DOLL HEAD MOVABLE AS A RESULT OF MOVEMENT OF ANOTHER DOLL BODY PART

Seymour Adler, El Segundo, Calif., assignor to Mattel, Inc., Hawthorne, Calif., a corporation of California

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4 Claims

ABSTRACT OF THE DISCLOSURE

A doll head is mounted upon a conventional doll body. A drive mechanism is connected to the doll head to drive the doll head in different directions. Part of this drive mechanism is connected to one limb of the doll while the other part of the mechanism is connected to another limb of the doll. Preferably these limbs are the doll's arms. The drive mechanisms each have interrelated links, where the motion of one leg is connected to cause rotation of the doll head on a generally vertical axis.

BACKGROUND OF THE INVENTION

This invention is directed to a doll head which is movable as a result of movement of another doll body part. In order to provide maximum similarity between the doll and a baby, doll with interrelated parts are well known. Movable limbs and arms, as well as movable heads are well known in doll constructions. Previous dolls have also been provided with closing eyelids, which are usually gravity operated. Other dolls have been provided with liquid handling structures which permit the dolls to be fed from nipped bottles. Still other dolls have interrelated limbs, where the motion of one leg is connected to cause motion of the other leg. Nothing has been done in the past with respect to motion of the doll's head. It has been merely frictionally located on the body so that it can be turned in the desired direction. However, there has been no animation of the head. Thus, prior constructions have completely failed to meet this need for a fully animated doll head.

SUMMARY

This invention is directed to a doll head movable as a result of movement of another doll body part. The further doll body part, which causes head movement, preferably comprises one or more of the limbs of the doll. Drive mechanism is connected between the doll body and the head, and this drive mechanism is interconnected so that one motion of a doll body part causes one mode of motion of the head, while a different motion of the same or another doll body part causes a different mode of motion of the head. More particularly, limbs are preferred as the drivers, and more particularly, the two doll arms are preferred as the drivers. One of the arms is connected through the drive mechanism to drive the head in one mode, while the other is connected to drive the doll head in another mode. Thus, by independent operation of the two limbs, complex motion of the head is possible while motion of one of the driving limbs causes doll head motion in one of its modes. This structure is advantageous over the prior art, for it is novel to provide doll head motion by limb motion. Furthermore, since this structure provides doll head motion in different modes, depending on which driver is operated, full doll head animation is produced.

It is thus an object of this invention to provide doll head animation by interconnecting another doll part through drive means to drive the doll head. It is a further object to provide doll head animation by separately connecting two different doll limbs into the drive mechanism and connecting the drive mechanism to the head so that motion in two different modes occur as a result of actuation of the two different driving limbs. It is another object of this invention to provide doll head animation which is economic of construction and easily installed within the doll, and at the same time has a long trouble free life so that dolls with doll head animation in accordance with this invention may be economically manufactured and widely used with a long life. Other objects and advantages of this invention will become apparent from a study of the following portion of this specification, the claims and the attached drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view of a doll, partly in section with parts broken away, showing a preferred embodiment of the structure of this invention where a mechanism is provided so that the doll head is movable as a result of movement of another doll body part.

FIG. 2 is an enlarged section taken generally along the line 2--2 of FIG. 1.

FIG. 3 is an enlarged section taken generally along the line 3--3 of FIG. 1.

FIG. 4 is an enlarged section taken generally along the line 4--4 of FIG. 1.

FIG. 5 is a view similar to FIG. 3, showing the operating parts in a different position.

FIG. 6 is a front elevational view of a doll, partly in section and partly with parts broken away, showing a further embodiment of structure wherein the doll head is movable as a result of movement of another doll body part.

FIG. 7 is an enlarged section taken generally along the line 7--7 of FIG. 6.

FIG. 8 is an enlarged section taken generally along the line 8--8 of FIG. 6.

FIG. 9 is an enlarged section taken generally along the line 9--9 of FIG. 6.

DESCRIPTION

Referring to the drawings, a doll is indicated at 10 in FIG. 1, which doll incorporates the preferred construction wherein the doll head is movable as a result of movement of another doll body part. FIG. 1 illustrates doll 10 as having body 12. Body 12 is preferably blow molded from synthetic polymer composition material, as is conventional in doll making practice. Body 12 terminates at its upper end in neck 14, which has a substantially spherical exterior surface. Head 16 has skirt 18 which engages upon the spherical outer surface of neck 14. By means of this surface, the head may be moved with respect to body 12. Body 12 also carries arms 20 and 22. Arm pivot openings 24 and 26 are located in the shoulders of the doll for securement of the arms thereto. Plugs 28 and 30 are respectively engaged through openings 24 and 26 and secured to the arms 20 and 22. Plugs 28 and 30 have enlarged heads 32 and 34 which permit the arms to rotate on a horizontal, transverse, lateral axis through the upper part of the doll body, and prevent the arms from being pulled off the body. These plugs are installed outwardly through the opening and are secured into the arms by adhesive means or the like. Other fastening means which secures the arms to the body and permits their rotation can alternatively be used.

Operative interconnection mechanism is provided between the arms and the head to cause head motion upon arm motion. Pivot pin 36 is mounted transversely of neck 14, substantially parallel to the axis of arm rotation. U-shaped yoke 38 has lever 40 and flange 42 which extend downward and each have a hole therein in which pivot pin 36 is located. Lever 40 continues to extend downward
ly and is bifurcated to form fingers 44 and 46 which have internal cam surfaces. The fingers 44 and 46 are spaced from each other at their outer end to leave slot 48. Toward pivot pin 36 the fingers 44 and 46 are divided by recess 50. Crank 52 has a crank pin 53 engaged between fingers 44 and 46 so that upon rotation of arm 22, the crank pin acts upon the cam surfaces within fingers 44 and 46 to cause rocking of yoke 38 about pivot pin 36.

Shaft 54 is secured on its upper end within the interior of head 16. Shaft 54 is rotatably mounted in an opening in the top of yoke 38, and on the interior of yoke 38, between fingers 44 and flap 42 thereof, shaft 54 carries bevel gear 56. By this means, rocking of the yoke about the axis of pivot pin 36 causes nodding of the doll head by its oscillation about the axis of pivot pin 36. The shape of the cam surfaces on the interior of fingers 44 and 46 is such that upon continued rotation of the arm 22, the head 16 nods back and forth. The rearward limit of motion is shown in dotted lines in FIG. 2, while the forward limit of motion is at an equal angle in the opposite direction. Since the crank pin on crank arm 52 engages in recess 50 when arm 22 is normally down, as shown in FIG. 1, and the crank pin is then close to pivot pin 36, the rotative or angular motion of arm 22 causes relatively quick nodding motion of head 16. However, when arm 22 is raised upward, the crank pin on crank arm 52 is at the lower end between the fingers 44 and 46 so that the mechanical advantage is less and motion is more subdued. The internal shape of the cam surfaces on lever 40 and arm 42, in conjunction with the position of the crank determines the mechanical ratio between the arm and the nodding of the head. The shape of these cam surfaces is chosen with two factors in mind. The first is an even motion and the second is the maximum excursion of the yoke that the lever shape is such as not to engage the interior of the body at the maximum excursion points. Between lever 40 and flap 42 of yoke 38, sleeve 58 is rotatably positioned upon pivot pin 36. As is best seen in FIG. 5, bevel gear 60 need not be fully circular, but need only be a segmental gear with teeth through the arc of action. Furthermore, bevel gear has a dependent lever secured thereto, which lever is bifurcated into fingers 62 and 64. These fingers have interior cam surfaces 66 and 68, respectively. Included between cam surfaces 66 and 68 is recess opening 70.

Plug 28 carries crank 72 secured thereto and crank 72 in turn has a crank pin 74 which engages between cam surfaces 66 and 68 when the crank pin is in its upper position. Thus, when the crank pin is in its upper position, as is seen in FIG. 3, rotation of the arm controls rotation of the crank pin which in turn controls rotation of bevel gear 60. Bevel gear 60 is in gear tooth engagement with bevel gear 56 so that head oscillation about the axis of shaft 54 occurs.

Cam surfaces 66 and 68 on fingers 62 and 64 could be sufficiently long to engage crank pin 74 between them through the entire rotation of crank 72, as is shown in the structure in FIG. 8. However, such creates a large excursion of the lower ends of the fingers, and this excursion either limits doll head rotation or causes lever engagement with the doll body. Thus, the double lever structure illustrated in FIG. 5 is preferred. Ring 76 is secured on bevel gear 60 and is open on one side to provide stops 78 and 80. As is seen in FIG. 3, lever 82 is rotatably mounted upon pivot pin 36 and is held into ring 76 between the stops thereon by means of sleeve 58. Lever 82 has on its opposite end fingers 84 and 86 which respectively have internally facing cam surfaces 88 and 90. These cam surfaces are spaced from each other at the outer end to form a slot therebetween. Fingers 84 and 86 extend beyond the ends of fingers 62 and 64, and extend to a point where crank pin 74 is fully constrained between the cam surfaces of either the fingers on the lever fixed to the gear or the fingers on lever 82. The width of lever 82 between stops 78 and 80 permits some rotative freedom between lever 82 and gear 60. In the particular shape of doll body construction of the doll body 12, about 40° of total freedom is preferred as optimum. This amounts to 20° on each side of the center point shown in FIG. 3. However, in other dolls, doll body shapes may require different amounts of freedom. Again the cam surfaces on the interior of the four fingers controlling bevel gear 60 are shaped in such manner as to give a proper, smooth head rotational movement. Of course, when the crank is in the upper position shown in FIG. 3, the mechanical advantage is greater and head rotation is faster for ease of arm rotation. Additionally, the shapes of the cam surfaces on the arms are formed in such a way as to limit maximum excursion.

Operation of the doll 10 involves rotation of the arms 20 and 22 about their transverse or lateral axis in order to cause head rotation. Presuming arm 22 is in the position of FIG. 1, an arm 20 is rotated in the counter clockwise direction as is seen in FIGS. 3 and 5, and the first increment of rotation from the position of FIG. 3 does not cause motion. This is because lever 82 is free between the stops, and opening 70 is provided around crank pin 74. However, after slight rotation of arm 20, crank pin 74 engages cam surfaces 68 so that gear 60 is rotated in the clockwise direction. This causes the doll's nose to move to the left, as is seen in FIG. 1. With continued arm rotation in this direction, crank pin 74 follows cam surface 68. In view of the fact that cam surface 88 is not engaged, lever 82 can remain in a counter clockwise position as compared to gear 60. This provides clearance around the end of finger 84 with respect to the doll body. As rotation continues, and finger 62 has reached its limit of rotation, crank pin 74 engages between cam surfaces 88 and 90. At about this time the position shown in FIG. 5 is reached and crank pin 74 engages cam surface 90. Since lever 82 is against stop 80, rotation of the crank causes counter clockwise rotation of gear 60. Crank pin 74 remains in engagement with cam surface 90 through the bottom center and until the crank pin rises sufficiently relatively to the fingers 64 and 86 so that the crank pin engages cam surface 66. At this point lever 82 is "left behind" for it is free to move between its stops. Crank pin 74 follows up cam surface 66 and rotates gear 60 in the counter clockwise direction without requiring lever 82 to make the full excursion to the right, as is seen in FIG. 5. Finally, crank pin 74 reaches the top center and is positioned within opening 70. Thus it is clear that this construction permits a relatively large rotative motion of gear 60 without the otherwise indicated need of the ends of the levers. It is seen that motion of the arm, whether by complete rotation, oscillation of the crank pin 74 near its bottom center or oscillation of the crank pin 74 near its top center causes oscillation of head 16 about the axis of shaft 54 so that the doll appears to be shaking its head "no."

Operation of arm 22 by moving it in the counterclockwise direction, as seen in FIG. 2, causes oscillation of yoke 38 about pivot pin 36. As the crank pin proceeds in the counter clockwise direction, it thrusts finger 44 to the left to cause oscillation of the yoke in the clockwise direction shows in dotted lines in FIG. 2. As rotation of crank 52 continues, its crank pin engages with the cam surface on the interior of finger 46 to cause motion of the yoke 38 in the counter clockwise direction. When finally returned to the upright position in FIG. 2, the head is again held upright. Thus, oscillation of arm 22 with the crank pin on lever 82 on the opposite end in the upper position, or rotation of arm 22 causes nodding of the doll head. During this operation it must be noted that yoke 38 oscillates about pivot pin 36. If gear 60 was restrained, such rotation would cause rotation of the doll head on its vertical axis at the same time it was nodding. However, opening 70 prevents restraint of gear 60 when crank pin 74 is shown in the position in FIG. 3. Thus, when the doll head is pointed forward as is shown in FIG. 1, nodding motion.
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does not cause oscillation of the head in the "no" direction. As far as assembly is concerned, plugs 28 and 30 are first inserted outwardly through openings 24 and 26 and secured into the arms. The remainder of the operating mechanism, except pin 36, is already secured to the doll head. The mechanism is inserted through the neck opening and engaged over the crank pins. This is the reason for the slot 48 and the opening between fingers 84 and 86. When lowered into position, pin 36 is inserted and the structure is ready for operation.

Referring to the embodiment shown in FIGS. 6 through 9, a doll having another embodiment of the mechanism where the doll head is movable as a result of movement of another doll body part is generally indicated at 102. Doll 102 is again provided with body 104 which has neck 106 which has a spherical exterior surface. Head 108 has skirt 110 which is mounted upon neck 106 for motion of head 108 with respect to body 104. Motion is created by mechanism which interconnects arms 112 and 114 with the head so that arm motion causes head motion. However, this is exemplary of the invention, and it is clear that motion of another doll body part can cause head motion. Arms 112 and 114 are respectively fitted with plugs 116 and 118 which have enlarged heads engaging on the interior body 104 and which pierce through openings in the shoulders of the doll body and are respectively secured into the arms. Thus, arm rotation causes plug rotation. Furthermore, plugs 116 and 118 are respectively fitted with crank pins 120 and 122.

Brace 124 is secured within head 108 of the doll. Shaft 126 is secured to bracket 124 and extends downward into neck 106. Yoke 128 is pivotally mounted upon pivot pin 130. This pivotal mounting is accomplished by pivot holes in downwardly extending lever 132 and flange 134 of the yoke having pivot holes therein. The pivot hole receives pivot pin 130. Shaft 126 is rotatably mounted in yoke 128 so that the yoke can oscillate upon the axis of pin 130. The axis of pin 130 is preferably transverse of the doll, and parallel to the axis through the shoulders upon which the arms rotate. Lever 132 is bifurcated at its lower end to provide surface 136 and 138 between which crank pin 122 operates, as seen in FIG. 7. Thus, rotation of arm 114 and action of crank pin 122 in the slot in the end of lever 132 causes oscillation of yoke 128 about pivot pin 130 to cause nodding of the doll head.

Shaft 126 passes through the top of yoke 128 and is rotatable with respect thereto. Bevel gear 140 is secured thereto so that rotation of the bevel gear causes rotation of the head about the axis of shaft 126. Bevel gear 142 is rotatably mounted upon pivot pin 150 and is secured to lever 144. Lever 144 extends downward and it is bifurcated at its lower end to provide cam surfaces 146 and 148. Crank pin 120 is located between these cam surfaces. The cam surfaces are separated at their lower ends substantially the thickness of crank pin 120, and at the upper end are further separated to leave opening 150. Thus, rotation of arm 112 operates crank pin 120 between cam surfaces 146 and 148 to cause rotation of lever 144 about pivot pin 130. Since gear 142 is secured to lever 144, it also rotates. Since gear 140 is in gear tooth engagement with gear 142 it also rotates and causes rotation of shaft 126 and doll head 108. This oscillation of head 108 about the vertical axis gives the impression that the doll is shaking its head "no." Both arms are fully rotatable in a full circle so that the crank pins of the arm can operate closer to or farther away from their pivot point on pivot pin 130. Thus, when the crank pins are closer to the pivot pin, the mechanical advantage is much greater and the doll head moves at a faster rate as compared to arm rotation. When in the farthest position, head motion is more gentle as compared to arm motion. Opening 150 between cam surfaces 146 and 148 in lever 144 permits lever 144 to rock forward and back upon nodding motion of the doll head. Thus, gear 142 is not restrained when crank pin 120 is in the position shown in FIG. 8 and nodding motion does not cause head rotation.

Assembly of doll 102 is similar to the assembly of doll 10. Plugs 116 and 118, with their crank pins, are inserted outward through the openings in the doll body shoulders and are secured into arms 112 and 114. The remainder of the mechanical structure, except pin 130, is secured onto the doll head and the structure is dropped down through the neck opening. The open ends of the bifurcated levers 132 and 144 permit these levers to engage over their respective crank pins. When in position, pin 130 is inserted and installation is completed.

This invention having been described in its preferred embodiment and an additional embodiment disclosed, it is clear that this invention is susceptible to numerous modifications and changes within the skill of the routine artisan and without the exercise of the inventive faculty. Accordingly, the scope of this invention is defined by the scope of the following claims.

1 claim:

1. In a doll having a body with a neck portion, a head movably mounted on said neck portion, and movable limbs; pin means defining a transverse pivot axis in said neck portion; a bracket mounted for pivotal movement about said pin means; a shaft journaled in said bracket about a generally vertical axis fixed relative to said bracket, said shaft extending upwardly through said neck portion and being fixed to said head; a first gear fixed to said shaft adjacent said pin means; a second gear journaled on said pin means and meshing with said first gear; first drive means connecting one of said limbs to said bracket to swing the same about said pin means and thereby cause said head to nod in a fore-and-aft direction; and second drive means connecting another of said limbs to said second gear to rotate the same about said pin means and thereby cause said head to rotate horizontally about the axis of said shaft.

2. A doll as defined in claim 1 wherein said limbs comprise arms pivotally mounted on said body about an axis substantially parallel to said pin means; said first drive means comprising a first slotted depending lever on said bracket and a first crank pin on said one arm engaging in the slot of said lever.

3. A doll as defined in claim 1 wherein said second drive means includes a lost-motion driving connection to said second gear whereby said head may be caused to nod in a fore-and-aft direction a predetermined amount without rotating said head about the axis of said shaft.

4. A doll as defined in claim 1 wherein said limbs comprise arms pivotally mounted on said body about an axis substantially parallel to said pin means; said second drive means comprising a second slotted depending lever fixed to said second gear, a third slotted depending lever journaled on said pin means and drivingly engageable with said second gear through a lost motion means, the slots of said second and third levers being of varying width and respectively different configurations, and a crank pin on the other of said arms engaging in the slots of both said second and third levers.

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