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DOLL WITH MOVABLE LIMBS

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Fig. 1

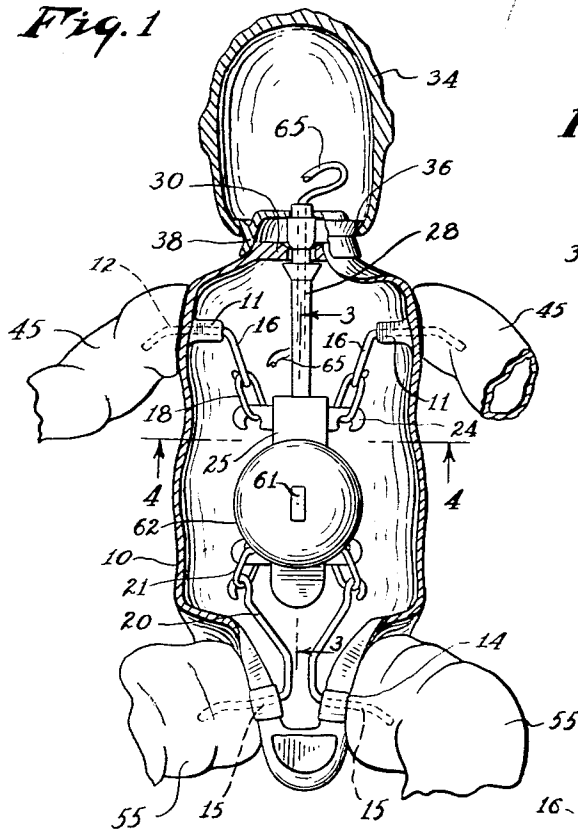


Fig. 2

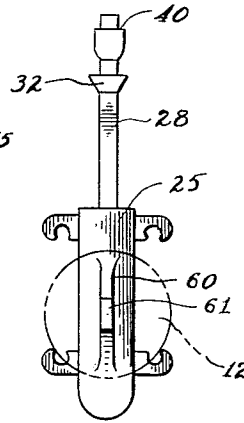


Fig. 3

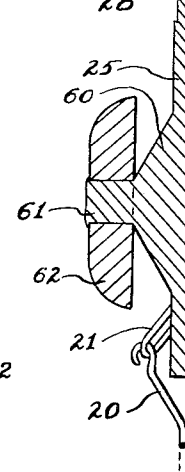


Fig. 4

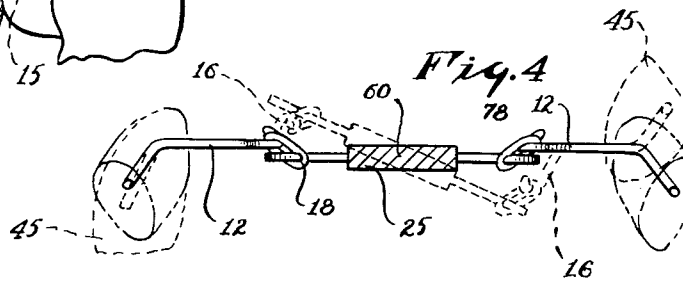


Fig. 5

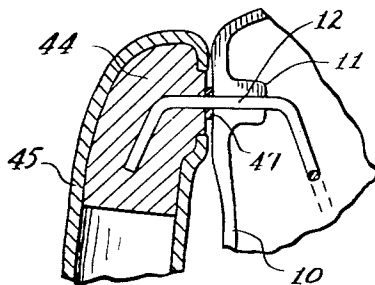
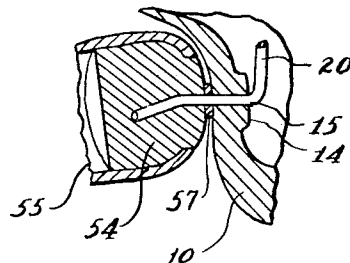


Fig. 6



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DOLL WITH MOVABLE LIMBS

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6 Claims. (Cl. 46—120)

This invention relates to dolls, and more especially to a construction for making the limbs of a doll move automatically in response to rocking of the doll body.

It is an object of the invention to provide an improved doll construction in which the limbs move easily and are balanced so that slight movements of the doll cause the limbs to move in a life-like manner. In the preferred construction, the head is also connected with the balance mechanism so that the head moves, preferably from side to side, in unison with the movement of the limbs.

Large movements of the limbs and head, in response to very slight movement of the doll body, or in response to mere jarring of the doll, are obtained by having a critically balanced inertia mass attached to the mechanism by which the limbs and head are moved. In its broader aspects, however, the invention need not include the inertia mass because the mass of the limbs themselves provide inertia for operating the mechanism, though not with the same critical action as is obtained when using an overbalancing weight.

Another object of the invention is to provide a doll structure, of the character indicated, with the parts of the operating mechanism shaped and correlated so that the mechanism is simple and inexpensive both to manufacture and assemble.

Other objects, features and advantages of the invention will appear or be pointed out as the description proceeds.

In the drawing, forming a part hereof, in which like reference characters indicate corresponding parts in all the views;

Figure 1 is a front view, with the head and body in section, and portions of the limbs broken away, showing a doll made in accordance with this invention;

Figure 2 is a detail view of the frame, of the operating mechanism, removed from the doll, and with the inertia mass taken from the frame;

Figures 3 and 4 are enlarged sectional views taken on the lines 3—3 and 4—4, respectively, of Figure 1;

Figure 5 is a sectional view showing the way in which each arm is connected with the body of the doll; and

Figure 6 is a view similar to Figure 5 but showing the way in which each leg is connected to the doll body.

The doll includes a body 10 which is hollow and preferably made in two halves that are glued together after the mechanism within the doll has been assembled.

The body 10 has inwardly extending bosses 11 which provide bearings for arm axles 12 and it has bosses 14 which provide bearings for leg axles 15.

At the inner end of each of the axles 11, there is a crank 16 with a hook on its inner end engaging a joiner 18, preferably a rubber band. At the inner end of each of the leg axles 15, there is a crank 20 with a hook at its inner end engaging a joiner 21, preferably a rubber band. All of the joiners 18 and 21 engage hooks 24 of a frame 25 which extends lengthwise of the doll body.

The frame 25 has an extension 28, at its upper end,

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passing through an opening in an end wall 30 at the upper end of the doll body 10. A collar 32, secured to the extension 28, prevents the frame 25 from being pulled upwardly, and this keeps the doll's head 34 from being pulled away from the neck.

The head 34 snaps over a ring 36 extending from a cap 38. The cap is attached to the upper end of the frame extension 28 and preferably seats against an upper collar 40 near the upper end of the frame extension 28. The cap 38 may be secured to the frame extension by glue, or in any other suitable manner.

The lower end of the cap 38 flares outwardly over the neck portion of the doll body and is freely rotatable, about the axis of the doll body, with the frame extension 28.

The lower portion of the collar 40 is curved to provide a substantially spherical bearing surface which fits against a complementary bearing surface in the end wall 30. These bearing surfaces limit the downward movement of the head so that the inside surface of the cap 38 will not bind against the neck portion of the body. This provides a minimum of friction between the head and body of the doll so that the head can swing freely from side to side and will not act as a brake on the free movement of the mechanism which raises and lowers the arms and legs.

The axles 11 and 15 are rigidly connected with the arms and legs, respectively, so that the arms and legs move in unison with the cranks 16 and 20. Figure 5 shows the way in which the axle 11 extends into an arm block 44 and then at an angle to prevent rotation of the axle 11 with respect to the block 44. This construction is most conveniently made by having the block 44 of two-piece construction with channels in the confronting faces of the two pieces which are brought together to make the block 44. An arm 45, preferably made of vinyl plastic, is snapped over the arm block 44. A small metal washer 47 between the block 44 and the body 10 holds the arm away from the body with a slight clearance in order to prevent friction between the arm 45 and the body 10.

Figure 6 shows a similar construction in which a leg axle 15 extends into a leg block 54 over which vinyl plastic 55 is snapped. A small metal washer 57 is placed over the axle 15, between the leg 56 and the doll body 10, for maintaining a slight clearance between the leg and body to prevent friction.

The frame 25 hangs from the joiners 18. When the arms 45, and legs 56 are in their mid-positions, the cranks 16 and 20 have their hook ends at an elevation which supports the frame 25 at an intermediate level between the front and back of the doll body, with the doll lying on its back. In this position, the frame 25 is in substantial alignment with the opening in the end wall 30, but accurate alignment is not necessary because of the ball and socket bearing provided by the collar 40 and the confronting face of the end wall 30. Although loosely supported by the joiners 18 and 21, the frame 25 can oscillate about an axis which extends lengthwise of the body of the doll. This axis is not fixed, because of the flexibility and the stretching of the joiners 18 and 21, but the axis of oscillation does remain within certain transverse limits.

The frame 25 has a boss 60 with a stud 61 extending upwardly through an inertia mass 62. The outer end of the stud 61 is preferably riveted to hold the inertia mass 62 rigidly in place on the frame 25; and the stud 61 is made with a rectangular cross section so as to prevent turning and loosening of the inertia mass 62. It is a feature of the construction that the center of gravity of the inertia mass is located at a substantial distance above the axis of rotation of the frame 25.

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Figure 4 shows the way in which the frame 25 oscillates to make the arm 45, on one side of the body, move upward while the corresponding arm 45, on the other side of the body, moves downward. When the frame 25 moves from the solid line position shown in Figure 4, to the dotted line position, the frame 25 pulls the left hand joiner 18 upward and lifts the crank 16 so that the axle 12 turns in a direction to raise the connected arm 25. The downward movement of the other side of the frame 25 pulls the right-hand joiner 18 downward and moves the crank 16 in a direction which turns the right-hand axle 11 to lower the right arm 45.

The axis of oscillation of the frame 25 is along the center of this frame as the parts move between the solid and dotted line positions shown in Figure 4. It will be evident that tilting of the doll body to either side, will cause the inertia mass 62 to rock the frame 25 toward that side and thus actuate the arms, legs and head. However, tilting of the frame 25 can be produced without rocking the doll body if either arm or either leg is moved upwardly or downwardly. This has the same effect as tilting the body and causes all of the limbs and head to move. Thus the action of the doll is very life-like in that the arms and the head move not only in response to rocking of the body but also in response to any manual displacement of the head or any limb.

If the inertia mass 62 is not used, the mechanism will not move the limbs as much in response to rocking of the body, though some movement will occur because of the mounting of the legs on axles which have a component of extension in different planes. Without the weight, the arms and legs will move when any one of them is moved, but only in proportion to the amount of displacement of the other arm or leg; whereas with the inertia mass, the movement is greater than the manual displacement would produce, because the unbalancing of the inertia mass 62 causes it to swing as far as the limbs will permit in the direction to which it is unbalanced. Since the limbs on the opposite sides of the doll move in opposite directions, that is, one moves up while the other moves down, they counterbalance one another and this permits an inertia mass of moderate weight to produce a swing of the limbs through large angles of movement.

The arms are moulded so that they are in a partially bent position, and so are the legs. The normal, mid-positions of the arms and legs, are part way up so that, with the doll lying on its back, the arm and leg of one side can move downwardly for a substantial distance before striking the support on which the doll is lying.

When this invention is applied to drinking dolls, a flexible water tube 65, from the mouth, extends through a central passage in the extension 28 of the frame. If the doll body 10 is water-proof, the tube 65 can terminate anywhere within the body. If the doll is of such a construction that the water must be kept in the tube 65, then the tube extends from the frame extension 28, at a location near the neck, and on a long loop which provides ample length for flexing so as not to interfere with the free oscillating movement of the frame 25.

The preferred embodiment of the invention has been shown and described but changes and modifications can be made and some features can be used in different combinations, without departing from the invention as defined in the claims.

What is claimed is:

1. A doll including a hollow body, limbs pivotally connected to the body by shafts extending through bearings in the body, a crank on the inner end of each shaft, a frame within the body and extending lengthwise of the body and having portions extending transversely of the body, and means suspending the frame from the cranks including universal connections between the cranks and the transversely extending portions of the frame for causing the frame to tilt about a longitudinal axis as a limb on one side of the doll is raised or lowered whereby

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the corresponding limb on the other side of the doll is moved in the opposite direction and an inertia mass connected to the frame for oscillating the frame when the body is tipped about an axis having a substantial horizontal component.

2. A doll including a hollow body, limbs having pivot shafts extending through bearings in the wall of the body, the shafts being rigidly connected to the limbs and each having a crank at its inner end extending toward a mid region of the body, and a frame located within the body and having portions extending from its opposite sides toward the sides of the doll body, universal connections between the cranks and the frame portions that extend toward the sides of the doll body, the frame being tiltable from side to side as the limbs on one side swing upwardly and the limbs on the other side swing downwardly.

3. The doll described in claim 2, characterized by an inertia mass connected to the frame with the center of the mass located at a different level from an axis about which the frame tilts from side to side.

4. A doll having a hollow body to which limbs, including both arms and legs, are connected by pivotal connections comprising operating elements extending through the wall of the body and rigidly connected within the limbs, a frame located within the body, and connections between the frame and the respective operating elements of both the arms and legs for transmitting motion between the limbs on opposite sides and on the same side of the doll, the frame being connected in position to move the limbs on one side of the doll upwardly when the limbs on the other side move downwardly and vice versa.

5. A doll comprising a doll body, limbs movable with respect to the body, connections joining the limbs to the body, the connection for each limb comprising a stiff operating element extending through a bearing in the wall of the body and having one end rigidly connected with a limb, a crank connected with the other end of the operating element, the cranks for the respective operating elements converging toward one another within the hollow body, and a frame located within the body and suspended from the ends of the cranks, remote from said operating elements, by joiners comprising flexible and stretchable elements from which the frame hangs within the body.

6. A doll comprising a hollow body, limbs movable with respect to the body, connections between the limbs and the body including an operating element rigidly connected to each limb and extending inwardly through a bearing in the wall of the doll body, a crank at the inner end of each of the operating elements, a frame within the doll body having side portions connected with the respective cranks and having an extension which passes through an opening in the neck of the doll body, a head connected to the extension of the frame, a ball-and-socket bearing between the head and the neck with clearance providing for free oscillating movement of the head and the frame as a unit about an axis extending lengthwise of the doll body, a washer between each limb and the doll body for reducing friction and providing free swinging movement of the limbs with respect to the doll body, and universal connections between the cranks and the frame for transmitting movement between the frame and the limbs, and an inertia mass connected to the frame in position which locates the center of gravity of the inertia mass above the axis of oscillation of the frame when the doll is lying on its back.

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