United States Patent

Winston

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[54] **TWIST LEVER TOY**

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[51] **Int. Cl.** **A63h 27/12**

[58] **Field of Search** 46/47, 64, 65, 68, 75, 206, 46/209

[56] **References Cited**

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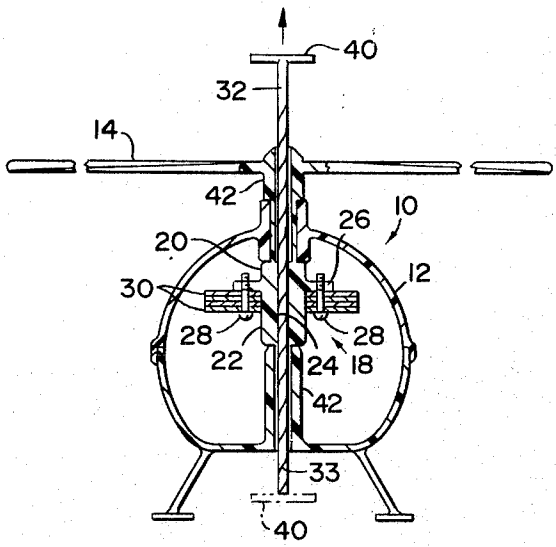
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Assistant Examiner—D. L. Weinhold
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[57] **ABSTRACT**

A mobile toy of the type designed to move over a surface or through the air and comprising an energy storing rotary element in the form of a flywheel which, when set into rotational motion, provides energy to propelling means thereby causing movement of the toy. The flywheel includes a hub with a centrally located channel designed to movably engage a driving means in the form of an elongated drive shaft having a convoluted outer surface. Linear movement of the shaft within the channel relative to the flywheel causes rotation of the flywheel due to the correspondingly shaped convoluted configurations of the exterior surface of the shaft at the surface of the channel.

10 Claims, 4 Drawing Figures



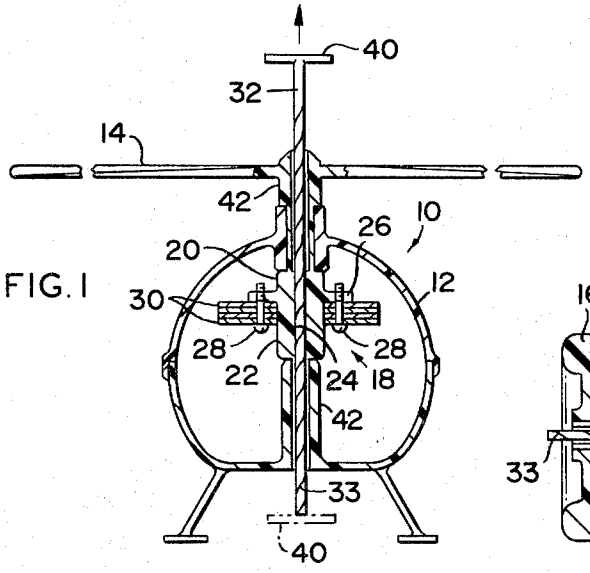


FIG. 1

FIG. 2

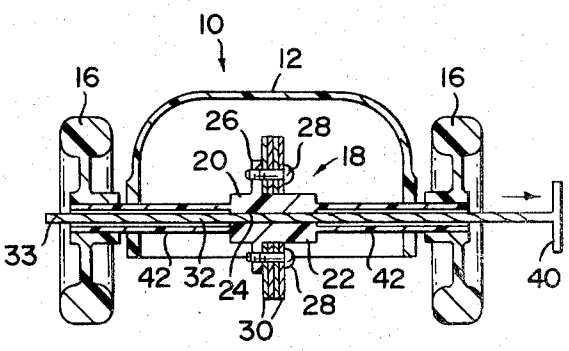


FIG. 3

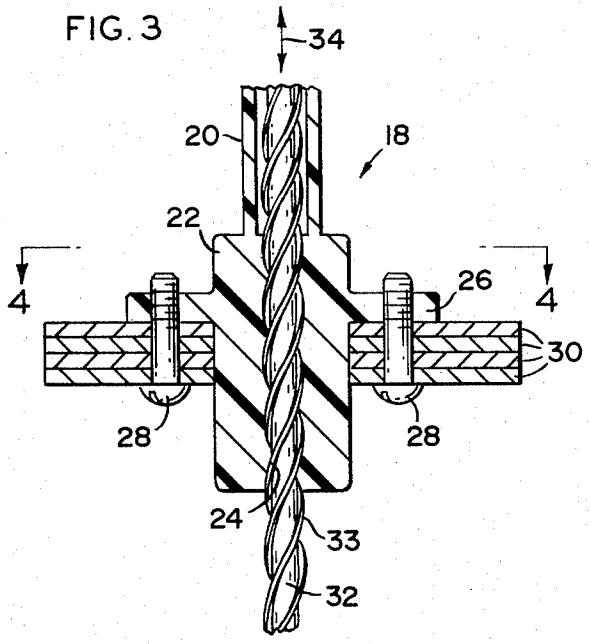
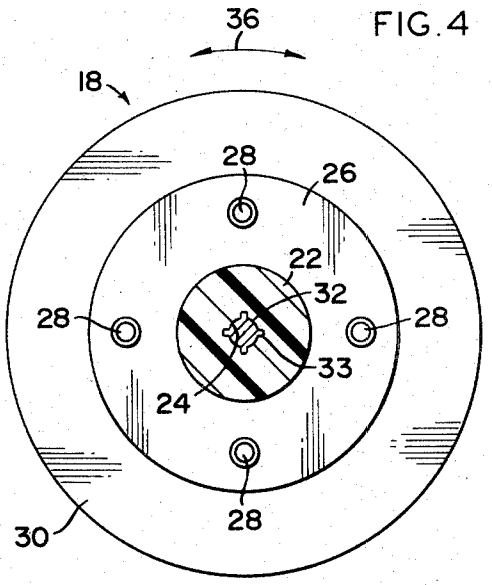


FIG. 4



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TWIST LEVER TOY

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a toy which may be in the form of an automobile, airplane, boat or the like and which is designed to move over a surface or through the air, for a relatively long period, by means of a rotationally mounted flywheel which supplies energy to propelling means in the form of wheels or a propeller.

2. Description of the Prior Art

There are a wide variety of toys such as airplanes, helicopters, automobiles, boats and the like which are designed either to move over a surface, including water, or through the air. In designing toys capable of such movement, it is desirable to provide a sturdy, relatively uncomplicated drive assembly to provide such motion. Toys of this type must be both sturdy and uncomplicated since they will be subject to rather rough treatment in the hands of small children. However, such toys should be capable of high performance in order to be popular with children and therefore be attractive from the commercial standpoint. Accordingly, the manufacturers and designers of conventional mobile toys run into the problems of providing an inexpensive, durable toy of relatively simple structure but capable of performing efficiently under relatively abusive conditions.

A number of conventional mobile toys have been designed to accentuate the performance features in an attempt to make these toys more popular from a commercial standpoint. However, in increasing the performance of such toys, manufacturers have resorted to relatively complex drive assemblies which have the effect of raising the cost and also making the toys less durable. This, of course, is unsatisfactory since the more complicated drive assemblies readily break down, thereby necessitating repair or rendering the toy inoperative and useless.

In order to overcome the above problems, a need has arisen for an inexpensive mobile toy drive assembly having a simple structure with a minimum number of moving parts and which is capable of efficient operation.

SUMMARY OF THE INVENTION

This invention relates to a high performance mobile toy of durable construction, of the type described, which overcomes the problems generally associated with mobile toys of this nature.

More specifically, the toy may be in the form of a helicopter, airplane, boat, automobile or like vehicle, and is provided with an energy storing rotary element. This rotary element may be in the form of a flywheel which is rotationally mounted on the body of the toy and which includes a hub having a substantially centrally located channel. The flywheel may be weighted through the use of a plurality of weighted elements which may comprise a number of annular shaped discs removably attached to the hub in order that the weight of the flywheel may be varied as desired. Each of the toys on which the flywheel may be mounted includes various types of propelling means including wheels, propellers or the like. The flywheel is connected directly to the propelling means by any applicable type connecting means. Once the weighted flywheel is set in motion, it has a gyroscopic effect which tends to drive the propelling means for a relatively prolonged period thereby moving the toy vehicle in a desired direction.

A driving member comprising an elongated shaft having a threaded exterior surface, arranged in a substantially convoluted configuration, is provided to operatively engage the flywheel, causing it to rotate and causing the toy to move as desired. Rotation of the flywheel occurs due to the fact that the surface of the channel, of the hub, is correspondingly shaped to conform to the convoluted surface of the drive shaft. Accordingly, when the shaft is forced through the channel in a co-linear direction to its own longitudinal axis, and perpendicular to the plane of the flywheel, the flywheel rotates relative to the longitudinal axis of the shaft.

Means to direct the movement of the shaft relative to the flywheel is provided by sleeve means attached adjacent to the hub and designed to have the shaft move therein. It should be noted that the shaft is capable of movement in either direction co-linear to its own longitudinal axis. Of course, the direction of linear movement of the shaft relative to the flywheel determines the direction of rotation of the flywheel and accordingly direction of rotation of the propelling means. This allows the toy to move in either forward or reverse direction with equal performance characteristics.

In operation, the body of the toy is held in the users hand and the shaft is inserted in the channel of the hub of the flywheel. Once the shaft is fully inserted, the flywheel is set in motion by rapidly and forcefully withdrawing the drive shaft by means of a handle which may be attached to either extremity of the shaft. When the flywheel is set in motion, the gyroscopic effect created thereby tends to maintain stability of the axis of the flywheel thereby making it efficient for operation in a helicopter type toy.

It can therefore be seen that a number of the problems prevalent in conventional type mobile toys are solved utilizing the drive assembly of the present invention.

The present invention accordingly comprises the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing in which:

FIG. 1 is a front sectional view of the drive assembly of the present invention utilized in a helicopter type toy.

FIG. 2 is a sectional view of the drive assembly utilized in an automobile type toy.

FIG. 3 is a sectional view of the cooperation between the flywheel and drive shaft.

FIG. 4 is a top sectional view taken along line 4—4 of FIG. 3 showing the direction of rotation of the flywheel.

Similar reference characters refer to similar parts throughout the several views of the drawings.

DETAILED DESCRIPTION

As shown in FIGS. 1 and 2, this invention relates to various types of mobile toys generally indicated at **10** and including a body **12** which may be made from a molded plastic or like durable material. Depending upon the type of toy vehicle in which the present invention is utilized, a propelling means which may be in the form of propeller **14** or wheel **16** serves to move the toy vehicle. The propelling means is driven by a drive assembly generally indicated at **18** movably mounted on the body **12** of the toy. The driving assembly comprises a rotary element in the form of a flywheel **20** which includes a central hub **22** having a centrally located channel **24**. An outwardly extending flange **26**, having a plurality of connecting means **28** in the form of threaded bolts or the like, are used to attach weighted elements **30** to the hub. These elements **30** are annularly shaped to fit in a stacked array about hub **22** and may be easily removed therefrom by means of removing the bolts **28**. This allows the weight of the flywheel to be varied as desired.

The drive assembly further comprises a driving member in the form of a drive shaft **32** having a spiral or substantially convoluted exterior surface thereon. The formed threads **33** on shaft **32** are designed to cooperate with the wall or surface of channel **24** which is also correspondingly shaped. Consequently, as shaft **32** moves in a co-linear direction relative to its own longitudinal axis, as indicated by arrow **34**, hub **22** and consequently flywheel **20** is caused to rotate due to the interaction of the cooperating surfaces of channel **24** and shaft **32**. As indicated by the arrow **34**, the shaft **32** may move in either direction. It is obvious that the direction of rotation of flywheel **20**, as indicated by arrow **36** in FIG. **4**, is dependent upon the direction of movement of shaft **32** on the interior of channel **24**. For this reason, the shaft **32** may enter channel **24** from either end thereof and be withdrawn from the same end by means of handle **40**.

As clearly shown in FIGS. **1** and **2** guide means in the form of a sleeve **42** are mounted adjacent to hub **22** in order to direct the movement of shaft **32** as it moves relative to flywheel **20**. In the particular embodiment shown, these sleeves **42** further serve as connecting means to fixedly secure hub **22** to the propelling means in the form of propeller **14** (FIG. 1) and wheels **16** (FIG. 2). Consequently, upon rotation of hub **22**, the propelling means will also be forced to rotate thereby providing motion to the mobile toy.

In operation, the extremity of shaft **32** opposite to handle **40** is inserted through sleeve guide means **42** and within channel **24** of hub **22**. Upon being inserted to its fullest point, the operator of the toy grasps handle **40** firmly and pulls the shaft forcefully and rapidly out of channel **24** of hub **22**. The interaction of the surfaces of channel **24** and shaft **32** causes rotation of fly wheel **20**. Because of the rigid connecting means extending between propelling means of the toy and hub **22**, the propelling means are also caused to be rotated thereby providing the desired motion to the toy.

It will thus be seen that the objects made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Now that the invention has been described,

What Is Claimed Is:

1. A toy comprising a body, a rotary element rotatably mounted on said body, said rotary element comprising a flywheel including a hub having a substantially centrally located channel; a driving member having a substantially convoluted exterior surface and movably arranged on the interior of said channel such that said convoluted surface of said driving member movably engages the surface of said channel, whereby movement of said driving member relative to said rotary element causes the rotation of said rotary element; propelling means mounted on said body to propel said toy, means to interconnect said rotary element and said propelling means such that rotation of said rotary element causes movement of said propelling means.

2. A toy as in claim **1** wherein said flywheel includes means for changing the mass of said flywheel.

3. A toy as in claim **12** wherein said changing means comprises weighted elements removably attached to said flywheel such that the weight of said flywheel may be varied.

4. A toy as in claim **3** wherein said each of said weighted elements each comprise a disc attached in a substantially stacked array to said hub.

5. A toy as in claim **1** wherein said driving member comprises an elongated shaft having a substantially convoluted surface extending along the length thereof; said channel including a surface configured to movably engage said convoluted surface of said shaft.

6. A toy as in claim **5** wherein the surface of said channel has a substantially convoluted configuration corresponding to the configuration of said driving means such that relative movement between said surfaces causes rotation of said flywheel.

7. A toy as in claim **1** wherein said driving means comprises an elongated shaft arranged on the interior of said channel to move substantially perpendicular to said rotary element and co-linear to the longitudinal axis of said driving means.

8. A toy as in claim **7** wherein said driving means is arranged on the interior of said channel to move in either direction co-linear to its own longitudinal axis.

9. A toy as in claim **1** further comprising guide means mounted adjacent to said hub so as to guide the movement of said driving means relative to said rotary element.

10. A toy as in claim **9** wherein said guide means comprises sleeve means mounted adjacent to said hub substantially co-linear relation to the longitudinal axis of said channel.

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