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TOY DEVICE FOR LAUNCHING ROTARY WING FLYING OBJECTS

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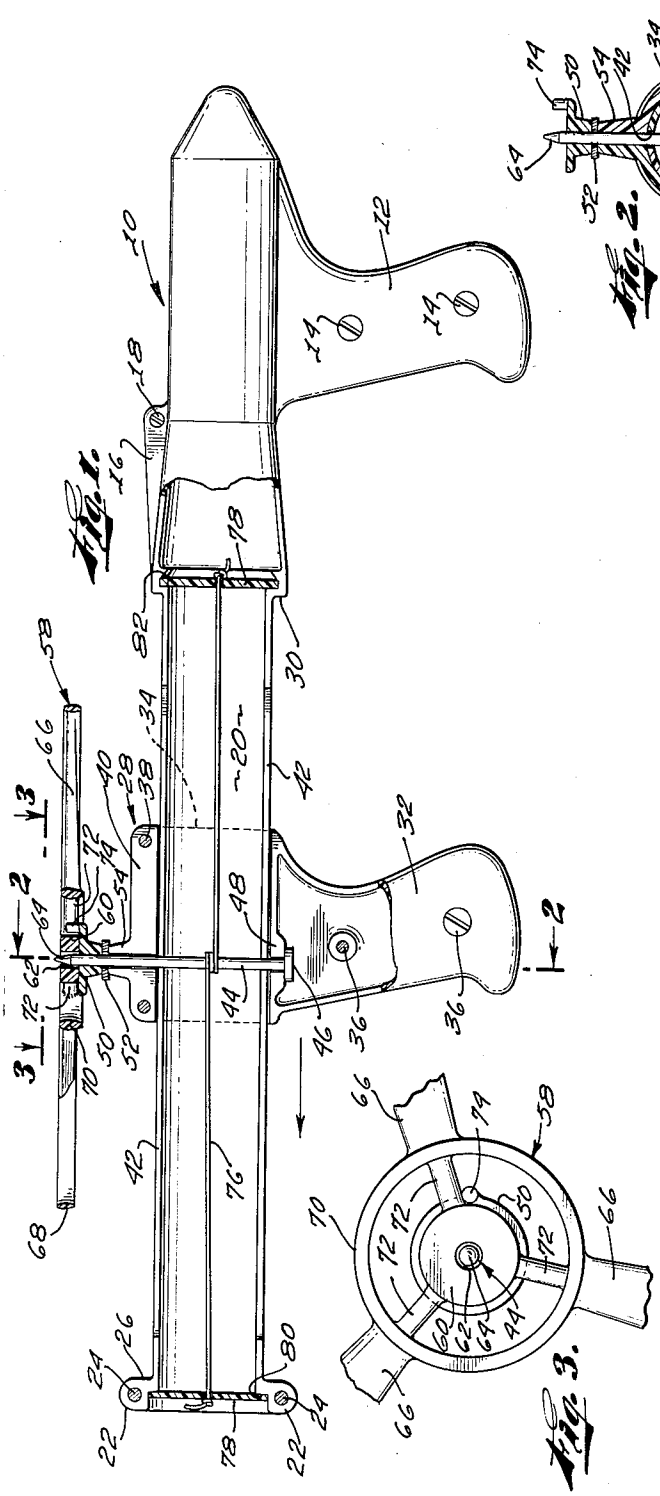


Fig. 1.

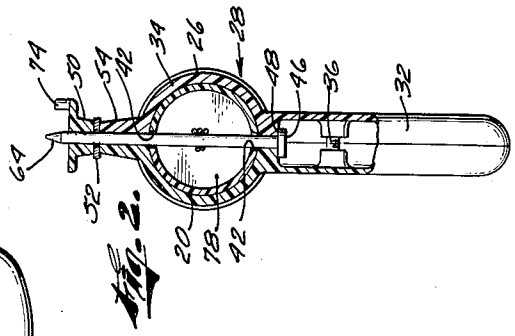


Fig. 2.

Fig. 3.

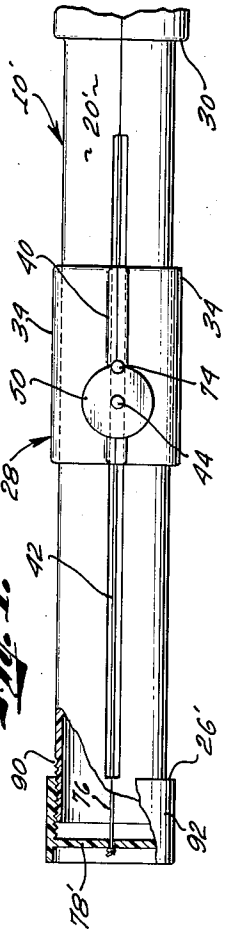


Fig. 4.

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TOY DEVICE FOR LAUNCHING ROTARY WING FLYING OBJECTS

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The present invention relates generally to a mechanical toy and specifically to a toy device in the form of a gun for launching rotary wing flying objects.

An object of my invention is to provide a toy for manually launching a rotary wing device into flight.

Another object of the invention is to provide a rotary wing launching device comprising a pair of relatively movably mounted parts, one of which has a rotatable shaft to drivingly engage the rotary wing, and a means for translating relative movement of the parts into rotation of the shaft and wing whereby the wing is propelled into space.

A further object of the present invention is to provide a launching device of this type incorporating a highly efficient torque generating means to smoothly accelerate a rotary wing to a high angular velocity prior to launching whereby the wing is propelled into prolonged free flight.

Yet another object of the invention is to provide a rotary wing launched having a minimum of parts and particularly a simple and sturdy torque generator means adapted to give a long service life under rough usage such as might be expected from children and mounted in a protected position to prevent inadvertent or deliberate damage thereto arising out of use of the launcher by children.

Another object of my invention is to provide a launcher of this type adaptable to embodiment in the form of a gun but not employing any moving parts of a type such as might be dangerous for children and also having a flying object which will not cause injury to any person against whom it might be launched.

These and other objects of my invention will be apparent from the following description of a presently preferred embodiment thereof and of an alternative form when taken in conjunction with the annexed drawing in which:

FIGURE 1 is a side elevational view, partly in section, of a toy gun device embodying my invention;

FIGURE 2 is a sectional view taken on the line 2—2 of FIGURE 1;

FIGURE 3 is a partial top plan view, on an enlarged scale, taken in the direction 3—3 of FIGURE 1; and

FIGURE 4 is a partial top plan view of another embodiment of my invention illustrating an adjustment means which may be utilized in conjunction with the torque generating means of the invention.

As will be apparent, my invention can be embodied in different types of toy devices. Referring to the drawing, it will be seen that in the present instance the invention is illustrated as being embodied in a toy gun; however, it will be understood that this is for purposes of illustration and example rather than by way of limitation.

In general, the illustrated toy gun embodiment of my rotary wing launcher includes an elongate barrel provided at its rear end with a pistol grip portion for one hand of the user. A launching platform member is slidably mounted on the gun barrel and also has a pistol grip portion for the other hand of the user. A shaft is rotatably mounted in the sliding launching platform and has a free end adapted to seat and drivingly engage the hub portion of a rotary wing flying device. An elongate flexible member, such as a length of string, is tightly helically wrapped around the rotatable shaft and anchored at opposite ends of the gun barrel, so as to be tautly suspended by the anchor point. Thus, when the launching platform is slid along the gun barrel the shaft is urged into rotation as it travels along the string. The resulting torque is drivingly transmitted to the rotary wing device which is accelerated sufficiently to fly off of its seat on the shaft end.

Specifically, the device includes a gun 10 preferably made from a plastic material and assembled from a pair of mirror image half sections. At its rear end the gun 10 includes an integrally formed pistol grip portion 12 through which the complementary pair of half sections are held together by a plurality of suitable removable fasteners 14. On top of the gun 10 and just forwardly of the pistol grip 12 is an integrally formed mock gunsight 16 made up of a lip or flange on each of the gun half sections for receiving a removable fastener 18.

The gun 10 has a forwardly extending elongate tubular barrel portion 20 terminating in a pair of diametrically opposite radially outstruck ears 22. In order to hold the two half sections of the gun 10 together at the front end the ears 22 are adapted to receive removable fasteners 24. At the junction of ears 22 and barrel 20 an annular rearwardly facing shoulder 26 is defined for limiting forward movement of a launching platform member 28 slidably mounted on the barrel 20. Rearward sliding movement of the launching platform 28 is limited by a forwardly facing exterior annular shoulder 30 formed at the rear end of the barrel 20.

The launcher 28 is preferably made of a plastic material and also comprises a pair of mirror image half sections. An integral pistol grip portion 32 of launcher 28 is surmounted by a sleeve section 34 adapted for a close sliding fit with the gun barrel 20. The two half sections comprising the launcher 28 are assembled around the barrel 20 and held in assembled condition by a pair of removable fasteners 36 in the pistol grip portion 32 and a pair of removable fasteners 38 inserted through an upstanding longitudinal flange 40 on top of the sleeve portion 34.

As is shown in FIGURE 4, the gun barrel 20 is formed with a pair of diametrically opposite longitudinally extending slots 42. A rotatable shaft 44 is vertically carried by the launcher 28 and has a diameter less than the width of the slots 42, through which it passes. The shaft 44 thus prevents angular movement of the launcher 28 relative to the gun 10 while at the same time it is capable of undergoing rotation when the launcher 28 is slid along the barrel 20.

For preventing upward axial displacement of the shaft 44, the launcher 28 in its pistol grip portion is internally formed with a downwardly facing seat 48 which is provided with a central opening through which the shaft passes. The shaft passes upwardly through the pair of slots 42 formed in the gun barrel 20, preferably intersecting the longitudinal axis of the barrel 20, and continues upwardly through the central opening of a boss portion 54 formed on the sleeve section 34 integrally with the flange 40. Mounted on the shaft 44 and seated on top of the boss 54 is a washer 52 above which a hub seat member 50 is rigidly affixed or integrally formed with the shaft 44, the hub seat preventing downward axial movement of the shaft 44.

The hub seat 50 is adapted to mount and drivingly engage a rotary wing device, as for example the rotor 58 seen in FIGURE 3. This rotor has a hub 60 formed with a center hole 62 for the reception of a tapered upper end 64 of the shaft 44, which projects above the hub seat 50 and facilitates centering rotor 58 about the shaft 44. Extending radially outwardly from the hub 60 and equally angularly spaced there-around is a plurality of integral-

ly formed air foils 66 which are interconnected at their outer ends by a circular rim 68. In their inner ends the air foils 66 are intercepted by a ring 70 concentric with but of larger diameter than the hub 60, and the extreme inner ends of the air foils 66 take the form of narrow root sections 72 interconnecting the ring 70 and hub 60.

The driving engagement between the shaft 44 and rotor 58 is provided by means of an upstanding dog 74 integrally formed with the hub seat 50 and spaced from the axis of the shaft 44 a distance at least equal to the radius of the rotor hub 60. As is indicated in FIGURE 3, when the rotor 58 is placed on the hub seat 50 on shaft 44 the dog 74 is positioned in one of the spaces between a pair of the root sections 72 and is thus positioned for driving engagement with the rotor 58.

For translating sliding movement of the launcher 28 into rotation of the shaft 44 I have devised a very inexpensive but highly efficient torque generating means. As is shown in FIGURE 1, an elongated flexible member such as a length of cord 76 is suspended within the gun barrel 20 substantially along the longitudinal axis of the barrel and is anchored at opposite ends in a pair of discs 78. The disc 78 at the forward end of the gun 10 is seated in an annular shoulder 80 that faces forwardly. At the rear end of the gun barrel 20 the other disc 78 is seated in an internal rearwardly facing annular shoulder 82. The pair of discs 78 are held in seated position by the tension of the cord 76 and the cord is helically wound about the shaft 44. Thus, when the gun 10 is held in one hand at the grip portion 12 and the launcher 28 is slid along the barrel 20 by means of the grip portion 32, the shaft 44 frictionally held in the traveling helical bight portion of the cord 76 is urged into rotation.

In the use of my launching device, the launcher 28 is initially positioned adjacent the rear shoulder 30 on the gun barrel 20. The rotor 58 is then placed on the hub seat 50 of the upwardly protruding shaft 44 with the dog 74 against one of the root sections 72. The gun 10 is then held in the other hand at the grip portion 12 and supported in such a manner that the shaft 44 is aligned with the desired flight path of the rotor 58. Thereafter, the launcher 28 is pushed forwardly and accelerated until it contacts the forward shoulder 26 of the barrel 20. The traveling bight portion of the cord 76 transmits a corresponding acceleration of the shaft 44 until the rotor 58 achieves a high angular velocity. Because of the engagement of the dog 74 with one of the root sections 72 during acceleration and because of the presence of a full diameter portion of the shaft 44 within the central opening 62 of the rotor hub 60, the rotor 58 will remain seated on the hub seat 50 until movement of the launcher 28 is arrested against the forward stop 26. By the time the launcher 28 has been stopped at the forward end of the gun the angular velocity of the rotor 58 will greatly exceed the minimum required for the creation of sufficient thrust by the air foil sections 66 for lifting the rotor 58 from the seat 50. The rapidly spinning rotor 58 will then soar into free flight and if the shaft 44 has been vertically inclined the rotor 58 can achieve a very great height.

In FIGURE 4 I have shown an alternate form of gun disignated by the numeral 10′ which is utilized with a launcher 28 identical to that described in conjunction with the gun 10. However, in this instance the gun 10′ has been adapted for adjusting the tension of the cord 76 so that when slackness occurs in the cord after prolonged use it can be retensioned for once again frictionally driving the shaft 44.

The barrel 25 of the gun 10′ at its forward end is exteriorly threaded as indicated by the numeral 90 to mount an interiorly threaded cylindrical cap member 92. This member serves to hold together the front end portions of the two half sections comprising the gun 10′ and also, by virtue of its larger diameter, defines a rearwardly facing shoulder 26′ which limits forward sliding movement of the launcher 28.

The cap member 92 includes an interiorly disposed disc portion 78′ which is centrally apertured to receive the forward end of the actuating cord 76. As in the form of the invention shown in FIGURE 1, a knot is tied in the cord 76 on the outside of the disc portion 78′ to seat the cord 76. In the assembly of the device it is preferable that the cap member 92 be threaded inwardly as far as possible until the disc portion 78′ abuts the front end of the barrel 20′. The knot is then tied in the cord 76 snugly against the outer face of the disc portion 78′. Thereafter, in order to tension the cord 76 properly about the actuating shaft 44, the cap member 92 can be backed off on the threaded end 90 of the barrel 20′, thus tensioning the cord 76 between the disc 78′ and disc 78 at the rear end of the barrel 20′. With this construction as the material of the cord 76 elongates or creeps after prolonged use, further backing off of the cap member 92 will renew the tension of the actuating cord. As is apparent, the form or embodiment of my launching device shown in FIGURE 4 is used in the same manner as the first described embodiment of my invention.

Although the forms of the invention herein shown and described are fully capable of achieving the objects and providing the advantages hereinbefore mentioned, it is to be understood that they are merely illustrative of presently preferred embodiments and I do not mean to limit myself to the details of construction herein shown and described other than as defined in the appended claims.

I claim:

1. A device for launching a rotary wing flying object, comprising: a pair of rigid members mounted one upon the other for relative movement therebetween, each of which is adapted to be grasped by a hand, said pair of members when held in opposite hands moving relative to one another in response to relative movement of the hands; a rotatably mounted shaft carried by one of said members and having a means on one end adapted to concentrically seat and drivingly engage a hub portion of said object whereby a torque of said shaft can be transferred to said object for causing it to fly the other of said members having longitudinally extending slot means through which said shaft carried by said one member passes for movement of said shaft and said one member longitudinally relative to said other member; and a means on the other of said members and drivingly connected to said shaft to translate relative movement of said pair of members into torque of said shaft for launching said object.

2. A device for launching a rotary wing flying object, comprising: a first rigid member adapted to be manually stationarily supported at a grip portion thereof by a single hand and having an elongate portion extending beyond said grip portion; a second rigid member coaxially slidably mounted on said elongate portion of said first member and having a grip portion adapted to be grasped by the other hand whereby said second member can be moved manually along said first member; a rotatable shaft mounted on said second member to be carried along therewith when said second member is slid along said first member and having a free end provided with means adapted to concentrically support and drivingly engage a hub portion of said object, said second member mounting said shaft in angular relationship to the direction of movement of said second member along said first member; and a means bodily immovably mounted on said elongate portion of said first member and drivingly engaged with said shaft to translate movement of said second member into rotation of said shaft whereby said object is rotated for launching it into flight.

3. A device for launching a rotary wing flying object, comprising: an elongate straight rigid member; a second rigid member slidably mounted on said first member for

reciprocal movement within a limited range along said first member; a rotatable shaft carried on said second member in angular relationship to said first member and having a free end provided with a seating means adapted to support and drivingly engage said object; and a means bodily immovably mounted on said first member in parallel relation to said first member and drivingly engaged with said shaft to translate relative movement of said members into rotation of said shaft whereby said object is rotated for launching it into flight.

4. A device as set forth in claim 3 in which said last mentioned means comprises an elongate flexible member tautly suspended along said first member and wound about said shaft.

5. A device for launching a rotary wing flying object, comprising: an elongate tubular rigid barrel terminating at its rear end in a hand grip portion; a tubular member coaxially slidably mounted on said barrel and having a hand grip portion; a shaft rotatably mounted on said member in angular relationship to said barrel to be carried along by said member when said member is slid along said barrel and having a free end provided with a hub seat adapted to concentrically seat and drivingly engage a hub portion of said object; and enclosed means extending along said barrel and connected thereto so as to be bodily immovable and drivingly connected to said shaft to translate sliding movement of said member along said barrel into rotation of said shaft so that when said grip portions are grasped in opposite hands and moved relative to one another said object is rotated by said shaft and launched into flight.

6. A device for launching a rotary wing flying object, comprising: an elongate tubular rigid barrel terminating at its rear end in a hand grip portion; a cylindrical member coaxially slidably mounted on said barrel and having a hand grip portion; a shaft rotatably mounted in said member and passing freely through a pair of diametrically opposite longitudinally extending slots formed in said barrel to intersect the common axis of said barrel and member and having an exposed upper end carrying a hub seat adapted to concentrically seat and drivingly engage a hub portion of said object, said shaft and slots also serving to restrain said member against angular movement relative to said barrel; and a bodily immovable means extending longitudinally within said barrel and connected thereto and drivingly connected to said shaft to translate sliding movement of said member along said barrel into rotation of said shaft so that when said grip portions are grasped in opposite hands and moved relative to one another said object is rotated by said shaft and launched into flight.

7. A launching device as set forth in claim 6 in which said means comprises an elongate flexible member tautly suspended along said barrel and wound about said shaft.

8. A device for launching a rotary wing into flight, comprising: an elongate flexible member; rigid means for tautly and straightly suspending said flexible member along and between opposite ends of said rigid means; a shaft; second rigid means slidably mounted on said first-mentioned rigid means for movement longitudinally of said first means, said shaft being rotatably mounted on said second rigid means and drivably engaged by said member whereby said shaft is rotated in passing from one end to the other of said first rigid means when said second rigid means is moved longitudinally of said first means; and means on a free end of said shaft for releasably supporting and drivingly engaging a rotary wing whereby longitudinal movement of said second means is translated into rotation of said shaft and rotary wing to launch said wing into free flight.

9. A device for launching a rotary wing flying object comprising: an elongated tubular rigid barrel provided at its rear end with a generally radially outwardly extending hand grip portion, said barrel being formed with a pair of diametrically opposite slots extending longitudinally of said barrel and said barrel adjacent opposite ends of said slots being formed with a pair of confronting circumferentially extending exteriorly disposed shoulders; a cylindrical member coaxially slidably mounted around said barrel for reciprocable movement between the limits defined by said confronting shoulders and provided with a generally radially outwardly extending hand grip portion; a shaft rotatably seated in and extending diametrically through said member and through said slots of said barrel, said shaft and slots being adapted to restrain said member against angular movement on said barrel; a hub seat affixed to an exposed upper end portion of said shaft adapted for concentrically seating and drivingly engaging a hub portion of said object; a pair of centrally apertured discs internally seated within said barrel at longitudinally spaced apart positions, said barrel being formed with a pair of oppositely facing circumferentially extending shoulders adapted to coaxially seat said discs; and a cord extending through said apertures of said discs to be coaxially tautly and straightly suspended within said barrel between ends of said cord that are affixed to said discs, said cord being wound about said shaft to translate movement of said member and shaft along said barrel into rotation with said shaft to launch said object into flight.

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