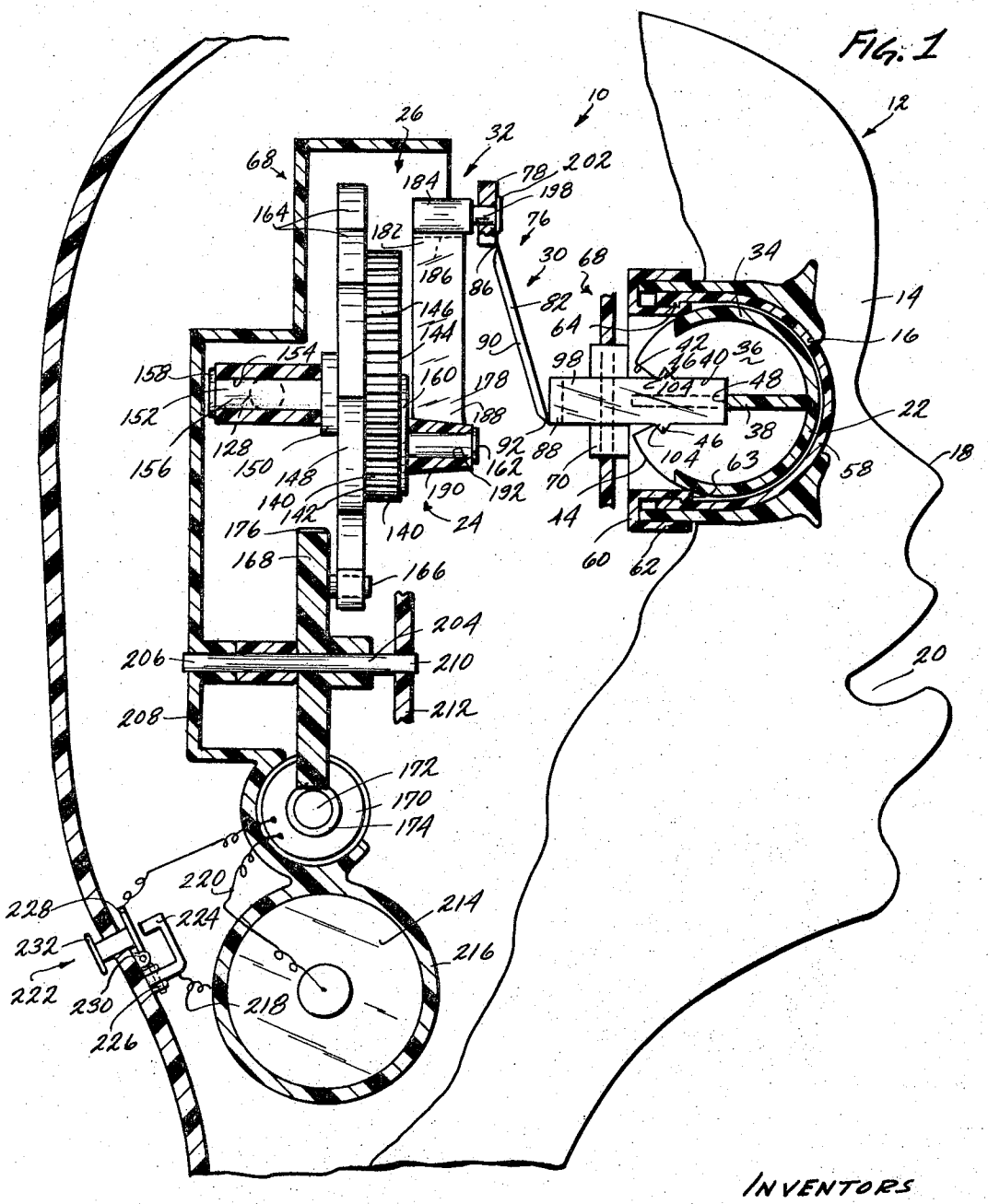
Nov. 21, 1967 J. W. RYAN ETAL 3,353,296

EYE-MOVING APPARATUS COMBINING PLURAL OUTPUT MEANS TO PRODUCE ONE MOTION

Filed Dec. 6, 1966 4 Sheets-Sheet 1



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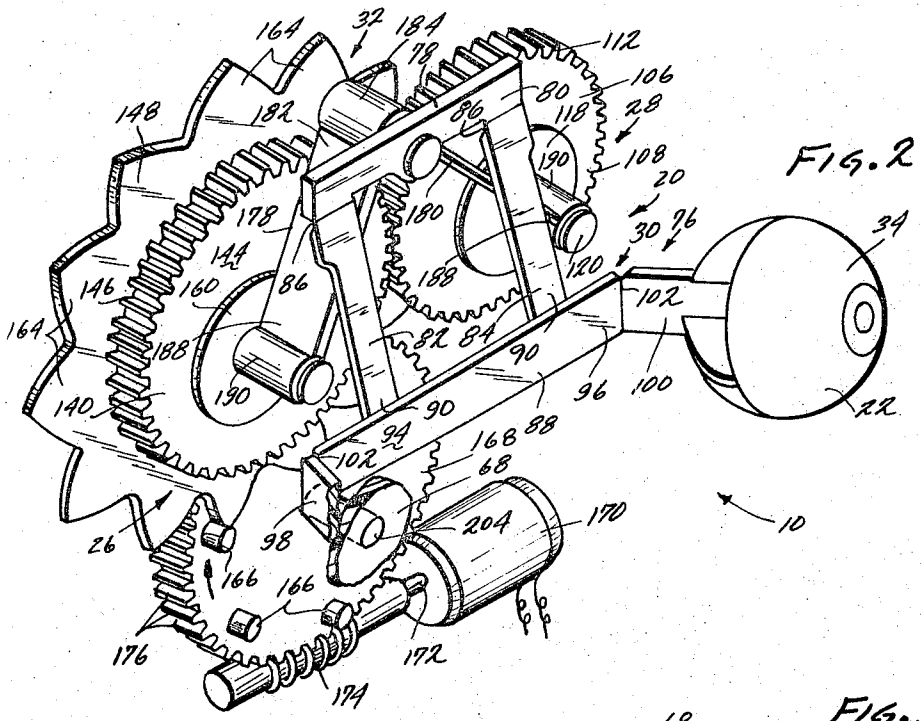

FIG. 2

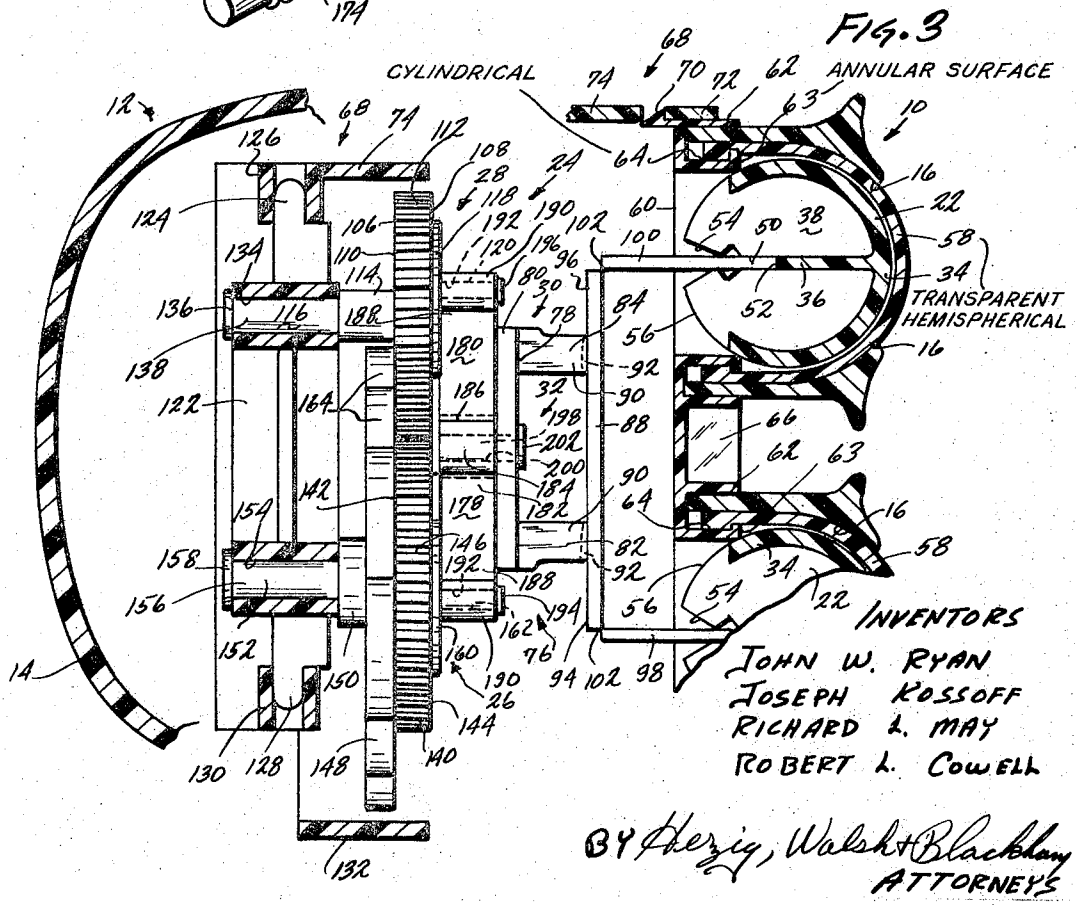

FIG. 3

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Filed Dec. 6, 1966 4 Sheets-Sheet 3

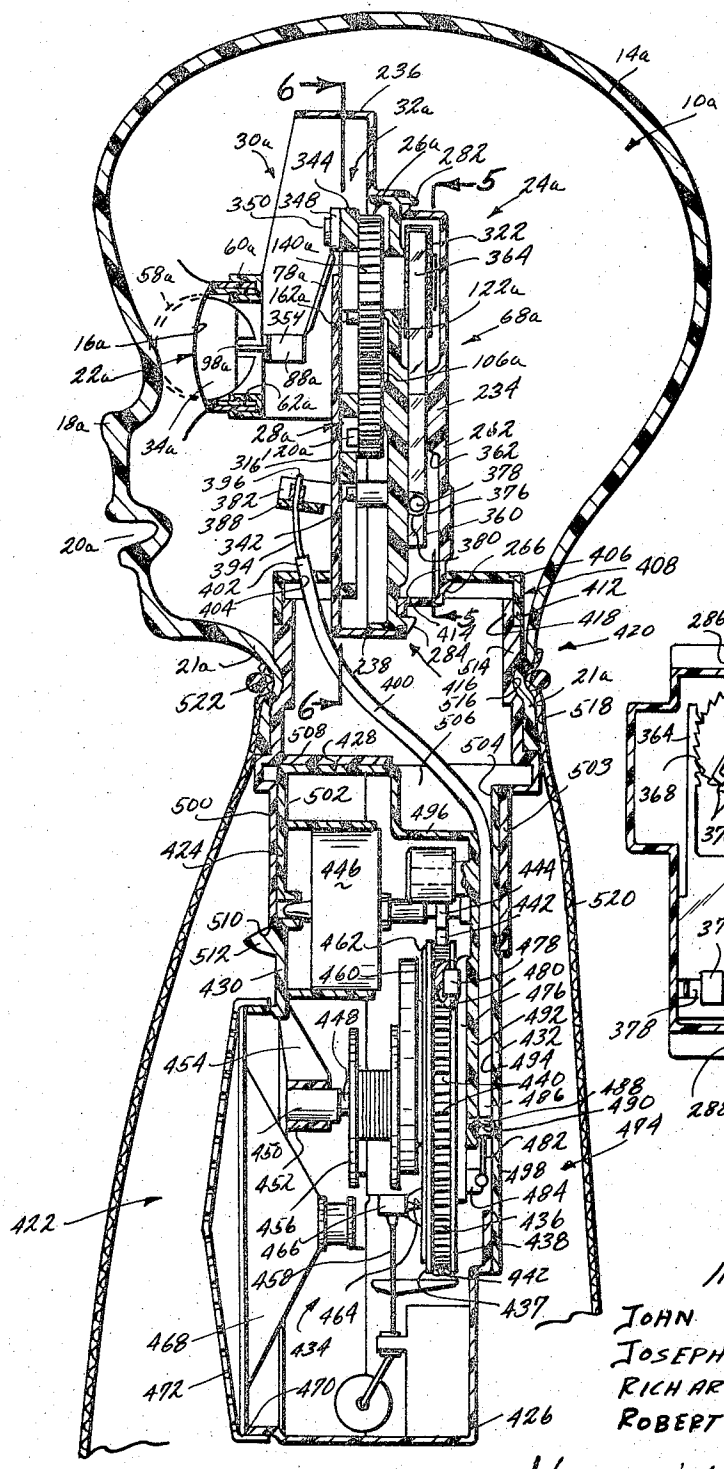

FIG. 4

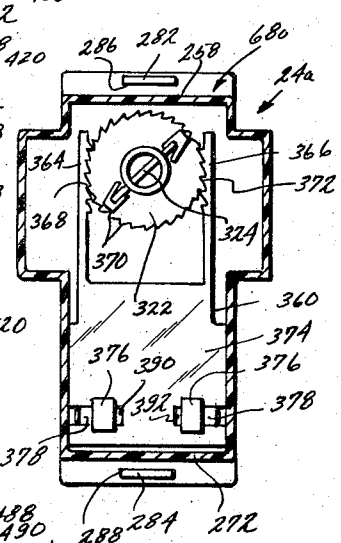

FIG. 5

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Filed Dec. 6, 1966 4 Sheets-Sheet 4

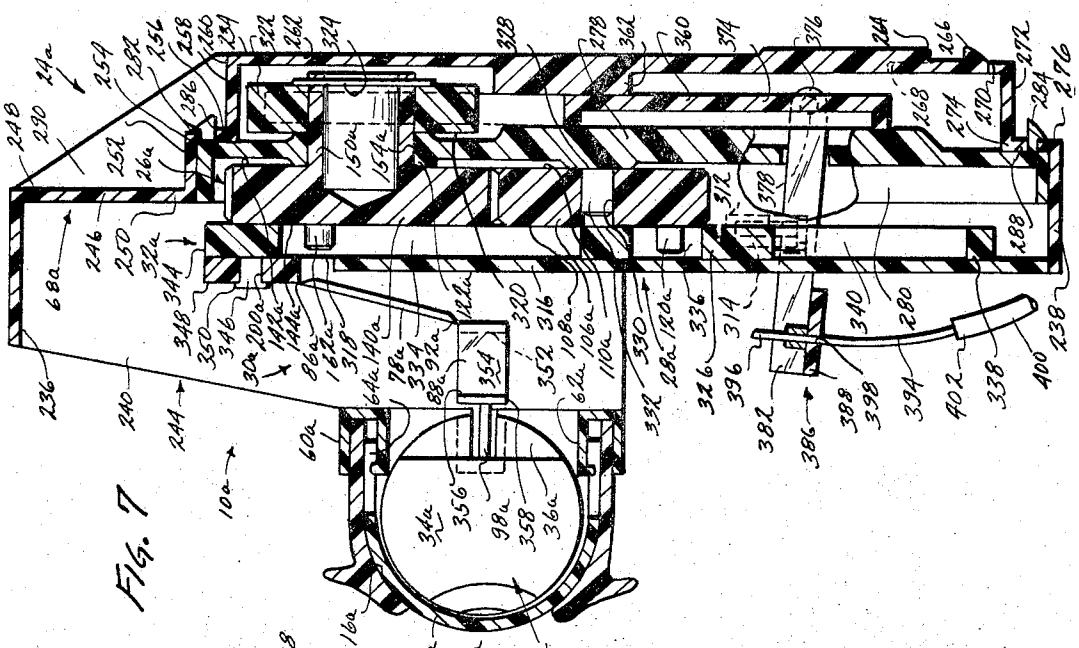

FIG. 7

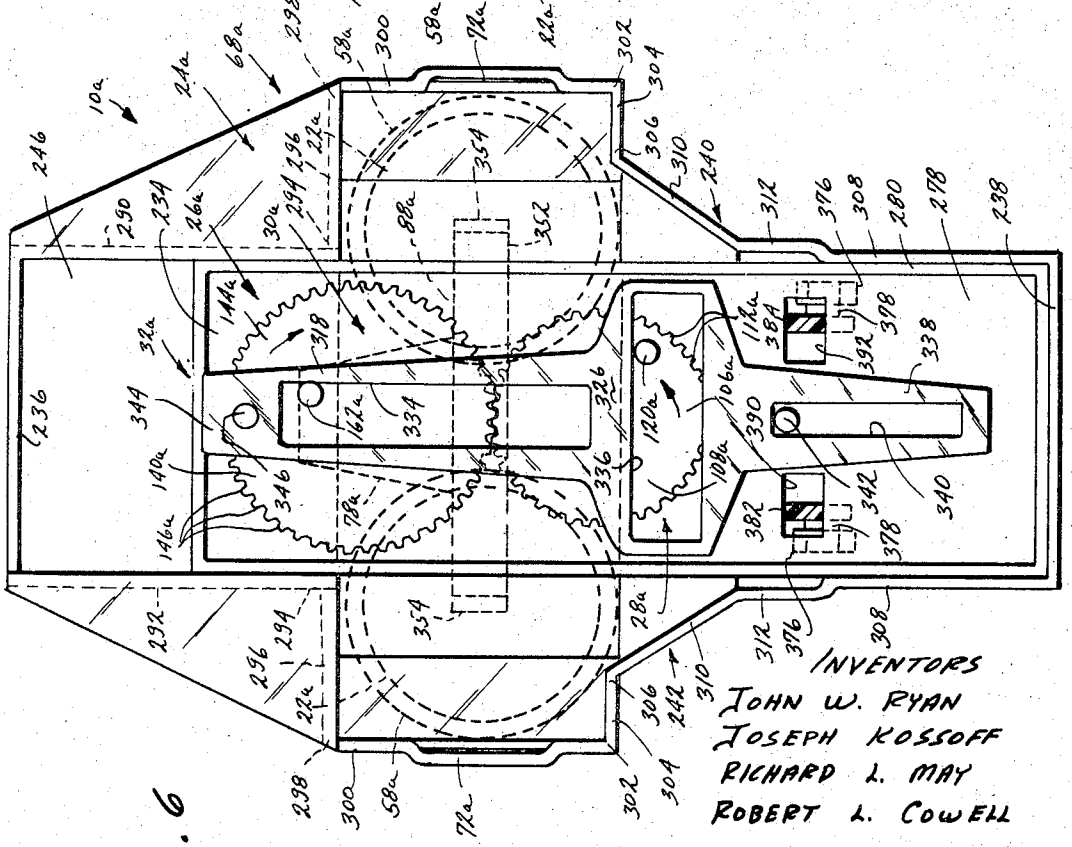

FIG. 6

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3,353,296

EYE-MOVING APPARATUS COMBINING PLURAL OUTPUT MEANS TO PRODUCE ONE MOTION

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Filed Dec. 6, 1966, Ser. No. 599,569
8 Claims. (Cl. 46—247)

ABSTRACT OF THE DISCLOSURE

A doll's eyeballs are floatingly mounted in clear plastic bubbles and are driven through eye-sweeping movements, which simulate random movements, by an eyeball connector having a link connected to each eyeball and a single connection to a member which combines the output motions of two different crank pins into a composite output motion.

The present invention relates to a new and useful eye-moving apparatus for figure toys and more particularly to such an apparatus for simulating random eye-sweeping movements in figure toys.

Several different types of eye-moving means are known for figure toys. Most of the means impart a rather unrealistic movement to the eyes because they either rotate them about a horizontal axis or about a vertical axis. Other figure toys or manikins, such as those disclosed in U.S. Patents Nos. 1,328,100; 1,760,318 and 2,114,851 obtain an eye movement which is more realistic than that obtained by merely rotating an eye about a horizontal or vertical axis by mounting the eyes for universal movement and then manually manipulating the eyes. While generally satisfactory, the manually manipulatable eyes have the disadvantage that more skill is required to manipulate the eyes than that possessed by the average child of an age to enjoy figure toys in the form of dolls and the like.

In view of the foregoing factors and conditions characteristic of eye-moving mechanisms, it is a primary object of the present invention to provide a new and useful eye-moving means not subject to the disadvantages enumerated above and having drive means for driving a doll's eyes through simulated, random eye-sweeping movements.

According to the present invention, an apparatus for simulating random eye-sweeping movements in a figure toy is provided. The apparatus includes eyeball means mounted in a figure toy and drive means for driving the eyeball means through simulated, random eye-sweeping movements. The drive means includes a first output means having a first predetermined motion and a second output means having a second predetermined output motion differing from the first output motion. The apparatus also includes means connecting the drive means to the eyeball means with no intervening supports or connections. The connecting means includes means for combining the first and second output motions into a single, composite output motion.

The drive means also includes output-motion interrupting means operatively associated with the first and second output means for periodically interrupting the composite output motion so that the doll will appear to fix its eyes on an object for a short time and then move its eyes to another object.

The figure toy also includes eye socket means in which the eyeball means are seated forming a ball-and-socket type joint therewith so that the eyeball means may be given universal movement by the connecting means.

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The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The present invention, both as to its organization and manner of operation, together with further objects and advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings in which like reference characters refer to like elements in the several views.

In the drawings:

FIGURE 1 is a side elevational view, with parts broken away and shown in cross-section to show internal construction, of a figure toy and eye-moving means constituting a first embodiment of the present invention;

FIGURE 2 is an enlarged, perspective view of the eye-moving means shown in FIGURE 1;

FIGURE 3 is a transverse, cross-sectional view of the toy shown in FIGURE 1;

FIGURE 4 is a cross-sectional view of a figure toy incorporating an eye-moving means constituting a second embodiment of the present invention;

FIGURE 5 is a cross-sectional view taken along line 5—5 of FIGURE 4;

FIGURE 6 is an enlarged, partial cross-sectional view taken along line 6—6 of FIGURE 4; and

FIGURE 7 is an enlarged, partial cross-sectional view of the eye-moving means shown in FIGURE 4.

Referring again to the drawings and more particularly to FIGURES 1–3, an eye-moving means constituting a first embodiment of the present invention, generally designated **10**, is shown in combination with a figure toy **12** having a head **14** which includes a pair of eye sockets **16**, a nose **18** and a mouth **20**.

The eye-moving means **10** may be substantially the same as the one disclosed in copending application Ser. No. 599,568, filed Dec. 6, 1966 and includes a pair of eyeball means **22**, and a drive means **24** for driving the eyeball means **22** through simulated, random eye-sweeping movements. The drive means **24** includes a first output means **26** having a first predetermined output motion and a second output means **28** having a second predetermined output motion differing from the first output motion.

The eye-moving means **10** also includes a connecting means **30** for connecting the drive means to the eyeball means **22**. The connecting means **30** is unsupported and free-floating being connected only to the eyeball means **22** and the drive means **24** and includes a composite-output-motion transmitting means **32** for combining the first and second output motions into a single composite output motion.

The eyeball means **22** each includes a hollow, substantially hemispherically-shaped, eyeball member **34** in which a pair of plates **36**, **38** are mounted at right angles to each other. The plate **36** is provided with a substantially rectangular slot **40** having a mouth **42** which flares outwardly to the periphery **44** of the plate **36** and a pair of notches **46** intermediate the mouth **42** and a closed end wall **48** defining the inner end of the slot **40**. The plate **38** is provided with a slot **50** having a closed end **52** lying at right angles to the end wall **48** and an outwardly-flaring open end **54** at the peripheral edge **56** of the plate **38**.

The eyeball means **22** are each floatingly mounted in a transparent, substantially hemispherically-shaped, plastic bubble **58** which is clamped into position with an associated eye socket **16** by a bridge member **60** having a clamping ring **62** clamping the eye socket **16** and associated bubbles **58** together at the hollow, cylindrical open ends **64** thereof. Each ring **62** includes an annular surface **63** of less diameter than the major diameter of an associated eyeball member **34** for preventing removal thereof from an associated bubble **58** while permitting

universal movement therein. The bridge **60** includes upper and lower rails, as shown at **66** in FIGURE 3 for the lower rail, connecting the clamping rings **62** together, and is connected to a housing **68**, which houses the eye-moving means **10**, by a pair of clips carried by the ends of the bridge **60**, as shown at **70** in FIGURE 3 for one clip. Each clip **70** may be snapped into engagement with an associated lug **72** affixed to an associated sidewall **74** on the housing **68**.

The connector means **30** includes an eyeball connector **76** which may be made from a suitable plastic material, such as polypropylene, and includes a U-shaped member **78** having a bight portion **80** to which a pair of downwardly and forwardly extending arms **82, 84** are connected by associated hinges **86** formed in the eyeball connector **76** by reducing the cross-section thereof at the junction of the arms **82, 84** with the bight portion **80**. The eyeball connector **76** also includes a cross arm or bar **88** which is connected to the free ends **90** of associated arms by associated hinge members **92** formed in the connector **76** by reducing the cross-section thereof at the junction of the arms **82, 84** with the cross bar **88**, as is well known in the art for forming live hinges in polypropylene members. The cross bar **88** includes a first end **94** and a second end **96** to which first and second links **98, 100**, respectively, are connected by live hinges **102** formed in the connector means **30** by reducing the cross-section thereof at the junction of the links **98, 100** with the cross bar **88**. The links **98, 100** each carry a pair of protuberances **104** which may be seated in associated notches **46** provided in associated slots **40** so that the links **98, 100** may be connected to their associated eyeballs **22** for transmitting realistic, non-uniform eye-sweeping movements thereto from the drive means **24**.

The second output means **28** includes a small-diameter gear **106** having a front face **108**, a rear face **110** and a plurality of teeth **112**. The rear face **110** carries an integrally formed hub **114** and a spindle **116** and the front face **108** is provided with a cylindrical land **118** and an integral crank pin **120** which are offset from the center or rotation of the gear **106**. The gear **106** is journaled in a bearing block **122** having a first cylindrical end **124** connected to a hollow boss **126** on the sidewall **74** of housing **68** and a second cylindrical end **128** connected to a hollow boss **130** provided on a sidewall **132** of the housing **68**. The bearing block **122** is provided with a first aperture **134** rotatably receiving the spindle **116**, which may be maintained in operative association with block **122** by forming an enlarged head **136** on the free end **138** of spindle **116** and by the hub **114**.

The first output means **26** includes a large-diameter gear **140** having a rear face **142**, a front face **144** and a plurality of teeth **146**, which mesh with the teeth **112**. The rear face **142** carries a motion-interrupting means or star wheel **148** which, in turn, carries a hub **150** and a spindle **152** for rotatably connecting the gear **140** and the star wheel **148** to the bearing block **122** by engaging the spindle **152** in an aperture **154** provided in the bearing block **122**. The free end **156** of the spindle **152** may be provided with an enlarged head **158** which cooperates with the hub **150** for maintaining the spindle **152** in operative association with the bearing block **122**. A cylindrical land **160** and an integral crank pin **162** are carried by the front face **144** of the gear **140** and are offset from the center of rotation thereof.

The star wheel **148** includes a plurality of teeth **164** engageable by three closely spaced pins **166** provided on a gear **168** which forms a part of the drive means **24** and which is driven by an electric motor **170** having an output shaft **172** carrying a worm gear **174** meshing with teeth **176** on the gear **168**. The pins **166** rotate the wheel **148** through three predetermined increments of rotation during each complete revolution of the gear **168**. The pins **166** are adapted to engage three teeth **164** in succession and then remain disengaged from the teeth **164** until the gear **168** starts its next revolution. As will become apparent hereinafter, this mode of operation drives the eyeballs **22** in such a manner that they appear to become fixed on an object for a short time and then move to another object upon which they become fixed for a short time before moving on again. The increments of rotation imparted to the star wheel **148** are transmitted thereby to the large-diameter gear **140** which, in turn, drives the small-diameter gear **106**.

The combined output of the gears **106** and **140** is transmitted to the connector **76** by the composite, output-motion generating means **32** having a pair of arms **178, 180** each of which includes a first end **182** connected to a hub member **184** by an associated live hinge **186**. The arms **178, 180** each includes a second end **188** which carries a hub **190** provided with an aperture **192**. The aperture **192** on the arm **178** rotatably receives the crank pin **162** on gear **140** and the hub **190** is retained in position on the crank pin **162** by an enlarged head **194** provided thereon. The aperture **192** in the arm **180** rotatably receives the crank pin **120** and the associated hub **190** is retained in position on the crank pin **120** by an enlarged head **196** provided thereon. The hub member **184** carries a pin **198** received in an aperture **200** provided in the bight portion **80** of the eyeball connector **76** for connecting the hub member **184** thereto. The pin **198** may be provided with an enlarged head **202** for retaining it in position on bight portion **80**. The pin **198** constitutes an eccentric drive for the connector means **30** and is driven through a path defined by the combined output of the crank pins **120** and **162**. This combined output appears to be random in nature because the drive gear **168** may make a great many revolutions before the path followed by the pin **198** repeats itself. This is accomplished, in part, by giving the large-diameter gear **140** an odd number of teeth, such as 31, and the small-diameter gear **106** an even, lesser number of teeth, such as 28. The connector **76** transmits the path of travel of the pin **198** to the eyeball means **22** moving them through simulated random eye-sweeping movements within their associated bubbles **58**.

The gear **168** is rotatably mounted in the housing **68** by a shaft **204** having a first end **206** journalled in an end wall **208** of housing **68** and a second end **210** journalled in a partition **212** provided in the housing **68**. Electric current for the motor **170** is supplied by a dry cell means **214** mounted in a cylindrical portion **216** of the housing **68** and connected to the motor **170** by electric leads **218, 220** through a switch **222** having a fixed contact **224** affixed to the head **14** by rivet means **226** and a movable contact **228** swingably connected to the head **14** by a pivot pin **230**. The movable contact **228** carries a push button **232** which is reciprocally mounted in the head **14** for actuation by a child-user of the doll **12**.

In use, the switch **222** may be closed completing a circuit to the electric motor **170** for continuously operating the gear **168**. Each complete revolution of the gear **168** imparts three increments of rotation to the motion interrupting means or star wheel **148** which, in turn, imparts an increment of rotation to the output means **26** and **28**. The increments of rotation imparted to the gears **26** and **28** moves the associated crank pins **162, 120** imparting a predetermined output motion thereto which is combined into a single output motion by the pin **198** on bight portion **80** by the transmitting means **32**. This composite output motion is transmitted from the pin **198** to the eyeball means **22** by the connector **76** moving the eyeball means **22** through simulated, random eye-sweeping patterns making it appear that the doll's eyes become fixed on an object for a short period of time and then randomly move to another object upon which they become fixed for a short period of time before moving on to the next object.

Referring now to FIGURES 4–7, an eye-moving means constituting a second embodiment of the present invention, generally designated at **10a**, it is shown in combina-

tion with a figure toy **12***a*. This figure toy is shown herein for purposes of illustration, but not of limitation, in the form of a doll having a head **14***a*, a pair of eye sockets, like the one shown at **16***a* in FIGURE 7, a nose **18***a*, a mouth **20***a* and a cylindrical neck **21***a*.

The eye-moving means **10***a* may be substantially the same as the one disclosed in copending application Ser. No. 599,546, filed Dec. 6, 1966 and includes a pair of eyeballs, like the one shown at **22***a* in FIGURES 4 and 7, which are driven through simulated, random eye-sweeping movements by a drive means **24***a* including a first output means **26***a* having a first predetermined output motion and a second output means **28***a* having a second predetermined output motion differing from the first output motion.

The eyeball means **22***a* are connected to the drive means **24***a* by a connecting means **30***a* which includes a composite-output-motion transmitting means **32***a* for combining the first and second output motions into a composite output motion.

The eyeball means **22***a* are each substantially the same as the eyeball means **22** described in connection with the first embodiment of the present invention including a hollow, substantially hemispherically-shaped member **34***a* in which a pair of plates, like the one shown at **36***a*, are mounted at right angles to each other.

The eyeball means **22***a* are each floatingly mounted in a transparent plastic bubble **58***a* which is clamped into position within an associated eye socket **16***a* by a bridge member **60***a* having a pair of clamping rings, like the one shown at **62***a*, clamping the eye sockets **16***a* and associated bubbles **58***a* together at the open ends **64***a* thereof. The bridge member **60***a* is substantially the same as the bridge **60** shown in connection with the first embodiment of the present invention and includes a pair of clips, like the one shown at **70** in FIGURES 1 and 3 of the first embodiment (not shown in connection with the second embodiment) which may be engaged in a pair of lugs **72***a* provided on a housing **68***a* in which the drive means **24***a* is mounted.

The housing **68***a* includes a rear wall **234**, a top wall **236**, a bottom wall **238** and a pair of matching, spaced-apart side walls **240**, **242** forming an open front **244** in the housing **68***a*. The back wall **234** includes an upper, substantially vertical portion **246** having an upper end **248** connected to the top wall **236** and a lower end **250** connected to a substantially horizontal portion **252** of back wall **234**. The horizontal portion **252** includes an end **254** from which a back wall portion **256** depends into engagement with a second horizontal portion **258** having an end **260** from which a substantially vertical portion **262** depends. The depending portion **262** includes a lower end **264** which is provided with a lug **266**. The lug **266** is given lateral flexibility by providing a pair of vertical slots, as indicated at **268** in FIGURE 7 for one slot, extending vertically in the back wall **234** on each side of the lug **266** and a horizontal slot **270** provided in the back wall **234** below the lug **266**.

The back wall **234** also includes a substantially horizontal portion **272** extending inwardly from the lower end **264** of the portion **262** and having an end **274** from which a back wall portion **276** depends into engagement with the bottom wall **238**. The depending portions **256** and **276** are aligned for forming a shelf for a plate member **278** which is provided with a peripheral flange **280** and which is maintained in position in the housing **68***a* by upper and lower clips **282**, **284** engageable in associated slots **286**, **288** provided in the depending portions **256** and **276**, respectively.

Each side wall **240**, **242** includes a rearwardly extending portion, as shown at **290** in FIGURES 4 and 7 for the side wall **240**, for reinforcing the back wall **234**. The side walls **240**, **242** each also includes an upper, substantially vertical portion **292** having a lower end **294** from which a substantially horizontal, outwardly-extending portion **296** extends. The portions **296** each includes an outboard end **298** from which a substantially vertical portion **300** depends into engagement with an end **302** of a substantially horizontal, inwardly-extending portion **304** having an end **306** which is connected to a lower, vertical portion **308** by a downwardly and inwardly directed portion **310**. Each depending portion **300** is provided with lugs **72***a* for connecting the bridge member **60***a* to the housing **68***a*. Each lower vertical portion **308** is provided with a lug **312** engageable by an associated clip **314** (as shown in broken lines in FIGURE 7) provided on a cover plate **316** for retaining the cover plate **316** in position within the housing **68***a*. The plate **316** maintains the transmitting means **32***a* in sliding engagement with the first and second output means **26***a* and **28***a*.

The first output means **26***a* comprises a large-diameter gear **140***a* having a front face **144***a* against which the upper portion **318** of the transmitting means **32***a* is engaged for sliding motion with respect thereto. The gear **140***a* is provided with a plurality of teeth **146***a*, a hollow, cylindrical spindle **150***a* and a rear face **142***a*. The spindle **150***a* is rotatably mounted in an aperture **154***a* provided in a thickened portion **122***a* of the member **278**. The thickened portion **122***a* forms bearing surfaces for the rear face **142***a* of the gear **140***a* and for the front face **320** of a gear **322** which is connected to the spindle **150***a* by a pin **324** for rotation thereby.

The second output means **28***a* comprises a small-diameter gear **106***a* having a plurality of teeth **112***a* meshing with the teeth **146***a* on the large-diameter gear **140***a*. The gear **106***a* includes a front face **108***a* slidably receiving the lower portion **326** of the means **32***a* and a rear face **110***a* bearing against a circular land **328** provided on the plate member **278**. The gear **106***a* is provided with an aperture **330** rotatably mounting the gear **106***a* on a pin **332** extending from the land **328**.

The transmitting means **32***a* appears in front elevation substantially as shown in FIGURE 6 and is provided with a substantially vertical, rectangular opening **334** in its upper portion **318** and a substantially horizontal, rectangular opening **336** in its lower portion **326**. These openings function as output motion interrupting means, as will be more fully described hereinafter. The transmitting means **32***a* includes a tongue **338** which depends from the portion **326** and which is provided with a substantially vertical, rectangular opening **340**. The transmitting means **32***a* is connected to the first output means **26***a* by a crank pin **162***a* which is provided on the face **144***a* of the gear **140***a* and which is disposed within the opening **334** for working engagement with the upper portion **318** during rotation of the first output means **26***a* by the gear **322** which, in turn, is driven through means and in a manner to be hereinafter described. The second output means **28***a* is operatively associated with the transmitting means **32***a* by a crank pin **120***a* which is carried by the face **108***a* of gear **106***a* and which is disposed within the opening **336** for working engagement with the lower portion **326** upon rotation of the gear **106***a* by the gear **140***a*. The tongue **338** is limited in movement by a pin **342** which is affixed to the member **278** and which is disposed within the opening **340**.

The transmitting means **32***a* also includes an upper end **344** which carries a pin **346** for connecting the transmitting means **32***a* to the connecting means **30***a*.

The connecting means **30***a* may be made of a suitable plastic material, such as polypropylene, and is substantially the same as the connecting means **30** described in connection with the first embodiment of the present invention except that the connecting means **30***a* is substantially T-shaped having a stem portion **78***a* extending upwardly from a cross bar portion **88***a*. The stem portion **78***a* includes an upper end **348** which is provided with an aperture **200***a* receiving the pin **346** which has a flattened head **350** for maintaining the end **348** in position thereon. The stem portion **78***a* is provided with a first

live hinge **86***a*, which is formed in the upper end **348** by reducing the cross section thereof, and a second live hinge **92***a* formed therein by reducing the cross section of the stem portion **78***a* at its junction with the cross bar portion **88***a*. The cross bar portion **88***a* includes a substantially horizontal bar **352** and a pair of forwardly extending arms, such as the one shown at **354** in FIGURES 4 and 7, mounted on the ends of the bar **352** at right angles thereto. Each arm **354** includes a free end **356** to which a link **98***a* is connected by a live hinge **358**. The links **98***a* are connected to associated eyeball means **22***a* by frictional engagement of the links **98***a* with associated plates **36***a*.

The drive means **24***a* also includes a drive member **360** which is reciprocably mounted in the housing **68***a* between the back wall **234** and the plate **278** and is maintained in sliding engagement therewith by a flute **362** provided on the back wall **234**. The drive member **360** carries a pair of upwardly-extending fingers **364**, **366** extending into operative engagement with the gear **322** for imparting rotation thereto upon reciprocation of the drive member **360**. The finger **364** carries a plurality of downwardly-extending teeth **368** which engage a plurality of teeth **370** on gear **322** during the downstroke of the member **360** for rotating it counterclockwise, as viewed in FIGURE 5. The finger **366** carries a plurality of upwardly-extending teeth **372** engageable with the teeth **370** on gear **322** for rotating it in a counterclockwise direction on the upstroke of the member **360**. The fingers **364**, **366** have sufficient resiliency to flex the teeth **368** on the finger **364** past the teeth **370** on the gear **322** during the upstroke of the member **360** and to flex the teeth **372** on the finger **366** past the teeth **370** during the downstroke of the member **360**.

The drive member **360** includes a lower end **374** which is provided with a pair of hollow bosses **376** pivotally receiving associated trunnions **378** extending laterally from the ends **380** of a pair of arms **382**, **384** provided on a U-shaped actuating member **386** having a bight portion **388**. The arms **382**, **384** are rockably mounted in associated apertures **390**, **392** provided in the plate **278**. The drive member **360** may be reciprocated by rocking the actuating member **386** upon the pivot points formed by the plate member **278** by any suitable means. One such means is shown herein for purposes of illustration, but not of limitation, as comprising a reciprocating wire filament **394** having an end **396** frictionally engaged in an aperture **398** provided in the bight portion **388** of the member **386**. The filament **394** is slidably mounted in a sheath **400** having an upper end **402** restrained against movement by frictional engagement with an aperture **404** provided in a top wall **406** of a transition member **408** having an encompassing side wall **412**. The member **408** is provided with an aperture **414** in the top wall **406** for receiving the lower end **416** of housing **68***a* which is retained in position therein by the clip **266** provided on the end **264** of the back wall portion **262**.

The encompassing side wall **412** of the member **408** frictionally engages a reduced-diameter portion **418** of a second transition member **420** which connects the housing **68***a* to a sound producing means **422** which is shown herein for purposes of illustration, but not of limitation, as comprising a random-record voice unit of the type disclosed in U.S. patent application No. 505,895, filed Nov. 1, 1965, and now Patent No. 3,315,406. The sound producing means **422** includes a pear-shaped housing **424** having a large end **426** and a small end **428** formed by a front housing half **430** and a rear housing half **432**.

The sound producing means **422** also includes a phonograph device **434** which is mounted in the housing **424** and which includes a turntable **436** having peripheral flanges **437**, **438** and a plurality of peripheral teeth **440**. The phonograph device **434** also includes a toothed belt **442** which is trained about a toothed pulley **444** and the turntable **436** for driving a governor **446**. The turntable **436** includes a spindle **448** which is seated in a bearing **450** carried by a cylindrical member **452** supported from the front housing half **430** by a gusset plate **454**. A spool **456** is mounted on the spindle **448** and may be rotated by pulling a drawstring **458** coiled thereon. A motor **460** of the clock-spring type is mounted in the phonograph device **434** between the spool **456** and the turntable **436** and is wound by pulling the drawstring **458**, as more fully described in said application No. 505,895.

The turntable **436** carries a phonograph record **462** having interleaved spiral grooves, not shown, each having a distinctive group of words or sounds recorded thereon. These grooves may be engaged by a phonograph needle **464** carried by a tone arm **466** which may be positioned at the beginning of a particular groove by the drawstring **458** when it is drawn to wind the spring motor **460**. The tone arm **466** is connected to a speaker cone **468** mounted in an opening **470** provided in the front housing half **430** behind a speaker grille **472**.

The sound producing means **422** includes a power-take-off means **474** supplying power to the drive means **24***a*. The power-take-off means **474** may be of any suitable type, such as the type shown in said copending application Ser. No. 505,895, and includes a plate **476** which is reciprocably mounted in the rear housing half **432** for reciprocation by the turntable **436**. This reciprocation may be imparted to the plate **476** by a rotatable roller **478** which is rotatably mounted on the plate **476** forming a cam follower adapted to follow a cam in the form of a groove **480** provided in the turntable **436**, all as more fully disclosed in said application Ser. No. 505,895. The plate **476** is connected to the end **482** of filament **394**, which is remote from the end **396**, by a connector **484** affixed to the plate **476** for reciprocation thereby. The sheath **400** has a second end **486** provided with a flared portion **488** seated in a notch **490** provided in a rear wall **492** forming part of the rear housing half **432**. An elongated slot **494** is provided in the rear wall **492** and extends from the notch **490** to a stepped portion **496** on the end **428** for receiving the sheath **400**. A cover plate **498** is affixed to the rear wall **492** for retaining the sheath **400** in position within the slot **494**.

The second transition member **420** includes a front wall **500**, conforming in shape to the front wall **502** of the front housing half **430** in the vicinity of end **428**, a rear wall **503** conforming in shape to the rear wall **504** of the rear housing half **432** below the stepped portion **496**, side walls, like the one shown at **506**, conforming in shape to the side walls of the housing **426** at the end **428**, and a curved top wall **508** adapted to engage the end **428**. The member **420** is mounted on the end **428** with a friction fit. When so mounted, a U-shaped notch **510** provided in the front wall **500** engages a protuberance **512** provided on the front housing half **430**. The member **420** also includes a large-diameter portion **514** provided with an annular groove **516** in which the neck **21***a* of the doll **12***a* and the upper end **518** of a cape **520** are firmly seated by an annular band **522**.

Operation of the second embodiment of the present invention will be readily understood. The phonograph device **434** may be energized to rotate the turntable **436** causing the groove **480** to impart a linear motion to the roller **478** which, in turn, reciprocates the plate **476**. Reciprocation of the plate **476** reciprocates the filament **394** rocking the member **386** on the member **278** to reciprocate the drive member **360** imparting rotation to the gear **322**.

Rotation of the gear **322** imparts rotation to the crank pins **120***a* and **162***a* through associated gears **106***a* and **140***a*, respectively, giving each of them a predetermined, different output motion which is combined by the member **32***a* into a single output motion which is intermittent because the openings **334** and **336** are of sufficient size to result in lost motion of the output means **26***a* and **28***a* with respect to the member **32***a*. The output of the member **32***a* is transmitted to the eyeballs **22***a* by the connecting means **30***a* for simulating random eye-sweeping move-

ments wherein the doll's eyes appear to become fixed on an object for a short period of time and then sweep on randomly to another object.

The groove **480** in the turntable **436** may be asymmetrical in shape, as shown in said application Ser. No. 505,895, so that the plate **476** and the filament **394** reciprocate on an irregular cycle. This adds to the simulation of random eye-sweeping movements.

While the particular eye-moving devices herein shown and described in detail are fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that they are merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

What is claimed is:

1. Apparatus for simulating eye-sweeping movements in figure toys having eye socket means, comprising:

eyeball means universally pivotally mounted in said eye socket means;

drive means for driving said eyeball means through simulated, eye sweeping movements with respect to said eye socket means, said drive means including first and second output means having different predetermined output motions; and

means connecting said drive means to said eyeball means, said connecting means including means for combining said first and second output motions into a single, composite output motion and eyeball connector means connecting said combining means to said eyeball means for transmitting said composite output motion directly to said eyeball means, said eyeball connector means converting said composite output motion into universal pivotal movement of said eyeball means.

2. An apparatus as stated in claim **1** wherein said drive means includes output-motion interrupting means operatively associated with said first and second output means for periodically interrupting said output motions during continuous operation of said drive means.

3. An apparatus as stated in claim **1** wherein said connector means is connected only to said combining means and said eyeball means whereby it is free-floating.

4. An apparatus as stated in claim **1** wherein said eye socket means comprises a pair of eye sockets and wherein said eyeball means comprises:

a transparent, substantially hemispherically-shaped member mounted in each of said sockets, each of said transparent members having a hollow, cylindrical open end;

a substantially hemispherically-shaped eyeball member floatingly mounted in each of said transparent members; and

clamping ring means clamping each of said open ends of said transparent members to an associated socket, each of said clamping ring means including an annular surface coacting with an associated one of said eyeball members to maintain it in position in an associated one of said transparent members without restricting the universal movement of said associated eyeball member.

5. Apparatus for simulating eye-sweeping movements in figure toys, comprising:

eyeball means mounted in said figure toy;

drive means for driving said eyeball means, said drive means including first and second output means having predetermined output motions, said first output means comprising first gear means having a first predetermined number of teeth and a first crank pin offset from the center of rotation of said first gear means, said second output means comprising a second gear means having a second predetermined number of teeth meshing with said first predetermined number of teeth and a second crank pin offset from the center of rotation of said second gear means; and

means connecting said drive means to said eyeball means, said connecting means including means for combining said first and second output motions into a single, composite output motion, said combining means including means connecting said first and second crank pins to a single output member, said means connecting said drive means to said eyeball means also including means placing said single output member in operative association with said eyeball means.

6. An apparatus as stated in claim **5** wherein said drive means includes:

star wheel means carried by one of said first and second gear means;

powered gear means mounted in said figure toy;

motor means operatively associated with said powered gear means for imparting continuous rotation thereto; and

crank pin means operatively associating said powered gear means with said star wheel means for imparting predetermined increments of intermittent rotation thereto, whereby said one gear means is rotated intermittently during continuous rotation of said powered gear means.

7. An apparatus as stated in claim **5** wherein said drive means includes:

powered gear means operatively associated with one of said first and second gear means;

a pair of finger means reciprocably mounted in said toy astraddle said powered gear means, one of said finger means including teeth engageable with said powered gear means for imparting an increment of rotation thereto only when said one finger means is moved in one direction, the other of said finger means including teeth engageable with said powered gear means for imparting an increment of rotation thereto only when said other finger means is moved in a direction opposite to said one direction; and

motor means mounted in said toy in operative association with said finger means for imparting reciprocation thereto.

8. Apparatus for simulating eye-sweeping movements in figure toys, comprising:

(A) eyeball means mounted in said figure toy, said eyeball means comprising:

(a) a transparent, substantially hemispherically-shaped member mounted in each of said sockets, each of said transparent members having a hollow, cylindrical open end;

(b) a substantially hemispherically-shaped eyeball member floatingly mounted in each of said transparent members; and

(c) clamping ring means clamping each of said open ends of said transparent members to an associated socket, each of said clamping ring means including an annular surface coacting with an associated one of said eyeball members to maintain it in position in an associated one of said transparent members without restricting the universal movement of said associated eyeball member;

(B) drive means for driving said eyeball means, said drive means including first and second output means having predetermined output motions, said first output means comprising:

(a) first gear means having a first predetermined number of teeth; and

(b) a first crank pin offset from the center of rotation of said first gear means, said second output means comprising:

(c) a second gear means having a second predetermined number of teeth meshing with said first predetermined number of teeth; and

(d) a second crank pin offset from the center of rotation of said second gear means; and

(C) means connecting said drive means to said eyeball means, said connecting means including means for combining said first and second output motions into a single, composite output motion, said combining means including:

(a) means connecting said first and second crank pins to a single output member, said means connecting said drive means at said eyeball means also including:

(b) means placing said single output member in operative association with said eyeball means.

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