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LIGHT VALVE

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FIG. 1

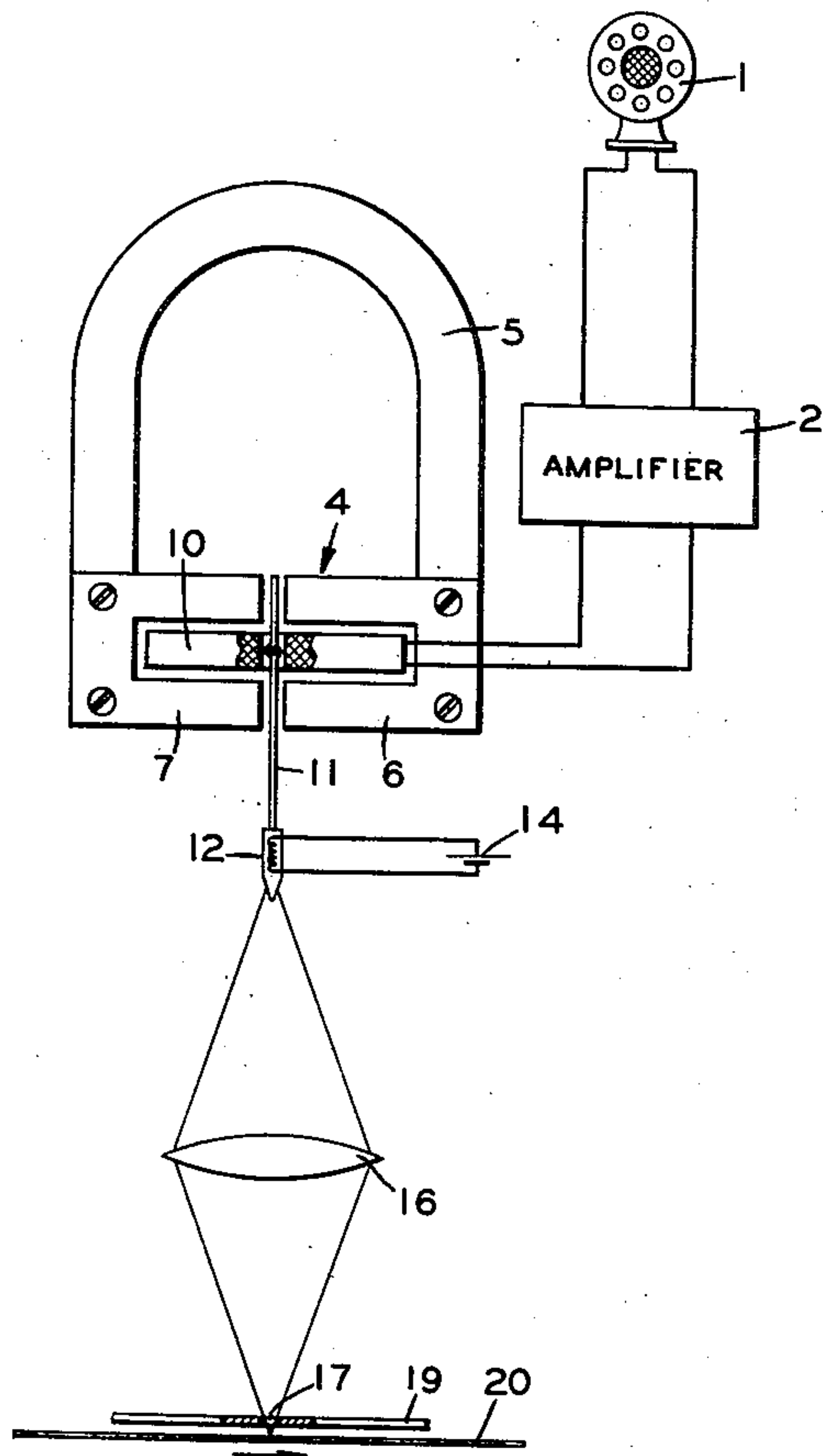
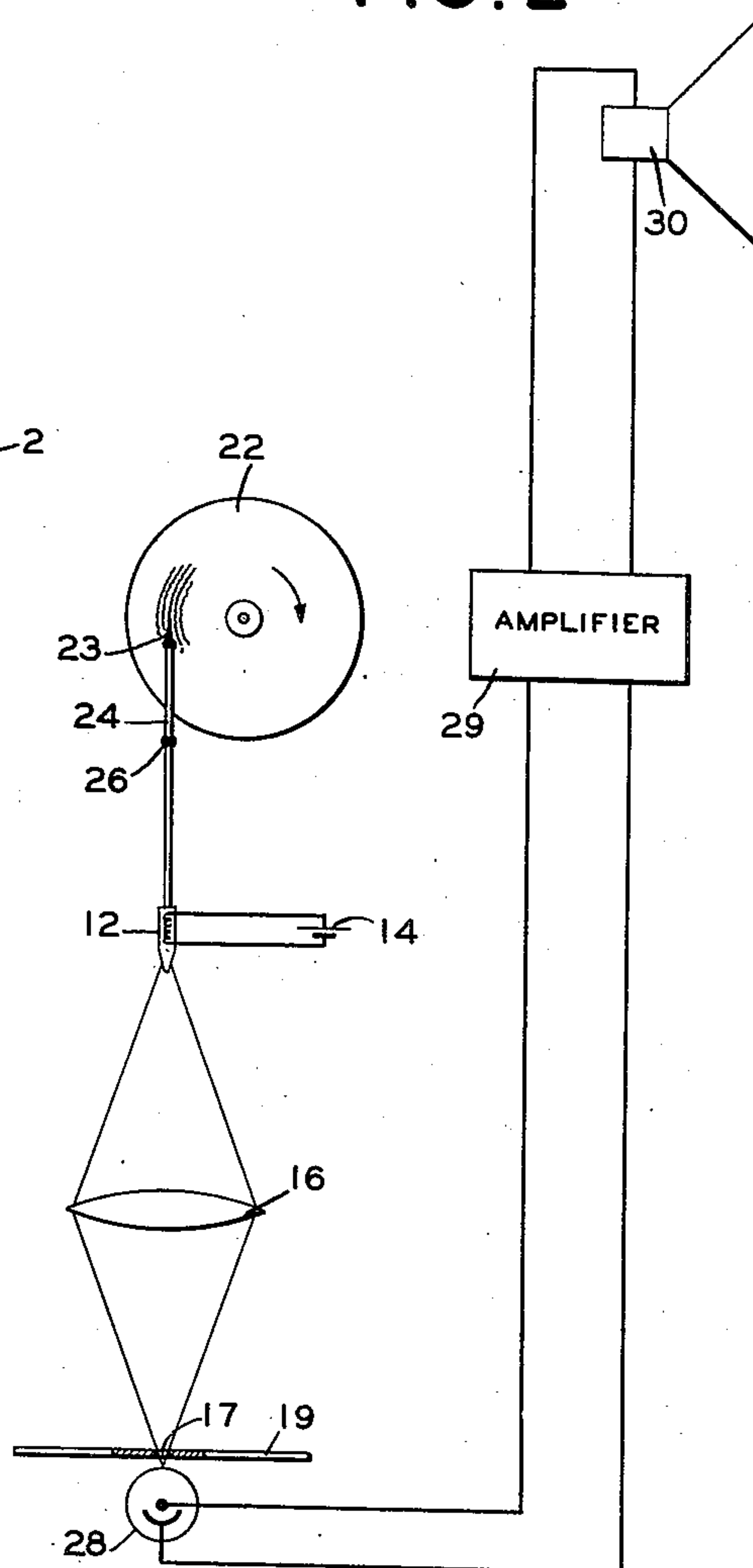


FIG. 2



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LIGHT VALVE

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2 Claims. (Cl. 179—100.4)

This invention pertains generally to electro-optical signaling systems and more particularly to electrically operated optical devices for use in connection with sound recording and reproducing systems.

The common types of sound recording and reproducing systems include a variable beam of light created either by means of a source of light, the intensity of which varies in accordance with electrical current variations, or by means of a light valve which acts directly on a beam of unmodulated light under the control of variable electrical currents. These devices are commonly used in connection with microphone or loud speaker circuits for converting sound energy into permanent records on light sensitive film or for converting the recorded sound into electrical current variations in a loud speaker circuit. Difficulties have been encountered in the use of variable intensity light sources for the reason that such sources do not faithfully convert electrical variations into light variations either because of a mechanical weakness or because of inherent characteristics which make it impossible to obtain modulated light including a sufficient range of frequencies to provide faithful sound reproduction. Light valves present somewhat similar difficulties because of electrical and mechanical limitations.

Accordingly, the principal object of this invention is to provide a means for varying the intensity of a beam of light and eliminating the previous mechanical and electrical limitations inherent in light modulating apparatus.

A further object of this invention is to eliminate the necessity of utilizing a means for directly varying the intensity of a beam of light.

Still another object of this invention is to provide a device capable of creating a variable beam of light for use in sound recording and reproducing systems.

Further objects and advantages of this invention will be apparent after consideration of the following description taken in connection with the accompanying drawing, wherein:

Fig. 1 is a diagrammatic illustration of a sound recording system embodying the invention; and

Fig. 2 is a diagrammatic illustration of the invention as it is embodied in a sound reproducing system.

Fig. 1 of the drawing illustrates a sound recording system comprising a microphone 1 which may be of any well-known form for converting sound energy into electrical energy, together with a suitable amplifier 2 connected for amplifying the

electric currents which represent the aforementioned sound energy. An electromagnetic motor device 4 is connected in the output of the amplifier 2 and as shown includes a permanent magnet 5, pole pieces 6 and 7, actuating coil 10 and vibratable armature 11. It is not necessary that the particular form of electromagnetic motor illustrated in the drawing be used in a system of this nature, as any form of motor, such as those utilized for actuating loudspeakers or mechanical recorders, may be used in its stead.

An important feature of this invention resides in the provision of a very small light source 12 attached in any suitable manner to be vibrated by the armature 11. Light source 12 is as light in weight as possible and preferably has a mass of, and is of the type and size utilized in, exploratory devices such as those used for investigating the interior of the human body whereby the load imposed on armature 11 is negligible. The light source 12 may be energized by any suitable form of source of electrical energy 14.

The optical system includes whatever lenses are required, such as lens 16, and the light slit 17 in screen 19. The light entering the slit 17 is brought to a focus on light sensitive film 20 or other recording medium and the width of slit 17 is so chosen that it equals the thickness of the light beam at said slit so that movement of source 12 causes varying amounts of said beam to impinge on screen 19 at the edge of slit 17 whereby varying amounts of light pass through it.

Sound energy impinging on the microphone 1 is converted into electrical currents of amplitudes corresponding to said sound energy which are amplified in the amplifier 2 and fed through coil 10 of electromagnetic motor 4. The reaction between the flux crossing the air gap between pole pieces 6 and 7 under the influence of the permanent magnet 5 and the electromagnetic field generated by sound currents flowing in coil 10 causes armature 11 and light source 12 to vibrate back and forth in the horizontal plane of the motor 4. Thus, the beam of light emanating from source 12 and concentrated by lens 16 is increased and decreased as it vibrates and is intercepted in varying amounts at slit 17, whereby the quantity of light impinging on film 20 is increased and decreased in accordance with the sound energy impinging on microphone 1. From the above description it is evident that light variations are recorded on film 20 without the use of a variable light source or a light valve.

Fig. 2 illustrates an electrical sound reproducing

ing system embodying this invention and comprising the record 22 which may be of any suitable form so long as it includes a sound track of physical proportions representing sound energy. Needle 23 is associated with record 22 in such relation that it is vibrated in accordance with the sound vibrations recorded on the record. Needle 23 may be supported in any suitable fashion by means of pivoted arm 24 whereby the sound track causes it to vibrate about the pivot point 26. Here again the light source 12 is supported on the end of arm 24 to be vibrated in accordance with the recorded sound. Light emanating from source 12 is concentrated into a beam by lens 16 and focused through slit 17 in screen 19. Here again slit 17 passes varying amounts of light, depending on the position at any moment of source 12. The light beam falls at its focus on the electrode of photoelectric cell 28 which converts the light variations into variable electric currents. These currents are amplified in amplifier 29 and fed through loudspeaker 30 which converts the electrical energy into sound energy.

It will be obvious to those skilled in the art that this invention is not limited to use in the particular apparatus illustrated in this application. The idea of vibrating a source of light in accordance with electric currents which represent some form of intelligence is applicable to any form of system adapted to provide mechanical vibration corresponding to any type of electrical signals. For instance, this application is applicable to facsimile signaling systems wherein either information or pictures are transmitted.

Modifications of this invention other than those

illustrated herein will be readily apparent to persons of ordinary skill in the art, and therefore it is desired that this invention shall be limited only as required by the prior art and the appended claims.

I claim:

1. In a sound recording system, a source of sound modulated electrical current, electromagnetic means connected to said source comprising a vibratory member, the mechanical vibrations of which vary in amplitude in proportion to the amplitude variations of said current, a primary source of light vibrated by said vibratory member, a light sensitive recording medium, an optical system for focusing light from said light source on said recording medium, and a screen having a slit therein, said slit being dimensioned to normally pass said focused light and to interrupt an amount of light in said beam in proportion to the amplitude of vibration thereof.

2. In a signaling system, a vibratory member, means for vibrating said member in such fashion that the mechanical vibrations thereof vary in amplitude in proportion to the vibrating force of said means, a primary source of light attached directly to and vibrated by said vibratory member, a light sensitive medium, an optical system in fixed position between said vibratory member and said medium for focusing light from said source on said medium, and a screen having a slit therein, said slit being dimensioned to normally pass said focused light beam and to interrupt an amount of light in said beam in proportion to the amplitude of vibration thereof.

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