

Nov. 26, 1935.

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2,022,473

METHOD OF RERECORDING SOUND

Filed Aug. 27, 1931

2 Sheets-Sheet 1

Fig. 1

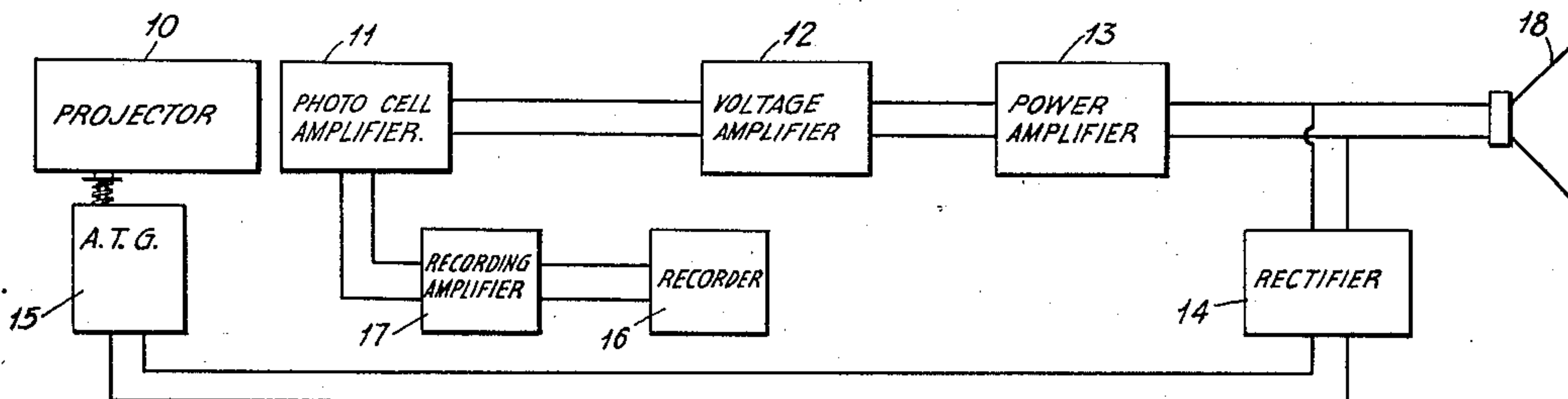


Fig. 3

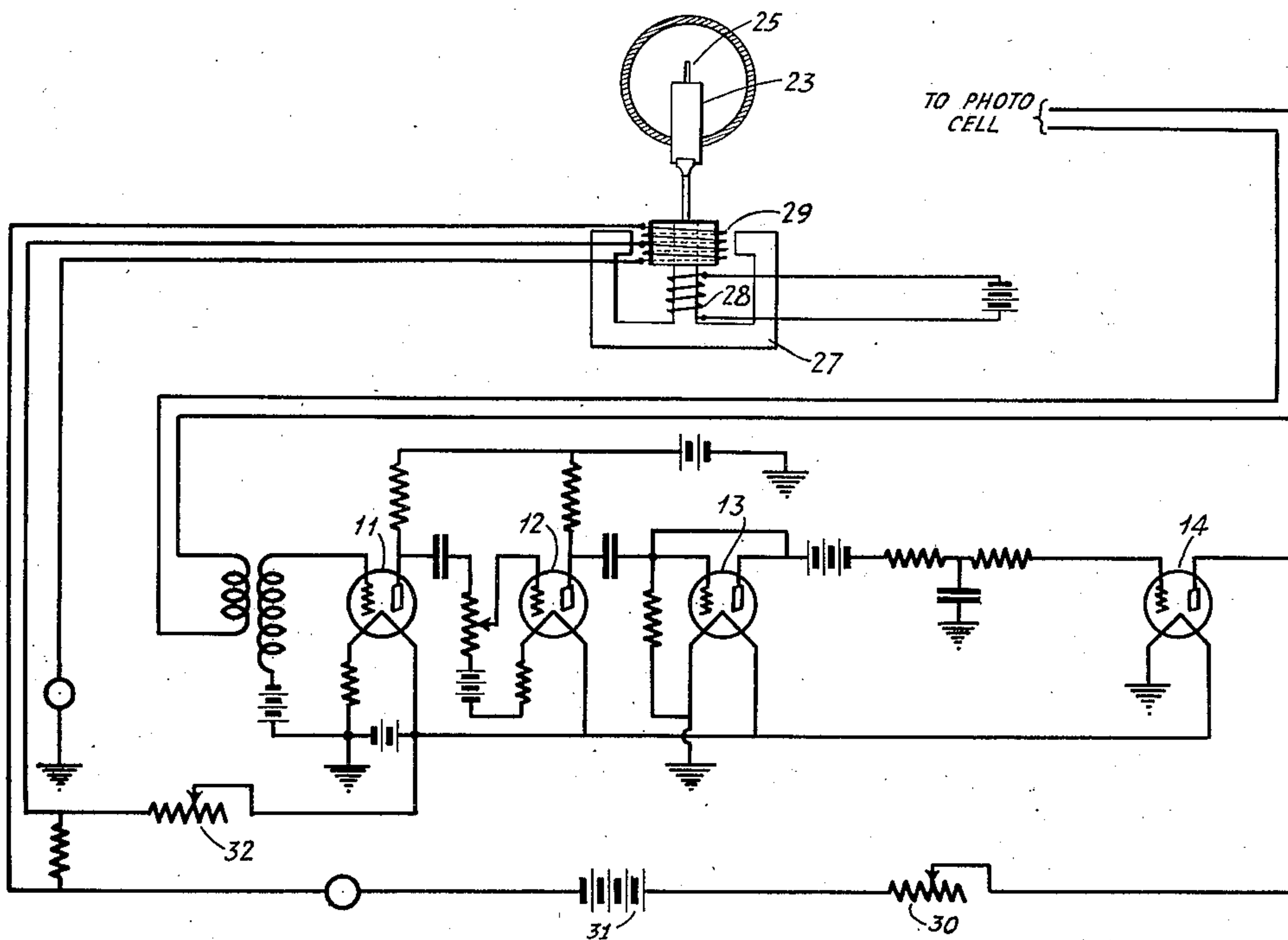
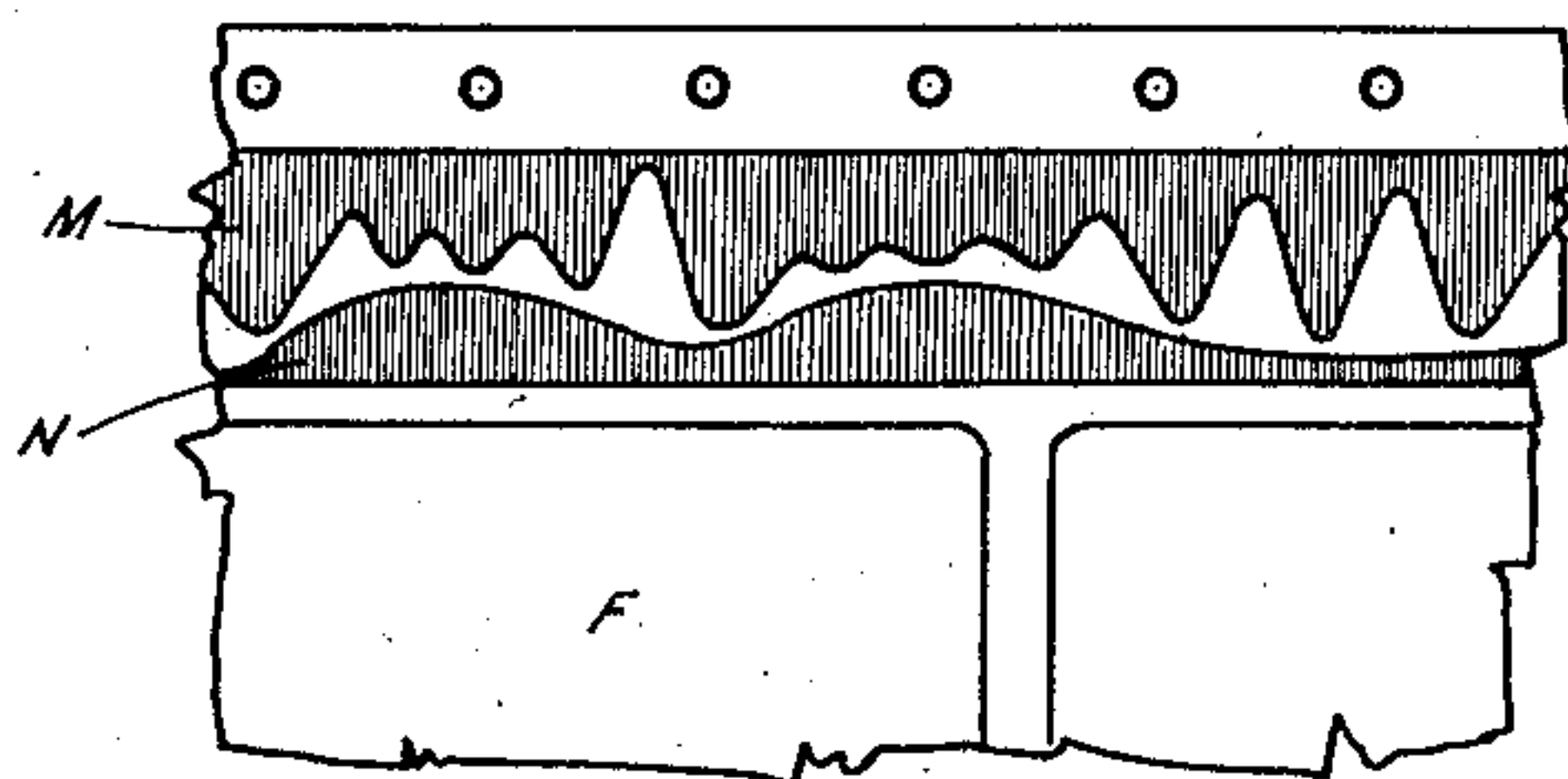


Fig. 4



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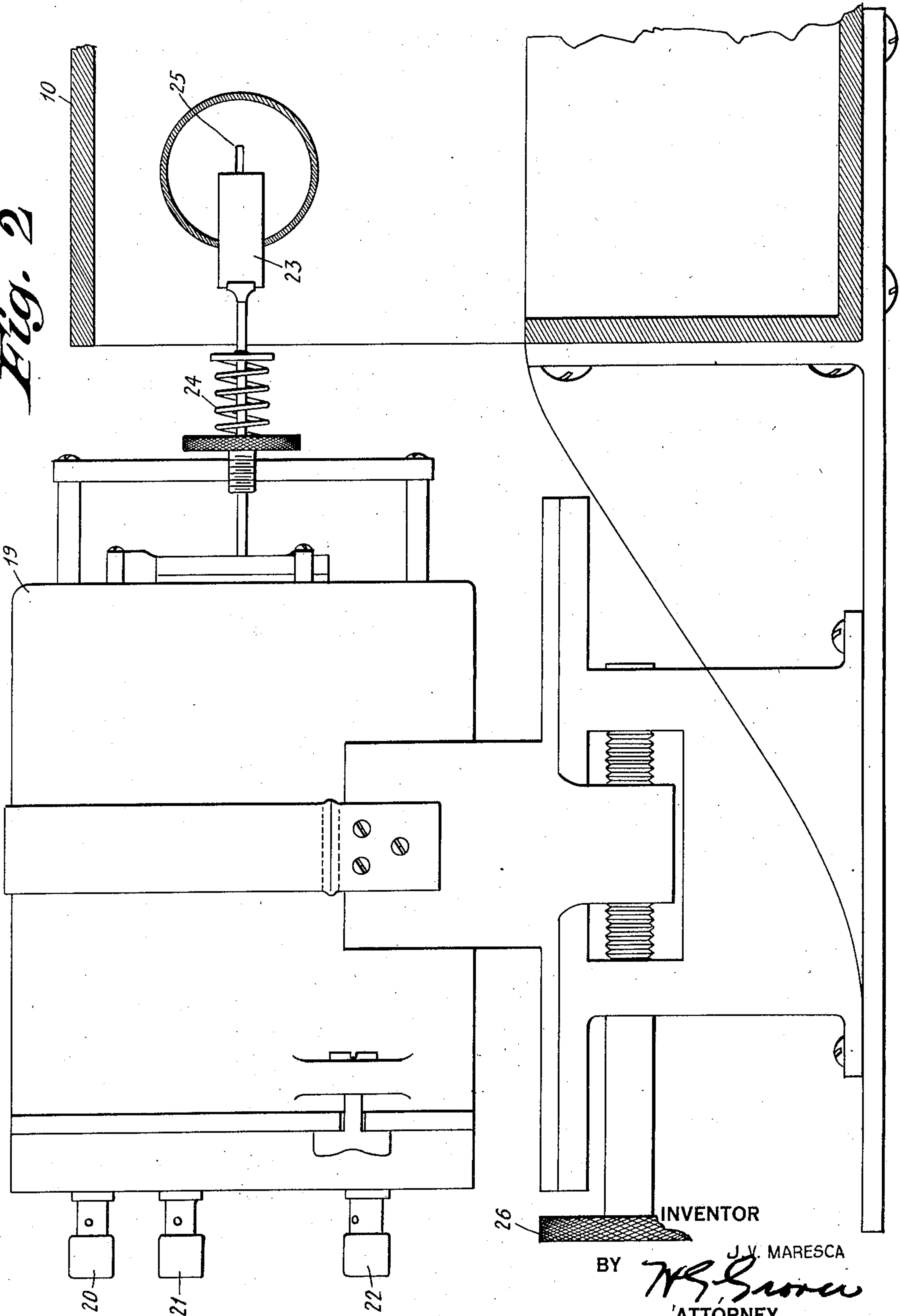
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Fig. 2



UNITED STATES PATENT OFFICE

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METHOD OF RERECORDING SOUND

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Application August 27, 1931, Serial No. 559,651

11 Claims. (Cl. 179—100.3)

This invention relates to the rerecording of sound from one sound record to another and has for its principal object the provision of an improved means and method of rerecording sound in a manner to permit the raising of the level of certain parts of the record, such as dialogue and the like.

The present invention is similar in some respects to that disclosed in a copending application of Hugh McDowell, Jr., Serial No. 494,215, filed November 8, 1930, patented April 26, 1932, Patent No. 1,855,196, and assigned to the same assignee as the present application.

In the aforesaid copending application is disclosed means whereby the greater part of the normally clear portion of the sound record is eliminated in order to permit full modulation at a given sound intensity, thus permitting the modulation to fall to its natural minimum and rise to its natural maximum without the production of objectionable ground noise.

The present invention differs from that of the copending application in that the normal sound record with its white portion unshaded, is utilized to control the operation of the rerecorder, and means are provided for shading more or less of the clear portion of the film during rerecording. This permits the level of any desired part of the sound record, such as dialogue, to be raised without undue amplification of the ground noise.

My invention will be better understood from the following description when considered in connection with the accompanying drawings, and its scope will be pointed out in the appended claims.

Referring to the drawings:

Fig. 1 is a diagrammatic illustration of a rerecording equipment wherein my invention has been embodied;

Fig. 2 illustrates a form of anti-ground noise device suitable for use in connection with the rerecording apparatus;

Fig. 3 is a wiring diagram illustrating certain features of the anti-ground noise device of Fig. 2; and,

Fig. 4 illustrates a section of the rerecorded sound track.

The apparatus illustrated by Fig. 1 includes a projector 10 of the usual type, a photo-cell amplifier 11, a voltage amplifier 12, a power amplifier 13, a rectifier 14, and an anti-ground noise device 15. From the photo-cell amplifier 11 audio current is supplied to a recorder 16 through a recording amplifier 17. For purposes of monitoring, the output circuit of the power amplifier 13 is connected to a loudspeaker 18

which is preferably of the electro-dynamic type.

The projector 10 is of any well-known type including the usual light slit and optical system. The anti-ground noise device 15 is similar in most respects to that disclosed by the aforesaid copending application.

As shown more clearly in Fig. 2, it includes the casing 19 which is adjustably mounted on the frame of the projector 10, and is provided with terminals 20, 21 and 22. It also includes a shutter or shading member 23 biased to a predetermined position by means of a spring 24, and arranged to cover a part of the light slit 25 of the projector 10. The normal position of the shutter 23 with respect to the light slit, is determined by adjustment of the thumb screw 26 which determines the distance between the casing 19 and the projector 10.

The connections of the anti-ground noise device 15 to the photo-cell of the amplifier 11, are shown in Fig. 3. It will be noted that the photo-cell is connected to the anti-ground noise device through the amplifiers 11, 12 and 13, and the rectifier 14, and that this device is provided with a core member 27 upon which are wound the field coil 28 and an audio current coil 29, the latter coil being connected to the rectifier 14 through its end terminals, and being grounded at its mid terminal.

With these connections a sound record moved through the projector 10 is utilized to modulate the light applied to the photo-cell which in turn controls the operation of the anti-ground noise device, the monitoring loudspeaker, and the various amplifiers. The light modulated current of the photo-cell is rectified by the rectifier 14, and the rectified impulses are supplied to the coil 29 through a resistor 30, a battery 31, the ground connection of the coil, and a resistor 32.

In the operation of the apparatus the shutter 23 moves in accordance with the input of the amplifier circuit, moving nearer the clear edge of the sound track to accommodate the peaks of modulation on the film, and moving farther away from this edge when the percentage of modulation is reduced. Since the vibration of the shutter 23 is in exact accordance with the direct current impulses of the rectifier 14, it therefore permits the transmission of light through the slit 25 only to the extent required to permit the peak modulation to be recorded. The type of record produced is illustrated in Fig. 4 wherein the sound record is indicated at M, and the shading due to the shutter 23 is indicated at N.

As will be apparent to those skilled in the art, 55

the present invention has the advantage that the sound level of dialogue and the like may be raised without the production of excessive ground noise, this result being due to the fact that the normally clear portion of the sound record is shaded in a manner to prevent the amplification by the amplifiers 11 and 17 of the larger part of the ground noise which would otherwise become excessive upon increase in the amount of amplification during the rerecording of sound of comparatively low intensity.

Having thus described my invention and the operation thereof, what I claim is:

1. The method of rerecording sound from a record comprising normally clear and opaque portions which includes reproducing sound impulses from said record, raising the sound impulse level during the rerecording of predetermined sections of said record, shading the normally clear portion of said sections to reduce the ground noise impulses which otherwise would have been reproduced during said reproduction from said sections, and recording said impulses.

2. The method of rerecording sound from a record comprising normally clear and opaque portions which includes reproducing audio impulses from said record, raising the sound impulse level during the rerecording of the dialogue sections of said record, shading the normally clear portion of said sections to reduce the ground noise impulses which would otherwise have been reproduced and rerecorded from said sections, and recording said audio impulses.

3. The combination of means for directing light through a phonographic record whereby it is modulated in accordance with a sound record, means for converting said modulated light into electrical impulses, means for amplifying said modulated impulses, means for recording said amplified modulated impulses, and means operated by and in accordance with said impulses varying said light in accordance with the level of the recorded sound.

4. The combination of means for directing light through a phonographic record whereby it is modulated in accordance with a sound record, means for converting said modulated light into electrical impulses, means for amplifying said modulated impulses, means for recording said amplified modulated impulses, means for rectifying said impulses, and means operated by and in accordance with said rectified impulses to vary said light in accordance with the level of the recorded sound.

5. The combination of a projector including a light slit projecting a light through a sound record whereby said light is modulated by said record, means for converting said modulated light into electrical impulses, means for amplifying said impulses, means for recording said impulses, and means in cooperative relation with said recording means and responsive to said am-

plified impulses for varying the effective length of said slit.

6. The combination of a projector including a light slit projecting a light through a sound record whereby said light is modulated by said record, means for converting said modulated light into electrical impulses, means for amplifying said impulses, means for recording said impulses, and means in cooperative relation with said recording means and arranged to vary the effective length of said slit in accordance with the level of said impulses.

7. The method of re-recording sound from a record comprising normally clear and opaque portions which includes reproducing sound impulses from said record, shading the normally clear portions of said record to reduce the ground noise impulses otherwise reproduced from said sections, recording said reproduced impulses and shading the portions of the record so produced in accordance with the sound recorded thereon.

8. The method of re-recording sound from a record comprising normally clear and opaque portions which includes passing light through said record, producing amplified electrical impulses in accordance with the light passed by said record, rectifying said impulses, shading the clear portion of said record in accordance with said rectified impulses to reduce the ground noise impulses otherwise reproduced from said sound record, recording said reproduced impulses, and shading the normally clear portion of the record of said reproduced impulses.

9. Apparatus of the class described comprising a photoelectric sound reproducer, means in said reproducer for masking the clear portions of a sound record reproduced therein, means for amplifying impulses from said reproducer, means for photographically recording the amplified impulses, and means for masking the portion of the soundtrack not occupied by said recorded impulses.

10. The method of making sound records comprising electrically reproducing a sound record from an ordinary soundtrack not of the anti-ground noise type, amplifying the reproduced impulses to an appropriate level, utilizing said impulses to produce shading of the clear part of the sound record which is being reproduced to prevent the pick-up of ground noise therefrom, recording the reproduced impulses, and shading the record so as to produce a record of the anti-ground noise type.

11. Apparatus of the class described including means for reproducing sound impulses from a photographic sound record, means for shading the normally clear portions of said record to reduce the ground noise impulses otherwise reproduced from said portions, means for recording said reproduced impulses, and means for shading the portions of the record produced in accordance with the sound recorded thereon.

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