Nov. 12, 1940. J. E. JENKINS ET AL 2,221,312

MEANS ADAPTED TO REPRODUCE SOUNDS OR OTHER SENSORY EFFECTS

Original Filed Sept. 23, 1933

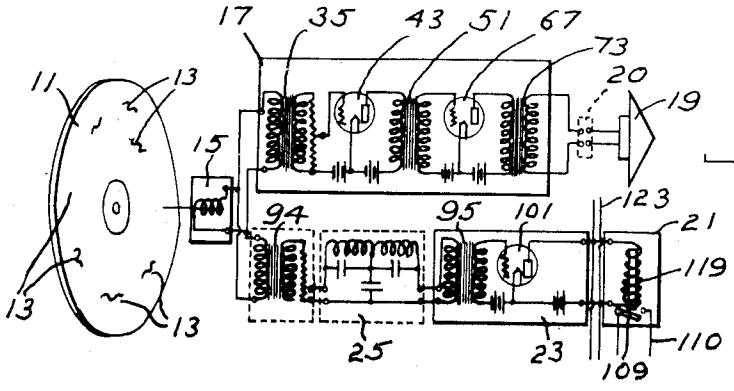


Fig. 1

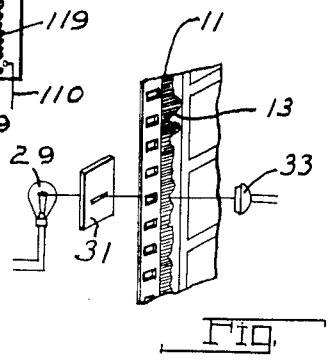


Fig. 2

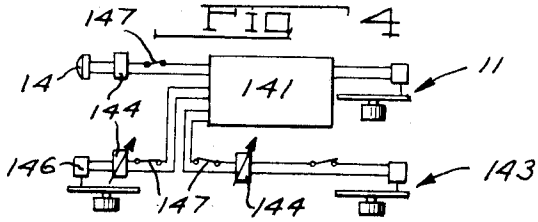


Fig. 4

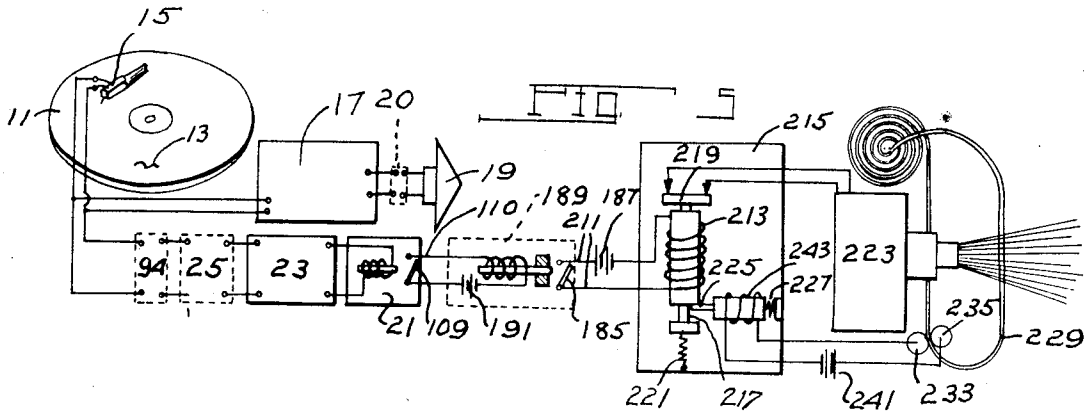


Fig. 5

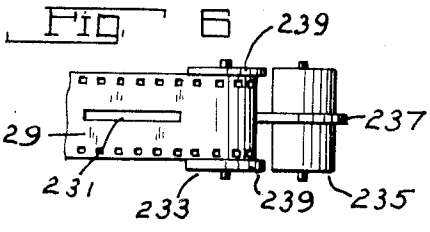


Fig. 6

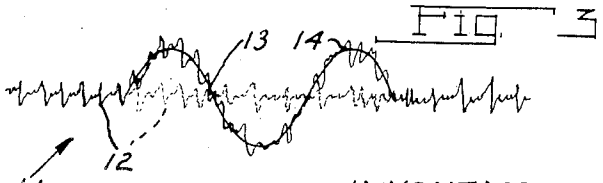


Fig. 3

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MEANS ADAPTED TO REPRODUCE SOUNDS OR OTHER SENSORY EFFECTS

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Original application September 23, 1933, Serial No. 690,656, now Patent No. 2,116,314, dated May 3, 1938. Divided and this application April 7, 1938, Serial No. 200,652

6 Claims. (Cl. 88—16.2)

This invention relates to means adapted to reproduce sounds or other sensory effects, as from a record, and adapted to control operative devices in conjunction with the sounds or other sensory effects so artificially reproduced.

An object of the invention is to correlate the reproduction of sensory effects such as sound, with the effects produced by a picture reproducer and to provide automatically for a predetermined timed relationship in their operation.

Another object of the invention is to accomplish the control of a motion picture projector in timed relation with a record containing operating components.

Another object relates to displaying a moving picture sequence repeatedly in conjunction with an audible sequence.

Numerous other objects and advantages of the invention will be appreciated as the same is more fully understood from the following description, which, taken with the accompanying drawing, discloses a preferred embodiment of and for the purpose of disclosing our invention.

Referring to the drawing:

Figure 1 is a diagrammatic representation of a system embodying a portion of the invention, said system being actuated from a grooved sound track or record by means of a magnetic pick-up device;

Figure 2 is a diagrammatic representation of a photoelectric pick-up device, which may be substituted for the magnetic pick-up in the system shown in Figure 1 for use with a photographic record;

Figure 3 is an enlarged diagrammatic representation of one form of sound record or track having an operating frequency superimposed thereon in accordance with our present invention;

Figure 4 is a diagrammatic representation of apparatus for making a record for use in practicing our invention;

Figure 5 is a diagrammatic representation of apparatus for operating a motion picture projector in conjunction with a sound record in accordance with our present invention; and

Figure 6 is a perspective view of parts of the apparatus shown in Figure 5.

To illustrate the invention, we have shown on the drawing, in Figure 1, an electrical system for reproducing sound, and at the same time, controlling operable devices, such as tuned relays 21, from a record represented generally at 11, through a pickup device 15. The sound record 11 may be made in any suitable or convenient manner known to the art and may be of any suitable form, that is to say, may be a groove formed in a cylinder or disk, as shown in Figure 1; may be a photographic record on film, as shown in Figure 2; or may be a magnetic record on wire.

The record

As shown in Figure 3, the record 11 consists of a single recorded track incorporating both a normal sound recording 12, which, for simplicity, we shall call the sound track, and a device-operating recording 13, which we shall call the operating component; that is to say, the normal sound track is combined with the operating component so that the record 11 consists, in part, of recorded vibrations 14, comprising the resultant of the sound track 12, and the operating component 13.

The operating component 13 may have a sinusoidal wave form as shown in Figure 3, or may be of more complicated configuration. The wave may be a simple wave or may be the envelope of an oscillation of higher frequency.

Method of making the record

The record 11, if the operating component is applied thereto artificially, may be prepared in any suitable or convenient manner as by connecting, with a suitable recording apparatus 141, a suitable device 143 for delivering to the recording apparatus the operating component at the proper time so that the same may be superposed upon the sound vibrations as they are recorded, the sound vibrations being fed into the sound recording device by any suitable pickup, such as a microphone 145, if the record is made from the original sound, or a pickup device 146, where the record 11 is made from a previously recorded sound track, or a microphone and pickup may be used together if desired as where previously recorded incidental music is to be "dubbed" as a background in the record for the original sound.

The oscillating device 143 may be an oscillating electric circuit tuned to the frequency desired for the operating component, or may be a previously prepared record of an operating vibration having a desired frequency or frequencies. The oscillating device is connected with the recording device through a normally open control key 147, which key is closed by the operator whenever it is desired to impress the operating component upon the sound recording. This is known as "dubbing" the operating component on the sound track.

Alternatively, a device capable of creating

vibrations in the air, may be positioned near the sound pickup 145 of the recording device 141, the vibration device being actuated at intervals to add the desired operating component to the sound waves reaching the pickup device.

Numerous other methods of superposing the operating frequency upon the sound track in the record will suggest themselves to those familiar with the art of recording sound waves and our invention is not necessarily limited to any particular mode of producing the composite record 11. It is, however, preferable to prepare the composite record 11 by "dubbing" the operating frequency upon the sound track, rather than by adding the same to the sound waves before they are applied to the pickup 145.

The foregoing methods may be employed in making record grooves in wax or similar material, and in making magnetized wire records and photographic records. We also contemplate making magnetized wire and photographic records by first applying the actuating component upon the recorded sound track. In the case of the magnetic record, this may be accomplished by magnetizing the wire at the proper places in accordance with the desired operating component, the wire being either previously or subsequently treated to magnetize it in accordance with the sound track recording.

In photographic records, the operating component may be photographed on the undeveloped negative on which the sound track record is subsequently or has previously been photographed, and the double exposure developed on the negative from which a positive print of the composite recording can be made, or a negative of a normal sound track record may be printed as a positive and the print of a separate negative of the operating component superimposed on the positive print of the sound sequence and the double exposure developed on the positive.

The sound-reproducing and device-actuating system consists of a suitable pickup device 15 adapted to be vibrated in accordance with the vibrations recorded on the record 11, a sound-emitting device or loud speaker 19 connected to the pickup preferably through the amplifying system 17, and a tuned relay 21 adapted to be actuated by the operating component of the record and also connected with the pickup device through a relay operating system 23 and filter 25.

The pickup device 15, as shown in Figure 1 of the drawing, may consist of an ordinary magnetic device, such as is commonly used in conjunction with the ordinary grooved phonograph record, or, an ordinary mechanical phonograph pickup may be used in conjunction with a microphone to impress the vibrations of the record 11 upon the input of the amplifying system 17.

In Figure 2 of the drawing, the sound track 11 is shown as a photographic record, such as is commonly used in the audible moving picture art and the pickup device includes the light source 29, the aperture 31 and a target 33, comprising a photo-electric cell, or other light-sensitive device, connected to the input of the reproducing system and upon which light rays from the light source impinge after passing through the aperture and the photographic record 11, as is well known in the art.

Our invention does not necessarily reside in the particular form of record and cooperating pickup device employed but any suitable or convenient form or forms of record and cooperating pickup device may be used to apply the vibrations of the record upon the sound reproducing and device-actuating system.

Record producing and device operating system

The amplifying system 17 also may be of any suitable or convenient form or arrangement for the purpose of receiving the vibrations initiated therein by the pickup device of whatever character used, amplifying the vibrations and delivering the amplified vibrations to the sound-emitting speaker 19 and to the relay 21.

To illustrate our invention we have shown an amplifying system comprising transformers 35, 51 and 73 and vacuum tubes 43 and 67 connected as shown in Figure 1. The speaker 19 is connected to the output of the amplifier 17.

The relay 21 may be connected to the pickup 15 through a suitable transformer 94, a filter 25 which passes only the operating component and a suitable amplifier 23 having the usual transformer 95 and vacuum tube 101.

The coil 119 of the relay is connected across the output of the amplifier 23. The relay 21 is adapted for operation by current delivered to the coil, the function of the relay-operating system 23 being to amplify the power of the relay-operating component sufficiently to operate the relay, which may require for its operation more power than is delivered to the operating system. The relay, when actuated by the operating component, operates the shiftable member 109, which may be mechanically connected to control a device to be operated, or, as illustrated, may be arranged to operate an electrical switch for controlling the circuit 110, which, in turn, may be connected to effect the electrical control of any device to be operated.

While in some cases, it may not be necessary to utilize the amplifier 23 and the filter 25, since it is possible to operate the relay 21 directly from the output of the amplifier system 17, it is, however, desirable to provide these refinements in order to insure positive operation of the relay in response to the operating component on the record.

In Figure 5 of the drawing we have shown a system embodying our present invention arranged to accomplish the control of a moving picture projector in timed relationship with a record containing operating components. The arrangement includes a pickup device 15, which, operating in conjunction with the record, is arranged to deliver the vibrations received therefrom to the sound amplifier 17 and the sound-emitting device 19. The pickup device also delivers the operating component through the transformer 94, filter 25 and amplifier 23 to the relay 21, the switch 109 of which is connected through a time delay relay 189 more fully explained below, to control an operating circuit 211 including a suitable power source 187 and the coil 213 of a relay 215. The relay 215 has a shiftable element 217 carrying a switch operating member 219, which is normally biased towards switch open position by means of the spring 221. When the solenoid 213 is energized by the closure of the switch 185, the switch 219 will be closed against the urge of the spring 221. The switch 219 is connected to control the operating motor of a motion picture projector 223 and the circuit including the switch 219 is preferably arranged to cause the projector 223 to operate when the switch 219 is closed. In order to hold the switch 219 in closed position against the bias of the spring 221 after the operating frequency has passed by the pick-up device 15, we

provide holding means comprising a holding finger 225 operatively associated with the shiftable element 217 of the relay 215. This holding finger is normally biased as by a compression spring 227 toward a position retaining the member 217 in switch-closing position. In order to open the switch 219 after the picture sequence projected by the device 223 is completed, the film 229 which is mounted for projection by the device 223, is provided with a cut-out slot 231 therein, and the film, as it travels through the projector 223, passes between a pair of rollers 233 and 235 as shown in Figure 6 of the drawing. One of these rollers has a flange 237 adapted to register with the cut-out portion 231 of the film when the same passes between the rollers. The other roller has lateral flanges 239 to align the film properly on the rollers so that the slot 231 will register with the flange 237.

The rollers are preferably formed of suitable electrical conducting material and form switch means controlling a circuit including a suitable power source 241 and a solenoid or operating coil 243 which, when energized, serves to retract the holding finger 225 against the urge of the compression spring 227, permitting the switch 219 to open under the influence of the spring 221.

It is desirable to incorporate a time delay element in the connection between the switch 109 and the relay 215. This may be accomplished by connecting the switch 109 in a series circuit 110, including an electrical power source 191 and the operating coil of a relay 189 of the time-delay type, having a normally open switch 185 adapted to close when the coil of the relay is energized in response to the closure of the switch 109. It is desirable to delay the closure of the switch 185 under certain circumstances, in order that the relay will not operate if the switch 109 closes accidentally as in response to imperfections in the record, or other circumstances, which impart a vibration in the system approximating the operating frequency. A dashpot or relay 215 may also be provided to guard against accidental operation of the super-sensitive relay 21. In other words, by imparting a time delay feature in relay 189, closure of the switch 185 may be prevented except when the operating component is intentionally prolonged sufficiently to cause the closure of the switch 185 by the operating component rather than by incidental, or accidentally initiated vibrations approximating the operating component.

While the film 229 is passing through the projector, the rollers 223 and 225 will be insulated, the one from the other, by the film passing therebetween. At the termination of the sequence projected by the device 223, the slot 231, formed in the film, will permit the flange 237 of the roller 235 to engage and make electrical contact with the periphery of the roller 233, thus completing a circuit for energizing the solenoid 243 and permitting the switch 219 to open as aforesaid, thus stopping the operation of the projector 223.

The foregoing system is particularly well adapted for displaying a moving picture sequence repeatedly in conjunction with an audible sequence. The record 11, and the picture projector 223 are preferably driven in timed relationship so that the record and picture sequence are completed coincidentally or in any desired sequence, although in the illustrated arrangement they are not synchronized in the usual sense after the beginning of the sequence. The record, in the illustrated arrangement is reproduced on a phonograph turn-table having repeating mechanism for causing the pickup device to be returned to the initial or starting position on the record, after the record has been completely played and the projector is provided with an endless film or the equivalent, which can repeat itself indefinitely. As heretofore stated, the rollers 233 and 235 render the projector inoperative at the end of the projection of the picture sequence, and the pickup device 15 causes the projector to start in operation as soon as the controlling operating frequency 13 engages the pickup preferably at the beginning, but if desired, at any time during the playing of the record. It is desirable, but by no means essential, to have the film 229 formed as a continuous strip as shown in Figure 5, since this is the simplest way of operating a continuous picture projector.

The present application comprises division of our copending application serial No. 690,656, filed September 23, 1933, now Patent No. 2,116,314, May 3, 1938, which in turn is a continuation in part of our copending application Serial No. 662,860, filed March 27, 1933 relating to sound and control record.

While several illustrative embodiments have been described in detail, it is not intended that our invention be limited to the forms shown nor otherwise than by the terms of the appended claims.

We claim:

1. In a remote control system for picture projection apparatus having electrical driving means and having a visual record to be projected, a remote station, a source of control impulses at said station, an energizing circuit for said driving means, switch means responsive to said control impulses for closing said energizing circuit, interlock means for maintaining said circuit closed, and means controlled by said visual record for releasing said interlock and breaking said energizing circuit.

2. In a remote control system for picture projection apparatus having electrical driving means and having a visual record to be projected, a remote station, a source of control impulses at said station, an energizing circuit for said driving means, switch means responsive to said control impulses for closing said energizing circuit, interlock means for maintaining said circuit closed, index means on said visual record, and means responsive to said index means for releasing said interlock and breaking said energizing circuit.

3. In a remote control system for picture projection apparatus having electrical driving means and having a visual record to be projected, a remote station, a source of control impulses at said station, an energizing circuit for said driving means, switch means responsive to said control impulses for closing said energizing circuit, interlock means for maintaining said circuit closed, index means on said visual record, and switch means responsive to said index means for releasing said interlock and breaking said energizing circuit.

4. In a remote control system for picture projection apparatus having electrical driving means and having a visual record to be projected, a remote station, a source of control impulses at said station, an energizing circuit for said driving means, switch means responsive to said control impulses for closing said energizing circuit, interlock means for maintaining said circuit

closed, switch means comprising a pair of members normally separated by said visual record, and means for releasing said interlock and breaking said energizing circuit when said members contact.

5. In a remote control system for picture projection apparatus having electrical driving means and having a visual record to be projected, a remote station, a source of control impulses at said station, an energizing circuit for said driving means, switch means responsive to said control impulses for closing said energizing circuit, interlock means for maintaining said circuit closed, switch means comprising a pair of members normally separated by said visual record, and means comprising a relay for releasing said interlock and breaking said energizing circuit when said members contact.

6. In a remote control system for picture projection apparatus having electrical driving means and having a visual record to be projected, a remote station, a source of control impulses at said station, an energizing circuit for said driving means, a relay responsive to said control impulses, a movable armature adapted to close said energizing circuit upon actuation of said relay, interlock means maintaining said armature in closed circuit position subsequent to operation of said relay, switch means comprising a pair of members normally separated by said visual record, and means comprising a second relay for releasing said interlock and breaking said energizing circuit when said members contact.

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