

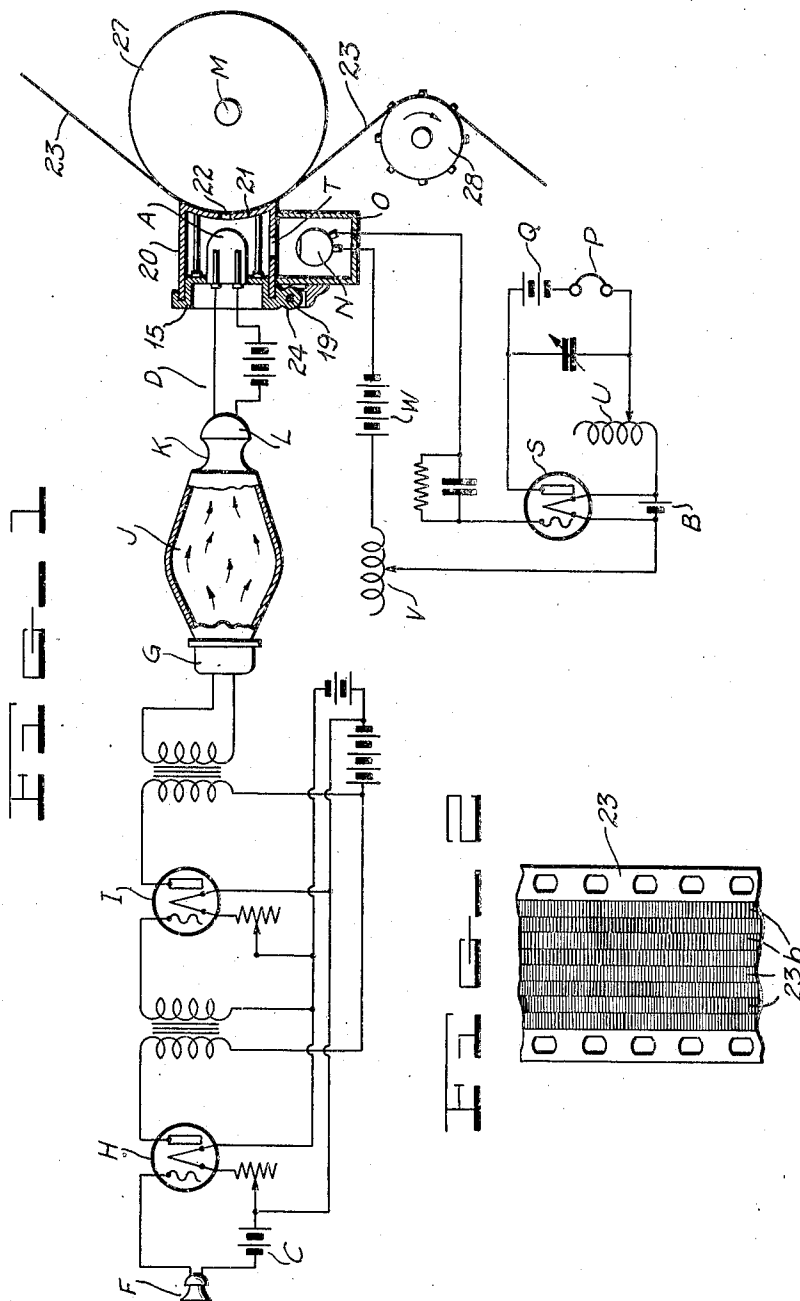
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PHOTOGRAPHIC RECORDING AND SOUND REPRODUCING SYSTEM

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PHOTOGRAPHIC RECORDING AND SOUND
REPRODUCING SYSTEM

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20 Claims. (Cl. 179—100.3)

This invention relates broadly to combined sound and motion picture systems and so-called "Entertainers", and more particularly to apparatus used in conjunction with the making of photographic records of sound.

This application is a division of my pending application, Serial No. 643,154, filed June 4, 1923.

One of the objects of this invention is to provide a sound recording camera arranged in co-operative relation to means for causing sounds to produce varying electrical impulses in an electric circuit which in turn cause varying intensities of light for affecting a sensitized film.

Another object of this invention is to provide a construction of sound recording apparatus with means for minimizing the tension on the film while it is being rotatively moved past a light aperture.

Another object of the invention is to provide apparatus including a recording lamp and either an optical system or an apertured shield therefor past which a film may be continuously moved during the sound recording operation and in which said lamp or the shield through the aperture of which its rays are projected may be adjusted across the width of the film so that multiple rows of sound tracks may be successively formed side by side, thus providing for a maximum length of the record of the sound waves arranged in longitudinal row formation upon a minimum length of film.

A still further object of this invention is to provide a sound translating circuit co-acting with the sound recording lamp and including a light sensitive cell whereby the sound may be reproduced simultaneously with the recording thereof.

With these and other objects in view the invention resides in a certain novel construction, combination and arrangement of parts as hereinafter more fully described and particularly defined in the appended claims, and as illustrated in the accompanying drawing in which:

Fig. 1 is a diagrammatic view of my invention illustrating a sound recording apparatus; and

Fig. 2 is a view of a portion of the sound recording film.

In Fig. 1, reference letter C designates the sound transmitting telephone circuit. D represents the sound receiving circuit and E designates an auxiliary sound receiving circuit. The circuit C includes a microphone F and electron

tubes H and I constituting an audio frequency amplifier. A telephone G is arranged in the output circuit of the audio frequency amplifier and is acoustically coupled to a chamber J opening to the mouthpiece K of the microphone L of the first sound receiving circuit D.

The sound receiving circuit D includes a lamp A which is preferably gas-filled and constitutes part of a sound camera 15 which is mounted on a horizontal slide 19 at one end of a tube or container 20, the opposite end of the container being associated with a coating plate 21 in which is located a very narrow lateral slit 22 in relation to the film over which a sensitized film 23 is pressed by a roller 27 arranged to move.

By using the sound reproducer G, the microphone K and the inter-connecting acoustic chamber J, the sound currents in circuit C are clearly amplified in circuit D. Under certain circumstances, however, it may be preferable to combine the circuits C and D as one electrical network, thereby eliminating the use of the telephone G, the acoustical coupling means J and the microphone L.

In order that the attendant or operator of the camera may hear the sounds as the same are produced or during the acts of photographing objects in motion and the recording of such sounds, I provide the circuit E including a light reactive cell N arranged in a housing O supported by the container 20 and communicated therewith through a light opening T by the sound recording lamp A. The cell N is arranged in series with the input circuit of the electron tube S and with battery W. The filament electrode of the electron tube S is heated from battery B and there is arranged in the input circuit the inductance V and in the output circuit the inductance U. The output circuit includes high potential source Q and the telephones P'.

By this arrangement the microphone F is positioned within the range of the performer and the sound amplified through audio frequency amplifier constituted by tubes H and I, and delivered by the telephone G to the chamber J from which the sounds pass to the microphone L in the first sound receiving circuit. The intensity of the light at the lamp A varies with the telephonic current in the circuit D so that the telephonic current is photographically recorded upon the film 23 as it is pulled over the drum 27 by the sprocket 28. In order to check the process of recording on the film, the circuit E is actuated simultaneously with the

recording process and any number of branch telephone circuits may extend from this point to headsets P' enabling the camera operator to keep close check upon the recording process.

5 Without the arrangement of my invention, the sound might never be recorded upon the film, as the recording apparatus might be entirely inactive. Large portions of the film might pass the slot 22 without any action from the recording lamp A but with the checking circuit arranged in accordance with my invention, close observation may be made upon the system at all times.

It will be understood that light in the gas filled lamp A is generated by the telephonic electric current passing through the gas therein and that the intensity of the light depends entirely upon the intensity of the electric current in the respective circuits C and D. Incident to the foregoing, the light produced by the lamp A fluctuates in accordance with the telephonic current pulsations, initially induced in the microphone F and amplifier as aforesaid.

By means of the constructional arrangement of the aforesaid camera 20 a very long sound record on a film strip of minimum length is rendered possible. It also enables me to arrange the sound record film in endless loop formation and to successively expose separated lengths of the film both in the recording process or the reproducing process and the construction of said film and its association with the camera 20 enables me to record sound in intended synchronism with the process of photographing pictures of objects in motion. In cases where a sound record is formed directly on the picture film, it is sometimes difficult to obtain a sound record which consistently harmonizes or mates with the pictures of said object in motion. In other words, the pictures photographed on the film may in the developing operation turn out in a very satisfactory or excellent manner and the sound record in a very unsatisfactory manner. This necessitates retaking the picture and again recording a new sound record therefor, and at great cost and loss of time. In my sound record film, as shown in Fig. 2, I can make photographic impressions of telephonic sound waves in row formation side by side upon the film and cause similar records to be arranged side by side upon the film and thereby permit one to choose such record portion of the film which may best match with pictures taken on a separate film such as usually employed in motion picture apparatus.

It will be noted that in the preferred arrangement of this invention the film 23 is moved past the aperture 22 by being flexed over the curved peripheral surface of the rotary drum 27. The rear wall 21 of the lamp container 20 is made arcuate with reference to the center of rotation M of the drum 27. This structure provides a curved support for the film which is an improvement upon gates having straight walls between which the film must be drawn. The advantage of the curved support is that it causes the film to be flexed so as to remove any tendencies of the film to warp. Thus the rays of light impinge upon the emulsion of the film more uniformly. Then, too, by the use of the rotary platen behind the light slit less tension is required longitudinally of the film itself in order to precisely maintain the distance between the film and the light source.

It will be further noted that the lamp container 20 may be mounted upon a rod 19 upon

which it may be slideably positioned. Alternatively, the rod 19 may be threaded to co-act with the internally threaded lug 24 so that in the option of the operator, the container 20 with the recording lamp A and the aperture 22 may be moved transversely of the film 23 to permit the formation on the film of multiple rows of sound tracks. In case the rod is threaded, it would be an obvious expedient to provide the same with a knurled knob for manually screwing it in either direction. If the rod is not threaded, any suitable and well known means may be employed for the purpose of positively maintaining the lamp holder in the transverse position to which it may be adjusted. Such means may, for example, consist of the frictional relation between the slide rod 19 and the member which it supports.

The sound tracks as formed upon the film are preferably in parallel with the edges of the film and they may be in accordance with any one of several systems of progressive exposure. For example, the record may be continuous from one row to the next, starting all the rows at one end of the film. Again, the film motion may be reversed so that adjacent rows are run in opposite directions. Still another system is to join the two ends of the film together in such manner that the two outer rows become continuous, the next-to-the-outer rows become continuous, and so forth. Thus, each continuous run of the film may be of twice the original length of the film itself. A film with eight sound tracks across its width, therefore, may be completely exposed with only three interruptions to adjust the camera 20 transversely with respect to the film.

While I have described my invention in its preferred embodiment, I desire that it be understood that modifications may be made and that no limitations upon the invention are intended other than are imposed by the scope of the appended claims.

I claim:

1. In combination with a sound recording camera having a sensitive film arranged to be advanced therein, a light valve unit arranged to photographically impress a sound record onto a sound track formed longitudinally of the film, means including a photo-cell supported by the camera for monitoring the sound recording operation, and means to permit a selective movement of the unit transversely with respect to the movement of the film for producing parallel sound tracks in any desired sequence, said monitoring means being positioned and arranged for operation in the recording of said several parallel sound tracks.

2. In combination with a sound recording camera having a sensitive film arranged to be advanced therein, of a light valve unit arranged to photographically impress a sound record onto a sound track formed longitudinally of the film, means for selectively transversely positioning the unit with respect to the longitudinal movement of the film whereby the sound track may be formed at optionally determined transverse locations on the film.

3. In combination with a sound recording camera having a sensitive film arranged to be advanced therein, of a light valve unit arranged to photographically impress a sound record onto a sound track formed longitudinally of the film, means for slidably supporting the unit whereby it may be moved transversely with respect to the longitudinal movement of the film, and

means for selectively transversely positioning the unit to predetermined and variable transverse fixed positions, whereby a plurality of sound tracks may be longitudinally formed on the film in any desired recording sequence.

4. An entertainer comprising camera mechanism for strip film and having a lamp housing, the light valve in said lamp housing, a slit in said housing for exposing said film to rays of light from said light valve and a rotary member providing a curved support for said film opposite and closely adjacent said slit for carrying the film in a curvilinear path past said light slit.

5. Camera mechanism for strip film comprising a rotary platen, a lamp housing having an arcuate wall concentric with said platen and spaced from said platen so as to permit of the free passage of said film therebetween, a slit in said arcuate wall arranged to expose only a portion of the width of said film at any one time to light rays, and means to shift said arcuate wall transversely with respect to said film, whereby a plurality of exposure tracks may be formed upon said film.

6. Camera mechanism for sound film comprising apertured diaphragm means whereby any selected portion of the width of said film may be exposed and means for arbitrarily shifting said apertured diaphragm means transversely with respect to the longitudinal movement of said film whereby a plurality of longitudinal sound tracks may be successively formed thereon in any desired sequence.

7. Camera mechanism for sound film comprising an illuminating device, a film platen, a light-slit holder interposed between said illuminating device and said film platen and means for slidably and arbitrarily adjusting said light-slit holder transversely with respect to said platen so as to expose different sound tracks across the width of said film in any desired sequence.

8. In a sound film device, a film, a convex film-supporting surface, a slit member having a concave surface between which and said convex surface there is only sufficient separation for permitting said film to be moved, means for laterally and arbitrarily adjusting said slit member with respect to said film, a light source from which light may be projected through the aperture of said slit member and onto said film, and means for varying the intensity of said light source in response to sound effects to be photographically recorded on said film.

9. The invention set forth in claim 8 in combination with a "listening in" system responsive to fluctuations in the intensity of said light source in the various laterally adjusted positions of said slit member.

10. Camera mechanism for sound film comprising an illuminating device, a film gate, means including a light slit member transversely and arbitrarily adjustable across the width of said film gate for exposing a film to direct rays from said illuminating device, a photo-sensitive cell exposable to other direct rays from said illuminating device and a sound reproducing system connected to said photo-sensitive cell responsive to sound modulated light rays emitted from said illuminating device and impressed upon said photo-sensitive cell.

11. Camera mechanism in accordance with claim 10 in combination with a sprocket driven film for recording sound effects and a sound re-

producing device for simultaneously rendering said sound effects audible.

12. Sound recording means including a source of sound-modulated light, means for directing said light to traveling sensitized film for recording thereon, and means for arbitrarily shifting said light laterally across the width of the film for recording thereon in any desired sequence of laterally disposed rows.

13. Camera mechanism for sound film comprising a recording lamp, means for exposing selected portions of the width of said film to a beam of light from said recording lamp whereby a plurality of sound tracks may be successively formed thereon, and means for directing said light beam onto an arbitrarily selected sound track.

14. A sound film bearing multiple rows of sound tracks exposed to a beam of light from a recording lamp by means of camera mechanism as defined in claim 13.

15. Camera mechanism in accordance with claim 13 in which said means for directing said light beam comprises a screw member adjustable at will.

16. Camera mechanism for sound film comprising a recording lamp, means for progressively exposing any selected one of a plurality of restricted transverse areas of said film to rays of light from said recording lamp and means for presenting a convex flexed surface of said film to said rays.

17. A strip of sensitized film bearing parallel rows of exposures to sound-modulated light such as produced in the camera mechanism defined by claim 16.

18. In sound recording apparatus, a light sensitive film, a light valve housing having an opening exposed to said film, a light valve in the light valve housing responsive to modulated energy, corresponding to sound variations, the light valve being arranged to project modulated light through the opening onto the film, means for longitudinally advancing said film for exposure to light from said light opening, and means including a trackway member on said housing transversely with respect to the direction of advancement of said film for slidably moving the light valve housing relatively to the film, whereby the modulated light is projected onto selected sound tracks as the film is advanced.

19. In sound recording apparatus, a light sensitive film, means for advancing the light sensitive film for exposure to light, a light valve housing having an opening exposed to the film, a light valve in the light valve housing responsive to modulated energy corresponding to sound waves, the light valve being arranged to project modulated light through the opening onto the advancing film, and means including a guide rail and a screw for slidably moving the light valve housing relatively to the film, the relative movement being transversely with respect to the advancement of the film for projecting the modulated light onto selected sound tracks as the film is advanced.

20. In a transparent light sensitive film, a sound record thereon of a width less than that of said film and progressively displaced laterally with respect thereto.

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