Dec. 2, 1969 R. G. BAULARD-COGAN 3,481,070

ANIMATED DOLL

Filed June 17, 1966 5 Sheets-Sheet 1

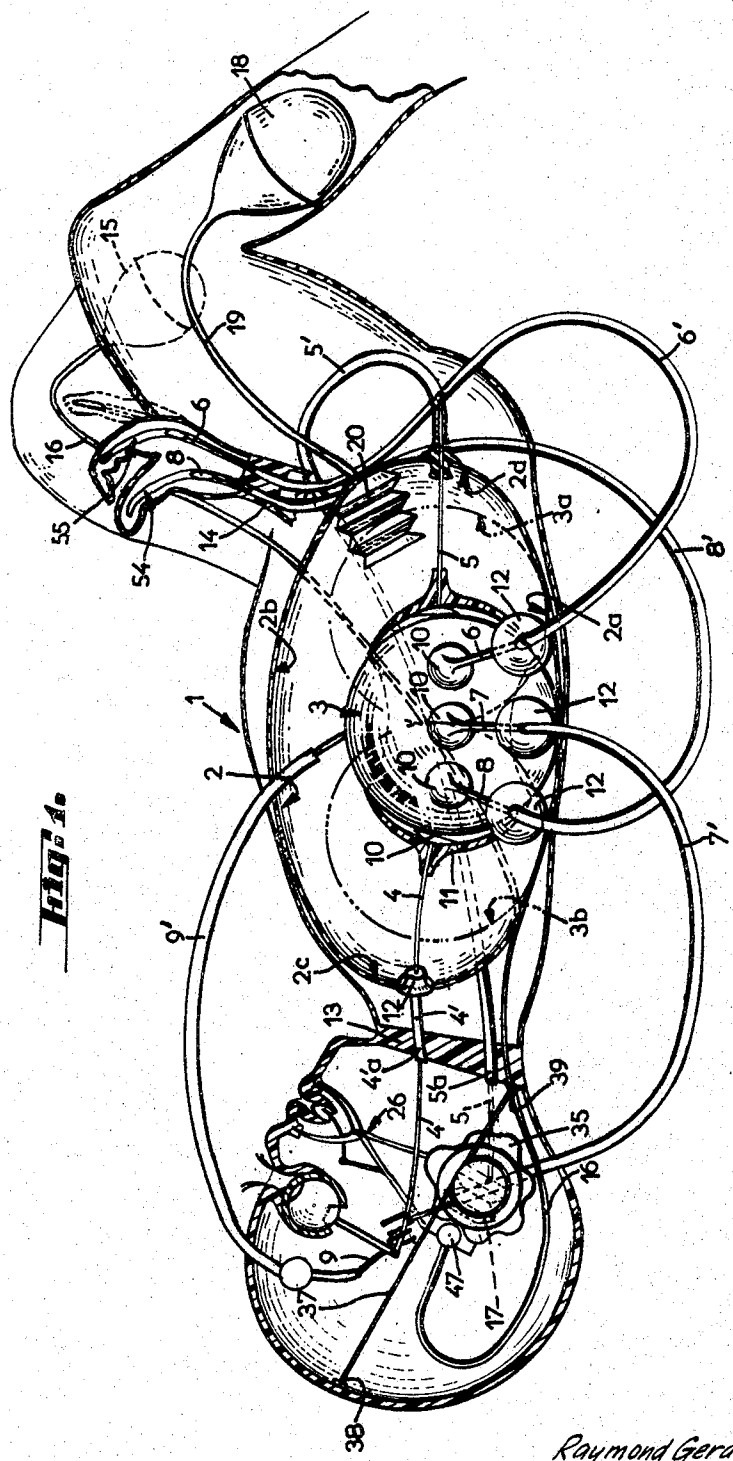


Fig. 1.

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ANIMATED DOLL

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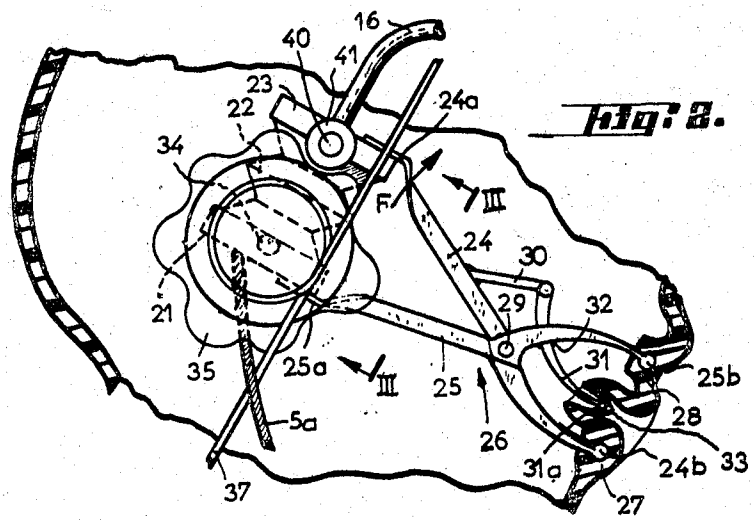
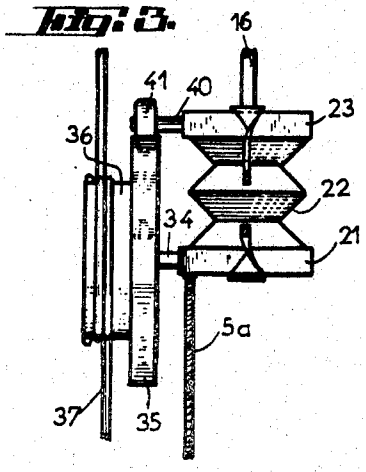


Fig: 2.

Fig: 3.



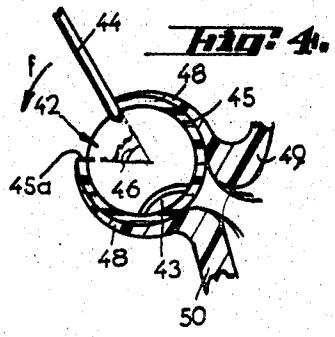


Fig: 4.

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Fig. 6.

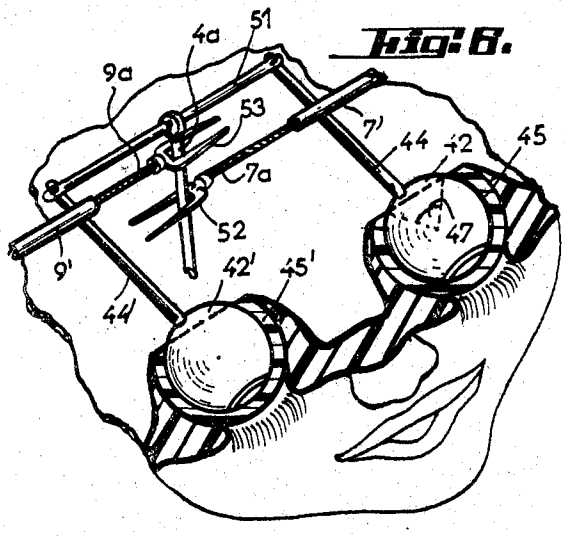


Fig. 5.

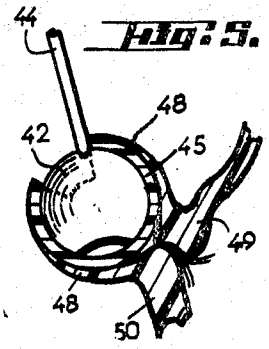
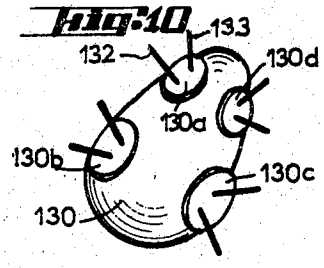


Fig. 10.



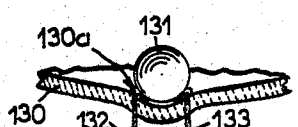


Fig. 11.

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ANIMATED DOLL

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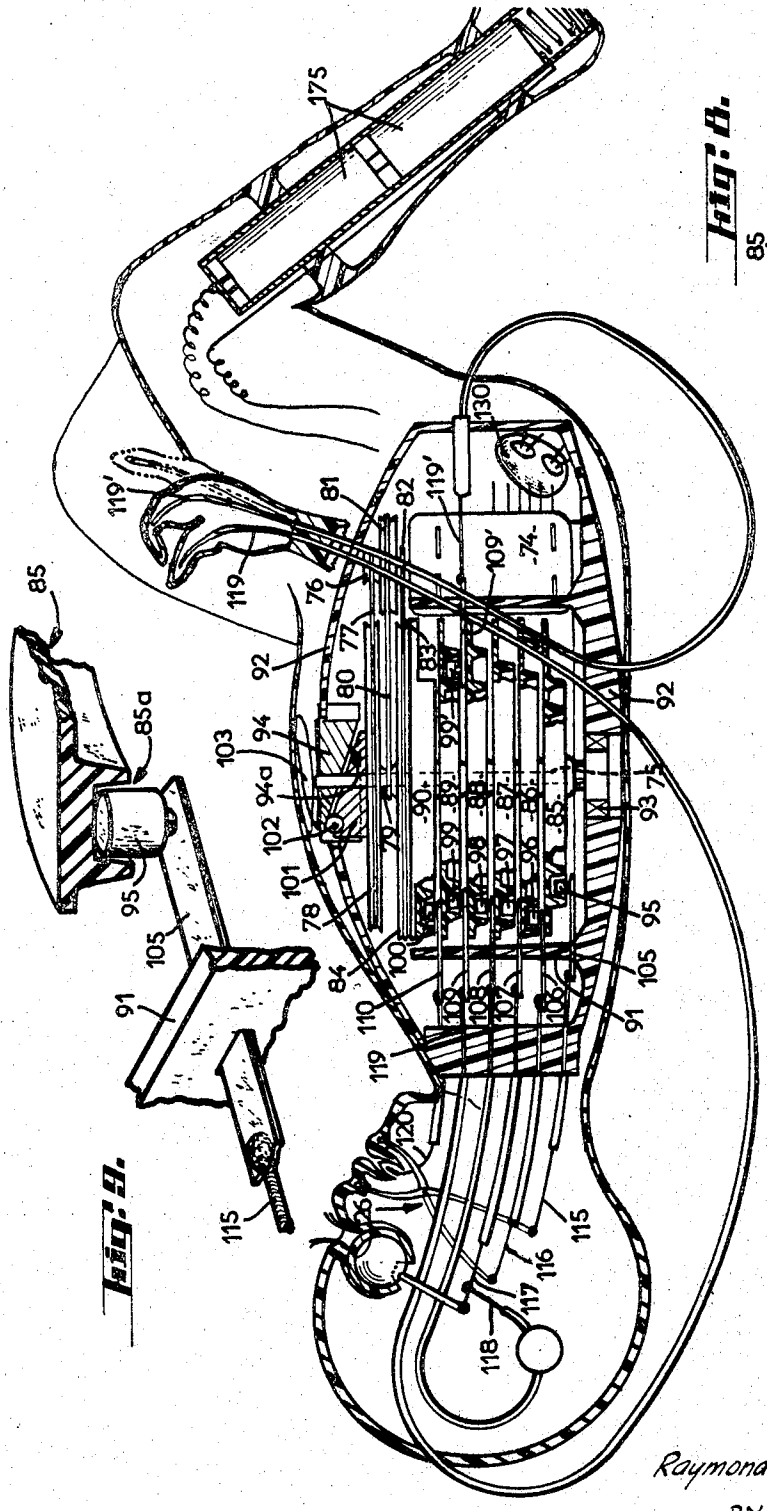


Fig. 6.

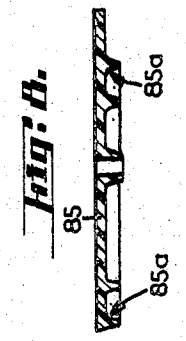


Fig. 8.

Fig. 7.

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ANIMATED DOLL

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Fig. 14.

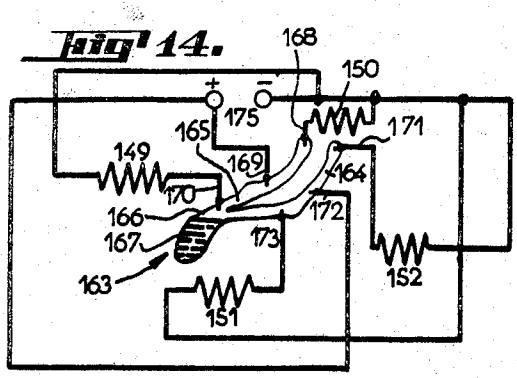


Fig. 12.

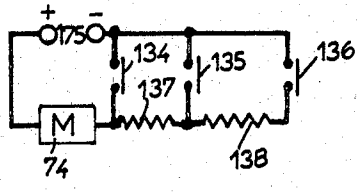
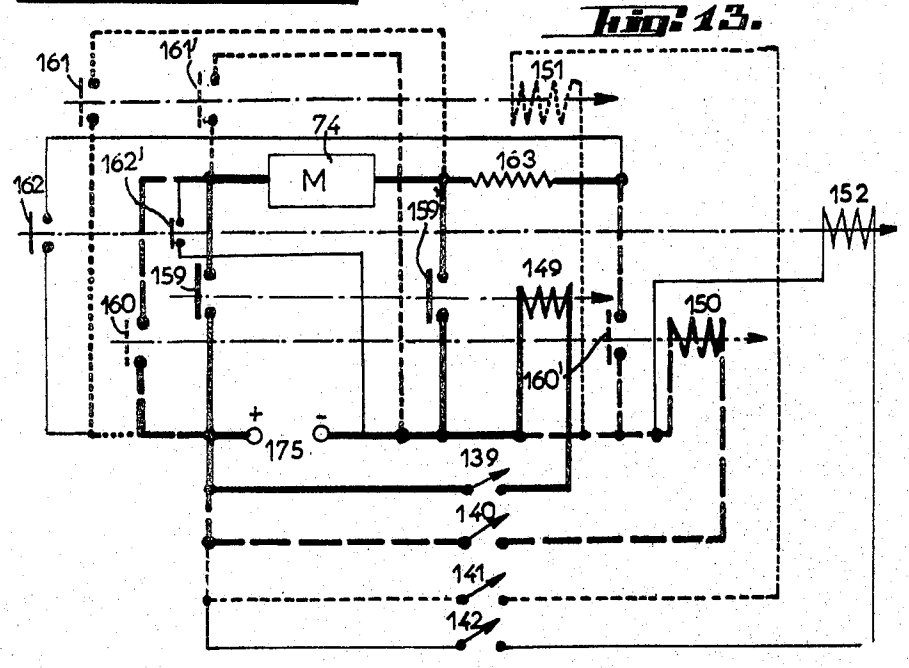


Fig. 13.



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United States Patent Office

3,481,070
Patented Dec. 2, 1969

3,481,070

ANIMATED DOLL

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Filed June 17, 1966, Ser. No. 558,432
Claims priority, application France, June 28, 1965, 22,597
Int. Cl. A63h 3/48, 11/00
U.S. Cl. 46—135 2 Claims

ABSTRACT OF THE DISCLOSURE

The invention notably relates to a self-animated doll subjected to progressive movements and/or deformations which will give the exact illusion of the life.

Particularly, the doll's eyes and mouth are animated with movements simulating as desired the laugh, the voracity, the astonishment and generally all the human expressions.

It is the essential object of the present invention to provide animated dolls, figured or creation characters, animals, toys and the like, as well as the articles obtained by this method.

Mechanical methods of animating marionettes, puppets, etc. have been known for many years.

However, these mechanical methods are unsuitable for giving a semblance of life to the movements performed by the characters which are mostly abrupt, jerky and limited or in other words artificial, irrespective of the skill of the operator or puppet-player.

In the U.S. Patent No. 3,153,881 of Oct. 27, 1964 in the applicant's name for "Animated Doll," a method was described which was based on the use of inflatable flexible bladders of limited elasticity, enclosed in the object for imparting thereto changes in shape or gradual movements of the body of said object to give the nearest possible illusion of life. The object was animated by using a source of fluid under pressure adapted to be selectively distributed through adequate means disposed for example at a relative distance from the object.

This invention is concerned with objects, notably of the type set forth in the U.S. Patent No. 3,153,881 but of which the animation and more particularly the self-animation are obtained preferably by simply altering the position or inclination of said objects. In other words, if the object is, say, a doll, according to this invention the mere fact of inclining the doll in such or such position will entail progressive movements and/or deformations of the doll which will give the exact illusion of life.

More particularly, the method of this invention for animating and more specifically self-animating objects is remarkable notably in that progressive movements and/or deformations of the various movable and/or deformable members or limbs of said object are controlled and produced by causing the relative inclination of said object due to the provision, within said object, of at least one movable body, the movements of said body in relation to said object controlling and causing the aforesaid movements and/or deformations.

According to another feature of the method of this invention, to a predetermined relative position of said movable body and said object corresponds a predetermined sequence of movements and/or deformations of said object.

An object according to this invention, for carrying out the above method is remarkable notably in that there is disposed within said object, at least one movable body of which the position with respect to said object controls through the medium of associated mechanical, magnetic and/or electrical actuators the progressive movements

and/or deformations of the various movable and/or deformable members or limbs of said object.

According to another feature of this invention, the aforesaid movable body consists of a metal ball, for example a steel or the like, movable in a cavity or recess provided in said object.

More particularly, according to a specific form of embodiment of this invention, the aforesaid ball is retained by an elastic strap, belt or envelope, and said actuators consist of cables or the like extending through said strap and carrying at their relevant ends outflaring portions disposed between said strap and said ball.

Under these conditions it is clear that if said object consists for example of a doll and said ball is movable within a cavity of say, avoid configuration disposed in the abdomen of the doll, when the latter is gradually inclined or dandled the various members and/or limbs thereof such as the eyes, mouth, hands, legs, etc., are gradually and elastically actuated as a consequence of the rocking motion impressed to the doll, thus giving to the doll a semblance of life.

According to another form of embodiment of this invention, the aforesaid movable body consists of a small ball of conducting metal, for example, a ball coated with a contact metal such as silver, gold, palladium or the like, movable within an electrically insulating and fluid-tight cavity either vacuumized or filled with an inert gas such as nitrogen or a rare gas, said cavity being solid with the object to be animated; on the other hand, electrical conducting contact studs are disposed in this cavity; thus, in given inclined positions at least two studs are electrically interconnected by said ball movable in said cavity constituting in this case a ball switch, in order to close an electric circuit comprising a source of current such as a dry battery, and a motor adapted through suitable actuators or like means, to drive movable and/or deformable members of said objects.

More particularly, if said motor is adapted rotably to drive at a slow speed, through a suitable reducing gear, for example of the belt-and-pulley type, at least one cam or like member engaged by rollers or tappet followers carried by the ends of cables or the like for actuating the movable and/or deformable members of said object, and if the latter consists for example a doll, it is clear that when the doll is set in a certain position causing the ball to close the electric circuit, a predetermined sequence of movements is obtained as a function of the cam contour.

Moreover, if the device comprises at least two pairs of said contact studs adapted to be interconnected by turns by said ball for connecting said motor either directly or through associated relay means respectively to the terminals of said dry battery or to said terminals through a resistance connected in series with said motor, different speeds or rates of said movements and/or deformations will be obtained, according to the doll position, thus giving very different semblances of life. Thus, for example, the doll may look asleep, when lying on back or reclining, and perform slow movements, the same doll looking perfectly awake and performing quick movements when seated.

In addition, at least two other pairs of contact studs adapted to be interconnected by turns by said ball may be provided for connecting either directly or through associated relay means said motor to the battery terminals to cause the current to flow through said motor respectively in one and in the other direction. By reversing the direction of rotation of the motor, said cams engage with their opposite side or slope the ends of the control cables, thus changing completely the type of movement performed by the members controlled thereby.

For instance, if the cam engages the end of a cable controlling the mouth opening and closing movements and has an asymmetric contour rising slowly on one side and descending steeply on the other side, according as the cam engages first with one face or with the other face the mouth control cable, the baby-doll's mouth will either open slowly and close rapidly, thus giving the impression of voracity, or open rapidly and close slowly, thus giving the impression of a complete astonishment. This example proves the great variety of movements and expressions that can be obtained by simply reversing the direction of rotation of the motor.

In order to offer a clearer understanding of this invention, the same will now be described with reference to the accompanying drawings illustrating diagrammatically by way of example a few forms of embodiment of the invention.

In the drawings:

FIGURE 1 is a longitudinal section illustrating somewhat diagrammatically an animated doll constructed according to the teachings of this invention;

FIGURE 2 is a detail view showing on a larger scale with parts broken away the mechanism controlling the operation of the mouth of the doll illustrated in FIGURE 1;

FIGURE 3 illustrates one portion of the mechanism of FIGURE 2, as seen in the direction of the arrows III—III of this figure;

FIGURE 4 is a detail view showing on a larger scale the eye control mechanism;

FIGURE 5 is a view similar to FIGURE 4 but showing a different position of the eye;

FIGURE 6 is a detail view showing on a larger scale and in perspective the mechanism controlling the simultaneous operation of the two eyes of the doll of FIGURE 1;

FIGURE 7 is a view similar to FIGURE 1, showing a modified form of embodiment of the invention, wherein the doll is adapted to be animated by an electromotor adapted to be started, operated and stopped under the control of a contact device according to the invention;

FIGURE 8 is a sectional view of a plate carrying the cam in which the roller followers actuating the various cables are mounted as shown in FIGURE 7;

FIGURE 9 is a detail view showing on a larger scale the contour of the cam member and the manner in which this contour controls the push or pull movements of the cables controlling in turn the movement and/or deformations of the various elements of the doll, illustrated in FIGURE 7;

FIGURE 10 shows on a larger scale and in plane view from beneath, a ball switch device having four operative positions and a stop position, according to this invention;

FIGURE 11 shows on a larger scale with parts broken away the manner in which each pair of contact studs may be constituted, and also the manner in which they are interconnected through the movable ball within the contact device;

FIGURE 12 illustrates the wiring diagram of the electromotor of the doll shown in FIGURE 7, connected to its supply battery through a mercury- or ball-switch for example of the type illustrated in FIGURE 10 to provide three different motor speeds and a stop position;

FIGURE 13 is a view similar to FIGURE 12 but showing a circuit adapted, by utilizing four relays associated with a four-position switch, to provide two different motor speeds in one and in the other direction, and a stop position, that is, four different sequences of operation of the doll, shown in FIGURE 7, and a stop position, and

FIGURE 14 shows a wiring diagram comprising a mercury switch according to this invention and the manner in which this switch is connected to the relays controlling the motor operation which are shown in FIGURE 13, the means for connecting the motor to the contacts responsive to said relays being omitted since they are exactly similar to those shown in FIGURE 13.

Referring first to FIGURES 1 to 6 of the drawings, it will be seen that the animated object according to this invention, which is shown herein by way of example, consists of a baby doll **1**. The abdomen of the doll **1** comprises an ovoid cavity **2** containing a relatively heavy ball **3**. To facilitate the description, it may be assumed that in the position shown in FIGURE 1 the doll is lying substantially horizontally on its back. Advantageously, the doll's body consists of a flexible elastomer such as rubber, affording a certain elastic deformation of the body which gives a greater semblance of life to the doll.

Assuming that the baby-doll **1** is lying on its back, the ball **3** will normally rest by gravity in the rear portion **2***a* of cavity **2**, away from the front portion **2***b*, this ball **3** being more or less free to assume the positions shown in chain-dotted lines at **3***a* and **3***b*, more or less near the top **2***c* of the cavity **2** or near the bottom **2***d* of said cavity, the terms front, rear, top, bottom, left-hand, right-hand being used herein to facilitate the description and referring to the baby-doll body in its upright position.

Preferably, the ball **3** is relatively heavy and consists for example of a steel ball such as those used in lorry ball-bearings. However, this ball needs not be perfectly spherical and may advantageously be purchased from ball-bearings manufacturers by using waste ball-bearings rejected for minor defects such as pitting or slight ovalization.

In the form of embodiment illustrated in FIGURE 1 various control cables designated by the reference numerals **4** to **9** in the drawings extend from the contact ball **3** to the doll's limbs to be moved or deformed. These cables advantageously consist of steel wires sliding in sheaths, somewhat in the fashion of Bowden bicycle or the like. They are attached at one end to the ball **3** by means of outflared portions having a concave bottom face engaging the surface of said ball **3**; the various cables extend through an elastic strap **11** surrounding one portion of said ball **3** and comprising suitably spaced orifices permitting the passage of the bare cable ends therethrough. The outflared portions **10** are thus constantly pressed by said strap **11** against the ball surface. When the bare cable ends extend through the wall of the cavity or enclosure **2** they pass through sockets or like members **12** acting at the same time as abutments to the relevant sheaths **4'**, **5'**, **6'** etc. of these cables. Of course, the other, free ends of sheaths **4'**, **5'** etc. are also suitably attached in the vicinity of the ends of the various doll's members to be moved or deformed. Thus, for instance, the sheath **4'** is attached at **4'***a* to a solid portion **13** of the neck, beyond which the cable **4** emerges freely to actuate the eyes as will be explained presently. Similarly, sheaths such as **6'** and **8'** for actuating the hands are attached to a harder portion **14** of the wrist of each hand.

The various cables and their sheaths for actuating the different members or limbs of the baby-doll are shown as emerging from the body, to simplify the drawings, but it is clear that in actual practise all these cables and sheaths are housed within the doll's body. Moreover, although only certain cables for actuating the main elements of the doll are shown in the drawings, notably for actuating the eyes, the mouth and the hands, it is obvious that these cables may be multiplied at will and that according to the same principle other elements of the doll, such as the legs, feet, head, hair, etc., may be actuated if desired.

In FIGURE 1 there is also shown a pear-shaped bulb or like device **15** housed in the left-hand leg of the baby-doll and connected through a rubber hose or like means **16** to bellows means **17** arranged inside the doll's head for a purpose to be set forth presently.

Similarly, enclosed in the right-hand leg of the baby-doll is a pear or like element **18** connected to a hose **19** opening into a bellows or like element **20** housed in the lower portion of cavity **2**.

By pressing these pears **15** or **18**, as shown in the flexible rubber calf portions of the doll's legs, the corresponding bellows **17** and **20** are more or less inflated. The function of bellows means **17** will be clearly apparent from the following description of FIGURES 2 and 3; the function of bellows **20** is as follows: when the doll is seated and therefore the ball **3** under the action of the gravity presses said bellows **20** mounted in the lower part of cavity **2**, by pressing the pear **18**, the bellows **20** is inflated and the ball **3** is pushed back upwards and causes the consequent movements and deformations of the doll's members. Therefore, the doll will be animated each time when in the seated position, the right-hand calf is depressed and further released.

FIGURES 2 and 3 of the drawings show more in details the mechanism provided for actuating the mouth of the doll of FIGURE 1. The operative end *5a* of cable **5** is opposite to the cable end associated with the ball **3**. This cable end *5a* is relatively rigid so that when the cable **5** emerges from the end *5'a* of its sheath attached to the base of neck **13** this end is capable of pulling and pushing the lower end plate **21** of a bellows **22** comprising an opposite end plate **23**, the bellows **22** with end plates **21**, **23** forming said bellows means **17**.

As already explained in the description of FIGURE 1, a hose **16** opens into the bellows **22**. The corresponding ends *24a* and *25a* of the two prongs of a shear-like device **26** are rigid with the end plates **21** and **23** of bellows **22**, the opposite arms *24b* and *25b* respectively of said shear-like device being rigid with the lower and upper lips respectively of the doll's mouth, or with adjacent portions thereof. Preferably, the ends *24b* and *25b* carry small enlarged portions force-fitted in corresponding recesses of the lower and upper lips **27** and **28** respectively of the mouth. The shear-like device **26** comprises a pivot pin **29**. As shown in FIGURE 2, the arms of this shear-like device **26** are advantageously cut from flat sections in order to impart the maximum stiffness to the device, these sections being somewhat twisted at their ends *24a* and *25a* to facilitate the fastening thereof for example by means of screws, to the end plates **21** and **23** of bellows **22**. On one arm, for instance the upper arm **24** of the shear-like device **26**, there is a small projecting rod **30** having pivoted thereon a small curved arm **31** sliding in a guide ring or the like **32** rigid with the arm **25** of the shear-like device. Under these conditions, when the arms of this device **26** open or close, the small curved arm **31** is sunk into or on the contrary moved more or less away from, the bottom of the doll's mouth, and more particularly its free end *31a* adhering to the tongue **33** is sunk more or less into the mouth. Advantageously, as shown, the tongue **33** consists of a small bag similar to the finger of a glove, which is formed integrally with the mouth and turned inside out. The interior of the tongue **33** may be either attached to the end *31a* of arm **31** for example by a spot of glue, or simply resiliently pressed thereagainst.

Mounted on the end plate **21** of bellows **22** is a pivot pin **34** carrying respectively a cam **35** and a drum **36**. A cable or like element **37** is wound on said drum, for example by forming one loop thereon, this cable having its ends anchored to two opposite fixed points **38** and **39** of the baby-doll's head as clearly shown in FIGURE 1. This cable **37** may if desired have a certain elasticity. The other end plate **23** carries a rotary shaft **40** provided with a roller follower **41** engaging the contour of cam **35**. The pivot pins **34** and **40** may be mounted either for rotation in the end plates **21** and **23**, or fixed, and in this last instance the cam **35** and drum **36** on the one hand, and roller follower **41**, on the other hand, are mounted on the pins **34** and **40** respectively. The mode of operation of the mouth, that is, notably of the lips and tongue of the doll, is clearly apparent from the above description of FIGURES 1 to 3.

Thus, when as a consequence of relative movements of the movable body or ball **3** in the cavity **2** provided in the abdomen of the doll the control cable **5** is pulled or pushed, to move the end plate **21** of bellows **22** up or down in the doll's head, two superposed effects are observed. Assuming, for example and to facilitate the description, that the cable **5** is pushed into its sheath or in other words that the end plate **21** of bellows **22** is pushed upwards within the baby-doll's head, under these conditions, the complete shear-like device **26** will rotate in the direction of the arrow F of FIGURE 2 about its fastening points *24b* and *25b* in the lips **27** and **28**. Thus, as the mouth is made of flexible plastic material it will undergo a certain deformation so that its intermediate portion will be lowered and the commissures of the lips will be raised, thus giving a certain general cheerfulness to the baby's features. This effect is attended by another effect. In fact, as the end plate **21** is raised, the drum **36** will rise while rotating along the cable **37** wound thereon thus causing the cam **35** rigid with drum **36** to rotate likewise. Therefore, the contour of cam **35** which is engaged by the roller follower **41** will move the pivot pin **40** alternately towards and away from the pivot pin **34**, thus moving the end plates **21** and **23** away from each other and simultaneously actuating the arms **24** and **25** of the shear-like device **26**. The doll's mouth is alternatively opened and closed, more or less rapidly according to the thrust transmitted through the cable **5** to the plate **21**; thus animating the mouth as a function of the cam contour. Moreover, in conjunction with the mouth opening and closing movements, co-ordinate movements of the tongue in the doll's mouth are obtained.

If, instead of pushing the cable **5** the latter had been pulled, very similar effects would have been obtained, except that the complete shear-like assembly **26** would have pivoted in a direction opposite to that shown by the arrow F in FIGURE 2, so that the commissures of the lips would have been lowered, thus giving an impression of sadness to the baby's features.

Independently of the movement of the movable body or ball **3** within the baby's body, the mouth opening and closing movements may be controlled simultaneously with the movements of the tongue by acting upon the pear **15** in order to move or less inflate the bellows **22** and therefore more or less divaricate the arms of the shear-like device **26**. It may be noted that these movements controlled by means of the pear **15** can be obtained irrespective of the position of the shear-like device **26** taken as a whole, that is, when the baby's feature are expressive of sadness, joy or serenity (the cable **5** being in this last case in its mean position, neither pushed nor pulled too far in the doll's head). Moreover, it may also be noted that the amplitude of the movements controlled by means of said pear **15** may be as great or as moderate as desired, thus permitting of imitating a mumbling attitude, a cry, a complete astonishment, etc. These movements of the mouth, controlled directly by the pear **15**, are superposed, of course, to those controlled automatically by the cam rotatably driven by possible displacements of the ball **3**.

The controlled movements of the eyes are clearly apparent from FIGURES 4 to 6 of the drawings.

In these figures, it will be seen that each eye consists of a solid inner ball **42** on which the iris **43** and the pupil of the eye are drawn, the rear portion of the eye-forming ball **42** being rigid with an actuating rod **44**. This ball **42** is mounted inside another, hollow ball **45** of transparent material, consisting for example of two half-balls glued or suitably assembled to the ball **42**. The hollow ball **45** has formed therein a notch preferably of tapered ovoid configuration having for instance a centre angle **46** (in the vertical plane of the eye) of about 45° and a centre angle **47** in the horizontal plane of the eye of the order of

60°. The ball **42** is mounted for free rotation within the hollow ball **45**.

When assembling the eyes the ball **45** is force-fitted in the ocular cavity constituted by walls **48** formed integrally with the orbital arches **49** and **50** and with the remaining portions of the head. The ball **45** may if desired be glued on the inner faces of said walls **48**.

In FIGURE 6 is will be seen that the two eyes, designated by the same reference numerals but with a prime (') in the case of the right-hand eye, are operatively interconnected by a coupling rod **51** attached to the pair of eye-actuating arms **44** and **44'**. The rod **51** has its ends pivotally attached to said arms **44** and **44'**, and its central portion is attached to the end **4***a* of the cable **4** visible notably in FIGURE 1. Moreover, a pair of forks **52** and **53** are carried respectively by the ends **7***a* and **9***a* of a pair of opposite cables **7** and **9** (also visible in FIGURE 1) emerging from corresponding sheaths **7'** and **9'** anchored in the left-hand and right-hand portions of the head respectively. With this arrangement the forks **52** and **53** are adapted, when the cables **7** or **9** are pushed inwards, to push the end **4***a* of cable **4** to the right or to the left (in relation to the baby-doll's head). Of course, the cables **7** and **9** are anchored to the movable body **3** in opposite directions, so that the movements of cables **7** and **9** for pushing the end **4***a* of cable **4** interfere with each other.

The movement of the eyes is clearly apparent from FIGURES 4, 5, 6 and 1 of the drawings. In fact, it will been seen that when the cable **4** is pulled or pushed in the baby-doll's head, the coupling rod **51** is moved up or down in the head. This causes the upward or downward movement of both eyes respectively, and more particularly of the inner balls **42** and **42'** carrying the iris thereof, through the medium of said arms **44** and **44'**. As long as these arms **44** and **44'** are moved within the angular limits of said angle **46** in a vertical plane of the notch formed in the hollow ball **45**, only the iris moves up or down, the eye remaining open. In other words the baby's eyes look upwards or downwards. Similarly, the actions of forks **52** and **53** pushing to the right or to the left the end **4***a* of cable **4** will control the turning of the eyes to the left or to the right, respectively. Preferably, the cables **7** and **9** are mounted in the manner shown diagrammatically in FIGURE 1. More particularly, the cable **7** is mounted on the right-hand side of ball **3** and secured on the right-hand side of the baby-doll's head, and the other cable **9** is mounted on the left-hand side of ball **3** and secured to the left-hand side of the head. Thus, the doll constantly tends to look in the direction towards which it is inclined, and notably to look at the person dandling the doll.

If the cable **4** pushing or pulling the coupling rod **51** and the associated arms **44** and **44'** oversteps the point where the balls **42** and **42'** revolve freely within the hollow balls **45** and **45'**, the arms **44** and **44'** engage the edges of the notches limiting the walls **48**, thus carrying along these walls and closing the eye while altering the shape of the orbital arches, as shown in FIGURE 5. For example, if the cable **4***a* pushes the rods **44** and **44'** upwards as shown in FIGURE 5, the upper eyelids close gradually as if the baby were asleep. If the amplitude of the movement of cable **4** were further increased, the shape of the orbital arch **49** would be altered to simulate anger and then pain (which, with the construction shown in FIGURE 1, takes place when the baby in turned upside down). On the other hand, if the movement tending to incline the arms **44** and **44'** took place with excess in the downward direction, shown by the arrow *f* (FIGURE 4), these arms **44** and **44'** will firstly abut against the lower end **45***a* of the hollow balls **45** and **45'**. The shape of the stiffer orbital arch **50** remains practically unaltered and if this rotation in the direction *f* is continued the shape of the other orbital arch **49** is altered and this arch is raised, thus tending to open the eyes wide as the features of the face are being altered. It will be noted that this expression appears when the baby is seated or upright.

The animation of the hands is clearly apparent in FIGURE 1. Preferably, each hand comprises two actuating cables one leading to the thumb and the other to the four fingers of the hand which act as one, this last cable sliding for example in the forefinger. The mechanism for animating the right hand of the baby-doll is shown in FIGURE 1. In the form of embodiment illustrated it is assumed that the hand is made of a flexible elastic material and that in the inoperative position it is normally nearly closed. The end portions of cables **6** and **8** which engage the hand consist of spring steel or the like and are substantially rectilinear; these end portions are slidably mounted in corresponding sleeves **54** and **55** provided in the thumb and in the hand portion corresponding to the four fingers. When the cables are pulled out from said sleeves, the hand is closed, and when the cables are caused to engage these sleeves the hand is opened. Preferably, these cables **6** and **8** do not act in conjunction, this result being obtained by simply shifting the opposite ends of these cables which are secured to the movable ball or body **3**. Thus, when this ball or body **3** is caused to move in the baby-doll's body, the thumb and the other fingers of the hand open or close independently or not, and moreover, differently in the case of the two hands. Thus, a true simulation of the actual movements of a baby's hand is obtained. In FIGURE 1 the chain-dotted lines show the fully outstretched position of the forefinger concealing the other fingers of the hand.

It may also be noted that the movable body consisting of the aforesaid ball **3** is normally in frictional contact, not in rolling contact, with the inner wall of cavity **2**. On the other hand, the angular position of the elastic strap **11** surrounding the movable body **3** is practically invariable in the cavity **2** with respect to the baby-doll's body, due notably to the opposite guide cables **4** and **5** and also of the various other control cables which, in the example illustrated, are disposed regularly along a relatively long arc of the spherical body **3** and extend through the cavity **2** in a substantially central or axial vertical plane (in relation to the doll's body) of said cavity.

In the alternate form of embodiment illustrated in FIGURE 7, the various elements of the baby-doll, notably the eyes, the mouth, the hands are actuated in a manner very similar to that described hereinabove in connection with the preceding figures, notably FIGURE 1. However, in this modified structure the movements of the various control cables are obtained by means of an electromotor **74** suitably energized by means of dry batteries **175** adapted to be housed for example in the legs of the doll. This motor **74** is adapted to drive at a relatively slow rotational speed a shaft **75** through the medium of a small pulley **76** keyed on the motor shaft and connected through a belt **77** to another, larger pulley **78** mounted for loose rotation on said shaft **75** and rotatably solid with another small pulley **79** also mounted for loose rotation on shaft **75** for driving in turn through another belt **80** a pulley **81** mounted for loose rotation on the motor shaft **74**, this pulley **81** being rigid with another counter-pulley **82** mounted for loose rotation on the motor shaft **74** and driving through another belt **83** a large pulley **84** keyed on said shaft **75**. Thus, a very high reduction ratio is obtained between the shaft of motor **74**, which may be a D.C. commercial motor, and said shaft **75**. In fact, it is known that these motors revolve at relatively high speeds, and therefore the provision of the gear-reducing device described hereinabove permits of driving the shaft **75** at very low speeds of the order of a few revolutions per minute. Moreover, the various pulley-and-belt transmissions constitute a friction drive which, in case of jamming or locking of a member of the baby-doll, or in case of sudden reversal of the direction of rotation, will simply cause the pulley **76** to slip on belt **77** instead of stalling the motor and thus cause damages thereto.

Keyed on shaft **75** are various cams consisting of sinuous grooves formed in flat discs in the form of moulded

elements. In FIGURE 7, the assembly comprises six cams **85** to **90** controlling for example the eyes, the mouth and the hands of the baby-doll, as in the form of embodiment illustrated in FIGURE 1 and described hereinabove. The contour of these cams is clearly apparent from the detail drawings of FIGURES 8 and 9. Thus, FIGURE 2 shows an axial cross-section of cam **85** with its cam groove **85***a*. Each cam groove is engaged by at least one roller follower **95** to **100** mounted on the end of a relatively rigid resilient blade **105** to **110** sliding in a relatively stiff guide portion **91** of a casing **92** mounted in the baby-doll's body. The blades **105** to **110** are connected for example by welding to the ends of corresponding control cables **115** to **120**.

It will be readily understood that when the motor **74** is energised to cause the relatively slow rotation of the various cams **85** to **90**, the rollers **95** to **100** follow the cam grooves constituting said cams, thus pulling or pushing the corresponding cables according to the cam contours and actuating the corresponding elements of the new baby-doll. It is clear that with this form of embodiment of the invention the actuation of the different movable elements of the doll is much simpler, notably in the case of the mouth, since two cables **115** and **116** actuate independently of each other the two arms of the shear-like device **26** for producing all the desired movements of the mouth according to a programme controlled through the cams. Moreover, it will be seen that the movement of the tongue is obtained separately by means of a cable **120** and that the eyes are caused to look to the left or to the right by using a single cable **118** pulling or pushing the cable **117** adapted to move freely in a vertical direction for controlling the opening and closing of the eyes, or causing them to look down or up.

In the form of embodiment illustrated it will be seen that the cam **89** controls through the medium of cable **119** the opening or closing of the right-hand thumb, the opening and closing movements of the other fingers of the same hand being controlled by means of another cable **119'** responsive to a blade **109'** carrying a roller follower **99'** engaging the sinuous cam groove **89***a* of cam **89** but on the opposite side in relation to the axis of shaft **75**. Thus, by simply shifting the shaft **75** by one half of a revolution, the same movements of the thumb and of the other fingers of the hand are obtained without using an additional cam.

In the form of embodiment illustrated the electromotor and cam assembly is mounted in a casing **92** housed within the abdomen of the baby-doll. The shaft **75** is carried at one end by a ball-bearing or like bearing **93** and its opposite end extends through a member **94** in which an orifice is formed to this end, the member **94** being carried by the casing **92**. This member **94** is adapted to move in a direction parallel to the axis of shaft **75**. It comprises a surface **94***a* inclined to the axis of shaft **75**. Another member **101** keyed on shaft **75** carries a small ball **102** or the like rolling on said inclined surface **94***a* of member **94** for alternately pushing this member **94** outwards against the elastic resistance of a return spring **103** reacting against the inner wall of the abdomen of the baby-doll. Thus, during the rotation of shaft **75**, the doll's belly is rhythmically raised and lowered, thus simulating the human respiration.

According to this invention a mercury-or-ball switch is mounted on the baby-doll's body, for example in the lower portion thereof, under the motor **74**, this switch being adapted through suitable electrical connections, in certain relative inclinations of the doll, to control the different movements of the motor such as slow or fast speed, forward or reverse rotation. As already explained in the foregoing reversing the direction of rotation of the motor and therefore of the cams produces a completely different sequence of movements.

The switch may consist for example of a structure of the type illustrated diagrammatically in FIGURES 10 and 11 in the form of a ball switch comprising a fluid-tight, electrically insulated chamber **130** containing a small ball **131** of conducting metal, for example a ball coated with a contact metal such as silver, gold, palladium or the like. Advantageously, this chamber **130** is vacuumized or filled with an inert gas such as nitrogen or a rare gas. In this chamber a plurality of electrical conducting studs, for example eight in number as shown in FIGURE 10, are disposed, a typical arrangement of one pair of contact studs **132**, **133** being shown in detail in FIGURE 11. Each pair of studs is advantageously recessed in the chamber **130** so as to constitute a small cup or "pot hole" such as **130***a*, **130***b*, **130***c*, **130***d* in which the switch ball is adapted to fall and be slightly retained to facilitate the making of a satisfactory electric contact with each stud of the relevant pair for a given relative inclination of the doll. These studs consist simply of suitably bent metal strips providing a gap adapted to be bridged when the ball **131** engages these studs. In a modified form of embodiment (not shown) each pair of studs may be obtained separately with the relevant cup, and thus be inserted in the walls of chamber **130**, these walls comprising in this case corresponding orifices adapted to be sealed by said cups. If desired, the ball **131** may be replaced by a suitable quantity of mercury, thus facilitating the manufacture and positioning of the contact studs as these may consist simply of copper rods extending through the insulating wall of chamber **130**.

In FIGURE 7 the various connections between the motor **74**, battery **175** and the switch (of which the outer wall is visible at **130**) are not shown in order to avoid unnecessary complications in the drawing. On the other hand, FIGURES 12, 13 and 14 of the drawings show by way of example three wiring diagrams, inter alia, among the many ones that can be devised for interconnecting these devices.

In the modified form of embodiment illustrated in FIGURE 12 it is assumed that a switch having three operating positions (corresponding to the contacts **134**, **135** and **136**) is used. When one of these contacts is closed, the ball or the mercury in the switch chamber **130** bridges the two studs of a pair, the other contacts being open. Furthermore two resistances **137** and **138** are mounted in series with the motor **74**.

This device operates as follows:

When the ball of the three-contact switch (that is, a switch having three pairs of contact studs **134**, **135** and **136**) is in a position such that none of these contact pairs is bridged, the motor is de-energised. When the contact ball is in the position closing the contact pair **134**, the other contacts **135** and **136** are open and the motor **74** is connected directly across the terminals of battery **175**, and revolves at high speed. When the ball engages contact studs **135** (the other contacts **134** and **136** being open) the battery terminals **175** supply the motor **74** through the medium of the series-connected resistance **137**, thus causing the motor to operate at a reduced speed. Similarly, when the ball closes the third contact **136**, contacts **135** and **134** being open, the motor is energised in series with both resistances **137** and **138**, and operates at a still lower speed.

In a preferred form of embodiment illustrated in FIGURE 13 a four-position switch, for example of the type illustrated in FIGURE 10, is used, these four contact positions being designated by the reference numerals **139**, **140**, **141** and **142**. Of course, when one of these contacts is closed, the other three are open. Closing one of these contacts will connect the terminals of battery **175** to a corresponding electromagnetic relay **149**, **150**, **151** or **152**. Energising one of the relays will close the corresponding associated pairs of contacts, **159**, **159'**; **160**, **160'**; **161**, **161'**; **162**, **162'**. From this electric wiring diagram it will be seen that by inserting a single electrical resist-

ance 163 in series with the motor 74, the following operative positions of the motor may be obtained:

(A) All contacts 139 to 142 open; motor 74 stopped.

(B) Contact 139 closed, contacts 140, 141 and 142 open; motor operating at high forward speed.

(C) Contact 140 closed, contacts 139, 141 and 142 open; motor operating at slow forward speed.

(D) Contact 141 closed, contacts 139, 140 and 142 open; motor operating at fast reverse speed.

(E) Contact 142 closed, contacts 139 to 141 open; slow motor operating at slow reverse speed.

In the alternate form of embodiment illustrated in FIGURE 14, the same conditions of operation of the motor as those provided by the diagram of FIGURE 13 are obtained by utilizing the same relays 149 to 152 associated with the corresponding contacts 159, 159' to 162, 162'. On the other hand, instead of utilizing a ball-switch, a mercury switch 163 having two arms 164, 165 connected by a central portion 166 is used. This switch comprises six contact studs 168 to 173 consisting for instance of copper rods extending through the insulating chamber containing the mercury 167 in switch 163. By comparing FIGURES 13 and 14 it will be seen that the switches 139 to 142 of FIGURE 13 consist respectively of pairs of contact studs 168, 169; 170, 171 and 172, 173. The quantity of mercury 167 introduced into this switch is sufficient to permit a proper bridging of the pairs of contacts but small enough to prevent the simultaneous closing of two pairs of contacts. Preferably, switch 163 is housed in casing 92 disposed in the abdomen of the baby-doll so that when the latter is lying horizontally on its back the mercury is collected in cup 166 (as shown in FIGURE 14). When the baby-doll is raised by inclining same to the left, the mercury flows into the arm 165 so as to start the motor firstly at low forward speed and then at high forward speed, and if the doll is inclined to the right from the preceding position (lying on its back) as the mercury is at 166, the mercury will flow into the other arm 164 so as to firstly start the motor at low reverse speed and then accelerate it at high reverse speed. It will be noted that when the mercury penetrates into one of the arms 164 or 165, it can flow from one to the other arm only after passing through the common section 166, thus de-energising the motor. Moreover, assuming for example that the doll has been raised by inclining it to the left, the mercury having flown from cup 166 to arm 165, if the baby-doll is subsequently inclined to the right (without laying it back to its horizontal position) the mercury will remain in said arm 165, so that the sequence of movements and deformations in course remains unchanged.

Of course, a rather similar two-armed switch containing a ball instead of a certain quantity of mercury 167 could be used in lieu of switch 163, by providing only four pairs of contact studs suitably disposed in the two arms, instead of the six studs 168 to 173.

Many modifications may be brought to the above-described forms of embodiment. Thus, more particularly, if a self-aminated object is contemplated, that is, an object, of the type described hereinabove with reference to FIGURES 7 to 14 of the drawings, it is possible to design and arrange the parts in such a manner that a sequence of cam-controlled movements and/or deformations terminates with a movement and/or deformation of said object which entails a change in the relative position of the movable body consisting of the mercury or the ball within the switch, thus creating a different sequence of movements. Preferably, if the object consists or a doll, for example a baby-doll, the arrangements may be such that when the doll is lying on its back it will remain motionless with closed eyes. It may also be noted that if a girl plays with a doll of this type, she will leave it lying as a rule only when the doll has closed its eyes, that is, when it is asleep. Moreover, in the case of an object animated by means of an electromotor, it will be advantageous to weight said cams or one of the driving pulleys, for example pulley 78, to constitute an inertia flywheel, in order to obtain continuous, jerkless movements and avoid any sudden stoppage when the motor is de-energised, the movements being stopped on the contrary in a slow, gradual manner.

In addition, a remote control device may be contemplated notably in the form of a radio localizing system permitting of modifying at will the relative inclination of the switch in the baby-doll's body, this switch being either pivotally mounted and urged to its normal position by spring means, or preferably mounted for rotation about a pivot pin; in this case the switch may have substantially the shape of a toroid or ring in which the aforesaid pairs of contact studs could be provided, the ball or mercury rolling therein. Thus, the starting or stopping of a sequence of movements and/or deformations are remote controlled through said cams. Thus, for instance, assuming that the baby-doll is lying on its back and normally asleep (the motor being de-energized) one may "wake" it from a distance by using radio means for tilting or rotating the motor energizing switch, and then put again the "baby" asleep by allowing the switch to resume its normal position. This remote control system is extremely convenient for a performing a great number of sketches, notably for motion-picture and television scenes, and the indirect control of the movements by means of the motor and cams gives a perfect semblance of life.

If desired, the chamber containing said movable body consisting of a relatively heavy ball 3 may be filled with a fluid having a given viscosity for retarding the movements of said movable body in said chamber.

Of course, this invention should not be construed as being limited by the specific forms of embodiment described and illustrated herein, which are given by way of example only and to which many modifications may be brought without departing from the spirit and scope of the invention.

What I claim is:

1. An animated doll comprising movable and deformable members each provided with a respective actuating means, a closed internal cavity, a free movable body enclosed in said cavity and means for operatively connecting said actuating means to said body wherein eyes are constituted by a ball on which the iris and the pupilla are drawn said ball being rotatably mounted in a hollow transparent ball formed with a notch of tapered ovoid configuration having a central angle from about 45° to about 60°, an actuating arm secured to the rear portion of the ball carrying the iris extending through said notch, said hollow transparent ball being force fitted in the ocular cavity so as to be rigid therewith, said ocular cavity being formed integrally with orbital arches and other portions of the doll's head, the actuating arms of the two eyes being articulated at both ends of a connecting rod which is connected to a first actuating cable forming an aforesaid actuating means, whereas when said cable is actuated the iris of both eyes is raised or lowered beyond its angle of free rotation within the aforesaid transparent ball, the corresponding actuating arm abutting against the edges of the aforesaid notch and causing the transparent ball to rotate while altering the shape of the orbital arches, two other lateral cables also forming aforesaid actuating means further acting on said first cable controlling said actuating rod for controlling right-hand and left-hand movements of the eyes.

2. An animated doll comprising movable and deformable members each provided with a respective actuating means, a closed internal cavity, a free movable body enclosed in said cavity and means for operatively connecting said actuating means to said body wherein the mouth is actuated by a set of two levers pivoted like the arms of shears of which the ends terminate respectively in the vicinity of the lips and at points solid with

two opposite end plates of bellows, said bellows being connected on one hand to an actuating-fluid inlet hose and on the other hand through one of said end plates to a control cable forming said actuating means causing said bellows to be raised and lowered in the baby-doll's head, a drum being rotatably mounted on a first of said end plates of said bellows and a cord being wound thereon and secured by its opposite ends in the doll's head, the drum being solid with a cam in rolling engagement with a roller mounted on the second end plate of the bellows, whereby said drum rotates when said end plates are raised or lowered in the head, thus moving the doll's lips towards or away from each other when said cam is rotated.

References Cited

UNITED STATES PATENTS

564,563	7/1896	Hinrichs	46—169
1,489,385	4/1924	Ciavatti	46—135
1,555,979	10/1925	Hunter et al.	46—169
2,509,373	5/1950	Stevens	46—169
3,125,826	3/1964	Ostrander	46—135 XR
3,153,881	10/1964	Baulans-Cogan	46—135 XR
3,154,881	11/1964	Elwell	46—171 XR

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U.S. Cl. X.R.

46—120, 168