

March 2, 1971

S. TEPPER ET AL
MISSILE-TOSSING TOY

3,566,537

Filed Aug. 15, 1969

3 Sheets-Sheet 1

FIG. 1

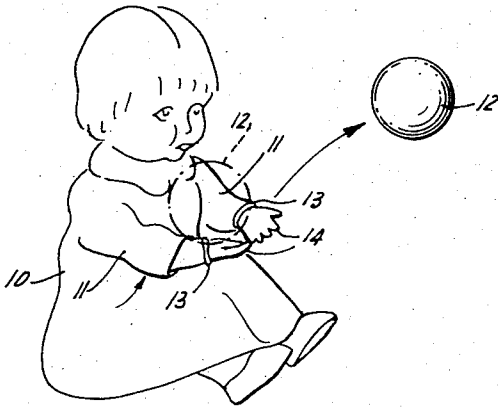


FIG. 2

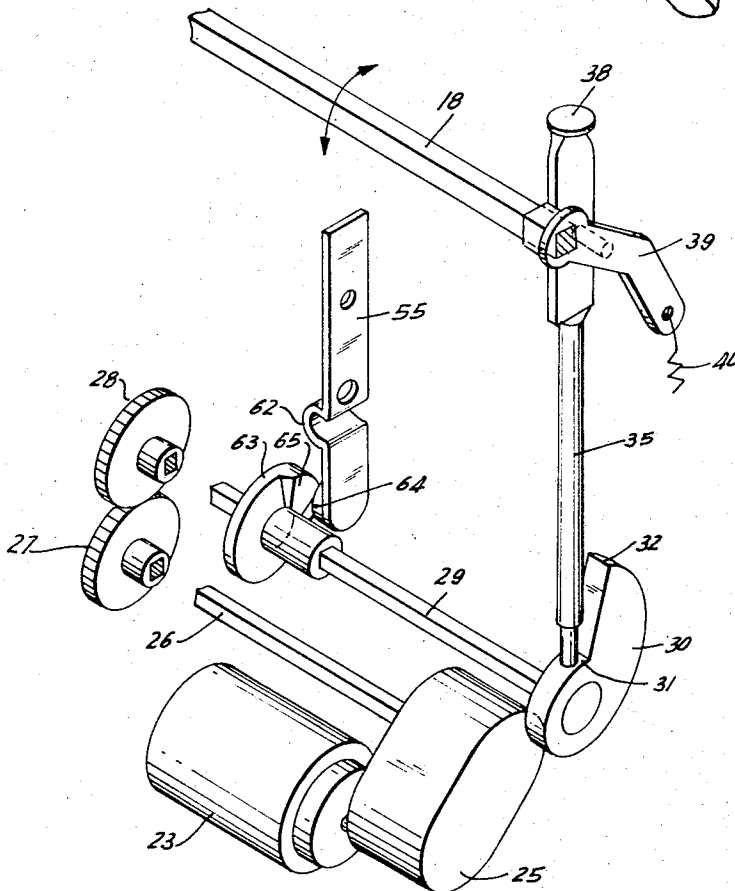


FIG. 6

INVENTORS:
SIDNEY TEPPER
THOMAS J. FAULS
BY
Breitenfeld & Reine
ATTORNEYS

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S. TEPPER ET AL

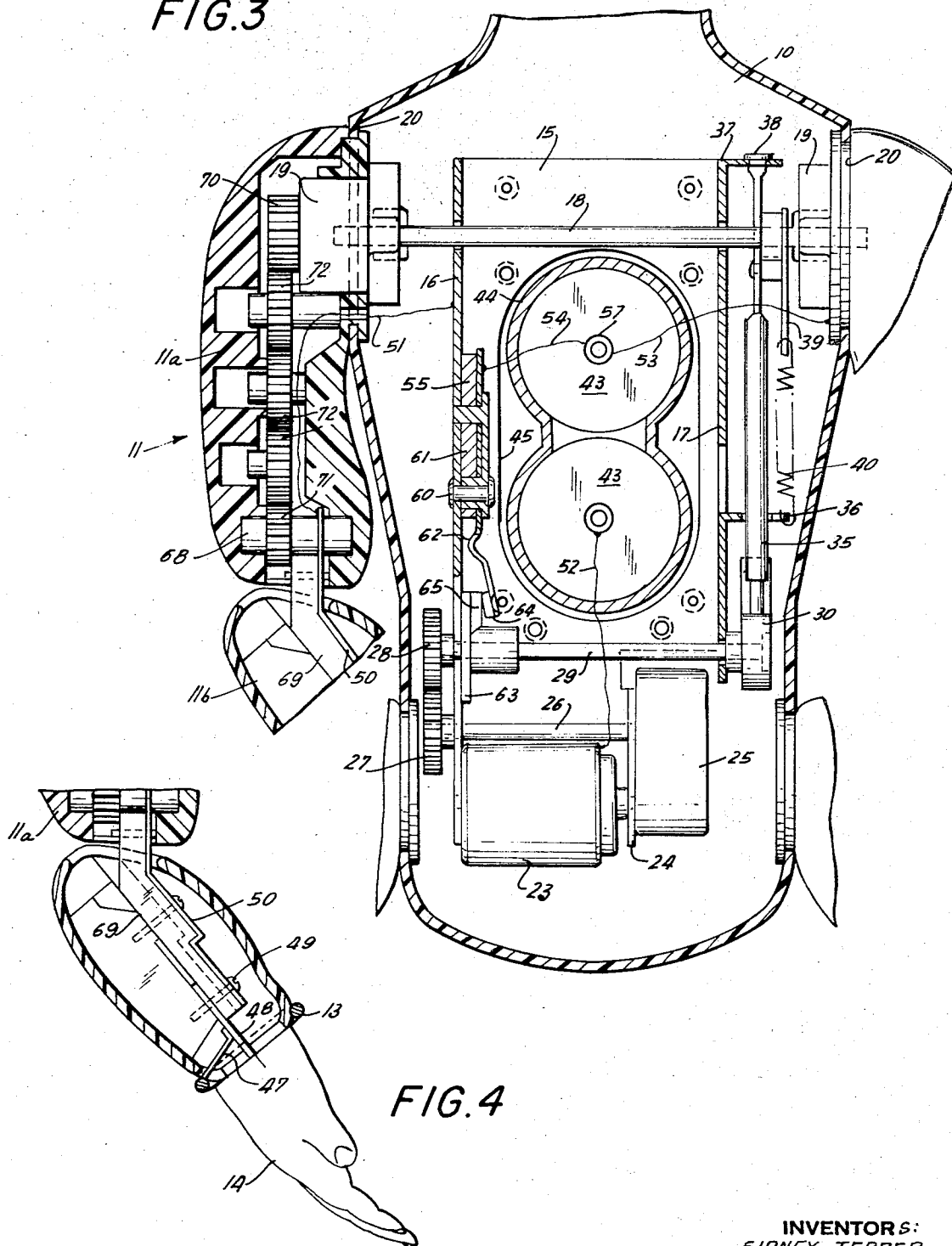
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FIG. 3



INVENTORS:
SIDNEY TEPPER
THOMAS J. FAULS
BY
Breitenfeld & Levine
ATTORNEYS

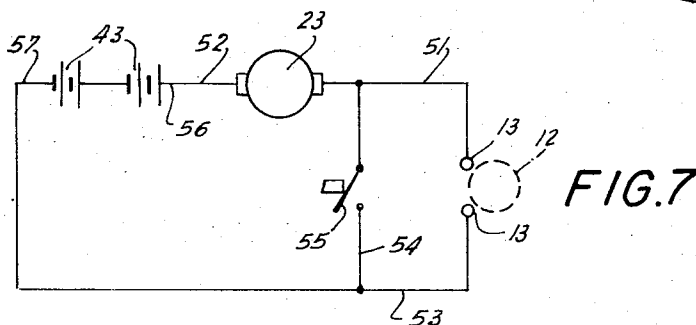
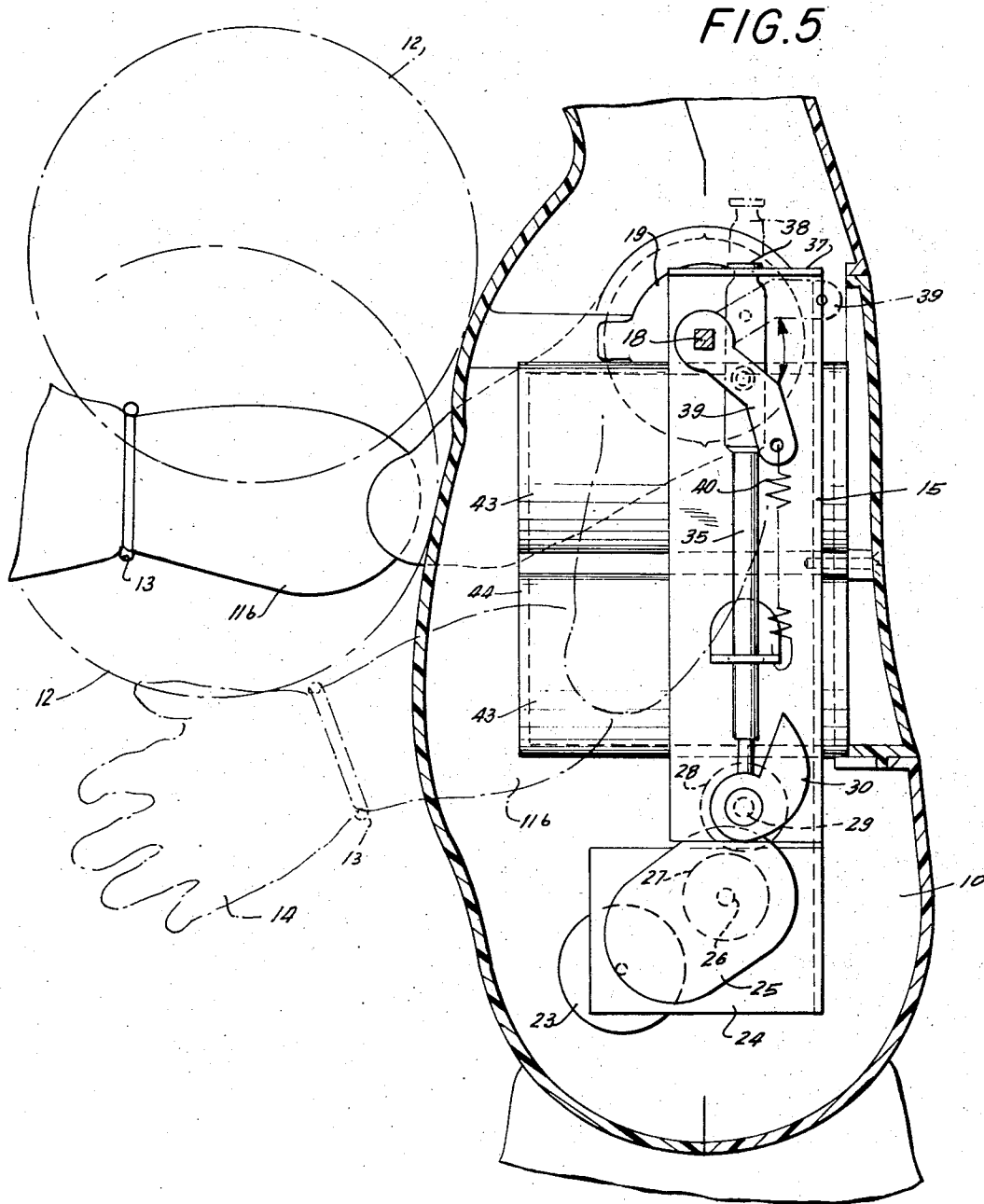
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INVENTORS:
SIDNEY TEPPER
THOMAS J. FAULS
BY
Breitenfeld & Lennie
ATTORNEYS

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MISSILE-TOSSING TOY

Sidney Tepper, Millburn, and Thomas J. Fauls, West Orange, N.J., assignors to Topper Corporation
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Int. Cl. A63h 33/26

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10 Claims

ABSTRACT OF THE DISCLOSURE

The toy includes a body carrying a pair of appendages and a switch. The switch may comprise an electrical contact member carried by each appendage. A missile thrown to the toy closes the switch, e.g., the missile may be electrically conductive to bridge the contact members, thereby completing an electrical circuit which moves the appendages from their initial position to an intermediate position. A spring is tensioned during this movement, the tension being released suddenly causing the appendages to snap back to their initial position and toss the missile.

This invention relates to animated toys in which there is at least one, and preferably two, appendages movable with respect to a body, and has particular reference to such a toy capable of catching and tossing a missile, such as a ball.

The invention will be described and illustrated in connection with a human-like doll provided with movable arms, but many phases of the invention are applicable to a wide variety of animated toys, such as toy animals.

A general object of the invention is to provide a toy whose appendages are normally maintained in a missile-receiving condition and which, in response to catching a missile, automatically move to an intermediate position and then suddenly snap back to their initial position, as a result of which the missile is propelled by the appendages away from the toy.

Another object of the invention is the provision of such a toy including an electrical circuit for actuating the appendages, the circuit being completed when the toy receives a missile.

It is a further object of the invention to provide such a toy wherein the appendages are simulated human arms, each arm bending at the elbow during its movement to simulate human ball-tossing arm movement.

To accomplish these objectives, the invention provides a toy body carrying an exposed electrical switch, and pivotally supporting a shaft upon which a pair of appendages are mounted. The switch is closed when a missile is tossed to the toy, and completes a motor-energizing circuit within the toy body. The switch may comprise an electrical contact carried by each appendage, and the missile may have a metallized surface for bridging the contacts. The electric motor within the body is adapted to rotate a cam, and a follower link pivots the shaft and arms in one direction upon rotation of the cam. Simultaneously, a spring connected to the shaft is tensioned, and during rotation of the cam, the spring is permitted to snap the shaft and appendages back to their starting position whereby the missile is tossed by the toy. Following this snap action, a switch in the motor-energizing circuit automatically opens to discontinue movement of the appendages until the missile is tossed to the toy again. Each appendage comprises two parts pivoted together, and within these parts is a gear train including a gear fixed to the shaft for pivoting the two parts with respect to each other during movement of the appendage with respect to the toy body.

Additional objects and features of the invention will be apparent from the following description in which reference is made to the accompanying drawings.

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In the drawings:

FIG. 1 is a perspective view of a doll according to this invention with its arms in ball-receiving position;

FIG. 2 is a perspective view of the doll with its arms in an intermediate ball-tossing position;

FIG. 3 is a fragmentary front cross-sectional view, on an enlarged scale, taken through the doll body;

FIG. 4 is a fragmentary cross-sectional view showing the doll's forearm;

FIG. 5 is a fragmentary side cross-sectional view taken through the doll body;

FIG. 6 is a perspective view showing part of the arm-moving mechanism; and

FIG. 7 is a schematic diagram of the electrical circuit carried by the doll.

The toy chosen to illustrate this invention is a doll (FIGS. 1 and 2) having a body 10 and a pair of arms 11 movably mounted on the body at the shoulder region. Surrounding the wrist of each arm is a metal bracelet 13 serving as an electrical contact. Normally, the arms 11 are outstretched, as shown in FIG. 1, ready to catch a ball 12 thrown to the doll. Ball 12 may be hollow and of light-weight material, such as plastic, and is provided with an electrically-conductive exterior surface, such as a metal coating. When the ball 12 is received by the doll, as indicated in broken lines in FIG. 1, it rests against the doll's chest and in the doll's arms (illustrated by the upper ball position in FIG. 5), and contacts the two bracelets 13, thereby completing an electrical circuit within the doll. As a result, the arms 11 pivot downwardly about the shoulders, but they bend at the elbow, until they reach the position shown in FIG. 2. During this movement, the ball 12 rolls into the hands 14 of the doll (see the lower ball position in FIG. 5) and out of engagement with bracelets 13. The circuit nevertheless remains energized until the arms 11 are snapped back to their initial position (FIG. 1), whereby the ball 12 is tossed by the arms, as illustrated by the full line ball in FIG. 1. The electric circuit is automatically deenergized, and ready to repeat the cycle described above upon receipt of the ball once again.

The mechanism for producing the action referred to above is illustrated in FIGS. 3-6. Within the doll body 11 is a bracket having a back plate 15, secured to the body back wall, and two side plates 16 and 17. A horizontal shaft 18 passes loosely through holes in side plates 16 and 17, whereby it is rotatably retained by the bracket. An arm connector member 19 (FIG. 3) is fixed to each end of shaft 18 and passes through an opening in the shoulder region of body 10. Secured to each connector 19, for rotation therewith, is the upper end of an upper arm portion 11a of doll arm 11. The edge of each shoulder opening in body 10 is loosely accommodated within a groove 20 in the upper end of arm portion 11a, so that the upper arm portion is free to rotate with shaft 18, with respect to doll body 10.

Pivotal movement of shaft 18 is effected by an electrical activating circuit including a battery-operated motor 23, supported between the lower end of bracket side plate 16 and a lower side plate 24 carried by back plate 15. The shaft of motor 23 is connected to speed reduction gearing 25 which in turn rotates a shaft 26 journaled between side plates 16 and 24. A gear 27 carried by one end of shaft 26 meshes with a gear 28 carried by one end of another shaft 29 journaled between side plates 16 and 17. The other end of shaft 29 carries a cam 30 having an involute shape. Thus, the cam surface begins at a point 31 (FIG. 6), relatively close to the axis of shaft 29, inclines gradually to a point 32 relatively far from the axis of shaft 29, and then drops sharply back to point 31.

The lower end of a vertical follower link 35 rests upon cam 30, and it passes through a hole in a guide tab 36 projecting horizontally from bracket side plate 17. The upper end of follower 35 passes through a narrow slot in a stop tab 37 projecting horizontally from the upper end of side plate 17, and is formed with a head 38 larger than the width of the slot, the reason for which will be mentioned below. Near its upper end, follower link 35 is pivotally connected to a lever 39 at a point between the ends of the lever. One end of lever 39 is fixed to shaft 18, and the other end is connected to the upper end of a tension spring 40, the lower end of which is connected to tab 36.

It will be appreciated that as cam 30 rotates clockwise in FIG. 5, follower 35 moves from point 31 to point 32 and rises gradually thereby pivoting lever 39 and shaft 18 counterclockwise causing spring 40 to be tensioned. In other words, follower 35 and lever 39 move from their solid line positions in FIG. 5 to their broken line positions. As soon as follower 35 passes point 32, during continued rotation of cam 30, the follower is suddenly unsupported and free to drop back toward point 31, whereupon spring 40 snaps lever 39 and shaft 18 in a clockwise direction. To avoid damage to the surface of cam 30, the lower end of follower 35 does not strike the cam when spring 40 snaps lever 39 downwardly. Instead, head 38 of follower 35 strikes stop tab 37, and the cam surface engages follower 35 during the initial portion of its next cycle of movement.

The electrical activating circuit includes, in addition to motor 23, batteries 43, bracelets 13, and a switch for by-passing the bracelets. Batteries 43 are housed within an enclosure 44 (FIGS. 3 and 5), formed integrally with the back portion of doll body 10, projecting through an elongated opening 45 in the bracket back plate 15. A cover 46 closes the enclosure 44 and permits access for replacing batteries. A contact (not shown) within the enclosure electrically connects two of the battery terminals, and the other two terminals are connected as described below.

Referring to FIGS. 3, 4, and 7, each bracelet 13 is connected via a metal strip 47, passing into the forearm portion 11b through a hole in the wrist, to a metal plate 48. The latter is connected by screw 49 to a metal strip 50 which passes through opposed openings in the forearm and upper arm portions, 11b and 11a respectively, of arm 11. Strip 50 of one of the arms, i.e., the arm illustrated in FIG. 3, is connected by a wire 51 to metal side plate 16, one terminal of motor 23 also engaging side plate 16. The other motor terminal is connected by wire 52 to a battery terminal 56, and another battery terminal 57 is connected by wire 53 to the bracelet 13 of the other doll arm.

Battery terminal 57 is also connected, by a wire 54 to a metal contact strip 55 (see also FIG. 6) of the by-pass switch. Strip 55 is mounted on side plate 16 by a rivet 60 but is insulated from side plate 16 by a block 61, and is insulated from rivet 60 as well. Near its lower end, strip 55 is deformed to define a contact 62 adapted to engage side plate 16. At its lower end, strip 55 is provided with a button 64 seated against one face of a disk-like switch actuator 63, the latter being fixed to shaft 29. Actuator 63 is substantially flat, but is formed with one rise 65, so that contact 62 is permitted to engage side plate 16 except when rise 65 engages button 64, as shown in FIG. 3.

The pivoted elbow connection between forearm 11b and upper arm 11a is achieved by means of a pin 68 (FIG. 3) pivotally held within upper arm 11a near its lower end. Fixed to the pin 68, and passing through the opposed openings in the upper arm and forearm, is a member 69 to which plate 48 and strip 50 are secured, this attachment serving to connect forearm 11b to member 69. Relative pivotal movement between the forearm 11b and upper arm 11a is effected by a gear train within

the upper arm. A gear 70 is fixed to arm connector member 19, and a gear 71 is fixed to pin 68. Three idler gears 72, rotatable on pins mounted within upper arm 11a, transmit rotary motion from gear 70 to gear 71, the gear ratios being so chosen that arms 11 each bend at the elbow during movement with respect to the body 10, as illustrated by the two arm positions in FIG. 5.

The operation of the doll is as follows:

In its rest position, the arms of the doll are outstretched, as shown in FIG. 1 and the upper arm position of FIG. 5, and motor 23 is deenergized, since no ball bridges bracelets 13, and contact 62 is out of engagement with side plate 16 due to the presence of rise 65 against button 64. When electrically conductive ball 12 is caught by the doll (FIG. 1 and upper ball position of FIG. 5), a circuit is completed from battery terminal 56, through wire 52, motor 23, side plate 16, wire 51, elements 50, 49, 48, and 47, one bracelet 13, ball 12, the other bracelet 13, and wire 53, to battery terminal 57. Consequently, motor 23 is energized and causes rotation of shaft 29, via gearing 25, shaft 26, and gears 27 and 28; hence cam 30 rotates clockwise in FIG. 5. Follower link 35 rises lifting lever 39 and rotating shaft 18 counterclockwise to lower arms 11. Hence, ball 12 rolls into the doll's hands 14 (lower arm and ball position of FIG. 5) and out of engagement with bracelets 13. However, motor 23 remains energized, since by this time rise 65 of switch actuator 63 has moved away from button 64, and therefore contact 62 engages side plate 16. A circuit is completed from battery terminal 57, through wire 54, strip 55, side plate 16, motor 23, and wire 52 to battery terminal 56.

When follower 35 passes point 32 of cam 30, spring 40 snaps arms 11 upwardly, via lever 39 and shaft 18, causing the ball 12 to be tossed. Simultaneously rise 65 of actuator 63 moves into engagement with button 64, thereby moving contact 62 away from side plate 16, whereby motor 23 is deenergized. Use of by-pass switch 55 thus insures that each cycle of action of the doll terminates at the same point, i.e., with follower 35 engaging approximately the low point 31 of cam 30. The doll is now ready to once again catch and toss ball 12.

The invention has been shown and described in preferred form only, and by way of example, and it is understood, therefore that many variations may be made in the invention which will still be comprised within its spirit. Thus, although the switch which initiates actuation of the toy has been shown as comprising a pair of bracelets 13, this switch could be a micro-switch located on the doll's chest which closes when the ball 12 comes to rest against the chest, and which opens when the ball rolls into the doll's hands. In such a case, the ball 12 need not be electrically conductive.

What is claimed is:

1. An animated toy comprising:

- (a) a body,
- (b) at least one appendage movably connected to said body,
- (c) an electrical activating circuit carried by said body for moving said appendage,
- (d) an exposed, normally open switch carried by the toy, said switch forming part of said circuit,
- (e) an independent missile supportable by said appendage and when so supported closing said switch to complete said circuit and cause movement of said appendage from its initial position to an intermediate position,
- (f) a spring linked to said appendage, and
- (g) means for tensioning said spring as said appendage moves from said initial to said intermediate position and thereafter suddenly releasing the tension in said spring, whereby said spring causes said appendage to snap back to its initial position and thereby toss said missile.

2. An animated toy as defined in claim 1 including two

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appendages, and wherein said switch includes a pair of spaced apart electrical contact members carried by said appendages, and said missile is electrically conductive and bridges said contact members when supported by said appendages.

3. An animated toy as defined in claim 2 wherein said missile is a ball having an electrically conductive outer surface.

4. An animated toy as defined in claim 2 wherein said toy is a doll, and said appendages are the arms of the doll.

5. An animated toy as defined in claim 4 wherein each of said electrical contact members is a bracelet.

6. An animated toy as defined in claim 1 including (h) a switch in said electrical activating circuit, said switch (h) being in parallel with said switch (d), and (i) means for maintaining said switch (h) open when said appendage is in its initial position and closing said switch (h) after said appendage is moved out of its initial position, whereby said circuit is completed by said switch (h) until said appendage returns to its initial position.

7. An animated toy as defined in claim 1 wherein said means (g) includes a cam rotatable by said circuit, and a cam follower engaging the surface of said cam and transmitting the motion of the latter to said spring, the surface of said cam having

(I) two points spaced different distances from the axis of rotation of said cam

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(II) a gradually inclined portion joining said two points, and

(III) a sharply inclined portion joining said two points, said spring being tensioned as said follower rides along said gradually inclined portion from the point closer to the cam axis to the farther point and said tension being suddenly released when said follower moves past said farther point.

8. An animated toy as defined in claim 2 wherein each of said appendages comprises two relatively movable parts, and including

(j) means for moving said parts with respect to each other as said appendages move with respect to said body.

9. An animated toy as defined in claim 8 wherein said toy is a doll, said appendages are the arms of the doll, said parts of each appendage are an upper arm and a forearm pivotally joined at an elbow region, and said means (j) causes each arm to bend at the elbow.

10. An animated toy as defined in claim 8 wherein said means (j) includes a series of gears within each of said appendages.

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