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J. W. RYAN ETAL
 APPARATUS FOR SIMULATING REALISTIC EYE AND
 MOUTH MOVEMENTS IN A FIGURE TOY

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3 Sheets-Sheet 1

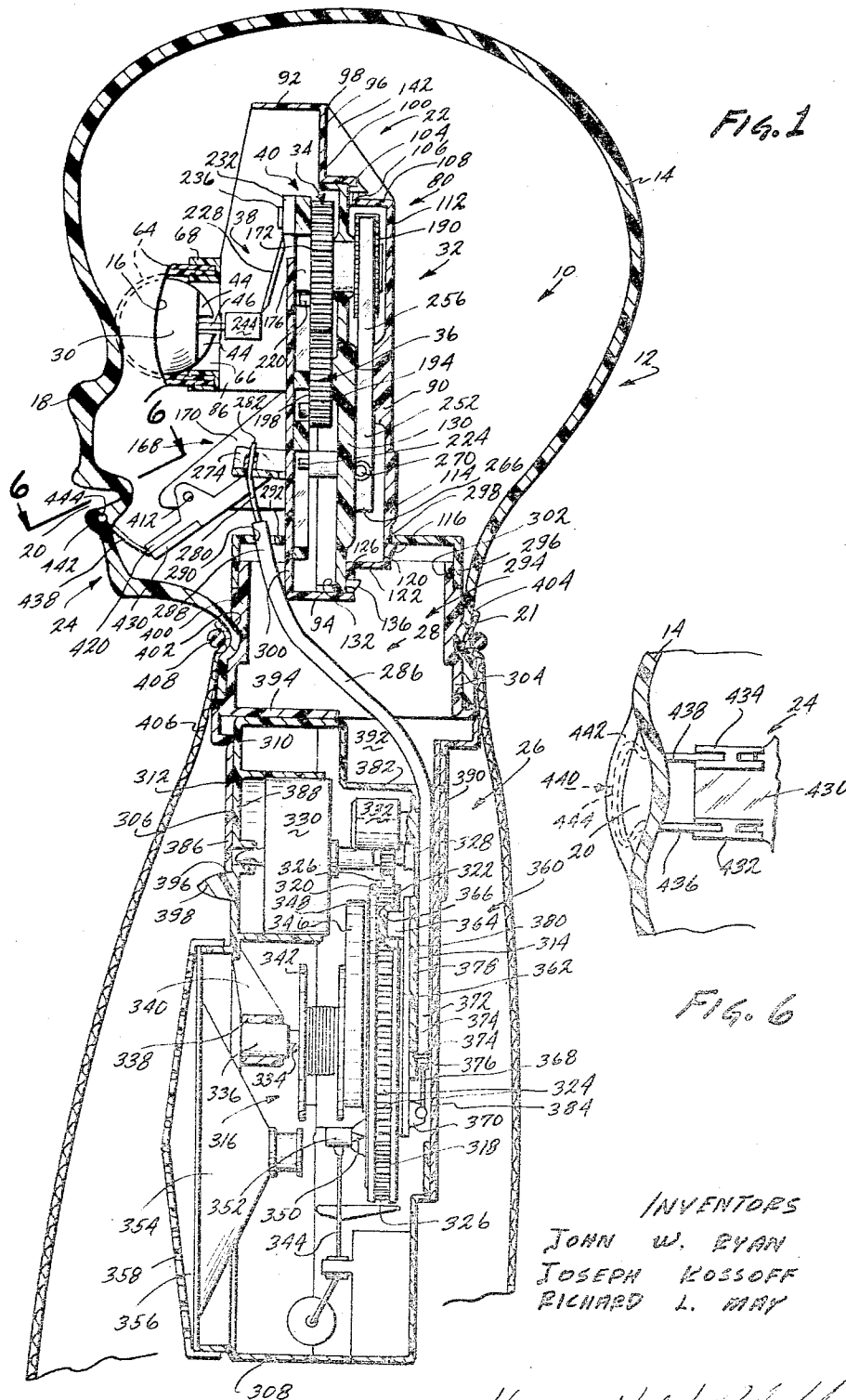


FIG. 1

FIG. 6

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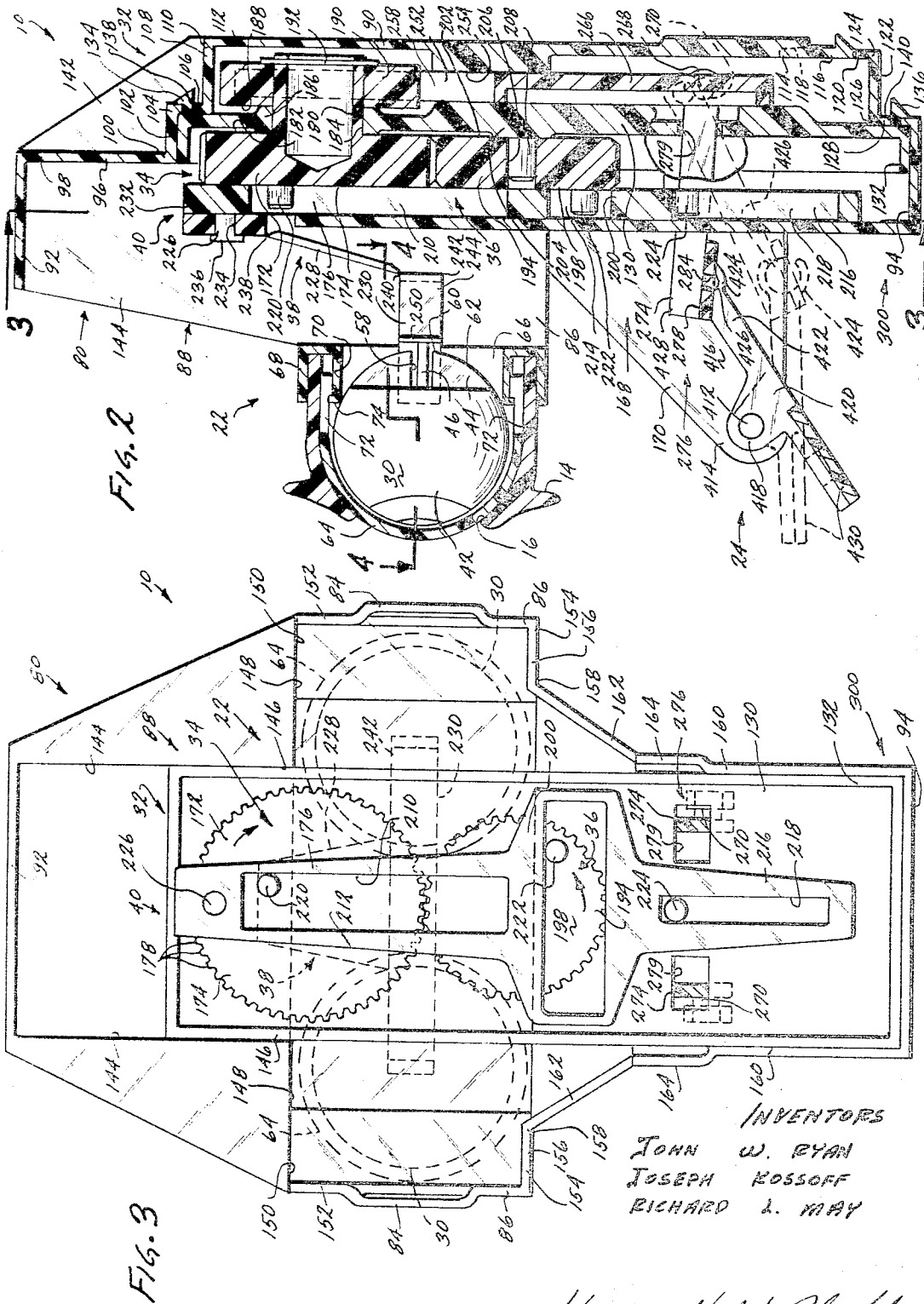
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5 Sheets-Sheet 2



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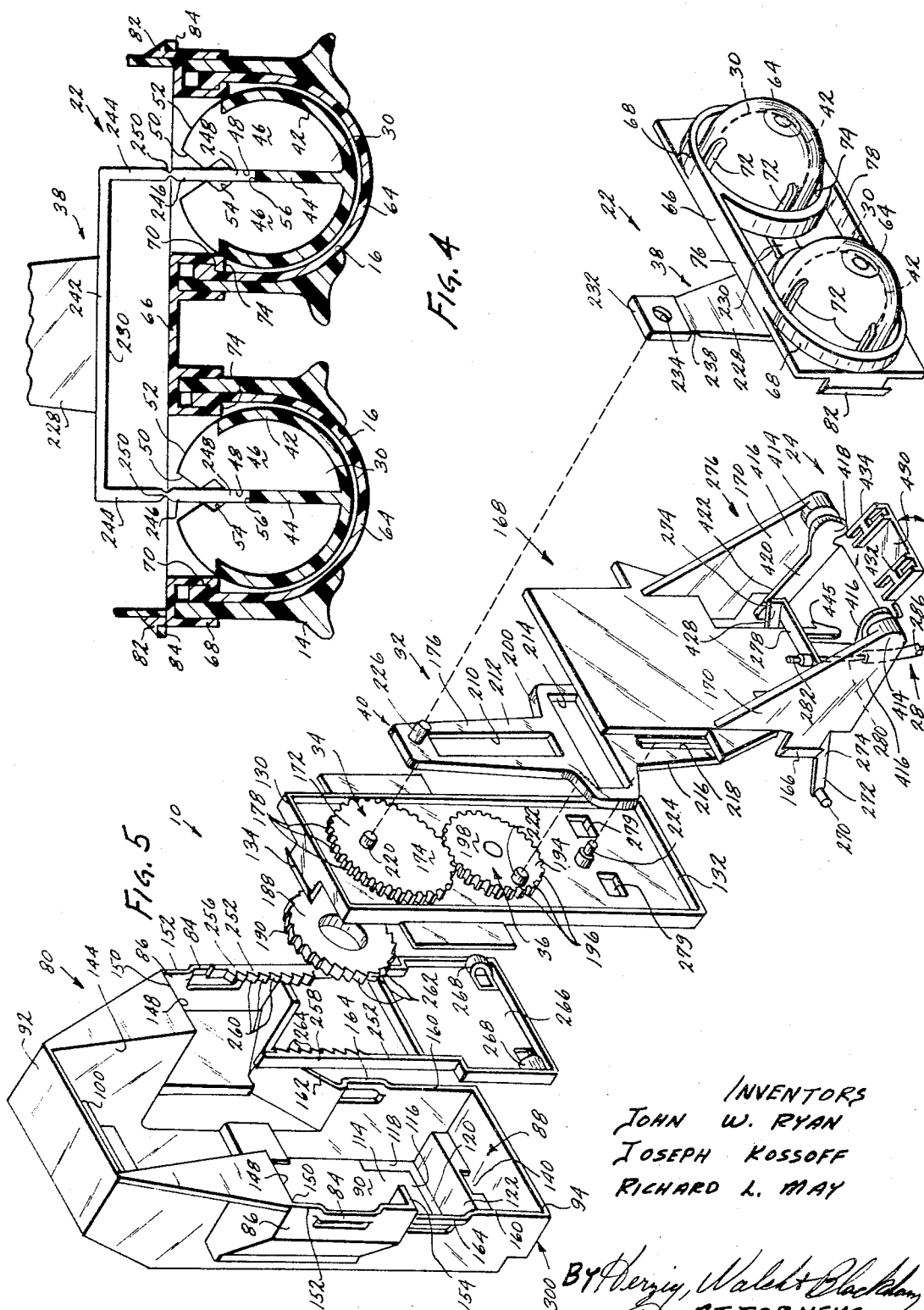
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APPARATUS FOR SIMULATING REALISTIC EYE AND MOUTH MOVEMENTS IN A FIGURE TOY

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1 Claim. (Cl. 46—118)

ABSTRACT OF THE DISCLOSURE

A figure toy eye and mouth moving apparatus driven by the turntable of a phonograph through a pair of meshed, eye-driving gears supplying separate output motions to a motion combining member which transmits a composite motion to a pair of eyeballs and through a rockable lever connected to the lower lip of the top by a U-shaped, wire connector having a bight portion embedded in the lower lip and following the contour thereof. The eyeballs are floatingly mounted in transparent, plastic bubbles and are retained therein by an annular chamber on a clamping ring which clamps the bubble in position in eye sockets provided in the toy.

Cross-reference to related application

The eye moving portion of the apparatus of the present invention is also disclosed as one embodiment in copending application Ser. No. 599,569 filed Dec. 6, 1966 concurrently herewith.

Background of the invention

The background of the invention is set forth herein in two parts.

Field of the invention

The present invention pertains to the field of animated figure toys, generally and more particularly to an apparatus for simulating realistic eye and mouth movements in a figure toy having a soft, flexible, rubber-like head which is provided with eye sockets and movable mouth means. The apparatus includes eyeball means mounted in the eye sockets, a first output means having a first predetermined output motion and a second output means having a second predetermined output motion, means for combining the first and second output motions into a single, composite output motion, first means connecting the composite output motion to the eyeball means for transmitting simulated random, eye-sweeping movements thereto, drive means for driving the first and second output means and second means connecting the drive means to the mouth means for imparting realistic movements thereto.

Description of the prior art

Eye and mouth moving mechanisms for figure toys are known from such patents as German Patent No. 492,633; British Patent No. 699,463; United States Patent No. 1,805,231 and United States Patent No. 2,641,866. While generally satisfactory, the mechanisms disclosed in these patents do have several disadvantages.

A major disadvantage with the mechanism disclosed in all of these patents resides in the fact that rather artificial, unrealistic movements are imparted to the eyes and the mouth because rigid heads are used and the eyes are mounted therein on either vertical or horizontal pivot means while the movable portion of the mouth is affixed thereto on pivot pin means.

One disadvantage of mechanisms of the type disclosed in the German patent resides in the fact that they are comparatively expensive to manufacture and complicated to use.

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Summary of the invention

In view of the foregoing factors and conditions characteristic of eye and mouth moving mechanisms for figure toys, it is a primary object of the present invention to provide a new and useful apparatus for simulating realistic eye and mouth movements in a figure toy not subject to the disadvantages enumerated above and having a drive means especially designed for imparting realistic, simulated eye movements and mouth movements to a figure toy.

Another object of the present invention is to provide an apparatus of the type described which includes means for combining first and second output motions into a single, composite output motion which is transmitted to a doll's eyes by a free-floating connecting means.

A further object of the present invention is to provide an apparatus of the type described including drive means receiving power from a phonograph device.

A further object of the present invention is to provide an apparatus of the type described which includes a single rockable lever for imparting movements to a doll's mouth and its eyes through connecting means and gear means of the present invention.

According to the present invention, a new and useful apparatus for simulating realistic eye and mouth movements in a figure toy is provided. The figure toy includes a soft, flexible, rubber-like head which is provided with eye sockets and movable mouth means. Eyeball means are mounted in the eye sockets for actuation by a drive means of the present invention. The drive means includes a first output means having a first predetermined output motion and a second output means having a second predetermined output motion. The apparatus includes means connecting the drive means to the eyeball means and the connecting means, in turn, includes means for combining the first and second output motions into a single, composite, output motion for imparting irregular motions to the eyeball means.

The drive means is also connected to the mouth means by a second connecting means for imparting realistic movements to the mouth means. 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.

The features of the present invention which are believed to be novel are set forth with particularly 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.

Brief description of the drawings

FIGURE 1 is a vertical, cross-sectional view of an apparatus of the present invention in combination with a figure toy in the form of a doll;

FIGURE 2 is a partial, enlarged cross-sectional view of the apparatus shown in FIGURE 1;

FIGURE 3 is a cross-sectional view taken along line 3—3 of FIGURE 2;

FIGURE 4 is a partial cross-sectional view taken along line 4—4 of FIGURE 2;

FIGURE 5 is an exploded perspective view of the apparatus shown in FIGURE 2; and

FIGURE 6 is an enlarged, partial cross-sectional view taken along line 6—6 of FIGURE 1.

Description of the preferred embodiment

Referring again to the drawings, an apparatus for animating a figure toy constituting a presently preferred embodiment of the invention, generally designated 10, is shown in combination with a figure toy 12. The figure

toy 12 is shown herein for purposes of illustration, but not of limitation, in the form of a doll having a soft, flexible, rubber-like head 14 including a pair of eye sockets 16, a nose 18, a mouth 20 and a cylindrical neck 21.

The animating apparatus 10 includes an eye-moving means 22 and a mouth-moving means 24 which are connected to a common power source 26 by a connecting means 28 of the Bowden wire type.

The eye-moving means 22 may be substantially the same as the one disclosed as the second embodiment in copending application Ser. No. 599,569 filed Dec. 6, 1966 and includes a pair of eyeballs 30 which are driven through simulated, random eye-sweeping movements by a drive means 32 including a first output means 34 having a first predetermined output motion and a second output means 36 having a second predetermined output motion differing from the first output motion. The eyeball means 30 are connected to the drive means 32 by a connecting means 38 which includes a composite-output-motion transmitting means 40 for combining the first and second output motions into a composite output motion.

The eyeball means 30 each includes a hollow, substantially hemispherically-shaped, eyeball member 42 in which a pair of plates 44, 46 are mounted at right angles to each other. The plate 46 is provided with a slot 48 (FIGURE 4) having a mouth 50 which flares outwardly to the periphery 52 of the plate 46 and a pair of notches 54 intermediate the mouth 42 and a closed end wall 56 defining the inner end of the slot 48. The plate 44 is provided with a slot 58 having an open end 60 at the peripheral edge 62 of the plate 44.

The eyeball means 30 are each floatingly mounted in a transparent plastic bubble 64 which is clamped into position within an associated eye socket 16 by a bridge member 66 having a pair of clamping rings 68 clamping the eye socket 16 and associated bubbles 64 together at the open ends 70 thereof. Each bubble 64 is provided with a plurality of axially extending slots 72 adjacent the open end 70 permitting the open end to conform to the inner diameter of an associated socket 16 under the influence of the associated clamping ring 68. Each ring 68 includes an annular surface 74 of less diameter than the major diameter of an associated eyeball member 42 for preventing removal thereof from an associated bubble 64 while permitting universal movement therein. The bridge member 66 includes upper and lower rails 76, 78 connecting the clamping rings 68 together and is connected to a housing 80, which houses the eye-moving means 22, by a pair of clips 82 carried by the ends of the bridge 68. Each clip 82 may be snapped into engagement with an associated lug 84 affixed to an associated side wall 86 on the housing 80.

The side walls 86 form an open front 88 in the housing 80 which includes a rear wall 90, a top wall 92 and a bottom wall 94. The back wall 90 includes an upper, substantially vertical portion 96 having an upper end 98 connected to the top wall 92 and a lower end 100 connected to a substantially horizontal upper portion 102 of the back wall 90. The upper portion 102 includes an end 104 from which a back wall portion 106 depends into engagement with an intermediate horizontal portion 108 having an end 110 from which a substantially vertical portion 112 depends. The depending portion 112 includes a lower end 114 which is provided with a lug 116. The lug 116 is given lateral flexibility by providing a pair of vertical slots 118 (FIGURES 2 and 5) in the back wall 90 on each side of the lug 116 and a horizontal slot 120 provided in the back wall 90 below the lug 116. The back wall 90 also includes a substantially horizontal, lower portion 122 extending inwardly from the lower end 124 of the portion 114 and having an end 126 from which a back wall portion 128 depends into engagement with the bottom wall 94. The depending portions 106 and 128 are aligned for forming a shelf for a plate member 130 which is provided with a peripheral flange 132 and which is

maintained in position in the housing 80 by upper and lower clips 134 and 136, respectively, engageable in associated slots 138 and 140 provided in the depending portions 106 and 128, respectively.

Each side wall 86 includes a rearwardly-extending portion, as shown at 142 in FIGURES 1 and 2 for one side wall 86, for reinforcing the back wall 90. Each side wall 86 also includes an upper, substantially vertical portion 144 having a lower end 146 from which a substantially horizontal, outwardly-extending portion 148 extends. Each horizontal portion 148 includes an outboard end 150 from which a substantially vertical portion 152 depends into engagement with an end 154 of a substantially horizontal, inwardly-extending portion 156. The portion 156 has an end 158 which is connected to a lower, vertical portion 160 of an associated side wall 86 by a downwardly and inwardly directed portion 162. Each lower vertical portion 160 is provided with a lug 164 engageable by an associated clip 166 (as shown in FIGURE 5 for one clip) provided on a cover plate and hanger assembly 168 for retaining it in position within the housing 80. The plate and hanger assembly 168 maintains the transmitting means 40 in sliding engagement with the first and second output means 34 and 36 and includes a pair of forwardly-extending brackets 170 supporting the mouth-moving means 24.

The first output means 34 comprises a large-diameter gear 172 having a front face 174 against which an upper portion 176 of the transmitting means 40 is engaged for sliding motion with respect thereto. The gear 172 is provided with a plurality of teeth 178, a hollow, cylindrical spindle 180 and a rear face 182. The spindle 180 is rotatably mounted in an aperture 184 provided in a thickened portion 186 of the plate 130. The thickened portion 186 forms bearing surfaces for the rear face 182 of the gear 172 and for the front face 188 of a gear 190 which is connected to the spindle 180 by a pin 192 (FIGURE 2) for rotation thereby.

The second output means 36 comprises a small-diameter gear 194 having a plurality of teeth 196 meshing with the teeth 178 on the large-diameter gear 172. The gear 194 includes a front face 198 slidably receiving an intermediate portion 200 of the means 40 and a rear face 202 bearing against a circular land 204 provided on the plate 130. The gear 194 is provided with an aperture 206 rotatably mounting the gear 194 on a pin 208 extending from the land 204. The gears 172 and 194 may be caused to produce output motions differing from each other by providing an odd number of teeth 178 on the gear 172 and an even number of teeth 196 on the gear 194. For example, it has been found that 31 teeth 178 meshing with 24 teeth 196 produces a composite output motion, through means and in a manner to be hereinafter described, which moves the eyeball members 42 through a great many different eye-sweeping patterns before a particular pattern repeats itself. Thus, the eyeball members 42 appear to be moving at random.

The transmitting means 40 appears in front elevation substantially as shown in FIGURE 3 and is provided with a substantially vertical, rectangular opening 210 in its upper portion 212 and a substantially horizontal, rectangular opening 214 in its intermediate portion 200. The openings 210 and 214 function as output-motion interrupting means, as will be more fully described hereinafter. The transmitting means 40 includes a lower, tongue portion 216 which depends from the intermediate portion 200 and which is provided with a substantially vertical, rectangular opening 218. The transmitting means 40 is connected to the first output means 34 by a crank pin 220 provided on the face 174 of the gear 172 and disposed within the opening 210 for working engagement with the upper portion 212 during the rotation of the first output means 34 by the gear 190 which, in turn, is driven through means and in a manner to be hereinafter described. The second output means 36 is operatively as-

sociated with the transmitting means 40 by a crank pin 222 carried by the front face 198 of gear 194 and disposed within the opening 214 for working engagement with the intermediate portion 200 upon rotation of the gear 194 by the gear 172. The tongue 216 is limited in movement by a pin 224 affixed to the plate 130 and disposed within the opening 218. A pin 226 is carried by the upper portion 212 of the means 40 for connecting it to the connecting means 38.

The connecting means 38 may be made from a suitable plastic material, such as polypropylene, and is substantially T-shaped having a stem portion 228 extending upwardly from a crossbar portion 230. The stem portion 228 includes an upper end 232 which is provided with an aperture 234 receiving the pin 226 which has a flattened head 236 for maintaining the end 232 in position thereon. The stem portion 228 is provided with a first living hinge 238, which is formed in the upper end 232 by reducing the cross-section thereof, and a second living hinge 240 formed therein by reducing the cross-section of the stem portion 228 at its junction with the crossbar portion 230. The crossbar portion 230 includes a substantially horizontal bar 242 and a pair of forwardly extending arms 244 mounted on the ends of the bar 242 at right angles thereto. Each arm 244 includes a free end 246 (FIGURE 5) to which a link 248 is connected by a living hinge 250. The links 248 are connected to associated eyeball means 30 by frictional engagement of the links 248 with associated plates 44 and 46.

The drive means 32 includes a drive member 252 (FIGURE 5) which is reciprocally mounted in the housing 80 between the back wall 90 and the plate 130 and is maintained in sliding engagement therewith by a flute 254 provided on the back wall 90. The drive member 252 carries a pair of upwardly-extending fingers 256, 258 extending into operative engagement with the gear 190 for imparting rotation thereto upon reciprocation of the drive member 252. The finger 256 carries a plurality of teeth 260 which engage and drive the teeth 262 on the gear 190 during the downstroke of the member 252 for rotating the gear 190 in a clockwise direction, as viewed in FIGURE 5. The finger 258 carries a plurality of upwardly-extending teeth 264 engageable with the teeth 262 on the gear 190 for rotating it in a clockwise direction on the upstroke of the member 252. The fingers 256 and 258 have sufficient resiliency to flex the teeth 260 on the finger 256 past the teeth 262 during the upstroke of the member 252 and to flex the teeth 264 on the finger 258 past the teeth 262 during the downstroke of the member 252.

The drive member 252 includes a lower end 266 which is provided with a pair of hollow bosses 268 (FIGURE 5) pivotally receiving associated trunnions 270 extending laterally outwardly from the rear ends 272 of a pair of arms 274 provided on a U-shaped actuating member 276 having a bight portion 278. The arms 274 are rockably mounted in associated apertures 279 provided in the plate 130. The drive member 252 may be reciprocated by rocking the actuating member 276 upon the pivot points formed by the plate member 130 by the Bowden wire type connecting means 28 which includes a reciprocating wire filament 280 (FIGURE 1). The filament 280 has an end 282 frictionally engaged in an aperture 284 provided in the bight portion 278 of the member 276 and is slidably mounted in a sheath 286 having an upper end 288 restrained against movement by frictional engagement with an aperture 290 provided in a top wall 292 of a transition member 294 having an encompassing side wall 296. The member 294 is provided with an aperture 298 in the top wall 292 for receiving the lower end 300 of housing 80 which is retained in position therein by the clip 116 provided on the end 114 of back wall 90.

The encompassing side wall 296 of the member 294 frictionally engages a reduced-diameter portion 302 of a second transition member 304 which connects the hous-

ing 80 to the power supply means 26. The power supply means 26 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 Ser. No. 505,895 filed Nov. 1, 1965 and now Patent No. 3,315,406. The power supply means 26 includes a pear-shaped housing 306 having a large end 308 and a small end 310 formed by a front housing half 312 and a rear housing half 314.

The power supply means 26 also includes a phonograph device 316 mounted in the housing 306 and including a turntable 318 having peripheral flanges 320, 322 and a plurality of peripheral teeth 324. The phonograph device 316 also includes a toothed belt 326 which is trained about a toothed pulley 328 and the turntable 318 for driving a governor 330. The belt 326 is retained in position on the pulley 328 by an idler 332. The turntable 318 includes a spindle 334 which is seated in a bearing 336 carried by a cylindrical member 338 supported from the front housing half 312 by a gusset plate 340. A spool 342 is mounted on the spindle 334 and may be rotated by pulling a drawstring 344 coiled thereon. A motor 346 of the clock spring type is mounted in the power supply means 26 between the spool 342 and the turntable 318 and is wound by pulling the drawstring 344, as more fully described in said application No. 505,895.

The turntable 318 carries a phonograph record 348 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 350 carried by a tone arm 352 which may be positioned at the beginning of a particular groove by the drawstring 344 when it is drawn to wind the spring motor 346. The tone arm 352 is connected to a speaker cone 354 mounted in an opening 356 provided in the front housing half 312 behind a speaker grille 358.

The power supply means 26 includes a power-take-off means 360 which is connected to the member 276 by the connecting means 28. The power-take-off means 360 includes a plate 362 which is reciprocally mounted in the rear housing half 314 for reciprocation by the turntable 318. This reciprocation is imparted to the plate 362 by a rotatable roller 364 rotatably mounted on the plate 362 for forming a cam follower adapted to follow a cam in the form of a groove 366 provided on the turntable 318, all as more fully disclosed in said application Ser. No. 505,895. The plate 362 is connected to the end 368 of filament 280, which is remote from the end 282, by a connector 370 affixed to the plate 362 for reciprocation thereby. The sheath 286 has a second end 372 provided with a flared portion 374 seated in a notch 376 provided in a rear wall 378 forming part of the rear housing half 314. An elongated slot 380 is provided in the rear wall 378 and extends from the notch 376 to a step portion 382 on the end 310 for receiving the sheath 286. A cover plate 384 is affixed to the rear wall 380 for retaining the sheath 286 in position within the slot 380.

The second transition member 304 includes a front wall 386, conforming in shape to the front wall 388 of the front housing half 312 in the vicinity of end 310, a rear wall 390, conforming in shape to the rear wall 380 of the rear housing half 314 below the stepped portion 382, side walls, like the one shown at 392, conforming in shape to the side walls of the housing 306 at the end 310, and a curved top wall 394 engaging the end 310. The member 304 is mounted on the end 310 with a friction fit. When so mounted, a U-shaped notch 396 provided in the front wall 386 engages a protuberance 398 provided on the front housing half 312. The member 304 also includes a large-diameter portion 400 provided with an annular groove 402 in which the neck 21 of the doll 12 and the upper end 404 of a cape 406 are firmly seated by an annular band 408.

The mouth-moving means 24 includes a rockable member 410 which is pivotally connected to the brackets 170

on member 168 by a pair of pivot pins, like the one shown at 412 in FIGURE 2, which engage associated hollow bosses 414, 414 carried by the free ends 416 of associated brackets 170. Each pin 412 extends laterally from an end 418 of an arm 420 forming a part of the member 410 and including another end 422 which carries a bifurcated member 424. The bifurcated members 424 engage associated pins 426 (FIGURE 2) extending outwardly from the ends 428 of associated arms 274 adjacent the bight portion 278.

The member 410 also includes a plate 430 which may be formed integrally with the arms 420 and which extends forwardly from the ends 418 thereof. The plate 430 carries a pair of H-shaped members 432, 434 engageable by the arms 436, 438 (FIGURE 6), respectively, of a substantially U-shaped wire clip 440 which may be used to connect the lower lip 442 of mouth 20 to the member 410. The clip 440 includes a bight portion 444 which comprises means including its shape and dimensions for following the natural contour of the lip 442 and which may be embedded therein in accordance with the method disclosed in copending application Ser. No. 558,305 filed June 17, 1966 so that the flexible, soft material forming the lip 42 will adhere to the bight portion 444. Rocking of the member 276 by the wire 280 rocks the member 410 about its pivots 412 transmitting realistic movements to the lower lip 442. Downward travel of the member 276 is limited by a pair of outwardly extending projections, like the one shown at 445 in FIGURE 5, which are engageable by associated arms 274.

Operation of the apparatus of the present invention will be readily understood.

The power supply means 26 may be energized to rotate turntable 318 causing the groove 366 to impart a linear motion to the roller 364 which, in turn, reciprocates plate 362. Reciprocation of plate 362 reciprocates filament 280 rocking member 276 on plate 130 to simultaneously reciprocate the drive member 252 and rock the lip moving member 410 about its pivots 412 imparting rotation to gear 190 and moving lower lip 442, respectively.

Rotation of the gear 190 imparts rotation to the crank pins 220 and 222 through associated gears 172 and 194, respectively, giving each of them a predetermined, different output motion which is combined by the member 40 into a single output motion. This output motion is intermittent because the openings 210 and 214 are of sufficient size that lost motion of the output means 34 and 36 with respect to the member 40 results. The output of the member 40 is transmitted to the eyeball means 30 by the connecting means 38 for simulating realistic, random, eye-sweeping movements 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 366 in the turntable 318 may be asymmetrical in shape, as shown in said application Ser. No. 505,895, so that the plate 362 and the filament 280 reciprocate on an irregular cycle. This adds to the simulation of random eye-sweeping movements and realistic lip movements.

While the particular apparatus for animating figure toys herein shown and described in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiment 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 claim.

What is claimed is:

1. In an animated figure toy having pivotally movable eyes and movable lip means: sound reproducing means including a rotary member defining an asymmetrical cam; reciprocable means engaging said cam to be reciprocated thereby; means connecting said reciprocable means to said movable lip means for moving the same simultaneously with operation of said sound reproducing means; means for pivotally moving said eyes and including a rotary input member; means connecting said reciprocable means to said input member to convert reciprocation to unidirectional rotation of said input member; said means for pivotally moving said eyes including motion-modifying means drivingly connected between said input member and said eyes, whereby pivotal movements of said eyes are non-synchronous with movements of said lip means.

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