United States Patent

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[54] **TOY MOVING-PICTURE AND AUDIO-SYNCHRONIZING MECHANISM**
9 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **46/232,** 40/33
[51] **Int. Cl.** **A63h 33/26**
[50] **Field of Search** 40/28.2, 33; 46/13, 175, 232

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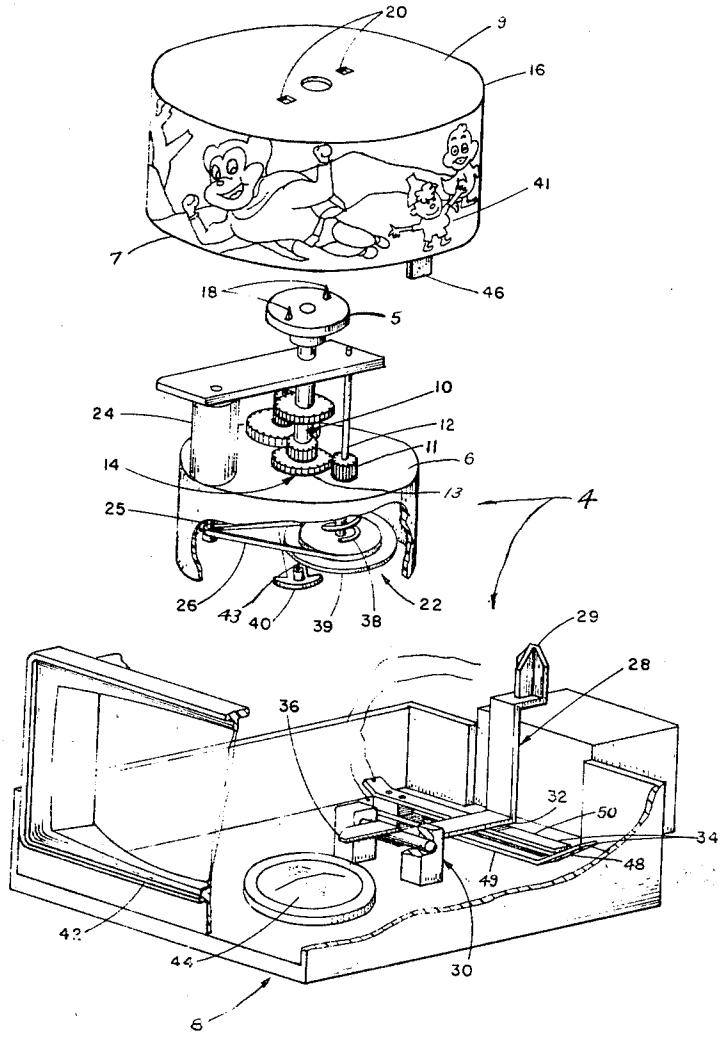
ABSTRACT: A storytelling toy is provided having a series of pictures on a drum that rotates. A record telling the story is synchronized with the rotating picture drum. The toy is designed so that the drum and voice recording are interrupted at the end of each cycle and are resynchronized through actuation of a dual action switch each time the toy is restarted. Any undesired actuation of the switch by a child, therefore, cannot cause the unit to remain out of synchronization beyond one cycle of operation.



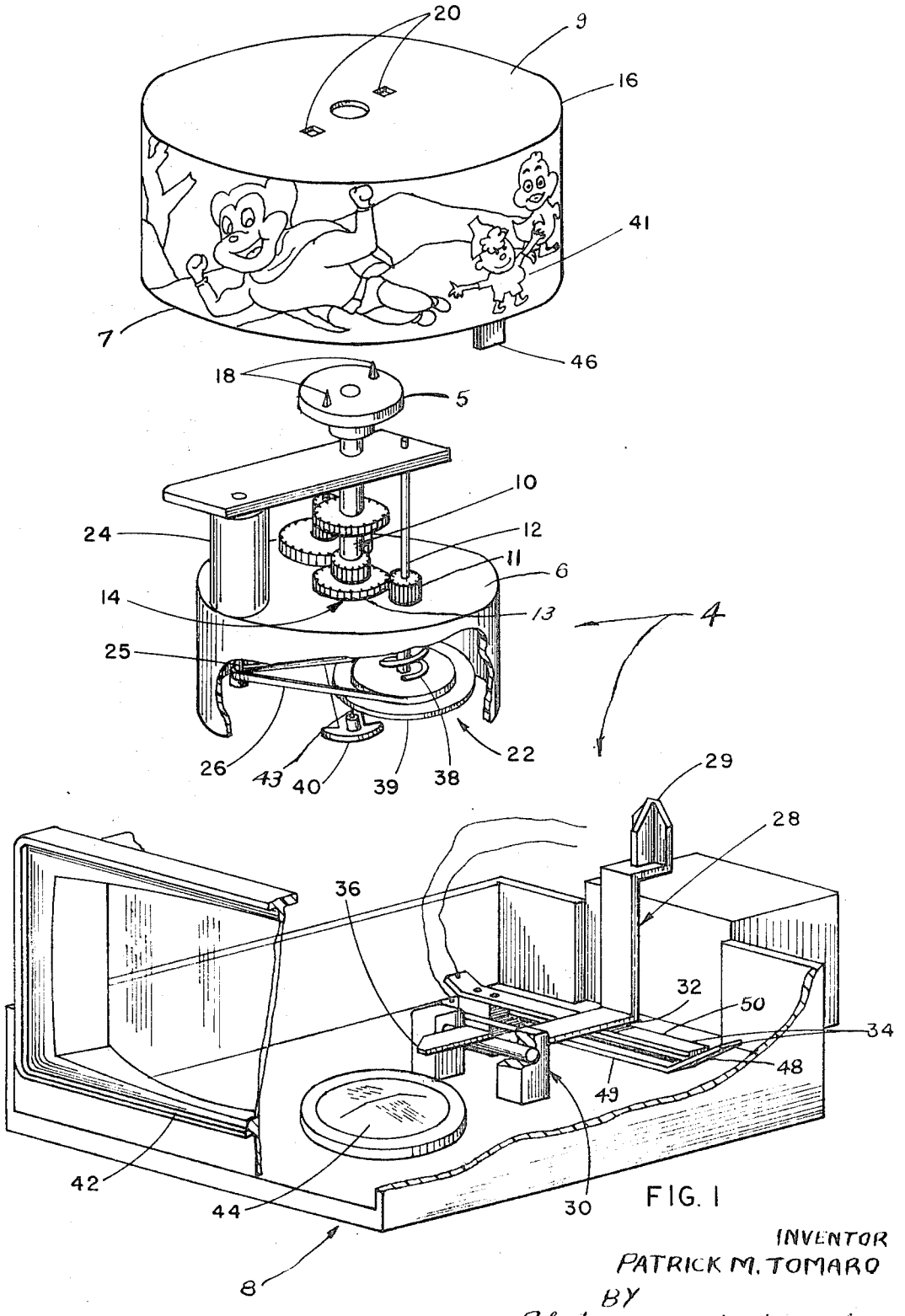


FIG. 1

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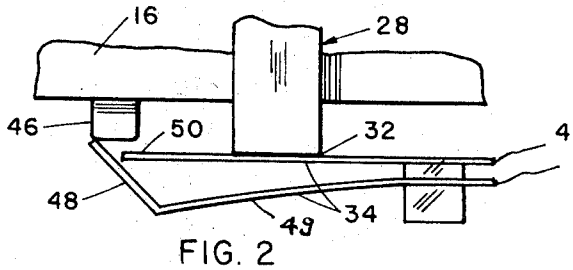

FIG. 2

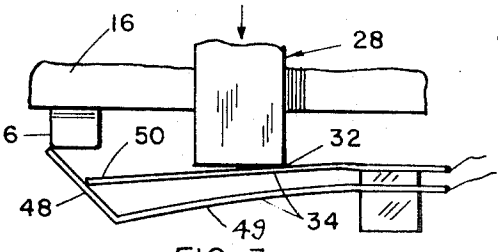

FIG. 3

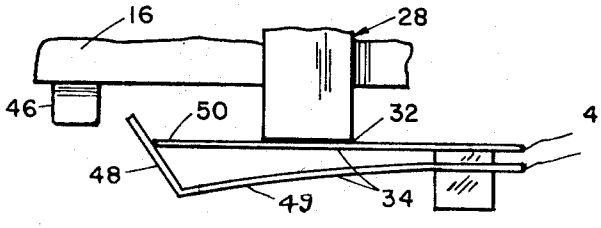

FIG. 4

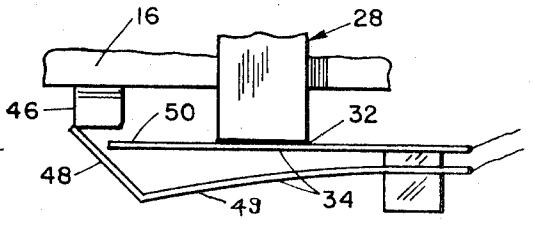

FIG. 5

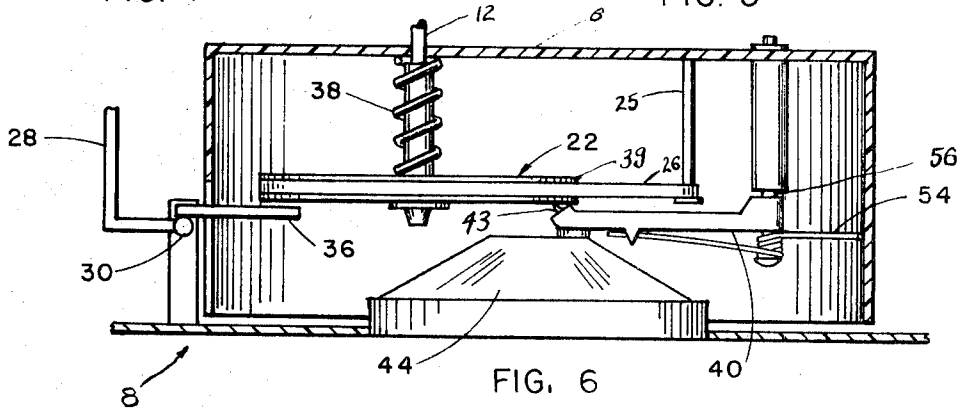

FIG. 6

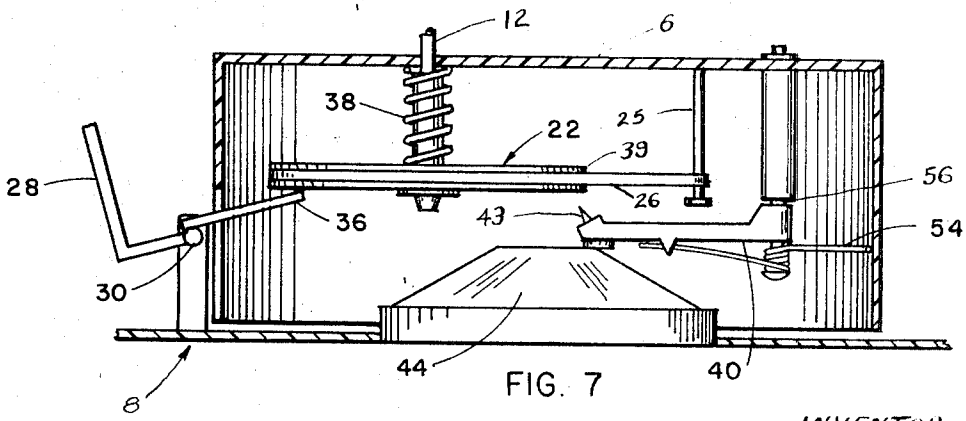

FIG. 7

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TOY MOVING-PICTURE AND AUDIO-SYNCHRONIZING MECHANISM

BACKGROUND OF THE INVENTION

Various toys have employed means to provide an audio description of a moving picture story. For example, spring-wound motors and various mechanical linkages have been used in attempting to actuate a picture story; others use electrical motors and other interconnections. Such toys, used by children, are subject to interruption during a cycle of operation, and, therefore, are subject to being operated out of synchronization.

SUMMARY OF THE INVENTION

A toy moving-picture and sound-synchronizing mechanism is herein disclosed. A serial picture story is located on a rotating drum which moves past a viewing window. The drum is rotated by a drive, including an electric motor, simultaneously with the resetting of a record.

The drive includes contacts and a dual action switch arranged relative to one another so that when the dual action switch is contacted by a child one portion of the switch exerts pressure on the contacts, thereby closing the contacts, allowing the motor to be energized, simultaneously actuating the motor and the record. Another portion of the switch resets the record to coordinate the sound of the rotating record with the rotation of the drum past the viewing window.

An interruptor is operatively associated with the rotating drum, interrupting the drive after one rotation of the drum.

The interruption caused by the interruptor allows the mechanism to be resynchronized should the dual action switch be contacted during a cycle of operation causing the record to be reset so that the sound is out of synchronization with the rotating picture story. After interruption, when the dual action switch is contacted to commence a new cycle of operation, the record is reset providing a sound description synchronized with the moving serial picture story.

The various features and advantages of the present invention may be better understood by referring to the following detailed description and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective view showing the toy moving-picture and audio-synchronizing mechanism.

FIGS. 2 through 5 are enlarged side views showing the interaction between the interruptor, contacts and dual action switch during a cycle of operation.

FIG. 6 is a side view showing the position of the record and dual action switch after rotation of the record has begun.

FIG. 7 is a side view showing the position of the record when contacted by the dual action switch prior to the record commencing rotation.

DETAILED DESCRIPTION

The mechanism herein disclosed synchronizes the movement of a serial picture story **41** with the sound of a record **22** and assures resetting should the mechanism be forced out of synchronization. A drive **4** including a motor **24**, contacts **34**, a dual action switch **28**, and shafts **10** and **12** controls the movement of the serial picture story **41** and the rotation of the record **22**.

FIG. **1** as shown is an exploded perspective view of the mechanism to facilitate a general understanding of the relationship of the individual parts and the makeup of the mechanism. The exploded view is divided into essentially three parts. The first part includes a base portion **8** wherein the completely assembled mechanism is mounted. A viewing window **42** is attached to the base **8** to allow a child to view the moving serial picture story **41**.

The uppermost part of the exploded view includes a drum **16** having the serial picture story **41** mounted on its surface.

Attached to the base **7** of the drum **16** is an interruptor or lug **46** extending downwardly therefrom. The drum **16** also has two grooves **20** extending through its top **9** to allow engagement with pins **18** shown in the center part of the exploded view.

The center part of the exploded view includes among other features a motor **24** and gear train **14**. The motor **24** is mounted to housing **6** and has a motor shaft **25** extending downwardly therefrom. A drive belt **26** is attached to the motor shaft **25** and the record **22**; the record **22** being rigidly mounted to a record shaft **12**. Pins **18** extending upwardly from the top portion **5** of a drum shaft **10** provide engaging means for grooves **20** in the top **9** of the drum **16**. The drum shaft **10** has drive gears **13** located thereon. When the motor **24** is energized the gears **13** help transfer some of the torque from the rotating record shaft **12** to the drum shaft **10** causing rotation of the drum shaft **10**.

The drum **16** is mounted on the drum shaft **10** with pins **18** engaging grooves **20**. The assembled apparatus is then mounted on the base **8** so that as the drum shaft **10** rotates the drum **16** displays the serial picture story through the picture window **42**.

A dual action switch **28** is pivotally mounted to the base **8** through pivoting supports **30**. The dual action switch **28** includes a top portion **29** capable of being depressed by a child. Spring-pressed contacts **34**, including upper and lower generally parallel spaced resilient portions **50** and **49**, respectively, are mounted on the base **8** and arranged relative to one portion **32** of the dual action switch **28** to be contacted thereby. Depression of the top **29** of the dual action switch **28** will cause the switch **28** to pivot about its supports **30** forcing the one portion **32** to depress the upper contact **50**. The depressed upper contact **50** engages an extended portion **48** of the lower contact **49**, thereby closing the contacts **34**, providing an energy path for the current from the batteries, not shown, to the motor **24**. Simultaneously with the depression of the dual action switch **28** and the closing of contacts **34**, another portion **36** of the dual action switch **28** contacts the record **22**. The record **22** is rigidly attached to record shaft **12**. A record spring **38** is wedged between the record **22** and housing **6**. Further, the record shaft **12** is loosely mounted to the housing **6** so as to permit a slight amount of vertical movement thereto. When the portion **36** contacts the record **22** rigidly attached to the movable record shaft **12** the record **22** and shaft **12** move vertically upward causing compression of the spring **38**. The compressed spring **38** then forces the record **22** to move back to its normal position when the portion **36** of the switch **28** is released from contact with the record **22**.

An arm shaft **56** is rigidly mounted to housing **6**. Arm **40** is pivotally mounted to the arm shaft **56** to normally maintain contact with the rotating record **22** through needle **43**. An arm spring **54** is mounted to the arm shaft **56** having one end attached to arm **40** and the other end engaging housing **6**. During audio operation, the arm **40** normally contacts diaphragm **44** and the needle **43** engages record **22** whereby the compressive forces exerted by the spring **38** and the diaphragm **44** hold the arm **40** and needle **43** in contact with the record **22**. As the record **22** rotates the arm **40** moves inward toward the center of the record **22** extending arm spring **54** such that when the record **22** is engaged by the portion **36** of switch **28** it is moved vertically upward. Such action releases the compressive contact between the record **22** and the needle **43** causing the extended spring **54** to pull the arm **40** back toward its starting position, near the edge **39** of the record **22**, the relaxed position of the arm spring **54**.

As seen in FIG. **1**, a drum shaft **10**, is operatively associated with a record shaft **12** through a gear train **14**. The drum shaft **10** has a drum **16** seated thereon through pins **18** which engage grooves **20** located in drum **16**. A spring loaded record **22** is rigidly attached to the record shaft **12** and rotates therewith.

Torque is applied to a motor shaft **25** by a motor **24** driven by batteries (not shown). A drive belt **26** connects the motor

shaft 25 and record shaft 12 providing rotation to the record shaft 12 and a spur gear 11 rigidly attached thereto. The rotation of record shaft 12 causes spur gear 11 and gears 13 located on the drum shaft 10 to mesh thereby rotating the drum shaft 10. As the drum 16 rotates the serial picture story 41 is moved past the viewing window 42. Simultaneously with the rotation of the drum 16 the record 22 mounted on record shaft 12 rotates allowing sound to be transmitted to the diaphragm 44 through the arm 40 coordinating the record sound with the rotating serial picture story.

A dual action switch 28 is pivotally mounted on the base 8 and arranged proximate to contacts 34. The dual action switch 28 has a top 29 which can be pressed by a child. When the top 29 is pressed, the dual action switch 28 pivots about its mounting 30 whereby one portion 32 of the switch 28 engages contacts 34 causing them to close, providing a current path to the motor 24 from a battery power source (not shown). The other portion 36 of the switch 28 contacts the spring-loaded record 22 moving the record 22 and shaft 12 upward compressing the spring 38 enabling the record arm 40 to assume a position near the edge 39 of the record 22 in contact with the diaphragm 44. When the top 29 of the switch 28 is released the record spring 38 returns to its relaxed state pushing the record 22 into contact with needle 43 thereby wedging the needle between the record 22 and diaphragm 44.

The positioning of the arm 40 is controlled by arm spring 54 mounted on arm shaft 56 and attached to arm 40 and housing 6. As the record 22 is rotated the arm 40 and needle 43 advance inward along the record groove toward the center of the record 22 held in contact with the record 22 by the opposing forces of diaphragm 44 and the spring 38. Normally, the arm 40 reaches the center position of the record 22 as the drum 16 completes one revolution.

Once a cycle of operation of the mechanism has commenced a child at play may again contact the top 29 of the dual actuation switch 28. Such contact will cause resetting of the record 22 resulting in sound which is out of synchronization with the moving serial picture story 41. To aid in providing resynchronization, the drum 16 has an interruptor or lug 46 attached to its base 7. The lug 46 rotates with the drum 16 and extends downwardly therefrom. When the lug 46 and drum 16 have completed one revolution the lug 46 will engage an upwardly extending portion 48 of the lower contact 49, moving it away from engagement with the upper contact 50 causing the contacts 34 to open. Opening of the contacts 34 stops the flow of current to the motor 24 ceasing the operation of the mechanism.

Although the record sound may be temporarily out of synchronization with the moving serial picture story 41 during any one revolution, contact on the top 29 of the switch 28 after the interruptor 46 has opened the contacts 34 will cause resetting of the record 22 and closing of the contacts 34 so that proper synchronization between the moving serial picture story 41 and the record sound will be achieved.

If the mechanism is allowed to operate undisturbed through one full cycle, the interruptor 46 located on the base 7 of the drum 16 will engage the extended portion 48 of lower contact 49 moving it away from the upper contact 50 ceasing the flow of current to the motor 24, thereby stopping rotation of the drum and record.

FIGS. 2—5 provide a better understanding of the relationship between the dual action switch 28 and interruptor or lug 46 when engaging the contacts 34.

Initially, as shown in FIG. 2, the interruptor 46 is in contact with the upwardly extending portion 48 of lower contact 49 holding the contacts 34 open, thus preventing a flow of current to the motor 24. This position is designated as the off position.

As shown in FIG. 3, when the dual action switch 28 is pressed the portion 32 of the switch 28 forces the upper contact 50 to engage the upwardly extending portion 48 of the lower contact 49. Such action closes the contacts 34, completing a current path to the motor 24, thereby causing rotation of shafts 10 and 12 and, therefore, rotation of the drum 16 and record 22. This position is designated as the start position.

After the switch 28 is contacted completing a current path to the motor 24, not shown in FIG. 3, the switch 28 can be released once the interruptor 46 has moved slightly away from the upwardly extending position 48 of the lower contact 49. The lower contact 49 is arranged relative to the upper contact 50 to normally maintain contact therewith. This is achieved by providing a lower contact 49 having an upwardly extending portion 48 with sufficient springlike resiliency to normally maintain contact with the upper contact 50, as shown in FIG. 4. This is the normal operating position.

After the drum 16 has undergone one complete revolution, the interruptor 46 will engage the upwardly extending portion 48 of the lower contact 49 forcing the upwardly extending portion 48 of the lower contact 49 to disengage the upper contact 50 thereby opening the contacts 34, interrupting the flow of energy to the motor 24 causing shafts 10 and 12 and, therefore, the drum 16 and record 22 to cease rotation, see FIG. 5. This is the stop position. It should be apparent that FIG. 5 is included for completeness of description, the relative positions of the elements shown being physically the same as that of the off position described in FIG. 2.

FIGS. 6 and 7 illustrate the relationship between the dual action switch 28 and the spring-loaded record 22. FIG. 6 shows the record 22 during normal audio operation when the portion 36 of the dual action switch 28 is not in contact with the spring loaded record 22. During normal audio operation the arm 40 is in contact with the diaphragm 44 and the needle 43 engages record 22 supplying an audio description to the rotating picture 41.

When the top 29 of the dual action switch 28 is pressed the record 22 is effectively reset. Such pressure pivots the switch 28 about its supports 30 causing one portion 36 thereof to engage the record 22 moving it upward, allowing the record arm 40 to be repositioned near the edge 39 of the record 22. As shown in FIG. 7, the portion 36 of the switch 28 engages the record 22 moving the record 22 and record shaft 12 upward, compressing the spring 38. This upward movement of the record 22 releases the needle 43 from engagement with the record groove allowing the arm 40 to spring back near the edge 39 of the record 22 under the force exerted by the extended arm spring 54, as previously described. When the pressure on the top 29 of the dual actuation switch 28 is relieved, the spring 38 extends to a relaxed position forcing the record 22 to assume its normal operating position in contact with the needle as shown in FIG. 6.

It should be understood that various modifications can be made in the arrangement, form and construction of the invention herein disclosed without departing from the scope or spirit of the invention.

What I claim is:

1. A toy moving-picture and audio-synchronizing mechanism including a picture-carrying drum mounted on a drum shaft and being rotatable therewith, a lug attached to the base of said drum and rotatable therewith, a rotatable record shaft operatively associated with said drum shaft, a spring loaded record mounted on said record shaft and adapted to play a sound as said record shaft is rotated, a motor providing rotation to said drum shaft and said record shaft, a battery power supply electrically connected to said motor, resilient contacts interposed between said motor and said power supply arranged to interrupt the flow of energy to said motor when contacted by said lug, said resilient contacts including an upper and lower portion, said lower portion including an upwardly extending portion having a springlike resiliency to normally maintain contact with said upper portion so that said resilient contacts are closed and the motor is energized, said upwardly extending portion movable away from said upper contact, when engaged by said lug, opening said contacts, a dual action switch pivotally arranged relative to said record and said drum such that when said contacts are opened a child may press said switch whereby one portion of said switch en-

gages the record thereby resetting said record enabling it to commence its audio operation while another portion of the switch simultaneously forces the upper portion of said contacts into engagement with said upwardly extending portion of said lower portion closing said contacts providing energy to said motor thereby causing rotation of said shafts.

2. A toy moving-picture and audio-synchronizing mechanism including a rotatable drum having a serial picture story located thereon, a rotatable record operatively associated with the rotatable drum providing sound synchronized to the rotation of the serial picture story, drive means for continuously rotating said drum and said record simultaneously such that the continuous rotation of the serial picture story on the drum is synchronized with the continuous sound of said record, an interruptor operatively associated with said drum to automatically interrupt said drive means when said drum completes one rotation and the serial picture story begins to repeat, thereby stopping the rotation of said drum and said record whereby reactuation of said drive means rotates said drum and said record simultaneously and continuously so that said record sound is synchronized with the continuous rotation of the serial picture story on said drum.

3. A toy moving-picture and audio-synchronizing mechanism as set forth in claim 2 in which said drive means includes a dual action switch arranged relative to said record and drum for resetting said record and actuating said drive means such that when said dual action switch is contacted one portion of the switch engages and resets the record while the other portion of the switch aids in commencing the rotation of said drum whereby the continuous rotation of the serial picture story is synchronized with the continuous sound of said record.

4. A toy moving-picture and audio-synchronizing mechanism as set forth in claim 2 wherein said drive means includes a drum shaft adapted to rotate said drum, a rotatable record shaft having a record mounted thereon operatively associated with said drum shaft, and a motor adapted to rotate said shafts when energized.

5. A toy moving-picture and audio-synchronizing mechanism as set forth in claim 2 wherein said interruptor is a lug attached to said lug rotating with said drum and arranged to automatically interrupt said drive means when said drum has rotated through one complete revolution.

6. A toy moving-picture and audio-synchronizing mechanism as set forth in claim 2 wherein said drive means includes a motor, a battery power supply electrically connected to said motor, resilient normally closed contacts interposed between said motor and said power supply, said normally closed contacts arranged to be opened interrupting the flow of energy to said motor when engaged by said interruptor, a dual action switch arranged relative to said contacts for engagement therewith to close said contacts after they have been opened by said interruptor.

7. A toy moving-picture and audio-synchronizing mechanism as set forth in claim 2 in which said drive means includes resilient contacts having an upper and lower portion, said lower contact portion including an upwardly extending springlike portion normally in contact with said upper contact portion so that said upper and lower contact portions are normally closed by their interaction but capable of being opened when engaged by said interruptor.

8. In a toy adapted to provide simultaneous synchronized multiple actions, a motor, a dual action switch providing simultaneous electrical and mechanical control of said multiple actions, spring-pressed electrical contacts connected to said motor and operatively associated with one portion of said dual action switch, a first moving portion of said toy operated by said motor and having an interruptor associated therewith, said interruptor positioned to engage said contacts providing control of said motor, a second moving portion of said toy for conjoint action with the movement of said first portion and capable of being reset by the mechanical control portion of said dual action switch, whereby said dual action switch and said interruptor can act in concert to control the movement of said first and second portion of said toy.

9. In a toy adapted to provide simultaneous synchronized multiple actions as claimed in claim 8, said first moving portion of said toy including a picture story, said second moving portion including a record providing sound to the moving picture.