July 22, 1952 M. B. GRUBER 2,603,912

SOUND FOR FIGURES OR PUPPETS

Filed June 26, 1948 3 Sheets-Sheet 1

Fig. 1

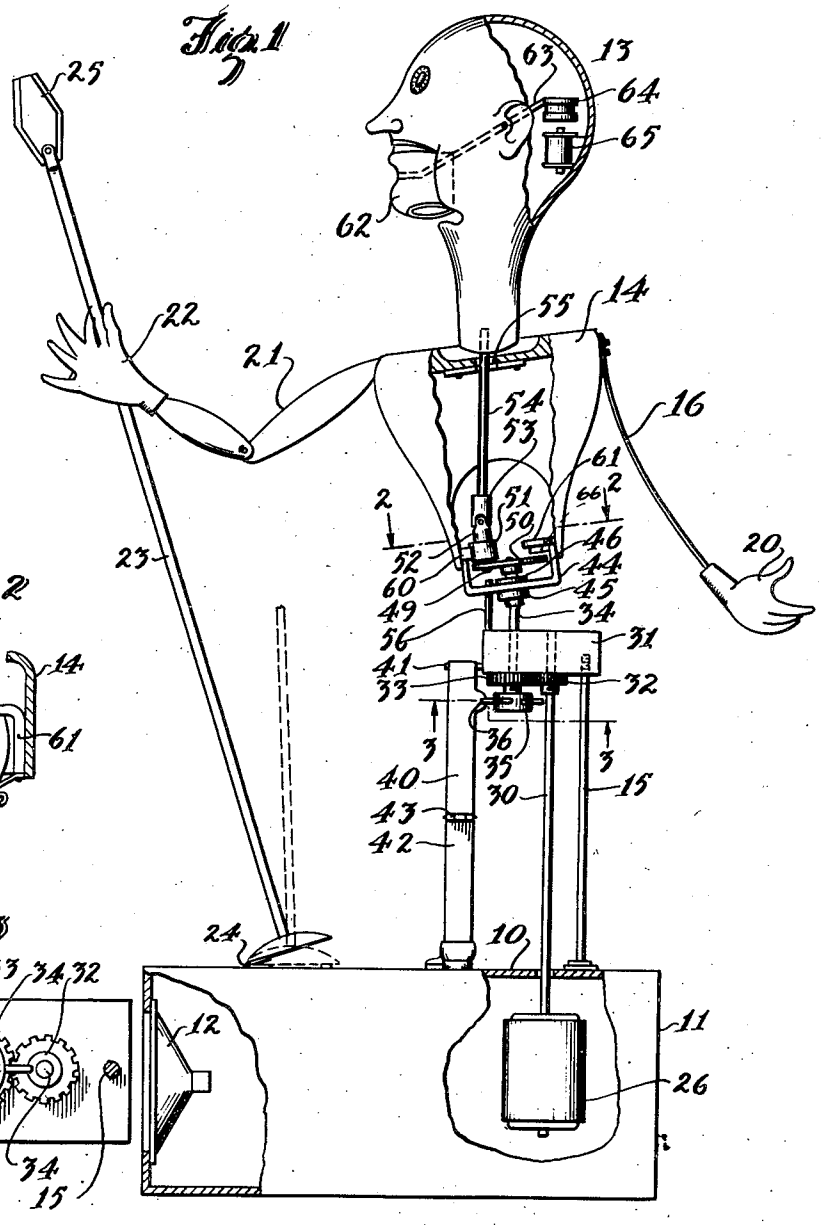


Fig. 2

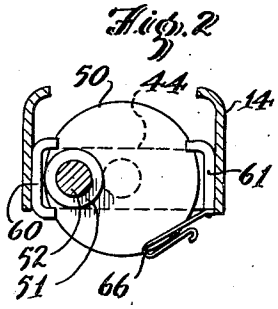
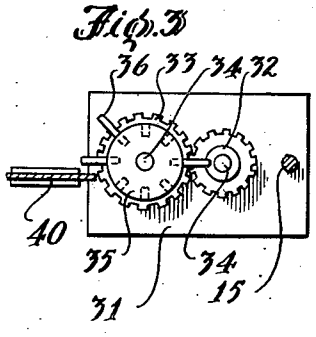


Fig. 3



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SOUND FOR FIGURES OR PUPPETS

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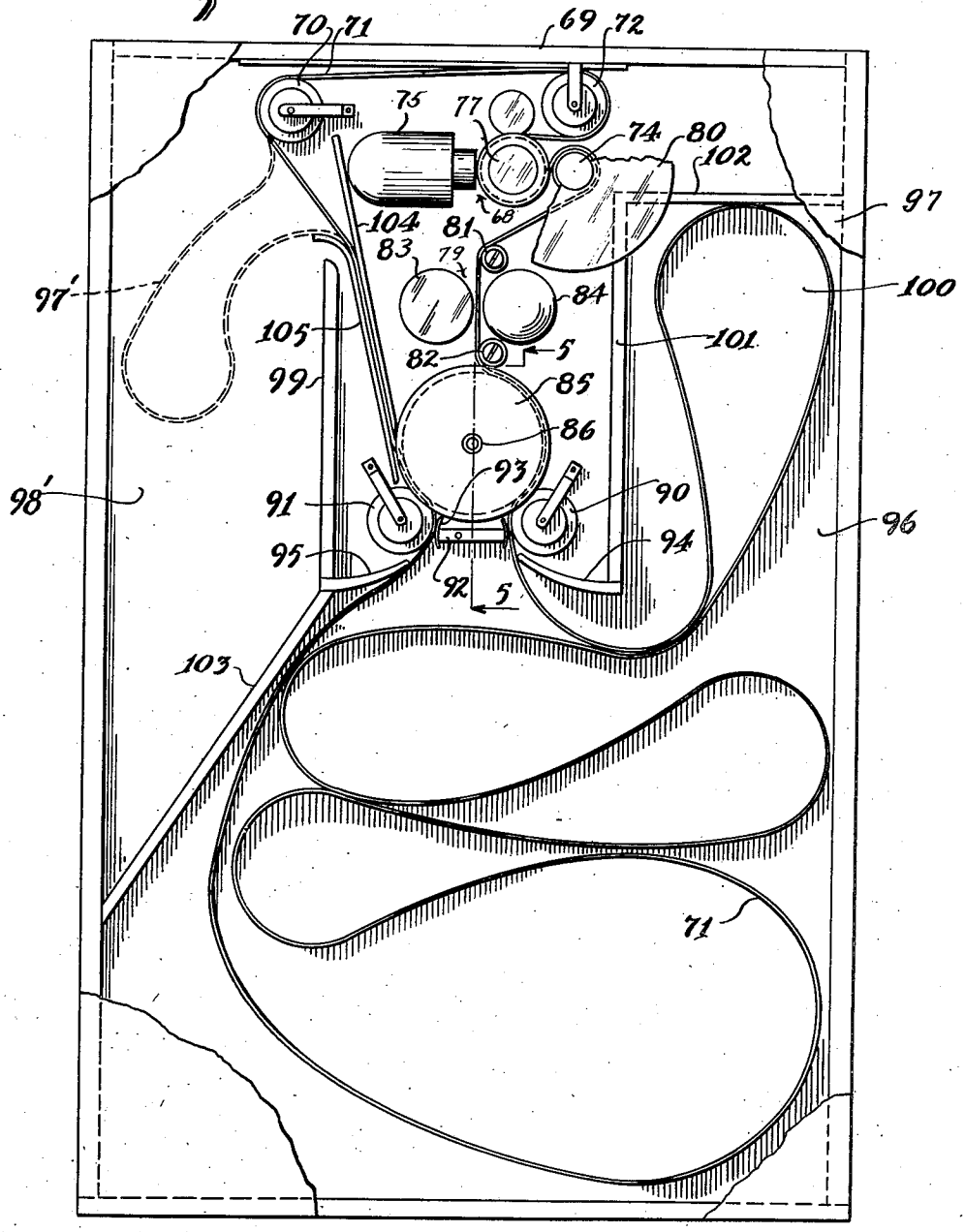
Fig. 4



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SOUND FOR FIGURES OR PUPPETS

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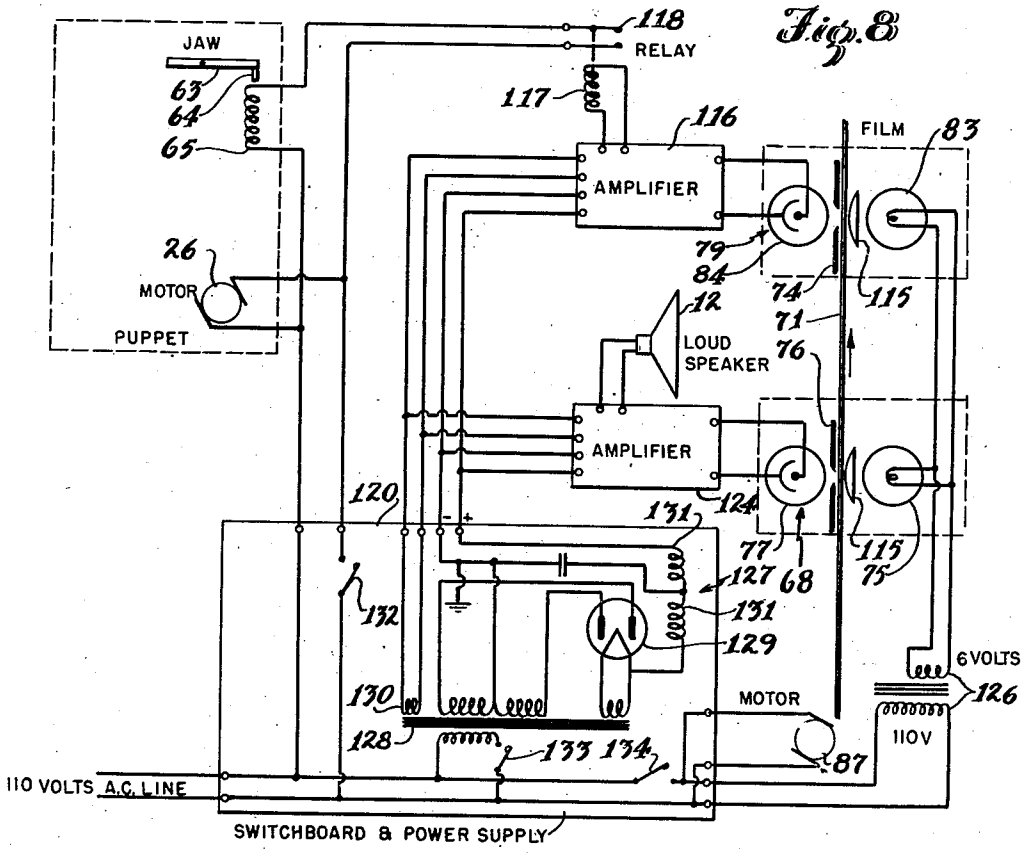
Fig. 8



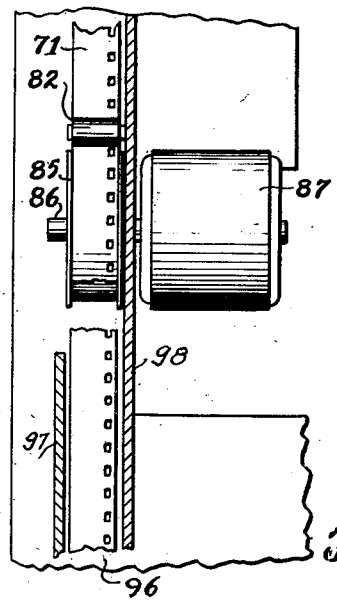


Fig. 5

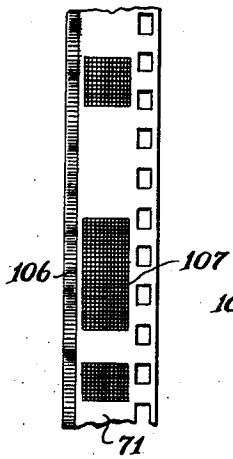


Fig. 6

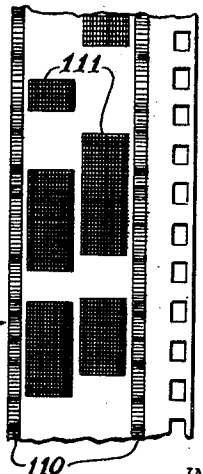


Fig. 7

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UNITED STATES PATENT OFFICE

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SOUND FOR FIGURES OR PUPPETS

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Application June 26, 1948, Serial No. 35,468

7 Claims. (Cl. 46—118)

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This invention relates to figures or puppets which speak or sing while parts of the body are caused to be moved to a life-like manner and has for its principal object the provision of a novel device of this character to be used for entertainment or display advertising wherein the movement of the mouth is coordinated with the music or speech being "delivered" by the figure.

Another object of the invention is to provide an improved figure of this character wherein the articulated structure will have a compound movement simulating the motion of a singer rendering a song in an animated fashion.

Another object of the invention is to provide an animated figure wherein a single driven shaft will impart a swaying motion to the body and also an oscillating movement of the head.

Yet another object of the invention is to provide an advertising or display device producing both sound and mechanical motion, both being derived from a single film having a sound track and also having a series of opaque and transparent areas. In the embodiment of the invention chosen for illustration in the drawing, a single figure is employed although plural figures may also be used, both deriving their sound and movement control from a single film, the film likewise having opaque areas controlling movement of a part of the figures such as the mouth. Alternatively, a single figure may be employed and compound movement thereof be controlled by the single film which also carries the sound track. For instance, one band may be employed to control movement of the eyes and another to control body motion.

A still further object of the invention is to provide a sound-on-film apparatus wherein improved means are employed for moving and storing an endless film without the necessity of winding the film on reels. The arrangement permits the film, after leaving the sound head, to be delivered to a storage area of relatively small size compared with the length of the film, the film being continuously withdrawn from storage area for re-introduction into the sound head.

Another object of the invention is to provide improved means of this character wherein the wear on the continuously moving film is reduced to a minimum.

In the drawings:

Fig. 1 is a rear elevation of an animated, talking figure embodying the present invention, parts being broken away to show interior mechanism.

Fig. 2 is a section taken on line 2—2 of Fig. 1.

Fig. 3 is a section taken on line 3—3 of Fig. 1.

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Fig. 4 is an elevational view of a continuous sound film and storage area arrangement embodying the present invention.

Fig. 5 is a section taken on line 5—5 of Fig. 4.

Fig. 6 is a plan view of a section of film of the invention.

Fig. 7 shows plural sound tracks on the film.

Fig. 8 shows a circuit.

The puppet shown in Figs. 1, 2 and 3 is arranged to be mounted on the upper surface 10 of a housing 11 which may further form a support for a loud speaker 12. The puppet has a head 13, a torso 14 and a fixed leg 15 which also forms a support for the torso. One arm 16 may comprise a flat spring arranged to move as the body sways. A hand 20 is at the outer extremity of the arm. The other arm 21 is formed in two hinged sections and the hand 22 is secured to a post 23 hinged on the housing at 24 and carrying a simulated microphone 25 at its upper end. Thus as the body sways, arm 21 and post 23 also are permitted to move.

The mechanism for imparting motion to the puppet is driven by a motor 26 having a vertical shaft 30 which is journalled at its upper end in a block 31 supported by leg 15.

A gear 32 keyed to shaft 30 engages a gear 33 keyed at the lower end of a shaft 34 also journalled in block 31. Rotation of shaft 34 also imparts rotation to a hub 35 keyed at the lower end thereof, such hub having a plurality of spaced radial fingers 36 which successively engage and cause forward movement to an upper leg section 40 pivoted at 41. The lower leg section 42 is hinged at 43. This arrangement causes a life-like kicking action of the leg.

A U-shaped frame 44 is carried on shaft 34, a collar 45 which is keyed to the shaft limiting downward movement of the frame, and a collar 46 limits upward movement of the frame. Shaft 34 is bent approximately 10° from its axis of rotation at the point where it enters collar 45. The torso 14 is mounted at the upper end of frame 44 and accordingly, rotation of the shaft imparts a rocking movement to the torso. A disc 50 is keyed at the upper end of shaft 34 and an eccentrically disposed pin 49 in the disc connected with a roller 51 having a resilient outer covering (not shown) and carrying one part 52 of a universal joint, the other part 53 being keyed to a shaft 54 which passes through an opening 55 in the shoulder section of the torso. The head 13 is rigidly secured at the upper end of such shaft.

There is no positive driving connection between collars 45—46 on frame 44 and shaft 34 but there

is sufficient frictional engagement between the parts to cause partial rotation of the frame as the shaft turns. One or more pins 56 limit the oscillation of the frame and accordingly, the torso. It is thus turned to one extreme position by the rotating shaft and then returned to the other extreme position by gravity due to the axially offset upper section of the shaft.

Roller 51 is largely free to rotate relative to disc 50 but there is sufficient friction to cause the roller to rotate when the disc rotates. This would cause the head to rotate continuously in one direction but is prevented from doing so by friction devices 60 and 61 carried by frame 44 and which engage the roller as it passes. Thus, in one planetary revolution of roller 51 the head turns in one direction when moving from member 60 to 61 and as the roller contacts member 61 reverse rotation is set up due to friction. Continuing, the head again rotates in the first direction while roller 51 travels from 61 to 60 and again rotates in the opposite direction whilst roller 51 traverses 60.

In this fashion a life-like swaying action is imparted to the figure, the latter having appropriate clothing. The head is fitted with the usual hinged jaw section 62 and movement thereof is controlled by a centrally pivoted lever 63, carrying an armature 64 associated with an electromagnet or solenoid 65.

The jaw is normally closed and is arranged to be opened when the circuit is closed. This arrangement, may, of course, be reversed. A hook 66 carried by the frame supports the wire (not shown) leading to the magnet and may also cooperate with member 61 to produce reverse rotation of the head.

The sound head and film arrangement shown in Figs. 4 and 5 include a housing 69, an idler 70 over which the endless film 71 travels, a second idler 72 and a third idler 74. The sound head 68 which is arranged to pick up impulses from the sound track is conventional and includes a light source 75 having an optical slit 76 (Fig. 8) limiting the light only to the sound track and a photo-electric cell 77. The shaft carrying idler 74 also carries a fly wheel 80. Continuing, the film traverses two idlers 81 and 82 where the film passes between a second sound head 79 for the action track. This includes a light source 83 and a photo-electric cell 84.

The film then engages a friction driving wheel 85 keyed to shaft 86 which is driven by motor 87. Friction idlers 90 and 91 keep the descending and ascending film sections in engagement with driving wheel 85. A short bracket 92 has film guides 93 at each end thereof and the film is further guided into and out of the film chamber by fingers 94 and 95.

In the film chamber 96 the film is confined between walls 97 and 98 which are spaced apart a distance slightly more than the width of the film in order to retain all sections of the film in vertical alignment as it laps back and forth in the film chamber.

In order to reduce the over-all dimensions of the film chamber, it is further provided with an upwardly extending portion 100 defined by walls 101 and 102 and on the opposite side an inclined wall 103 is provided. After leaving the chamber the film is drawn upwardly by rollers 85 and 91, passing between partitions 104 and 105 and thence to idler 70.

In the event that for any reason the film is moved upwardly by rollers 85 and 91 faster than it moves through the sound heads, it accumulates as shown at 97' in a supplemental chamber 98' defined by walls 103 and 99.

A short section of the film 71 is shown in Fig. 6, the film being like any standard motion picture film which has been previously processed by recording on one side thereof the usual sound track 106 and the other side a series of opaque areas 107 separated by transparent areas, to control mechanical action. By using the friction drive of the present invention the sprocket holes are not needed. Film 109 shown in Fig. 7 is similar except that it has plural sound tracks 110 and plural bands of opaque areas 111. This arrangement is useful wherein plural figures are used or when compound synchronized motions are desired.

Referring now to the circuit shown in Fig. 8, the sound head 79 is placed with lamp 83, optical slit 74 and photo-electric cell 84. A condensing lens 115 may be used for greater light efficiency. This sound head is of the same type of arrangement found in the majority of projectors used for showing motion pictures. An amplifier 116 is connected between the photo-electric cell 84 and a relay coil 117. The amplifier may be of a relatively insensitive type but must be capable of amplifying direct current. It has been found that a single stage is sufficient, especially where a high impedence relay is used. Relay contacts 118 are connected in series with solenoid 65 and a power line in supplying unit 120. The armature 64 is controlled by solenoid 65 and provides mechanical power for the puppet's jaw. The same power line which is connected to the solenoid also runs motor 26 which provides power for the body motion of the puppet. The other sound head 68 which may be substantially identical with the first is placed adjacent to the first in such manner that the film is run through both as was earlier described. This sound head, like the first, includes the light source 75 and photo-electric cell 77. Thus, the components of this sound head are the same as the first except that the cell 76 is adjusted to cover a different part of the film area and hence picks up the variations in the second band only. The recorded sound may be put on the film by the variable density or variable area method. Amplifier 124 is connected between photo-electric cell 77 and loud speaker 12. The amplifier must be relatively sensitive and contain a power output stage since the loud speaker should produce enough sound to be heard in an average-sized room. It has been found that lamps 75 and 83 may be small six volt automobile headlight lamps as they are rugged and provide a small concentrated point source of light. A step-down transformer 126 provides the alternating current voltage for both lamps, the power being derived from the 110 volt power line.

The power supply for both amplifiers is contained in a power pack 127 which may be placed adjacent switchboard 120. A high voltage power transformer 128 is connected in the usual manner to a rectifier tube 129. The amplifier tube heaters are supplied with six volts from a winding 130 on transformer 128. A low pass filter 131 is employed to filter the high voltage anode supply current and keep the hum from the loud speaker. Switches 132, 133 and 134 are placed in the puppet motor circuit, the amplifier power pack circuit and the sound lamp circuit, respectively, the latter switch also being arranged to close the circuit for sound head motor 87.

The operation of the unit is as follows. Switch

133 is first closed to allow the tube heater to reach the operating temperature. Switch 134 is then closed to light the sound lamps and switch 132 is simultaneously closed to start operation.

As the variable density patches on the sound track pass the sound head 68 the variations in light intensity on the photo-electric cell produce variation in voltage at the amplifier input. These variations are amplified and transmitted to loud speaker 12 where they are transformed into sound.

As the film passes the slit 74 in sound head 79 variations in density on another part of film 71 supply intermittent illumination to the photo-electric cell 14. These variations are amplified by amplifier 116, transmitted to relay coil 117 which causes contacts 118 to be made or broken in synchronism with the film density. The contacts central operation of solenoid 65 and the jaw is successively opened and closed. Thus the operation is continuous for as long a period as is desired.

The use of the film of Fig. 7 will depend upon the particular type of figure or figures employed. For instance, if a single figure is used and compound movements are required one of the sound tracks may be eliminated. If two figures are employed, one talking to the other, the arrangement of two sets of tracks may be used.

While three forms or embodiments of the invention have been shown and described herein for illustrative purposes, and the construction and arrangements incidental to specific applications thereof have been disclosed and discussed in detail, it is to be understood that the invention is limited neither to the mere details or relative arrangement of parts, nor to its specific embodiments shown herein, but that extensive deviations from the illustrated forms or embodiments of the invention may be made without departing from the principles thereof.

What I claim is:

1. In a sound on film control system, an endless film having plural longitudinal rows of indicia recorded thereon, one of said indicia rows being representative of a sound track, the remaining rows of indicia being discriminately disposed opaque patterns, photo-electric film sensing means for converting said second track indicia into electrical impulses, amplifying and sound reproducing means responsive to said impulses, a second photo-electric film sensing means including an amplifier arranged and adapted to sense said opaque patterns, a switching relay responsive to said second sensing means, an external circuit including said relay switching means and arranged to be completed by the actuation thereof, a power source and a motor for driving said film past the plural sensing means.

2. In a sound on film control system, an endless film having plural longitudinal rows of indicia recorded thereon, one of said indicia rows being representative of a sound track, the remaining rows of indicia being discriminately disposed opaque patterns, plural light sources disposed relative to said indicia, photo-electric film sensing means for converting said sound track indicia into electrical impulses, amplifying and sound reproducing means responsive to said impulses, a second photo-electric film sensing means including an amplifier arranged and adapted to sense said opaque patterns, a relay having switching means responsive to said second sensing means, an external circuit including said relay switching means, a solenoid and a motor, said circuit arranged to be completed by the actuation of said switching means to energize said solenoid and said motor, a power source and electrically operated driving means for continuously moving said film past the plural sensing means.

3. In a sound on film control system, an endless film having plural longitudinal rows of indicia recorded thereon, film guide and driving means for moving said film in a circuitous path, one of said indicia rows being representative of a sound track, the remaining rows of indicia being discriminately disposed opaque patterns, a light source disposed relative to said indicia, photo-electric film sensing means for converting said sound track indicia into electrical impulses, amplifying and sound reproducing means responsive to said impulses, a second photo-electric film sensing means disposed apart from the first sensing means on said circuitous film path and including an amplifier arranged and adapted to sense said opaque patterns, a switching relay responsive to said second sensing means, an external circuit including the switch of said relay and arranged to be completed by the actuation thereof, a power source and a motor for continuously driving said film past the plural sensing means whereby said opaque patterns intermittently operate said switching relay in accordance with the pattern thereof.

4. In a sound on film control system for effecting movement of a mechanical figure simultaneously with the reproduction of sound, an endless film strip having longitudinal rows of indicia recorded thereon, one of said rows being representative of a sound track, the other of said rows consisting of intermittently disposed opaque dots, means for individually sensing the respective rows of indicia comprising plural photo-electric cells, a sound reproducing mechanism responsive to one of said photo-electric cells including an amplifier and a reproducer, an amplifier associated with the other of said cells, a switching relay actuable by said latter amplifier, a power source, driving means for moving said film continuously past said photo-electric cells whereby mechanisms for moving said figure are responsive to the actuation of said switching relay and controlled by said opaque dots in coordination with the sound reproduced by said sound track.

5. In a sound on film control system, an endless film having plural longitudinal rows of indicia recorded thereon, one of said indicia rows being representative of a sound track, the remaining rows of indicia being discriminately disposed opaque patterns, photoelectric film sensing means for converting said sound track indicia into sound, a second photoelectric film sensing means including an amplifier arranged and adapted to sense said opaque patterns, a switching relay responsive to said second sensing means, an external circuit including said relay switching means and arranged to be completed by the actuation thereof, a power source and a motor for driving said film past the plural sensing means.

6. In a sound on film control system, an endless film having plural longitudinal rows of indicia recorded thereon, one of said indicia rows being representative of a sound track, the remaining rows of indicia being discriminately disposed opaque patterns, photo-electric film sensing means for converting said sound track indicia into electrical impulses, amplifying and sound reproducing means responsive to said impulses, a second photoelectric film sensing and amplifying means for converting said opaque patterns

into mechanical motion, a power source and a motor for driving said film past the plural sensing means.

7. In a sound on film control system, an endless film having plural longitudinal rows of indicia recorded thereon, one of said indicia rows being representative of a sound track, the remaining rows of indicia being discriminately disposed opaque patterns, photo-electric film sensing means for converting said sound track indicia into sound, a second photo-electric film sensing and amplifying means for converting said opaque patterns into mechanical motion, a power source and a motor for driving said film past the plural sensing means.

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