Jan. 5, 1937. L. G. PHELPS 2,066,538

SYNCHRONIZING SOUND REPRODUCING RECORD WITH DISPLAY DEVICE

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Fig. 2.

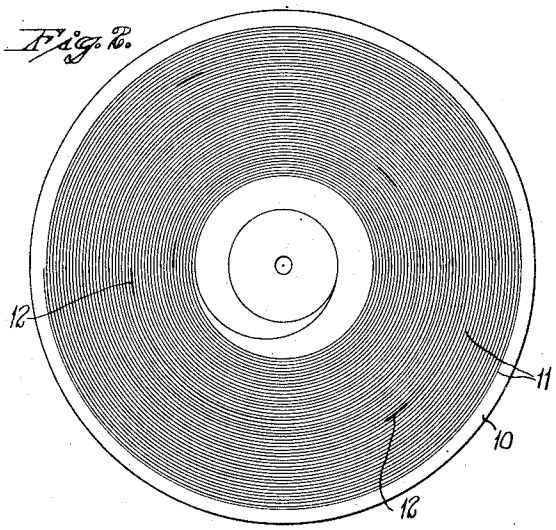


Fig. 3.

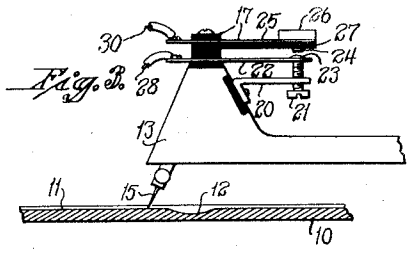
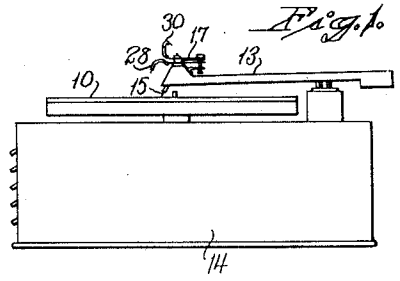


Fig. 1.



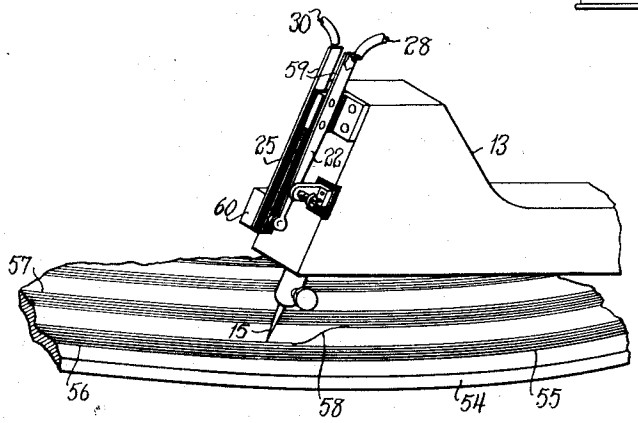


Fig. 4.

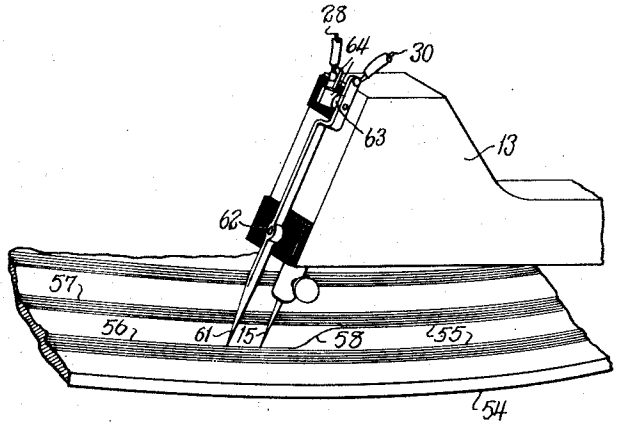


Fig. 5.

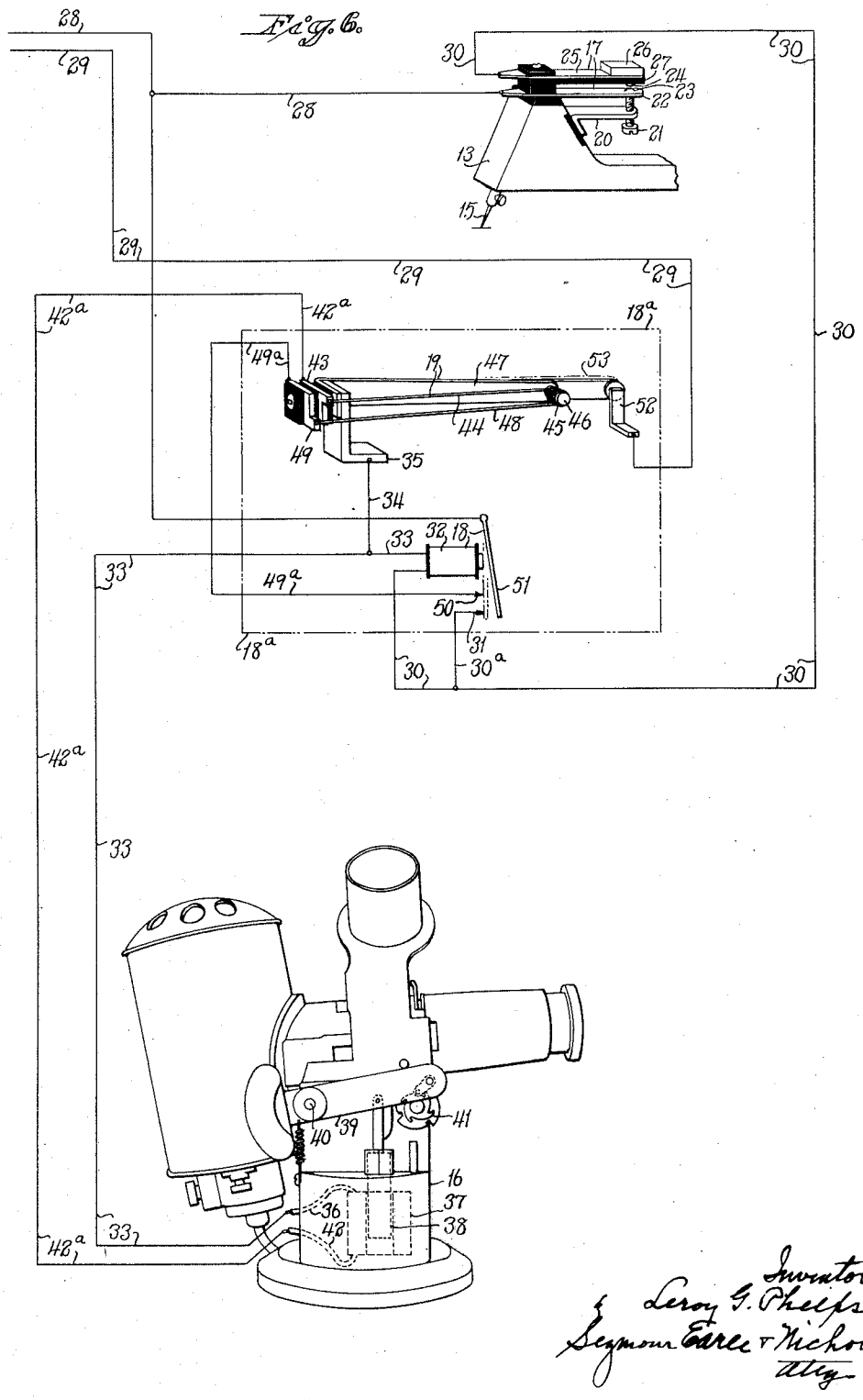
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SYNCHRONIZING SOUND REPRODUCING RECORD WITH DISPLAY DEVICE

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Fig. 6.



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SYNCHRONIZING SOUND REPRODUCING RECORD WITH DISPLAY DEVICE

Leroy G. Phelps, Hamden, Conn.

Application February 7, 1935, Serial No. 5,432

8 Claims. (Cl. 274—1)

This invention relates to improvements in synchronizing sound-reproducing records, such as phonograph disk- and cylinder-records or the like, with display devices.

One object of this invention is to provide an improved synchronizing construction, whereby a sound-reproducing needle traveling in a sound-reproducing groove of a phonograph record or the like encounters a deflection-path which is adapted to deflect the needle, and in consequence thereof to actuate suitable switch-mechanism which is connected to display-mechanism actuatable in consequence of the actuation of the switch-mechanism.

Thus, for example, a phonograph record describing a series of pictures may be made, and pictures corresponding thereto may be displayed by a suitable projector so associated with the phonograph record that when a description of one picture is ended, a deflection-path actuates the needle and therethrough actuates the switch-mechanism to cause the next picture to be shifted into proper position in the projector, so as to be displayed in conjunction or synchronism with the audible description of the same made by the phonograph record. This procedure can be repeated as often as there is room upon a single record for descriptions of different pictures.

Another embodiment of this invention may employ a phonograph record to start at the correct instant, a motion-picture projector which is synchronized with the phonograph record, thus making an automatic start of the projector at the right instant, so that the sound will be in synchronism with the picture.

Still another embodiment of the invention may employ a phonograph record containing a series of descriptions of articles for sale, the latter being mounted on suitable mechanism actuated at the proper intervals to successively bring the various articles into display position one at a time to synchronize with the corresponding description on the record.

Obviously, many other uses of this invention will be apparent, and with the above and other objects in view, this invention includes all improvements over the prior art which are disclosed in this application.

In the accompanying drawings, in which certain ways of carrying out the invention are shown for illustrative purposes:

Fig. 1 is a side elevation of a phonograph made in accordance with this invention;

Fig. 2 is a plan view of a phonograph disk-record illustrating this invention;

Fig. 3 is a fragmental vertical section of the phonograph disk shown in Fig. 2, along a sound-reproducing groove in the neighborhood of a deflection-path in the sound-groove, together with a side elevation of a portion of a reproducing-arm and a needle of a phonograph;

Fig. 4 is a fragmental perspective view illustrating a modified form of this invention;

Fig. 5 is a fragmental perspective view illustrating a still further modified form of this invention; and

Fig. 6 is a diagrammatic view illustrating the phonograph reproducing-arm, a display device in the form of a projector, and switch-mechanism, and suitable connections for synchronizing a phonograph record with a projector.

In the description and claims, the various parts are identified by specific names for convenience, but they are intended to be as generic in their application as the prior art will permit.

Referring to Figs. 1, 2, 3, and 6 of the drawings, the phonograph record 10, here shown in the form of a disk, although it is to be understood that cylinder-records can also be employed, is provided with a sound-reproducing spiral-groove 11 having deflection-paths 12 at suitable intervals. The reproducing-arm 13 of a phonograph or other suitable sound-reproducing device 14 carries a needle 15 adapted to travel in the sound-groove 11 to produce sound in any of the known ways.

In the form of the invention illustrated in Fig. 6, the display device 16 is shown in the form of a projector to project "still" pictures. Any suitable projector may be employed for this purpose, one such projector, as illustrated in Fig. 6, being made by the Wyko Projector Corporation of New York.

In order to synchronize successive descriptions on the record 10 between the deflection-paths 12, with successive "still" pictures in the projector 16, a master-switch 17, a relay-operated switch 18 and a circuit-breaker or circuit-changer 19 are interconnected with suitable connections so that when the needle 15 passes a deflection-path 12, the master-switch 17 which is normally open, closes and causes the relay-operated switch 18 to close and actuate the projector 16 to bring the next "still" picture into projecting position, after which operation the circuit-breaker 19 opens the circuit through the projector and relay-operated switch, after which the circuit-breaker 19 automatically closes and remains in closed position until the master-switch 17 is again actuated by another deflection-path 12, whereupon the same

type of actuation of the projector 16 occurs to bring the next "still" picture into projecting position to synchronize with the corresponding description on the disk.

The master-switch 17 includes a bracket 20 mounted upon the reproducing-arm 13 and carrying an adjusting-screw 21 adapted to engage against and adjust the spring-metal terminal 22 to bring its contact 23 into suitable adjusted relation with the contact 24 carried by the spring-metal terminal 25. Mounted on the end of the terminal 25 is a weight 26, and cemented along the terminal 25 is a flexible member 27 of rubber or other suitable material adapted to damp the vibrations of the terminal 25.

Electric power for actuating the device enters by means of the wires 28 and 29. The wire 28 is connected to the terminal 22 of the master-switch 17. The terminal 25 of the master-switch 17 is connected to the wire 30, a branch 30a of which extends to the contact 31 while wire 30 connects to one terminal of the coil 32 of the relay-operated switch 18. Connected to the other terminal of coil 32 is a wire 33, one branch 34 of which is connected to the terminal 35 of the circuit-breaker switch 19. When the needle 15 passes over a deflection-path 12, the weight 26 of the impact-actuated master-switch 17 closes the switch temporarily, whereupon current flows through the relay-coil 32 and closes the armature 51 of the relay-operated switch 18. The current passes through the wire 33 which extends to the terminal 36 of the coil 37 which latter actuates the solenoid-plunger 38 to pull the latter down and swing the arm 39 about its pivot 40 to actuate the ratchet-mechanism 41 and thereby push a succeeding picture into projecting position in the projector, whereupon the arm 39 returns to its original position.

The current leaving the coil 37 passes into the terminal 42 and through wire 42a of the circuit-breaker 19, whereupon it passes through the wire upper-reach 44 and around the insulation 45 on the pin 46 secured to the spring-bar 47 and back through the wire lower-reach 48 to the terminal 49 and thence through wire 49a to the terminal 50 of the relay-operated switch 18 and through the metal armature 51 thereof to the contact 31, thus completing the circuit.

The spring-bar 47 of the circuit-breaker 19 is normally held pressed against the terminal 52 by means of the wire reaches 44 and 48, so that when current passes through these reaches, they become heated and permit the spring-bar 47 to withdraw to the dotted-line position 53, to thus move away from the contact 52 and break the circuit through the relay-operated switch 18 and to the projector 16.

After the circuit has thus been broken, the wire reaches 44 and 48 no longer being heated by electric current, cool down, whereupon they contract and pull the spring-bar 47 back into position in contact with the terminal 52, ready for the next time that the master-switch 17 is actuated. The switches 18 and 19 may, if desired, be mounted on a single panel or in a single box indicated in broken lines at 18a.

In the form of the invention illustrated in Fig. 4, a fragmental portion of a sound-record disk 54 is illustrated, with a sound-reproducing groove 55 in the form of laterally-separated sections 56, 57, etc., connected by an eccentric portion 58 which provides a deflection-path for actuating the needle 15 of the reproducer-arm 13. The switch-mechanism in this form of the invention is somewhat different, to provide for the somewhat different mode of actuation by the deflection-path 58, which latter operates by deflecting the needle 15 sidewise, whereas the deflection-path 12 of Fig. 3 actuates by deflecting the needle 15 in an approximately endwise direction. In this Fig. 4, the master-switch 59 has parts that are substantially the same in function as the corresponding parts of the master-switch 17 in the form of the invention illustrated in Fig. 3, the only essential difference being that the switch 59 is differently arranged, so that when the deflection-path 58 gives a sidewise movement to the needle 15, a corresponding sidewise impact actuation is imparted to the switch by means of the weight 60 thereof, similar to the mode of action of the weight 26 of the master-switch 17. The groove-portions 56 and 57 are shown separated a considerable distance apart in order to clearly illustrate the invention, but in actual practice their distance apart needs to be only such as results from omitting two ordinary grooves or channels.

In the form of the invention illustrated in Fig. 5, a fragmental portion 54 of the same phonograph record as is illustrated in Fig. 4, is shown, the only essential difference between the forms of the invention illustrated in Figs. 4 and 5, being the construction of the master-switch and the mechanism for operating the same. In this Fig. 5, the sound-reproducing needle 15 is the same as previously described, but in addition to this needle 15, a second needle 61 is pivoted at 62 to the reproducing-arm 13 and has a terminal 63 adapted to move into engagement with a second terminal 64. In this form of the invention, when the needle 15 starts to pass over the deflection-path 58, the needle 61 is still traveling in a main portion of the sound-groove portion 56, thus resulting in the switch-member 33 which is integral with the needle 61 and pivoted at 62 to swing about its pivot and bring the terminal 63 thereof into contact with the terminal 64, thus closing the master-switch and actuating the mechanism as previously fully described in connection with Figs. 1, 2, 3, and 6.

The form of the invention illustrated in Fig. 3 may have a second needle mounted thereon to pivot about a horizontal axis and positively actuate a master-switch in a similar manner to the form of the invention illustrated in Fig. 5.

In all the forms of the invention, the deflection-path, whether it be of the up-and-down form 12 which causes an approximately endwise deflection of the needle, or of the lateral form 58 which causes a sidewise actuation of the needle, results in a closure of the master-switch by virtue of the movable terminal of the master-switch closing the same and completing the circuit through the relay-operated switch 18. It is not necessary that the master-switch remain closed, since if it merely makes sufficient contact to once temporarily close the relay-operated switch 18, the latter then remains closed and performs its proper functions as previously fully described regardless of whether or not the master-switch immediately opens and remains open, although the rubber or like, damping material 27 acts to rather quickly bring the impact-movable contact of the master-switch to rest in open position.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are therefore to be considered in all re-

spects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. In combination: a sound-reproducing device having a reproducing-arm and a needle; switch-mechanism adapted to be directly mechanically actuated by deflection of said needle; and a sound-reproducing record having a sound-reproducing groove adapted to be traversed by said needle and provided with one or more deflection-paths intermediate the length of said groove and adapted to directly mechanically deflect said needle and actuate said switch-mechanism.

2. In combination: a sound-reproducing device having a reproducing-arm and a needle; switch-mechanism adapted to be directly mechanically actuated by deflection of said needle; and a sound-reproducing record having a sound-reproducing groove adapted to be traversed by said needle and provided with one or more deflection-paths intermediate the length of said groove and adapted to directly mechanically deflect said needle approximately endwise and actuate said switch-mechanism.

3. In combination: a sound-reproducing device having a reproducing-arm and a needle; switch-mechanism adapted to be directly mechanically actuated by deflection of said needle; and a sound-reproducing record having a sound-reproducing groove adapted to be traversed by said needle and provided with one or more deflection-paths intermediate the length of said groove and adapted to directly mechanically deflect said needle sidewise and actuate said switch-mechanism.

4. In combination: a sound-reproducing device having a reproducing-arm and a needle; a master-switch adapted to be directly mechanically actuated by deflection of said needle; a sound-reproducing record having a sound-reproducing groove adapted to be traversed by said needle and provided with one or more deflection-paths intermediate the length of said groove and adapted to deflect said needle; and a relay-operated switch connected to and actuatable as a result of actuation of said master-switch.

5. In combination: a sound-reproducing device having a reproducing-arm and a needle; a master-switch adapted to be directly mechanically actuated by deflection of said needle; a sound-reproducing record having a sound-reproducing groove adapted to be traversed by said needle and provided with one or more deflection-paths intermediate the length of said groove and adapted to deflect said needle; a relay-operated switch connected to and actuatable as a result of actuation of said master-switch; and an automatic circuit-changer connected to and adapted to actuate said relay-operated switch back to original position and change the circuit extending from said switches and circuit-changer, after which action, said circuit-changer automatically returns to its original position.

6. As an article of manufacture, a sound-reproducing record having a sound-reproducing groove designed and adapted to be traversed by a needle, said groove being provided with one or more deflection-paths intermediate the length of said groove and designed and adapted to deflect a needle to directly mechanically actuate switch-mechanism.

7. As an article of manufacture, a sound-reproducing record having a sound-reproducing groove designed and adapted to be traversed by a needle, said groove being provided with one or more deflection-paths intermediate the length of said groove and designed and adapted to deflect a needle approximately endwise to directly mechanically actuate switch-mechanism.

8. As an article of manufacture, a sound-reproducing record having a sound-reproducing groove designed and adapted to be traversed by a needle, said groove being provided with one or more deflection-paths intermediate the length of said groove and designed and adapted to deflect a needle sidewise to directly mechanically actuate switch-mechanism.

LEROY G. PHELPS.