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W. BROWN ET AL

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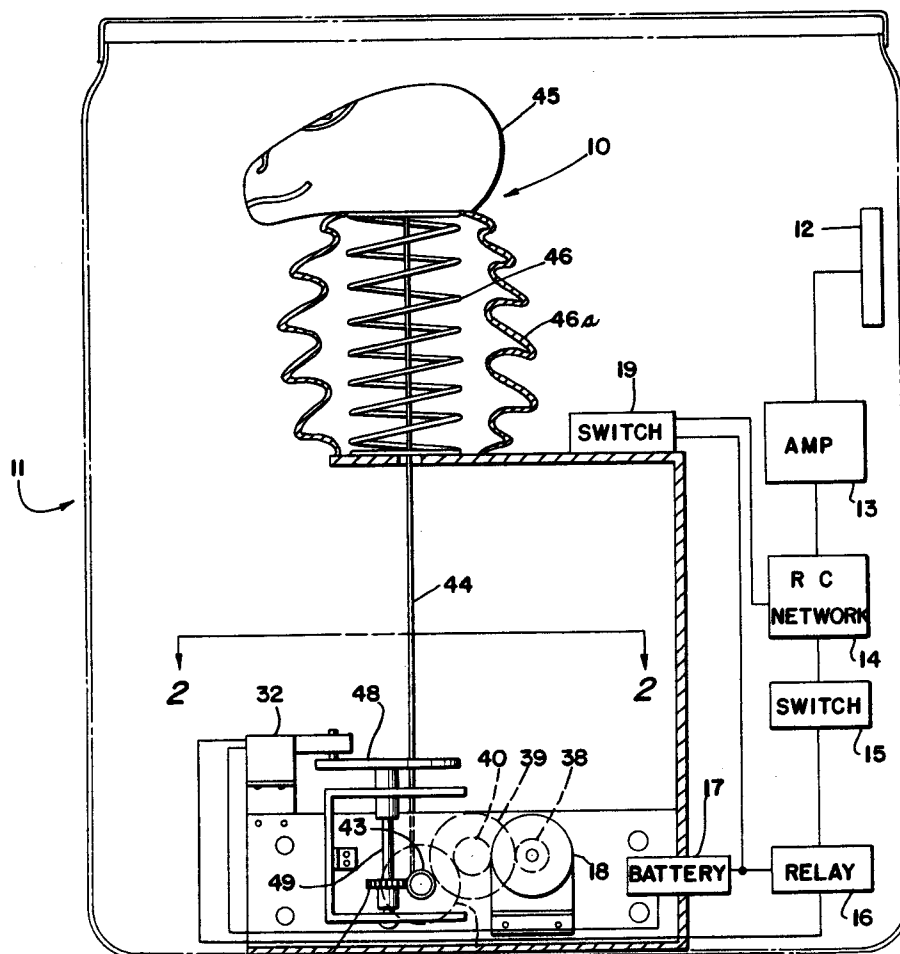


Fig. 1

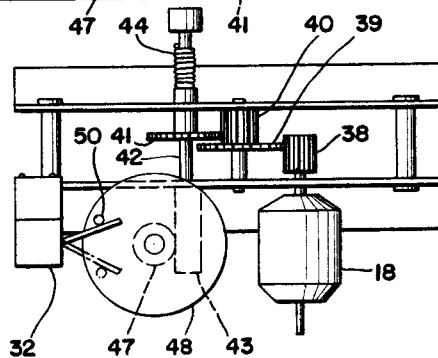


Fig. 2

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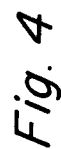


Fig. 3

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This invention relates to electro-mechanical toys and, more particularly, to a toy which will simulate a "magic act" by operating in response to an audible sound.

The device may be used as an amusing toy for children and adults (especially as a "bar joke" for the latter), a "prop" for formally or informally staged magic acts in which the performer appears to charm a snake or make a rope climb by itself, to name two well-known acts reportedly performed by Indian fakirs. If the device is provided in kit form, it will serve as an educational toy by teaching how acoustical energy may be converted into mechanical motion by sound pick-up amplification, rectification, and switching techniques.

The principal object of this invention is to provide an animated toy by which a simulated snake, rope, or the like object will be moved in and out of a receptacle by an acoustically-responsive control system which will impart motion to the object upon receipt of a remote acoustical signal.

Other objects, features, and advantages of the invention will become apparent and more fully understood from the following detailed description of the invention and the accompanying drawings in which:

FIGURE 1 is a partly schematic elevational view of the control and controlled elements according to this invention.

FIGURE 2 is a sectional view of the device shown in FIGURE 1, the plane of the section being indicated by the line 2-2 in FIGURE 1.

FIGURE 3 is a circuit diagram of the control device of FIGURE 1.

FIGURE 4 is an alternate embodiment of a portion of the circuit shown in FIGURE 3.

In general, the device comprises a sound-sensitive device which converts acoustic energy into electrical energy, an amplifier which increases the level of the electrical energy derived from the sound-sensitive device, a switch operated by the amplified electrical energy, a motor operated by the switch which, through a gear train, moves a rope, or like elongated object, in a direction determined by the polarity of the motor, and a reversing switch which will change the polarity of the motor and, consequently, the direction of movement of the elongated object at determinable intervals.

Referring now to the drawings, and particularly to FIGURE 1, a simulated snake 10 is mounted in a wicker basket 11 which is shown in phantom outline. As will be appreciated, the snake 10 and the wicker basket are for purposes of illustration and may be designed to simulate other forms and receptacles, such as, for example, a section of rope in a coil for the "climbing rope" trick, the figure and box for a jack-in-the-box, and the like. A microphone 12 or other sound-sensitive device is mounted within the basket 11. The microphone receives and converts acoustical energy into electrical energy. This resulting electrical energy is amplified by an amplifier 13. A condenser-resistor network 14 receives the amplified electrical energy and provides a D.C. voltage between the emitter and base of a transistor 15. The transistor 15 serves as a switching device which, in turn, operates a relay 16. The relay 16 serves to complete a circuit between a battery 17 and a motor 18. A manually-operated double pole, single-throw "off-on" switch 19 serves to place the battery 17 and the motor 18 in condition for automatic operation by the relay 16 and also serves to

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connect a battery 20 to a circuit comprising transistors 21, 22 and the switching transistor 15.

The amplifier 13 is a conventional two-stage amplifier comprising the transistors 21 and 22. As will be appreciated by those skilled in the art, other arrangements of electronic devices, such as vacuum tubes, may be substituted for the transistor network to provide the desired amplification function. The amplifier 13 is provided with resistors 23, 24, 25, and 26, which are selected to provide the bias necessary and to combine with the capacity of the microphone 12 to make the input circuit a high pass or low reject filter. By this arrangement, the device is made selectively sensitive and responsive to higher pitched sounds and non-responsive to lower ones. By proper adjustment of the values of these resistors, the sensitivity of the device to the amplitude as well as various pitches of sound can be regulated.

After the electrical energy from the microphone 12 is amplified in two stages by the amplifier 13, it is applied to a rectifier 27 in the network 14. The negative portion of the applied voltage is conducted by the rectifier 27 and a condenser 28 is caused to charge up. When the base B of the transistor 15 goes negative relative to the emitter E, current flows in the collector C. Thus, the transistor 15 acts as a switch dependent upon the intensity of the input signal from the microphone 12 and the amplifier 13. When the current from the collector C reaches a predetermined value, a coil 29 will close a switch 30 in the relay 16, causing the motor 18 to be connected to the battery 17.

The motor 18 has an armature 31 which is provided with a double pole, double throw, mechanically operated, reversing switch 32. The switching components of the switch 32 are illustrated schematically in FIGURE 3 and they include switches 33, 34, 35, and 36. The switches 33 and 34 are connected so that they will make or break simultaneously, and the switches 35 and 36 are likewise connected so that they, too, will make or break simultaneously. The switching pairs, comprising the switches 33 and 34, and 35 and 36, respectively, are constructed to work alternately. Thus, when the switches 33 and 34 are closed, the switches 35 and 36 are open. This alternating action of the reversing switch 32 serves to change the polarity of the armature 31 of the motor 18. Of course, the reversing switch 32 could be connected to the field 37 of the motor 18, if desired, but the switch 32 should never be connected to both the field and the armature.

The motor 18 drives a gear train which comprises spur gears 38, 39, 40, and 41. The driven spur gear 41 is keyed to a shaft 42. A worm 43 is keyed to one end of the shaft 42. A string or line 44 is wound around the other end of the shaft 42 and extends therefrom to a head portion 45 of the simulated snake 10.

The head portion 45 is held in a down position within the wicker basket 11 by the line 44 which acts against the bias of a spring 46. A fabric covering 46a is wrapped around the spring 46 to simulate a body portion. As the line 44 is wound onto the shaft 42, the head 45 is pulled into the basket 11 to the position shown in FIGURE 1. As the line 44 is unwound from the shaft, the spring 46 will push the head 45 in an upward direction and out of the basket 11.

Whether the shaft 42 is winding or unwinding the line 44 is dependent, of course, upon the direction of rotation of the motor 18. This direction of rotation is, in turn, dependent upon the polarity of the motor 18.

A mechanism is provided for reversing the polarity and, therefore, the direction of rotation of the motor 18 when the line 44 is wound on the shaft 42 to pull the head 45 into the basket 11, and when the line 44 is completely unwound from the shaft 42 and the head 45 is in an

extended position out of the basket 11. To this end, a worm wheel 47 is provided which is driven by the worm 43. A timing disc 48 is keyed to a shaft 49 which is driven by the worm wheel 47. A pin 50 is positioned on the upper surface of the disc 48. The gear ratio between the worm 43 and the worm wheel 47, the size of the timing disc, and the location of the pin 50 are selected so that the pin 50 will trip the reversing switch 32 when the line 44 is wound on the shaft and the head 45 is in a retracted position and when the line 44 is unwound from the shaft and the head 45 is in an extended position.

In the position shown in FIGURES 1 and 2, the line 44 is being wound on the shaft 42 and the head 45 is being pulled downwardly into the basket 11 against the bias of the spring 46. The disc 48 is being driven in a counter-clockwise direction. When the pin 50 strikes the reversing switch 32, the switch will assume the position shown in phantom outline in FIGURE 2 and the polarity of the motor will be reversed. When the motor is again energized, it will rotate in a reverse direction, causing the line 44 to be unwound from the shaft 42 and causing the timing disc 48 to revolve in a clockwise direction. When the line 44 is completely unwound from the shaft and the head 45 is in an extended position, the disc 48 will have completed substantially one revolution and the switch 32 will again be actuated by the pin 50 when this pin reaches the position shown in phantom outline in FIGURE 2.

The circuitry of the device is such that the head will move only when an acoustical signal of the proper tone is received by the microphone 12. Thus, an operator of the device may simulate a snake charmer by playing a flute or other wind instrument, or by whistling. The simulated snake will respond and move only when the proper acoustical tone is received and movement will cease upon termination of that tone.

The motor circuit, however, may be provided with a holding circuit which will insure movement of the simulated snake to a fully retracted or fully extended position even after termination of the acoustical signal. As is shown in FIGURE 4, a normally open holding switch 51 is connected in parallel with the switch 30a of the relay 16a. When the relay 16a is operated in response to an audible sound, a coil 52 will be energized by the battery 17a and the switch 51 will be closed by the energized coil. Thereafter, if the relay 16a is opened upon termination of the acoustic sound, the motor 18a will remain connected to the battery 17a by the switch 51. The motor 18a will continue to run in a direction determined by the position of the reversing switch. The reversing switch, which is schematically illustrated in FIGURE 4, comprises switches 33a, 34a, 35a, and 36a, and is the same as the previously described reversing switch 32. Since the reversing switch employed in the device is a break-before-make switch, the coil 52 will be de-energized upon operation of the reversing switch when the simulated snake is in either a fully extended or fully extracted position. The movement of the snake may be stopped at any intermediate position, of course, by manual operation of the off-on switch 19 or 19a.

In the light of the above specific disclosures, many other modifications and variations of the invention will become apparent to those skilled in the art. It is to be understood, therefore, that within the scope of the appended claims, the invention may be practiced otherwise than as specifically disclosed.

What is claimed is:

1. An animated toy mounted in a receptacle for movement out of and into said receptacle in response to an audible signal comprising a receptacle, an animated toy having a head portion and a body portion mounted in said receptacle, said body portion comprising a spring fixed to said head portion and normally biasing said head portion in a position out of said receptacle, means responsive to a selected audible signal to move said head portion out of said receptacle to an extended position and

to move said head portion into said receptacle to a retracted position.

2. An animated toy mounted in a receptacle for movement out of and into said receptacle in response to an audible signal comprising filter means for selecting an audible signal of a predetermined frequency, means for converting said selected signal into electrical energy, means for amplifying said electrical energy, a circuit comprising a battery, a motor, and a relay responsive to said amplified electrical energy, said relay connecting said motor to said battery when said relay is energized by said amplified electrical energy, a reversing switch for reversing the polarity of said motor, a winding shaft axially driven by said motor in a direction dependent upon the polarity of said motor, a receptacle, an animated toy having a head portion mounted in said receptacle for movement out of and into said receptacle, spring means normally biasing said head portion in a position out of said receptacle, a cord fastened to said head portion and to said winding shaft, means driven by said winding shaft for actuating said reversing switch when said cord is unwound from said shaft and said head is out of said receptacle and when said cord is wound on said shaft and said head is pulled into said receptacle against the bias of said spring means.

3. An animated toy mounted in a receptacle for movement out of and into said receptacle in response to an audible signal comprising a receptacle, an animated toy having a head portion mounted in said receptacle for movement out of and into said receptacle, spring means normally biasing said head portion in a position out of said receptacle, a winding shaft, a cord fastened at one end to said head portion and at the other end to said winding shaft, means responsive to a selected audible signal to rotate said winding shaft about its axis in a first direction to wind said cord on said shaft and pull said head portion into said receptacle to a retracted position against the bias of said spring and to rotate said shaft about its axis in a second direction to unwind said cord from said shaft and permit said head portion to extend out of said receptacle to an extended position, means to reverse the rotational movement of said shaft between said first and said second directions when said cord is wound on said shaft and said head portion is in said retracted position and when said cord is unwound from said shaft and said head portion is in said extended position.

4. An animated toy mounted in a receptacle for movement out of and into said receptacle in response to an audible signal comprising a receptacle, an animated toy having a head portion and a body portion mounted in said receptacle, said body portion comprising a spring fixed to said head portion and normally biasing said head portion in a position out of said receptacle, filter means for selecting an audible signal of a predetermined frequency, means for converting said selected signal into electrical energy, means for amplifying said electrical energy, a circuit comprising a battery, a motor, and a relay responsive to said electrical energy, said relay connecting said motor to said battery when said relay is energized by said amplified electrical energy, a reversing switch for reversing the polarity of said motor, a winding shaft axially driven by said motor in a direction dependent upon the polarity of said motor, a cord fastened at one end to said head portion and at the other end to said winding shaft, a worm fixed to said winding shaft, a worm wheel driven by said worm, a timing disc driven by said worm wheel, means fixed to said timing disc to actuate said reversing switch when said cord is wound on said shaft and said head portion is in said receptacle and when said cord is unwound from said shaft and said head portion is in an extended position.

5. An animated toy mounted in a receptacle for movement out of and into said receptacle in response to an audible signal comprising a receptacle, an animated toy having a head portion and a body portion mounted in

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said receptacle, said body portion comprising a spring fixed to said head portion and normally biasing said head portion in a position out of said receptacle, a winding shaft, a cord fastened at one end to said head portion and at the other end to said winding shaft, a worm fixed 5 to said winding shaft, means responsive to a selected audible signal to rotate said winding shaft about its axis in a first direction to wind said cord on said shaft and pull said head portion into said receptacle to a retracted position against the bias of said spring and to rotate said 10 shaft about its axis in a second direction to unwind said cord from said shaft and permit said head portion to extend out of said receptacle to an extended position, a worm wheel driven by said worm, a timing disc driven by said worm wheel, means to reverse the rotational

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movement of said shaft between said first and second directions, means fixed to said timing disc to actuate said reversing means when said cord is wound on said shaft and said head portion is in said retracted position and when said cord is unwound from said shaft and said head portion is in said extended position.

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