May 29, 1962 C. D. BERGER 3,036,404

SOUND-CONTROLLABLE TOY

Filed May 2, 1960 2 Sheets-Sheet 1

FIG. 1

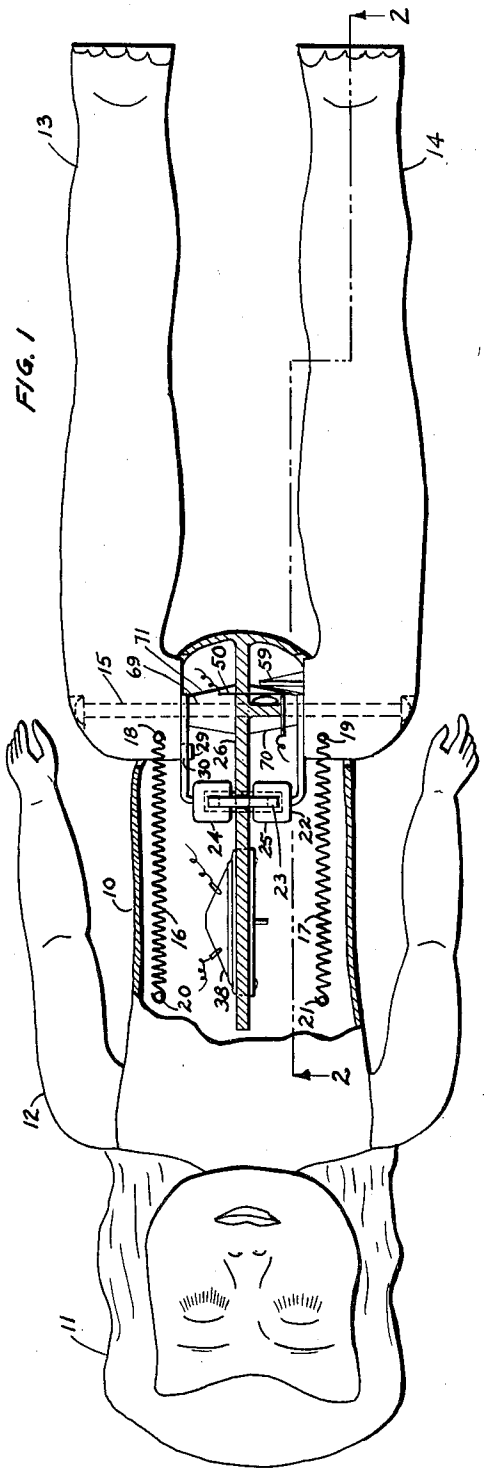
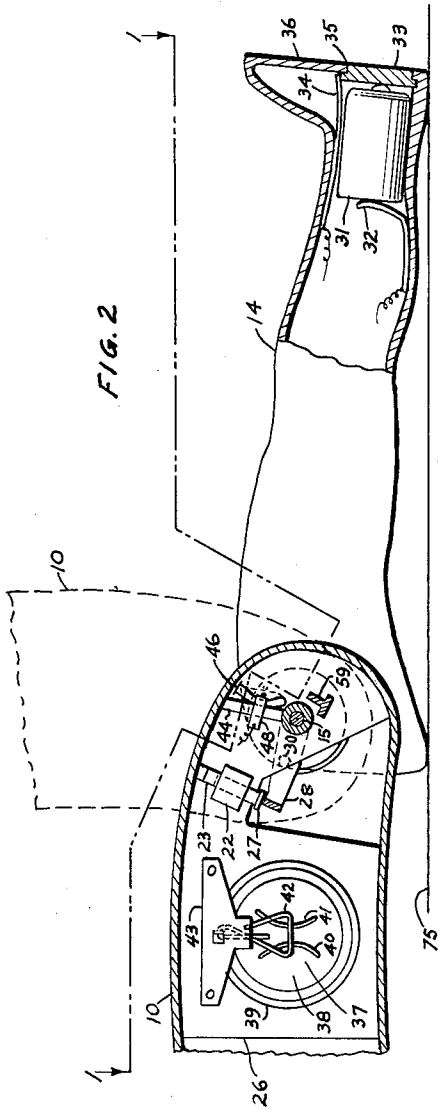


FIG. 2



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May 29, 1962 C. D. BERGER 3,036,404

SOUND-CONTROLLABLE TOY

Filed May 2, 1960 2 Sheets-Sheet 2

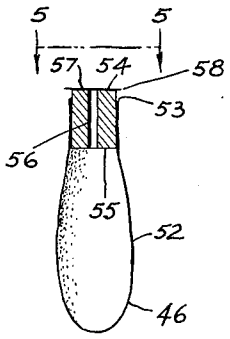


FIG. 4

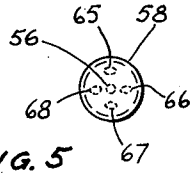


FIG. 5

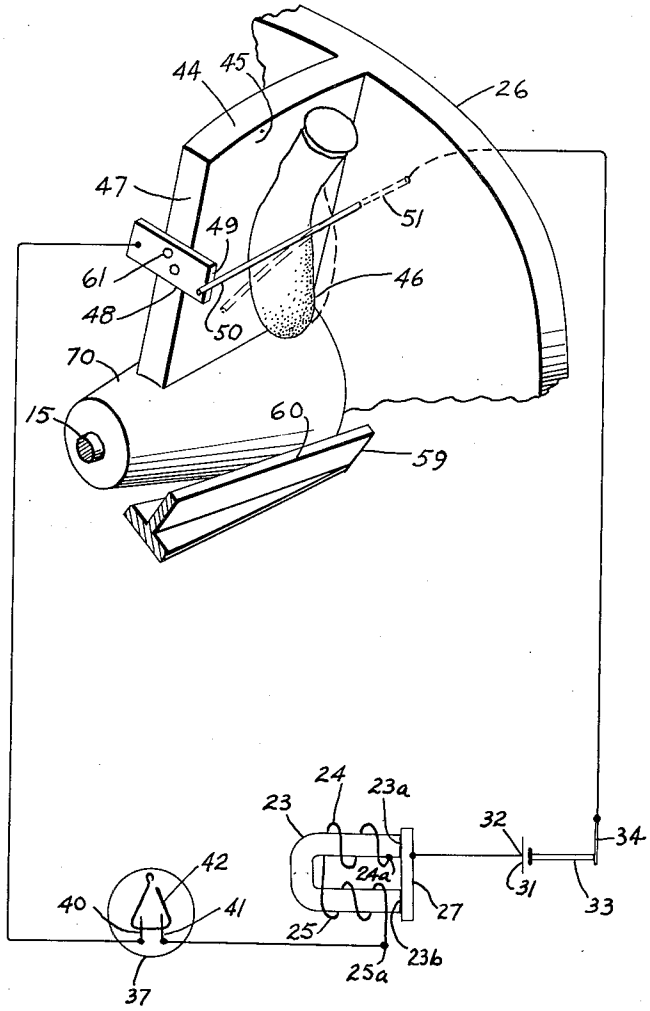


FIG. 3

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United States Patent Office 3,036,404 Patented May 29, 1962

3,036,404

SOUND-CONTROLLABLE TOY

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Filed May 2, 1960, Ser. No. 26,237
7 Claims. (Cl. 46—243)

This invention relates to a doll or toy having means actuated in response to sound or other vibration which will produce movements of one part relative to another part thereof.

More particularly the invention relates to a toy in which a spring actuated moveable part is manually positioned against the action of the spring to a restrained position and is there held by an electromagnet until the actuation of a sound-responsive circuit breaker in series with the winding of the electromagnet and a battery of dry cells causes the release of the moveable part.

Such a toy is described in my prior U.S. Patent 2,906,-059 for a "Doll With Sound-Actuated Moving Parts" which shows a doll which upon being placed in a supine position, simulating sleep, will remain so until a sufficiently loud sound or other vibratory disturbance is made to actuate the doll, whereupon it moves to a sitting position thereby simulating awakening in response to the disturbance. One of the features of the doll described in said prior patent is the provision of means for keeping the circuit open whenever the moveable part of the doll is not being held in the supine position by the electromagnet, in order to prevent the dry cells from being drained when the doll is not being operated. However, in all such sound-actuatable toys, the electromagnet circuit necessarily draws current from the dry cells whenever the moveable part of the toy is being held in the restrained position by the electromagnet. It is therefore a characteristic of such toys that once the toy has been placed in the restrained, current-draining position, it will remain so until the dry cells go dead if no sound or other disturbance is made to cause the electromagnet to release the toy, or if for any reason the moveable part does not move away from the restrained position when the proper sound is made. As the energy of the dry cells is limited, it is apparent that the number of times such a toy can be operated before new dry cells are required depends on how quickly the toy is released after being put in the restrained position. If these toys are actuated to the released position a short time, such as seconds or minutes, after being set in the restrained position the toys can be operated very many times before the dry cells require replacement. If, on the other hand, these toys are not actuated for long periods of time, such as hours, overnight, or even longer, the dry cells will require replacement after the toy has been operated only a few times. Thus the person operating the toy is required to remember to release the toy in order to conserve the energy of the dry cells. As children are apt to be forgetful about such matters, or in the case of a sound-responsive doll may purposely keep the doll in the supine position for long periods by means of a weight such as a blanket, it is desirable that some means of preventing prolonged draining of current from the dry cells be provided.

This invention comprises a sound-actuable toy of the type described above which is improved by having means to automatically open the electromagnet circuit an interval of time such as, for example, 30 seconds after the toy is put in its restrained position, which is long enough to permit the user to operate the toy by making the required sound at any time during said time interval but which is short enough so that if the user fails to do so, or if the toy for any reason does not move out of its restrained position during said time interval, the flow of current ceases before too much of the dry cell energy is

wasted. The improvement comprises the addition of a circuit-breaking contact which is connected in series with the electromagnet circuit and is arranged to cooperate with the moveable part of the toy in such a way that the contact is closed quickly when the moveable part of the toy approaches the released position, and the contact is caused to open an appreciable time interval after the moveable part is moved from the released toward the restrained position.

It is a feature of this invention that although the toy ceases to be in a sound-responsive condition at the end of the limited time period during which current is flowing in the circuit, the toy can very quickly again be placed in the sound-responsive condition by manipulating the moveable part of the toy first away from the restrained toward the released position, if not already there, and then back to the restrained position.

It is a further feature of this invention that by the provision of means to break the electromagnet circuit whenever the moveable part of the toy is not in the restrained position, together with means to break the electromagnet circuit automatically as soon as the moveable part of the toy has been in the restrained position for a limited but substantial period of time, there is no method of operation by the user that can cause the circuit to stay closed for longer than said limited period of time.

The primary objective of this invention is to provide a sound-controllable toy which will automatically stop wasting dry cell energy if the toy is not operated by the user by the end of a limited period of time but which nevertheless allows the user to operate the toy, by making the required sound or disturbance, at any time he chooses within this limited period.

Another object of this invention is to provide a toy of this type in which it is impossible for the energy of dry cells to continue to be dissipated without time limit.

A further object of this invention is to provide a sound-controllable toy in which the circuit will automatically open and stay open a substantial but limited period of time after the toy is placed in the operable position, although the circuit may first be opened by the action of sound or other means during said time period.

Another object of this invention is to increase the minimum number of times the toy can be operated before replacement of dry cells becomes necessary.

Another object of this invention is to make the replacement of dry cells in the toy less frequently necessary.

An alternate object is to permit the use of smaller and/or fewer dry cells in the toy without increasing the frequency at which the dry cells must be replaced.

Another alternate object of this invention is to permit the use of a less costly winding on the electromagnet of the toy, such as one having coarser wire or fewer turns, without increasing the frequency at which the dry cells have to be replaced, despite the fact that the less costly winding dissipates more power.

Another object of this invention is to provide sound-controllable toys which are more reliable in operation and less susceptible to the effects of improper utilization, thereby increasing the marketability of such toys.

Other objects and features of the invention will be apparent when the following description is considered in conjunction with the annexed drawings, in which,

FIGURE 1 is a top plan view and partial section view along line 1—1 of FIGURE 2 of a toy doll embodying my invention;

FIGURE 2 is a partial section along line 2—2 of FIGURE 1, the doll being shown in the supine position and resting upon a substantially horizontal surface;

FIGURE 3 is a detailed perspective view of the time-delayed circuit-breaking mechanism and a schematic diagram of the electric circuit controlled by said mechanism;

FIGURE 4 is a detailed longitudinal section of the pneumatic actuator in the time-delayed circuit-breaking mechanism;

FIGURE 5 is a detail view taken along line 5—5 in FIGURE 4.

The particular embodiment which the drawings illustrate is comprised of a doll having a hollow torso 10, with a head 11 and arms 12 mounted thereon, and a plastic rib 26 attached to the inside thereof. Torso 10 is pivotally mounted on a pair of hollow legs 13 and 14 by means of shaft 15 passing through hole 69 in bosses 70 and 71 which extend laterally from rib 26, which construction is arranged to permit torso 10 to move freely from the supine position shown in FIGURES 1 and 2 to the sitting position shown partially in dashed line in FIGURE 2.

Tension springs 16 and 17 attached to studs 18 and 19 on legs 13 and 14 respectively and to studs 20 and 21 inside torso 10 urge the torso to move from the supine to the sitting position, the weight-moment of the torso and attached parts about the pivot being less than that of the legs.

Electromagnet 22 comprised of core 23 and coil windings 24 and 25 is mounted astride rib 26, is retained fixedly thereby inside torso 10 and rotates therewith in an arc about shaft 15.

Armature 27 is attached to U-shaped crank 28 which is pivotally mounted on shaft 15. Crank 28 is fastened to leg 13 by engagement of boss 29 on said leg with hole 30 in said crank so that the armature 27 is effectively fixed to leg 13 and can be attracted and held by magnet 22 when torso 10 is in the supine position.

A dry-cell 31, to energize electromagnet 22, is mounted in leg 14 and is contacted at one terminal by spring contact 32 which is fastened to the inside of leg 14. Removable metal plate 33 retains dry-cell 31 and contacts the other terminal of said dry-cell and also makes contact with spring contact 34 which is fastened to the inside of leg 14. Plate 33 can be pulled out laterally from leg 14 so that dry cell 31 can be removed and replaced through opening 35 in foot 36 left thereby. When desired, leg 14 can be arranged so that two or more dry cells are mounted and connected in series therein.

Vibration-responsive circuit-breaker 37 mounted on rib 26 is comprised of vibratable diaphragm 38 mounted over hole 39 in rib 26, contacts 40 and 41 attached to said diaphragm and pendulous contact 42 supported by member 43 which is attached to rib 26. In the sound-responsive position, contact 42 lightly touches both contact 40 and contact 41. Vibration of the diaphragm causes momentary separation of contact 42 from either or both contacts 40 and 41 and thereby breaks the circuit momentarily.

Extending laterally from plastic rib 26 is a short transverse rib 44 on the side 45 of which pneumatic actuator 46 is attached with an adhesive and on end 47 of which fixed metal contact 48 is attached by means of small bosses 61 projecting from end 47 through holes in contact 48, the ends of bosses 61 being deformed by heat so as to retain contact 48. Extending approximately parallel to face 45 and more or less perpendicular to the plane of contact 48 is spring contact 50 which is mounted in and retained by friction in hole 51 in rib 26. When free to do so, spring contact 51 touches and makes electrical contact with end 49 of contact 48.

Pneumatic actuator 46 is comprised of a thin rubber bulb 52 which has an opening 53 into which is tightly fitted a valve 54 comprised of a cylindrical plug of plastic or other suitable material 55 having a hole 56 connecting the interior of bulb 52 with the atmosphere and a thin rubber disc 58 cemented over the end 57 of said plug. The spots of adhesive 65, 66, 67 and 68 that cement disc 58 to plug end 57 are separated from each other to permit leakage of air in and out of hole 56 through the spaces between the unattached portions of disc 58 and end 57.

Because of the flexibility of disc 58, valve 54 causes air to be expelled rapidly from bulb 52 when it is squeezed and permits air to be drawn into bulb 52 only very slowly when said bulb is released after squeezing. This action is due to the fact that a pressure above atmospheric inside bulb 52 causes disc 58 to be flexed away from end 57 while a pressure below atmospheric inside bulb 52 causes disc 58 to be pressed toward end 57 thereby tending to seal off hole 56 and permitting only slow leakage of air into bulb 52.

Bulb 52 of pneumatic actuator 46 is of such size and resilience that contact 50 is lifted thereby away from and out of electrical contact with end 49 of contact 48 when said bulb is not squeezed or deflated. A common toy balloon makes a suitable bulb.

Projecting from the upper end of leg 14 is rigid spike 59 at a radial distance from shaft 15 which is less than the radial distance between contact 48 and shaft 15. Spike 59 is of such length and is located in such position on leg 14 that when torso 10 is in the sitting position rubber bulb 52 is squeezed nearly flat between surface 60 of spike 59 and the side 45 of transverse rib 44.

FIGURE 3 is a view including the complete electrical circuit of the doll with the parts shown in the positions they have at a time immediately following the time the torso of the doll has been moved from the sitting to the supine position. The wiring needed to interconnect the various elements is not completely shown in the other views. The electrical elements are connected in a series circuit as follows. Contact 32 touching one terminal of dry cell 31 is connected directly to armature 27. Armature 27 makes electrical contact with pole faces 23*a* and 23*b* of electromagnet core 23 when the armature touches the pole faces, which happens when torso 10 is placed in the supine position. The electrical contact between the armature and the pole faces is broken whenever the pole faces move away from the armature. End 24*a* of coil windings 24 and 25 which are connected in series is electrically connected to core 23 and end 25*a* is connected to contact 41 of acoustic circuit-breaker 37. Contact 40 of the circuit-breaker is connected directly to contact 48. Contact 50 is connected directly to spring contact 34 and by means of plate 33 to the other terminal of dry cell 31.

From the foregoing it will be seen that the mode of operation of the doll and the electrical circuit contained therein is quite simple. The doll is first placed in a sitting position with legs 13 and 14 resting on a level surface 75, the torso 10 having the position partially shown in dashed line in FIGURE 2. In this position of the doll, actuator 46 is squeezed between rib 44 and spike 59 so that the actuator is depressed away from spring contact 50 which therefore touches against contact 48. The electrical circuit is not complete, however, because in this position of the doll, electromagnet core 23 is out of contact with armature 27. Upon pushing torso 10 down to the supine position the parts of the doll are initially as shown in FIGURES 1, 2 and 3. The armature makes contact with the pole faces 23*a*, 23*b* of the electromagnet, the electrical circuit is closed and current flows. The torso is then carefully released so as not to agitate the vibration-sensitive circuit-breaker 37 whereupon the magnetic attraction between the electromagnet and armtaure will maintain the torso in the supine position for a substantial but limited interval of time as will now be more fully explained.

From the moment that torso 10 is moved away from the sitting position toward the supine position, spike 59 no longer exerts pressure against actuator 46 which therefore because of its resilience immediately starts to pull in air from the atmosphere. However, because of the slow rate at which this is permitted by valve 54 it will be many seconds or minutes of time before bulb 52 of the actuator re-inflates sufficiently to lift spring contact 50 off of contact 48. Until the time that this occurs, therefore, the

circuit remains closed, provided it is not opened at some other point in the circuit as described below.

If, during the time interval that contacts **50** and **48** are in contact after the torso has been placed in the supine position as described above, sound waves or other vibrations cause diaphragm **38** to vibrate sufficiently to cause the circuit to be broken between contacts **40** or **41** and **42**, the result is a momentary interruption of current low and a loss of attraction between electromagnet **22** and armature **27**. Springs **16** and **17** thereupon immediately cause torso **10** to start moving toward the sitting position, if it is free to do so. This initial movement of the torso causes pole faces **23***a*, **23***b* to move out of electrical contact with armature **27** thus breaking the circuit at that point. After that happens, current flow cannot resume and the springs will raise the torso all the way to the sitting position. The overall effect is a movement of the doll simulating awakening in response to the sound that was made.

If, on the other hand, during the time interval that contacts **50** and **48** are in contact after the torso has been placed in the supine position, circuit-breaker **37** is not actuated by sound waves or other vibrations, the circuit remains closed and current flows throughout said time interval. The time interval ends when actuator **46** has re-expanded enough as shown in dashed line in FIGURE 3 to lift contact **50** off of contact **48** thus breaking the circuit at that point. After this there can be no further flow of current in the circuit until the torso is again brought to the sitting position in order to deflate actuator **46** and then back to the supine position.

If, after the torso has been placed in the supine position, an additional weight is placed on the torso, such as, for example, a blanket which is heavy enough to prevent the springs from lifting the torso when they would otherwise be free to do so, sound waves will cause no more than momentary interruption of current flow in the circuit because after the sound stops the current will start to flow again as long as contact **48** touches contact **50**. The aforementioned time-retard action of actuator **46**, will however, as previously described cause contacts **48** and **50** to separate as soon as the actuator becomes sufficiently re-inflated thus stopping further current flow even though the torso is kept in said supine position.

From the foregoing it is clear that the normal operation of the doll and the circuit therein are such that the doll can be moved from the sitting to the supine position, be let go of manually and be kept there by the flow of current through the electromagnet, simulating sleep for a substantial but limited time interval during which it is in a sound-responsive condition so that if a sufficiently loud sound is made the circuit in the doll is momentarily broken and the doll is caused to move to a sitting position simulating awakening of the doll in response to sound, but if no sound or other disturbance sufficient to break the circuit is made during said limited time, or if the doll is kept in the supine position by any cause, the circuit opens automatically at the end of said limited time period so that there is no further current flow in the circuit.

In order for the doll to be once again placed in the operating condition it is necessary that the torso be allowed to or be caused to move away from the restrained (supine) position. However it is not necessary that the torso go all the way to the sitting position because spike **59** will contact bulb **52** at a position of the torso which is somewhere between supine and sitting and cause at least partial deflation of the bulb which is enough to close contacts **50** and **48**. Of course bulb **52** will be deflated more if the torso is allowed to go all the way to the sitting position and then will provide the maximum time delay when the doll is subsequently placed in the supine position.

The operating time of actuator **46** can be made as short or long as desired by varying the volume and resilience of rubber bulb **52**, the size of hole **56** in the valve, the thickness of the rubber disc **58** and smoothness of mating surface **57** as will be apparent to those skilled in the art of pneumatic devices.

If the actuator operates, for example, after 30 seconds, the toy can be made to respond to sound after a short period of time such as 5 or 10 seconds or after a longer time such as 25 seconds. It is highly desirable that the toy can be made to respond after any one of such varying time intervals because the person operating the toy is effectively exercising greater control over the action of the toy than he would be if the toy remained in the sound responsive condition for only 5 seconds, for example. In the latter case, the operator has only a very few seconds leeway as to when he can make the sound to operate the toy.

Although a long time delayed actuator is most desirable from the point of view of giving the operator a wide latitude in selecting the time at which to operate the toy, too long a time delay, such as for example an hour or more, would reduce the degree to which some of the objectives of this invention are met. In any case, the time delay should be substantially less than the time that good dry cells could continue to energize the electromagnet sufficiently to restrain the urging of the springs in the toy.

While I have described a single embodiment of my invention, it will be understood that many other embodiments are possible and that many modifications may be made therein. I wish therefore to be limited not by the foregoing description which was given solely for purposes of illustration, but on the contrary to be limited only by the claims granted to me.

I claim:

1. In a sound-controllable toy, the combination of a stationary part, a moveable part having a restrained and a released position, resilient means urging said moveable part from said restrained to said released position, electromagnetic means including a winding to hold by magnetic attraction when energized said moveable part in said restrained position against the action of said resilient means, means to energize said electromagnetic means comprising an electrical series circuit including said winding, one or more dry cells, sound-actuatable circuit breaking means, means to keep said circuit open when said moveable part is not in said restrained position, and disconnectable electric contact means constructed and arranged to be connected by movement of said moveable part, and delayed action means constructed and arranged to disconnect said contact means only when said moveable part is in said restrained position.

2. A toy doll adapted to move from an initial supine position to a sitting position comprising, in combination, a first body portion including a torso, arms and head, a second body portion including legs, means pivotally mounting said legs on the lower part of said torso, means weighting at least one of said legs to provide a weight-moment for said second body portion about said pivotal connection greater than the weight-moment of said first body portion, resilient means urging said first body portion to rotate about said pivotal connection to place said doll in a sitting position, electromagnetic means for holding said torso in the supine position, an electrical circuit including a current source and said electromagnetic means, vibration actuated means for breaking said circuit and deenergizing said electromagnetic means to permit said doll to assume said sitting position under urging of said resilient means, delayed-action circuit breaking means comprised of a normally closed contact in said torso, means to open said contact having a released position in which said contact is open and a restrained position in which said contact is closed, means attached to one of said legs placing said contact opening means in said restrained position when said doll is in said sitting position, and means to delay the movement from said restrained to said released position of said contact opening means.

3. A toy doll adapted to move from an initial supine position to a sitting position comprising, in combination,

a first body portion including a torso, arms and head, a second body portion including legs, means pivotally mounting said legs on the lower part of said torso, means weighting at least one of said legs to provide a weight-moment for said second body portion about said pivotal connection greater than the weight-moment of said first body portion, resilient means urging said first body portion to rotate about said pivotal connection to place said doll in a sitting position, electromagnetic means for holding said torso in the supine position, an electrical circuit including a current source and said electromagnetic means, vibration actuated means for breaking said circuit and deenergizing said electromagnetic means to permit said doll to assume said sitting position under urging of said resilient means, and delayed-action circuit breaking means comprised of a normally closed spring contact attached to said torso, a hollow rubber bulb attached to said torso under said contact, valve means connecting the atmosphere to the interior of said bulb permitting air to be expelled rapidly therefrom when said bulb is squeezed and permitting air to be drawn into said bulb slowly when said bulb is released, said bulb lifting said spring contact to open said circuit when nearly full of air and permitting said contact to close said circuit when partly deflated, and means attached to one of said legs to squeeze said bulb against said torso when said doll is in said sitting position and releasing said bulb when said doll is not in said sitting position.

4. In a sound-controllable toy, the combination of a stationary part, a moveable part having a restrained and a released position, resilient means urging said moveable part from said restrained to said released position, electromagnetic means including a winding to hold by magnetic attraction when energized said moveable part in said restrained position against the action of said resilient means, means to energize said electromagnetic means comprising an electrical series circuit including said winding, one or more dry cells, sound-actuatable circuit breaking means, means to keep said circuit open when said moveable part is not in said restrained position, and disconnectable electric contact means responsive to the movements of said moveable part so that said contact means are connected by movement of said moveable part toward said released position and are disconnected as a result of movement of said moveable part toward said restrained position, and means to delay said disconnection of said contact means.

5. In a sound-controllable toy, the combination of a stationary part, a movable part having a restrained and a released position, resilient means urging said moveable part from said restrained to said released position, electromagnetic means including a winding to hold by magnetic attraction when energized said moveable part in said restrained position against the action of said resilient means, means to energize said electromagnetic means comprising an electrical series circuit including said winding, one or more dry cells, sound-actuatable circuit breaking means, means to keep said circuit open when said moveable part is not in said restrained position, and disconnectable electric contact means, and retarded means to disconnect said contact means, said stationary part, said moveable part, said contact means and said retarded means being so constructed and arranged that said retarded means is restrained by said moveable part from disconnecting said contact means when said moveable part is in said released position.

6. In a sound-controllable toy, the combination of a stationary part, a movable part having a restrained and a released position, resilient means urging said moveable part from said restrained to said released position, electromagnetic means including a winding to hold by magnetic attraction when energized said moveable part in said restrained position against the action of said resilient means, means to energize said electromagnetic means comprising an electrical series circuit including said winding one or more dry cells, sound-actuatable circuit breaking means, means to keep said circuit open when said moveable part is not in said restrained position and disconnectable electric contact means arranged and constructed to respond to the position of said moveable part so as to be connected when said moveable part is in the released position and to be disconnected a substantial time after said moveable part is placed in the restrained position.

7. In a sound controllable toy, the combination of a stationary part, a moveable part having a restrained and a released position, resilient means urging said moveable part from said restrained to said released position, electromagnetic means including a winding to hold by magnetic attraction when energized said moveable part in said restrained position against the action of said resilient means, means to energize said electromagnetic means comprising an electrical series circuit including said winding, one or more dry cells, sound-actuatable circuit breaking means, means to keep said circuit open when said moveable part is not in said restrained position, and a disconnectable electric contact, means to disconnect said contact having a free position in which said contact is disconnected and a restored position in which said contact is connected, said moveable part when in the released position holding said contact disconnecting means in said restored position and said moveable part when in the restrained position permitting movement of said contact disconnecting means to said free position, and means retarding the movement of said contact disconnecting means from said restored to said free position.

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