

United States Patent

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[56]

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[54] **TOY PHONOGRAPH DEVICE**
4 Claims, 9 Drawing Figs.

[52] U.S. Cl. **274/15,**
 274/1, 274/9
 [51] Int. Cl. **G11b 17/06**
 [50] Field of Search 274/1.1, 9,
 9.1, 1.0, 39, 39.1, 128, 1; 46/116, 117, 232;
 307/132; 200/45, 47, 5;

ABSTRACT: A miniature phonograph for use in toys to provide random playing of one of a plurality of sound messages. The device includes a flat record with a plurality of separate messages thereon and is operable in response to any appreciable movement of the device to initiate the playing of a message. The turntable is rotatably mounted and also mounted to pivot about an axis and to move parallel to said axis outside of its periphery, whereby the turntable is pivoted and raised to contact a stylus at a selected band. The stylus is mounted for limited movement to play said band.

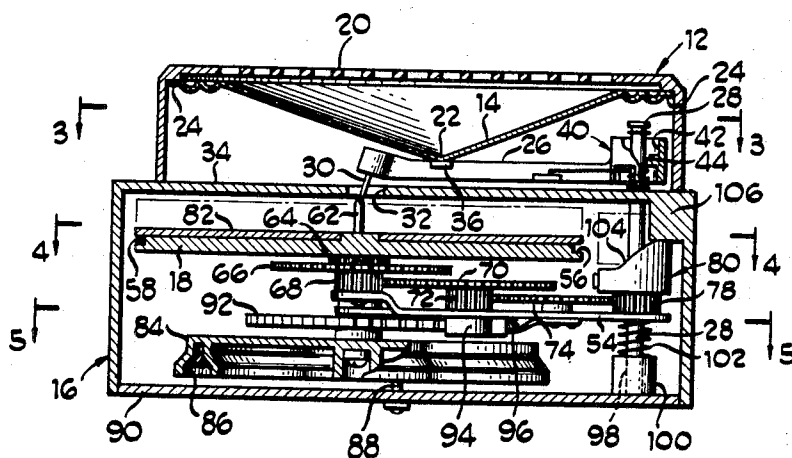


Fig 1

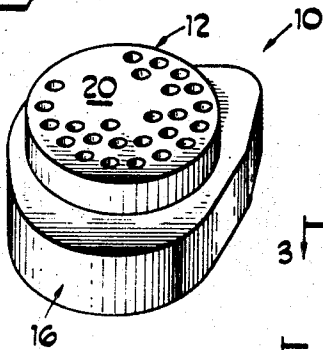


Fig 2

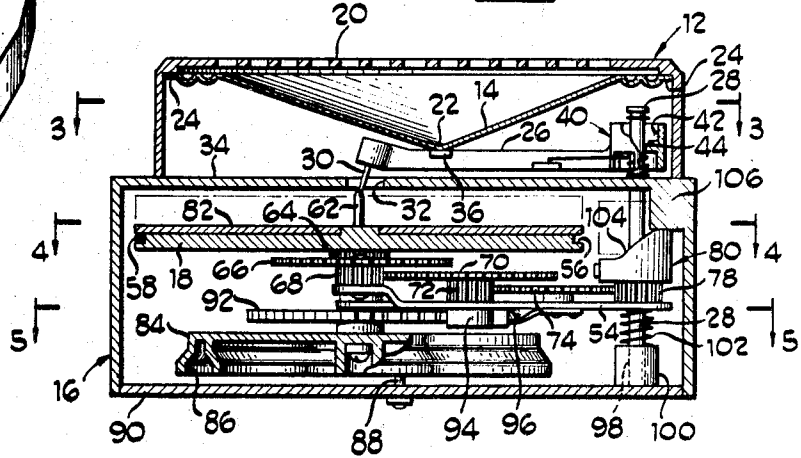


Fig 6

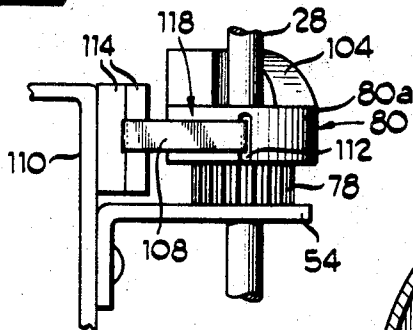


Fig 5

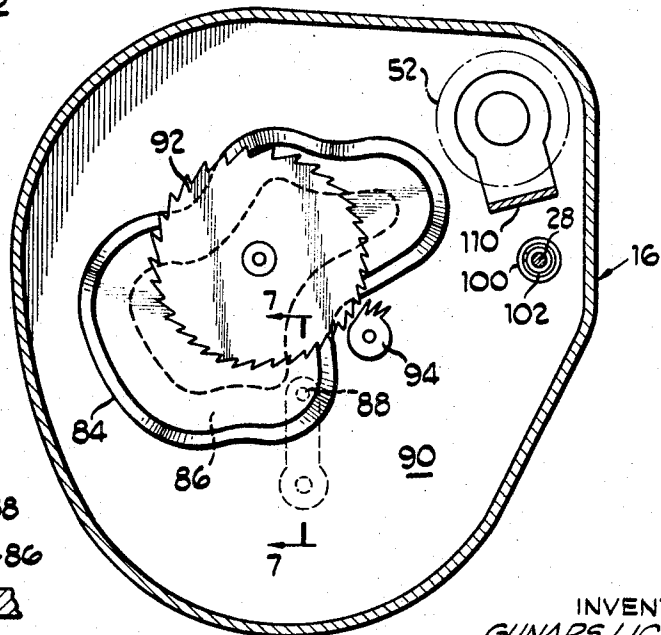
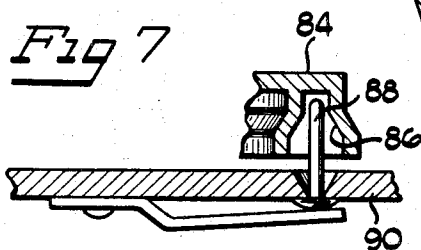


Fig 7



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Fig 3

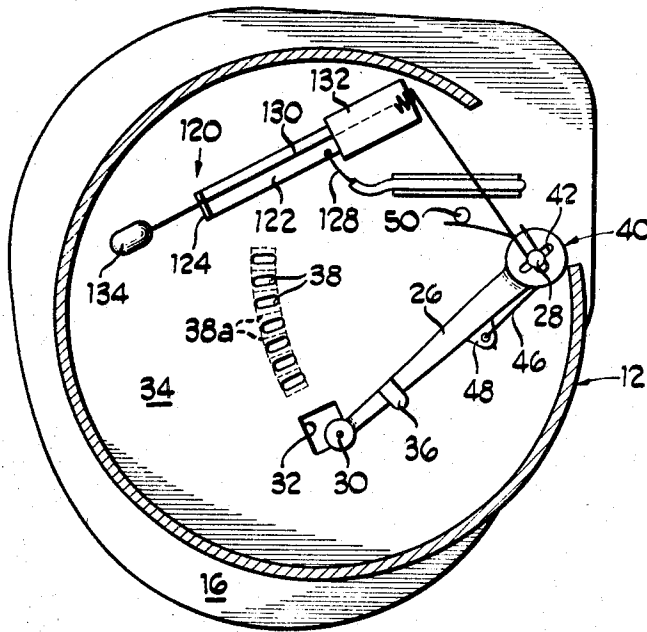


Fig 9

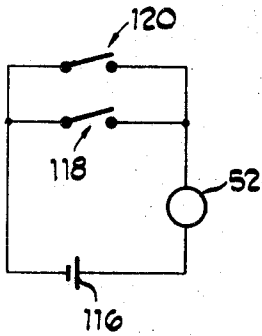
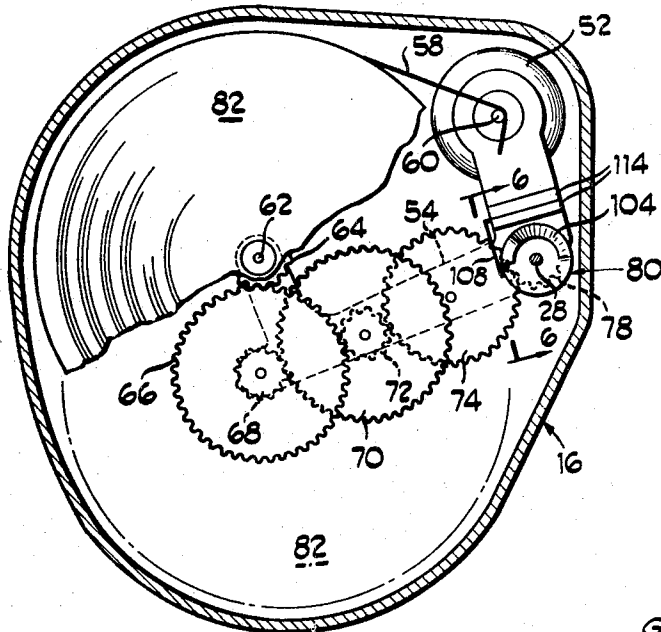


Fig 4



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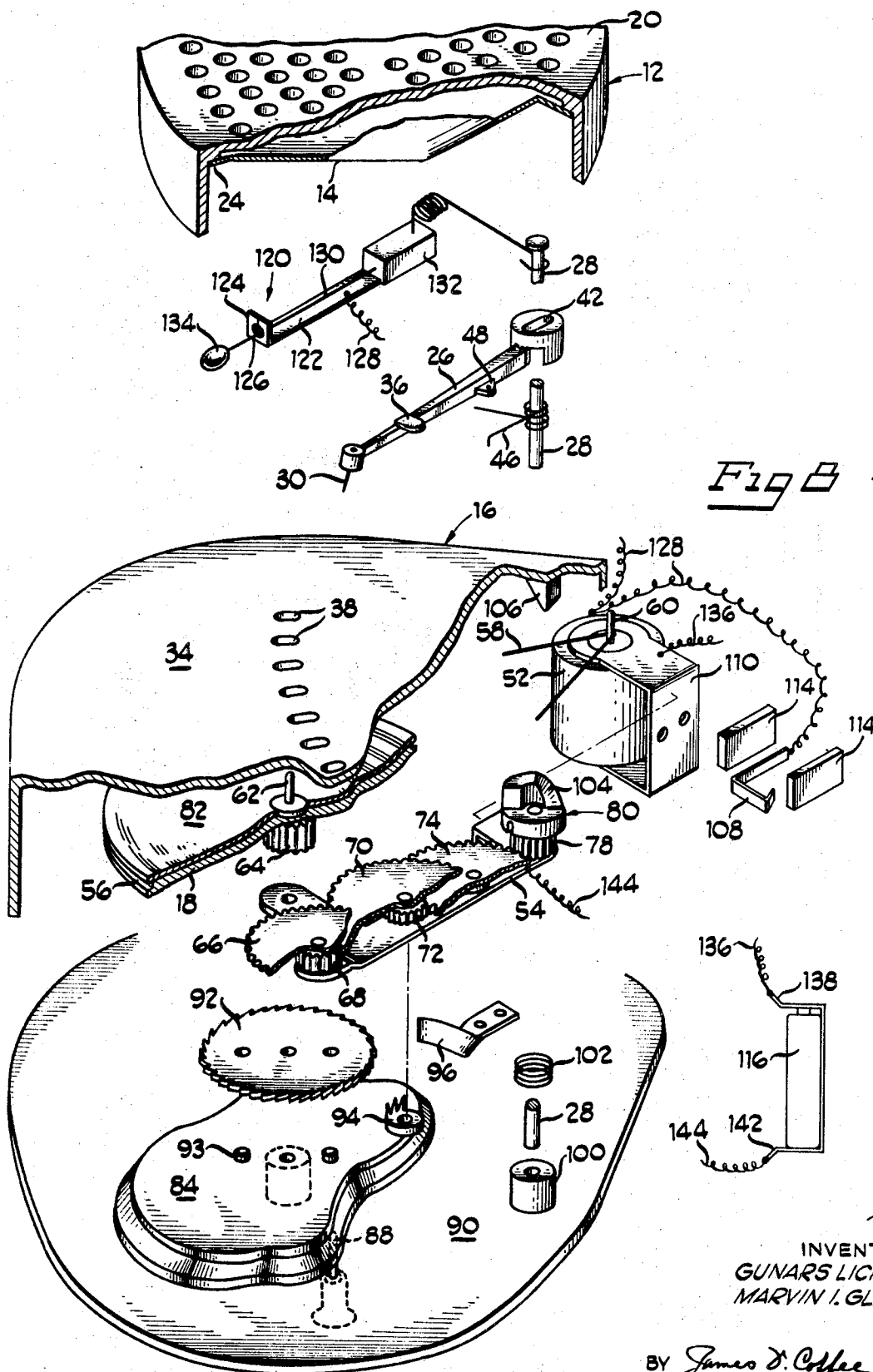


Fig 3

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TOY PHONOGRAPH DEVICE

BACKGROUND OF THE INVENTION

Miniature phonograph devices have been previously provided for use in toys and the like, and some of such devices have provided a random playing of a plurality of sound messages in response to sequential operation of the device. However, such prior art devices have generally included a manually operated means for effecting sequential operation of the phonograph, such as the pulling of a string or the pressing of buttons and the like. The present invention is particularly directed to a miniature phonograph device having no external control means and being operable simply through movement of the device or the toy in which it is mounted. Further, the present invention provides for the random playing of a plurality of sound messages by utilizing translating or lateral motion of the record relative to a stylus.

SUMMARY OF THE INVENTION

A phonograph device including a record having a plurality of separate, messages recorded thereon, drive means for rotating the record including a battery powered motor, sound reproducing means engageable with said record for reproducing the sound recorded thereon, means operable by said drive means for positioning the record relative to said sound reproducing means at the start of any one of said messages so that a complete one of said separate messages is reproduced upon operation of the drive means, and switch means controlling the operation of said drive means and comprising a vibratable wire contact element which is responsive to movement of said phonograph device to initiate operation of said motor and drive means.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the outside of the phonograph mechanism embodying the invention;

FIG. 2 is an enlarged side elevational view of the device, with parts removed and in section;

FIG. 3 is a horizontal sectional view taken along the line 3-3 in FIG. 2;

FIG. 4 is a horizontal sectional view taken along the line 4-4 in FIG. 2, with parts broken away and in section;

FIG. 5 is a horizontal sectional view taken along the line 5-5 in FIG. 2;

FIG. 6 is an enlarged vertical sectional view taken along the line 6-6 in FIG. 4;

FIG. 7 is an enlarged fragmentary sectional view taken along the line 7-7 in FIG. 5;

FIG. 8 is an enlarged exploded view of the components of the phonograph device, with parts broken away and in section; and

FIG. 9 is a schematic illustration of the electrical circuit used in the device.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As seen particularly in FIGS. 1 and 2, the phonograph device 10 embodying the invention comprises a housing having upper part 12 enclosing an acoustical diaphragm or speaker 14 and a lower part 16 enclosing the record turntable 18 and its drive mechanism. For convenience, the phonograph device will be described as though supported on a horizontal surface, in the position generally seen in FIG. 2, although the mechanism is capable of operating in any position.

The upper part 12 of the housing is generally cylindrical and includes a perforated upper wall portion 20 for escapement of sounds from the speaker cone 14. The speaker has its apex portion 22 directed downwardly in the housing, and the generally circular marginal edge 24 at the top of the speaker is fixed to the inner marginal edge of the upper wall 20. A tone arm 26 is pivotally mounted on a post 28 extending upwardly into the upper housing 12, and the free end of the tone arm carries a stylus or needle 30 in position for projection through

a relatively small opening 32 in the top wall 34 of the lower housing portion 16. An intermediate portion of the tone arm 26 is provided with a relatively wide portion or pad 36 for engagement with the apex 22 of the speaker cone 14 to thereby transmit vibrations of the needle 30 to the speaker cone. The upper wall 34 of the lower housing portion 16 also includes a plurality of small slots or openings 38 disposed along an arcuate path which also includes the stylus opening 32, and the purpose of these spaced-apart openings 38 will be made clear later on in the description.

It will be noted that the pivot mounting portion 40 of the tone arm 26 is a generally cylindrical piece having an elongated slot 42 which is formed at its lower portion with a tapered opening 44 (FIG. 2) for receiving the support post 28. The tone arm 26 is thereby provided with a limited amount of vertical tilting movement and, of course, the arm can also pivot horizontally about the axis of the post 28. A light wire spring 46 is coiled around post 28 with its opposite ends disposed so as to bias tone arm 26 to urge stylus 30 counterclockwise and against the edge of the opening 32 in the top wall 34, as seen particularly in FIG. 3. One end of spring 46 is fixed to a tab 48 on the tone arm, and the spring is coiled around the post 28 with the opposite end of the spring abutting a stop pin 50 carried by the housing wall 34.

The turntable 18 and its drive mechanism is disposed within the lower housing portion 16. More particularly, turntable 18 and its drive motor 52 are mounted on a plate 54 which is fixed at one end to the supporting post 28 for rotation therewith to provide for swinging movement of the entire turntable assembly from one side wall of the lower housing 16 to the opposite wall, as indicated particularly by a broken line showing of the turntable in FIG. 4. The turntable 18 includes a circular groove 56 around its side edge, and a drive belt 58 of rubber or the like is tensioned between the drive shaft 60 of drive motor 52 and the circular groove 56 surrounding the turntable. Consequently when electric motor 52 is operating, the turntable 18 is being driven, irrespective of its position along its arcuate path of movement about the axis of the supporting post 28.

Turntable 18 is fixedly mounted on a rotatable spindle 62 projecting upwardly from and fixed to a pinion gear 64 which is rotatably supported on plate 54. The pinion gear 64 is connected (FIG. 4) through a series of additional gears, including gear 66 and pinion 68 fixed thereto, gear 70 and pinion 72, and gear 74 which meshes with a pinion gear portion 78 of a cam 80 rotatably mounted on the supporting post 28. This gear drive mechanism is provided in order to translate a predetermined number of revolutions of turntable 18 into a single revolution of cam 80 and pinion gear 78 about the supporting post 28, with the latter motion providing control for the turntable so as to provide for reproduction of but one message or sound track of the multiple recordings provided on a record 82.

The supporting plate 54 also has rotatably mounted thereon, in depending relation, an irregular cam plate 84 having a downwardly facing irregular groove 86 in position for engagement with a pin or follower 88 carried by the lower wall 90 of housing portion 16. The cam plate is supported on plate 54 for rotation with turntable 18 through drive means including a ratchet wheel 92 overlying cam plate 84. Ratchet 92 is suitably fixed to cam 84, as by lugs 93 and the two are rotated in unison by means of a partially toothed gear or segmented 94 disposed on plate 54 for rotation with the coaxially disposed pinion 72 and adapted for meshing or driving engagement of its teeth with the ratchet 92. More particularly, the segmented pinion 94 is fixed to a shaft which is also fixed to the gear 72 for rotation therewith. Consequently, each rotation of gear 72 causes the tooth portion of the pinion to intermittently drivingly engage ratchet 92 and effect rotary motion of cam plate 84. In order to prevent free rotation of cam plate 84 during the period when pinion 94 is not in engagement with ratchet 92, there is provided a spring 96 having its free end in constant frictional engagement with ratchet 92 to provide a

drag on the latter and movement in but one direction. The spring 96 is fixed to the underside of the supporting plate 54.

As indicated previously, the entire supporting plate 54, together with the turntable 18 and irregular cam plate 84, is fixedly mounted on post 28 for vertical movement therewith. The lower end of post 28 is slidably disposed in a cylindrical recess 98 provided by a boss 100 fixed to the lower housing wall 90, and a coil spring 102 is disposed between the bottom wall and the lower end of post 28 to urge the latter in an upward direction. The integrally formed pinion gear 78 and cam element 80 is journaled on post 28 for rotation relative thereto. The cam element 80 includes a vertically inclined surface portion 104, which cooperates with a fixed wall portion or ledge 106 on housing portion 16 to provide for raising and lowering of post 28 and the support plate 54 attached thereto as pinion gear 78 is rotated. Cam 80 is of electrically conductive metal and provides also a contact portion of a switch means, seen particularly in FIG. 6, for controlling operation of the motor 52. A spring metal contact element 108 is mounted at one end between insulating blocks 114 on an upstanding bracket 110 fixed to the support plate 54, and element 108 has its inwardly bent free end portion positioned for contact with the periphery of the metal cam 80. The cam periphery also includes a slotted opening 112 therein, so that as the end of contact 108 falls into the slot 112 and out of contact with cam 80 the electrical connection is broken. Bracket 110 provides a support for motor 52. A more detailed description of the electrical circuit for the described device will now be given.

With reference particularly to FIGS. 6, 8 and 9, it will be noted that the miniature electrical drive motor 52 for turntable 18 is powered by a battery 116 disposed outside of the phonograph housing, and the electrical circuit for the motor includes a switch indicated at 118 and comprising the contact member 108 and the metal cam portion 80. In addition, the motor drive circuit includes a movement responsive actuating switch, indicated at 120 for also controlling the motor circuit. Switch 120 comprises an electrically conductive strip 122 of metal fixed to the bottom wall 34 of housing portion 12 and provided at one end with an upturned flange portion 124 having a slot or opening 126 therein (FIG. 8). Metal contact strip 122 is connected by a wire 128 with one of the terminals of motor 52. Associated with the metal strip 122 is a resilient, electrically conductive wire contact portion 130 which is mounted at one end in an insulating block 132 and extends parallel to contact strip 122 and through the opening 126 in the flanged end 124. The fixed portion of the resilient wire 130 extends outwardly of the rear of the block 132 and is connected to the metal supporting post 28. The opposite or free end of wire 130 is weighted, as by a mass of soft metal 134 or the like, and the weight 134 cooperates with the resilient wire to provide vibration of the wire and contact thereof with the flange portion 124 of contact strip 122 as the device 10 is moved around. The remainder of the electrical circuit consists of a wire 136 leading from one battery terminal 138 to the other of the motor terminals, through the conductive metal bracket 110 which supports motor 52, and a wire 144 leading from the other battery terminal 142 to plate 54. Thus it is seen that switches 118 and 120 are arranged in parallel in the electrical circuit controlling operation of motor 52. Each of the switches 118, 120 are normally open, with contact 108 disposed in slot 112 and with wire 130 free of contact flange 124.

As the phonograph device 10 is moved about, the vibratable wire contact 130 strikes contact flange 124 at the edge of opening 126 and thereby closes the circuit which includes switch 120, motor 52 and battery 116. The resulting momentary closing of the circuit to the motor provides a sufficient period of operation of the latter to rotate the turntable 18 and thereby rotate the pinion portion 78 of cam 80 sufficiently to cause flexible contact member 108 to disengage itself from within the slot 112 and engage the outer cylindrical wall portion 80a of cam 80. Such movement of contact 108 closes the parallel circuit to the motor; including switch 118, battery 116

and motor 52, until such time when cam 80 has rotated through 360 degrees and flexible contact 108 again moves into insulated slot 112 to open the circuit and stop the motor. During such single rotation of cam 80 and operation of drive motor 52, the turntable 18 is rotated and moved upwardly to a position of engagement between stylus 30 and a sound track on the record 82 to reproduce a complete one of the plurality of messages on the record. As cam 80 approaches the end of its single revolution, the turntable is lowered and contact 108 drops into the gap provided by slot 112 to shut off the motor.

More particularly, the operation of the described phonograph device is as follows. When device 10 is not operating, the phonograph mechanism is in the position seen in FIG. 2, with the turntable 18 lowered and switch 120 and cam switch 118 each in the open position. As the enclosed phonograph 10 is moved sufficiently to cause mass 134 to move the resilient wire contact 130, the switch 120 comprising wire 130 and flange 124 is closed to initiate operation of the motor 52. A resulting small amount of rotation of the turntable 18 is transmitted, through the gearing 64 to 74, to the pinion portion 78 of cam 80 to effect rotation of the cam and engagement of the contact element 108 with the metal cam surface 80a. The motor circuit is now closed and will remain closed until contact element 108 again drops into slot 112 on cam 80. During the initial rotation of cam 80, the latter moves upwardly under the biasing action of spring 102 (FIG. 2) and the cooperation of the inclined cam surfaces 104 with shelf 106, to raise the support plate 54 and the mechanism carried thereby. This elevation of plate 54 moves the turntable 18 into the dotted line position seen in FIG. 2, where one of the separate sound tracks on the record is engaged by the stylus 30. Continued rotation of the turntable causes rotation of cam 80 until the raised portion 104 thereof engages the cam shelf 106 to force cam 80 and its supporting post 28 downwardly, thereby disengaging record 80 from the needle 30, and subsequently allows contact element 108 to drop into the slot 112 on the cam and open the circuit to shut off the motor.

During the initial rotation of turntable 18 and prior to its elevation there is also provided some rotation of the irregular cam plate 84 by movement of the pinion segment 94 into driving engagement with the ratchet 92. In this respect it should be noted that pinion 94 is disposed so that its toothed portion engages ratchet 92 only during the period when turntable 18 is in its lowered position and during the initial stage of the operations described above. At such time, the pin 88 (FIG. 7) is fully within cam groove 86 and, consequently, the rotation of ratchet gear 92 by pinion 94 results in a positive lateral shafting of support plate 54 and turntable 18 to a new position with spindle 62 underlying one of the tapered edges 38a (FIG. 3) defining the lower portions of an adjoining pair of the openings 38 in wall 34. More particularly, slots 38 are formed with downwardly flared walls to provide enlarged openings on the lower surface of wall 34 which are separated only by an edge 38a. As cam 80 rotates further and is suddenly released from shelf 106 to permit plate 54 to move upwardly, the rounded end of turntable spindle 62 strikes an edge 38a and slides into and through one of the openings 38 forming such edge 38a. The spacing of openings 38 is, of course, correlated with the width of each of the several tracks or bands of recordings on record 82. This action provides a further randomlike positioning of the turntable 18. As spindle 62 moves through one of the slots 38, it fixes the rotating turntable in position circumferentially of its support post 28 and stylus 30 engages the particular sound groove then underlying the enlarged opening 32 in wall 34. Opening 32 is of sufficient width to permit the tone arm and stylus to traverse a single one of the multiple bands of recording on the turntable. Further, the spring 46 on tone arm 26 is sufficiently light to permit such limited swinging motion of the arm and yet is sufficiently strong to return the needle 30 to the edge of the enlarged opening 32 when record 82 is lowered out of contact with the needle.

After the several revolutions of record 82 required to complete the randomly selected message, the inclined portion 104 of cam 80 engages shelf 106 and cam 80 and plate 54 are forced downwardly against the opposition of spring 102. This downward movement of plate 54, of course, carries turntable 18 with it to thereby disengage record 82 from stylus 30 and reposition cam plate 84 as seen in FIG. 7. Finally, cam 80 rotates to a position wherein contact 108 drops into slot 112 to open the circuit and stop the operation of motor 52.

It is seen, therefore, that there is provided a phonograph device which is operable in response to movement of the device to provide random playing of any one of a plurality of recorded messages and then shut itself off, all without any external control such as an off-on switch. Such means for providing a spontaneous sound, is particularly adapted for use in dolls, stuffed figures, toys, and the like, wherein the apparently magical operation of the phonograph will provide fascination for a child.

Although shown and described with respect to particular mechanism, it will be apparent that various modifications might be made without departing from the principles of the invention.

We claim:

1. A phonograph device including a turntable supporting a flat record having a plurality of separate sound tracks thereon, drive means for rotating the turntable and record including an electrically powered motor, sound reproducing means including a stylus adapted to engage the sound tracks on said record, means for effecting relative movement of said record and stylus including mounting means for said turntable which is adapted to randomly move said turntable and record through a path parallel to the plane of said record so as to position the stylus at the start of any one of the sound tracks on the record, and switch means controlling the operation of said drive means, said switch means being responsive to movement of said phonograph device to close the electrical circuit for said motor.

2. A phonograph device comprising a housing, a rotatable turntable supporting a flat record and mounted on said housing for swinging movement through a path parallel to the plane of said record and for movement at right angles to said path, said record having a plurality of separate messages recorded thereon, sound reproducing means including a diaphragm, and a stylus associated with said diaphragm and

adapted for engagement with the sound grooves on said record, and drive means operable to effect rotation of said turntable and to cause said turntable to move through said path and also at right angles to the path so as to effect engagement of said stylus with the start of one of said recorded messages.

3. A phonograph device as set forth in claim 1, wherein said drive means includes a first cam means for controlling the movement of said turntable through said path and a second cam means for controlling the movement of said turntable at right angles to said path.

4. A phonograph device comprising a housing divided by an intermediate wall into an upper portion and a lower portion, an amplifying cone supported in said upper housing portion, a tone arm pivotally mounted at one end for movement in said upper housing portion through a path of slidable engagement with the apex portion of said amplifying cone to transmit vibrations from the tone arm to said cone, a stylus carried at the free end of said tone arm and movable through an opening in said intermediate wall, a turntable mechanism in said lower housing portion, means supporting said turntable mechanism for swinging movement through a path parallel to said intermediate wall, said turntable mechanism comprising a rotatable turntable including an upwardly extending spindle and supporting a record on its upper surface, said intermediate wall being provided with a plurality of closely-spaced, arcuately aligned additional openings positioned to receive said spindle and maintain said turntable in position during the playing of a portion of said record, an electrical motor drivingly connected with said turntable to effect rotation thereof, gear mechanism connected with said turntable and operative in response to rotation thereof to cause said turntable to swing about the axis of said supporting means, a first cam means operable by said gear mechanism and effective to control the swinging movement of said turntable supporting means, and a second cam means which is responsive to operation of said gear mechanism to effect axial movement of said turntable, and an electrical circuit connected with said motor and including a first switch means responsive to movement of said device to initiate operation of the motor to turn said turntable, and a second switch means operable by said turntable mechanism to keep said circuit closed for a predetermined period and then open the circuit to halt operation of the phonograph.

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