United States Patent [19]

McKeehan

[11] **3,798,835**

[45] **Mar. 26, 1974**

[54] **MOTOR DRIVEN BALL TOY**

[76] Inventor: **Rodger W. McKeehan,** 2536 Reclamation, Klamath Fall, Oreg. 97601

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[21] Appl. No.: **358,557**

[52] **U.S. Cl.** ..... **46/243 M,** 46/47, 46/100, 46/211

[51] **Int. Cl.** **A63h 29/22**

[58] **Field of Search** ..... 46/47, 100, 211, 243 M

[56] **References Cited**

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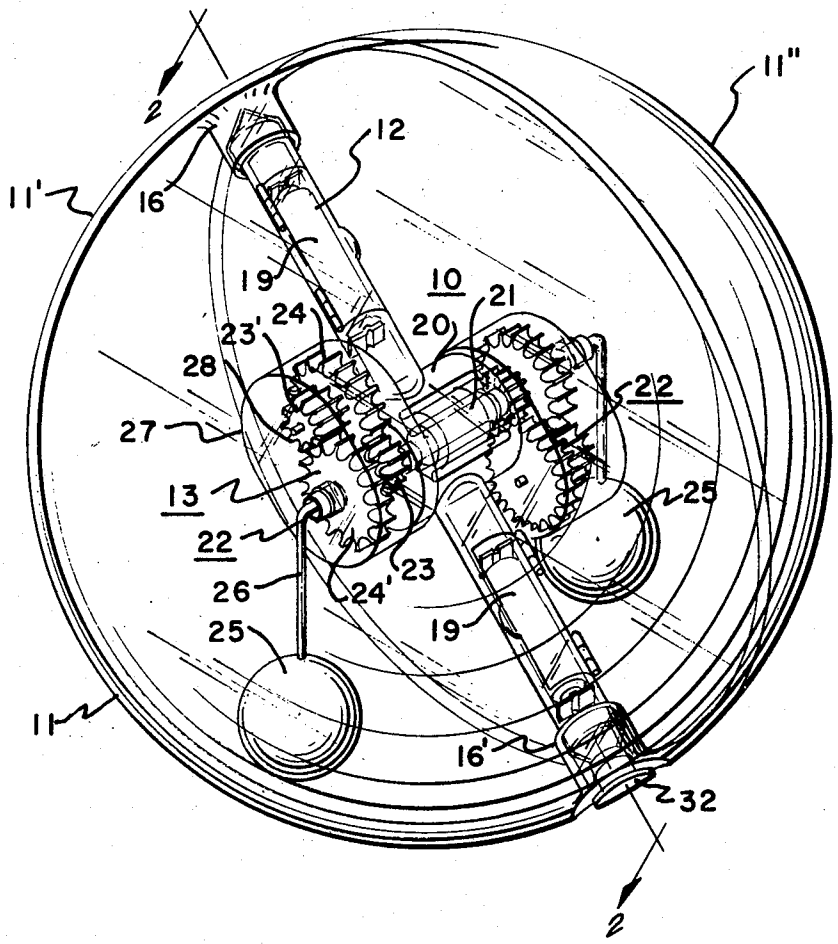
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Primary Examiner—Louis G. Mancene
Assistant Examiner—Robert F. Cutting
Attorney, Agent, or Firm—John W. Kraft

[57] **ABSTRACT**

The motor driven ball toy comprises a hollow ball casing, a toy drive assembly having an electric motor operable to drive pendulum weights carried distally from the motor armature shaft on pendulum arms disposed parallelly to the plane of rotation of the motor, and an axis cylinder mounted in the ball casing to support the toy drive assembly centrally in the ball casing. Further embodiments include an inertial switch operable to change the polarity of the motor in response to a high impact force, drive means to rotate the cylinder axis, and inertial control means for the means driving the cylinder axis.

16 Claims, 9 Drawing Figures



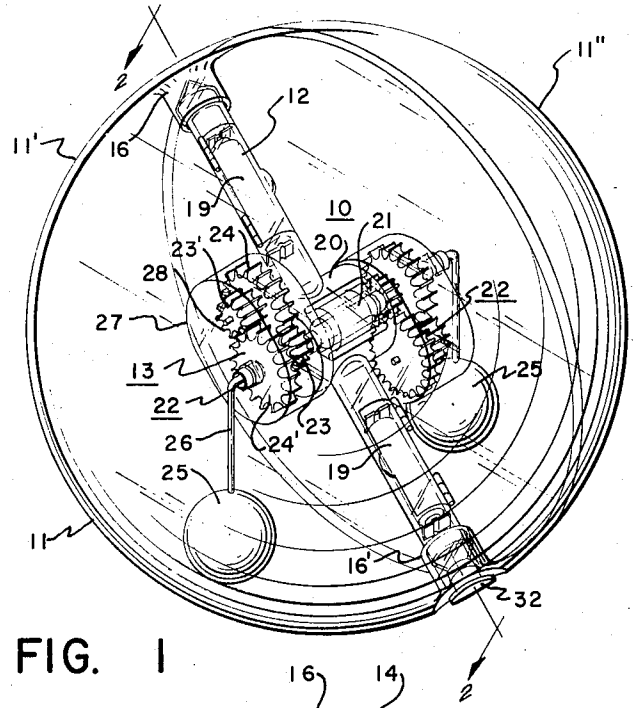


FIG. 1

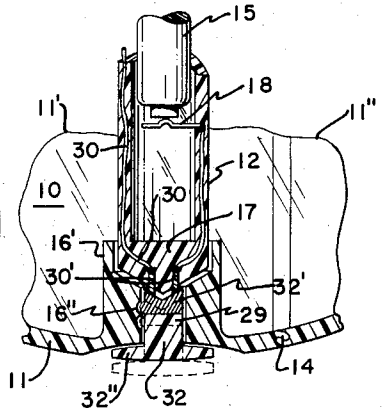


FIG. 3

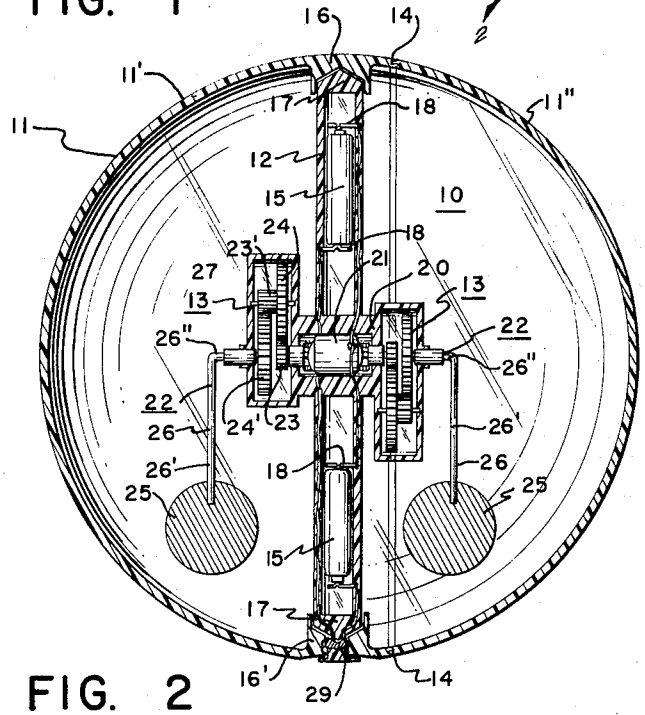


FIG. 2

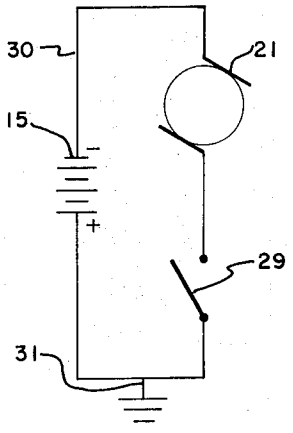


FIG. 4

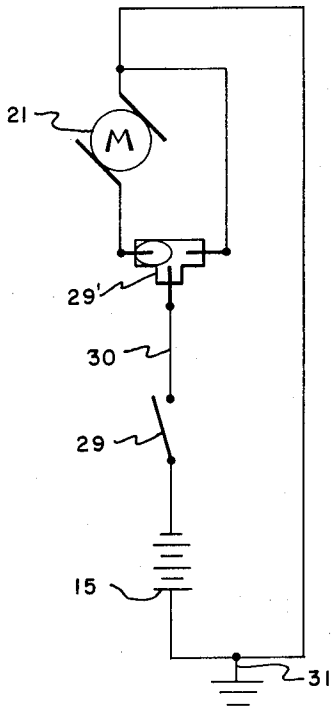


FIG. 5

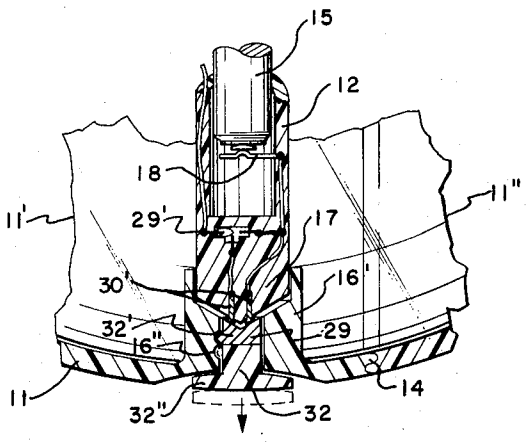


FIG. 6

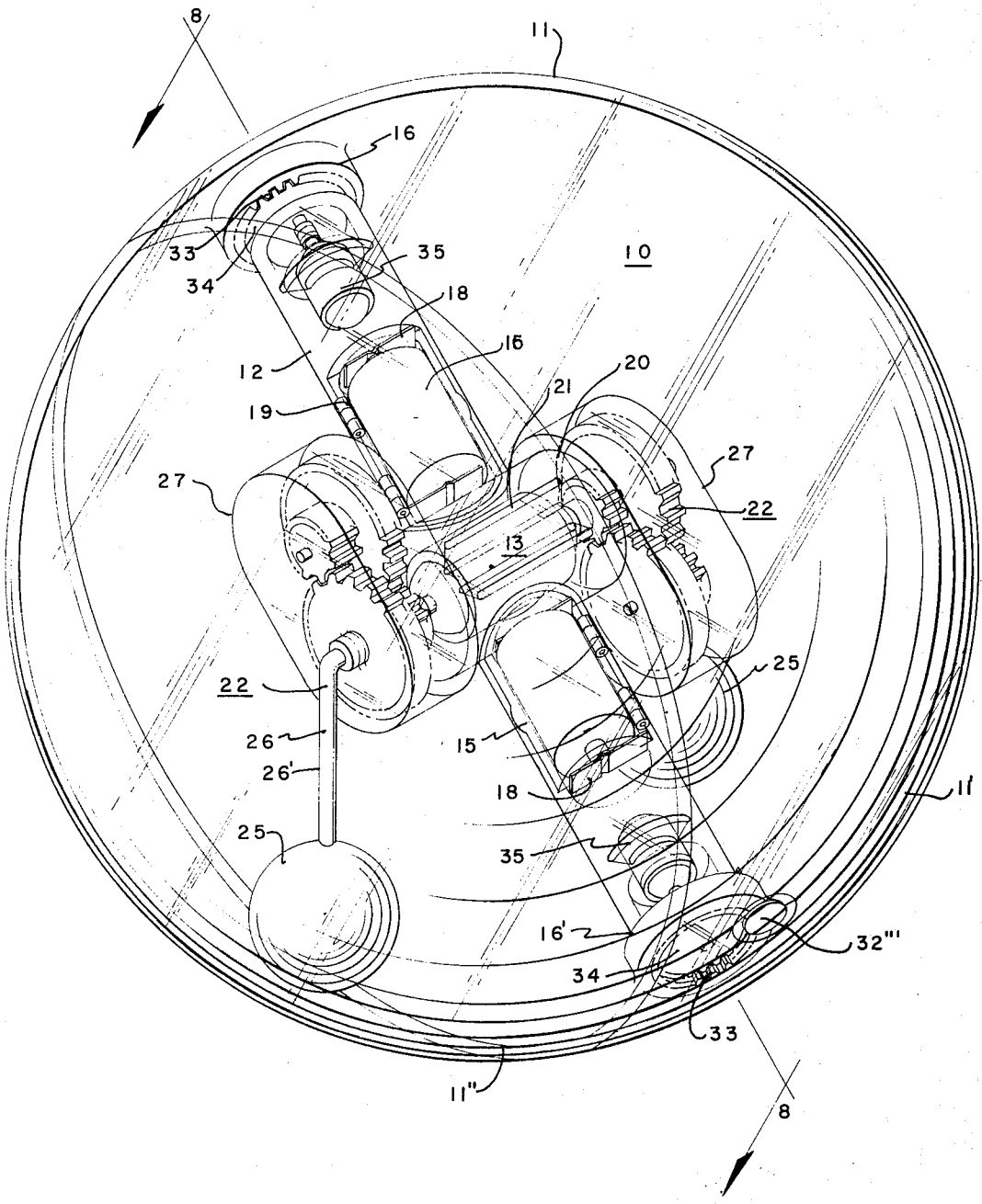

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FIG. 7

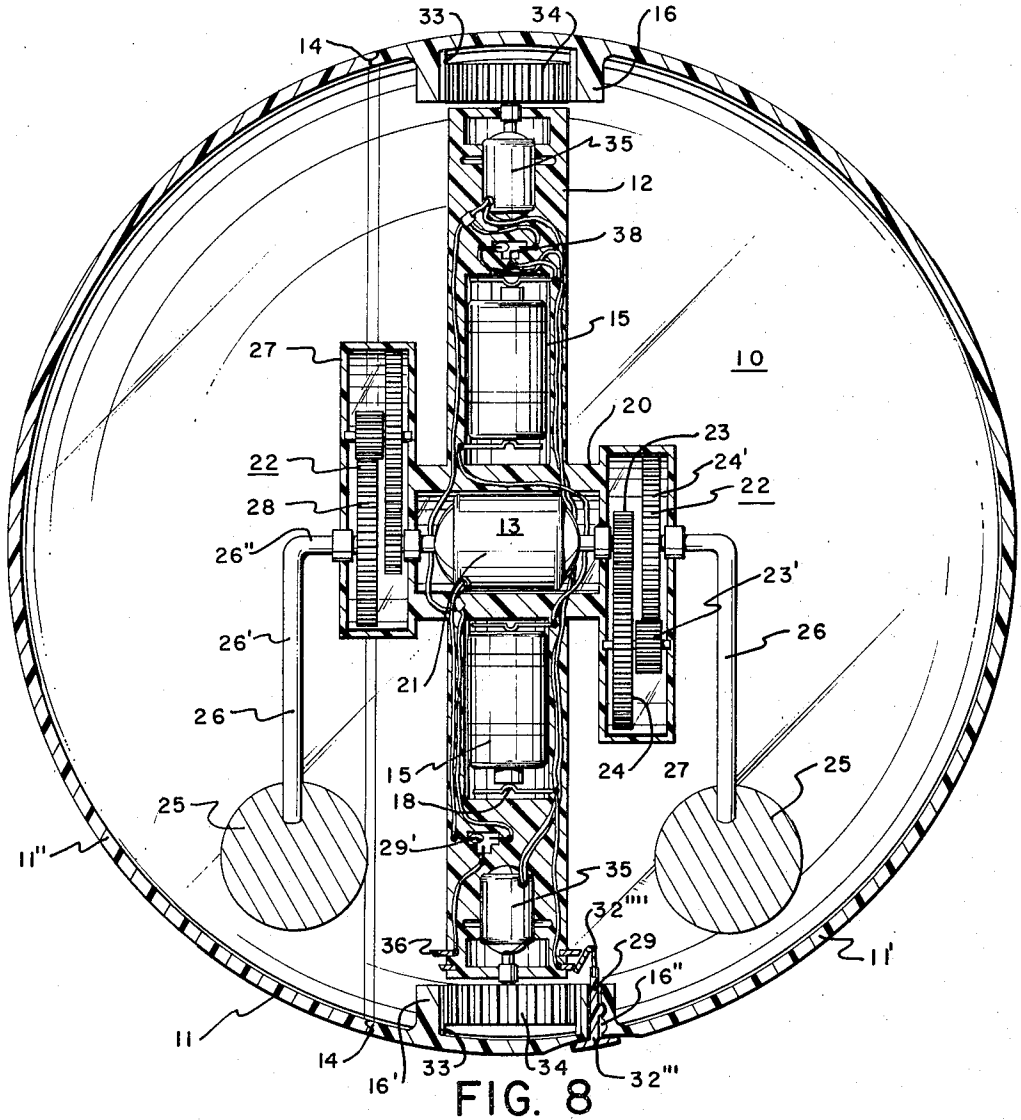

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FIG. 8

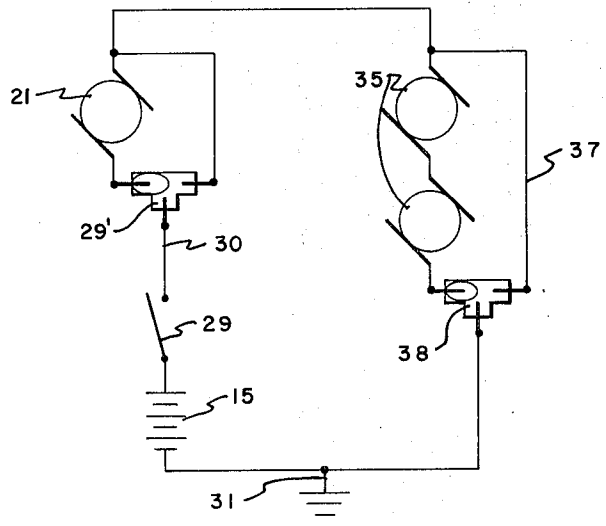

21
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37
29'
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29
38
15
31

FIG. 9

MOTOR DRIVEN BALL TOY

FIELD OF INVENTION

The present invention relates to toys and more particularly to motor driven ball toys.

DESCRIPTION OF THE PRIOR ART

Spinning toys, referred to as tops, are analogous to the motor driven ball toy of this invention. These toys employ various drive assemblies applied to the top or carried within it to transfer torque to set up a rotating momentum. This rotating momentum results in an inertial force to temporarily stand the top on its tip. The operation and purposes of a top are only analogous to the ball toy and would not accurately encompass the principles entailed in a self-inertially propelled schere. Thus, tops are submitted as prior art as most closely embodying physical appearances of the toy of this invention.

It is a primary object of this invention to provide a ball toy operable to motivate itself by means of an inertial drive means.

It is a further object of this invention that the drive means include an inertial switch operable to reverse the drive means and, thus, the direction of travel of the ball toy.

It is another object of this invention to provide drive means for motivating the ball along its latitude as well as its longitude.

It is an object of this invention that the means driving said ball toy along its latitude include an inertial switch to reverse the direction of rotation of the ball in response to a high impact force.

These and other objects shall become apparent from the description following, it being understood that modifications may be made without affecting the teachings of the invention here set out.

SUMMARY OF THE INVENTION

The motor driven ball toy comprises a hollow ball casing, a toy drive assembly having an electric motor operable to drive pendulum weights carried distally from the motor armature shaft on pendulum arms disposed parallelly to the plane of rotation of the motor, and an axis cylinder mounted in the ball casing to support the toy drive assembly centrally in the ball casing.

Further embodiments include an inertial switch operable to change the polarity of the motor in response to a high impact force, drive means to rotate the cylinder axis, and inertial control means for the means driving the cylinder axis.

A more thorough and comprehensive understanding may be had from the detailed description of the preferred embodiment when read in connection with the drawings forming a part of this specification.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the motor driven ball toy of this invention.

FIG. 2 is a cross-sectional view taken substantially along the lines 2—2 of the FIG. 1.

FIG. 3 is a fragmentary cross-sectional view of a portion of the axis cylinder at one of the poles thereof an on-off switch.

FIG. 4 is a schematic diagram of the electrical circuit of the motor driven ball toy.

FIG. 5 is a schematic diagram of the electrical circuit of a further embodiment including a polarity reversion inertia switch.

FIG. 6 is a fragmentary cross-sectional view of a portion of the axis cylinder at one of the poles of a further embodiment.

FIG. 7 is a perspective view of another further embodiment of the motor driven ball toy.

FIG. 8 is a cross-sectional view substantially along the lines F—F of the FIG. 6.

FIG. 9 is a schematic diagram of electrical circuits of the further embodiment of the FIG. 5.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT:

Referring now to the drawings and more particularly to the FIGS. 1 and 2, the motor driven ball toy of this invention is shown to advantage and generally identified by the numeral 10. The ball toy 10 comprises a ball casing 11, an axis cylinder 12, and a toy drive assembly 13. The ball casing 11 is fabricated as a hollow sphere of material such as glass, plastic, metal and the like. To provide service access, the ball casing 11 is fabricated in a main portion 11' which is intended to carry the axis cylinder 12, and a demountable portion 11'' which may be removed from the main portion 12. The portions 11' and 11'' may be secured to each other by any of a number of locking means which present a flush exterior seam in the assembled ball casing 11, such as interlocking beads 14, as shown in the FIG. 3.

Referring again to the FIGS. 1 and 2, the axis cylinder 12 is intended to support the toy drive assembly 13 within the ball casing 11, and to carry batteries 15 which power the assembly 13. The axis cylinder 12 is a substantially hollow cylindrically shaped member substantially coextensive with the diameter of the ball casing 11. The axis cylinder 12 is mounted at its poles by means of sockets 16 and 16' in the ball casing 11. The respective poles of the axis cylinder 12 may be provided with pointed socket engaging swivels 17 to facilitate rotation and removal of the cylinder 12 in concavely dispersed cone-shaped sockets 16 and 16'. A common cylindrical battery 15 is carried distally from each side of the midpoint of the axis cylinders 12 and is securely retained in the axis cylinder 12. The axis cylinder 12 is also provided with an electrical contact compressing clamps 18 of a type typically used in cylindrical battery-powered appliances. The batteries 15 may also be retained in the axis cylinder 12 by means of a suitably latched battery cavity door 19.

The toy drive assembly 13 is mounted at the midpoint of the axis cylinder 12. The toy drive assembly 13 is carried in a housing 20. The toy drive assembly 13 includes an electric motor 21 mounted transversely at the midpoint of the axis cylinder 12 and a pair of pendulum subassemblies 22 opposingly projected from either end of the motor 21 from the axis cylinder 12. Each of the pendulum subassemblies 22 includes a pinion 23 mounted to the ends of the armature which project to each side of the motor 21, a driven gear 24 driven by the pinion 23, and a pendulum weight 25 which is carried distally parallel to the plane of rotation of the axis cylinder 12 on a pendulum arm 26. The gears 23 and 24 are carried in a lobe 27 of the housing 20. Each gear train assembly comprises a driven pinion 23' and driven gear 23 and driving pinion 24' and driving gear 24. Each of the lobes 27 projects distally on a plane

parallel to, and toward opposite poles of the axis cylinder 12. Each of the pendulum arms 26 is an L-shaped rod-like member having a portion 26' disposed on a plane parallel to the rectilinear axis of the axis cylinder 12, and the plane of rotation of the motor 21 and a transversely disposed portion 26'' journally mounted in the lobe portion 27 of the housing 20. The driven gear 24 is fastened to the transverse portion 26'' of the pendulum arm 26. Both of the pendulum weights 25 cooperate synchronously, with the motor 21 and gears 23, 24. The weights 25 may be of any of a variety of shapes, such as spherical pendulum weights and are fastened to the terminal ends of the rectilinear portion 26' of each of the arms 26. It is to be understood that the pendulum weights 25 outweigh the casing 11. The intermediate gears 28 may be used to reduce the load on the motor 21, and may be mounted in the respective projected lobes 27.

Referring now to the FIG. 4, electrical connections of the toy drive assembly 13 include in one pole of the battery 15 to the motor 21 by a power wire 30 and connecting the opposite pole to the opposite contact of the motor 21 by means of a ground wire 31. The power wire 30 may include simple on-off switch 29. As shown more clearly in the FIG. 3, the switch 29 may be a button 32, recessly mounted in a rectilinearly disposed channel in the socket 16'. The power wire 30 may be disposed in the axis cylinder 12 to provide a pair of distally disposed and bifurcated contacts 30' which project from the terminal end of the swivel 17. The interiormost terminal end of the button 32 may be covered with a metalic conductor 32' which is operable, when the button 32 is fully engaged with its channel 16'' in the socket 16 to contact both of the contacts 30'. The button 32 may be retained in either of its on or off positions by a projecting bead 32'' which is engagable with one of a pair of grooves disposed in the channel socket 16'' at the respective on and off positions. In operation, the button 32 may be fully engaged with its socket 16' to close the switch 29 resulting in activation of the motor 21. The motor 21 is operable to drive the casing 11 with respect to the pendulum weights 25 in a line of travel over the poles of the cylinder axis 12. It is to be understood that the orientation of the weights 25 will be continually below the motor 21, with the arm portion 26' vertically plumb. Thus, it may be seen that the casing 11 is driven with respect to the fixed reference of mass of the weights 25.

Referring now to the FIGS. 5 and 6, a further embodiment of the motor driven ball toy is provided with means operable to reverse the direction of the travel of the toy drive assembly 13 when the casing 11 receiving an abrupt impact force such as a collision with an obstacle. The further embodiment of the motor driven ball toy 10 includes a ball casing 11, an axis cylinder 12, and a toy drive assembly 13. The ball casing 11 is substantially the same as the ball casing 11 set out above. Likewise, the arrangement and configuration of the axis cylinder 12 and the toy drive assembly 13 is substantially similar to the axis cylinder 12 and the toy drive assembly 13 set out above. The further embodiment also includes an inertially actuated switch 29' disposed in the power wire 30 which is operable to change the direction of rotation of the armature of the motor 21. The inertial switch 29' may be disposed distally from one of the terminal ends in the axis cylinder 12.

In operation, the motor driven ball toy 10 of the further embodiment may be set in motion by closing the switch 29 of the toy drive assembly 13 causing the ball casing 11 to move as set out above. Should the ball casing 11 collide with an obstacle, the contact of the inertial switch 29' is thrown to the opposite polarity causing the motor 21 to reverse its direction of rotation of the armature and the pendulum subassemblies 22.

Referring now to the FIGS. 7, 8, and 9, another further embodiment of the motor driven ball toy 10 is operable under certain conditions of frictional contact on the bass casing 11 to change the line of travel and may also provide guidance and control. This further embodiment of the motor driven ball toy 10 is also operable to provide a spinning motion providing many entertaining effects. This further embodiment of the motor driven ball toy 10, like the embodiment described above, includes a ball casing 11, an axis cylinder 12 and a toy drive assembly 13. The ball casing 11 is substantially identical to the ball casing 11 of the embodiments set out above. Likewise, the arrangement and configuration of the axis cylinder 12 and the pendulum drive assemblies of the drive subassemblies 22 of the toy drive assembly 13 are substantially similar to the axis cylinder 12 and the toy drive assembly 13 set out in the latter further embodiment above. The means actuating this further embodiment of the motor driven ball toy 10 includes drive means causing the axis cylinder 12 to rotate within the sockets 16. Accordingly, the sockets 16 and 16' supporting the axis cylinder 12 is provided with a ring gear-like teeth 33 and the terminal ends of the axis cylinder 12 are each provided with a sun gear 34 which may mesh with the teeth 33. Each of the sun gears 34 is fastened to the armatures of a pair of electric motors 35 which are in turn mounted rectilinearly in the end portions of the axis cylinder 12. The motors 35 are provided with electric power from the batteries 15. In this further embodiment, a button 32''' similar to the button 32 is disposed in the socket 16', to one side of the ring gear-like teeth 33. The terminal end of the button 32''' provided with a contact tab 32'''' which is operable to engage a pair of distally disposed contact rings 36 of the bifurcated power wire 30. Referring now to the FIGS. 3 and 8, the electrical connections of the drive assembly 13 of this further embodiment includes a simple switch 29 disposed in the power wire 30 connecting both the motor 21 to the batteries 15 and an axial drive circuit 37. The axial drive circuit 37 may merely include the motors 35 connected to the batteries 15, and controlled by the switch 29'. In practice it has been found convenient to provide venting means for motors 21 and 35. In operation, the verticle orientation of portions 26' and the mass of the weights 25 provides a fixed point against which the motors 35 may act to rotate the casing 11 above it poles, as well as along its equator resulting from drive of the motor 21.

As shown by the FIG. 8, the subcircuit controlling the drive motor 21 may include an inertia switch 38 operable to reverse the polarity of the motor 21 and motors 35, or be a simple circuit merely connected to the batteries 15 and controlled by the switch 29'. Thus, it may be seen that in operation the line of travel of the toy 10 will change should the casing 11 collide with an obstacle. It is to be understood that it is intended that inertia switches 29' and 38, controlling the direction of travel resulting from the pendulum subassemblies 22 and the

line of travel resulting from the motors **35** be used together in an embodiment of the toy **10**.

Having thus described in detail a preferred apparatus which embodies the concepts and principles of the invention and which accomplishes the various objects, purposes and aims thereof, it is to be appreciated and will be apparent to those skilled in the art that many physical changes could be made in the apparatus without altering the inventive concepts and principles embodied therein. Hence, it is intended that the scope of the invention be limited only to the extent indicated in the appended claims.

I claim:

1. A motor driven ball toy, comprising:

a hollow ball casing;

a ball drive assembly including an electric motor having its armature shaft projecting from both of its sides along a line centrally in said ball casing, and a pair of pendulum weights driven by said motor carried distally from said armature shaft on pendulum arms disposed parallelly to the plane of rotation of said motor; and

an axis cylinder mounted within said ball casing to support said toy drive assembly centrally within said ball casing, said cylinder having a chamber to carry batteries to activate said motor.

2. The apparatus of claim **1** wherein said ball casing is a sphere.

3. The apparatus of claim **1** wherein said ball casing is fabricated in a main portion and a demountable portion.

4. The apparatus of claim **1** wherein said motor synchronously drives each of said pendulum weights through a pinion mounted on each projecting portion of said armature shaft, and a driven gear on said pendulum arm which is driven by said pinion.

5. The apparatus of claim **1** including a simple on-off switch.

6. The apparatus of claim **1** wherein said toy drive assembly is fastened substantially midway in said cylinder axis, and wherein said cylinder axis is mounted in sockets disposed in the interior walls of said ball casing.

7. The apparatus of claim **1** wherein said toy drive assembly includes an inertial switch carried in said axis cylinder, and being of a type which will respond to an abrupt impact force on said ball casing, to change the polarity of said motor.

8. The apparatus of claim **3** wherein said demountable portion is locked to said main portion by interlocking beads which present a flush exterior seam in an assembled bass casing.

9. The apparatus of claim **4** including intermediate gears disposed in a meshing gear train between each of said pinions and said driven gears.

10. The apparatus of claim **5** wherein said simple on-off switch includes a button operable to recessly engage a channel the interiormost terminal end of said button having an electrical contact connected to one of the wires carrying electricity from said battery to said motor and said channel having an opposing contact connected to the opposing wire carrying electrical current from said battery to said motor, and said button being operable to engage said channel to present a recessed exterior to said ball toy and to be retained by a projecting bead on said button to engage either of a pair of grooves disposed in said channel the respective contact and no-contact positions of said switch.

11. The apparatus of claim **6** wherein said cylinder axis is provided in pointed socket engaging swivels and is demountably carried in concaved disposed cone shaped cylinder receiving sockets.

12. The apparatus of claim **6** wherein said sockets include ring gear-like teeth and wherein each of the poles of said axis cylinder are provided with a sun gear to engage one of the respective sockets, and including motor drive means to drive said sun gears.

13. The apparatus of claim **10** wherein said simple on-off switch is disposed through said ball casing into one of the poles of said axis cylinder.

14. The apparatus of claim **12** wherein said means driving said sun gears is an electric motor.

15. The apparatus of claim **14** including an inertial switch carried in said axis cylinder, and being of a type which will respond to an abrupt impact force on said ball casing, to change the polarity of said electric motor driving said sun gears.

16. The apparatus of claim **14** including an inertial switch carried in said axis cylinder, and being of a type which will respond to an abrupt impact force on said ball casing, to change the polarity of said motor.

* * * * *