

Jan. 8, 1935.

W. W. WOOD ET AL

1,987,544

METHOD AND APPARATUS FOR UTILIZING VIBRATIONS

Filed Nov. 12, 1932

2 Sheets-Sheet 1

Fig. 2.

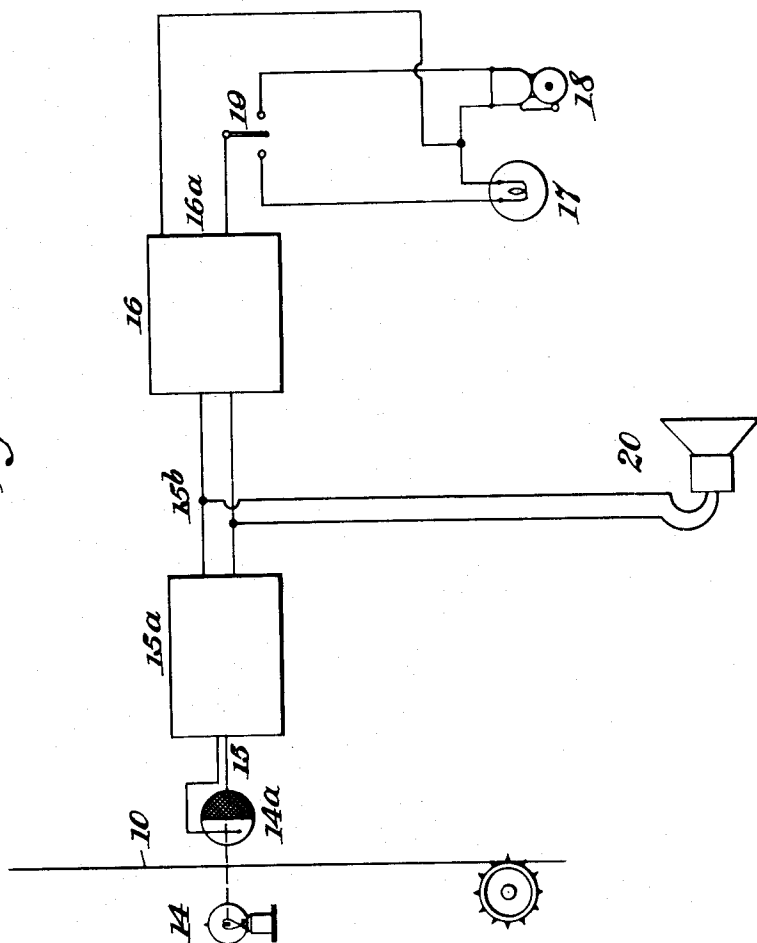
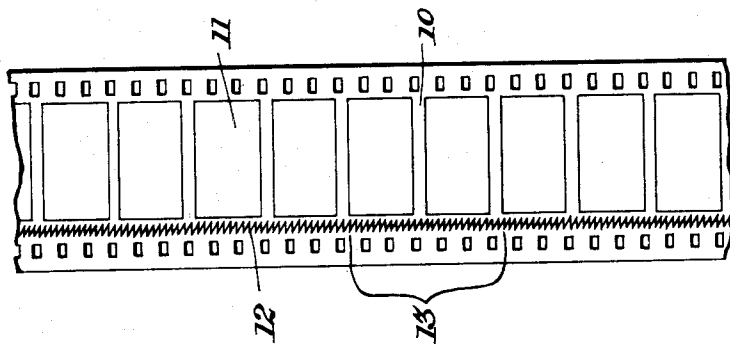


Fig. 1.



INVENTOR  
William W. Wood  
Frederick W. Lutz.  
BY  
*H. C. Anderson*  
ATTORNEY

Jan. 8, 1935.

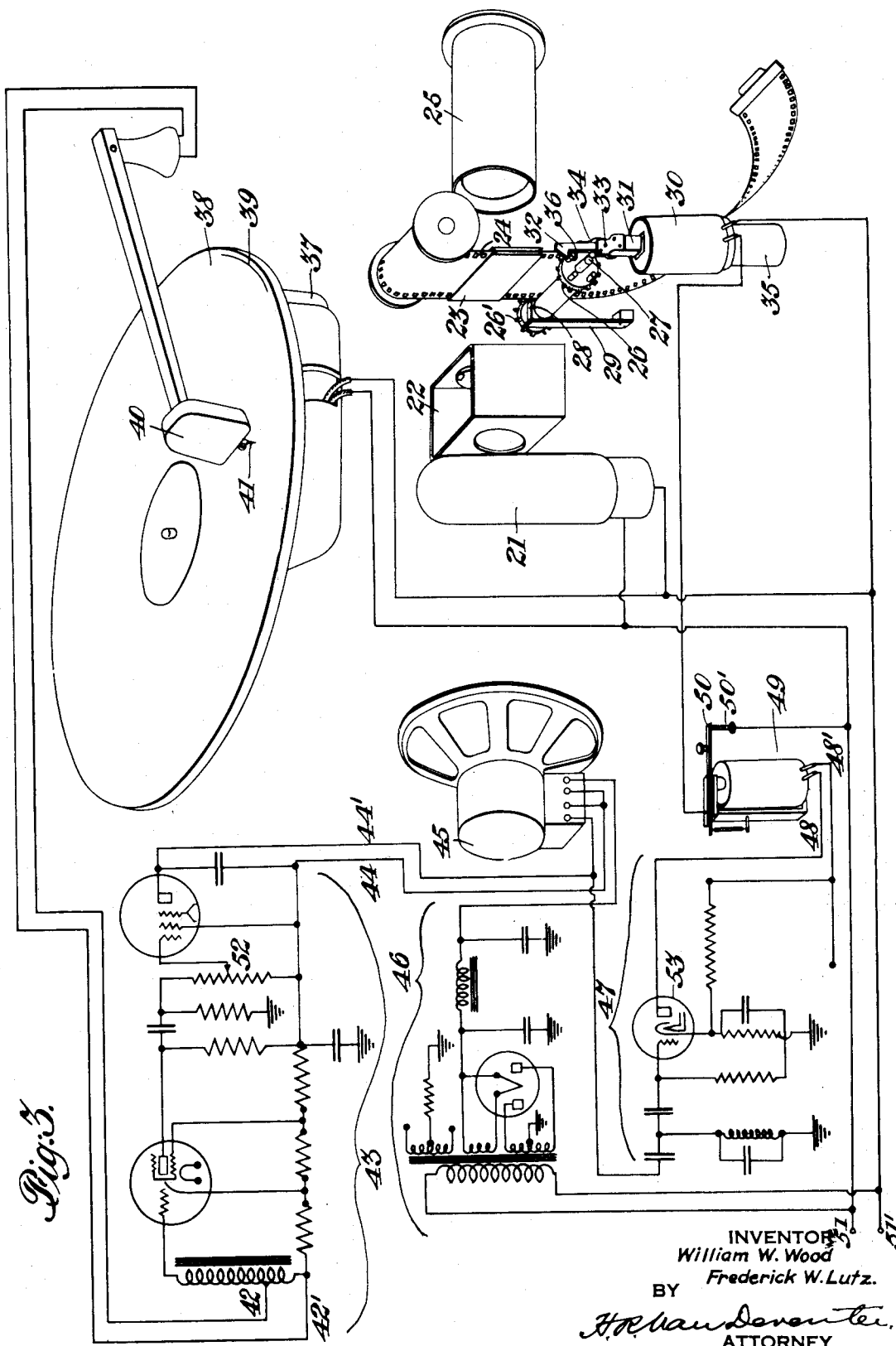
W. W. WOOD ET AL

1,987,544

METHOD AND APPARATUS FOR UTILIZING VIBRATIONS

Filed Nov. 12, 1932

2 Sheets-Sheet 2



## UNITED STATES PATENT OFFICE

1,987,544

## METHOD AND APPARATUS FOR UTILIZING VIBRATIONS

William W. Wood, New York, and Frederick W. Lutz, Floral Park, N. Y., assignors to Visomatic Systems, Inc., a corporation of New York

Application November 12, 1932, Serial No. 642,394

22 Claims. (Cl. 179—100.1)

This invention relates to a method and apparatus for utilizing vibrations, and has for an object the utilization of vibrations reproduced from a record (which may also have sound recordings, 5 thereon) to perform work.

Another object of the invention is to utilize vibrations to cause the display of a series of pictures in timed relation to a sound record.

A further object is to provide a method of and 10 apparatus for utilizing sound vibrations employing a film or disk record containing ordinary recordings of sound interspersed with vibrations of predetermined pitch, the latter being employed to control a work circuit.

The invention may be used for a wide variety 15 of purposes where the transmission of signals or the remote control of apparatus by radio or over wire circuits, is desired. The "work circuit" herein referred to may be considered broadly to be any circuit having any instrumentality therein 20 adapted to be actuated and/or controlled in accordance with the method herein described and claimed.

For the purpose of illustrating the invention, it 25 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" 30 is meant a film, disk, magnetic ribbon or the like, on which sound is recorded photographically, mechanically, magnetically, electrically, by engraving, or otherwise. By "picture projector" is meant any device for optically viewing or project- 35 ing 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 40 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 45 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 50 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 55 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 5 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 10 projector. These intervals are however not left blank, but are filled in with vibrations of definite pitch as hereinafter described.

By the herein described method and by using the apparatus disclosed, the operator is given a 15 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 20 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 25 been shown.

In the accompanying drawings:

Figure 1 shows a film having pictures and sound photographically recorded thereon;

Figure 2 shows diagrammatically how the film 30 of Figure 1 may be employed to carry out the method of utilizing vibrations herein described; and

Figure 3 is a diagram of a complete system for utilizing the herein described method and shows 35 one form of apparatus that may be used to carry out the method.

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 40 relation to the action of the pictures displayed in connection therewith. In order to utilize such a film in connection with the method of utilizing vibrations herein disclosed, the sound track 12 while remaining continuous and being produced 45 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 50 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 55

definite duration and will be recorded at proper intervals.

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 this method enables a sound-picture film to 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" therefor 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 with 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 "pick-up" 40 is provided having 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.

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 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 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 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.

A source of current may be connected to the terminals 51, 51' from which all of the elements may be supplied. These elements comprise the picture projector having the electric lamp 21, the phonograph having the driving motor 37, the amplifier 43 having therein one or more thermionic tubes as shown, the thermionic tube of the current supply 46, the filter 47, the loud speaker field, and the operating mechanism for the picture projector including the solenoid winding 30.

It is often desirable to assemble the picture projector, phonograph, amplifier, filter and current supply in a single casing, all connected up and ready for use, having a single connection including the terminals or conductors 51, 51' for connection with any lamp socket, and the arrangement of the various circuits and other parts in the manner described is therefore advantageous, care being taken in this layout to eliminate noise in the speaker circuit due to the operation of the phonograph motor 37 or the actuating mechanism of the picture projector.

It will be observed that the amplifier 43 is provided with a volume control 52 whereby the volume of sound emitted from the loud speaker 45 may be controlled in the usual manner. However, the operation of this volume control would also affect the current flowing through the filter circuit 47 of the relay 49 connected to the output thereof, and if the relay 49 were set to operate at some given minimum current and the volume control 52 were so adjusted that the amount of current delivered to the input of the filter circuit were less than this minimum, the relay would fail to operate.

In order to prevent failure of relay 49 because of the adjustment of the volume control 52, the filter circuit is provided with a suitable thermionic tube 53 in the output circuit thereof to which relay 49 is connected, so that the relay is always insured of getting ample current for its operation and while connected to the output circuit of the amplifier 43 is independent of any volume control regulation made in connection therewith.

The apparatus being connected as shown in Figure 3 and being supplied with current from a 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 pick-up 40 is brought in engagement with the sound track in the record 39. The impulses from pick-up 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. 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 pick-up 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 a view to the operation of relay 49, and when such parts of the record are encountered, these vibrations are translated by the pick-up and fed into the amplifier and are amplified and appear at the output end of the amplifier and enter the filter 47. The filter permits only said amplified vibrations to pass therethrough (rejecting vibrations due to ordinary sound record-

ings) 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 film upon receipt of a suitable visual or audible signal operated by the relay 49.

The filter 47 may be designed to resonate at 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 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 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 herein described method provides not only for the synchronization of sound and picture records at the beginning of the showing thereof, but also permits the operator to determine at intervals during the operation of the sound record, when to make changes in the pictures displayed and that the film 24 may be turned forward or backward.

This method not only provides for the control of the projector by the phonograph but further provides a method for displaying a series of pictures in timed relation with a sound record, the display of such series of pictures being controlled by electrical impulses derived from the sound record. And while a complete operative device has been shown by way of illustration, it is obvious that many other arrangements and instrumentalities can be employed to carry out the method herein described without however avoiding the appended claims.

What is claimed is:

1. The method of utilizing vibrations which includes providing a moving sound record having thereon an ordinary recording of sound and a predetermined sequence of reproducible vibrations of definite pitch in the same track spaced apart from said sound recordings and independent thereof, translating said sound recordings and said vibrations into electrical energy in a circuit common to both, amplifying said energy, filtering said energy to remove unwanted vibrations, and utilizing the resultant filtered energy to perform work.

2. The method as claimed in claim 1 including the additional step of connecting an energy translator to the filter output, said translator adapted to respond only to vibrations of predetermined pitch.

3. The method of utilizing vibrations which includes providing a moving sound record having thereon an ordinary recording of sound and a predetermined sequence of reproducible vibrations of definite pitch in the same track spaced apart from said sound recordings and independent thereof, translating said sound recordings and said vibrations into electrical energy in a circuit common to both, amplifying said energy, filtering said energy to remove unwanted vibrations, and utilizing the resultant filtered energy to perform work while continuing the movement of said record and the reproduction of sound therefrom.

4. The method of utilizing vibrations which includes selecting from a plurality of permanently recorded vibrations some of which lie within the audible range, a predetermined sequence of vibrations of definite pitch and duration spaced between groups of other recorded vibrations and in the same track therewith and independent thereof, reproducing all said vibrations by a single means, and utilizing said selected vibrations to perform work.

5. The method of utilizing vibrations which includes continuously recording vibrations produced by sound, inserting at predetermined intervals during said recording a series of vibrations independent of said sound vibrations and spaced apart therefrom and produced by means other than that used for recording sounds, reproducing all said vibrations by a single means, amplifying said reproduced vibrations, filtering out said last vibrations, and utilizing said last vibrations to perform work.

6. The method of utilizing vibrations which includes continuously recording vibrations produced by sound, inserting at predetermined intervals during said recording a series of vibrations of definite pitch and length in respect to the total length of the record being made and independent of said sound vibrations and spaced apart therefrom, reproducing all said vibrations by a single means, amplifying said reproduced vibrations, filtering out said last vibrations, and utilizing said last vibrations to perform work.

7. The method of utilizing vibrations which includes continuously recording vibrations produced by sound, inserting at predetermined intervals during said recording a series of vibrations independent of said sound vibrations and spaced apart therefrom and produced by means other than that used for recording sounds, reproducing all said vibrations by a single means, amplifying said reproduced vibrations, filtering out said series of vibrations, and utilizing said last vibrations to perform work while using said first vibrations to produce speech or music during the intervals in which said last vibrations are not being reproduced.

8. In combination, a sound record comprising a continuous sound track having thereon ordinary sound recordings, said track having a section between said sound recordings free therefrom and adapted to reproduce a series of vibrations of definite pitch and duration, means for reproducing said sound and vibrations, means for amplifying said sound and vibrations, means for audibly reproducing said sound, and means separate from said last means adapted to be actuated only by said vibrations of definite pitch.

9. In combination, a sound record comprising a continuous sound track having thereon ordinary sound recordings and having a section between said sound recordings free therefrom and adapted to reproduce a series of vibrations of definite

pitch and duration, means for reproducing said sound and vibrations, means for amplifying said sound and vibrations, means for audibly reproducing said sound, and a relay connected to said amplifying means and adapted to be actuated only by said vibrations of definite pitch.

10. A sound record for use with a picture projector employing a sequence of pictures to be projected from a film or the like, said record having a continuous sound track having thereon an ordinary recording of sound related to the pictures on said film, said sound track having interspersed therein sections free from said sound recordings and adapted to reproduce a series of vibrations of definite pitch and duration, means for reproducing said sound and vibration recordings, means for amplifying said recordings, a loud speaker connected to said amplifying means for reproducing sound, and means under the control of said series of vibrations for performing work.

11. A sound record for use with a picture projector employing a sequence of pictures to be projected from a film or the like, said record having a continuous sound track constituting an ordinary recording of sound, said recording being made in connection with the pictures on said film and bearing a definite relation thereto, said sound track having a section therein between said sound recordings free from said recordings and adapted to reproduce a series of vibrations of definite pitch and duration, means for reproducing said sound and vibration recordings, means for amplifying said recordings, a loud speaker for reproducing said sound, and means under the control of said series of vibrations for causing a state of change in an electrical circuit.

12. In combination, a phonograph, a record therefor having a continuous sound track constituting an ordinary recording of sounds, said track containing at intervals sections free from said ordinary recording, said sections having recorded therein vibrations of definite pitch, a picture projector, a series of pictures adapted to be projected thereby whose subject matter relates to said recorded sounds, means under the control of said vibrations whereby the operator may determine when a particular part of said record has been reached during the operation thereof, and means associated with said projector and under the control of the operator for causing the projector to display a predetermined picture.

13. In combination, a phonograph, an electric motor therefor, a record for said phonograph having a continuous sound track constituting an ordinary recording of sounds, said track containing at intervals sections free from said ordinary recording, said sections having recorded therein vibrations of definite pitch, electrical means for reproducing said sounds and vibrations, electrical means for amplifying the output from said first means, a picture projector having an electric lamp therein, a series of pictures the subject matter whereof is related to said recorded sounds and adapted to be projected by light from said lamp, electrical control means operated by said vibrations whereby the operator may determine when a particular part of said record has been reached, and a common source of power for operating the aforesaid motor, reproducing and amplifying means, the lamp and said electrical control means.

14. In combination with a device for projecting pictures, a series of pictures adapted for use in said projector, a phonograph machine, a record for use with said phonograph having recorded

thereon a plurality of sound recordings in sections and a plurality of recordings free from said sound recordings between said sections and of vibrations of definite pitch, an electrical pick-up adapted to engage said sound record and be operated thereby, a thermionic amplifier connected to said pick-up, a loud speaker connected to said amplifier, a filter circuit connected to said amplifier adapted to pass only current vibrations produced by said vibrations of definite pitch generated by said sound record, and a device connected to the output end of said filter whereby during the operation of said record the sections therein containing said vibrations of definite pitch may be evidenced to an operator.

15. In combination with a projector for projecting pictures, a series of pictures adapted for use in said projector, a phonograph machine, a record for use with said phonograph, said record having recorded thereon a plurality of sound recordings in sections and a plurality of recordings free from said sound recordings between said sections and of vibrations of definite pitch, an electrical pick-up adapted to engage said sound record and be operated thereby, a thermionic amplifier connected to said pick-up, a loud speaker connected to said amplifier, a filter circuit connected to said amplifier adapted to pass only current vibrations produced by said vibrations of definite pitch generated by said sound record, and a device connected to the output end of said filter whereby during the operation of said record the sections therein containing said vibrations of definite pitch may be utilized to automatically change the pictures in the projector.

16. In combination, a projector for projecting pictures, a plurality of pictures adapted to be projected thereby, a phonograph, a record for use with said phonograph, said record having recorded thereon a plurality of sound recordings in sections and a plurality of recordings free from said sound recordings between said sections and of vibrations of definite pitch, an electrical pick-up adapted to engage said record and be operated thereby, a thermionic amplifier connected to said pick-up and adapted to amplify the electrical impulses therefrom, a loud speaker connected to the output of said amplifier and adapted to translate the electrical energy therefrom into sound, a filter circuit connected to said amplifier adapted to pass only current vibrations produced by said vibrations of definite pitch, a relay connected to the output circuit of said filter and adapted to be operated by the current flowing therein, a circuit controlled by said relay, a source of current, and an actuating device serially included in said circuit, said last device being adapted to control the projection of any one of said series of pictures from said projector.

17. In combination, a phonograph having a sound record and motor means for operating said phonograph to produce sound, a projector adapted to project pictures and means for operating the same, and means controlled by vibrations produced by said record for repeatedly starting and stopping said projector in timed relation to the sound produced by said phonograph whereby pictures may be displayed in timed relation with said sound.

18. In combination, a picture projector including a lamp and means for moving a film or the like through the light beam from said lamp, a phonograph having a record and a motor for driving the same, a pickup, an amplifier connected to said pickup, a loud speaker connected to said

amplifier, a current supply device including a transformer and thermionic tube, a filter device having its input circuit connected to said amplifier and its output circuit including a relay adapted to control said first means in the picture projector, a casing upon and in which the aforesaid parts are mounted, circuit conductors extending from said casing and connected at their inner ends to said lamp, said motor, said current supply device and to said first means in the picture projector via said relay, a record for the phonograph having thereon an ordinary recording of sound, and means on said record for operating said pickup to produce a distinctive vibration of different character from other vibrations recorded on said record, said distinctive vibrations being passed to said amplifier and loud speaker and through said filter to said relay in order to operate the same and thereby operate said first means in the picture projector in timed relation to the ordinary recording of sounds reproduced by said record and at preselected intervals during the operation thereof.

19. In combination, a photograph having a sound record and a pickup and motor means for operating said phonograph, a loud speaker connected to said pickup and adapted to reproduce as sound, vibrations recorded on said record, a projector having a film and adapted to display pictures and including means for manually moving said film therein, and means on said record for producing a distinctive sound of different character from other sounds recorded thereon whereby the operator will be signalled to operate said manual means on said projector to move said film therein and thereby project pictures in timed relationship to other sounds produced by said record via said loud speaker at preselected intervals during the operation of said record.

20. In combination, a still picture projector including a lamp and means for moving a film or the like through the light beam from said lamp, a phonograph having a record and means separate from said first means for driving the same, a pickup, an amplifier connected to said pickup, a loud speaker connected to said amplifier, a casing upon and in which the aforesaid parts are mounted, circuit conductors extending from said casing for supplying current to said lamp, said last means, said amplifier and said loud speaker, a record for the phonograph having thereon an ordinary recording of sound, and means on said record for operating said pickup to produce a distinctive vibration of different character from other vibrations recorded on said record, said distinctive vibrations being passed to said amplifier and loud speaker to produce a sound of definite pitch adapted to act as a signal to the operator of the projector in order that pictures may be displayed therein in timed relation to the ordinary recordings of sound reproduced by said record and at preselected intervals during the operation of said record.

21. In combination, a still picture projector including a lamp and means for moving a film or the like through the light beam from said lamp, a phonograph having a record and means separate from said first means for driving the same, a pickup, an amplifier connected to said pickup, a loud speaker connected to said amplifier, a current supply device including a transformer and thermionic tube, a casing upon and in which the aforesaid parts are mounted, circuit conductors extending from said casing and connected at their inner ends to said lamp and said cur-

rent supply device and to the means for driving said phonograph, a record for the phonograph having thereon an ordinary recording of sound, and means on said record for operating said pickup to produce a distinctive vibration of different character from other vibrations recorded on said record, said distinctive vibrations being passed to said amplifier and loud speaker to produce a sound of definite pitch adapted to act as a signal to the operator of the projector in order that pictures may be displayed therein in timed relation to the ordinary recording of sounds reproduced by said record and at preselected intervals during the operation thereof.

22. In combination, a still picture projector including a lamp and means for moving a film or the like through the light beam from said lamp, a phonograph having a record and a motor for driving the same, a pickup, an amplifier connected to said pickup, a loud speaker connected to said amplifier, a current supply device including a transformer and thermionic tube, a film

control connected to said speaker and adapted to vary the volume of sound produced thereby, a casing upon and in which the aforesaid parts are mounted, circuit conductors extending from said casing and connected at their inner ends to said lamp, said current supply device, and said motor, a record for the phonograph having thereon an ordinary recording of sound, and means on said record for operating said pickup to produce a distinctive vibration of different character from other vibrations recorded on said record, said distinctive vibrations being passed to said amplifier and loud speaker to produce a sound of definite pitch adapted to act as a signal to the operator of the projector in order that pictures may be displayed therein in timed relation to the ordinary recording of sounds reproduced by said record and at preselected intervals during the operation thereof.

WILLIAM W. WOOD.  
FREDERICK W. LUTZ.

**CERTIFICATE OF CORRECTION.**

Patent No. 1,987,544.

January 8, 1935.

**WILLIAM W. WOOD, ET AL.**

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 5, second column, line 24, claim 19, for "photograph" read phonograph; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of March, A. D. 1935.

**Leslie Frazer**

(Seal)

Acting Commissioner of Patents.

**CERTIFICATE OF CORRECTION.**

Patent No. 1,987,544.

January 8, 1935.

**WILLIAM W. WOOD, ET AL.**

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 5, second column, line 24, claim 19, for "photograph" read phonograph; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of March, A. D. 1935.

**Leslie Frazer**

(Seal)

Acting Commissioner of Patents.