June 27, 1933. J. A. O'NEILL 1,915,613

MOTION PICTURE APPARATUS COMBINED WITH SOUND PRODUCERS

Filed March 30, 1928 3 Sheets-Sheet 1

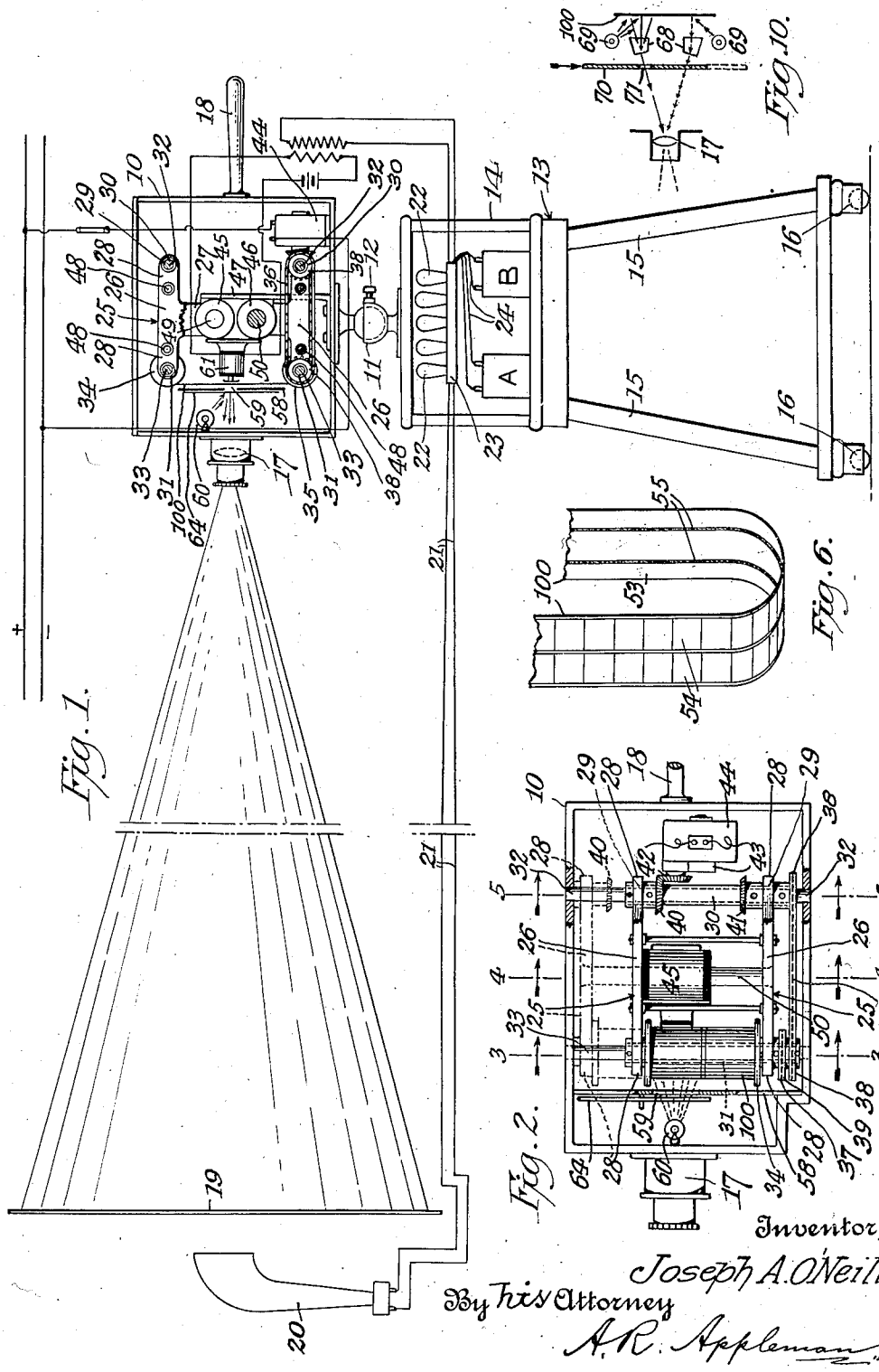


Fig. 1.

Fig. 10.

Fig. 6.

Fig. 2.

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MOTION PICTURE APPARATUS COMBINED WITH SOUND PRODUCERS

Filed March 30, 1928 3 Sheets-Sheet 2

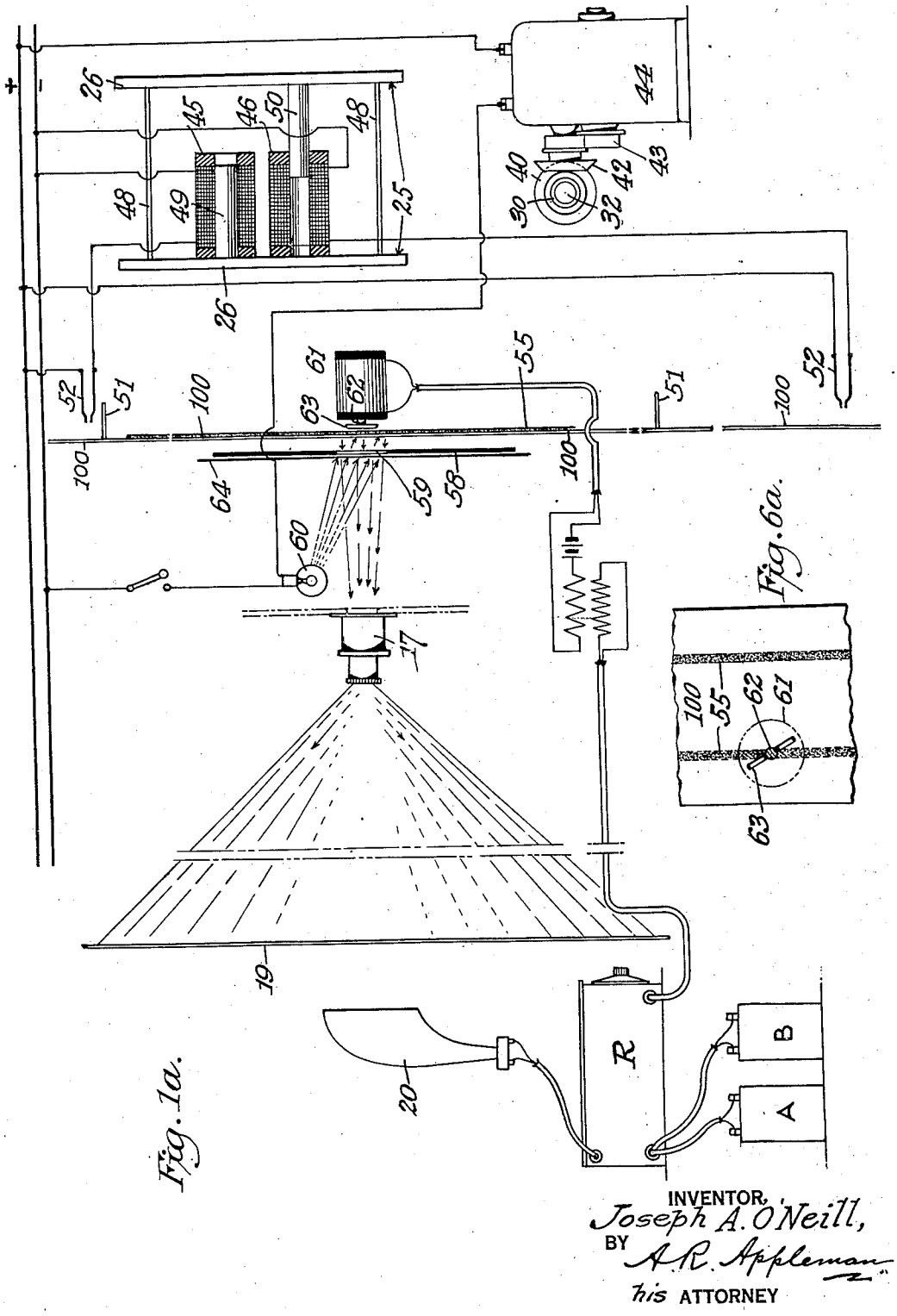


Fig. 1a.

Fig. 6a.

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MOTION PICTURE APPARATUS COMBINED WITH SOUND PRODUCERS

Filed March 30, 1928 3 Sheets-Sheet 3

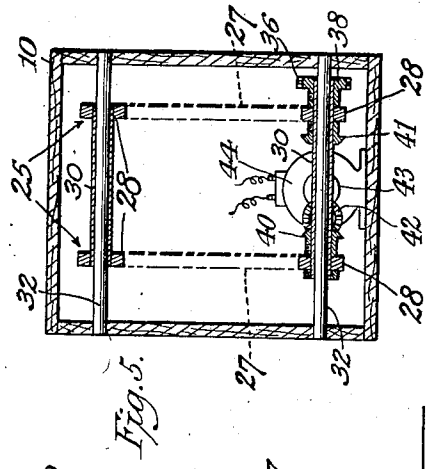


Fig. 5.

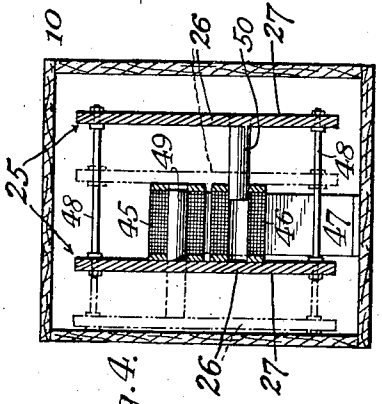


Fig. 4.

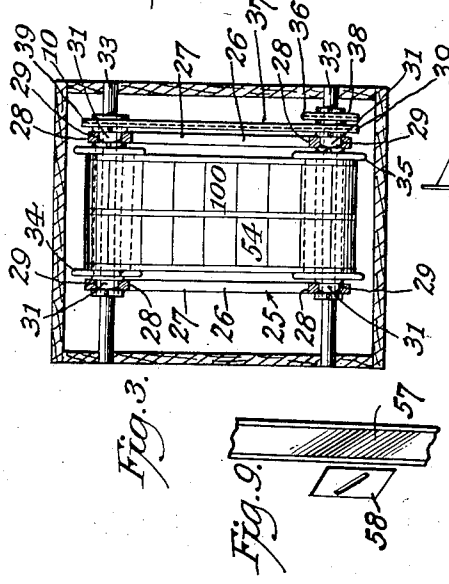


Fig. 3.

Fig. 9.

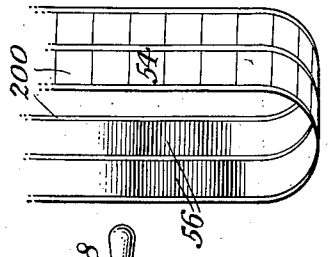


Fig. 8.

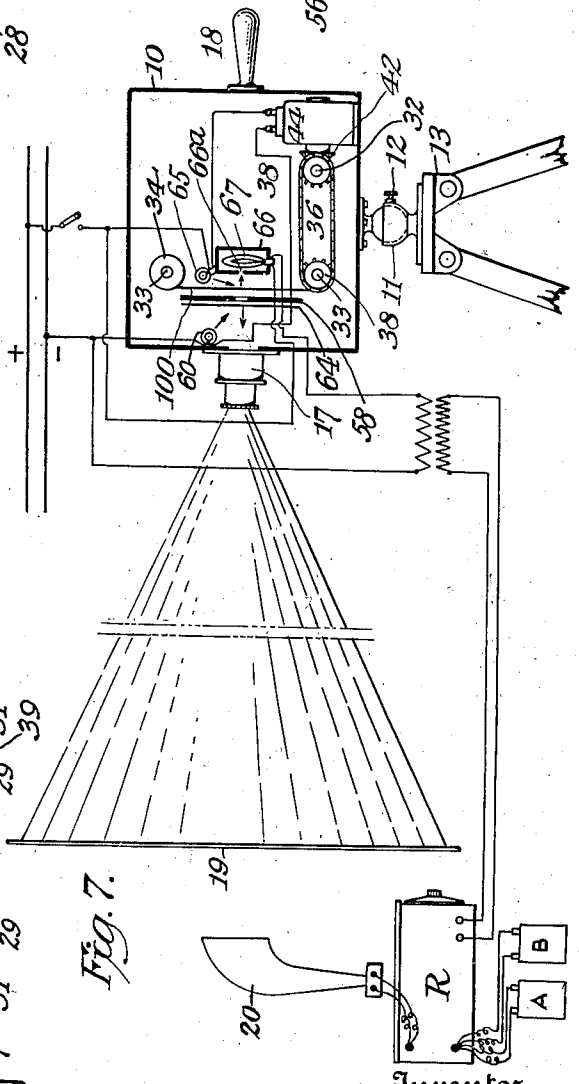


Fig. 7.

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Patented June 27, 1933 1,915,613

UNITED STATES PATENT OFFICE

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MOTION PICTURE APPARATUS COMBINED WITH SOUND PRODUCERS

Application filed March 30, 1928. Serial No. 265,917.

This invention relates to apparatus for projecting images onto a screen or the like and for translating sound tones synchronized with the movement or action of said images.

The invention contemplates providing apparatus designed to employ multi-row duplex records of a type shown and described in, and forming the subject matter of a copending application for patent, Ser. No. 265,916, filed Mar. 30, 1928, "Talking machine records". This record embodies a strip or sheet of opaque non-magnetic material provided on its front face with one, two or more longitudinal rows of moving pictures, said rows being parallel one to the other.

The other or rear face of the duplex record may carry a corresponding number of parallel trails of magnetic material, said trails being disposed on lines central with their respective rows of pictures on the face of the record, the pictures and the local polarization of their corresponding magnetic trails being in reversed sequence alternately, so that a continuous perfect sequence may be obtained when the feed is reversed in the operation of projecting and translating an entire record, as will hereinafter appear.

An object of the present invention is to provide apparatus whereby when one row of pictures and its corresponding locally polarized trail have been projected and translated respectively, devices automatically shift the multi-row duplex record laterally to bring or place the next row of pictures and its corresponding polarized trail in "focus" just prior to the operation of means for reversing the direction of feed of the said record.

The invention further contemplates the employment of one or more electric lamps at the front of the record, the rays thereof being reflected from the moving pictures to project the images through the lens of the apparatus.

The invention also embodies an electromagnetic inductive device included in a loud speaker circuit with the usual amplifying elements for translating sound tones, this device being placed back of the record with its needle positioned just over the locally polarized trail on said record.

In carrying out my invention, I may also employ double duplex records having rows of pictures on the front face and rows of printed striations on the rear face thereof.

When employing a record of the last named type, I preferably place one or more lamps at the rear thereof in a position to illuminate the said striations from which the light rays will be reflected through a narrow slit in the front wall of a box containing a photo-electric cell which will impart light controlled impulses through an appropriate loud speaker circuit to translate sound tones in synchronism with the pictures on the front face of the record.

The printed striations on the rear face of the record may extend laterally, or better still, they may extend diagonally of said record, to provide a wider light ray acting on or in the photo-electric cell which should be positioned with its longitudinal axis on the line of the light admitting slot.

Features of the invention are found in a slidable frame carrying a pair of spools on which the record may be carried, opposed solenoids to selectively shift the frame, and mechanical devices through which the spools are driven, together with motor driven gear connections, whereby the feed drive of the record is automatically reversed at the conclusion of the cross shifting movement of the said record.

A further practical form of the invention may embody a shiftable shutter plate arranged in front of a pair of appropriately positioned prisms forward of the record, said shutter plate being provided with a single opening through which light beams may be projected from the record, through one of the said prisms to the main projecting lens of the apparatus.

In order that the invention may be clearly understood and readily carried into effect the same will now be described more fully in detail, with reference to the accompanying drawings, wherein similar reference characters are employed to designate corresponding parts throughout the several views.

In the drawings:

Fig. 1 is a partial diagrammatic side ele-

vation on my improved projecting and translating apparatus constructed according to my invention.

Fig. 1*a* is a diagrammatic side elevation showing a different arrangement of some of the parts.

Fig. 2 is an enlarged plan view of the record operating and shifting mechanism, the top of the containing cabinet being removed.

Fig. 3 is a vertical cross section on the line 3—3 of Fig. 2.

Figs. 4 and 5 are vertical cross sections on the lines 4—4 and 5—5 respectively of Fig. 2.

Fig. 6 is a fragmentary perspective showing a double duplex record of the type employed in connection with the apparatus constituting my invention.

Fig. 6*a* is an enlarged view of a portion of the rear face of the record shown in Fig. 6, on which are two parallel rows or trails of locally polarized magnetic material, said view also showing a co-acting electro-magnetic needle ranging diagonally across one of the said trails, for translating sound tones therefrom.

Fig. 7 shows diagrammatically a modified form of projecting and translating apparatus, wherein a record is employed having one or a number of rows of pictures on its front face, and a corresponding number of rows of printed striations on its rear face from which light rays are reflected onto or into a photo-electric cell to translate sound tones therefrom.

Fig. 8 is a perspective detail of a record designed for use in connection with the apparatus shown in Fig. 7.

Fig. 9 is a perspective detail showing a record having striations printed diagonally of the length of the record to obtain a longer reflecting surface for the light rays.

Fig. 10 is a diagram with a movable shutter-plate in section showing a modified form of shifting means.

Referring now to the drawings in detail, the numeral 10 designates a cabinet or housing preferably mounted for universal adjustment on a ball and socket joint 11, which may be locked in a desired position by a set screw 12.

In one embodiment of the apparatus, I may employ a stand 13, supporting a box 14, to which the ball and socket joint is secured. The stand comprises legs 15 braced at the top and bottom by cross pieces and are provided with ball rollers 16, to enable the operator to move the entire apparatus as a unit, there being however, enough friction present between the ball rollers and their sockets to prevent movement of the apparatus over the floor when in operation.

The cabinet 10 carries a projecting lens 17 on its front wall, and an operating handle 18 extends backwardly from the rear wall thereof.

Spaced a suitable distance from the cabinet 10 is a screen 19, back of which is placed a loud speaker 20, connected as at 21 with the amplifiers 22 housed within the box 14 of the apparatus, said amplifiers, as shown in Fig. 1 of the drawings, being mounted on a base or outlet box 23, into which the leads 24 of the A and B batteries extend.

The amplifiers 22, as shown in Fig. 1 of the drawings, are carried with the apparatus constituting my invention, and are of course, movable therewith, but in Fig. 1*a* of the drawings, the said apparatus is connected to or plugged in an ordinary radio receiver indicated at R in said figure.

Mounted within the cabinet 10 is a frame 25, consisting of side members 26 of general I formation, each consisting of a central vertical bar 27, formed with laterally extending arms 28, the ends thereof being provided with bearings 29, to receive the ends of sleeves 30 and 31 slidable on fixed cross bars 32 and 33 extending across from side to side of the cabinet or housing 10 of the apparatus.

The lower sleeve 30, see Fig. 5, and the sleeves 31 are all slidable and rotatable on their respective bars 32 and 33, but the upper sleeve 30 is only slidable on its bar 32, and acts only as a connection between the side members 26 of the frame 25.

Fixed to the sleeves 31, carried by the forward cross bars 33 are upper and lower spools, reels or rollers 34 and 35, on which a duplex record 100 (shown in detail in Figs. 6 and 8) is carried and these spools or reels are preferably driven at the proper speed by chains 36 and 37 operating on sprockets 38 and 39 fixed to the rotatable sleeves 30 and 31.

The lower rear sleeve 30, (see best Figs. 2 and 5) carries opposed bevel gears 40 and 41, which co-operate alternately with a power bevel gear 42, driven through an appropriate connection 43, by a motor 44, to impart a uniform movement to the film.

To accomplish a quick lateral shift of the frame 25, when the record has been driven to the limit of one of its directional movements, I employ a pair of closely arranged solenoids 45 and 46, (Fig. 4) held in fixed relative positions by a bracket plate 47 rising from the floor of the cabinet or housing 10 of the apparatus.

The side members 26 of the frame 25 are permanently connected by tie bolts 48, having nuts bearing against the opposite faces of the frame members, each of which having attached thereto in fixed relation a core member 49 and 50 respectively which are adapted to co-operate with the coils of their respective solenoid to shift the frame 25 in selective opposite directions.

To automatically energize or operate a selected solenoid to quickly shift the duplex record 100 at the end of one of its runs, I may employ projecting pins or shoulder 51

carried by the said record 100 in projective relation therewith and in position to strike and close one of two normally open solenoid controlling circuit contacts or switches 52, arranged at the opposite extremes of the record runs.

The double duplex record 100 may embody a strip or sheet 53 of paper or other non-magnetic opaque material, here shown having a double row of pictures 54 on the front face thereof and a double hair line of locally polarized magnetic material on the rear face thereof, as shown at 55.

In connection with the operation of my improvements, I may employ another form of duplex record as shown at 200 in Figs. 8 and 9, in which I do not use the magnetic lines on the rear face of the record, but instead I employ printed striations 56, extending laterally of the record, or diagonally thereof as at 57, in Fig. 9.

Extending across the cabinet 10, and forwardly of the record 100, is a shutter plate 58, having a slot or opening 59 through which the rays from an electric lamp 60 project onto the pictures 54 of the record and are reflected forwardly through the main lens 17 of the apparatus.

Supported in fixed position back of the record 100 is an electro-magnetic inductive device 61, having a needle 62 provided with an elongated head 63 which is preferably positioned to extend diagonally over or across one of the locally polarized magnetic lines 55 to translate sound tones therefrom, the impulses from said device being carried through suitable circuits and amplifiers to the loud speaker 20.

In carrying out my invention, I may employ a rotary shutter 64, arranged preferably just forward of and supported by the shutter plate 58 and suitable connections (not shown) may be employed to drive said rotary shutter at the proper speed.

Another embodiment of the projecting and translating apparatus is shown in Fig. 7 of the drawings. In this form, I employ the double duplex record of pictures and striations shown in Fig. 8, and to translate sound tones from the said striations, I employ a lamp as at 65, whose rays illuminate said striations and are reflected through a slot 66*a*, in the wall of a dark-box 66.

This dark-box contains a photo-electric cell 67 which has proper circuit connections through the usual amplifiers to the loud speaker 20.

By using the term "duplex record" for the purpose of this description, I mean a record having a double row of pictures and sound tone lines, with the pictures on the front face of the record and the sound tone lines on the rear face thereof, hence duplex.

In Fig. 10 of the drawings I show another form of picture projecting means, in which I may employ a pair of prisms 68, a pair of lamps 69, a slidable shutter plate 70 having an opening 71, and the main lens 17 in combination.

The rays of the lamps 69 are reflected from the record 100 through one of the prisms 68, the opening 71 in the shutter plate 70 thence through the main projecting lens 17 as indicated by arrows; and when one row of pictures have been run, the plate 70 may be shifted to expose the opposite row of pictures, as will be understood.

It is thought that the operation and utility of the apparatus will be apparent without further description, and while in the drawings there is illustrated a preferred embodiment of the invention, it is to be understood that structural elements thereof are susceptible to such variations and modifications as fall within the scope of the invention claimed.

What I claim is:

1. Means for reproducing pictures from one face of an opaque strip-record provided for the purpose and sound tones from the opposite face thereof; in combination, an objective lens, means for imparting linear movement to the record, means for projecting a light beam upon the front face of said record at the optical axis of said lens and electro-magnetic means also on said axis for translating sound tones from the rear face of said record.

2. Means for reproducing pictures and sound tones from the respective opposite faces of an opaque strip-record provided for the purpose; in combination, an objective lens, means for driving the record, a lamp arranged in front of said record, means for restricting the light beam from said lamp to the picture space of said record at the optical axis of said lens, and an electric device also on said axis for translating sound tones from the rear face of said record.

3. Means for reproducing pictures and sound tones from the respective opposite faces of an opaque strip-record provided for the purpose; in combination, an objective lens, means for driving said record, a lamp forwardly of said record, means for restricting the light beam from said lamp to the picture space at the optical axis of said lens, means for interrupting said beam at frequent intervals, and means also on said axis for translating sound tones from the rear face of said record.

4. Means for reproducing pictures and sound from the respective opposite faces of an opaque strip-record provided for the purpose; comprising an objective lens, means for imparting a linear movement to said record, means at the front of said record for casting a beam of light on the picture space of said record at the optical axis of said lens, means at the back of said record for casting a beam of light on said record and electric means

activated by variable reflected beams for translating sound from the rear face of said record.

5. Means for reproducing pictures and sound tones from the respective opposite faces of an opaque strip-record provided for the purpose; in combination, an objective lens, means for driving the record, means for illuminating the picture space of the moving record at the optical axis of the lens so that the picture at that point is reflected through said lens for projection, means for illuminating the opposite side of said record and means for translating sound from said opposite side of said record.

6. Means for reproducing pictures and sound from the respective opposite faces of an opaque strip-record provided for the purpose; an objective lens, means for driving said record, a source of light adapted to cast a light beam on the picture side of the record at the optical axis thereof and at an angle that a picture is reflected into and projected by said lens, and an electric device arranged at the opposite face of said record for translating sound tones therefrom.

In testimony whereof I have signed my name to this specification this 17th day of March, 1928.

JOSEPH A. O'NEILL.