5, wherein the rockable means includes a ring disposed in a vertical plane and mounted for rotation upon the tower about a vertical axis and having a vertically disposed side slot, a horizontal pivot mounting in said ring for the end of the shaft with one end of the latter projecting out through said side slot to guide the same in pivoting movement to produce angular movement of the balancing arm.

7. A toy helicopter according to claim 4, wherein the control box has a sloping top with a slot therein through which the control stick projects into accessible position for manual operation.

8. A toy helicopter according to claim 5, wherein the lower end of the control stick is hollow and has a pair of opposite downwardly open slots with an enlarged upper closed end in at least one slot, a stop of greater diameter than that of the Bowden cable fixed on said cable fitting the enlarged upper end of the one slot, and a pivot mounting for the control stick within the control casing intermediate the upper end of said casing and the lower slotted end of the control stick.

9. A toy helicopter according to claim 5 wherein said counterweight includes a helically wound coil of metal wire having a number of similar turns adapted to be rotatably shifted inwardly upon or outwardly off the bent end of said balancing arm at will.

10. A toy helicopter of the character described including an operating unit comprising a supporting tower with a pivot mounting thereon having two degrees of freedom of movement, an elongated balancing arm having the intermediate portion thereof supported upon the pivot mounting, a helicopter proper secured upon one end of

the balancing arm and a counterweight upon the other end of said arm, at least one blade rotor upon the helicopter with means for variably driving the rotor, and means connected to the pivot mounting for angularly moving the balancing arm with respect to its axis and thereby tilting the helicopter; said other end of the balancing arm carrying the counterweight being bent laterally toward the pivot mounting to produce a torque on the balancing arm in opposition to said last-mentioned means, and a remote dual control unit for said operating unit including a control casing, a manually operable member mounted movably upon the control casing and effective to cause the means connected to the pivot mounting to angularly move said balancing arm, a second operable member also movably mounted upon said control casing

and effective to vary the drive of the rotor upon said helicopter, and cable means flexibly interconnecting the control casing and the operating unit for enabling the control casing to be variably positioned with respect to the operating unit.

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