

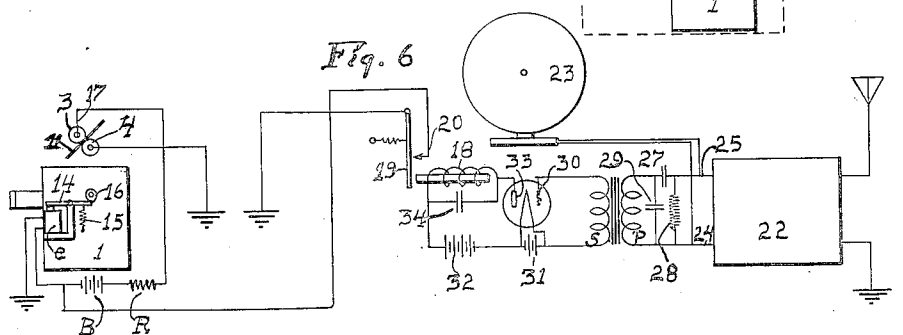
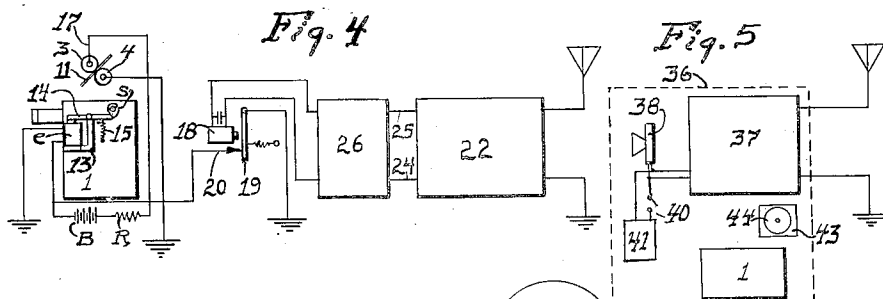
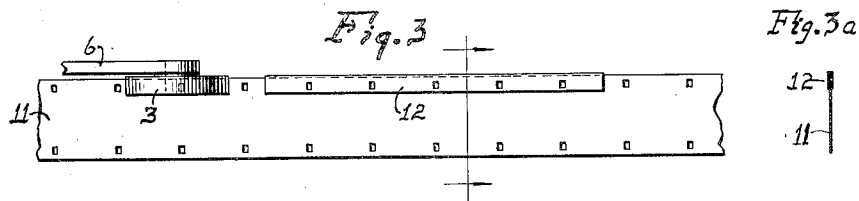
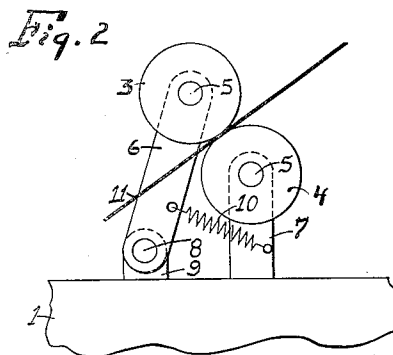
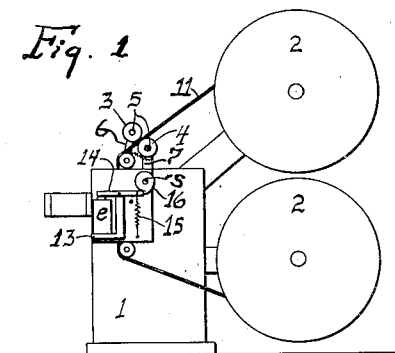
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METHOD AND MEANS FOR COMBINING PICTURES WITH SOUND

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METHOD AND MEANS FOR COMBINING PICTURES WITH SOUND

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This invention relates broadly to method and means for combining pictures with sound, and more particularly to pictures which are shown locally by any suitable method such as by a motion picture film projector, and sound produced remotely as through a radio broadcast system.

One object of the invention is to provide a method for producing synchronized talking motion pictures.

Another object is to provide a system whereby a film projector may be combined with radio receiving apparatus in such a manner that the audible effects may be transmitted from any existing radio broadcast studio and the visual effects produced locally at the broadcast receiver.

Another object is to combine such audible and visual effects in a manner that synchronization therebetween is effected.

A further object is to provide an improved method of controlling the operation of a motion picture film.

A still further object is to provide a system whereby a motion picture projector, located in a broadcast studio, is operated in synchronism with one or more similar projectors, located at other points, in such a manner that the sound components at the broadcast studio of a predetermined program may be reproduced either directly from the local film, by means of conventional photo-optical pickup apparatus, from separate sound records played into the broadcast microphone, or by eliminating records entirely and permitting the artists at the studio while watching the local projection to render sound effects into the microphone, appropriate to the local projection, and consequently to the remote projections operated in synchronism therewith.

A still further object is to provide a new and useful means for indexing motion picture films.

Still further objects and advantages of our invention will be shown as the specification progresses, and the novel features will be particularly pointed out in the appended claims.

In the drawings, Fig. 1 discloses an embodiment of our invention as applied to a motion picture film-projecting machine. Fig. 2 is an enlarged fragmentary view of the index contact apparatus. Figs. 3 and 3a show an index portion of the film and the associate contact wheels therefor. Fig. 4 is a circuit diagram used in carrying out our invention. Fig. 5 discloses an arrangement in a radio broadcast studio applicable to the invention. Fig. 6 shows a complete receiving system for effecting synchronized sound and pictures.

In carrying out the invention a motion picture projector 1 of any suitable type is employed, having conventional film spools 2 thereon. Mounted on the upper portion of the projector, and in the path of the film which feeds therethrough, is a pair of contact rollers 3 and 4 made of copper or any other suitable electrical conductor material. Said contact rollers are rotatably mounted at 5 to arms 6 and 7 respectively. Arm 7, made of a suitable conductor, serves to mechanically support and electrically ground roller 4 to the frame of the projector 1 while arm 6, made of a suitable insulating material, is provided at the lower end thereof with a pivotal support 8. Member 8 is fastened integrally with arm 9 of the projector 1. The arm 6, in being moved about its support 8, serves to yieldingly engage the rollers together and a spring 10 provides the necessary tension therefor. The film 11 passes between the rollers 3 and 4, as shown in Figs. 1 and 2 and normally serves to insulate the rollers from each other.

Means for electrically connecting the contact rollers 3 and 4 together at predetermined intervals are provided in indices 12 disposed adjacent one of the edges of the film and comprising copper or other suitable material electro-deposited or otherwise disposed so as to travel with the film.

The thickness of the index material is shown in Fig. 3a at 12 in exaggerated form but should not be such as to interfere with the flexibility of the film. Thus it can be seen that the film 11, normally feeding between the contacts 3 and 4, prevents elec-

trical connection therebetween but when the film advances longitudinally to a position where an index strip 12 is interposed between said rollers, electrical connection between the latter is immediately established for a purpose hereinafter set forth.

Any suitable means may be employed for driving the projector at a predetermined speed such as, for example, a synchronous or phonic-wheel motor (not shown) coupled to the conventional projector drive shaft *s* in the usual manner. For example, the shaft *s* and the motor shaft may be provided with grooved pulleys to permit of a belt coupling therebetween. If such a belt drive is used it is preferable to maintain a sufficiently loose adjustment of the belt with respect to the drive and driven pulleys to permit the belt to slip around the driven pulley when its associate shaft *s* is stopped as hereinafter explained. In effect this loose belt arrangement provides a friction engagement, or clutch, between the motor and shaft *s*, and since it will readily occur to those skilled in the art that many other mechanical arrangements may be utilized for the same purpose, it is not the intension to limit this invention to any particular method of frictionally engaging, or otherwise coupling the motor and projector.

Means for selectively starting and stopping the film is provided in an electromagnet *e* supported by an L-shaped yoke 13 at the upper end of which a horizontal armature 14 is pivotally mounted. The armature 14 is thus arranged to be tilted in one direction by the actuation of the electromagnet and in the opposite direction by a spring 15.

Fastened on the shaft *s*, so as to rotate therewith, is a cam 16 provided with a spiralled or eccentric periphery; said cam being in effect a ratchet wheel with one tooth. The spring 15 in exerting a downward pull normally keeps the horizontal armature out of contact with the periphery of the cam 16, thus permitting rotation of the shaft *s* and the consequent feeding of the film in the usual manner. However, when the spring 15 yields upon energization of the electromagnet *e*, the pawl-like end of the armature 14 will move upwardly and engage with the peripheral arrester on cam 16 and the clockwise rotation of the shaft *s* will abruptly cease; the driving motor being permitted to continue its rotation through the slippage of the driving belt or clutch as heretofore explained.

Referring now particularly to Figs. 1, 4, and 6, the magnet coil *e* has one of the ends thereof grounded in any suitable manner such as to the frame of the projector, the other end of said coil being connected to a source of current B. In series with the return circuit of the source B is a current-limiting resistor R which connects by means

of a flexible lead 17 to the metal pivot of roller 3. It will be manifest from the foregoing description that the film will normally feed through the projector until the rollers 3 and 4 encounter a metallic index 12 whereupon the magnet *e* becomes energized, operates its associate armature and automatically stops further feeding of the film, as already explained.

Provision for automatically or manually starting the film is provided in a relay 18 and associate armature 19 thereof. Said armature is connected to the grounded side of the magnet *e* and the contact 20 disposed adjacent thereto is connected with the other side of the magnet *e*. The relay contacts 19 and 20 therefore serve to short-circuit the magnet coil *e* whenever it is desired to initiate the progression of the film; the resistor R serving to limit the current flowing from the battery when the magnet *e* is shunted.

In one of the uses of the invention the projector is associated with a radio receiving set of the usual type such as is used for ordinary present day broadcast reception. Referring now to Figs. 4 and 6 such a set is shown at 22 with the conventional loudspeaker 23 (Fig. 6) connected to the output leads 24 and 25 thereof. In parallel with the loudspeaker and the receiver output is a filter 26, Fig. 4, responsive only to a predetermined signal frequency at which it is desired that the relay 18 shall operate.

The design of the filter is optional and, as will occur to those skilled in the art, will be largely determined by the frequency that is chosen as a signal for the operation of the relay. For the purpose of this patent a circuit for the filter 26 of Fig. 4 is shown in Fig. 6 and comprises a transformer having a primary P connected across the receiver output circuit 24 and 25 through a coupling condenser 27 and shunt resistor 28. The primary circuit may be tuned by an additional condenser 29. The secondary S is connected to the grid 30 of a vacuum tube amplifier having conventional batteries 31 and 32 for the filament and plate circuits respectively. The anode 33 is connected to one terminal of the relay coil 18 and the other terminal thereof is connected to the current source 32. It is desirable to shunt a condenser 34 across the coil 18.

An incoming signal will operate the loudspeaker 23 through the medium of the radio receiver 22 and the audible components will be received in the usual manner. In the operation of the device the projector 1, Figs. 4 and 6, has a film set in readiness for projection which is provided with a predetermined arrangement of spaced indices 12. With the shaft *s* of the projector tending to rotate in a clock-wise direction through the medium of the friction clutch as heretofore explained, the apparatus may be set in readiness for op-

eration. To facilitate starting the apparatus a small portion of the beginning of the film (which, incidentally, may be used for titles, etc.) may be left without an index 12 and the film will therefore travel until the first index encounters the contacts 3 and 4 whereupon the feeding operation of the projector will abruptly cease. The projector is at this point ready for a starting impulse.

In thus using the invention the program may comprise announcements over the loudspeaker during the interval that the local projector film is exposing a stationary view or message.

At a prearranged time when it is desirable at the broadcast station to initiate operation of the remote projector 1 at the receiving end, a signal may be broadcast and it will be amplified by the receiver and passed through the filter 26 for which frequency it is designed to amplify. Thus the starting signal will operate the relay 18 which in turn will start the film.

Fig. 5 discloses an arrangement in one use of the invention in connection with a radio broadcast system in which a broadcasting studio is represented at 36. In this arrangement a complete transmitting apparatus 37 and associate microphone 38 is provided. Since the apparatus 37 and 38 may be of such design as is obvious to any mechanic skilled in the art, it is thought that a further description of such apparatus is not necessary. For further simplifying the drawing, the member indicated as 1 of Fig. 5, comprises a complete projecting apparatus as shown in Fig. 1 and is located in the studio 36. With such an arrangement the film used for the program at the various remote receivers is similar to the one in the projector 1 in the studio.

The screen of the projector in the studio, (which may be a wall thereof) and the associate microphone are disposed before the broadcasting artists, and with the starting of the studio projector as well as the numerous remote projectors under control from the broadcasting end, it is possible to initiate all projectors simultaneously by means of a switch 40 (hereinafter described) and thereafter to permit the artists to cue their vocal or other renditions by watching their local film. Thus at the various remote points the audible program is a synchrony with the visual effects.

It should be observed that all projectors are driven by phonic or otherwise synchronized motors and, therefore, once two or more identical films are initiated simultaneously they will continue to run in synchronism. Furthermore they will be caused to stop simultaneously by means of the respective indices.

The particular frequency utilized for controlling the operation of the films will be

governed by the frequency which the filter 26 is designed to pass and amplify, the frequency used in the audible effects which it is desired to reproduce by the loudspeaker 23 and by the particular means used at the broadcasting station for deriving the film-initiating pulses. For example, if the entire range of audibility of the human ear is reproducible by the loudspeaker 23 and it is undesirable to have the film-initiating pulses also heard, then said pulses may be in the neighborhood of the frequency which is just above audibility. In this instance the audio frequency amplifier of the set 22 will have to be designed to pass these higher frequencies, such as is easily accomplished in an obvious manner by resistance-coupled and other well-known amplifiers.

In another instance the filter 26 may be tuned or otherwise so designed as to pass only a predetermined frequency within the audible range in which case the loudspeaker 23 would also be responsive to said frequency. However, if audible film-initiating pulses are used, confusion between such impulses and the audible program may be guarded against inasmuch as the projectors are susceptible to the effect of starting pulses only when the film indices are in registration with the roller contacts 3 and 4.

The switch 40, Fig. 5, when closed completes the circuit between the output of an oscillator 41 and the microphone 38. The oscillator may comprise any suitable frequency generator such as, for example, a vacuum tube oscillator, a tuning fork, a buzzer, a piezo or magnetostriction oscillator, etc., it being understood that the frequency thereof should be such as to correspond to the pass frequency of the filter 26.

With further reference to Fig. 5, it will be noted that a member 43 is located within the studio and comprises any suitable sound reproducer operated by records, such as a phonograph. These records comprise the audible effects appropriate to the film or films located at the remote projectors and therefore obviate the necessity of having artists actually present at the time of the broadcast program. In this instance the switch 40, as well as the local projector 1 of the studio, are left inoperative, inasmuch as the record 44 of the phonograph 43 may contain frequency components thereon which will effect initiation of the remote projectors at the proper time. By thus interposing the starting pulse among the musical or vocal components along the record track, said starting pulses will not only permit of starting the remote films in synchronism with the local records, but will re-synchronize these moving elements at every subsequent occurrence of a starting pulse and prearranged incidental index therefor. Instead of playing the record 44 before the microphone 38 for

broadcasting the components thereon, the invention should permit of electrically connecting an electrical phonograph pickup in place of the microphone, or in series therewith, so that the vibrations produced by the record will be conducted electrically instead of acoustically into the input circuit of the broadcasting station.

It is obvious that numerous changes may be made in the details set forth and illustrated herewith without departure from the spirit and scope of the invention as defined in the claims.

We claim:

1. In a radio broadcasting system for combining audible with visual effects, a broadcasting station having means for broadcasting said audible effects, a plurality of receiving stations each having a radio receiving set for receiving said audible effects, a picture projector at each receiving station, means associated with each projector and responsive to predetermined signals received through the corresponding receiving set for controlling the operation of each projector and means at said broadcasting station for broadcasting said signals.

2. The combination set forth in claim 1; and said signals received through said receiving set being inaudible to the human ear.

3. In a radio broadcasting system for combining audible with visual effects, a broadcasting station having means for broadcasting the audible effects, a plurality of receiving stations each having a radio receiving set for receiving said audible effects, and a picture projector at each receiving station, means associated with each projector and responsive to predetermined signals received through the corresponding receiving set thereof, for controlling the operation of its respective projector, and means at said broadcasting station for broadcasting said signals.

4. In a system of the character described, a transmitting station, a receiving station, means at said transmitting station for transmitting audible components; means at said receiving station for receiving and reproducing said components and projecting means thereat for projecting visual effects appropriate to said components, means responsively operable by signals for controlling the operation of said projection means, additional means at said transmitting station for transmitting said signals, and a single signalling channel between said stations through which said audible components and said signals are transmitted.

5. In a system of the character described, a transmitting station having means thereat for transmitting audible components; a receiving station having means for receiving and reproducing said components and additional means for displaying visual effects

appropriate to said components; apparatus also at said receiving station responsively operable by signals from said transmitting station for controlling the operation of said additional means; means at said transmitting station for controlling said signals, and a single signalling channel through which said audible components and said signals are transmitted.

6. The combination as set forth in claim 5; said signals being above the frequency range of the audible components.

7. A broadcasting station having a sound record and means for broadcasting the audible effects thereof, a receiving station having a radio receiver for receiving said audible effects, a motion picture projector associated with said receiver for producing visual effects, means responsive to predetermined signals through said receiver for controlling the operation of the film of said projector, and said sound record being provided with components for also broadcasting said predetermined signals.

8. In a radio broadcasting system for combining audible effects with visual performances, the combination with a broadcasting station having means for broadcasting said audible effects, a plurality of receiving stations each having a radio receiving set for receiving said audible effects, a motion picture film projector local to each receiving set, means associated with each projector and independent of the respective receiving set for automatically stopping the film thereof, and signalling means at said broadcasting station for starting said films through said respective receiving sets.

9. A radio broadcasting system for combining audible effects with visual performances, a broadcasting station having means for broadcasting said audible effects, a plurality of receiving stations each having a radio receiving set for receiving said audible effects, a motion picture film projector local to each receiving set, indexical means associated with each projector and independent of the respective receiving set for automatically stopping the films thereof, and signalling means at said broadcasting station for starting said films through said respective receiving sets.

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