

Oct. 12, 1971

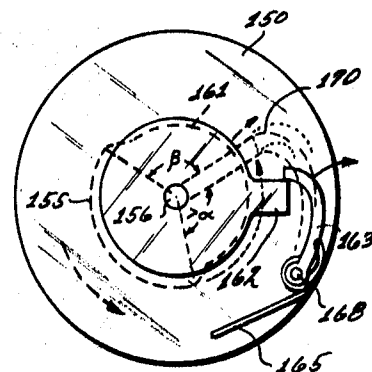
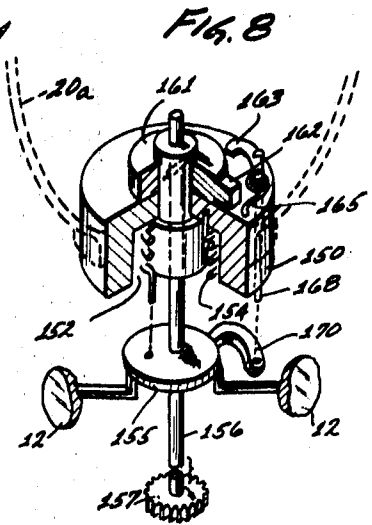
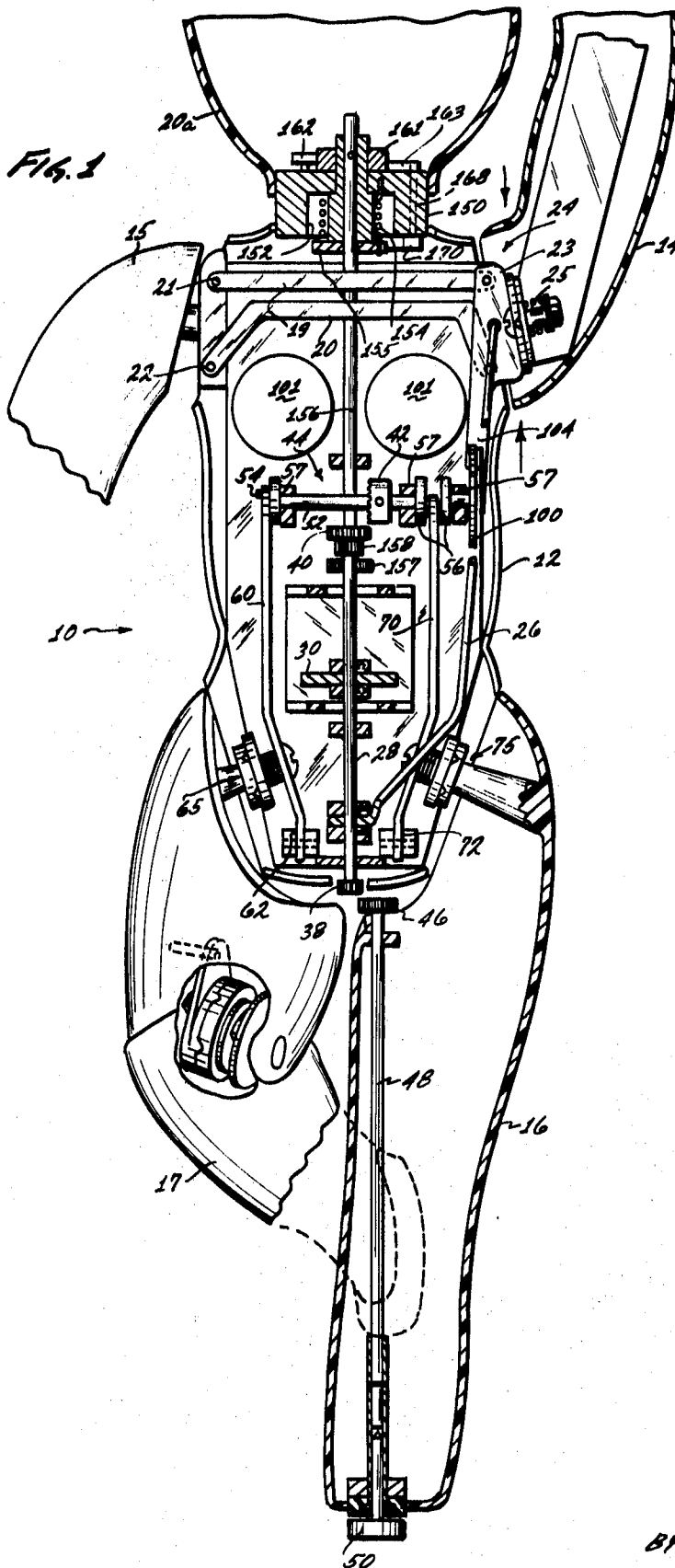
C. B. SLOOP ET AL

3,611,625

DOLL WITH ROTATABLE BODY AND APPENDAGE ROTATABLE
IN DELAYED RELATION THERETO

Filed Sept. 11, 1968

3 Sheets-Sheet 1



INVENTORS
CONRAD B. SLOOP
DENIS BOSLEY
ELLIOT HANDLER
JOSEPH KESOFF
JAMES F. MUNDAY
JOHN W. RYAN

BY *McE. Shink*
ATTORNEY

Oct. 12, 1971

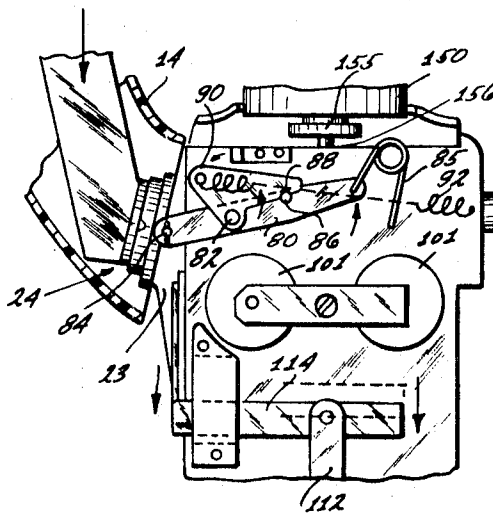
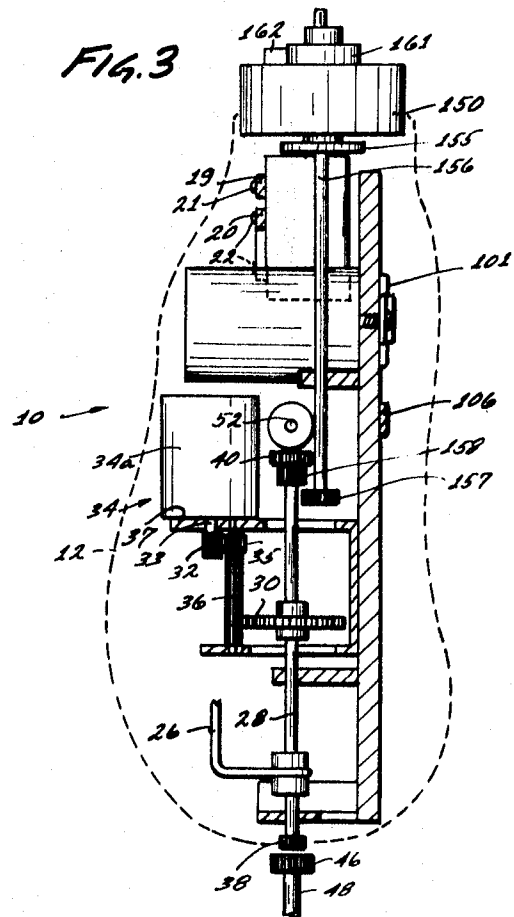
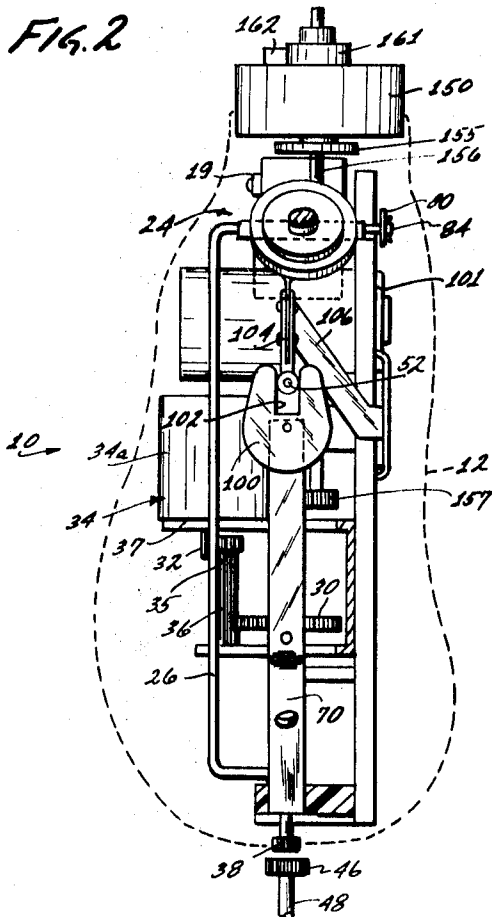
C. B. SLOOP ET AL

3,611,625

DOLL WITH ROTATABLE BODY AND APPENDAGE ROTATABLE
IN DELAYED RELATION THERETO

Filed Sept. 11, 1968

3 Sheets-Sheet 2



INVENTORS
CONRAD B. SLOOP
DENIS BOSLEY
ELLIOT HANDLER
JOSEPH KOSSOFF
JAMES F. MUNDAY
JOHN W. RYAN

BY Max E. Shink
ATTORNEY

Oct. 12, 1971

C. B. SLOOP ET AL
DOLL WITH ROTATABLE BODY AND APPENDAGE ROTATABLE
IN DELAYED RELATION THERETO

3,611,625

Filed Sept. 11, 1968

3 Sheets-Sheet 3

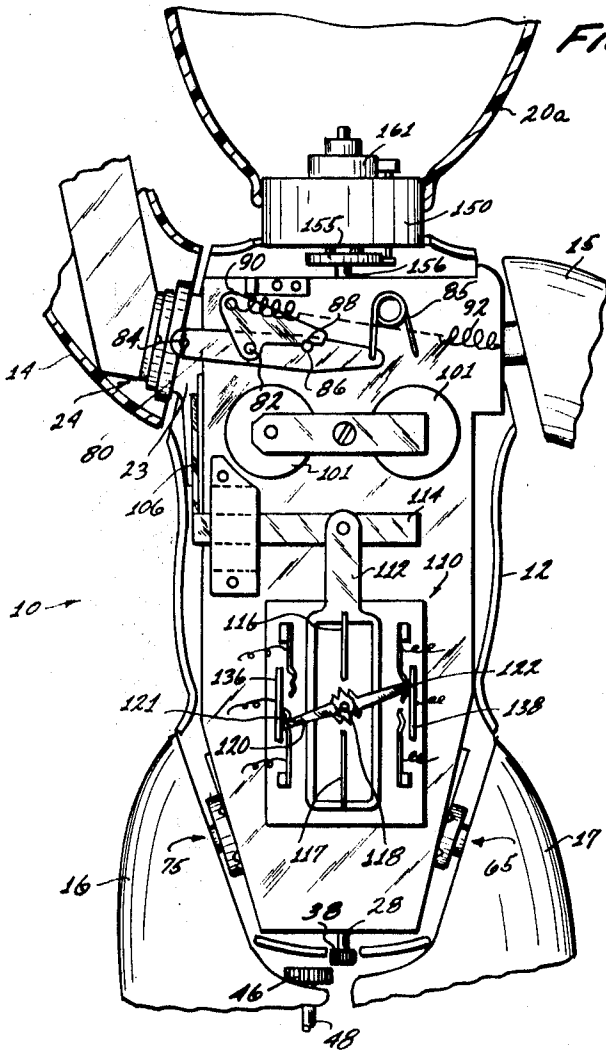


Fig. 4

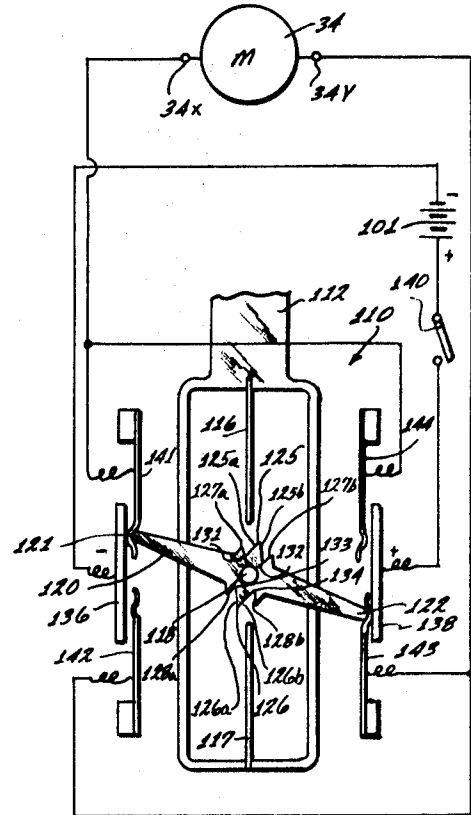


Fig. 7

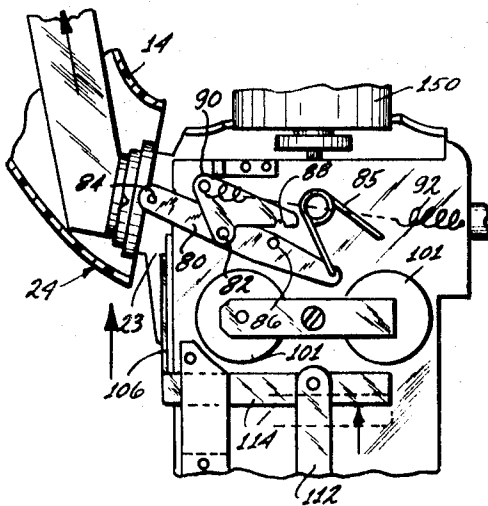


Fig. 5

INVENTORS
CONRAD B. SLOOP
DENIS BOSLEY
ELLIOT HANDLER
JOSEPH KOSOFF
JAMES F. MUNDAY
JOHN W. RYAN

BY *Max E. Shink*
ATTORNEY

1

3,611,625

DOLL WITH ROTATABLE BODY AND APPENDAGE ROTATABLE IN DELAYED RELATION THERETO

Conrad B. Sloop, Huntington Beach, Denis V. Bosley, Palos Verdes Peninsula, Elliot Handler, Los Angeles, Joseph Kossoff, Hawthorne, James F. Munday, South Gate, and John W. Ryan, Los Angeles, Calif., assignors to Mattel, Inc., Hawthorne, Calif.

Filed Sept. 11, 1968, Ser. No. 758,934

Int. Cl. A63h 11/00

U.S. Cl. 46-120

11 Claims

ABSTRACT OF THE DISCLOSURE

An animated doll energizable by a reversible DC motor selectively animating a stepping motion or a rotational motion with head-spotting. The doll includes a rotatable shaft which is movable along its axis of rotation from a neutral position to an upward position in which the shaft engages a crankshaft assembly to cause the doll's legs to move with respect to the doll's torso to produce a stepping motion. The rotatable shaft is also movable to a downward position in which the shaft drivingly engages a floor-contacting member which is inhibited from rotating thereby causing the drive train and the motor's housing, which is connected to the doll's torso, to rotate and to rotate the torso therewith. The doll's head is coupled to the torso with a torsion spring, which forms part of a head-spotting assembly. The latter is used to inhibit the rotation of the head during a fixed preselected portion of each revolution of the doll's torso.

BACKGROUND OF THE INVENTION

(1) Field of the invention

The present invention relates to an animated toy and, more particularly, to an animated toy, capable of performing one or more complex motions.

(2) Description of the prior art

One of the primary goals of toy designers is to develop reasonably priced animated toys, which can be operated safely and easily by children. This goal has been achieved quite often in the development of the many types of toy guns. Also, several kinds of animated dolls have been designed. Most of the animations, performed by such dolls, have been limited to relatively simple combinations of eye, lip, head or limb movements. Herebefore, the development of dolls capable of complex steps or movements has been generally very limited due to the difficulties encountered in the animation of complex steps, with a relatively simple, reliable and relatively inexpensive mechanism, which can be operated safely and easily by a child.

It is primarily for the above-mentioned reasons that prior art ballerina-type dolls are typically of the non-animated type, since the animation of the complex steps performed by a ballerina were found to be too difficult to implement with a simple, reliable and relatively inexpensive mechanism.

OBJECTS AND SUMMARY OF THE INVENTION

It is a primary object of the present invention to provide an animated doll, capable of performing any one or several complex motions.

Another object of the invention is to provide a relatively simple, reliable operable animated doll which is power operated to perform linear and/or rotational movements.

Yet another object of the present invention is to pro-

2

vide a power-driven ballerina doll which can be operated with ease by a child to animate one or more of traditional ballet-type motions.

A further object of the invention is to provide a power-operated animated toy capable of performing a plurality of complex steps including linear and/or rotational motions.

These and other objects of the invention are achieved by providing a toy, for example, a doll with limbs, selectively coupled to a hollow torso, in which a source capable of providing rotational motion is located. A multi-position switch which is used to control the motions which the doll is to perform is located in the doll's interior. The switch, is actuatable from the doll's exterior, for example, by the application of forces, to be described hereafter in detail, to one of the doll's arms. When the switch is activated to be in a first position, the source of rotational motion is rotatably coupled to a first step-controlling assembly which is also coupled to the doll's legs, transmitting linear motion thereto, so that the doll's legs animate a walking or stepping motion. When incorporated in a ballerina-type doll, the stepping motion simulates the motion known in ballet as a "pas de bourrée."

By merely changing the switch position to a second position the first step-controlling assembly is disengaged from the source and a second step-controlling assembly becomes engaged therewith. In one embodiment, the latter-mentioned assembly includes a shaft with a first end thereof extending through one of the doll's legs. By supporting the doll in an axis perpendicular to a surface with which the shaft's first exposed end is frictionally engaged, the shaft is inhibited from rotating, causing the doll's body to rotate. When incorporated in a ballerina doll, the rotating doll animates a ballerina, performing a pirouette.

The novel features of the invention are set forth with particularity in the appended claims. The invention will best be understood from the following description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1-4 are cross-sectional views along the front, left side, and back of one embodiment of the invention incorporated in a doll;

FIGS. 5 and 6 are partial cross-sectional views across the doll's back;

FIG. 7 is a combination side and schematic diagram of a novel connection reversing mechanism; and

FIGS. 8 and 9 are isometric and top views of a novel head-spotting mechanism.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In order to facilitate the explanation of the novel teaching of the invention, hereafter the various novel features will be described in conjunction with an animated doll, such as a ballerina doll which is operable to animate any one or a combination of ballet-type motions. However, as will become apparent to those familiar with the art, the various features may be incorporated in any toy in which similar motions are desired. Therefore, the description in conjunction with the ballerina doll should be regarded as one example, in which the teachings disclosed herein may be incorporated, rather than as a limitation thereof.

Attention is now directed to FIGS. 1 through 4, which are front, left side, and back cross-sectional views respectively, of one embodiment of the invention including a doll 10, having a torso 12 to which are connected a left arm 14, a right arm 15, a left leg 16 and a right leg 17. The doll further includes a head 20 supported above torso 12.

A pair of parallel linking bars **19** and **20** are pivotally supported at one end thereof at pivot points **21** and **22** respectively, by the torso **12**. At the other end the bars fixedly support a position control plate **23** which forms part of a position control unit **24**. At one end plate **23** supports arm **14** by means of a detent joint **25** so as to enable arm **14** to be swung to any desired position including the upward position, shown in FIG. 1.

Basically, the function of arm **14** is to control, as a function of upward or downward forces applied thereto, the vertical position of plate **23** relative to torso **12**. The vertical position of plate **23** in turn affects the position of actuable means comprising a rotatable rod or shaft **28** through push rod **26** which is coupled to both.

Rod **28** carries a main gear **30**, which is coupled to an output gear **32** (FIG. 3) connected to a shaft **33** of an energizable means comprising electrical motor **34**, through a gear train, consisting of gears **35** and **36**. Thus, when motor **34** is energized, the rotatable motion of the shaft thereof is transmitted through the gears to the rod **28**. The latter, in addition to supporting gear **30**, also supports at one end, gear **38** and at the other end gears **40** and **158**. Housing **34a** of motor **34** is fixedly connected to the torso. The connection is designated by numeral **37** (see FIG. 3).

Briefly, when arm **14** and joint **25** are raised from a neutral position thereby raising plate **23**, rod **26** and rotatable rod **28**, gear **40** engages a face gear **42** supported on, and designed to drive a motion control means comprising crank assembly **44** whose function is to move legs **16** and **17** in small elliptical orbits, causing doll **10** to animate small steps, such as for example, pas de bourrée-type steps, performed by a ballerina. On the other hand, when the position control unit **24**, rods **26** and **28** are in a downward selected position, gear **38** engages a gear **46** which is mounted at one end of a rotatable member or rod **48** which is rotatably mounted in the left leg **16**. A friction cup **50** is coupled to the other end of rod **48**.

When the doll is operated in the latter mentioned position or mode of operation, in which gears **38** and **46** are mechanically coupled, the function of cup **50** which is exposed through the bottom of leg **16** is to frictionally engage a stationary surface in order to inhibit the rotation of rod **48** and thereby function as a reaction member. Consequently, gear **30** supported on shaft **28** causes the latter to rotate when the motor is energized and thus the gear **38** and shaft **28** rotate around stationary gear **46**. Since the axis of gear **28** is offset from the axis of shaft **48** and since shaft **28** rotates on a fixed axis in the torso **12**, the latter is caused to rotate about the axis of shaft **48**. At the same time the gear **158** on shaft **28** meshes with gear **157** on shaft **156** and the net effect is a reverse rotation of the shaft **156** to thus cause the latter to remain stationarily oriented with respect to an external observer. In other words, when the torso **12** is rotating as described, the shaft **156** does not rotate and the head spotting mechanism operates in the manner to be described. As a result, the housing **34a** of motor **34** which is fixedly connected at **37** to torso **12**, rotates about the axis of shaft **48**, causing torso **12** to simultaneously rotate therewith. Thus, as long as gears **38** and **46** are mechanically coupled, and friction cup **50** is frictionally engaged to a stationary surface, the doll's entire body, rotates about an axis of rotation defined by a line extending between the cup **50** and the point on arm **14** at which a downward force is applied. During this rotation shaft **48** may nutate at its lower end.

The manner in which the crank assembly **44** causes the movement of legs **16** and **17** to animate a stepping motion, may best be explained by directing attention to FIG. 1. Therein, the crank assembly **44** is shown including a crank shaft **52** with substantial parallel crank pins, or members **54** and **56**, disposed 180° apart radially about the longitudinal axis of shaft **52**. Shaft **52** is sup-

ported within the torso by a plurality of bearing blocks, generally designated by reference numeral **57**.

A rod or bar **60** has one end thereof slidably supported in a sliding joint **62** and the other end pivotally mounted about pin **54** of the crank assembly **44**. Leg **17** is carried by rod **60** by means of a detent joint unit **65**. Thus, as shaft **52** of crank assembly **44** rotates, thereby causing pin **54** to rotate, rod **60** and leg **17** coupled thereto are caused to swing in small elliptical orbits which animate a stepping motion of leg **17**.

Likewise, pin **56** of the crank assembly **44** pivotally supports one end of a rod or bar **70**, whose other end is slidably mounted in a sliding joint **72**. A detent joint **75** identical with detent joint **65** fastens leg **16** to rod **70**. Consequently, when the latter pivots about pin **56** of crank assembly **44**, the elliptical motion of rod **70** is transmitted through the detent joint **75** to leg **16** to cause it to animate a similar elliptical motion. Since the pins **54** and **56** on crank shaft **52** are disposed 180° apart with respect to shaft **52**, the elliptical motions of the two legs are inter-related so that when one of the legs is down the other is up and when one of the legs points forward the other points backward to produce a highly realistic stepping motion.

From the foregoing it should thus be appreciated, that the animated motions which the doll is capable of performing, depend on the vertical position of shaft **28**, and, in particular, the positions of gears **38** and **40** with respect to their associated gears **46** and **42**, respectively. In the position of shaft **28** diagrammed in FIG. 1, in which neither of gears **40** and **38** is meshed, or mechanically coupled, to its respective gears **42** or **46** respectively, neither a stepping motion nor a rotational motion is produced. Therefore, the doll may be thought of as being in a neutral position. To cause the doll to animate the stepping motion, it is necessary to raise rod **28** in order to mechanically couple gear **40**, supported thereon, with the face gear **42** which is supported by the crank shaft **52** of the crank assembly **44**. In the particular embodiment, the raising of rod **26**, which is coupled to plate **23** of the position control unit **24** is achieved by pulling upwardly on arm **14** which is connected to the plate **23** by detent joint **25**.

The position control unit **24** includes a biasing arrangement, one function of which is to maintain the arm **14** in the pulled upward position and thereby cause the doll to produce the stepping motion until the arm is again purposely pushed downward thereby returning the doll to its neutral position. The position control unit **24** and the biasing arrangement incorporated therein may best be explained in conjunction with FIG. 4 and FIG. 5 to which reference is made herein. Therein, the unit **24** is shown including a first armature member **80** which is pivotally supported on a pivot pin **82**, assumed to be fixedly connected to the doll's torso. One end of the member **80** is also pivotally coupled to plate **23** by rod **84**. The other end of member **80** is connected to one end of a torsion spring **85** whose other end is fixedly connected to the torso.

The function of spring **85** is to apply downward force on arm **80**, so that once the arm **14** is pulled upwardly causing member **80** to rotate clockwise about rod **82**, the downward force applied to member **80** by spring **85** is sufficient to maintain arm **14** in the upward position. Consequently, the doll continues to animate the stepping motion until the arm **14** is forced downwardly to the neutral position by a downward force which is sufficient to overcome the force applied by spring **85** to member **80**. The arrangement diagrammed in FIG. 5 represents the arm **14** in its pulled upward position, while the arrangement of the unit **24**, shown in FIG. 4, represents the unit in the neutral position.

In the latter-mentioned position, a pin **86** which is fixedly carried by member **80** is in engagement in a detent **88** of a second armature-like member **90** of the unit **24**. Member **90**, which like member **80** is pivotally supported

by pivot pin 82, fixedly supports one end of a spring 92, whose other end is connected to the torso. Briefly stated, the function of member 90 and spring 92 coupled thereto is to control the force required to place the position control unit plate in the downward position so as to maintain the doll in the position in which the rotational motion of the doll body is produced.

As hereinbefore explained, the rotational motion of the doll is produced by engaging gears 38 and 46 (see FIG. 1) as well as, by causing the friction cup 50 to be frictionally engaged with a stationary surface so as to inhibit the rotation of rod 48 and thereby, through the various gears and rod 28, the rotation of the motor shaft 33 (see FIG. 3), thus causing the housing 34a of motor 34 and the torso to which it is connected to rotate. The engagement of gears 38 and 46 is accomplished by the lowering of rod 28 by means of push rod 26, which, as hereinbefore indicated is connected to plate 23 to which member 80 is also connected. Lowering of rod 26 is accomplished by pressing down on raised arm 14 so as to cause member 80 to pivot about rod 82 in a counter-clockwise direction with respect to its neutral position. The lowered position of member 80 and the other components of the position control unit 24 associated therewith are diagrammed in FIG. 6 to which reference is made herein.

When arm 14 is lowered and member 80 caused to rotate counter-clockwise about rod 82, pin 86 which, in the neutral position (FIG. 4) is in engagement with the detent 88 of member 90, causes the latter to also rotate about rod 82, in a counter-clockwise direction. Since spring 92 urges member 90 to rotate in a clockwise direction, it should be appreciated that the lowering of arm 14 and member 80 coupled thereto through plate 23 can only be accomplished by a force sufficient to overcome the torque applied by spring 92. The position control unit 24 is biased by spring 92 so that the initial force with which arm 14 must be lowered to overcome the tension of spring 92 is greatest when the arm 14 is first forced downwardly from its neutral position. Once the arm is moved downwardly from its neutral position, the magnitude of the force required to lower it so as to cause gears 38 and 46 to be mechanically engaged decreases greatly, in order not to overload bearings and cause the motor to stall.

Members 80 and 90 of the position control unit 24 are biased by spring 92, so that the arm 14 remains in the downward position in which the doll performs the rotational motion only as long as a sufficient downward force is applied to arm 14 to overcome the torque, provided by the spring 92. Once the downward force on arm 14 is removed, the spring 92 causes members 80 and 90 to rotate clockwise and return the plate 23 to the neutral position, thereby terminating the doll's rotation. Member 90 together with the strong spring 92 tends to produce a firm, clearly defined neutral position.

From the foregoing description it should thus be apparent, that in accordance with the teachings of the present invention, a doll is provided which is capable of animating two different types of motions. The doll incorporates an energizable motor which provides rotational motion to a rod 28 which is positionable to be in either a neutral, upward or downward position. The actual position of rod 28 is controlled by plate 23 of the position control unit 24 which is in turn controlled by the application of forces to a raised doll's arm.

When the arm and the position control unit 24 are in a neutral position, the gears mounted on rotatable rod 28 are in disengagement from their respective gears and consequently, the doll is motionless. By pulling upwardly on the raised arm, the position control unit 24 is biased upwardly raising rod 28 to provide engagement between one of its gears and a face gear coupled to a crank assembly, which through appropriate couplings activates the doll's legs to produce a stepping motion. Once biased upwardly to a produce the stepping motion, the position control

unit remains in such a position until it is forceably returned to its neutral position.

The position control unit 24 is further operable to be biased downwardly so as to lower rod 28 and thereby couple gear 38 mounted thereon to gear 46 on rod 48. The unit remains in the downward position, only as long as a sufficient downward force is applied. By pressing down on the arm and supporting the friction cup 50 on a stationary surface, cup 50 inhibits rod 48. Consequently, the motor housing coupled to the torso rotates thereby causing the entire doll body to rotate. The rotational motion is stopped by merely releasing the application of a downward force on the arm thereby enabling the biasing arrangement of the position control unit to return the unit and shaft 28, coupled to plate 23 thereof by means of rod 36, to its neutral position, in which the doll is again motionless.

It should be pointed out that during the stepping or bourrée motion the legs move alternately, up and down. However, for the performance of the rotational pirouette motion, the leg 16 with the friction cup 50 must be in a down position. Therefore in order to be able to switch from one position to another with maximum flexibility, it is important that when the stepping motion terminates the left leg 16 is in the downward position.

To provide such a condition in both the neutral and downward positions of the position control unit 24, the doll of the present invention includes a disc-like member 100 (see FIGS. 1 and 2), which is supported at one end of the crank shaft 52. Member 100 defines a radial slot 102 which points upwardly when pin 56 of the crank assembly 44 is down, at which time leg 16 of the doll is in the downward position, as diagrammed in FIG. 1. The doll further includes a tang 104 which is connected to plate 23 of the position control unit 24 to point downwardly by a linking arm 106. When the doll is operable to animate the stepping motion, in which the position control unit is in the upward position, tang 104 clears member 100, thereby enabling it to rotate on the rotated crankshaft 52, which is part of the mechanism employed to produce the stepping motion.

However, whenever the doll is to be switched to either the neutral or the downward position, by biasing the position control unit 24 downwardly from the upward position, tang 104 is forced downward, engaging slot 102 of member 100. It should be stressed that the doll's stepping motion can be stopped only when the slot 102 points upwardly so that tang 104 may be engaged thereto. Consequently, when the unit 24 returns to its neutral position from the upward or stepping motion position, slot 102 points upward, a position in which pin 56 and consequently leg 16 coupled thereto are in the downward state. Thus, leg 16 is down which permits the switching of the doll from the neutral position to the downward position to produce the animated rotational motion. Preferably, the peripheral edges of slot 102 are shaped to be quite sharp to insure that tang 104 engages slot 102 only when the latter points upwardly.

Herebefore, motor 34 (FIG. 3) has been assumed to provide the primary relative rotational motion between its housing 34a and its output shaft 33. In the stepping motion position, the shaft rotates transmitting rotational power to the gears and rods with which it is coupled to finally move legs 16 and 17 so as to animate a stepping motion. The motor is preferably a DC electrical motor which energizable from an appropriate DC voltage source, such as one or more DC battery cells 100.

To increase the versatility of the doll, the motor is preferably a reversible DC motor which is capable of providing a rotational motion in either of two opposite directions or senses, as a function of the polarity of the voltage applied thereto. The motor 34 shown in the figures is assumed to be of this type. The novel doll of the present invention includes a novel arrangement for automatically reversing the connections between the battery cells and the motor each time the position control unit 24 is switched

7

from its neutral position. Consequently, the doll is capable of animating the stepping motion in either a forward direction known in ballet as "en avant" or in a backward direction known as "en arriere," as well as rotate either clockwise or counter-clockwise about its fixed axis of rotation.

The novel connections reversing mechanism may best be explained in conjunction with FIG. 4 wherein it is designated by numeral 110. The connections between various elements of mechanism 110 the motor 34 and the battery cells 100 are schematically diagrammed in FIG. 7 to which reference is made herein. Basically, mechanism 110 includes a sliding member 112 which is connected by a linking arm 114 to plate 23 of the position control unit 24 in order to move up or down in synchronism therewith. Thus, member 112 assumes any one of three positions, which include the neutral position, the up position when the doll is operated to animate the stepping motion or in the down position when a rotational motion is produced.

As diagrammed in FIG. 7, the member 112 is in the neutral position. The member 112 supports a pair of resilient blades 116 and 117 which are aligned in a vertical direction or axis. Mechanism 100 includes a pivot-point-defining rod 118 about which an armature-like member 120 is pivotably mounted. The longitudinal axis of the rod which is fixed to the torso 12 intersects, and is perpendicular to, the axis in which the blades 116 and 117 are aligned. Thus, the blades are aligned with the center of armature-like member 120 which hereafter will be referred to as the armature 120.

The latter is shaped to define two rounded ring-like ends 121 and 122 and two triangular protuberances 125 and 126 on opposite sides of its center which is supported by rod or pivot point 118. The sides of the two protuberances 125 and 126 are designated by numerals 125a, 125b, 126a and 126b, respectively. Small ridges 127a, 127b, 128a and 128b extend from the protuberances' sides to define valley points 131, 132, 133 and 134.

The mechanism 110 further includes a fixed contact or plate 136 which is shown connected to the negative (—) terminal of battery 100 which, as herebefore stated, may include one or more cells. Another fixed contact or plate 138 is connected to the positive terminal of the battery, through an ON-OFF switch 140. Two resilient electrically conductive, normally open (NO) contacts 141 and 142 are positioned adjacent contact 136, while an identical pair of contacts designated 143 and 144 are located adjacent contact 138. Contact 141 and 144 are connected to a terminal 34x of motor 34 while contacts 142 and 143 are connected to terminal 34y of motor 34.

The function of ends 121 and 122 of armature 120 is to bias a pair of contacts such as 141 and 143 to be in electrical contact with plates 136 and 138, respectively, when the armature assumes a first position (as shown), while urging contacts 142 and 144 to make contact with plates 136 and 138, respectively, when the armature is rotated counter-clockwise in which it assumes a second position. In the first armature position (as shown) terminal 34y of motor 34 is at a positive potential with respect to terminal 34x. The potential polarity is reversed when the armature is in its second position. Thus, by changing the armature position the polarity of the voltage which is supplied to motor is reversed resulting in a reversal of the sense of rotation of its output shaft.

The armature position is changed by the application of a torque to the armature by either of blades 116 and 117. As previously stated, the mechanism 110 as diagrammed in FIG. 7 is assumed to be in the neutral position. In this position neither blade 116 nor blade 117 is in contact with the armature 120.

Assuming that the position control unit 24 is switched to the downward position to produce the rotational motion, member 112 which is coupled to plate 23 of unit 24 moves downward. As blade 116 engages side 125a, due to the resiliency of blade 116 it bends leftward finally engag-

8

ing point 131. Thereafter, as the blade 116 continues to move downward a torque is applied to the armature at a point to the left of its pivot point, causing the armature 120 to rotate counter-clockwise and thereby assume its second position. Similar switching to the second position from the diagrammed position may occur if member 112 were raised, causing blade 117 to engage the armature along side 126b and point 134.

Once the armature switches to its second position, it remains in it even when the member 112 returns to its neutral position in which neither blade 116 nor blade 117 engages the armature. However, when the position control unit 24 is again switched from its neutral position to either the upward position or the downward position either blade 117 engages side 126a and point 133, or blade 116 engages side 125b and point 132 to cause the armature to rotate clockwise, back to its first position (as shown). Thus, the connection control mechanism may be thought of as an arrangement which includes a two-position armature which is rotatable between the two positions. A change in the armature position is produced each time the arrangement is switched from its neutral position to either one of two other positions, for example, the upward or downward position.

Herebefore, it has been assumed that when the position control unit 24 is in the downward position in which the doll's torso rotates, the rest of the body, including head 20, rotates as a single unit. Such an arrangement would animate the rotational motion of a person, such as a ballerina, whose entire body rotates together. However, in ballet, a ballerina typically rotates her body, often referred to as pirouetting, while attempting to maintain her head during each body revolution in a relatively fixed direction, hereafter referred to as head-spotting. This, the ballerina accomplishes by maintaining her head to face in a fixed direction, such as forward, while her body rotates a portion, such as half a turn. As she continues to rotate her body she snaps her head to catch up with her body and thereafter return the head to face forward, as the body continues to rotate. Consequently, she appears to face forward continuously, even though her body rotates.

To animate such a head-spotting feature in the preferred embodiment of the invention, diagrammed in FIGS. 1 and 4, the doll's head 20 is not fixedly connected to torso 12. Rather, it is supported in a head support block 150, which, together with other elements required to animate head-spotting, is shown in FIGS. 8 and 9 to which reference is made herein. Block 150 which is shown to be cylindrically shaped defines an axial cavity 152 which is open at one end of block 150. A torsion spring 154 is axially positioned in cavity 152. One end of spring 154 is fixed to the block 150 and the other end is fixed to a cam 155 which is located adjacent the block's open end. As shown in FIG. 8 the cam 155 is fixedly connected to torso 12.

The head-spotting arrangement further includes spot holding means comprising a rod or shaft 156 which extends through both ends of block 150 and into the hollow torso 12. At its end in the torso, the shaft 156 supports a gear 157 (FIG. 1) which is designed to mesh with a gear 158 (FIG. 1) on rod 28 (FIG. 1), when the latter is in the downward position. The top end of shaft 156 (FIGS. 1 and 8) fixedly supports a spot holder connecting means comprising a first element 161 of a two element brake unit. Element 161 has a radial extension 162, which is designed to engage an arm-like element 163. The latter represents the second element of the brake unit. Arm 163 is biased towards element 161 by a leaf spring 165.

The block 150 defines a longitudinal opening which accommodates a rod 168. Arm 163 is connected to one end of rod 168 while a cam follower 170, which is designed to follow cam 155 is connected to the other end of rod 168.

Before proceeding to describe how the elements shown in FIGS. 8 and 9 produce head-spotting it should be recalled that in the rotational mode of operation the shaft

or rod 48 does not rotate, while gear 38 rolls around it and shaft 156 is, in effect, held stationary, against rotation, all as previously described.

As long as arm 163 does not engage extension 162 of element 161, as the cam rotates it also causes the rotation of block 150, which supports the head 20, through torsion spring 154. Consequently, the head, which may be assumed to be coupled to the torso through spring 154, rotates in substantial synchronism with the torso. However, once arm 163 engages extension 162, since arm 163 is coupled to the shaft 168 in block 150, the rotation of the block and the head mounted thereon is inhibited until the two (163 and 162) are somehow disengaged. Such disengagement occurs when the high point of the surface of cam 155 passes by cam follower 170 biasing the follower in an outward direction, opposite the biasing direction of leaf spring 165 (FIG. 9). Since the cam follower 170 and the arm 163 are fixedly connected to a common rod 168 when follower 170 swings outwardly arm 163 does the same, thereby disengaging itself from extension 162. As a result, the block 150 and the head 20 mounted thereon are free to rotate.

During the duration in which the block 150 is stationary and the cam 155 rotates compression or tension forces build up in the spring 154, depending on the sense of rotation of the cam. Once element 163, is disengaged from extension 162, namely, the brake is disengaged, the forces built up and stored in spring 154 are sufficient to cause the head to snap in the direction of rotation of the torso, catch up with it and thereafter complete the cycle of revolution therewith until the brake (elements 161, 162 and 163) is engaged once more, again stopping the rotation of the head.

The portion of each revolution during which the head is stationary while the torso rotates depends on the angles α and β (FIG. 9) which are preferably equal so that the head is stationary for an equal portion of each revolution, regardless of the sense of rotation of the body. Each angle is defined by the quiescent position of the cam follower 170 with respect to the edge of the high portion of the cam 155 in its quiescent or non-rotating position. As shown, $\alpha = \beta = 90^\circ$. Thus, with such an arrangement the head is stationary for about $\frac{1}{4}$ of each revolution.

It should be pointed out that the exact direction with respect to the vertical axis at which the head is stopped to produce the head-spotting effect depends on the direction of extension 162 about the longitudinal axis of shaft 156. However, irrespective of such a direction, once the doll is actuated in the downward position to produce rotational motion head-spotting would occur in the same direction, as long as the doll continues to rotate. Consequently, the direction may be regarded as a fixed pre-selected direction.

The foregoing description of the various embodiments of the invention may be summarized as comprising an animated toy which has a body (such as body 12) which may be thought as including a first body portion (torso 12) and a second body portion (legs 16 and 17). The toy also includes a multi-position mechanism (unit 24) which is operable to be in either a first position (the upward position) or a second position (the downward position). The neutral position may be disregarded since in such a position the toy's body is stationary. Motion control means (motor 34, the various gears, rods or shafts) are also included to transmit energy to the second body portion (such as the energy transferred by rods 69 and 70 to legs 17 and 16, respectively), to move it (producing the stepping motion) with respect to the first body portion when the multi-position mechanism is in the first (upward) position. The motor control means also control both body portions to rotate together when the multi-position mechanism is in the second (downward) position.

The novel toy may also be thought of as having two body portions (the torso and limbs as one, and the head as the other) and actuable means (motor 34, the gears, 75

rods or shafts) which cause one body portion (such as the torso and limbs) to rotate about a defined axis of rotation and spotting means (the assembly shown in FIG. 8) which causes the other body portion (head 20) to remain stationary or fixed in a selected direction during a part (such as 90°) of each revolution of the first body portion. The spotting means also include means (such as spring 154) which causes the head to return to the selected direction.

If desired, the novel toy may be used by a playing child together with a base plate (not shown) from which a vertical support rod extends. The rod may fit into an appropriate base in cup 50. Such an arrangement may assist the child to balance the doll in a vertical position to perform the pirouette motion. Also if the plate were used in the burr e motion the doll would tend to walk or step around the rod extending from the plate.

The term "head-spotting" has been used heretofore to refer to the feature of the invention in which a doll's head is maintained relatively stationary during a portion of a revolution of the doll's body, so that the head seems to point in a selected direction. Such a term is particularly applicable in connection with a doll which includes a head portion. However, the term may be interpreted generically and defined as "spot holding" to refer to holding or maintaining one portion of a device such as a toy fixedly pointing at a selected spot or in a selected direction during a portion of a revolution of the rest of the toy's body. The latter term, i.e. "spot holding," will therefore be used hereafter in the appended claims, particularly in claims not limited to a doll.

Although particular embodiments of the invention have been described and illustrated herein, it is recognized that modifications and variations may readily occur to those skilled in the art and, consequently, it is intended that the claims be interpreted to cover such modifications and equivalents.

What is claimed is:

1. An animated toy comprising:

a body having a first body portion and a second body portion connected to said first body portion;

a source of energy in said body;

a multiposition mechanism operable to be in at least either a first position or a second position;

motion control means coupled to said body, to said multiposition mechanism and to said source of energy for controlling the supply of energy from said source to said second body portion to move it with respect to said first body portion when said multiposition mechanism is in said first position, and for controlling said first and second body portion to rotate together about a selected axis of rotation, when said multiposition mechanism is in said second position;

means rotatable on said body and engageable with a fixed surface to provide reaction means for causing said first and second body portions to rotate together about said axis; and

a third body portion rotatably mounted on said first body portion, said toy including means coupled to said third body portion and said motion control means for controlling said third body portion, when said first and second body portions are rotating, to be directed in a selected, substantially fixed direction during a first part of each revolution of said first and second body portions and for rotating said third body portion a substantially complete revolution after the first part of each revolution.

2. An animated doll comprising:

a doll body including a torso and limbs coupled to said torso;

actuatable means in said doll body for causing said doll body to rotate about a defined axis of rotation and including means on said body, rotatable about

11

said axis for engaging a fixed surface to serve as a reaction member for said actuatable means;
a doll head; and

head-spotting means supported in said doll body above said torso, said head-spotting means including means driven by said actuatable means for causing said head to face a selected substantially fixed direction during a part of each revolution of said body and further means responsive to operation of said actuatable means for causing said head to rotate a complete revolution so as to again face said substantially fixed direction.

3. An animated figure toy comprising:

a body including a torso and appendages coupled to said torso;

actuatable means in said body for causing said body to rotate about a defined axis of rotation and including means on said body, rotatable about said axis for engaging a fixed surface to serve as a reaction member for said actuatable means;

spot holding means supported in said body; and

means connecting said spot-holding means to at least one of said appendages and said actuatable means for causing said spot holding means to hold said one appendage to face a selected substantially fixed direction during a part of each revolution of said body.

4. The animated figure toy as recited in claim 3 wherein at least selected ones of said appendages are hingedly coupled to said torso, said figure toy including in said torso motion control means coupled to the hinged appendages, said actuatable means including a rotatable member movable between a first position in said actuatable means to cause said body to rotate about said axis of rotation and a second position, in which said actuatable means are coupled to said motion control means through said rotatable member to cause said hinged appendages to move with respect to said torso.

5. The animated figure toy as recited in claim 4 wherein said actuatable means include an energizable motor having a housing fixedly coupled to said torso and an extended shaft which rotates with respect to said housing when said motor is energized, means coupling said rotatable member to said shaft to be rotated thereby, said motion control means including means couplable to said rotatable member which rotates when being in said second position, to receive rotary motion therefrom to cause the relative motion of said selected hinged appendages with respect to said torso.

6. The animated figure toy as recited in claim 4 wherein said hinged appendages which are coupled to said motion control means include a pair of legs independently movable with respect to said torso in a fore and aft pivotal movement producing a stepping motion.

7. The animated figure toy as recited in claim 6 wherein said appendages include a pair of arms, at least one arm being coupled to said torso and adapted for manual reciprocation with respect to said torso.

12

8. The animated figure toy as recited in claim 3 wherein said actuatable means include an energizable motor having a housing fixedly coupled to said torso and a shaft which rotates when said motor is energized, said means rotatable about said axis being couplable to said shaft to cause said motor housing and the torso connected thereto to rotate about said axis of rotation.

9. In a doll of the type including a torso with a head thereon, a member rotatable on said torso and engageable with a fixed surface to hold the same against rotation, and energizable means for causing said doll torso to rotate about said member through a complete revolution, the improvement comprising:

first means for rotatably supporting said head on said torso; and

second means coupled to said torso and to said first means for inhibiting the rotational movement of said head relative to said member during only a part of each complete revolution of said torso.

10 The improvement as recited in claim 9 wherein said first and second means include a head support block to which said head is fixedly coupled, a cam coupled to said torso for rotation therewith, a spring having one end connected to said cam and another end connected to said block;

said first and second means further including pivotable means, including a cam follower, coupled to said block and, stationary means engageable by said pivotable means for inhibiting the rotation of said head as said torso is being rotated from the time said pivotable means engage said stationary means until a predetermined point on said cam engages said cam follower, thereby disengaging said pivotable means from said stationary means to enable the rotation of said block.

11. The improvement as recited in claim 10 wherein said spring provides a sufficient force to said block when said pivotable means are disengaged from said stationary means to rotate said head in the direction of rotation of said torso.

References Cited

UNITED STATES PATENTS

1,685,358	9/1928	Harcourt	46—120 UX
2,638,348	5/1953	Arenson et al.	46—148 X
2,960,796	11/1960	Woodrey	46—245

FOREIGN PATENTS

50,730	10/1935	Denmark.
1,358,555	3/1964	France.

F. BARRY SHAY, Primary Examiner

U.S. Cl. X.R.

46—128, 136, 247; 318—280