June 18, 1963 S. ROBBINS ETAL 3,093,929

TOY HELICOPTERS

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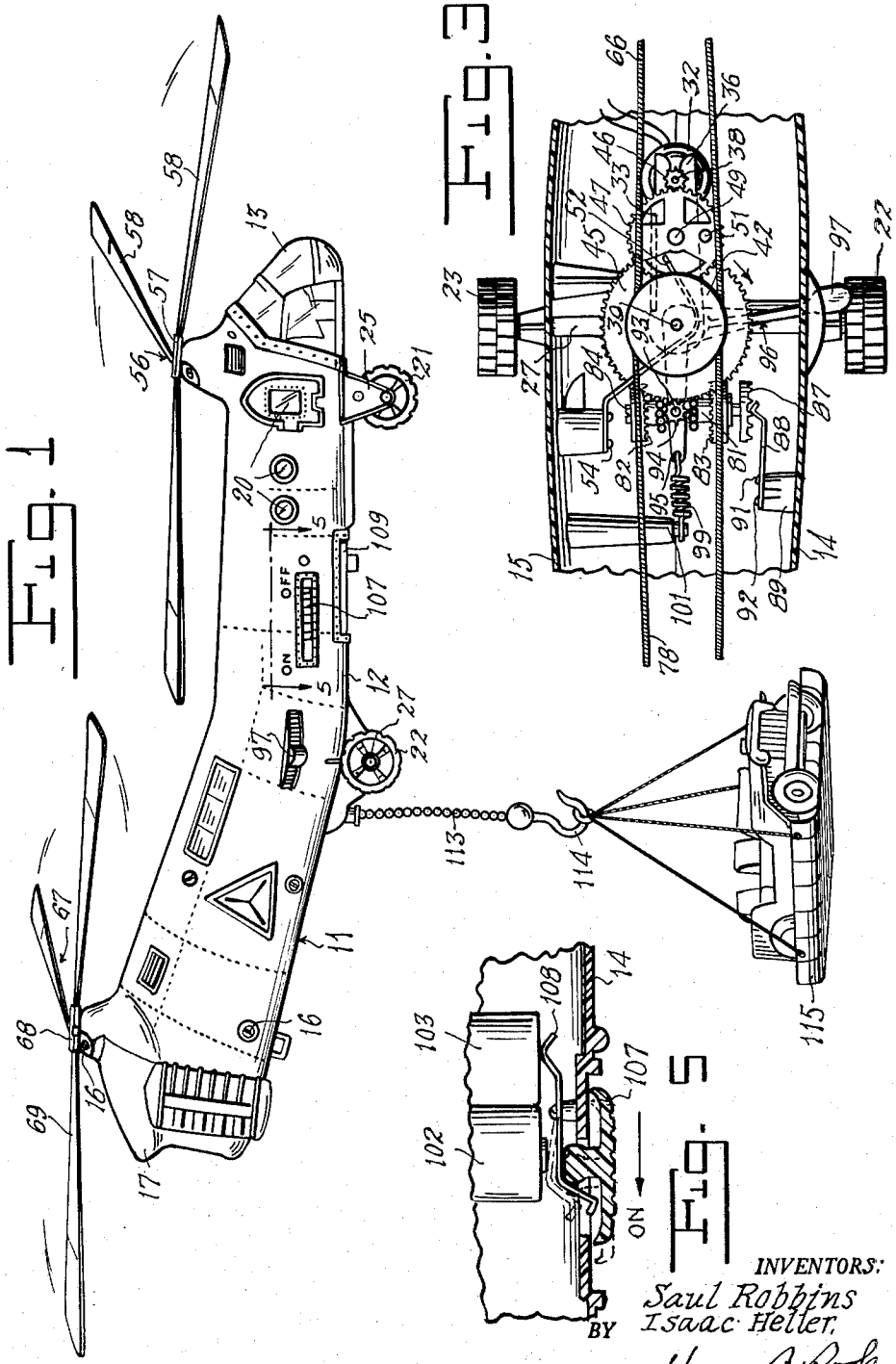


Fig. 1

Fig. 3

Fig. 5

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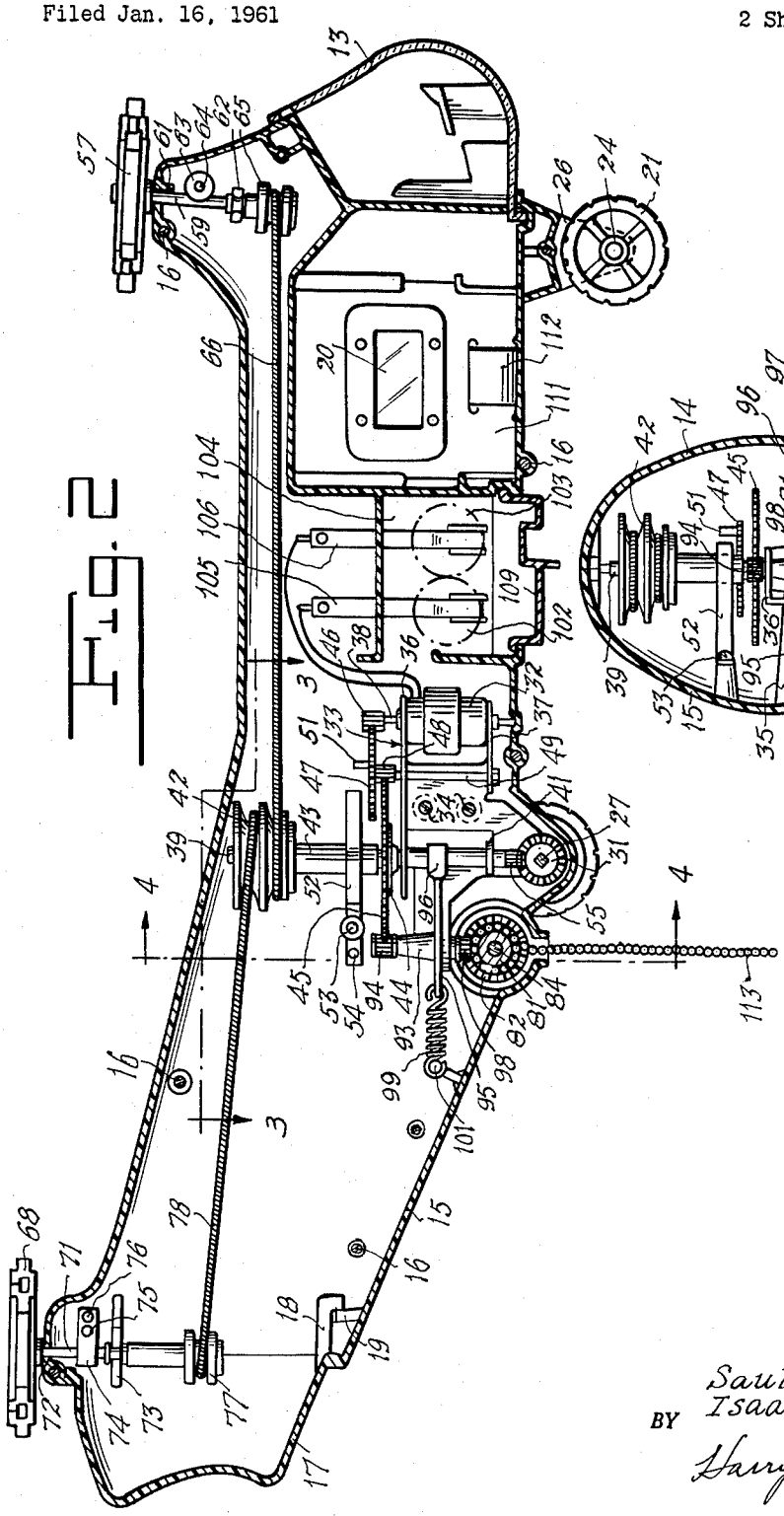


Fig. 2

Fig. 4

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TOY HELICOPTERS

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This invention relates to toys and, more particularly, to such simulating helicopters.

An object of our invention is to provide a miniature helicopter which may be used as a toy and which is motorized to simultaneously turn a pair of carrying wheels, its propellers, and a winch for raising or lowering an associated chain.

Another object of our invention is to provide a toy helicopter having a hollow plastic body in which is enclosed an electric motor operated from the outside by a switch connecting said motor to enclosed batteries, said motor being geared through a common drive shaft to simultaneously turn its propellers, a pair of carrying wheels and at will operate an enclosed winch one way or the other.

A further object of our invention is to provide a toy helicopter which is motorized for the operation of various parts thereof and which has a hollow body provided with a battery cover affording access to the enclosed operating batteries and a door affording access to the main body portion of the helicopter to allow for the insertion or removal of toy accessories.

These and other objects and advantages will become apparent from the following detailed description when taken with the accompanying drawings. It will be understood that the drawings are for purposes of illustration and do not define the scope or limits of the invention, reference being had for the latter purpose to the appended claims.

In the drawings, wherein like reference characters denote like parts in the several views:

FIGURE 1 is a side elevational view of a top helicopter embodying our invention.

FIGURE 2 is a vertical longitudinal mid-sectional view of the body of the helicopter to show the enclosed mechanism.

FIGURE 3 is a fragmentary horizontal view on the line 3—3 of FIGURE 2, in the direction of the arrows.

FIGURE 4 is a vertical sectional view on the line 4—4 of FIGURE 2, in the direction of the arrows.

FIGURE 5 is a fragmentary horizontal sectional view on the line 5—5 of FIGURE 1, in the direction of the arrows.

Referring to the drawings in detail, there is shown a toy helicopter generally designated 11 and comprising a hollow body 12. This body is desirably formed of a suitable plastic material and conveniently made in four parts. The parts of the body include the nose or cabin portion 13, desirably formed of transparent plastic material. The portion 13 is interlocked with respect to the main body sections 14 and 15 which are desirably opaque except for transparent window portions 20 and engage one another along the approximate mid-vertical longitudinal plane of the body.

These hollow body sections 14 and 15 are secured to one another in a suitable manner, as by means of screws 16 which extend transversely from one section to another, passing through suitable apertures in one section and received in suitably threaded sockets in the other. The fourth section of the body is the tail portion 17, suitably interlocked with respect to the rear end portions of the body halves 14 and 15 by means including in the present embodiment a latch device 18 hooking over a properly

placed rib or the like 19 on each of the body halves 14 and 15.

The helicopter is carried on three wheels, a single front wheel 21 and a pair of drive wheels 22 and 23. The front wheel is desirably formed of plastic material and has outstanding trunnion portions 24 turnably received in corresponding sockets in brackets 25 and 26 depending respectively from the body halves 14 and 15. The drive wheels 22 and 23, also desirably formed of plastic material, are non-rotatably mounted on the ends of a shaft or axle 27 non-circular, desirably square, in section, rotatable in bearing portions 28 and 29, disposed below the respective body halves 14 and 15. Slidable on said shaft 27 is a gear 31 which has a hub with an aperture of a size and shape corresponding with that of the shaft 27 so that, while it fits on said shaft, it will not turn thereabout. This is the gear which serves to drive the wheels 22 and 23 from an electric motor 32.

In order to mount the electric motor 32 and mechanism associated therewith for operation of the helicopter, we include a frame 33, which may be formed of steel or other durable material. This frame 33 may be mounted on one of the body halves, such as 15, as by means of screws 34 passing through apertures in said frame and received in correspondingly threaded support columns 35, one of which is indicated in FIGURE 4. The frame comprises flanges 36 and 37, projecting from the screw secured portion thereof as viewed in FIGURE 2, and carrying the armature shaft 38 of the motor 32. The flange 36 also carries the common drive shaft 39 for the helicopter mechanism at one portion and another portion of said shaft 39 is carried by a flange 41 of said frame. The frame 33 also extends downwardly and is apertured to receive the shaft 27.

The common drive shaft carries at its upper end a double pulley 42, desirably formed of suitable plastic material and having an elongated hub portion 43, from the lower end portion of which projects a disc 44 to which is secured a relatively large spur gear 45 serving to drive the shaft 39. Said gear 45 is driven through reduction gearing from the motor 32. This gearing, in the present embodiment, comprises a pinion 46 fixed on the upper end of the armature shaft 38, meshing with a gear 47 fixed with an associated pinion 48 on the upper end of a shaft 49 carried by the flanges 36 and 37.

The gear 47 carries an outstanding crank arm 51 which, during turning, engages a leaf spring 52 secured to the body section 15, as by means of a screw 53 and a stud 54 projecting from said body section 15 through a hole therein. The purpose of this spring is to make a noise simulating that made by a helicopter when in operation.

The pinion 48 meshes with the relatively large gear 45 so as to drive it and the shaft 39 at a reduced speed compared with that of the motor 32. On the lower end of the shaft 39 is secured a pinion 55 which meshes with the gear 31, engagement therebetween being caused by said gear bearing against the lower portion of the frame 33.

The front propeller 56 has a hub portion 57 in which the stems of the blades 58 are received. Said hub portion is mounted on the upper end of a shaft 59 turnable in bearings 61 and 62 and held in place by suitable means such as a washer 63 secured to the body section 15 by a screw 64. The lower end of the shaft 59 carries a pulley 65 driven from the lower portion of the double pulley 42 by suitable means such as a belt 66.

The rear propeller 67 has a hub 68 receiving the stems of the blades 69 and mounted on the upper end of a shaft 71. The shaft is carried in upper and lower bearings 72 and 73 on the body section 15 and held in place as by means of a plate 74 secured to said body section

as by means of a screw **75** and a stud **76** received in an aperture adjacent one end thereof. The lower portion of the shaft **71** carries a pulley **77** which is driven from the upper portion of the double pulley **42** by suitable means such as a belt **78**.

Disposed in the body of the helicopter rearwardly of the shaft **39** is a hoisting device or winch **79** comprising a drum **81**. To opposite ends of said drum are fixed gears **82** and **83**. Said drum **81** is mounted on a shaft **84** turnable in bearings **85** and **86** provided respectively in the sections **14** and **15** of the body. In order to hold the drum in a given position until positively moved therefrom, drag means **87** is secured to one end of the drum **81**, as outside of the gear **83**.

Said drag means may be in the form of a desirably plastic disc with radial ridges on its outer surface and engaged by a resilient pawl **88** to restrain movement thereof. This pawl **88**, shown most clearly in FIGURE 3, is secured to a columnar member **89** projecting inwardly from the body section **14** as by means of a screw **91** and a stud **92** received in an aperture in the outer end portion thereof. The end of the pawl **88** which engages the member **87** is desirably curved, as illustrated, so that it will permit motion in either direction after overcoming a predetermined holding force.

The drum **81** is driven from the gear **45** through planetary pinion **94** meshing therewith and secured to the upper end of a winch-operating shaft **93** carried by the inner arm **95** of a bell-crank lever **96**, provided with a control arm or lever portion **97** which projects outside of the body **12**, for movement by an operator such as a child using the toy. The lower end of the shaft **93** carries a pinion **98** which is movable, upon swinging the bell-crank lever about the shaft **39**, to engage one of the gears **82** and **83** to turn the drum **81** in one direction or the other. The arm **95** is biased to neutral position, as by a connected spring **99** with its other end connected to the body **12** as by encircling a stud **101**. Thus the winch **79** is not turned in either direction unless and until an operator moves the arm **97** to turn the bell-crank lever until the pinion **98** engages one of the gears **82** and **83**.

The motor **32** is powered by an electric battery which in this case comprises dry cells **102** and **103**, held in position in a battery compartment **104** of the body **12**. They lie between resilient contact means **105** and **106** at one side and an operating switch **107** provided with a resilient contact member **108** at the other. Said member normally presses the battery **103** against its contact strip **106** and, when in closed position, completes the circuit to the motor by pushing the other end portion of said strip into engagement with the central contact of the battery **102**.

The contact strips **105** and **106** are at all times operatively connected to the motor **32**, so that said motor is energized upon moving the switch **107** from the "off" to the "on" position, that is, from right to left, as viewed in FIGURES 1 and 5. The battery compartment **104** is normally closed by a cover member **109** which is adapted to be removed by pushing to the left, as viewed in FIGURES 1 and 2, and then pulling out. It may be replaced by hooking a left-hand ledge portion under a supporting shoulder on the body and then pushing up on its other end portion until it snaps into place. There is also desirably a side or cargo door **111** for the body **12** provided in the section **15** and held by a spring **112** so that it will stay in either open or closed position, as desired.

In the use of the helicopter, the cells **102** and **103** are placed in the compartment **104** so that they point in opposite directions, whereby they are connected in series when in use. The propeller blades are desirably inserted after the helicopter has been otherwise assembled and stood on its wheels. They are desirably arranged so that their stems snap easily into place in their hubs and so that they will enter only one way.

To start the helicopter **11**, the switch **107** is moved to the "on" position to energize the motor **32**. The wheels and propellers will then turn, and the helicopter will taxi along a floor or table. In operating the winch **79**, the helicopter **11** should be raised off the supporting surface, as by the hand, with the switch **107** in the "on" position, so that the motor is turning. Upon moving the control arm or lever **97** backward or forward, the winch will operate to lift or lower the chain **113** which may be a conventional bead chain, secured to its drum and a hook **114** and/or platform **115** suspended therefrom.

It will be understood that modifications and changes in the construction and combination of the parts of the toy can be made within the spirit and scope of the invention.

We claim:

1. In a toy helicopter a hollow body, propellers journaled on said body, an operating mechanism frame secured to and inside said body, a common drive shaft journaled on a vertical axis on said frame, means for driving said propellers from said shaft, an electric motor, a battery, a switch for energizing said motor from said battery for operation in one direction, gearing between said shaft and said motor including a relatively large gear on said drive shaft for receiving power from said motor, wheels on which said body may roll, means for driving some of said wheels from said drive shaft, a winch carried by said body and including a drum on which a chain may be wound or from which it may be unwound, a gear fixed at each end of said drum, winch control means having an operating arm projecting outside of said body, a winch operating shaft connected to said arm for actuation thereby, a pinion fixed on the upper end portion of said operating shaft, meshing with and planetary to said large gear, the pinion on the lower end portion of said operating shaft being adapted to mesh with either of said drum gears or lie therebetween, means biasing said pinion so that it is normally out of mesh with both of said drum gears whereby, when the motor is running, an operator may move the operating arm one way or the other to cause the winch to wind or unwind the chain with respect thereto.

2. In a toy helicopter, a hollow body, a propeller with a shaft pivoted in the upper portion of said body adjacent opposite ends thereof, a propeller pulley on the lower end of each shaft, an operating mechanism frame secured inside said body, a common drive shaft for said propellers carried by said frame, pulley means on said drive shaft, belts connecting said pulley means to said propeller pulleys, an electric motor adapted to be connected through a switch to a battery for operation in one direction, reduction gearing between said shaft and said motor, including a relatively large gear on the former, for transmitting power from said motor, three wheels on which said body may roll, an axle non-circular in section carrying a pair of said wheels and disposed beneath said drive shaft, a pinion on the lower end of said drive shaft, a gear with a hub fitting on said axle so as to rotate therewith, said gear meshing with said pinion to be driven thereby, a winch carried by said body and including a shaft and a carried drum on which a chain may be wound or from which it may be unwound, a pair of similar gears one fixed at each end of said drum, said gears having teeth projecting toward one another, a bell crank with one arm for operating projecting outside of said body and the other arm inside said body and extending at a right angle to said operating arm, a winch operating shaft carried in the free end portion of said other arm, a pinion fixed on the upper end portion of said operating shaft, meshing with and planetary to said large gear, a pinion on the lower end portion of said operating shaft, adapted to mesh with either of said drum gears or lie therebetween, a spring biasing said other arm so that said lower pinion is normally out of mesh with both of said drum gears, whereby when the motor is running, an operator may swing the operating arm one way or the other to cause

said lower pinion to engage one or the other of the drum gears and cause the winch to wind a chain thereon, or unwind it therefrom as desired, drag means on one end of said drum, and a resilient pawl engaging said drag means to hold the drum in position until positively moved by said motor.

3. A toy helicopter comprising a hollow body having a mechanism frame therein, a propeller journaled on said body, a drive shaft journaled in said frame on a vertical axis, a motor mounted on said frame, reduction gearing between said drive shaft and said motor, driving connections between the upper end of said drive shaft and said propeller, an axle having a pair of wheels thereon journaled in said body on a horizontal axis, a pinion on the lower end of said drive shaft, and a gear coaxially mounted on said axle to rotate therewith, said gear meshing with said pinion so as to be driven thereby upon operation of said motor and thereby drive said wheels, a winch including a drum journaled on said body, a gear fixed at each end of said drum, a winch operating shaft, a lever pivoted

on said body on which said winch operating shaft is journaled, a driving connection between said winch operating shaft and said drive shaft, a pinion on said winch operating shaft to mesh selectively with said gears on said drum, and means for actuating said lever to move said last-mentioned pinion into mesh with one or the other of said gears on the drum while maintaining the driving connection between said drive shaft and said winch operating shaft.

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