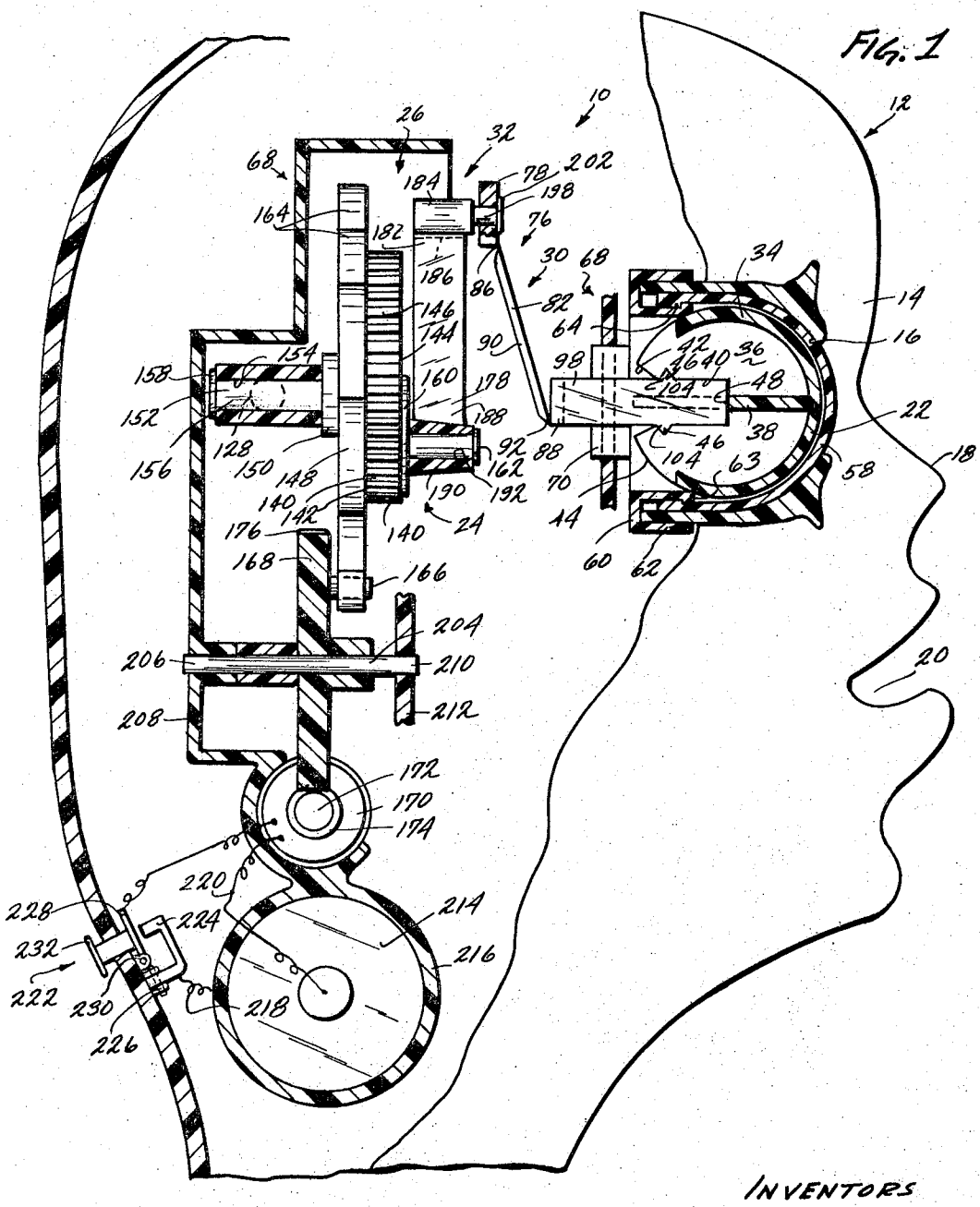
Nov. 21, 1967 J. W. RYAN ETAL 3,353,296

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

Filed Dec. 6, 1966 4 Sheets-Sheet 1

FIG. 1



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

Filed Dec. 6, 1966 4 Sheets-Sheet 2

FIG. 2

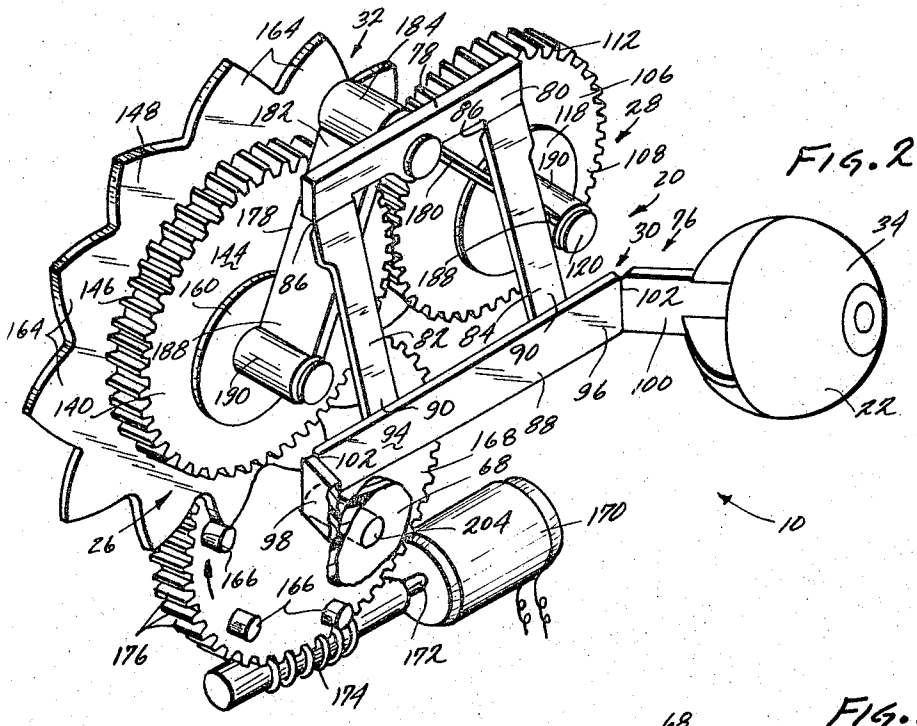
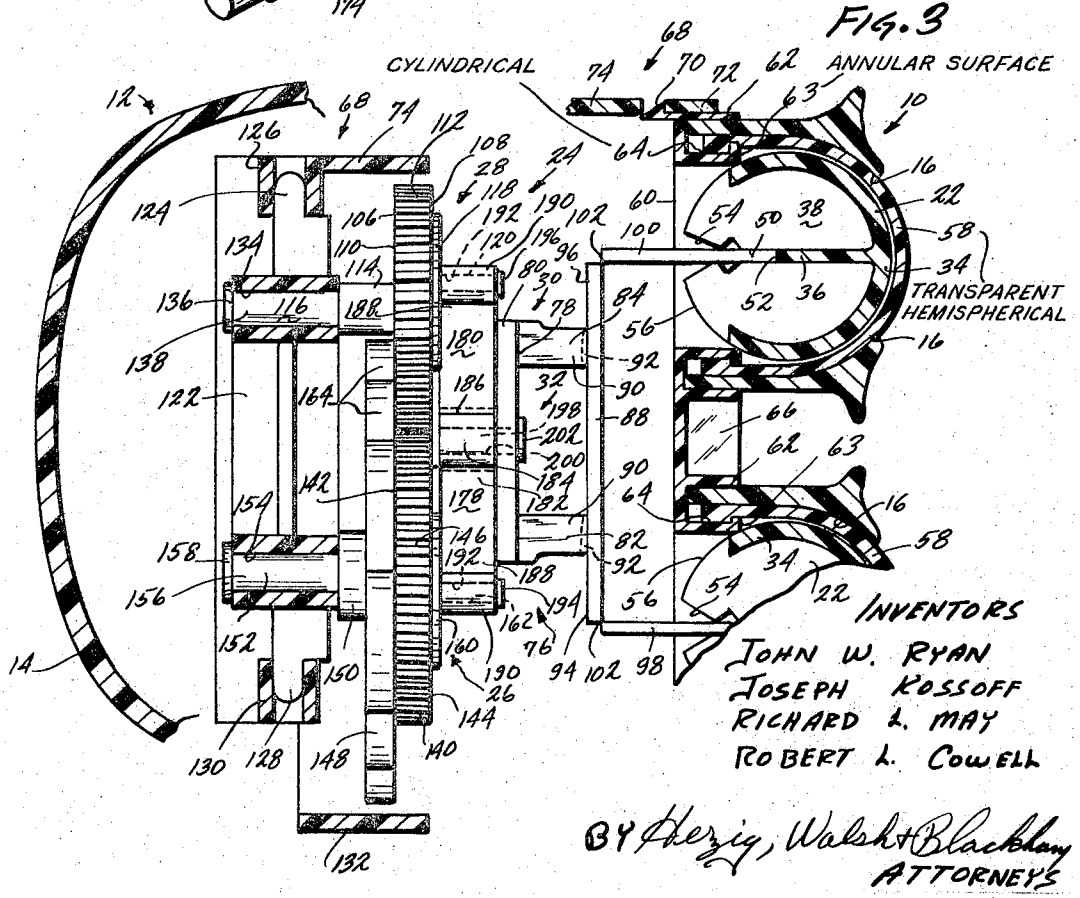


FIG. 3



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

Filed Dec. 6, 1966 4 Sheets-Sheet 3

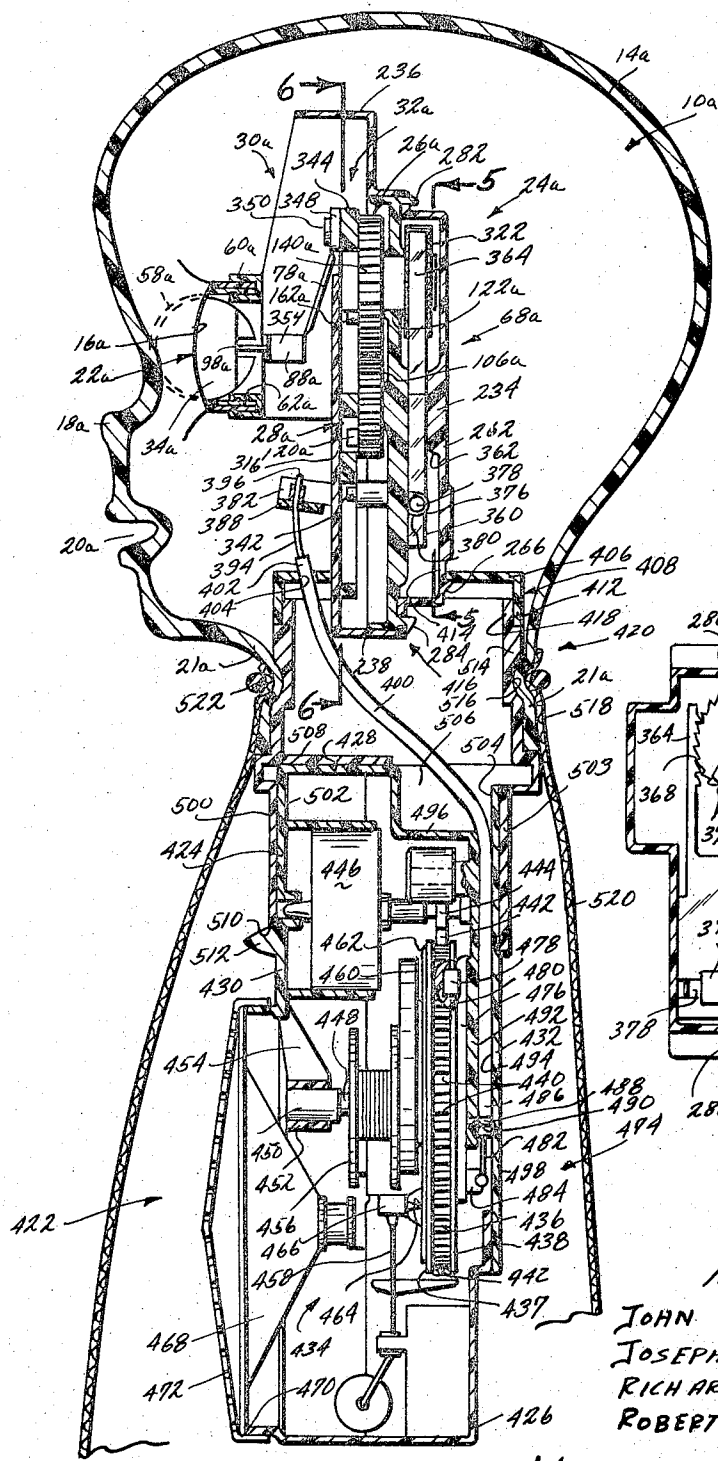


FIG. 4

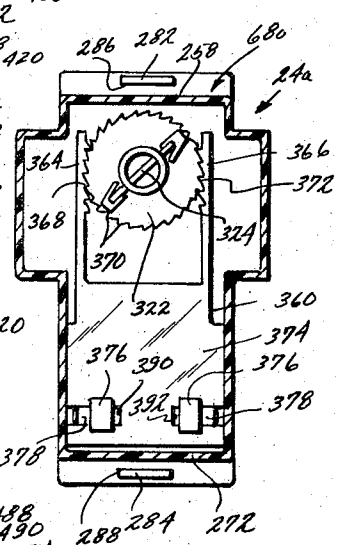


FIG. 5

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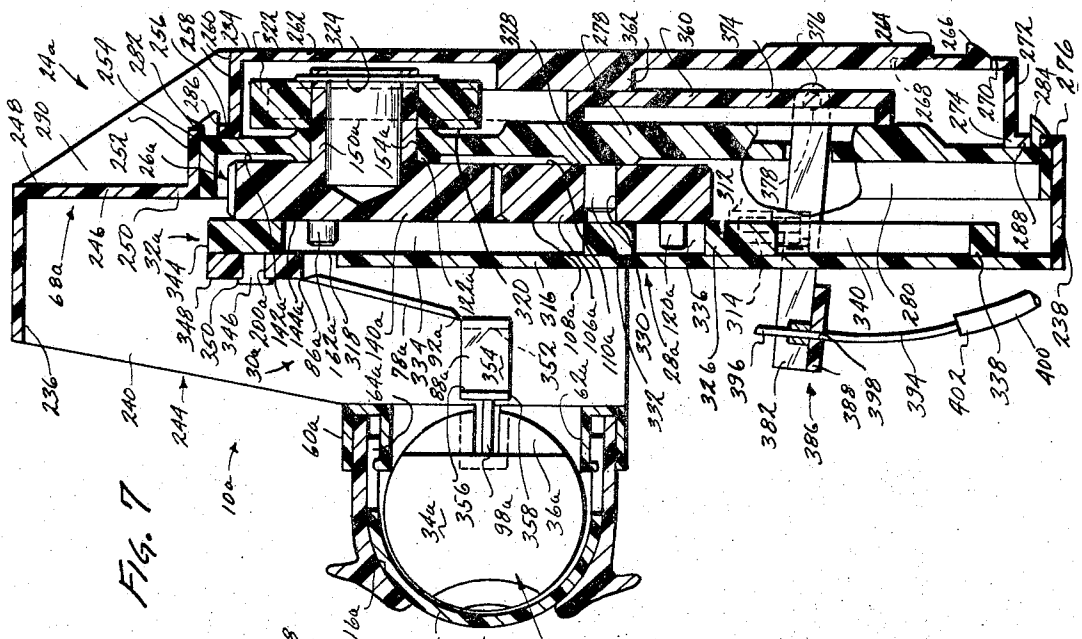


FIG. 7

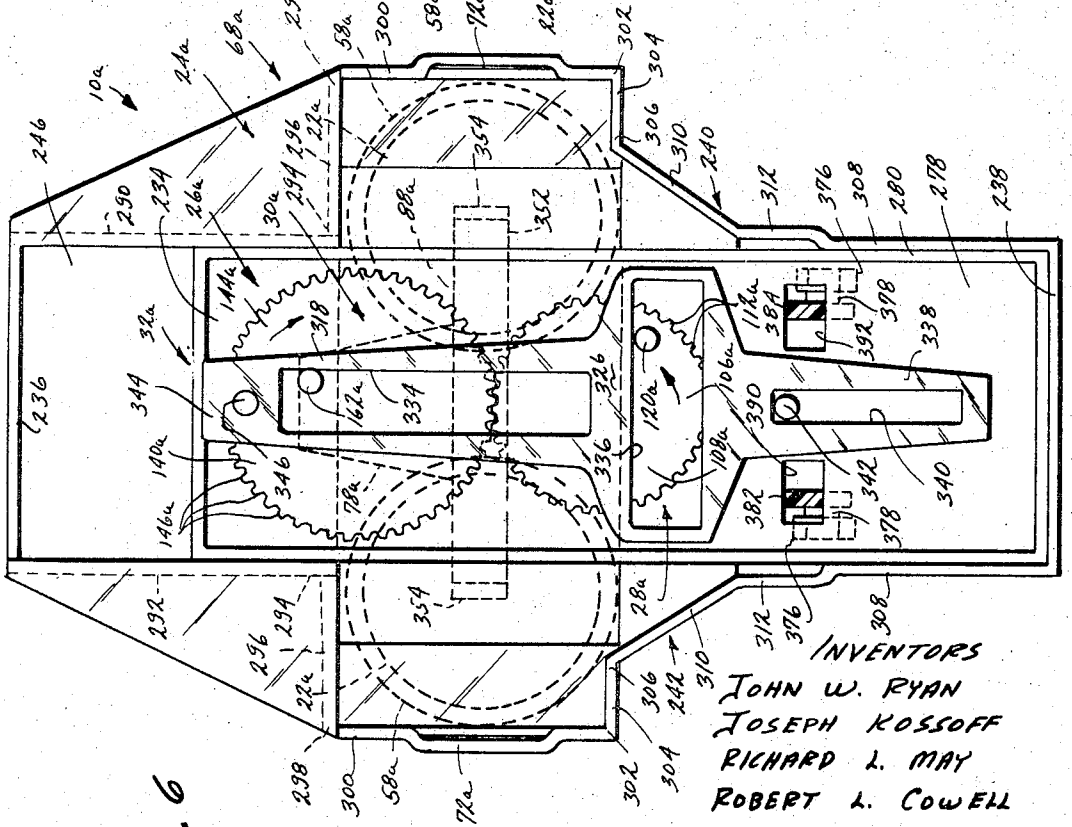


FIG. 6

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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.

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.

References Cited

UNITED STATES PATENTS

3,029,552	4/1962	Katz	46—100
3,250,037	5/1966	Katz et al.	46—135
1,328,100	1/1920	Poore.	
2,136,006	11/1938	Fisher.	
3,287,848	11/1966	Katz et al.	

FOREIGN PATENTS

575,139	2/1946	Great Britain.
512,985	2/1955	Italy.

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