

Feb. 18, 1969

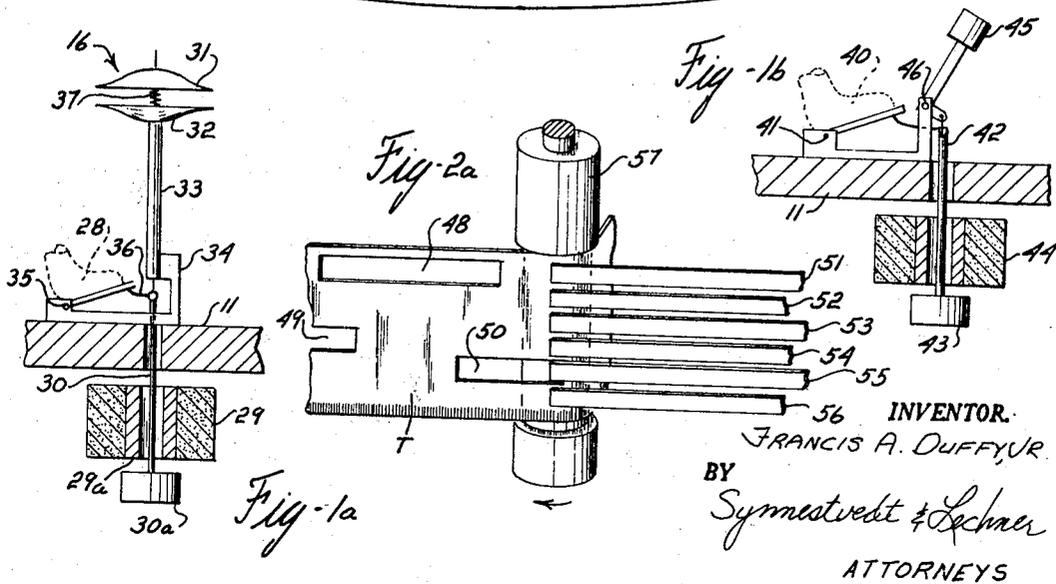
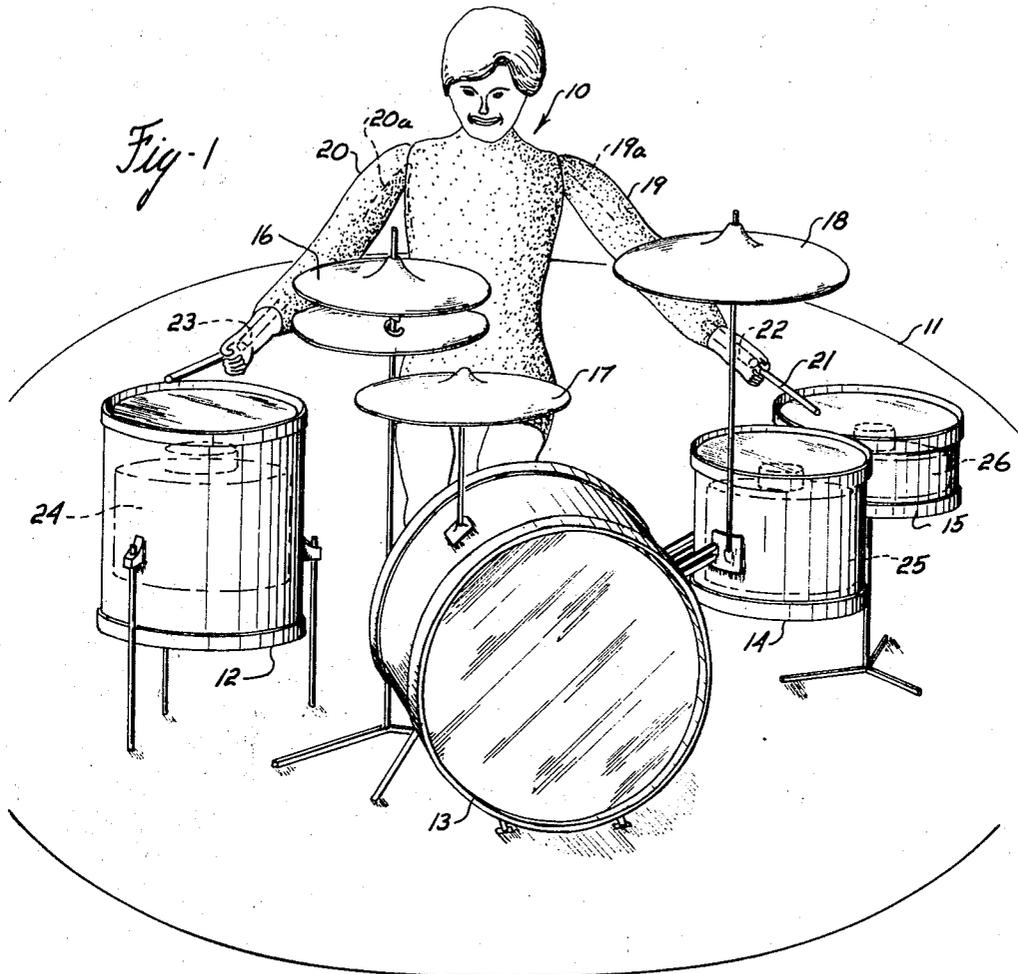
F. A. DUFFY, JR

3,427,745

ANIMATED FIGURE

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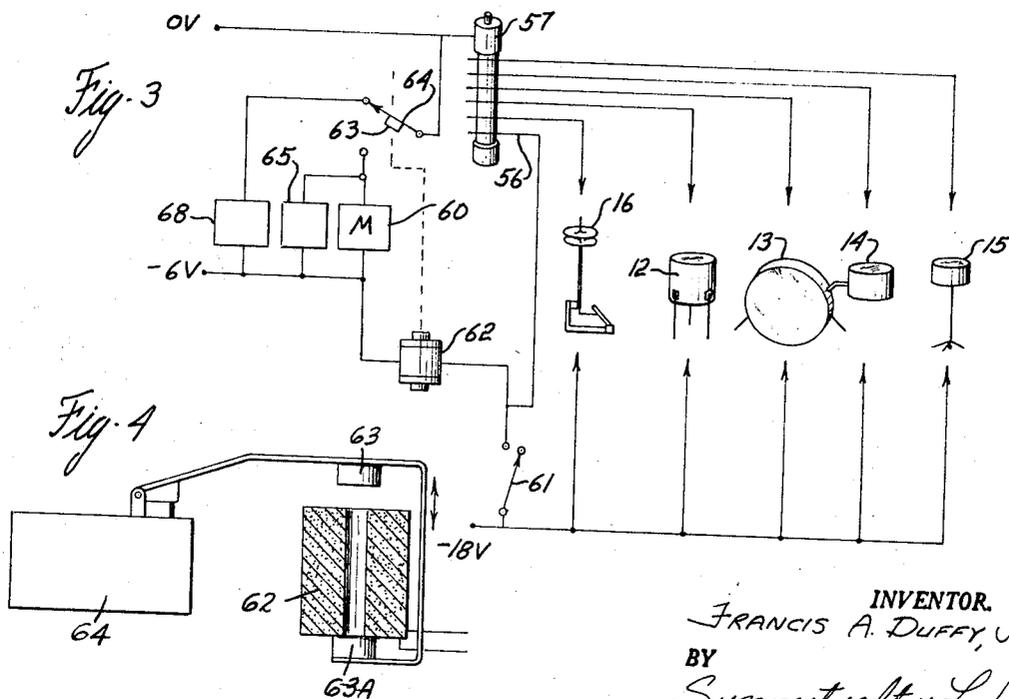
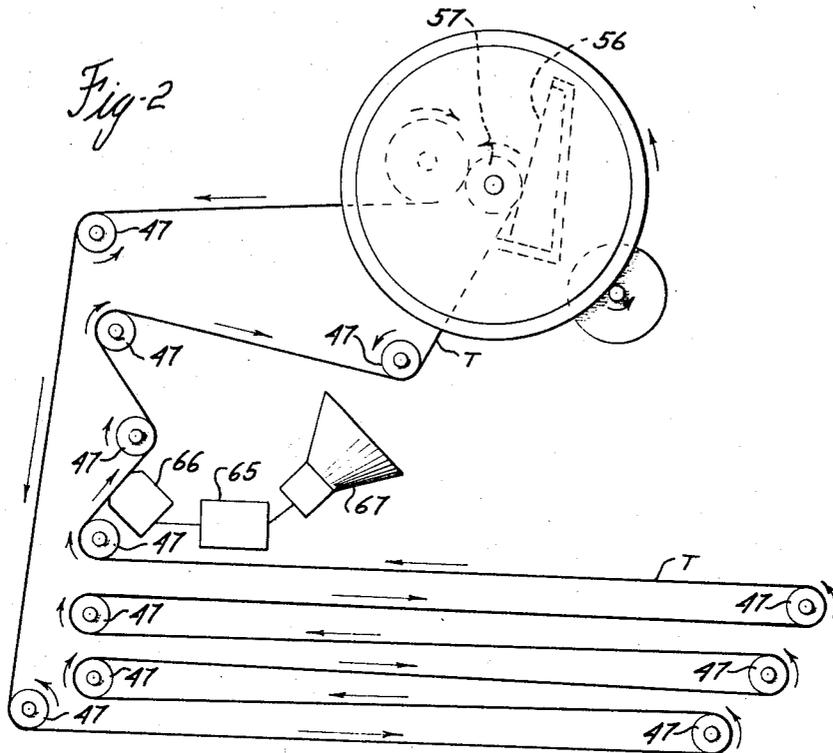
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ANIMATED FIGURE

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ANIMATED FIGURE

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5 Claims

ABSTRACT OF THE DISCLOSURE

An animated figure of a drummer gives musical performance by means of electromagnetic circuitry. Electromagnets draw drumsticks towards striking engagement with a plurality of drums and cause operation of associated musical instruments. A multichannel magnetic tape controls the playing of the drums. Musical compositions are recorded on the tape; these are reproduced by conventional play-back equipment in synchronism with the movements of the animated performer.

This invention relates to amusement devices and more particularly to an electrically operated animated figure capable of movements which simulate the actions of a musician; the invention includes means for reproducing musical compositions in synchronism with the movements of the animated figure.

One of the important objects of the invention is the provision of an animated figure controlled in such a manner that realistic, life-like movements and musical effects are produced.

Another object of the invention is the provision of an animated figure and control circuitry therefor which is simple in concept and dependable in operation.

Still another object of the invention is the provision of circuitry for synchronizing the reproduction of musical compositions in timed relationship with the simulated playing of one or more musical instruments by the animated figure.

Still another object of the invention is the provision of a simple and effective means for producing movements of the limbs of the animated figure.

A specific object of the invention is the provision of an animated figure of a drummer and of control mechanism for causing the simulated operation of a plurality of musical instruments.

Other objects of the invention will appear more fully hereinafter upon reference to the following detailed description when taken in light of the accompanying drawings in which:

FIGURE 1 is a perspective view of a figure formed in accordance with the teachings of the present invention;

FIGURE 1a is a view of a foot of the figure and mechanism for operation a pair of cymbals;

FIGURE 1b is a view of the other foot of the figure; FIGURE 2 is a view of a portion of the structure for effecting movements of the figure and reproduction of a musical composition in synchronism therewith;

FIGURE 2a is an enlarged view of a portion of the structure shown in FIGURE 2; and

FIGURE 3 is a schematic wiring diagram of circuitry used in connection with the present invention.

Turning first to FIGURES 1, 1a and 1b, figure 10 is shown secured to a suitable base 11 by means not illustrated. Although a variety of musical instruments, including pianos, organs or other instruments of the percussion type may be operated by the figure 10, according to the preferred embodiment, the figure is made to operate a plurality of drums 12 through 15 which are preferably of different sizes and type. These are also mounted on the base 11. The arrangement may also include cymbals 16, 17 and 18. The construction of the figure 10 is not particularly critical to the invention so long as arms 19 and 20 are provided with sufficient freedom of movement so as to freely move towards and away from the surfaces of drums 12, 14 and 15.

It is important, however, that at least one arm or the end of the arm, i.e., arm 19 in the illustrative embodiment, be free for movement in a vertical plane and in a horizontal plane, so that the drumstick 21 held in the hand of that arm can be moved towards and away from engagement with the drumhead of the drum 15 or of drum 14. This may be simply accomplished by providing a flexible joint between the arm 19 and the torso of the figure. In the illustrative embodiment, both arms are jointed to the torso by pieces of spring wire, shown in phantom lines at 19a and 20a. The spring wires bias the arms slightly so that they are ordinarily held in position with the drumsticks raised above the surface of the drums. Such a construction provides sufficient flexibility so that arm 20 can move towards and away from the drumhead of either drum 14 or drum 15. Arm 20 in the illustrative embodiment is only required to move in a single plane, that is, towards and away from the drum 12, although movement towards the other drums could obviously be provided for.

In order to control the movements of the arms 19 and 20, pieces of magnetic material are mounted in the hands of the arms 19 and 20, as shown at 22 and 23; preferably small electromagnets having their poles oriented lengthwise of the arms are provided.

Mounted within the drums 12, 14 and 15 are electromagnets 24, 25 and 26, each consisting of a coil and stationary iron core. Preferably, the polarity of the magnet 24 with respect to the magnet 23 and of the magnets 25 and 26 with respect to the magnet 22 is such that opposite poles are adjacent each other. Thus, when one of the electromagnets 24 through 26 is energized, the associated arm is drawn downwardly until the drumstick held by the hand of that arm moves rapidly towards contact with the drumhead.

Once an energized electromagnet is de-energized, the resilience of the joint for the arm returns that arm to its initial raised position.

As noted above, in the case of arm 19, depending upon whether electromagnet 25 or 26 is energized, the drumstick held in that arm will be drawn towards engagement with one or the other of the drums 14 and 15.

As shown in FIGURE 1a, the "high hat" cymbal set 16 is arranged so that operation of a foot 28 of the figure causes the cymbals to move towards and away from engagement with each other. This is accomplished by means of an electromagnet 29. An upwardly extending rod 30 fits through the iron core 29a of the magnet 29 and is provided at its lower end with a permanent magnet

30a. The other end of rod 30 is connected to the upper cymbal 31 of the cymbal set 16. Lower cymbal 32 is mounted on a sleeve 33 which is connected to the base 11 by means of a bracket 34.

Foot 28 is preferably hinged to the bracket 34 by a hinge pin 35 and is also connected to the shaft 30 by means of a connecting ring 36. A spring 37 urges the two cymbals apart, thus urging the permanent magnet 30a towards the iron core of the electromagnet 29. Upon energization of the magnet, the permanent magnet 30a is moved downwardly because its upper surface is of the same polarity as the lower face of the energized electromagnet; thus rod 30 and cymbal 31 are pulled downwardly until the faces of the two cymbals 32 come into contact. De-energization of the magnet 29 allows the armature to return to its original position in which the cymbals are separated under the urging of spring 37.

A similar arrangement is disclosed in FIGURE 1b. The figure's other foot 40 is shown pivotally mounted on a pin 41 for movement up and down. The foot is connected to a rod 42 which is in turn connected to a permanent magnet 43 which is beneath an electromagnet 44. Energization of the electromagnet 44 forces the permanent magnet 43 downwardly. A drumstick 45, pivotally mounted as shown at 46, is connected to the rod 42. Energization of the electromagnet causes downward movement of the rod 42 which rocks the drumstick about the pivot point 46 so that it moves towards and away from engagement with the drumhead of the large drum or "tom" 13.

An important aspect of the invention lies in the means for control of the animated figure 10. Preferably, control is achieved by the structure and circuitry schematically shown in FIGURES 2, 2a and 4. According to the invention, an extended loop of magnetic tape T is mounted on suitable support structure secured beneath the base 11 for movement in a continuous path. The tape is guided in its path by means of a plurality of rollers 47 and moves past a pair of control stations as will be explained hereinafter.

In order to control the operation of the animated figure, the tape is provided with a plurality of channels each bearing suitable control indicia. In the illustrative embodiment, the tape has six such channels, although this number could obviously be varied somewhat. The control indicia on the tape may take a variety of forms. Preferably, control of the electromagnets is achieved by apertures spaced in five of the channels. This arrangement may be seen in FIGURE 2a wherein three apertures 48, 49 and 50 are illustrated. In practice, numerous apertures will be provided in each of the channels.

Control of the figure is achieved by six contact members 51-56 (one for each channel) which are spring urged for engagement with the tape. The tape is threaded over a suitable metallic roller 57 at the point of contact with the contactor members. This roller forms a part of a circuit for controlling the operation of the figure whenever one or more of the contact members 51-56 makes contact with the roller through one of the apertures in the tape. Circuitry for accomplishing this is shown in FIGURE 3 and will now be described.

A motor 60 schematically indicated in FIGURE 3, is provided for the purpose of driving the tape T. The motor is started by means of a manually operable switch 61 which is momentarily closed to complete a circuit from a -6 volt terminal on a DC power supply, through an electromagnet 62, also shown in FIGURE 4, to a -18 volt terminal. A pair of permanent magnets 63 and 63a (FIGURE 4) are mounted on the operating arm of a microswitch 64. These permanent magnets are positioned so that they are adjacent opposite ends of the iron core of the electromagnet. The two permanent magnets have the same poles adjacent the core of electromagnet so that reversal of the polarity of the electromagnet moves the arm up and down as indicated by the arrow in FIGURE 4.

A circuit is completed from ground, through the

closed microswitch, through the motor to the -6 volt terminal. Once the small permanent magnet 63 engages the iron core of the electromagnet, it holds itself there, even after switch 61 opens and the microswitch 64 is held in the position which maintains the circuit through the motor 60. By means of the permanent magnet arrangement, the motor microswitch is held in the energized position saving the use of the battery power.

Also connected in the circuit in parallel with the motor 60 is an audio amplifier 65 for amplifying the sound representations recorded on the tape. Upon energization of the motor and amplifier circuits, the tape is advanced past a pick-up station 66 at which the recorded sound is picked up from one separate channel on the tape, amplified by the amplifier 65 and reproduced by the speaker 67. At the same time, the tape switches 51 through 56 sense the presence or absence of apertures in the other channels of the tape. Whenever an aperture passes over roll 57 in any given channel, the switch contactor member aligned with that channel engages the roll, thus completing a circuit from the -18 volt side of the line through the electromagnets associated with the different channels on the tape. Five of these electromagnets, namely magnets 24-26, 29, and 44 are represented in FIGURE 3 by the instruments in which they are mounted. The sixth is the electromagnet 62 which starts and stops the operation of the apparatus. When the switch contactor member 56 senses the aperture in the sixth channel, a circuit is completed from the ground to the -6 volt terminal on the storage battery. The solenoid 62 is reenergized, but the polarity is reversed from what it was when the switch 61 was closed to initiate a cycle. This reverse polarity repels the permanent magnet 63 and attracts magnet 63a, thereby breaking the circuit to the motor and stopping the operation of the apparatus until the next manual operation of the switch 61.

In the illustrative embodiment of the invention, a lamp 68 is adapted to be lit whenever switch 64 is in the raised position. This lamp may be used to illuminate a suitable advertising display device if desired.

Although an endless ribbon of tape is used in the illustrative embodiment, the apparatus may be modified to accommodate tape in cartridge form so that a wider selection of musical compositions may be played.

It should be evident from the foregoing that I have provided a highly unusual and effective animated figure suitable for advertising purposes or solely for the amusement of the public. The circuit and control system is extremely effective in operation and is arranged for minimum consumption of power.

I claim:

1. In combination, an animated figure of a musician, means mounting a hand of said figure for movement to a plurality of laterally spaced positions, means simulating a musical instrument at each of said positions, a portion of a magnetic material in said hand, an electromagnet at each of said positions, said magnetic material being positioned relative to each of said electromagnets whereby energization of a selected one of said electromagnets attracts the magnetic material thereby moving said hand towards said position to simulate the playing of a musical instrument, and electrical control circuitry for energizing said electromagnets according to predetermined rhythmic patterns.

2. Apparatus according to claim 1, wherein said musical instrument means includes a plurality of drums, one of said drums being located at each of said positions, and wherein said hand is provided with a drumstick adapted to be moved towards striking engagement with said drums upon energization of selected ones of said electromagnets.

3. Apparatus according to claim 1, wherein said magnetic material is a permanent magnet, the magnet being positioned so that opposite poles of said electromagnet and said permanent magnet are adjacent each other and further including spring biasing means for

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urging said hand to a raised position with respect to said musical instrument simulating means.

4. Apparatus according to claim 1, further including means associated with said figure for reproducing musical compositions and means synchronized with said musical composition for operating said control circuitry whereby the playing of musical compositions is simulated by said figure.

5. Apparatus according to claim 4, wherein the means for reproducing musical compositions includes a magnetic tape, the composition being recorded on said tape, wherein said synchronizing means includes at least one separate channel on said tape, control indicia spaced along said

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channel for energizing said electromagnets in synchronism with the play-back of the composition recorded on said tape.

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