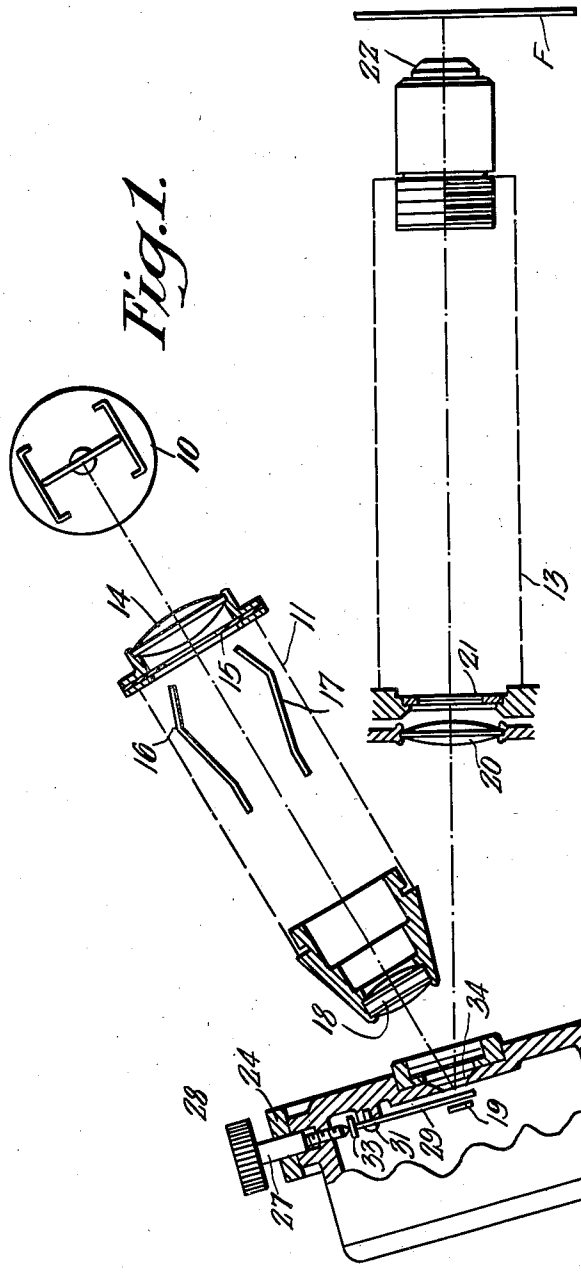
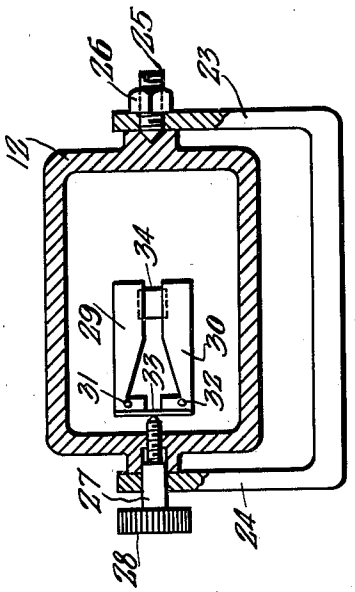
Dec. 2, 1941. G. L. DIMMICK 2,265,103

SOUND RECORDING

Filed June 29, 1939





Inventor

Glenn L. Dimmick

By

Attorney

Patented Dec. 2, 1941

2,265,103

UNITED STATES PATENT OFFICE

2,265,103

SOUND RECORDING

Glenn L. Dimmick, Haddonfield, N. J., assignor to Radio Corporation of America, a corporation of Delaware

Application June 29, 1939, Serial No. 281,819

6 Claims. (Cl. 179—100.3)

This invention relates to sound recording and more particularly to the photographic recording of sound on film. In recording sound on film it occasionally is desirable to produce an extremely wide sound record in which case a recording light of unusually high intensity must be used. Likewise, in recording sound on very slow fine-grained film it is sometimes desirable to use a recording light of high intensity. One type of lamp which is available for the purpose and which is quite satisfactory is what is known commercially as a high pressure mercury vapor lamp.

In the older mercury vapor lamps, the mercury vapor was operated at a relatively low pressure and the light produced had a comparatively low intrinsic brilliancy. In a type of mercury lamp now available, the mercury vapor is operated at a relatively high pressure and the light produced has a correspondingly high intrinsic brilliancy. In the operation of such lamps there are difficulties encountered due to their peculiar thermal characteristics. When the lamp is first turned on it takes a considerable time until it reaches equilibrium and the light remains of constant brilliancy. If the current through the lamp is changed it again takes several minutes for the lamp to reach a steady condition and the brightness of the light which will result can not be directly determined at the time the current is changed. For these reasons, it is unsatisfactory to control the brightness of the recording lamp in the manner customary for incandescent lamps where the brightness is controlled by a series resistance.

In the use of these mercury vapor lamps, I find it quite satisfactory to bring the lamp to equilibrium at a brightness slightly greater than that necessary in the recording and to then optically control the amount of light transmitted through the optical system so as to provide the proper light intensity at the film. This light control may be accomplished in any desired manner but I prefer to accomplish the result by a pair of shutters located immediately in front of the galvanometer mirror in the recording system.

One object of the invention is to provide an improved sound recording optical system.

Another object of the invention is to provide an improved apparatus for controlling the intensity of the sound recording light.

Another object of the invention is to provide an improved type of diaphragm for controlling the light intensity in sound recording systems.

Other and incidental objects of the invention will be apparent to those skilled in the art from a reading of the following specification and inspection of the accompanying drawing in which

Figure 1 is a top view partly in section of a recording optical system illustrating the invention, and

Figure 2 is a section taken on the line 2—2 of Fig. 1 and looking in the direction indicated by the arrows.

Referring first to Fig. 1, the high pressure mercury vapor lamp is indicated generally at 10. Light from this lamp passes through the optical barrel 11 to the galvanometer 12 where it is reflected by the mirror 19 and passes through the second optical barrel 13 to the film F.

The first optical barrel is provided with a condenser lens 14 which converges the light through an appropriately shaped aperture 15 adjacent which are located the ground noise reduction shutters 16 and 17 and the light then passes through the lenses 18 which direct it upon the galvanometer mirror 19. The mirror 19 is vibrated about an axis in the plane of the paper in accordance with the sound waves to be recorded and directs the vibrated beam through the lens 20 to the slit plate 21 which is provided with a narrow slit in the plane of the paper. Light passing through the slit 21 is focused by the objective lens 22 upon the film F in the form of a narrow line. This objective lens may be made as described and claimed in my concurrently filed application entitled "Sound recording optical system," identified as RCV Docket No. 6889, which discloses in detail an objective lens particularly adapted for the making of wide sound records.

The galvanometer 12 is provided with a pair of shutters 29 and 30 arranged in front of the mirror 19 and within the galvanometer casing. In order to decrease the light intensity these shutters are moved toward each other across the galvanometer mirror and thus serve as a diaphragm. In the optical system just described the light source 10 is imaged upon the galvanometer mirror 19, the aperture 15 is imaged by the lenses 18 and 20 upon the slit plate 21 and the galvanometer mirror 19 is imaged by the lens 20 at the entrance pupil of the objective 22 which has the slit plate 21 and the film F at its conjugate foci. Due to this arrangement the shutters 29 and 30 are located at an aperture stop of the optical system in relation to the image formed upon the film F and therefore movement of these shutters produces a change in in-

tensity without any change in position or dimensions of the image upon the film.

The shutters 29 and 30 are controlled as follows: The galvanometer is carried in a pair of supports 23 and 24. One of these supports carries an appropriate screw 25 which serves as a pivot for the galvanometer and which is locked in position by an appropriate lock nut 26. Coaxial with the screw 25 there is provided a second screw 27 which also serves as a pivot for the galvanometer. This screw 27, however, moves freely in the support 24 and is threaded into the casing of the galvanometer 12. It will be apparent that due to the sliding relation of the screw 27 to the support 24 it may be moved in and out without affecting the support of the galvanometer. The end of this screw 27 bears against a spring 33 which is attached to the shutters 29 and 30. These shutters are pivoted to the galvanometer casing at 31 and 32. When the screw 27 is turned by the knurled head 28 it moves the middle of the spring 33 in or out and causes corresponding movement of the shutters 29 and 30 about their pivots thereby causing the shutters to obscure more or less of the area of the mirror 19 or, as shown in Fig. 2, more or less of the galvanometer window 34.

It will be apparent that my invention is not limited to the use of a specific shutter arrangement shown but that I may use other appropriate diaphragm means which may be located either adjacent the galvanometer mirror or at any other point in the optical system which serves as an aperture stop of the system in relation to the image on the film F. For example, the diaphragm might be located adjacent the entrance pupil of the objective 22 where the image of the mirror 19 is formed or even adjacent the lamp 10. The light control device is preferably located at some point in the optical system between the light source and the place where the light beam is examined for intensity. The measurement of the intensity of the light may be accomplished by an appropriate exposure meter and a movable mirror in the manner described, for example, in Zimmerman application Serial No. 248,250, filed December 29, 1938.

The apparatus of the present application is an improvement on that described and claimed in the application of E. W. Kellogg, Serial No. 280,960, filed June 24, 1939; and is also related to the subject matter of the application of L. T. Sachtleben, Serial No. 281,951, filed June 29, 1939.

I claim as my invention:

1. In combination, a light source, lens means focusing light from said source upon a galvanometer mirror, further lens means directing light reflected from said mirror in the form of a fine line upon a film, and light intensity control means located adjacent said galvanometer mirror.

2. In combination, a light source, lens means focusing light from said source upon a galvanometer mirror, further lens means directing light reflected from said mirror in the form of a fine line upon a film, and an adjustable diaphragm located adjacent said galvanometer mirror.

3. In combination, a light source, lens means focusing light from said source upon a galvanometer mirror, further lens means directing light reflected from said mirror in the form of a fine line upon a record strip, and an adjustable diaphragm located adjacent said galvanometer mirror, said diaphragm including a pair of adjustable blades moved across the said mirror on opposite sides.

4. In combination, a high pressure mercury vapor lamp, lens means focusing light from said lamp upon a galvanometer mirror, further lens means directing light reflected from said mirror in the form of a fine line upon a film, and light intensity control means located adjacent said galvanometer mirror.

5. In combination, a high pressure mercury vapor lamp, lens means focusing light from said lamp upon a galvanometer mirror, further lens means directing light reflected from said mirror in the form of a fine line upon a film, and an adjustable diaphragm located adjacent said galvanometer mirror.

6. In combination, a high pressure mercury vapor lamp, lens means focusing light from said lamp upon a galvanometer mirror, further lens means directing light reflected from said mirror in the form af a fine line upon a record strip, and an adjustable diaphragm located adjacent said galvanometer mirror, said diaphragm including a pair of adjustable blades moved across the said mirror on opposite sides.

GLENN L. DIMMICK.