

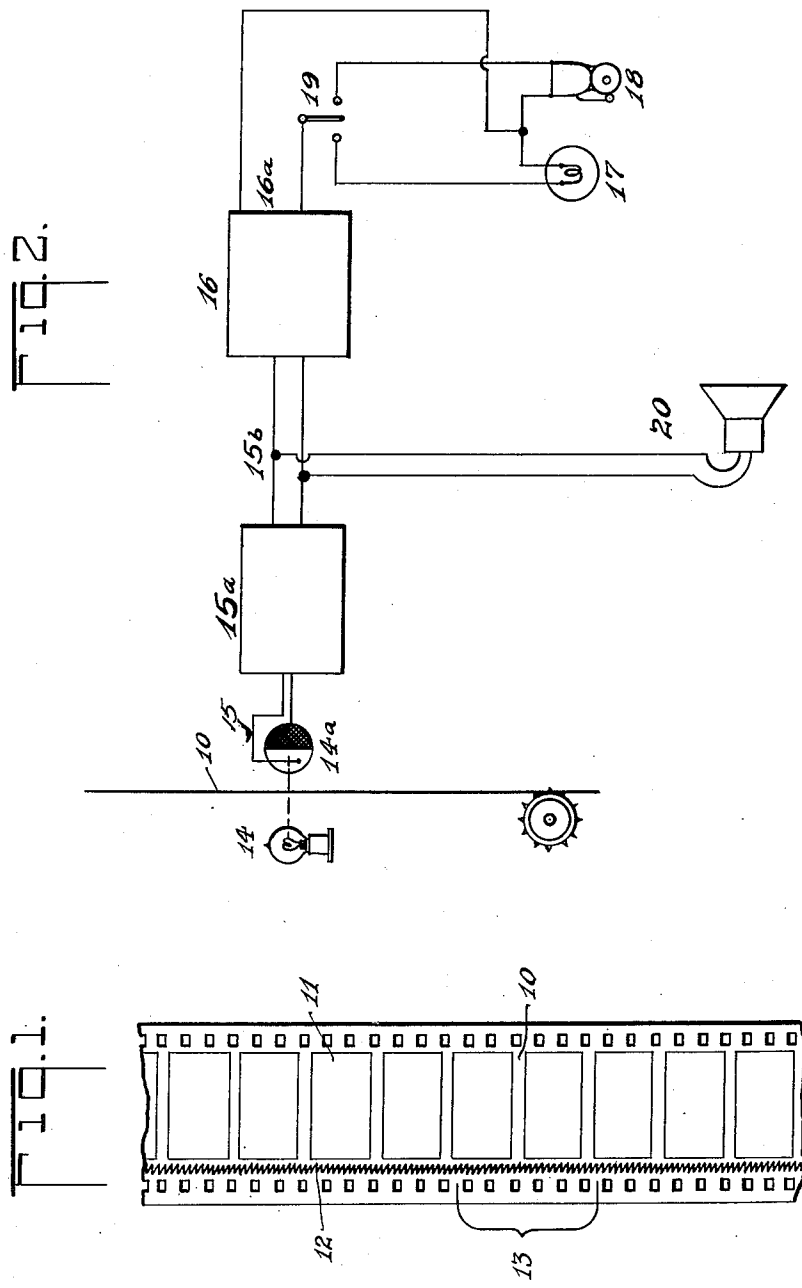
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W. W. WOOD ET AL

2,038,976

SOUND RECORD

Original Filed Nov. 12, 1932 2 Sheets-Sheet 1



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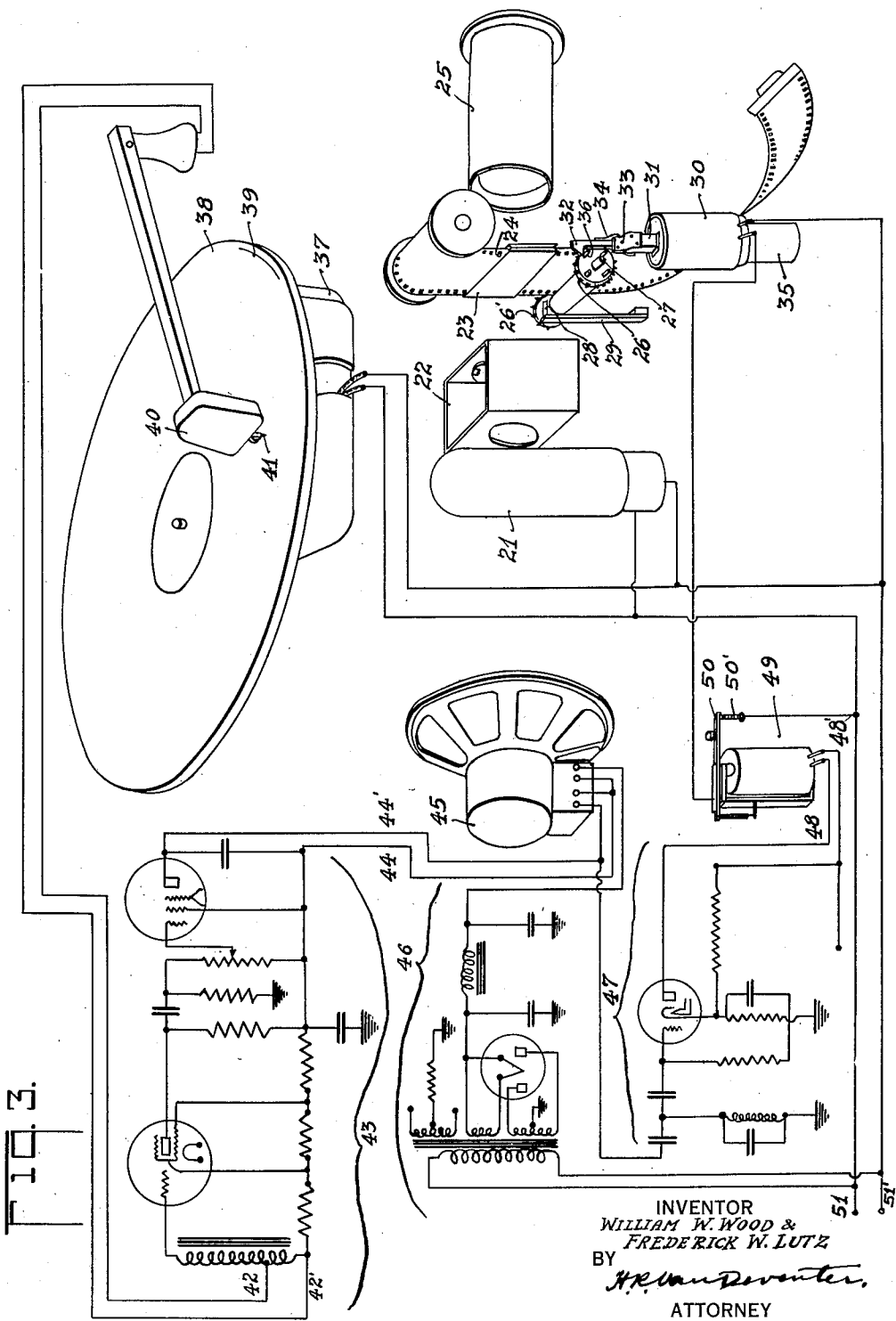
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UNITED STATES PATENT OFFICE

2,038,976

SOUND RECORD

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Original application November 12, 1932, Serial No. 642,394. Divided and this application January 7, 1935, Serial No. 740

6 Claims. (Cl. 274—41)

This invention relates to improvements in sound records, and is a continuation of the U. S. patent application Serial No. 642,394, filed November 12, 1932, now Patent No. 1,987,544, granted January 8, 1935, and has for an object a record for use in a talking machine containing vibrations adapted to be reproduced from the record (which may also have sound recordings thereon) to perform work.

Another object of the invention is to produce a sound record having thereon a plurality of vibrations arranged in groups of "pulses" to cause the display of a series of pictures in timed relation to sounds reproduced from a recording on said record.

A further object is to provide a record comprising either a film as commonly used in picture projection apparatus or a disk record or blank containing a sound track having thereon ordinary recordings of sound interspersed with vibrations of predetermined pitch, the latter constituting pulses which may be employed to control a work circuit or to produce an audible or visual signal to an operator.

Such records may be used for a wide variety of purposes, such as the transmission of signals or the remote control of apparatus by radio or over wired circuits. The "work circuit" herein referred to may be considered broadly to be any circuit having any instrumentality therein adapted to be actuated and/or controlled by pulses of current initially derived from the record as herein described.

For the purpose of illustrating the use of the improved record constituting this invention, it will be described as applied to controlling the operation of a picture projector from a phonograph. By the term "phonograph" is meant any device for the purpose of reproducing recorded sound from a sound record. By "sound record" is meant a film, disk, magnetic ribbon or the like on which sound is recorded photographically, mechanically, magnetically, electrically, by engraving or otherwise. Such record consists of a "blank" by which is meant a film, disk, magnetic ribbon or the like on which the sound may be recorded, preferably in a continuous track. By "picture projector" is meant any device for optically viewing or projecting pictures from a film or other picture record, either by projecting light through the record or reflecting it therefrom. By "picture record" is meant any record for use in a picture projector.

Sound and picture records are often combined by photographing the pictures and sound on a

single record, the result being the ordinary sound-picture film, the sound being recorded in synchronism with the taking of the picture.

There is also another class of synchronized sound-pictures wherein the sound is recorded on a cylinder or disk, and a sequence of pictures is taken on a separate record, such as a film, in synchronism or bearing some definite relation to the sound recording. An illustration is herein given using both the single-sound-on-film and picture record and the double-sound record with separate picture film system.

A series of pictures is taken upon a film to be displayed in a projector. A sound record is made relating to said pictures, the sound record to be operated in some definite relation to the picture projection.

It will be assumed that the picture film contains 12 pictures or groups of pictures and that the accompanying sound record is made so that a brief description of each picture (or group of pictures) is recorded thereon, to be reproduced while each picture is being projected with an interval between each recording during which interval the picture or group of pictures is changed in the projector. These intervals are however not left blank, but are filled in with pulses of vibrations of definite pitch as herein-after described.

By using the record constituting this invention, the operator is given a signal originating from the sound record when to change each picture by manually operating the projector mechanism, or if desired the mechanism of the projector may be automatically operated by the sound record as to cause the pictures to be changed. In order to simplify the description, it will be assumed that only a single picture is to be displayed during which the accompanying portion of the sound record is reproduced, then another picture, and so on until the entire 12 pictures have been shown.

In the accompanying drawings:

Figure 1 shows a film having pictures and sound photographically recorded thereon together with a plurality of pulses of vibrations of definite pitch and duration recorded at intervals in the sound track;

Figure 2 shows diagrammatically how the film, Figure 1, may be employed to give visual and audible signals independently of the sound reproduced therefrom; and

Figure 3 shows diagrammatically how a disk record (the equivalent of the film of Figure 1)

may be employed to control the operation of a picture projector from a phonograph.

The film 10 has thereon a plurality of pictures 11 and a sound track 12. Usually the recordings of sound on the sound track bear some definite relation to the action of the pictures displayed in connection therewith. In order to utilize such a film to produce audible or visual signals independently of the regular sound recordings thereon, the sound track 12 while remaining continuous and being produced in any desired manner, has interspersed therein a plurality of sections 13 in which are recorded vibrations of definite pitch. These vibrations may be of audible sounds or may be of any other character and may be recorded on the sound record 10 in any suitable manner. It will be assumed they are produced in this example by sounding an organ pipe of some desired pitch when the sound record is made so that the sound produced will be of definite pitch and may be of definite duration and will be recorded at proper intervals, but any suitable method of recording pulses of vibrations of definite pitch and duration can be used.

The record 10 being used in an ordinary projector having a sound head including the usual light source 14 and the usual photocell 14a as indicated diagrammatically in Figure 2, when one of the sections 13 passes through the sound head or other mechanism for reproducing the sound, it will cause a certain definite frequency to be generated by photocell 14a and delivered to the input circuit 15 of the amplifier 15a. A filter 16 is connected to the output 15b of the amplifier, and connected to the output 16a of this filter may be any suitable means for signalling, for example, a visual signal such as the lamp 17 or an audible signal such as the bell 18. A switch 19 may be provided to enable either the visual or audible signal to be used at will.

The series of vibrations of definite pitch and length within the sections 13 of the sound record need not be of a character that will affect the means 20 such as the loud speaker for audibly reproducing the ordinary sound recordings in those portions of the sound track other than the portions 13, but if a proper selection of audible frequency is made, the audible sound made in the loud speaker when the sections 13 are reproduced is not objectionable.

The output circuit 16a from the filter 16 is a work circuit and may contain any suitable means (such as the lamp 17, the bell 18 or the relay 49 of Figure 3) under the control of section 13 of the sound record 10 for performing work. The filter 16 insures that only the vibrations produced by the sections 13 will reach the work circuit as the filter will keep back all purely sound vibrations intended for the speaker 20. As the construction and operation of such filters are well known they are not here described in detail.

From the foregoing, it will be evident that a sound-picture film can be produced whereby certain sections of the sound track can be utilized to perform work other than that of mere sound production and that this may be accomplished by the employment of the apparatus herein described. Where the construction and operation of apparatus such as the amplifier, details of projector and the sound head or "pick-up" therefore are well known, they are not described in detail and any suitable types can be used.

Figure 3 shows a system wherein separate records are employed for the sound and pictures.

The picture projector comprises the electric lamp 21, having the usual condensing lens system 22 adapted to concentrate a beam of light on the film gate 23, the light passing through the picture film 24 therein and through the usual lens 25 on to a suitable screen (not shown). Any suitable mechanism for moving the film is employed, such as the usual sprocket wheels 26, 26' secured to a shaft 27 supported in any suitable manner. In this instance it will be assumed the projector is used for projecting still pictures and is to be manually operated, in which event the shaft 27 is provided with an ordinary hand wheel (not shown) whereby it may be rotated, thereby moving the film through the film gate 23.

In order to insure that the film is moved only one picture or "frame" at a time, a square cam 28 is mounted on shaft 27 and is engaged by a holding spring 29. Each surface of this cam corresponds to one "frame" on the film and if the shaft 27 is rotated one quarter turn thereby bringing successively the faces of cam 28 into engagement with the spring 29, successive pictures will be displayed. The square cam resists rotation of the shaft 27 and thereby the operator can easily turn only one frame at a time.

Should it be desired to automatically move the film through the gate 23 in order to automatically display successive pictures, the shaft 27 may be rotated by mechanical means which may be electrically operated. This means may include a solenoid 30 provided with a core 31 having at its upper end the latch 32 pivoted to 33 and pressed to the left by means of spring 34, so that it will, when moving upward, move to the right to engage pin 36. A dash pot 35 is provided in which may be placed a spring normally tending to hold 32 in the non-operating position shown in Figure 3, that is to say, hooked over one of the pins 36, four of which are placed in the side of wheel 26.

If a current of the proper characteristics is caused to flow in the circuit connected to the solenoid winding 30, the core 31 will be drawn downward carrying the latch 32 with it. As this is in engagement with the pin 36 in gear wheel 26, this wheel together with shaft 27 and wheel 26' will be rotated one quarter of a revolution. When the circuit of the solenoid winding is broken, the spring in the dash pot 35 will push the latch 32 up and another pin will be engaged and the operation just described will be repeated. As each quarter-revolution equals one "frame" or picture, and as the film 24 is engaged by wheels 26, 26', one picture will be displayed each time winding 30 is energized.

It is obvious that both the manual control and mechanical control as just described may be used simultaneously, if desired, without interference.

The phonograph machine may consist of a suitable electric motor 37 revolving the usual turntable 38 on which is supported a sound record 39 of the disk type. This sound record may have the usual continuous spiral groove constituting a sound track and containing ordinary recordings of sound interspersed at proper intervals with sections (similar to 13 on the sound track, Figure 1) adapted to reproduce a series of vibrations of definite pitch. A suitable reproducer commonly termed a "pickup" 40 is provided with a needle 41 adapted to contact with the sound track in the usual manner. The pick-

up may be of any suitable type and is connected by means of the conductors 42, 42' to the input end of a suitable amplifier generally denoted by the numeral 43.

5 The output end of the amplifier connects via conductors 44, 44' to suitable means for audibly reproducing current flowing in the output circuit of the amplifier and this means may consist of any suitable type of loud speaker 45. If
10 the loud speaker selected is of the ordinary dynamic type a suitable current supply device for the field of the speaker and for the vacuum tubes in the amplifier (and for the tube in the filter circuit to be presently mentioned) may be
15 employed, and this current supply device is generally denoted by the numeral 46.

A filter circuit generally indicated by the numeral 47 is connected to the output circuit of the amplifier, and the output circuit 48, 48' of the
20 filter circuit is connected to a suitable translating device, such as the relay 49, having a pair of normally open contacts 50, 50', which are connected to the solenoid winding 30 on the picture projector as shown.

25 A source of current may be connected to the terminals 51, 51' from which all of the elements may be supplied.

The apparatus being connected as shown in Figure 3 and being supplied with current from a
30 suitable source, say 60 cycles and 110 volts connected at 51, 51', and the film 24 being set to display the first picture of a series, the phonograph is started and the needle 41 of the pickup 40 is brought in engagement with the sound track
35 in the record 39. The impulses from pickup 40 pass into the input end of the amplifier 43 where they are amplified, passing out of the output end of the amplifier. These impulses pass into the loud speaker 45 and are translated into sound.
40 These impulses also pass into the input end of the filter 47, which, however, operates to prevent these impulses from passing through to the relay 49 which accordingly is not operated by the ordinary sound recordings, its contacts 50, 50' remaining open.

The pickup as it travels along the sound track encounters one or more portions thereof containing recorded vibrations of definite pitch, the characteristics of which have been selected with
50 a view to the operation of relay 49, and when such parts of the record are encountered, these vibrations are translated by the pickup and fed into the amplifier and are amplified and appear at the output end of the amplifier and enter the
55 filter 47. The filter permits only said amplified vibrations to pass therethrough (rejecting vibrations due to ordinary sound recordings) and the relay 49 is energized closing its contacts, thereby permitting current to flow through the solenoid winding 30, energizing the same and thereby causing the actuation of the film changing mechanism 26, 26', 27, 31, 32, 36 previously described, and causing a second picture of the series to be displayed. Meanwhile, the sound record 39 continues to revolve and the sound accompanying the second picture is reproduced and so on throughout the entire sequence of pictures.

In the event that the automatic mechanism shown in Figure 3 is not used, the operator merely manually operates the hand wheel to turn the
70 film upon receipt of a suitable visual or audible signal operated by the relay 49.

The filter 47 may be designed to resonate at
75 10% above or below the frequency predetermined

as the change-picture signal to allow for variations in the speed of the phonograph or other variations in recording and reproducing.

It will be seen that by providing the sound record with a sound track having interspersed
5 therein sections adapted to reproduce a series of vibrations of definite pitch and duration, that the necessity for pins, holes or other means in the record itself or in combination therewith for producing a signal for the operator or for actuating the film moving mechanism is eliminated, and that by providing the filter circuit 47 the action of the relay 49 is made positive and definite, as the filter circuit will only pass within
10 close limits, currents of frequency adapted to actuate the relay which will therefore not be actuated by any stray vibratory action that may rise from a sound or combination of sounds not intended to actuate it.

It will be apparent that the record herein
20 described provides not only for the synchronization of sound and pictures at the beginning of the showing thereof, but also permits the operator to determine at intervals during the operation of the sound record, which to make changes in the pictures displayed and that the film 24 may
25 be turned forward or backward.

The record and apparatus herein disclosed differs from the prior art, such as the patent to Jenkins et al. No. 1,909,765, issued May 16, 1933
30 in that the present invention comprises a moving record having thereon a single track in which track there is a normal recording of sound interspersed with a predetermined sequence of pulses or reproducible vibrations of definite pitch. For
35 example, by reference to Figure 1 of this application, it will be seen that the normal sound recording is indicated at 12, and a section of the predetermined sequence of reproducible vibrations or "pulses" is shown at 13. In the Jenkins et al. patent, referring to Figure 3 thereof, it will be seen that the normal sound recording is shown at 12 and the predetermined sequence of reproducible vibrations of definite pitch termed in the Jenkins patent the "operating component"
40 is combined therewith in the same track, or as the patent states (lines 84 to 90, page 2): "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."

In other words, in the prior art, the operating component has been superimposed on the sound track, whereas by the present invention the operating component or pulse is in sections lying within the same groove as the sound track, but not superimposed thereon and entirely separate therefrom. The present invention simplifies the construction and operation of the filter, as well as the relay or other device operated by the pulses 13, Figure 1, and these pulses cannot affect the sound recording, as they are not superimposed thereon and do not form a "component" there-
65 with.

While two forms of records have been shown by way of illustration, it is obvious that many other forms and types of record may be used containing pulses as described, and that said records may be employed for any desired purposes other than those herein described, without, how-
70 ever, avoiding the appended claims.

What is claimed is:

1. A sound record having a single track thereon comprised of a plurality of sections of recorded
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sounds, and a plurality of sections located between said first sections free from said sound recordings, said last sections constituting recordings of vibrations of definite pitch and duration.

5 2. A sound record having a single track thereon, and means located wholly within said track in addition to the ordinary recordings of sound therein and spaced apart therefrom for reproducing a series of vibrations of definite predetermined pitch and duration.

10 3. A sound record of the disk type having thereon a track, and ordinary recordings of sound in said track interspersed with recordings of a series of vibrations of definite pitch and duration, said last vibrations being spaced apart and independent of the ordinary sound recording.

4. A sound record comprising a blank, a track thereon, sound recordings in said track, and a plurality of pulses recorded within said track adapted to produce a series of signals audibly distinguishable from said sound recordings.

5 5. A sound record as claimed in claim 4 wherein the audible pulses are of predetermined pitch and duration.

6. A sound record as claimed in claim 4 wherein the audible pulses are produced by a frequency generator producing frequencies of definite pitch and duration.

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