Feb. 16, 1954 P. W. LANG 2,669,063

GROWING FIGURE TOY

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Fig. 1.

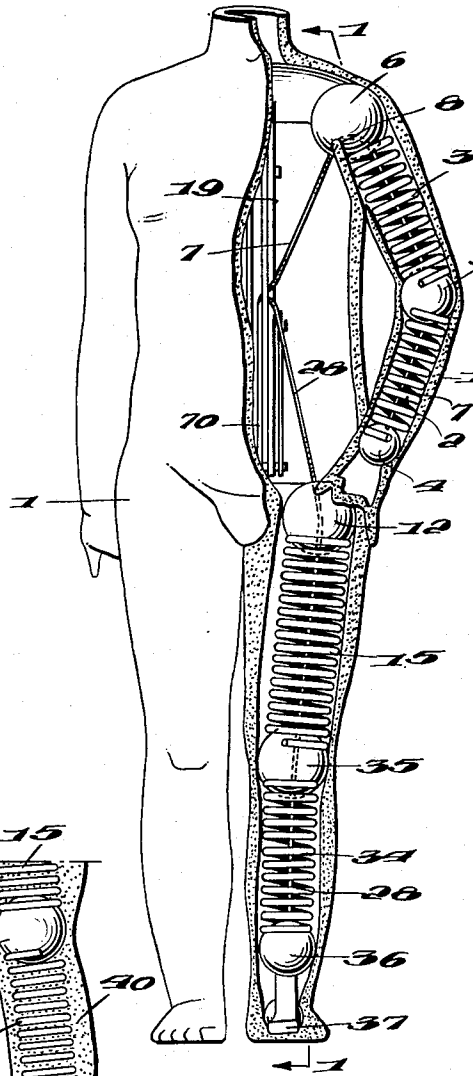


Fig. 2.

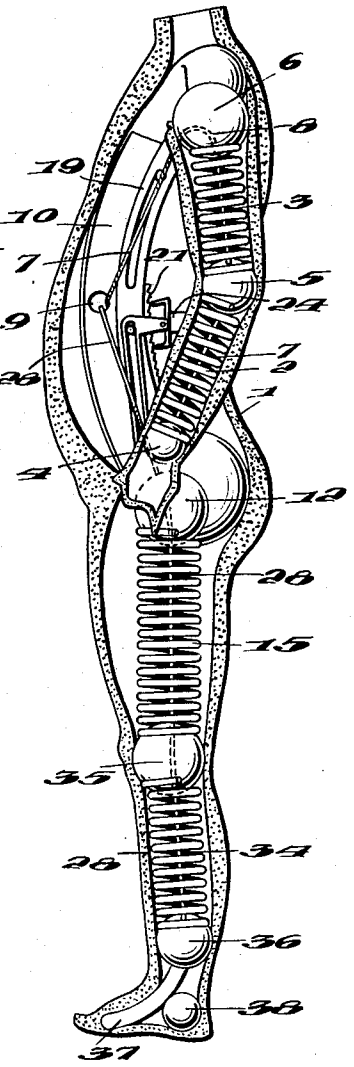
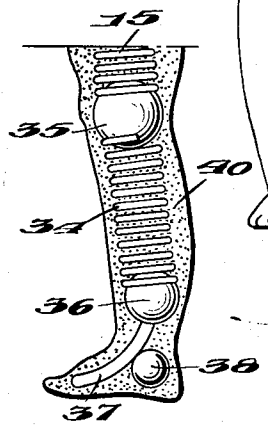


Fig. 3.



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GROWING FIGURE TOY

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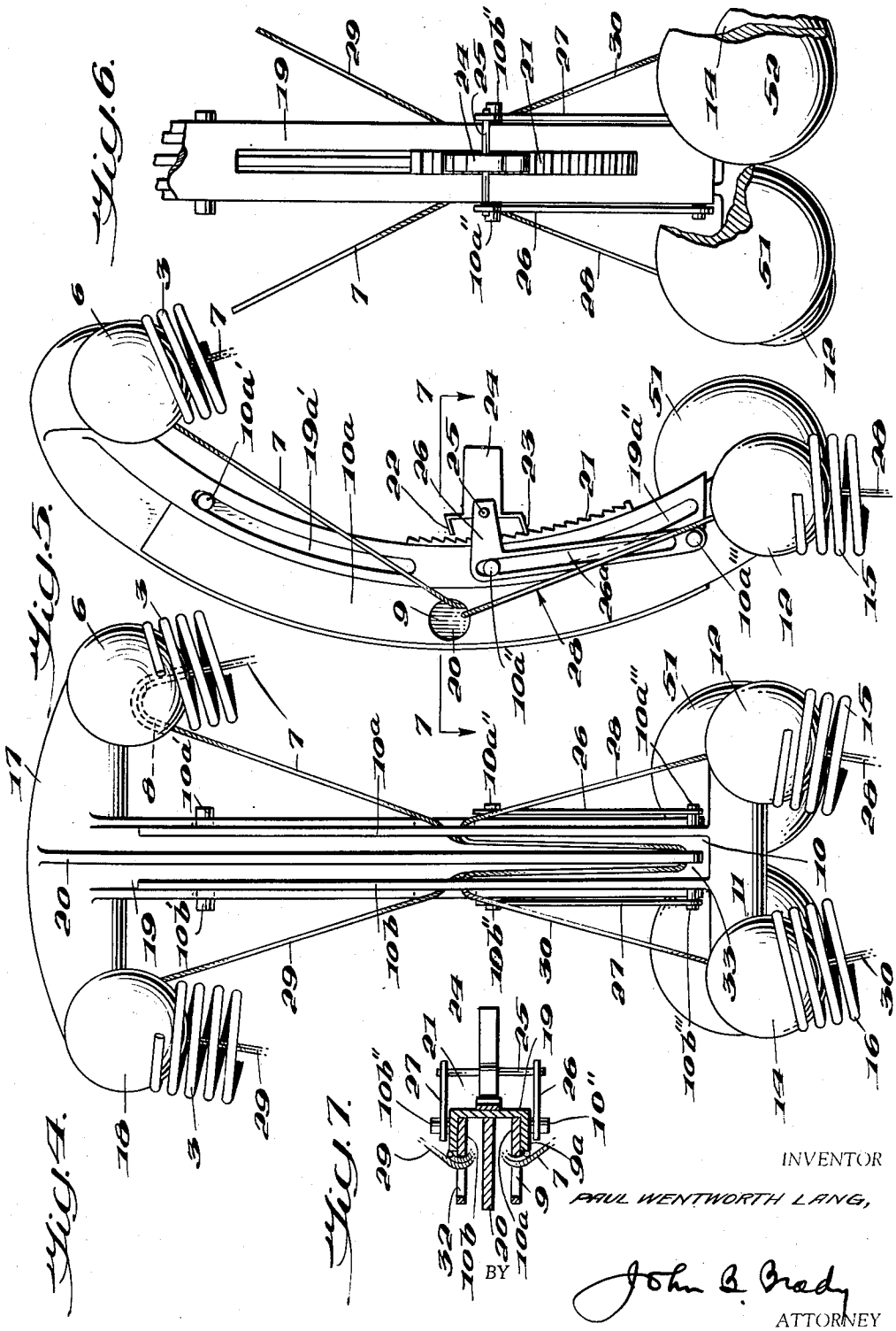

Fig. 6.

Fig. 5.

Fig. 4.

Fig. 7.

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Fig. 8.

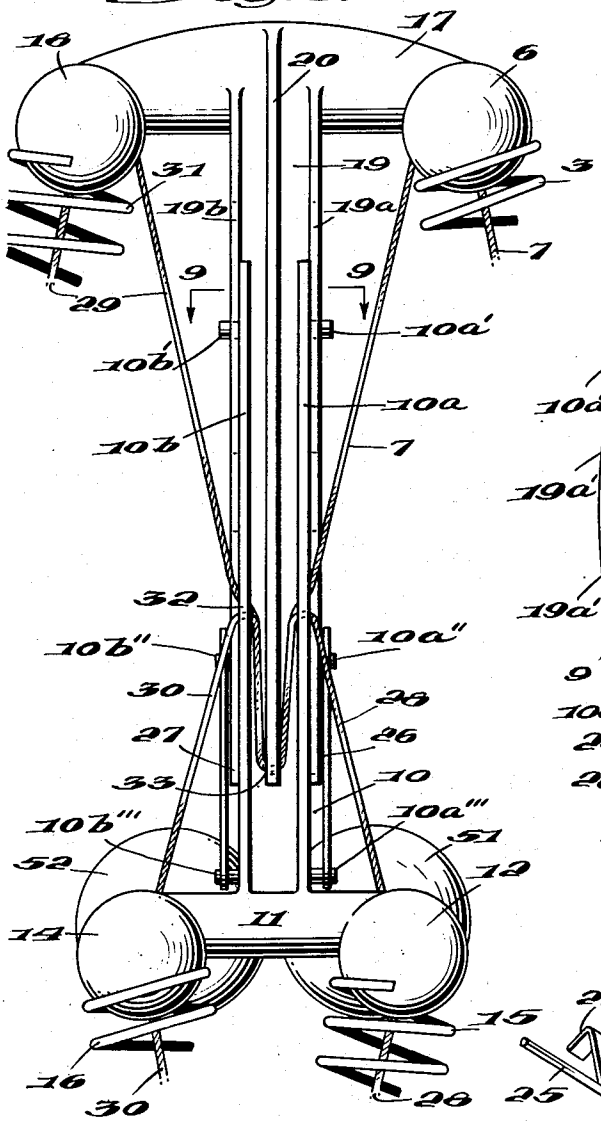

Fig. 10.

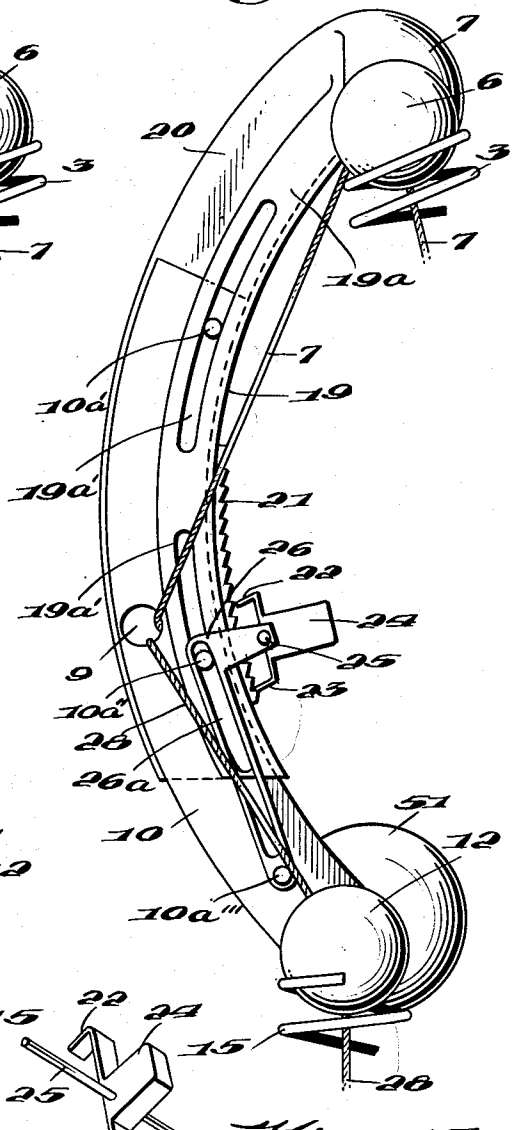

Fig. 14.

Fig. 9.

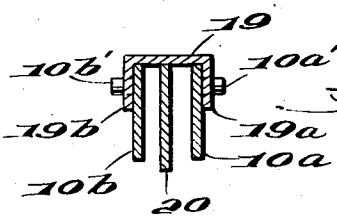

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Fig. 13.

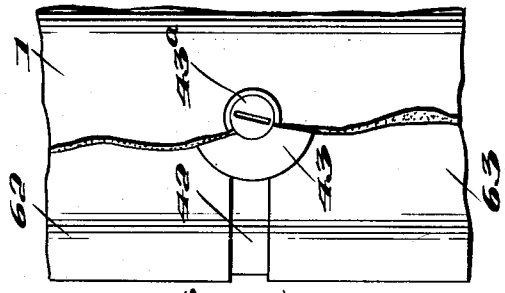

Fig. 12.

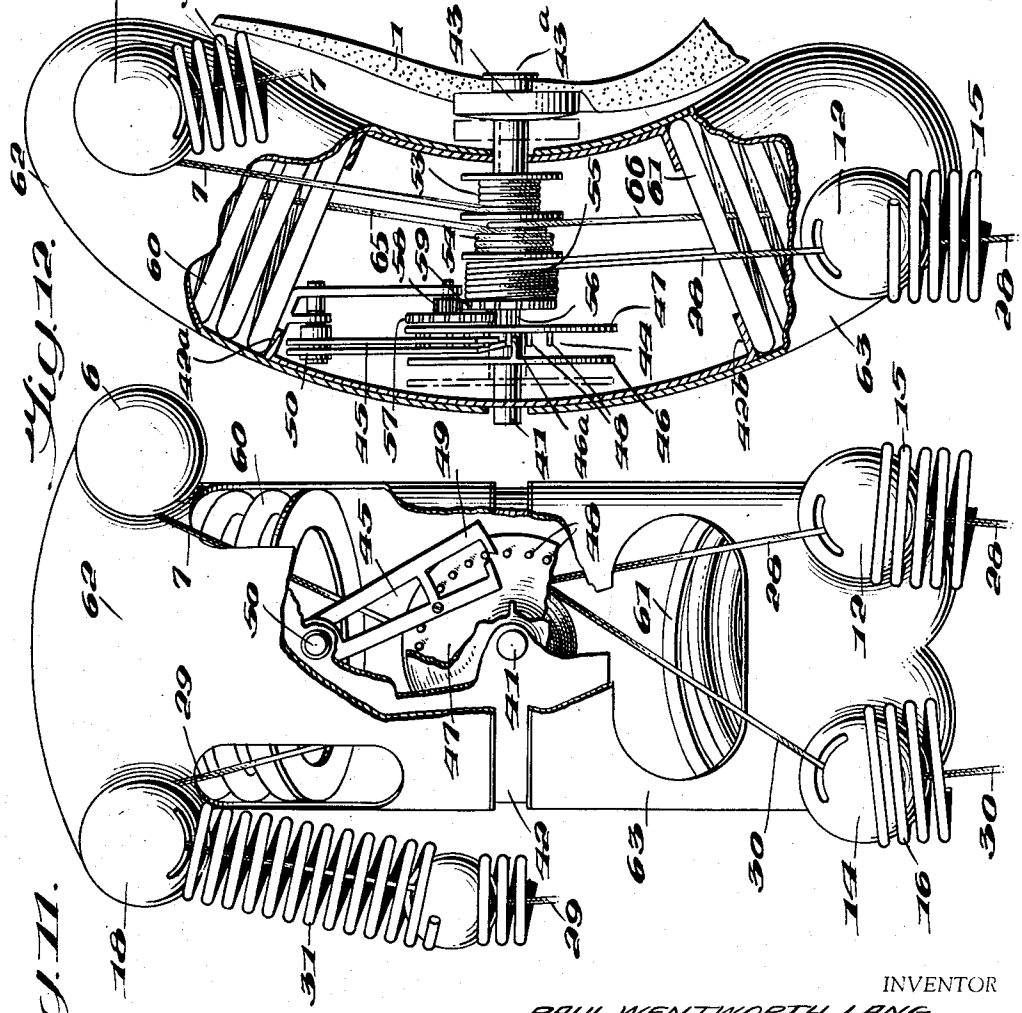

Fig. 11.

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UNITED STATES PATENT OFFICE

2,669,063

GROWING FIGURE TOY

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Application May 1, 1950, Serial No. 159,320

6 Claims. (Cl. 46—119)

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My invention relates broadly to figure toys and more particularly to a method and means for simulating growth in animate figures.

One of the objects of my invention is to provide a method and means for simulating growth in animate objects.

Still another object of my invention is to provide a construction of toy which simulates growth in animate figures.

Still another object of my invention is to provide a construction of toy which may be manufactured inexpensively on a mass production scale for enhancing the entertainment value or attractiveness in toys by simulating growth in animate figures.

Still another object of my invention is to provide a construction of toy having a casing formed from resilient expansive and contractive material with motive means encased therein and arranged for controlled expansive movement simulating the effect of growth in animate figures.

Still another object of my invention is to provide a rubber or synthetic rubber encased figure toy having coil springs therein and operative to expand from a compressed position to an extended position for stretching the rubber or synthetic rubber casing in a manner simulating growth of an animate figure.

Still another object of my invention is to provide a construction of mechanism for coordinating the controlled expansion and contraction of a multiplicity of coil spring members enclosed in a rubber or synthetic rubber body whereby the coil spring members may simultaneously expand for stretching the rubber or synthetic rubber body for simulating animate growth.

Still another object of my invention is to provide a construction of mechanism for controlling the simultaneous expansion of a multiplicity of coil spring members distributed at different positions within a rubber or synthetic rubber encased figure toy for stretching different parts of the figure toy in a controlled manner representative of animate growth of the figure toy for enhancing the educational and amusement value of the figure toy.

Still another object of my invention is to provide an arrangement of control mechanism for expanding different parts of a rubber or synthetic rubber encased figure toy having means for readily restoring the expanded parts of the figure toy to the original contracted positions thereof.

Other and further objects of my invention reside in the construction of growing figure toy as

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set forth more fully in the specification hereinafter following by reference to the accompanying drawings, in which:

Figure 1 is a front elevational view of a figure toy partially broken away and illustrated in section to show the internal construction thereof in accordance with my invention; Fig. 2 is a vertical sectional view taken through the figure toy of Fig. 1 substantially on line 1—1 thereof and illustrating the operating mechanism in elevation; Fig. 3 is a fragmentary vertical sectional view through a portion of the figure toy showing a modified construction in which the coil elements are embedded in the resilient material of the figure toy; Fig. 4 is an enlarged front elevational view of the expansion and contraction control mechanism embodied in the figure toy of Figs. 1–3, the mechanism being shown in completely contracted position preparatory to an expansive condition simulating growth; Fig. 5 is a side elevational view of the expansion and contraction control mechanism shown in Fig. 4, the mechanism being illustrated in a wholly contracted position; Fig. 6 is a fragmentary enlarged elevational view of the expansion and contraction mechanism of Figs. 4 and 5, showing more particularly the regulator for controlling the expansive movement of the mechanism; Fig. 7 is a transverse sectional view taken substantially on line 7—7 of Fig. 5; Fig. 8 is a front elevational view of the expansion and contraction mechanism of Figs. 4–7 illustrated in expanded position simulating growth of the animate object; Fig. 9 is a transverse sectional view taken substantially on line 9—9 of Fig. 8; Fig. 10 is a side elevational view of the expansion and contraction control mechanism illustrated in Fig. 8 in the expanded position thereof; Fig. 11 is a front elevational view of a modified form of expansion and contraction control mechanism for a figure toy embodying a regulated rotatably controlled mechanism utilized in the expansion and contraction device as distinguished from the translatory mechanism shown in Figs. 1–10; Fig. 12 is a side elevational view of a modified form of mechanism illustrated in Fig. 11, parts of the device being broken away and illustrated in section to show parts of the rotatable control mechanism more clearly in elevation; Fig. 13 is a fragmentary view of the rear of the figure toy illustrating the manually controlled actuating means for operating the clutch mechanism of the device illustrated in Figs. 11 and 12 when resetting the figure toy to contracted position preparatory to a repeat cycle of expansive opera-

tion; Fig. 14 is a perspective view of the escapement mechanism which governs the rate of operation of the expansion cycle in the form of my invention shown in Figs. 1–10.

My invention is directed to a toy novelty in which a rubber or synthetic rubber casing representative of an animate figure encloses coil spring members biased to expanded positions and including restraining members in the form of cords which may be wrapped upon spaced positions on a central arbor, the central arbor being connected through clutch mechanism with an escapement governor. The escapement governor operates to control the release of the coil spring members at a rate to simulate growth of the figure toy from a contracted normal limit position to an expanded limit position for projecting the parts of the figure toy. In restoring the figure toy to contracted position the parts of the figure toy are individually collapsed by applying manual force thereto while the arbor is released from the escapement governor by operation of the clutch mechanism. The arbor may be wound manually to wind up the restraining members which connect with the ends of the coil springs for contracting the coil springs and correspondingly contracting the rubber or synthetic rubber encasing whereby the figure toy is restored to its original animate position, the escapement governor reconnected with the arbor through operation of the clutch mechanism and the figure toy thus conditioned for a repeating cycle of expansion or growth. My invention finds expression in a variety of figure toys such as a rubber or synthetic rubber encased snake or reptile, a rubber or synthetic rubber encased doll or a rubber or synthetic rubber encased plant, tree, bush or vegetation. The principle I have evolved is that of controlling the expansion of a spring motor to stretch an enclosing casing from one limiting position to another giving the appearance of growth of the enclosing casing.

The escapement mechanism within the figure toy is particularly appropriate for use in a toy representative of a doll as the escapement mechanism produces an audible sound simulating the heart beat thereby increasing the attractiveness of the toy to children.

The principles of my invention when applied to a doll provide for the simulated growth of not only the arms and legs of the figure but also the torso portion of the figure which is arranged with coil springs surrounding the restraining cords which extend to the arm and leg members of the figure toy and which provide for the central expansion and contraction of the figure toy.

The preferred form of my invention employs a contraction and expansion mechanism of a type in which two substantially linearly extending members are arranged for translatory movement therebetween in a somewhat telescopic relation. The two members slide in a longitudinal direction toward or away from each other and are provided with transversely extending extremities forming guides for coil spring members which project through the resilient body structure of the figure toy. The coil springs are connected from their ends through restraining members which pass through the hereinbefore referred to guides and are looped through one of the substantially linearly extending members intermediate the length thereof and through the extremity of the coacting linearly extending member whereby the said members under action of the coil springs which are connected with the restraining members operate to continuously displace the substantially linearly extending members to a position in which the extremity of one of the substantially linearly extending members tends to align itself with the intermediate portion of the other of the substantially linearly extending members through which the said restraining members pass. This continuous displacement to which the coacting linearly extending members are subjected is regulated by a weight and ratchet mechanism so that the substantially linearly extending members move apart gradually. This gradual expansive movement when embodied in an animate figure such as a doll, a plant, tree, bush, vegetation, or a figure toy of general construction, such as a snake or a serpent, simulates a condition of growth which imparts a naturalness to the device which is attractive, entertaining, educational, and in many applications very amusing.

Referring to the drawings in more detail I have shown the preferred embodiment of my invention applied to a doll formed by a casing of highly resilient material having expansive and contractive properties, which I have represented generally by reference character 1. The casing may take a variety of shapes such as the form of a doll or other figure toy, plant, tree, bush or vegetation. I provide a multiplicity of expansive coil springs within the parts of the figure which simulate the limbs. For example, in Figs. 1, 2 and 3, the figure simulates a doll wherein expansive coil springs 2 and 3 are disposed in the arm of the doll. Expansive coil spring 2 is disposed between ball member 4 adjacent the hand, and ball member 5 adjacent the elbow. Expansive coil spring 3 is disposed between ball member 5 at the elbow and ball member 6 at the shoulder. The restraining member or cord 7 is fastened to ball 4 and extends through the coil spring 2, the ball 5 and the coil spring 3 and through a passage 8 formed in ball member 6 by which the direction of the restraining cord 7 is changed so that the restraining cord extends downwardly and through a port 9 formed in the side wall of the longitudinally extending member 10*a* of the substantially linearly extending member 10. Substantially linearly extending member 10 includes a pair of longitudinally extending members 10*a* and 10*b* secured to a transverse header 11 at the adjacent extremities thereof. The transversely extending header 11 maintains the ball members 12 and 14 at the extremities thereof in predetermined spaced relation for guiding the coil springs shown respectively at 15 and 16. The ball members 12 and 14 are arranged in a manner similar to the symmetrically arranged ball members at the opposite end of the device hereinbefore referred to as ball member 6. That is to say, ball member 6 is carried by the extremity of a transversely extending header 17 which carries the ball member 18 on the other end thereof. The transversely extending header 17 connects with substantially linearly extending member 19 and with the central longitudinally extending member 20. The substantially linearly extending member 19 may be channel shaped in section as shown more clearly in Fig. 9 with the side walls 19*a* and 19*b* spaced to embrace the substantially linearly extending members 10*a* and 10*b* which are adapted to slide in a longitudinal direction. The movement of the channel shaped member 19 and the members 10*a* and 10*b* is coordinated by pin and slot connections. That is, member 10*a* carries pin 10*a*'

which projects through slot 19a' in member 19a. Pin 10b' projects from member 10b through a depending slot in side channel shaped member 19. The substantially linearly extending members 10 and 19 are thus capable of mutual movement in a longitudinal direction. That is, members 19 and 10 move telescopically with respect to each other. The central longitudinally extending member 20 may be integral with or separate from the channel shaped member 19; but in any event is keyed to move with the channel shaped member 19 guided by pins 10a' and 10b' operating in the aligned slots represented in Figs. 5 and 10 at 19a'. To facilitate mounting the expansion and contraction device within a resilient casing, such as the torso of a doll, the coacting members 19 and 20 are slightly curved in contour as represented in Figs. 2, 5 and 10, so that members 19 and 10 slide linearly but in a controlled curved path. The ball members 6 and 18 approach and recede with respect to each other in a linear direction which may be in a somewhat inclined plane depending upon the mounting of the expansion and contraction device within the resilient casing which is to be subjected to the expansion and contraction movement. The linear movement of the members 19 and 10 is further controlled by means of pin and slot connections spaced from the aforesaid pin and slot connections similarly to pin 10a' and slot 19a'. These additional pin and slot connections are illustrated in Figs. 4–10, consisting of pins 10a'' and 10b'' carried by linearly extending members 10a and 10b and extending through slots 19a'', in the side walls of channel shaped member 19 which I have represented in Figs. 5 and 10 at 19a''. Thus the translatory movement of members 19 and 10 is guided in spaced positions along the channel shaped member 19.

The rear of the channel member 19 carries the toothed rack 21. The toothed rack 21 is curved or somewhat arcuate in contour and coacts with spaced teeth 22 and 23 formed on opposite ends of the strip 24a on which is mounted the weight 24 which is carried by a transversely extending shaft member 25. The transversely extending shaft member 25 is pivoted at opposite ends thereof in the flat members 26 and 27. The flat members 26 and 27 are substantially right angularly shaped as shown more clearly in Figs. 5 and 10, with elongated portions slotted as represented at 26a. The ends of the elongated portions of each of the members 26 and 27 are pivotally mounted on pintles 10a''' and 10b''', extending from the sides of linearly extending members 10a and 10b. Members 26 and 27 rock angularly about pintles at 10a''' and 10b''' as channel shaped member 19 and members 10a and 10b slide linearly with respect to each other under control of the step-by-step movement of weight 24. This step-by-step movement produced by the constant tension maintained between members 10 and 19 enables the members 10 and 19 to expand or extend with respect to each other according to a regulated or controlled movement, so that the sliding action of member 10 with respect to member 19 is gradually effected. The mass of weight 24 is such that by shaking the doll, movement may be induced in strip 24a for moving teeth 22 and 23 step-by-step under control of rocking weight 24.

Sufficient lost motion is provided by the slotted arrangement of members 26 and 27 to allow step-by-step movement of weight 24 for preventing too rapid an expansion or spreading of the coacting members 10 and 19. It is believed this expansion or spreading action will be clear from the foregoing specification, but for purposes of emphasis it is pointed out that the coil springs constitute the motive means for the expansive action. These coil springs hereinbefore partially described are arranged symmetrically at opposite ends of the mechanism to exert continuous force on the restraining members represented at 7, 28, 29 and 30. That is to say, coil spring 3 exerts a continuous force on restraining member 7; coil spring 31 exerts a continuous force on restraining member 29; coil spring 15 exerts a continuous force on restraining member 28; while coil spring 16 exerts a continuous force on restraining member 30. It will be understood that potential energy is stored in the several coil springs and their associated and aligned coil springs by compressing the springs. Kinetic energy is produced by the several coil springs during the gradual and controlled expansion of the several coil springs in unison, whereby restraining members 7 and 28 passing through port 9 in the side 10a of member 10 and restraining members 29 and 30 passing through the corresponding port disposed in member 10b represented in Fig. 7 at 32 and extending through a port 33 in the end of the centrally longitudinally extending member 20 forming part of the member 19, whereby a continuous translatory force is exerted, tending to displace the member 19 to a position in which the ported terminus of member 20 becomes substantially aligned with the ports 9 and 32 in members 10a and 10b. This translatory movement in a longitudinal direction is regulated and controlled by the step-by-step operation of the weighted escapement 24. As the substantially linearly extending members 19 and 10 approach the limit of their fully expanded position the weighted escapement is sufficiently disengaged from the rack teeth 21 to permit the two coacting members 19 and 10 to be manually squeezed together by forces applied to the transversely extending members 11 and 17 to condition the mechanism for a repeat cycle at which time the weighted escapement is again engaged with the rack teeth 21. Thus control between the two members 10 and 19 is relieved automatically in the fully expanded position of the members but is restored upon the replenishment of potential energy in the device so that the transformation from a potential energy condition to a kinetic energy condition can only occur over an extended time cycle and with a gradual movement simulating growth.

The potential energy is stored up by the series operation of a multiplicity of coil springs simultaneously as indicated for example in Figs. 1, 2 and 3 by coil springs 2 and 3 acting conjointly or coil springs 15 and 34 acting conjointly. The springs 15 and 34 act against restraining member 28 and through ball members 12, 35 and 36. The ball member 36 adjacent the end of the figure is provided with a projecting extension 37 thereon that is slidable adjacent the surface of a rearwardly disposed floating ball 38. The extension 37 serves as a foundation means for the toe portion of the foot of the figure while the floating ball 38 serves as a foundation means for the heel of the foot so that as extension 37 slides against the surface of floating ball 38 the application of pressure produces a simulated

growing action to the extreme foot end of the figure.

In Figs. 1 and 2 I have shown the manner of encasing the coil springs with the resilient material 1 constituting the body structure of the figure. Special precaution is taken to mold the parts of the figure in predetermined graduated thicknesses to eliminate bulging or collapsing of the parts of the figure where concentrated forces are introduced so that a natural appearance is maintained for the figure. That is to say, in case of a doll the outwardly projecting contour portions are provided with relatively thick walls which maintain the shape of the figure for stretching actions produced intermediate the thinner wall portions. In other words the lateral thickness of the walls of the figure is so selected that stretching is not accompanied by distortion but natural shapes are maintained. In certain forms of my device I may mold the resilient material as represented in Fig. 3 at 40 directly around the coil springs 15 and 34 and around the ball members 35 and 36 and the extension 37 and the floating ball 38. The resiliency of the molded material is such that the material expands as the coil springs 15 and 34 exert a drawing force on restraining member 28 simulating growth of the figure.

The ball members 6, 12, 14 and 18 serve as guides for the coil springs which are free to orient about the ball members when changing the angular disposition of the limbs of the figure. The transverse member 11 may connect with pad members 51 and 52 that serve to shape the figure casing 1. I may mount the ball members in sockets in the transverse members 7 and 11 and thereby increase the adjustability of the limbs. The ball members 6, 12, 14 and 18 when free to revolve universally greatly facilitate the ease of moving the limbs to desired selected positions.

The restraining means under these conditions serve to maintain the ball members in their sockets in any of the positions to which the limbs enclosing the springs may be moved.

The fact that the substantially linearly movable members are retractible toward and away from each other for spreading the transversely extending members 11 and 17 in substantially parallel positions enables the device to be mounted within the torso of the figure so that it is effective to expand and contract the torso in a vertical direction simultaneously with the expansion and contraction of the limbs in similitude which further increases the naturalness of the appearance of the device in simulating growth.

Figs. 11, 12 and 13 show a modified form of my invention wherein a rotatable mechanism is employed for winding the restraining members 7, 28, 29 and 30 on sections of a drum within the figure toy. The sectionalized drum is mounted on a shaft 41 which is journaled within a hollow and somewhat curved casing represented at 42. The shaft 41 is slidable longitudinally under control of a push button device 43 which extends through the resilient body structure represented at 1 for effecting disengagement of the clutch mechanism represented at 44 for disconnecting the escapement mechanism represented at 45 when the device has expanded to its maximum limit and preparatory to the manual contraction thereto to permit the re-cycling expansion operation. Button 43 is provided with a head diametrically grooved at 43a to allow the entry of a small tool or blade or the edge of a coil for rotating the shaft 41 while the clutch is disengaged for rewinding the restraining members 7, 28, 29 and 30 on the drums 53, 54 and 55 when retracting the coil springs 3, 15, 16, 31 etc.

The clutch member 44 comprises a disc 46 having a projecting lug 46a thereon adapted to engage a lug carried by coacting disc 47.

Disc 47 carries a series of horizontally projecting spaced pins 48 which are engaged step-by-step by the end of the bifurcated escapement lever 49 that is pivoted interiorly of one end of casing 42 at 50 in a position operative to swing angularly in a plane offset from the plane of disc 47. Shaft 41 connected to the set of drums 53, 54 and 55 through speed reduction gearing 56, 57, 58 and 59 so that the set of drums rotate at a slow rate compared to the rotation of shaft 41 in releasing restraining members 7, 28, 29 and 30, from drums 53 and 55 and restraining members 65 and 66 from drum 54. Thus the coil springs and also the torso are allowed to gradually expand simulating animate growth.

The torso portion of the device also expands as separate coil springs 60 and 61 are disposed between the ends of casing 42 at 42a and 42b and the interior ends of the telescopic members 62 and 63, which slide thereon. Restraining members 65 and 66 extend from drum 54 to the ends of coil springs 60 and 61 and release these coil springs gradually allowing the telescopic members 62 and 63 to spread apart on casing 42. The members 62 and 63 carry the ball members 6, 18 and 12, 14 and/or the sockets in which these members are supported. The restraining means 7, 28 and 30 pass through the ball members 6, 18, 12 and 14, as previously described. When the restraining members 7, 28, 29 and 30 are released from the drums 53 and 55 and restraining members 65 and 66 released from drum 54 the coil springs 60 and 61 become effective to push the telescopic members 62 and 63 apart simulating the appearance of animate growth.

The repeated clicking sound of the escapement mechanism that governs the rate of growth of the device adds further attractiveness to the device as the clicking simulates the sound of a heart beat for the device when built into a doll or manikin.

In Figs. 1–10 and Fig. 14, I have illustrated the rack 21 and the teeth 22 and 23 supported by supporting strip 24a of weight 24 on an enlarged scale with a relatively small number of teeth formed in the rack 21. It will be understood, however, that the enlarged showing is for purposes of explaining the operation of my invention and that in practice the gear teeth are formed on a scale that enables prolonged operation of the expanding cycle to take place. Also the arcuate contour of the rack 21 is so determined that the teeth 22 and 23 supporting strip 24a of weight 24 remain in step-by-step engagement therewith until the expansion limit has been reached whereupon the two coacting members may be restored to contracted position from a limiting position in which teeth 22 and 23 of weight 24 are retracted from meshing engagement with rack teeth 21. In the contracting process the coaction of the teeth 22 and 23 with the rack 21, as shown more clearly in Fig. 14, insures the restoration of the telescopic members 10 and 19, to their initial position, preparatory to an expansion cycle. The teeth 22 and 23 are formed on a resilient supporting strip 24a that supports the supporting weight 24 at angles as shown in the drawings so that a resiliency is provided in the rockable device that permits the

sliding of the teeth over the ratchet-like teeth **21** of the rack when the device is being restored to the original condition preparatory to expansion. The links **26** and **27** serve to guide the weight, the resilient supporting strip **24***a* and the teeth **22** and **23** throughout the restoring cycle to the position at which the expansion cycle commences.

I may mold the parts of the casing of the expansion and contraction mechanism, shown in Figs. 11–13 or of the telescopic members of Figs. 1–10, from plastic, thereby reducing costs in manufacture and production.

While I have described my invention in certain preferred embodiments, I realize that modifications may be made and I desire that it be understood that no limitations upon my invention are intended other than may be imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. A figure toy comprising a resilient tubular casing, an expandible and contractible coil spring enclosed by said resilient tubular casing, a terminus member embedded in the end of said tubular casing, a ball member floatingly supported in the end of said tubular casing and slidably engaged by said terminus member, said coil spring being connected with said terminus member for forcing said terminus member in sliding cam-like contact with said floatingly supported ball member for displacing said terminus member and said ball member within said tubular casing for stretching said tubular casing as said coil spring expands for simulating animate growth at the end of said tubular casing.

2. A figure toy as set forth in claim 1 in which rounded termini are housed within said casing on which said coil spring is supported and a restraining member extending through said rounded termini and movable therethrough during the expansive action of said coil spring for controlling the stretching of said tubular casing.

3. A figure toy comprising a resilient tubular casing terminating in an end portion extending in a generally extending transverse direction to the axis of said tubular casing, said end portion including a ball member in the interior thereof substantially in alignment with the axis of said tubular casing, an expansible and contractible coil spring mounted interiorly of said tubular casing member, a ball member disposed in said tubular casing in a position displaced from the aforesaid ball member but substantially in axial alignment therewith, a curved extension member connected with said second mentioned ball member and projecting in a direction substantially in alignment with the laterally extending portion of said casing and in slidable contact abutment with said first mentioned ball member whereby expansion and contraction of said coil spring effects displacement of said second mentioned ball member for correspondingly displacing said first mentioned ball member through the sliding abutment effected by the movement of said extension with respect to said first mentioned ball member for simulating growth of said laterally extending portion in correlation to simulating growth of said tubular casing.

4. A figure toy as set forth in claim 3 in which said extension member moves in a path that is substantially tangent to said first mentioned ball member as said coil spring expands and contracts.

5. A figure toy as set forth in claim 3 in which the laterally extending portion of said casing simulates the shape of an animate member and in which said extension member imparts movement in one direction to the said casing while said first mentioned ball member imparts movement in an opposite direction to said casing for simulating growth of the simulated animate member.

6. A figure toy as set forth in claim 3 in which said first mentioned ball member is located in a position corresponding to the position of a heel and in which an extension member terminates in a position of a toe and wherein the slidable displacement of said extension member with respect to said first mentioned ball member operates to spread the terminus of said extension member away from said ball member for simulating growth between the heel and the toe of the figure toy.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
268,020	Howard	Nov. 28, 1882
1,049,345	Dolman	Jan. 7, 1913
1,062,129	Sweeney	May 20, 1913
1,484,182	Margus	Feb. 19, 1924
1,918,122	Naue	July 11, 1933
2,129,421	Hales	Sept. 6, 1938
2,252,125	Hauser	Aug. 12, 1941
2,422,913	Leach	June 24, 1947
2,564,813	Moyers	Aug. 21, 1951

FOREIGN PATENTS

Number	Country	Date
352,728	France	1905
104,280	Great Britain	1917
633,641	Great Britain	1949