United States Patent

Gardel et al.

[15] **3,660,931**

[45] **May 9, 1972**

[54] SIDE-STEPPING DOLL

[72] Inventors: **Robert Gardel**, New York, N.Y.; **Egon Gorsky**, Westfield, N.J.

[73] Assignee: **Mattel, Inc.**, Hawthorne, Calif.

[22] Filed: **Sept. 22, 1970**

[21] Appl. No.: **74,346**

[52] **U.S. Cl.** **46/120**, 46/150, 46/247

[51] **Int. Cl.** **A63h 11/00**

[58] **Field of Search**.....46/149, 150, 136, 247, 120

[56] **References Cited**

UNITED STATES PATENTS

3,243,916	4/1966	Ryan	46/150
3,421,258	1/1969	Gardel et al.	46/150 X
3,445,960	5/1969	Ryan	46/247

FOREIGN PATENTS OR APPLICATIONS

461,453	10/1913	France	46/150

Primary Examiner—F. Barry Shay

Attorney—Seymour A. Scholnick

[57] **ABSTRACT**

A doll having animated torso, leg, arm and head movement. The torso follows a side to side pivoting movement, with the center of the pivoting taking place at the bottom of the torso. The arms move in unison from side to side. The head oscillates back and forth along with the movement of the torso and arms. The legs propel the doll from side to side, first moving a predetermined number of steps to one side, then reversing the direction and moving the same number of steps to the other side.

17 Claims, 9 Drawing Figures

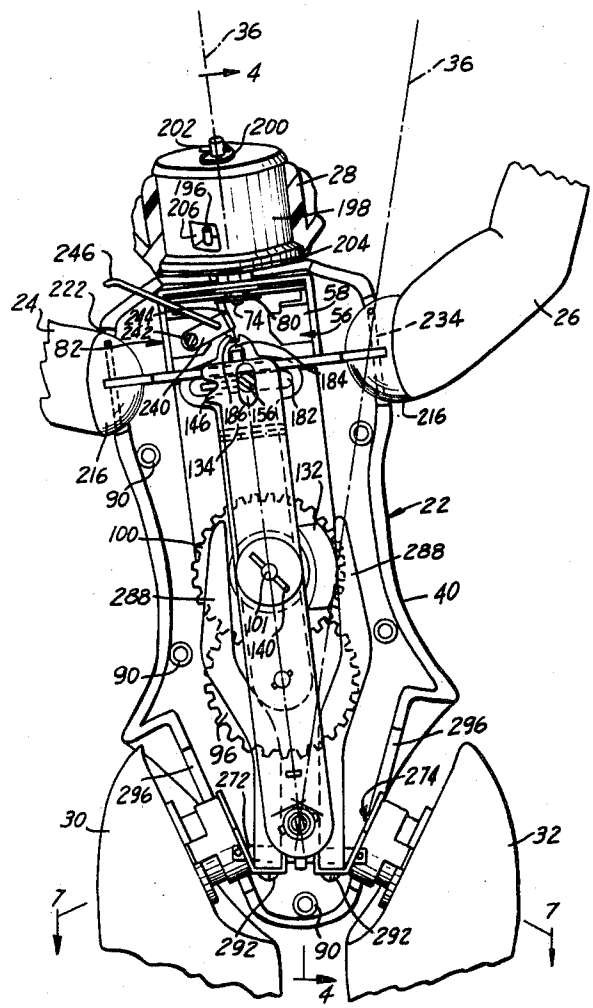


FIG. 1

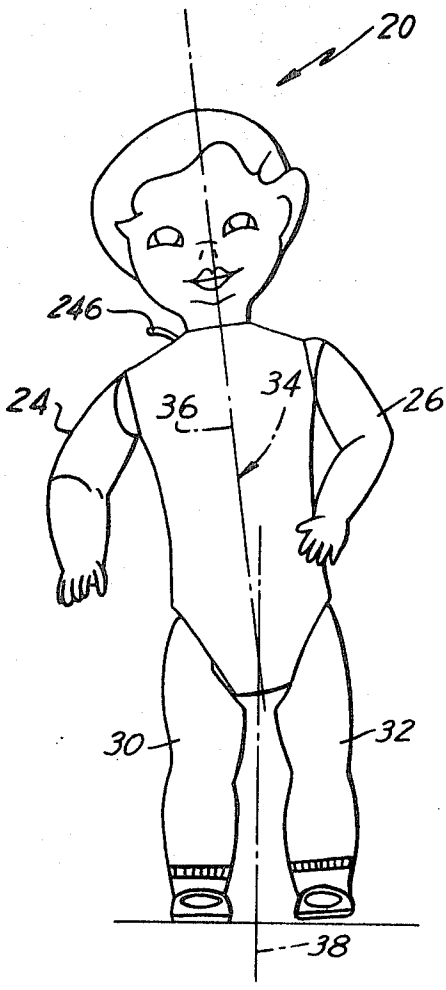
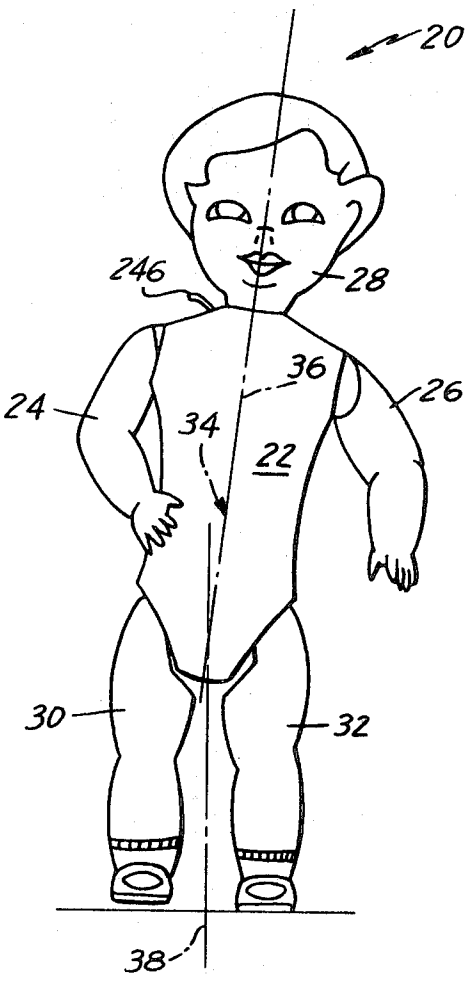


FIG. 2



INVENTORS
ROBERT GARDEL
EGON GORSKY
BY
Mark E. Shirk
ATTORNEYS.

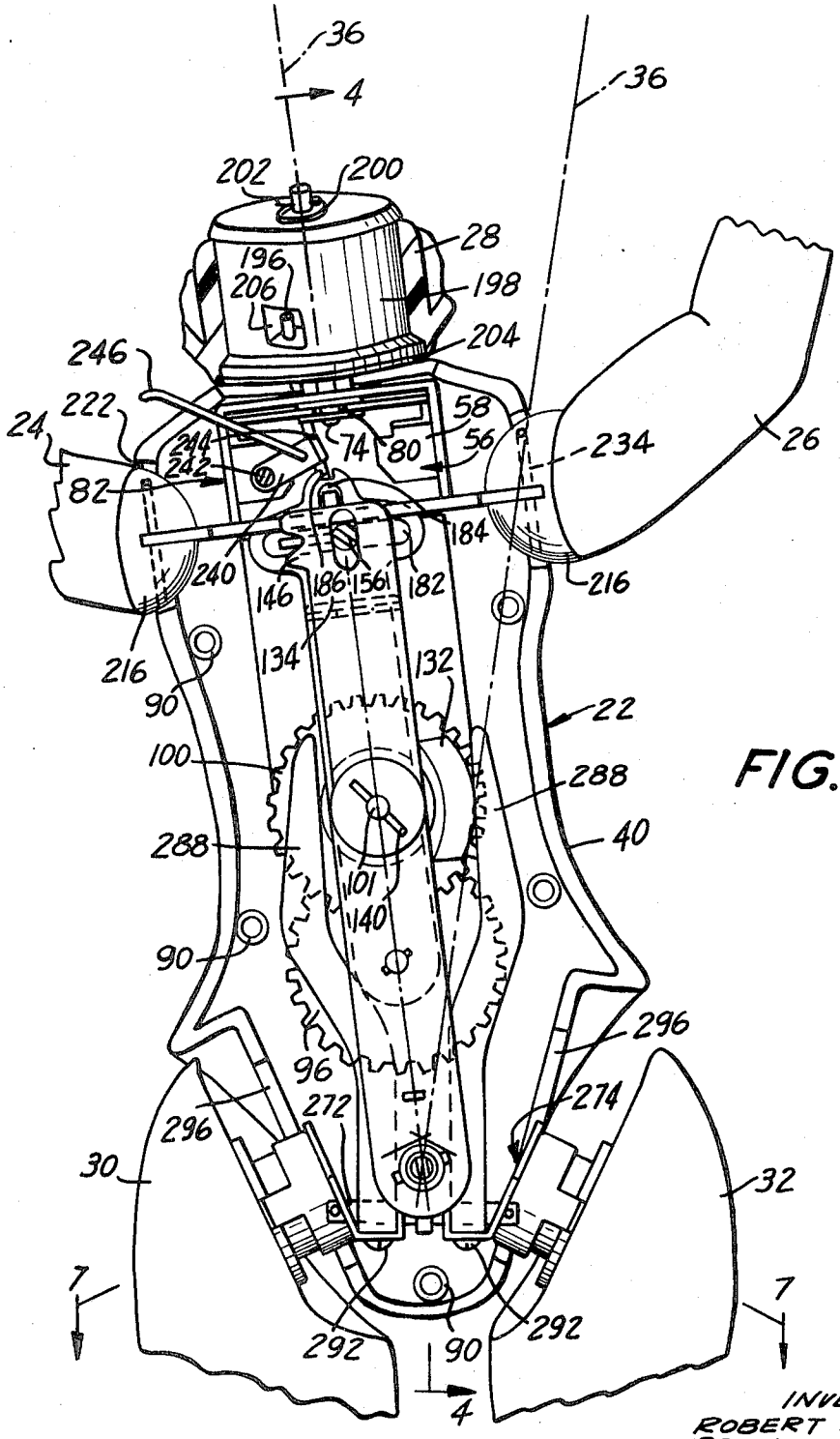


FIG. 3

INVENTORS
ROBERT GARDEL
EGON GORSKY
BY
Mark E. Steinle
ATTORNEYS.

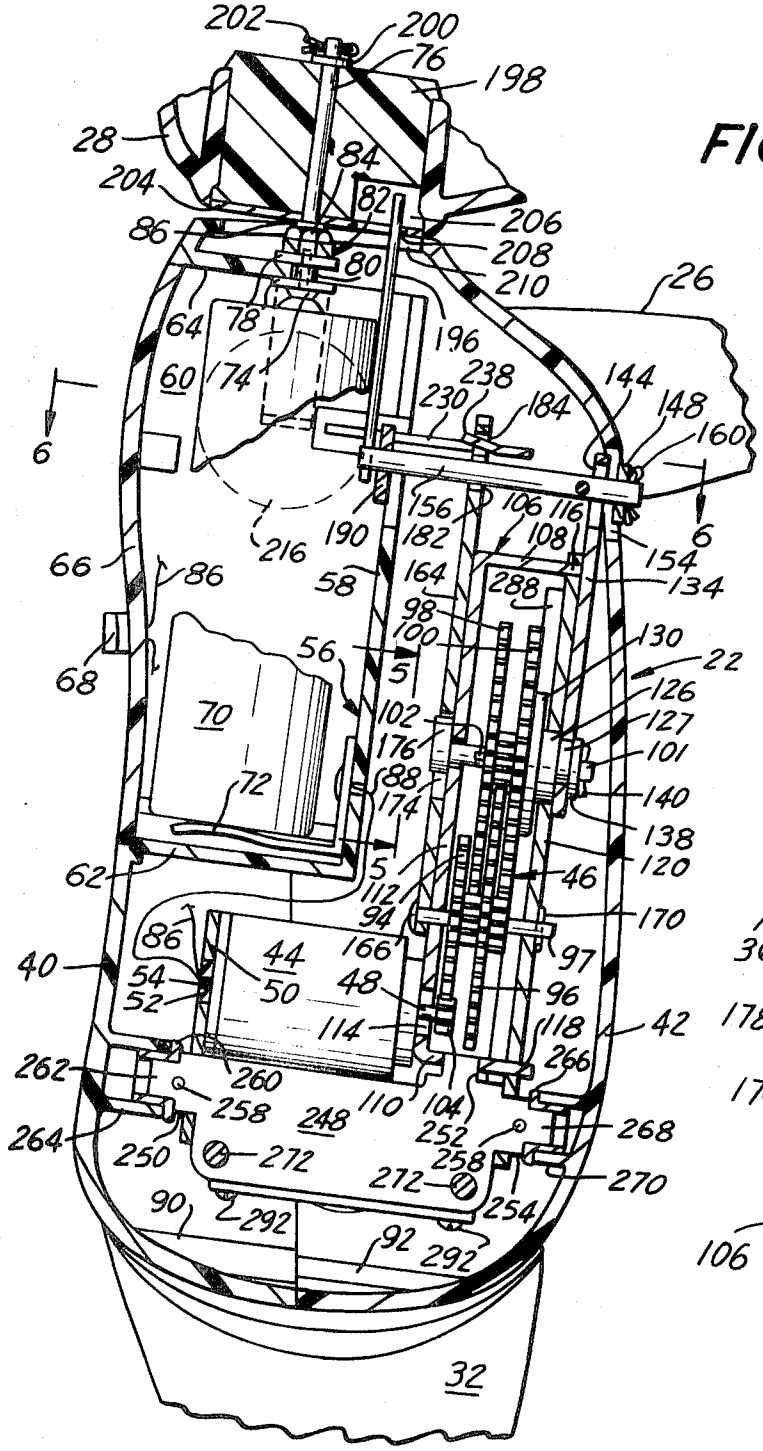


FIG. 4

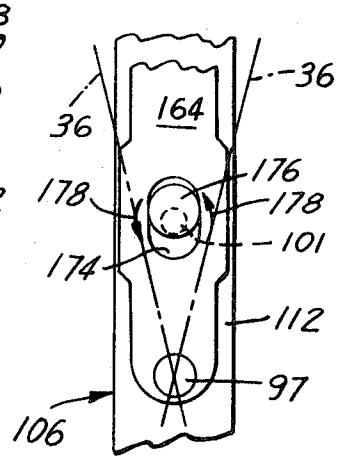


FIG. 5

INVENTORS
ROBERT GARDEL
EGON GORSKY
BY
Mat E. Slinde
ATTORNEYS.

FIG. 6

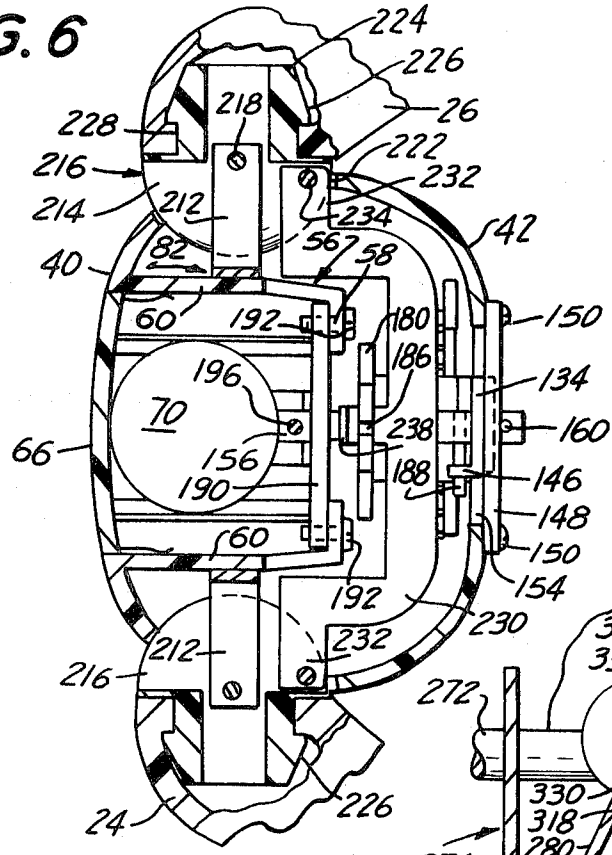
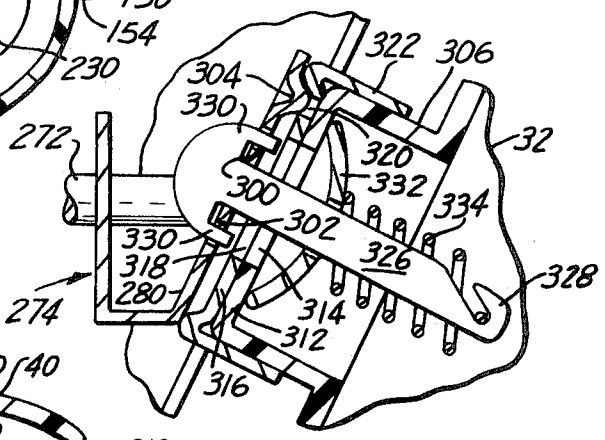


FIG. 8



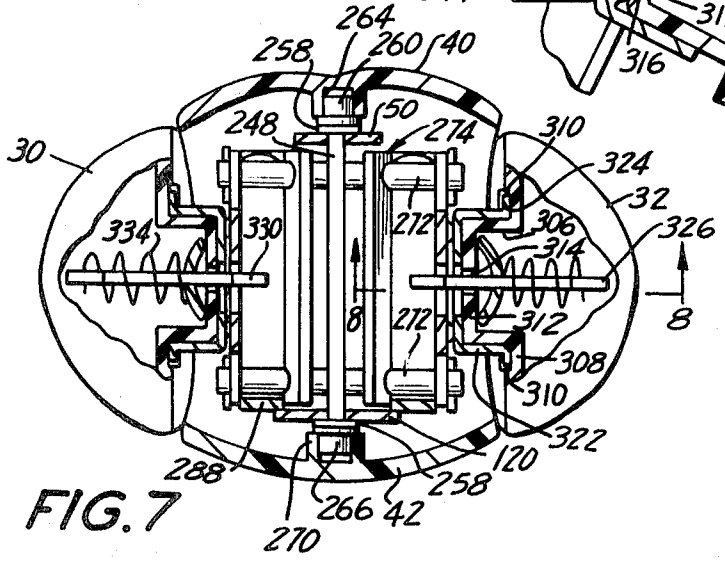


FIG. 7

INVENTORS
ROBERT GARDEL
EGON GORSKY
BY
Mark E. Shirk
ATTORNEYS.

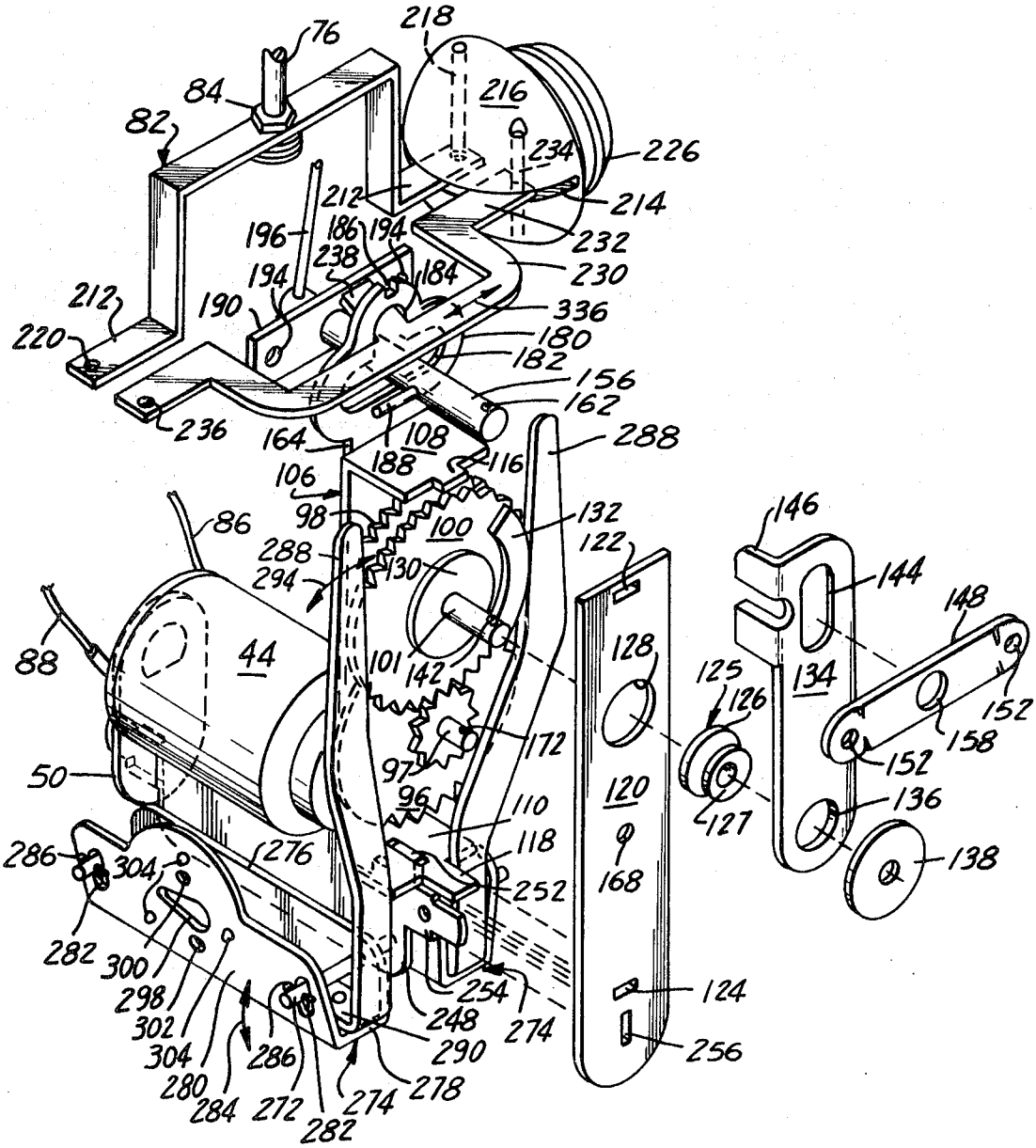


FIG. 9

INVENTORS
ROBERT GARDEL
EGON GORSKY
BY
Mark E. Steinle
ATTORNEYS.

SIDE-STEPPING DOLL

This invention relates to an animated doll, and more particularly, to an animated doll that accomplishes a side-stepping movement.

There are various types of animated dolls available which can accomplish varying actions. Among the actions accomplishable by the prior art dolls is a walking action. Thus, these dolls are capable of moving forwardly when they are actuated through some power source, such as a battery powered motor.

One of the features of the doll of this invention is that it possesses a side-stepping motion. Additionally, the doll not only walks sideways, but it does so in two directions. That is, at the end of a predetermined number of steps in one direction, the doll starts to walk sideways in the opposite direction.

While the doll is undergoing its side stepping motion, it also undergoes a number of other animated movements. Thus, the arms, torso and head also move at the same time that the doll is walking to the side.

One of the purposes of the doll of this invention is to simulate the side-stepping action of a dancing doll. While doing so, the torso reciprocates from side to side, the arms move in a side to side swaying or swinging motion and the head turns about the torso, first turning in a clockwise direction and then turning in a counterclockwise direction.

Another function of the doll is to simulate the side-stepping action of a baby holding onto the rail of a crib or playpen. When carrying out this function, a locking mechanism is provided to prevent the arms from reciprocating. Thus, the arms are held in a forward position, such as the position that would be used by a baby in holding onto the rail of a crib. Accordingly, the baby will give the motion of walking from side to side in a playpen or crib when the arms are locked in their forward position.

It is accordingly an object of this invention to provide a new and improved animated doll.

It is another object of this invention to provide a new and improved animated doll having a side-stepping motion.

These and other objects of this invention are accomplished by providing an animated doll comprising a torso, a pair of arms, a head, a pair of legs vertically depending from said torso, with at least one of said legs being pivotally mounted in said torso, said one of said legs being adapted to pivot in a plane parallel to the transverse axis through said torso, and drive means within said torso, said drive means having means associated therewith for reciprocating said torso from side to side, with the other of said legs being lifted when the upper portion of said torso is reciprocated to the side away from said other of said legs, and said pivotally mounted leg being moved in the direction of said lifted leg when it is lifted.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a front elevational view of a doll embodying the present invention, as shown in the position wherein the doll is moving to its left;

FIG. 2 is a front elevational view of the doll of this invention, as shown in the position wherein the doll is moving to its right;

FIG. 3 is an enlarged fragmentary front elevational view of the doll of this invention, with the forward portions of the torso shell removed, and portions shown in vertical section for purposes of clarity;

FIG. 4 is a sectional view taken along the line 4—4 of FIG. 3;

FIG. 5 is an elevational view taken in the direction of line 5—5 of FIG. 4;

FIG. 6 is a sectional view taken along the line 6—6 of FIG. 4;

FIG. 7 is a sectional view taken along the line 7—7 of FIG. 3;

FIG. 8 is an enlarged sectional view taken along the line 8—8 of FIG. 7; and

FIG. 9 is an exploded perspective view showing the drive mechanism of the doll of this invention.

Referring now in greater detail to the various figures of the drawings wherein like reference characters refer to like parts, a doll embodying the present invention is generally shown at 20 in FIGS. 1 and 2. Doll 20 basically comprises a torso 22, a pair of arms 24 and 26, a head 28 and a pair of legs 30 and 32.

The median line of the body of the doll is illustrated in phantom at 34 in FIGS. 1 and 2. Median line 34 includes an upper portion 36 and a lower portion 38. The upper portion 36 of the median line moves from the extreme position on the doll's right shown in FIG. 1 to the extreme position on the doll's left shown in FIG. 2 during the movement of the doll. The pivoting point of the upper portion 36 is about the base of torso 22. When the doll is stepping to the left, as viewed in FIG. 1, the upper portion of the axis 36, along with the portions of the doll above the base of the torso, oscillates from the position shown in FIG. 1 to a substantially vertical, but slightly inclined to the doll's left, position. When the doll is side stepping to its right, the upper portion 36 of the line 34 oscillates from the position shown in FIG. 2 to a substantially vertical, but slightly inclined to the doll's right, position.

So long as the doll is operating, there is a continual oscillation of the axis of the doll. Accordingly, if the doll should take six steps to the left, the upper portion 36 of the axis will pivot or oscillate between the position shown in FIG. 1 and the vertical six times. Likewise, if the doll should then take six steps to the right there will again be six oscillations of the upper portion of the axis. During this oscillating movement, the lower portion 38 of the axis will remain substantially vertical. All of the oscillation of the upper portion of the doll is in a plane that is parallel to the transverse axis through the doll. Accordingly, the torso 22 will rock from side to side during the movement of the doll.

It is apparent from FIGS. 1 and 2 that the legs 30 and 32 vertically depend from the torso 22. Additionally, the legs are pivotally mounted with respect thereto. Accordingly, when the center of gravity of the doll is disposed over one leg, the other leg is lifted. When the torso oscillates back to a substantially vertical position, the lifted leg is replaced on the ground, and the other leg, which is freely pivotable with respect to the torso, slides toward the previously lifted leg. When the torso is again oscillated or pivoted so that its center of gravity is over the freely pivotable leg, the first leg will again be lifted, and placed back on the table or other supporting surface at a position which is farther away from the position where the leg previously stood. Accordingly, the side-stepping movement of the doll is basically accomplished through a lifting and replacing action of one leg and a dragging or sliding action of the other leg.

It should also be noted that as the legs 30 and 32 are moving through their side-stepping action, the arms 24 and 26 swing in unison. The two extreme positions for the swinging movement of the arms are shown in FIGS. 1 and 2. Also, at the same time the arms, torso and legs are moving, the head 28 will turn from side to side. The combined movements of the head, arms, torso and legs gives the doll the appearance of a dancer.

A locking device is provided to maintain the arms 24 and 26 in a set position. With the arms so set, only the legs, torso and head will move. Accordingly, when the doll goes through its side-stepping movement, it will give the appearance of a baby walking from side to side while holding onto the rail of a crib or playpen.

The construction of the doll 20 is best seen in connection with FIGS. 3 to 9. As seen in FIGS. 3 and 4, the torso 22 comprises a rear shell 40 and a forward shell 42, which are preferably made of molded plastic. The torso forms a housing for a drive means comprised of motor 44, a gear train 46 and drive shaft 48. The motor 44 preferably comprises a D.C. motor. The motor is supported at its rear end by a plate 50 that is mounted in the rear shell 40. A bushing 52 is secured in a hole in the plate, and the rear end 54 of the motor shaft is journalled in the bushing.

As best seen in FIGS. 4 and 6, the rear shell 40 includes an inwardly extending compartment 56. Compartment 56 includes a forward wall 58, a pair of vertically extending side walls 60, a bottom wall 62 and a short top wall 64. The rear of compartment 56 is covered by a removable panel 66 that is suitably secured in place. Panel 66 includes an "on-off" switch 68 which is mounted thereon, and which includes a manually movable member on the outside surface to selectively enable energization of motor 44.

As seen in FIG. 4, a dry cell battery 70 is mounted within compartment 56. The battery is releasably secured between a first terminal 72 and a second terminal 74. Terminal 72 is comprised of a flexible or resilient contact of conductive metal, and is secured on front wall 58 of compartment 56. Terminal 72 engages a first terminal of dry cell battery 70.

Terminal 74 comprises the head of a screw that is threadedly received within a shaft 76. A pair of washers 78 are telescoped over shaft 76, and are positioned on opposite sides of a slot 80 formed in wall 64 of compartment 56. A U-shaped bracket 82 (FIG. 3) has a central hole formed in the bridging section thereof, and shaft 76 passes through this central hole. A nut 84 is threadedly secured on shaft 76, and thereby mounts the shaft against upper wall 64.

Panel 66 is removable in order to permit the insertion of battery 70. A pair of conductor leads 86 and 88 are connected to the terminals 72 and 74, and are connected via switch 66 to the input leads of motor 44. As seen in FIG. 4, lead 86 is connected to terminal 74 by a split collar that is telescoped over shaft 76.

The rear torso shell includes a plurality of sockets 90 which are formed integrally with the shell and which extend horizontally. A plurality of pins 92 (one shown in FIG. 4) are integrally formed with the front torso shell 42 and extend horizontally. A pin 92 is provided for each socket 90. The pins 92 are aligned with sockets 90 so that the pins can be pressed fit into the sockets to secure the front torso shell to the rear torso shell.

As seen in FIG. 4, gear train 46 includes gears 94 and 96 that are rotatably mounted on shaft 97, and gears 98 and 100 that are mounted on shaft 101. Gear 98 is keyed to shaft 101, as shown at 102, and gear 100 is rotatably mounted on shaft 101. A gear 104 is keyed to the shaft 48 of motor 44 and is enmeshed with gear 94. As is apparent from FIG. 4, gear train 46 serves to reduce this speed of output shaft 48 of motor 44.

A U-shaped bracket 106 is positioned in forward torso shell 42. Bracket 106 includes an upper leg 108, a lower leg 110 and a substantially vertically extending leg 112. An opening 114 is formed in leg 112 through which motor shaft 48 passes. As seen in FIG. 9, upper leg 108 includes a forwardly projecting tab 116 and lower leg 110 includes a forwardly projecting tab 118.

As seen in FIGS. 4 and 9, a vertically extending bar 120 is mounted on U-shaped bracket 106 by inserting tab 116 in slot 122 of bar 120 and by inserting tab 118 in slot 124 of bar 120. A cam 125, comprising discs 126 and 127, which are unitary, is telescoped over shaft 101 and is freely rotatable in hole 128 of bar 120. Disc 127 is eccentrically mounted with respect to disc 126 and shaft 101 (FIG. 4). Cam 125 is secured to disc 130, which is in turn secured on the face of gear 100, and accordingly is rotated along with gear 100. A segment of a ring 132 is also mounted on the face of gear 100 adjacent the gear teeth thereof. Segment 132 and disc 130 lie in the same plane. As will be explained hereinafter, segment 132 serves as a cam when the gear 100 is rotated.

As seen in FIGS. 4 and 9, a plate 134 is rotatably mounted on disc 127 by the insertion of the disc into hole 136 in the plate. Plate 134 is secured in place by a washer 138 that passes over shaft 101, and by a pin 140 (FIG. 4) that passes through a hole 142 in shaft 101. Plate 134 also includes a vertically extending slot 144 adjacent the top thereof. A slotted flange 146 projects inwardly from the top of plate 134.

As seen in FIGS. 6 and 9, a bar 148 is mounted on outer torso shell 42 by a pair of screws 150 that pass through holes 152 (FIG. 9) in the bar. Bar 148 bridges an opening 154 in the forward torso shell. A shaft 156 passes through slot 144 in plate 134 and central opening 158 (FIG. 9) of bar 148. As seen in FIG. 4, one end of shaft 156 is secured in place by a cotter pin 160 that passes through a hole 162 (FIG. 9) adjacent the end of the shaft.

As seen in FIG. 4, a plate 164 is mounted against U-shaped bracket 106 by the head 166 of shaft 97. As further seen in FIG. 4, shaft 97 passes through U-shaped bracket 106 and hole 168 (FIG. 9) of plate 120. The shaft is fixedly secured in place by pin 170 which passes through hole 172 in shaft 97 (FIG. 9). It is thus seen in FIG. 4 that shaft 97 is rigidly fixed in place and gears 94 and 96 are freely rotatable thereon.

As seen in FIGS. 4 and 5, plate 164 includes a vertically extending slot 174 therein. A disc 176 is eccentrically mounted on shaft 101 (FIG. 5) and is positioned in slot 174. As seen in FIG. 4, shaft 101 passes through a hole in leg 112 of U-shaped bracket 106. Accordingly, when gear 98, which is keyed to shaft 101, is rotated, the shaft will be rotated therewith. Since disc 176 is eccentrically mounted on the shaft, the rotation of the shaft will cause plate 164 to pivot around shaft 97 by the contacting of the disc 176 with the walls of slot 174. The rotational movement of the disc is shown by arrows 178 in FIG. 5. The extreme positions for the central axis of plate 164 are shown in phantom at 36 in FIG. 5. Lines 36 correspond to the two extremes for the axis of the torso, as shown in FIGS. 1 and 2.

Plate 164 includes an elongated, integral top section 180 (FIG. 9). A lateral slot 182 is formed in section 180, and a second slot 184, in communication with slot 182, projects perpendicularly upward from slot 182. A notch 186 is formed in the upper edge of top section 180.

As seen in FIG. 4, shaft 156 passes through slot 182. A pin 188 is secured in shaft 156, and is received in the slot in flange 146 of plate 134 (FIGS. 6 and 9). Shaft 156 also passes through a central opening in bar 190 (FIG. 6 and 9). Bar 190 is secured on forward wall 58 of compartment 56 by screws 192 (FIG. 6) passing through holes 194 in the bar. As seen in FIGS. 4 and 9, a shaft 196 is secured in shaft 156 and projects vertically upward therefrom.

A cylindrical block 198 (FIG. 4) is freely rotatably mounted on shaft 76. The block is held in place on the shaft by washer 200 and cotter pin 202. Block 198, which is formed of rigid plastic, is mounted on, and secured to, circular metal plate 204. Block 198 includes a cavity 206 therein that is aligned with a hole 208 in plate 204. Shaft 196 passes through hole 208 and is received in cavity 206. Head and neck member 28 (FIGS. 1 and 2) is formed from a resilient soft plastic and is frictionally held on block 198. The head member is positioned over neck opening 210 in torso 22.

As seen in FIG. 9, a U-shaped bracket 82 includes a pair of flanges 212. Each flange 212 is received within a horizontal slot 214 in a hemi-spherical shoulder member 216. Each shoulder member is pivotally secured to its associated flange 212 by a pin 218 that is vertically positioned within the shoulder member and passes through a hole 220 in the flange. As seen in FIGS. 3 and 6, shoulder members 216 are received in openings 222 in torso 22.

Shoulder members 216 include cylindrical extensions 224 (FIG. 6). Each extension 224 includes a tapered annular flange 226. As seen in FIG. 6, arm members 24 and 26 each are hollow, and are comprised of a resilient plastic. Each arm member includes an annular lip 228 at the top thereof (FIG. 6). Arm members 24 and 26 are secured on cylindrical extensions 224 by snapping the lips 228 over the annular flanges 226 so that the lips are received in the groove between the inner edge of the flanges and the hemi-spherical shoulder members 226. The arm members are frictionally secured in these grooves, and can be hand moved to enable a change in the disposition of the arms by rotating them in their respective grooves.

As seen in FIG. 9, a second U-shaped member 230 is provided. U-shaped member 230 lies in a plane which is perpen-

dicular to the plane of U-shaped member 82. U-shaped member 230 also includes a pair of flanges 232 which are received in slots 214 of shoulder members 216. Flanges 232 are pivotally secured to shoulder members 216 by pins 234 that pass through holes 236 in flanges 232. Member 230 includes a flange 238 projecting from the center thereof that is received in slot 184 of the head 180 of plate 164.

A locking means comprising small bar 240 (FIG. 3) is pivotally mounted on the front wall 58 of receptacle 56 by a pin 242. Bar 240 includes a flange 244 projecting perpendicularly therefrom. Flange 244 is selectively engageable in notch 186 by pivoting the same around pin 242. The bar 240 is pivoted by the movement of arm 246 which projects through an opening in the torso 22 (see also FIGS. 1 and 2).

As seen in FIGS. 4, 7 and 9, a vertically extending plate 248 is positioned beneath motor 44. As seen in FIG. 4, plate 248 includes a first tab 250 that is received in a vertical slot in plate 50, a second tab 252 that is received in a slot in leg 110 of U-shaped bracket 106, and a third tab 254 that is received in a vertical slot 256 (FIG. 9) in plate 120. The securement of the tabs 250, 252 and 254 in their respective slots maintains plate 248 in its set orientation. As seen in FIG. 4, pins 258 lock the plate 248 in place. As seen in FIGS. 4 and 7, a brass bushing 260 is placed over the tip 262 of tab 250. Bushing 260 is received in a cylindrical socket 264 formed on rear torso shell 40. Similarly, a brass bushing 266 is placed over the tip 268 of tab 254. Bushing 266 is received in cylindrical socket 270 formed on the forward torso shell 42.

A pair of circular rods 272 (FIGS. 4 and 7) is horizontally mounted in plate 248. Rods 272 are rigidly maintained in place by a pressed fit within the plate 248. As best seen in FIG. 9, a bracket 274 is mounted on rods 272 on each side of plate 248. Each bracket 274 includes a vertical leg 276, a horizontal leg 278 and an inclined leg 280. As seen in FIG. 9, rods 272 pass through holes in legs 276 that are circular and are slightly larger in diameter than the diameter of rods 272. With respect to legs 280, the rods 272 pass through vertically extending slots 282 which have a height approximately twice as great as the diameter of the rods 272. In this way, brackets 274 are pivotable on rods 272 about axes transverse thereto and in the directions of arrow 284 (FIG. 9). The brackets 274 are secured on the rods 272 by cotter pins 286.

A pair of vertically extending bars 288 (FIG. 9) is provided, with one bar 288 being on each side of shaft 101. Each bar 288 includes a flange 290 (FIG. 9) that is secured to leg 278 of a bracket 274 by a pair of screws 292 (FIG. 4). Thus, the screws 292 hold the bars 288 rigidly in place, and prevent any rotational or transverse movement of the bars. However, when the brackets 274 are moved in the direction of arrows 284, bars 288 will likewise move therewith, as indicated by arrows 294 in FIG. 9.

As best seen in FIG. 3, the lower portion of torso 22 is provided with a pair of leg openings 296 for securement of the leg members 30 and 32 to the torso. The leg members 30 and 32 are both hollow, and are preferably formed of molded plastic. The leg members are secured to legs 280 of brackets 174. For this purpose, each leg 280 includes an elongated opening 298 which extends between a pair of aligned openings 300 and 302 (FIG. 9). Leg 280 also includes three equally spaced beads or projections 304 which are provided around openings 298, 300 and 302. These projections are spaced approximately 120° from each other.

As seen in FIGS. 7 and 8, each leg 30 and 32 includes a dished portion or hub 306. An annular flange 308 extends transversely from dished portion 306. As seen in FIG. 7, a pair of diametrically opposed recesses 310 is provided in each flange 308. The hub 306 includes an integral end wall 312 which extends transversely to the axis of the annular flange, and which includes an opening 314.

An indexing disc 316 is mounted on wall 312 of hub 306. Disc 316 includes a central opening 318 which is aligned with opening 314, and three equally spaced openings 320 which are alignable with projections 304. As seen in FIG. 8, projections 304 are received in openings 320. Disc 316 also includes an annular integral wall 322 that is telescoped over hub 306. Wall 322 includes a pair of L-shaped flanges 324 (FIG. 7) that is received in recesses 310.

A locking member 326 is provided for each leg 30 and 32. L-shaped member 326 is an elongated bar and has a hook 328 at one end and a pair of L-shaped projections at the other end. A washer 332 is telescoped over locking member 326, and bears against the inside of wall 312. A compression spring 334 is telescoped over locking member 326, has one end bearing against washer 322 and the other end received in hook 328. A suitable opening can be provided in legs 30 and 32 for the insertion of the washer 332 and spring 334.

Each leg 30 and 32 is mounted on wall 280 of bracket 274 by inserting the locking member 326 through the elongated opening 298. After the locking member has been so inserted, pressure is brought against spring 334 and the locking member is rotated 90°. This brings the L-shaped projections 330 into alignment with openings 300 and 302. When pressure against the spring is released, the ends of the projections enter openings 300 and 302, thereby locking the locking member in place, as shown in FIG. 8. This, in turn, secures the legs 30 and 32 onto the torso 22.

The securement of the legs to the torso is carried out through a structure that is substantially the same as the structure disclosed in our co-pending application Ser. No. 866,953, filed Oct. 16, 1969. The spring 334 holds the legs securely against bracket 274, with the projections 304 received in openings 320. With the legs thus engaged, they will remain in the vertical position shown in FIGS. 1 and 2. When in this position, they will enable the doll to go through its side stepping motion, as will be explained hereinafter. However, if it is desired to place the doll in a sitting position, it is necessary only to rotate the legs forward so that the projections 304 are dislodged from their associated openings 320, and aligned with the openings spaced 120° from the standing position. This will lock the upper torso of the doll in a slightly forward leaning position relative to the legs, and the doll will therefore be supported in a balanced seated position. When it is desired to render the doll operational for its side stepping motion, the legs are then rotated 120° in the opposite direction to return them to the vertical position.

In order to operate the doll, the "on-off" switch 68 is placed in the "on" position thereby making a closed circuit between the battery 70 and the electric motor 44. As the electric motor begins to operate, the motor shaft 48 causes gear 104 to rotate, which in turn drives the gear 94. Gear 94 will in turn drive gear 98 which is keyed to shaft 101. This will cause shaft 101 to rotate along with disc 176. At the same time, gear 98 will rotate gear 96 which in turn rotates gear 100. Gear 100 is freely rotatable on shaft 101, and will accordingly rotate relative thereto. The rotation of gear 100 will also cause the rotation of disc 130 (FIG. 9) and cam segment 132, both of which are adhesively secured to the face of gear 100.

Referring to FIG. 9, it is seen that the rotation of gear 100 will alternately bring cam segment 132 into contact with each of the bars 288. In FIG. 9, the segment 132 is shown in contact with the righthand bar 288. With the segment 132 thus contacting the bar 288, the bar 288 is held rigidly in the position shown in FIG. 9. In this connection, it should be recalled that the bars 288 are rigidly secured to brackets 274, which brackets are in turn pivotable on rods 272 in the direction of arrows 284. This in turn permits the reciprocation of the bars 288 in the directions of arrows 294. The contacting of a bar 288 by cam segment 132 rigidly holds the bar in its outermost position relative to shaft 101.

As best seen in FIGS. 7 and 8, the legs 30 and 32 are secured to brackets 274 through the use of locking members 326. Accordingly, when one of the brackets 274 is held rigidly in place by the engagement of cam segment 132 against a bar 288, the leg associated with the bar 288 will also be held rigidly in place. This condition is shown for leg 32 in FIG. 3. At the same time, the other leg 30 is pivotable on rods 272,

since there is no member retaining the leg in place. Accordingly, again referring to FIG. 9, it is seen that the rotation or pivoting of leg **30** is from an innermost position which is determined by the engagement of the top of rods **272** against the top of slots **282** to an outermost position which is limited by the engagement of the lefthand rod **288** (FIG. 9) against the circumference of disc **130**. The continued rotation of gear **100** alternately brings the cam segment **132** into engagement with the two bars **288**, thereby shifting the locking of the legs from leg **32** to leg **30** and back again to leg **32**. One of the legs **30** and **32** must be locked in place in order to obtain the side-stepping movement of the doll.

Referring again to FIG. **4**, it is seen that gear **98** is keyed to shaft **101** by keying member **102**. The gears are proportioned in such a way that gear **98** and its associated shaft **101** will make approximately 16 revolutions for each revolution of gear **100**. Disc **176** (FIGS. **4** and **5**) is eccentrically keyed to shaft **101**. As the shaft **101** rotates, the disc **176** will rotate in slot **174** of plate **164**, as indicated by arrows **178** in FIG. **5**. Since the disc **176** is eccentrically mounted on the shaft **101**, the rotation of the disc in slot **174** will reciprocate plate **164** around shaft **97**, with the limits of the reciprocation of the plate being indicated by the axis lines **36**.

Through the use of the gear train **46**, the shaft **101** is rotated at a high rate of speed relative to the movement of the other parts of the doll. Accordingly, the plate **164** will be reciprocated at a relatively high rate of speed. It should be noted that the plate **164** will not interfere with the movement of shaft **156**, since the shaft is freely movable within slot **182** of the head **180** of plate **164** (see FIG. **9**). The rapid movement of the plate **164** in one direction and then the other will in turn cause a reaction of pulling the gear train **46**, and all other elements connected thereto, in the direction of the plate. Thus, since there is a substantial amount of weight of the plate above the pivot pin **97**, and since the plate is rapidly forced to one side and then the other, the movement of the plate will pull the shaft **101** in the direction that the plate is moving. This will in turn move the gear train **46** and the bracket **106** in which the gear train is supported in the same direction as the plate **164**. Likewise, all other elements which are supported on plate **248** will be rotated in the same direction as plate **164**. To aid in this rotation, tabs **262** and **268** (FIG. **4**) of plate **248** are freely rotatable in bushings **260** and **266**. Accordingly, as the plate **164** is reciprocated from side to side by the disc **176**, all of the elements supported on plate **248**, such as the brackets, gear train and motor **44**, will be reciprocated along therewith by the force of the plate pulling against the disc **176** during the rapid reciprocation of the plate.

The reciprocation of all of the elements supported on plate **248** by the reciprocation of plate **164** will in turn shift the bulk of the weight of the doll side to side. Accordingly, the torso shell **22** will reciprocate with the reciprocation of the other elements. The limits of the reciprocation of these elements is best seen through axis lines **36** in FIG. **3**. The reciprocation of these elements will thus shift the center of gravity of the torso, and of the doll, from being over one leg to being over the other, as shown in FIGS. **1** and **2**. The movement of the weight from being over one leg to being over the other leg will in turn cause the side-stepping action of the doll.

Referring again to FIG. **3**, it is seen that leg **32** is held rigidly in place by the abutment of bar **288** associated with leg **32** against cam segment **132**. Accordingly, when the weight of the doll is shifted to the left, as viewed in FIG. **3**, the weight will be placed entirely over leg **30**, and leg **32** will be lifted off the supporting surface, as shown in FIG. **1**. The continued reciprocation of plate **164** will reciprocate the torso **22** toward the righthand axis line **36**. This will place the weight of the doll over the leg **32**, thereby returning leg **32** to the supporting surface.

When the weight of the doll is over leg **32**, leg **30** is free to pivot around rods **272**. Thus, the bar **288** shown in abutment with disc **130** in FIG. **3** will reciprocate downwardly to the position shown in FIG. **9** under the urging of the weight of leg **30**, since there is no weight on this leg. The leg **30** will therefore slide along the supporting surface as the bar **288** associated therewith is pivoted downwardly. This action brings the leg **30** into close proximity to leg **32**, since both legs are at the lowermost position of their reciprocation around their associated rods **272**.

When the weight of the doll is again shifted to being placed over leg **30**, the leg **32** will again be raised. When the weight is shifted over leg **32**, it will be placed on the supporting surface a distance slightly to the right of the position where it was placed during the previous reciprocation of plate **164**. This is because of the fact that on each reciprocation of the doll the freely pivotable leg, which is leg **30** when the cam segment **132** is in the position shown in FIG. **3**, will be dragged toward the rigid leg **32** each time the weight is shifted to the rigid leg. Accordingly, the action is one of lifting rigid leg, replacing the rigid leg on the supporting surface by the shifting of the weigh over the rigid leg, and the dragging or sliding of the pivoted leg each time the weight is shifted over the rigid leg. On each cycle, the sliding leg is first moved toward the rigid leg, and then the rigid leg is lifted and placed a greater distance away from the slid leg.

As pointed out above, shaft **101** makes approximately 16 revolutions for each revolution of gear **100** and its associated cam segment **132**. Accordingly, cam segment **132** will be in contact with each bar **288** for approximately five or six revolutions of shaft **101**. Therefore, the doll will make approximately five or six steps in one direction before reversing direction. After cam segment **132**, as seen in FIG. **3**, has been rotated out of contact with bar **288**, the segment will be between the two bars. At this time, the segment will be placing pressure against both bars **288**, and neither leg will be freely pivotally secured. At this time, the torso **22** will reciprocatd from side to side, with each leg **30** and **32** being alternately lifted. However, the doll will not move in either side direction since neither leg will be freely slidable relative to the other.

Again referring to FIG. **3**, when the cam segment **132** has been rotated into contact with the lefthand bar **288**, as viewed in FIG. **3**, leg **30** will then be rigidly held in place. The continued transverse reciprocation of the torso **22** will alternately shift the weight from leg **30** to leg **32**. However, when the leg **30** is rigid, it will be lifted off the supporting surface when the weight of the doll is over the leg **32**, as seen in FIG. **2**. When the leg **30** is replaced on the supporting surface by the shifting of the weight of the doll over leg **30**, leg **32** will slide toward leg **30**. When the weight of the doll is again shifted over leg **32**, leg **30** will be lifted and will be replaced on the supporting surface a distance farther to the right of the doll. When the cam segment has rotated out of contact with the bar **288** associated with leg **30**, the torso will again reciprocate from side to side, with both legs being lifted, but without the doll's making any side movement. When the cam segment **132** is again rotated into the righthand bar **288**, as viewed in FIG. **3**, the doll will again go through its side stepping movement to its left, as seen in FIG. **1**.

It is thus seen that the movement of the doll of this invention is a first movement to one side for a predetermined number of steps, a halting of the side stepping movement wherein the torso of the doll will reciprocate and the legs of the doll will alternately be raised, a side stepping movement for a predetermined number of steps in the opposite direction and finally a halting of the side stepping movement where again the torso of the doll will reciprocate and the legs will be alternately raised. At the same time that the doll is undergoing its side-stepping movements, the arms **24** and **26** will sway from side to side and the head **28** will turn from side to side. The extreme positions for the swaying of the arms are shown in FIGS. **1** and **2**.

The swaying movement of the arms **24** and **26** is also controlled by the reciprocation of plate **164**. As seen in FIG. **9**, flange **238** of U-shaped member **230** is received in a slot **184** of the head **180** of plate **164**. Accordingly, as the plate **164** is reciprocated back and forth to the extreme positions indicated

in phantom at 36 in FIG. 5, the flange 238 will be carried along with the plate. This will cause a reciprocation of U-shaped member 230, as indicated by arrows 336 in FIG. 9. The flanges 232 on U-shaped member 230 are pivotally secured to shoulder members 216 by pins 234 (FIGS. 6 and 9). Accordingly, as the U-shaped member 230 is reciprocated in the direction of arrows 336, the shoulder members will be rotated around pins 218 (FIGS. 6 and 9).

It is thus seen that U-shaped member 82 and its associated flanges 212 provides a rigid pivot point for the shoulder members via pins 218. The arms 24 and 26 are rigidly secured on the extensions 224 (FIG. 6) of the shoulder members. Thus, when the shoulder members are rotated around pins 218, the arms will be rotated therewith, thereby causing the swaying of the arms from side to side, as indicated in FIG. 1.

As pointed out above, the arms can be rotated vertically around shoulder extensions 224, in view of the engagement of annular lips 228 of the arms in the grooves formed by flanges 226 (FIG. 6). Accordingly, when it is desired to have the doll give the appearance of a dancer, the arms 24 and 26 can be raised upwardly to the position indicated in FIG. 3. In this way, the arms will swing from side to side with the hands above the head during the side stepping movement. Alternatively, the arms can be lowered to the position shown in FIGS. 1 and 2 to have the doll assume a different pose while going through its side-stepping motion.

If it is desired to have the doll give the appearance of an infant stepping from side to side while holding onto a crib rail or playpen rail, the arms can be fixed at a height substantially the same as that shown in FIGS. 1 and 2, and they can be prevented from swaying from side to side. To accomplish this, arm 246 (FIG. 3) is pushed downwardly to enable the engagement of flange 244 in notch 186. This will lock the top of plate 164 in place, in view of the fact that bar 240 from which flange 244 extends is rigidly secured to the torso shell by pin 242. Accordingly, since the top of plate 164 is rigidly held in place by the engagement of the flange 244 in notch 186, the arms will no longer swing from side to side, and instead will be held rigidly in place.

When the arms are held rigidly in place the mechanism by which the doll will undergo its side stepping motion is varied. Thus, it is seen from FIGS. 3 and 5 that the securement of plate 164 at its top will prevent lateral movement of the upper end of the plate relative to the torso when disc 176 is rotated within slot 174. Instead, as 176 rotates in 174, the engagement of flange 244 in the notch 186 of plate 164 serves to form a pivot point for the plate 164. Accordingly, as best seen in FIG. 5, when the disc 176 is rotated to the left in slot 174, the bottom of the plate 164 will also be forced to the left, while pivoting around the flange 144. This will physically swing shaft 97 to the left and thus swing bracket 106 to the left, thereby shifting the weight of the doll to the left. Continued rotation of disc 176 will cause a countermovement of the plate to the right, thereby forcing the weight of the doll to the right. Accordingly, when the arms are held rigidly in place, the shifting of the weight of the doll is carried out by the movement of shaft 97. Here again, the plate 248 will still be moved by rotating the same within bushings 260 and 266.

With the arms locked in place, the side stepping action of the doll is exactly the same as that described above. However, the mechanism for shifting the weight varies in that no longer will the force of the plate 164 shifting around shaft 97 cause the movement, but now, the movement takes place by physically shifting the shaft 97 from side to side through the movement of the base of plate 164.

The head and neck member 28 is reciprocated from side to side through the movement of cam 125 (FIG. 9). It will be recalled that disc 126 of cam member 125 is adhesively secured on the front face of disc 130, and disc 127 of the cam member is eccentrically mounted on disc 126 and shaft 101. Disc 127 is rotatably mounted in plate 134. Since cam 125 is secured on disc 130, it will rotate therewith, and at the same speed of rotation as gear 100.

The rotation of gear 100 will cause the rotation of disc 127 in plate 134. Since the disc 127 is eccentrically mounted on shaft 101, the movement of the disc relative to the shaft will cause the raising and lowering of plate 134, as is apparent from FIGS. 4 and 9, as the shaft is rotated. As the disc 127 is raised by the rotation of gear 100, the engagement of the disc in hole 136 of plate 134 will in turn raise the plate since the hole 136 has a diameter which is substantially the same as the diameter of the disc. As the plate 134 is raised, the lower arm of slotted flange 146 will contact pin 188, thereby rotating the pin in a clockwise direction, as viewed in FIG. 9. This will in turn cause the clockwise rotation of shaft 156.

The clockwise rotation of shaft 156 will in turn cause the clockwise rotation of shaft 196, as viewed in FIG. 9. Since the shaft 196 is received in cavity 206 (FIG. 4) of the cylindrical block 198 on which the head and neck member 28 is mounted, the rotation of the shaft 196 will cause the counterclockwise rotation of the head and neck member around shaft 76, as viewed in FIG. 4. Thus, the head 28 will be rotated to the left so long as plate 134 is being raised by disc 127.

Continued rotation of gear 100 will cause the lowering of plate 134 as the disc 127 is lowered within hole 136. This will cause the abutment of the upper arm of flange 146 against the pin 188, thereby rotating the pin and the associated shaft 156 in a counterclockwise direction, as viewed in FIG. 9. The rotation of shaft 156 in a counterclockwise direction will in turn cause a rotation of shaft 196 to the left. This will in turn cause the rotation of head member 28 in a clockwise direction around shaft 76 (FIG. 4). In other words, the head will now start rotating toward the right of the doll.

It is thus seen that for each complete revolution of gear 100 the head 28 will go through a complete cycle of first rotating to the right and then to the left. It will reach its extreme right and left positions during each complete revolution of gear 100. It should also be noted that gear 100 is rotating at about 1/16 the rate of speed of gear 98. Thus, the head 28 will make one complete cycle for each side stepping cycle of the doll. At the same time, the torso will reciprocate back and forth approximately 16 times. This gradual turning of the head will simulate the actual movements of an infant.

It is accordingly seen that the doll of this invention will go through a number of different animated movements. The doll can step from side to side and carry out the stepping movement in two directions. The doll will also go through a leg shifting movement at the times it is not moving from side to side. The torso will continue to reciprocate in a plane which is parallel to a transverse axis through the doll, namely, the axis that passes through the arms of the doll. The arms of the doll can be made to sway from side to side as the doll is moving, or can be held in a fixed position. The vertical orientation of the arms can also be changed at will by hand rotating the arms on the shoulder sockets. The head of the doll will turn gradually from side to side as the doll is going through its movements.

The doll of this invention can be constructed from any of the materials known to the art. The torso shell and legs are preferably formed from a rigid, skin colored plastic. The head of the doll is made from a more resilient plastic which has the texture of skin. The discs which serve the cam functions, such as discs 176, 130, 126 and 127 and the cam segment 132 are preferably formed from a plastic having a low coefficient of friction, such as polytetrafluoroethylene or nylon. If desired, the doll can be fitted with a breast plate to cover the bar 148. Alternatively, the plate 148 can be incorporated entirely within the front shell 42, thereby giving the doll the appearance shown in FIGS. 1 and 2.

To facilitate the maintaining of the doll in an upright position at all times, the soles of the doll's shoes are provided with a resilient material, such as a thin web of polyurethane foam or other foam material. This prevents the slipping of the doll when the weight of the doll is changed from one leg to the other.

Without further elaboration the foregoing will so fully illustrate our invention that others may by applying current or fu-

ture knowledge readily adapt the same for use under various conditions of service.

What is claimed as the invention is:

1. An animated doll comprising a torso, a pair of arms, a head, a pair of legs vertically depending from said torso, with at least one of said legs being individually pivotally mounted in said torso, said one of said legs being adapted to pivot in a plane generally parallel to the plane of the legs, and drive means within said torso, said drive means having means associated therewith and connected to said torso for reciprocating said torso and other leg from side to side relative to said one leg, with the other of said legs being lifted when the torso is reciprocated to the side away from said other of said legs, and said pivotally mounted leg being moved relative to said torso and other leg in the direction of said other of said legs when the torso is reciprocated to the side away from said pivotally mounted leg.

2. The animated doll of claim 1 wherein both of said legs are individually pivotally mounted with respect to said torso, with said doll further including means for rigidly securing one of said legs while said other leg is pivotable with respect to said torso, with said rigidly secured leg being lifted when the center of gravity of said torso is placed over the pivotally mounted leg, and said pivotally mounted leg being moved in the direction of said rigidly secured leg when the center of gravity of said torso is over said rigidly secured leg.

3. The animated doll of claim 2 wherein each of said legs is mounted on a bracket that is pivotally mounted to said torso, each of said brackets having a bar projecting vertically upward therefrom, said means for rigidly securing a leg comprising cam means mounted in said torso, said cam means adapted to alternately contact the bar associated with each of said legs, said leg which is rigidly secured being held in its rigid condition by the contacting of said cam means with said bar.

4. The animated doll of claim 3 wherein said cam means is rotatably mounted within said torso, whereby the rotation of said cam means brings the cam means into alternate engagement with said bars.

5. The animated doll of claim 1 wherein the means for reciprocating said torso comprises a plate, said plate having a slot formed therein, said drive means having means associated therewith for reciprocating said plate from side to side, with the reciprocation of said plate acting to move said torso from side to side.

6. The animated doll of claim 5 wherein said means to reciprocate said plate comprises cam means mounted on said drive means and in said slot.

7. The animated doll of claim 6 wherein said cam means comprises a disc, said drive means including a drive shaft, said disc being eccentrically mounted on said drive shaft, whereby the rotation of said drive shaft will rotate said disc in said slot and reciprocate said plate.

8. The animated doll of claim 1, and further including means cooperating with said drive means to swing said arms from side to side.

9. The animated doll of claim 8 wherein said means to swing said arm from side to side comprise a pair of shoulder members, said shoulder members being pivotally mounted on a fixed bracket, said arms being dependent from said shoulder members, a second member being pivotally mounted to said shoulder members, and means for reciprocating said second member whereby said shoulder members will pivot around their mounting on said fixed bracket, thereby swinging said arms.

10. The animated doll of claim 9 wherein said means for reciprocating said second member comprises a plate, said plate being linked to said second member, said means for reciprocating said torso comprising means for pivotally reciprocating said plate in order to reciprocate said second member and said torso.

11. The animated doll of claim 10, and further including locking means, said locking means adapted to be releasably secured to said second member in order to prevent the swinging of said arms when said plate is pivotally reciprocated, with the reciprocation of said plate still causing the reciprocation of said torso.

12. The animated doll of claim 1, and further including means cooperating with said drive means to pivot said head from side to side.

13. The animated doll of claim 12 wherein said means for pivoting said head comprises a vertically extending plate, a shaft having a rod projecting therefrom, said rod being received within said head, means for raising and lowering said plate, with the raising and lowering of said plate causing the rotation of said shaft, said head being pivotally mounted, with the rotation of said shaft in a first direction causing said rod to pivot said head to the right, and with the rotation of said shaft in a second direction causing said rod to pivot said head to the left.

14. The animated doll of claim 13 wherein the means for raising and lowering said vertically extending plate comprises cam means rotatably mounted on said drive means, said cam means being received in an opening in said plate.

15. An animated doll comprising a torso, a pair of arms, a head, a pair of legs vertically depending from said torso, both of said legs being individually pivotally mounted in said torso, with said legs being adapted to pivot in a plane generally parallel to the plane of the legs, drive means within said torso, said drive means having means associated therewith for reciprocating said torso from side to side relative to one of the legs by shifting the center of gravity of said torso, means for rigidly securing said legs relative to said torso to prevent the pivotal movement thereof, said securing means acting alternately on said legs whereby one of said legs remains pivotally mounted while the other of said legs is rigidly secured, said rigidly secured leg being lifted when the center of gravity of said torso is over said pivotally mounted leg, and said pivotally mounted leg sliding toward said rigidly secured leg when the center of gravity of said torso is over said rigidly secured leg.

16. The animated doll of claim 15 wherein said securing means comprises rotatably mounted cam means with the rotation of said cam means alternately serving to rigidly secure said legs.

17. The animated doll of claim 15 wherein the means for reciprocating said torso comprises a pivotally mounted plate, said drive means including a shaft, cam means secured to said shaft, said cam means pivotally reciprocating said plate, with the movement of said plate serving to shift the weight of said torso from side to side, in order to shift the center of gravity from being over the pivotally mounted leg to being over the rigidly secured leg.

* * * * *