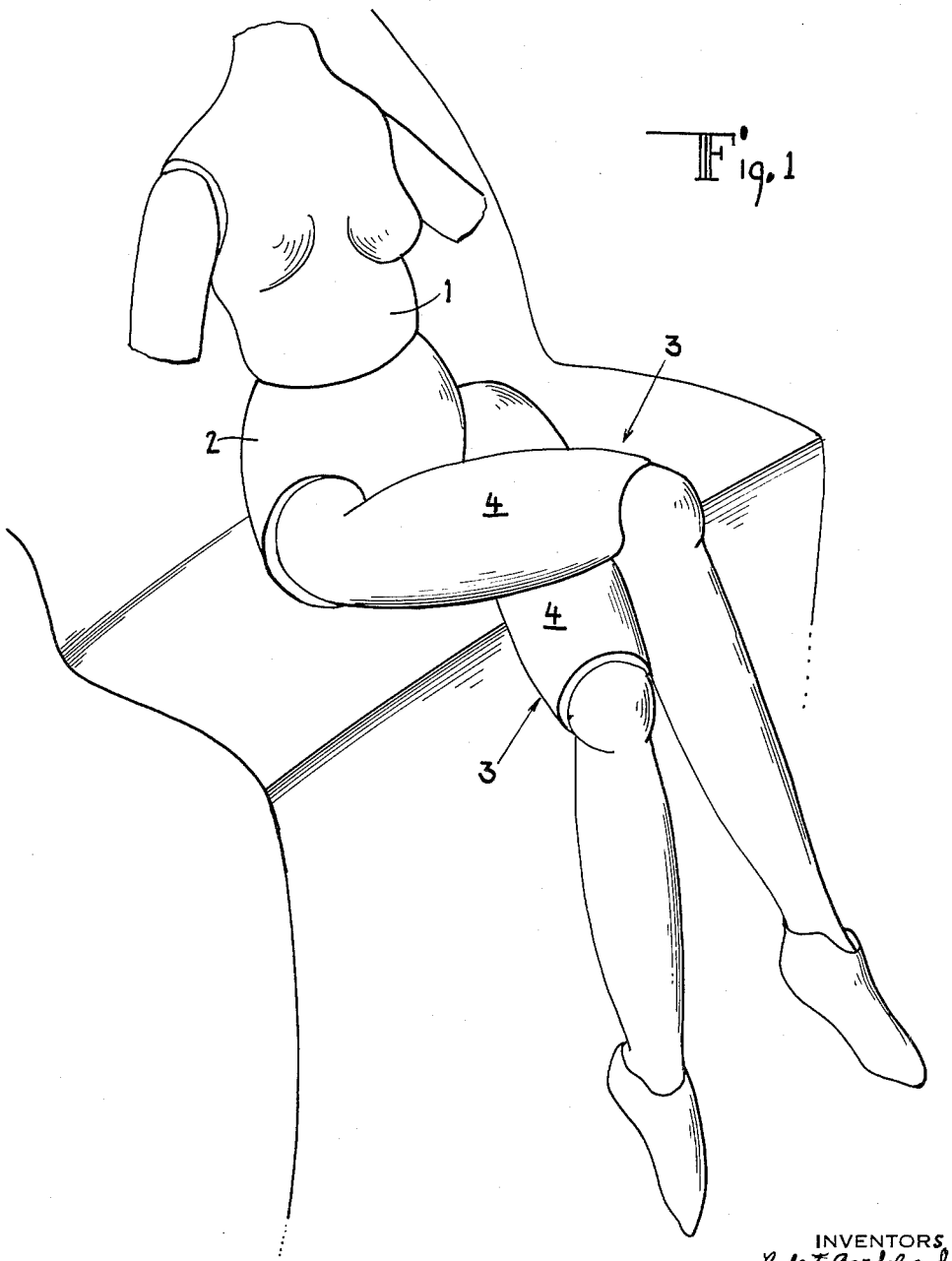
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DOLL LEG MOUNTING AND OPERATING MECHANISM

Filed Feb. 12, 1958 4 Sheets-Sheet 1

Fig. 1



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DOLL LEG MOUNTING AND OPERATING MECHANISM

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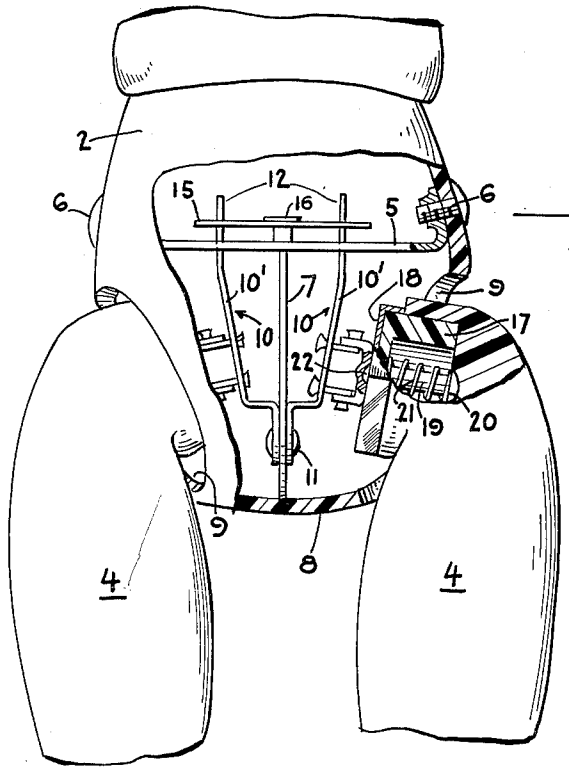


Fig. 2

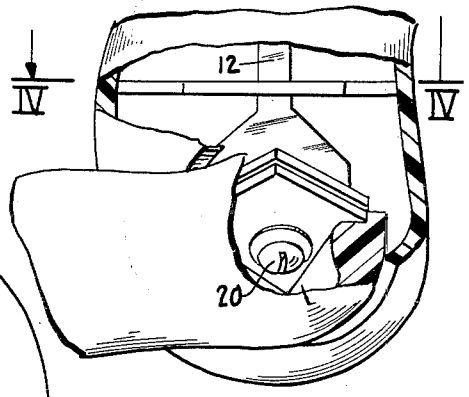


Fig. 3

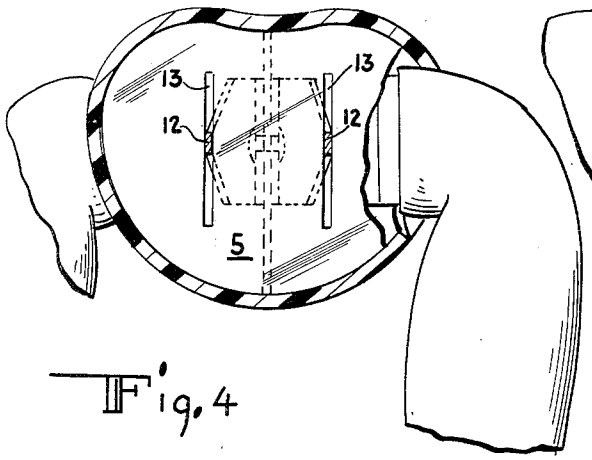


Fig. 4

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DOLL LEG MOUNTING AND OPERATING MECHANISM

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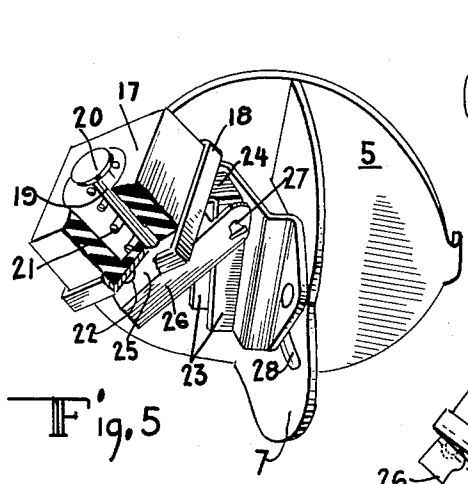


Fig. 5

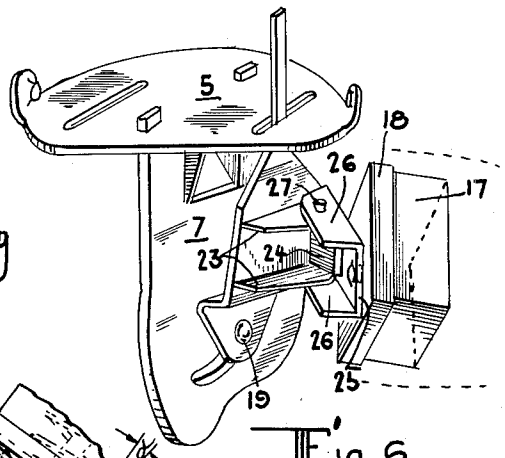


Fig. 6

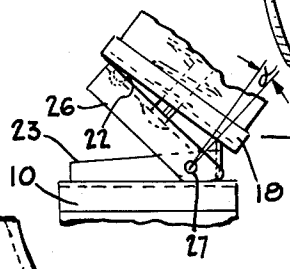


Fig. 5a

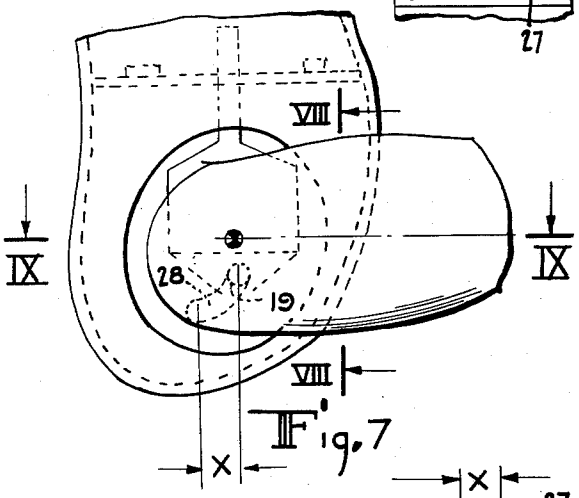


Fig. 7

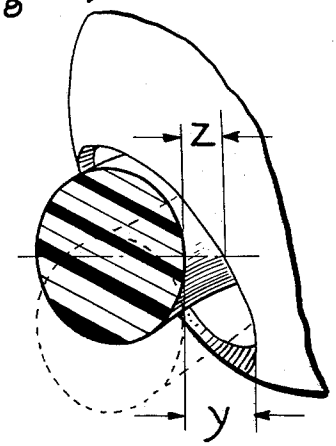


Fig. 8

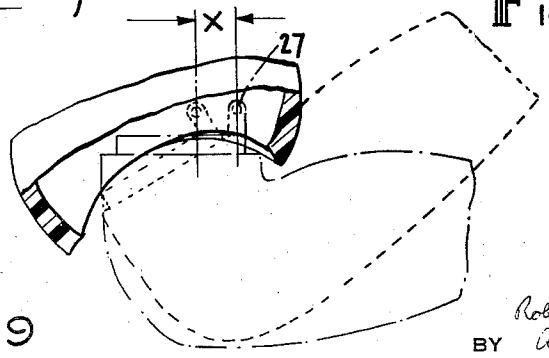


Fig. 9

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DOLL LEG MOUNTING AND OPERATING MECHANISM

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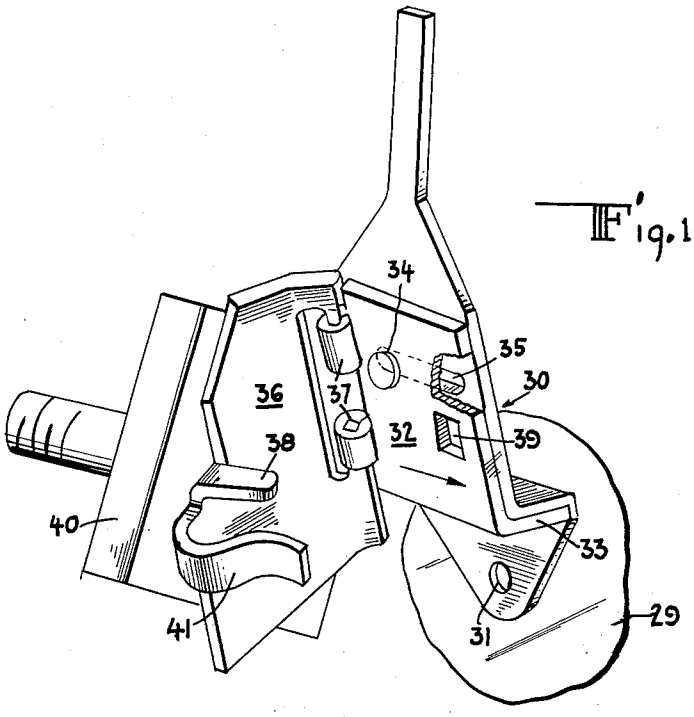


Fig. 10

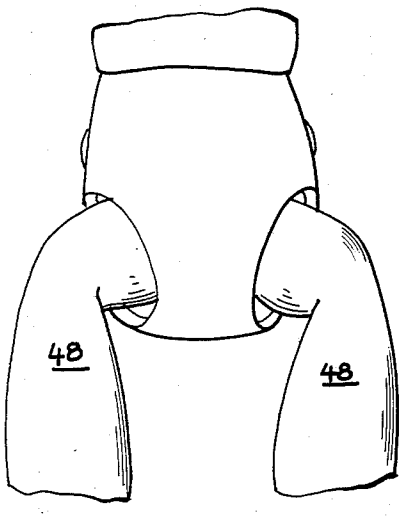


Fig. 11

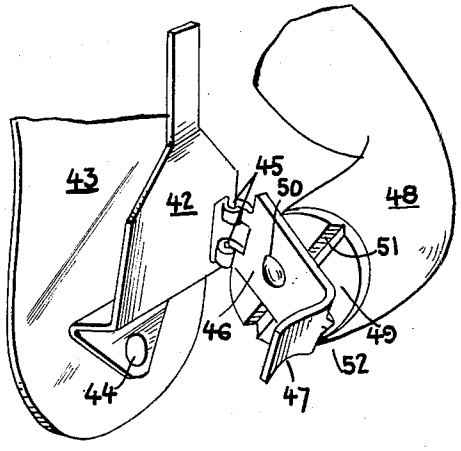


Fig. 12

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United States Patent Office 3,016,652 Patented Jan. 16, 1962

3,016,652

DOLL LEG MOUNTING AND OPERATING MECHANISM

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Filed Feb. 12, 1958, Ser. No. 714,756
18 Claims. (Cl. 46—149)

This invention relates to a doll leg mounting and operating mechanism. An object of this invention is to provide such a mechanism which can function to effect the walking motion (as in applicants' Patent No. 2,736,135, February 28, 1956) and in which the legs can also be moved to sitting position and crossed, in a manner closely resembling the corresponding human motion and position. When this mechanism is combined with suitable articulation of the knees, ankles, waist, arms, etc., a wide variety of life-like poses become possible.

Practical embodiments of the invention are shown in the accompanying drawings, in which:

FIG. 1 represents an elevation of a doll torso and legs in the seated, leg-crossed position made possible by the provision of the mechanism described below; parts being broken away;

FIG. 2 represents a detail front elevation of the lower part of a doll body and upper parts of the legs, in standing position, connected by one form of the walking and leg-crossing mechanism, parts of the body wall, leg and leg mounting being broken away and parts being shown in section;

FIG. 3 represents a detail side elevation of the lower part of a doll body and upper part of the left leg, in sitting position, parts of the body wall and leg being broken away;

FIG. 4 represents a horizontal section, taken on the line IV—IV of FIG. 3;

FIG. 5 represents a bottom perspective view of one form of leg-crossing mechanism, only the right leg unit being shown and part of the leg-mounting "button" being broken away;

FIG. 5*a* represents a detail bottom plan view of the mechanism shown in FIG. 5, parts being broken away;

FIG. 6 represents a rear perspective view of the mechanism shown in FIGS. 5 and 5*a*, in the same adjusted position;

FIG. 7 represents a side elevation of the lower part of a doll body and upper part of the right leg, in sitting position;

FIG. 8 represents a vertical section taken on the line VIII—VIII of FIG. 7, the section of the leg in crossed position being shown in broken lines;

FIG. 9 represents a horizontal section taken on the line IX—IX of FIG. 7, the outline of the leg in crossed position being shown in broken lines;

FIG. 10 represents a rear perspective view (comparable to FIG. 6) showing a modified form of mechanism in its leg crossing position;

FIG. 11 represents a front elevation of the lower part of a doll body and upper part of the legs, designed to be crossed by means of a simplified mechanism, and

FIG. 12 represents a rear perspective view of the simplified mechanism used in a doll body such as that of FIG. 11, with a right leg attached and moved to leg crossing position.

Referring to the drawings, the torso illustrated in FIG. 1 includes an upper body portion **1** and a lower body portion **2**, suitably articulated in a manner constituting no part of the present invention, and legs **3** which are jointed at the knees (preferably as shown in applicants' Patent No. 2,791,063, dated May 7, 1957) and also, if desired, at the ankles. Such multiple articulation is characteristic of the "ballerina" type dolls, but is not at all restricted thereto. As clearly shown in FIG. 1, the achievement of the seated leg-crossed position requires an additional articulation of the legs enabling them to be moved toward each other, in the sitting position, to such an extent that the thigh portions **4**, **4** are crossed, with the right knee to the left of the left knee and vice versa. This capability has, preferably, to be added to a reliable walking motion, and the mechanism should be adaptable to doll bodies of flexible (e.g. vinyl) materials as well as to rigid bodies.

As shown in FIGS. 2 to 6, the leg crossing mechanism is combined with a walking mechanism comprising a horizontal plate **5** fixed to the body wall at the points **6**, **6** (approximately hip level) and a vertical plate **7** having its upper end secured to the middle of the plate **5** and its lower end terminating at the bottom wall **8** of the body between the leg openings **9**. Leg supporting elements **10** have their wide flat vertical lower ends pivotally fixed by a rivet **11** or the like to the plate **7** near the bottom wall **8** of the body, the rivet **11** providing a horizontal axis around which the elements **10** can rock. The narrow upper ends **12** of the elements **10** project through slots **13** in the plate **5** and engage in openings through a rocker arm **15** mounted on a vertical pivot **16**. The wide flat middle portions **10'** of the elements **10** are disposed, preferably, to slant outward and upward, as disclosed in applicants' Patent No. 2,736,135, cited above.

In order to provide the normal walking and sitting capabilities, each leg **4** is secured to a "button" **17** (shown here as being square but which may be round, as in FIG. 12), the button being backed by a metal cap **18** and secured to the walking mechanism by means of a post **19**, fixed on said mechanism and having a head **20**, combined with a spring **21** which bears strongly against the under side of the head **20** and against the enclosed side of the button **17**. The cap **18** is provided with a small projecting boss **22** arranged to engage one or more suitably located depressions in the matching surface of the walking mechanism so as to hold the leg releasably in standing position, at least, and in other positions if desired.

The additional leg-crossing capability is provided by adding to the walking mechanism certain elements, shown particularly in FIGS. 2, 5 and 6, which constitute in effect a limited-motion hinge between the elements **10** and the leg-attaching parts **17–21**. One part of the hinge is shown as being a generally U-shaped piece secured to the middle portion **10'** of the element **10** and having substantially horizontal upper and lower sides **23** and a substantially vertical end **24** which projects somewhat farther from the surface of the portion **10'** than do the sides **23**. The second part of the hinge comprises a flat portion **25** (on which the post **19** is mounted) and inwardly folded horizontal flanges **26**, so spaced as to embrace the sides **23** of the first part to which they are secured by means of a hinge pin or pins **27**. The relative locations of the hinge axis, of the portion **25** and of the end **24**, as well as the ends of the flanges **26**, are preferably such that the outer edge of the end **24** and/or the projecting ends of the flanges **26** will limit the extent of the hinging motion, approximately as indicated in FIGS. 5, 5*a* and 6; said edge may also engage the cap **18** throughout the hinging motion so that the hinged parts will tend to spring toward their closed positions and to be retained resiliently there. The opening motion is preferably limited to a range short of the dead-center position, as indicated by the angle α in FIG. 5*a* in order to cause the hinge-closing tendency just described. The hinge axis is located near the front edge of each leg supporting element, and it will be evident that the interposition of the hinge between the ele-

ments 10 and the leg-attaching parts 17–21 makes it possible to swing the legs toward and across each other from the normal straight-out sitting position. Rotation between standing and sitting positions takes place around the axes of the posts 19, while rotation from straight sitting to leg-crossed sitting takes place around the axes of the hinge pins 27.

It will be noted that the upper parts of the legs are turned through almost 90° between the thigh zones and the points of attachment and that they are rather deeply recessed on the inside of the turn 4, to provide clearance between that part of the leg and the adjacent edge of the leg opening 9. Due to the advantageous location of the hinge axis the clearance problem is generally not serious.

With certain shapes and sizes of dolls, it may be found desirable to shift the hinge axis away from the front of the body when the legs are crossed and a simple means for effecting this result is shown in FIGS. 5 to 9. All that is required is to provide a slot 28 (in the plate 7) for the rivet 11, so that the whole moveable mechanism may be moved a short distance toward the rear when the legs are in crossed position. By making the forward end of the slot 28 its highest part, the mechanism will automatically stay at that end when the doll is walking and thus creating an upward thrust between the legs and the body. The shape of the legs and of the leg openings may also be relied on to maintain the rivet 11 (the walking axis) in its proper forward position. For instance, as shown in FIGS. 7, 8 and 9, the distance of rearward shift (with a downward component) is identified as *x*, which takes advantage of the fact that the inward clearance *y* between the upper part of the leg and the adjacent edge of the leg opening, with the leg connection in its rearward (and downward) position is substantially greater than the corresponding clearance *z*, measured with the leg and walking mechanism in the standing or walking position.

An alternative, but somewhat more complex, mechanism is shown in FIG. 10 wherein the vertical plate (corresponding to plate 7) is indicated at 29, having a leg supporting element 30 (corresponding to element 10) pivotally connected thereto at 31. In this case a generally flat member 32, having a guiding flange 33 along its bottom is slidably secured to the element 30 by means of the headed stud 34, passing through the horizontal slot 35. The member 32 constitutes the first part of a hinge and the member 36 is the second part, said parts being hingedly connected as indicated at 37, for example. The member 36 is provided with a locking pin 38, so positioned as to project through a hole 39 in the member 32 and also, when the member 32 and element 30 are in the position shown, through a matching hole (not shown) in the element 30. It will be evident that the pin 38 will thus lock the element 30 and member 32 in the position shown, when the hinge is closed, i.e., in the walking position. When the hinge is open (as in FIG. 10) the member 32 can be displaced rearwardly (in the direction of the arrow) for reasons explained above. A leg mounting button 40 is shown, and it will be understood that its details are, in general, similar to those of the button previously described.

In addition to the pin 38, the member 36 is provided with a bent spring finger 41 adapted to snap over the corresponding edges of the member 32 and element 30 to hold the hinge releasably in its closed (standing or walking) position.

A simpler alternative arrangement, which may be quite adequate particularly in smaller or less expensive dolls, is shown in FIGS. 11 and 12, where a leg supporting element 42 (similar to the elements 10 and 30), pivotally secured to a vertical plate 43 (similar to plates 7 and 29) for rocking movement about a horizontal axis 44, is hingedly connected at its front edge, as indicated at 45, to a plate 46. The free end of the plate 46 is bent to form a spring flange 47 (comparable to finger 41) adapted to snap over the rear edge of the element 42 to hold the hinge releasably in its closed position. A doll leg 48 mounted on a round button 49 is secured to the plate 46 in any suitable manner, as by a post 50 and spring (not shown), and the button surface may be provided with a depression, such as the groove 51, arranged to be engaged by a projection 52 on the plate 46 to hold the leg releasably in standing position (FIG. 11). When legs mounted on supports of the character just described are turned forward to the sitting position (separating the groove 51 from the projection 52 by 90°, more or less), they can also be crossed by swinging them horizontally toward and past each other; the leg-crossed position of the right leg supporting mechanism being shown in FIG. 12. Due to the somewhat exaggerated lateral offset at the upper part of the leg (FIG. 11), there is sufficient clearance so that no rearward shift of the mechanism is needed in this case. The mechanism also has no stop for limiting the extent of the leg-crossing movement, since the leg openings in the body constitute a satisfactory stop, particularly in a relatively small doll.

It will be understood that various changes may be resorted to in the material, form, construction and arrangement of the several parts without departing from the spirit and scope of the invention, which is not intended to be limited to the details herein shown and described except as they may be included expressly or by necessary implication in the claims.

What we claim is:

1. A doll leg mounting and operating mechanism in association with a doll body, comprising, an element connected to the doll body by means permitting rotation of said element with respect to said body around a substantially horizontal axis, an element connected to the doll leg, the connection between said last named elements and said leg including means permitting movement of the leg between standing and sitting positions, and a hinge connection between said elements, the hinge having a substantially vertical axis and being operable when the leg is in its sitting position.

2. A mechanism according to claim 1 which includes releasable means for holding said elements in hinge-closed position.

3. A mechanism according to claim 1 which includes spring means urging said elements toward hinge-closed position.

4. A mechanism according to claim 1 in which the hinge axis is located adjacent the front of the doll body.

5. A mechanism according to claim 1 which includes means for varying the position of the hinge axis with respect to the doll body.

6. A mechanism according to claim 5 which includes releasable means for retaining the hinge axis in at least one adjusted position.

7. A mechanism according to claim 1 in which the element connected to the doll body constitutes a part of a walking mechanism.

8. A doll leg mounting and operating mechanism comprising, a hollow doll body, a plate disposed horizontally across said body and spaced from the bottom thereof, a plate disposed vertically in the front-and-back median plane of the body and extending downward from said horizontal plate, a leg supporting element pivotally secured to said vertical plate for movement about a horizontal axis, an element connected to the doll leg, the connection between said last named element and said leg including means permitting movement of the leg between standing and sitting positions, and a hinge connection between said elements, the hinge having a substantially vertical axis and being operable when the leg is moved forwardly beyond its standing position.

9. A mechanism according to claim 8 which includes releasable means for holding said elements in hinge-closed position.

10. A mechanism according to claim 8 in which the hinge axis is located adjacent the front of the doll body.

11. A mechanism according to claim 8 which includes means for varying the position of the hinge axis with respect to the doll body.

12. A mechanism according to claim 11 which includes releasable means for retaining the hinge axis in at least one adjusted position.

13. A mechanism according to claim 8 in which the doll body is of a non-rigid material and in which said horizontal and vertical plates lie with their peripheries in engagement with the body wall throughout substantial proportions of said peripheries, whereby said plates aid in maintaining said body in its desired form.

14. In a doll leg mounting and operating mechanism, a leg supporting element, an element connected to the doll leg, the connection between said last named element and said leg including means permitting movement of the leg between standing and sitting positions and a hinge connection between said elements, the hinge having a substantially vertical axis and being operable when the leg is moved forwardly beyond its standing position.

15. A mechanism according to claim 14 in which the means permitting movement of the leg comprises a pivot connection between the leg and the element connected thereto.

16. A mechanism according to claim 15 in which the pivot connection comprises a post mounted on the element connected to the leg and a spring cooperating with said post to urge the leg resiliently into engagement with said element.

17. A mechanism according to claim 16 which inlcudes means on the leg supporting element for urging the leg against the force of said spring away from the element connected to the leg as said elements are moved from hinge-closed toward hinge-open position.

18. A mechanism according to claim 14 which includes a plate slidably mounted on the leg supporting element and means guiding said plate for limited horizontal movement with respect to said leg supporting element, said plate being hingedly connected to the element connected to the doll leg.

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