Dec. 15, 1931. R. H. TOWNSEND 1,836,205

METHOD AND APPARATUS FOR USE IN CONNECTION WITH THE MAKING OF SOUND RECORDS

Filed Jan. 12, 1929

Fig. 3.

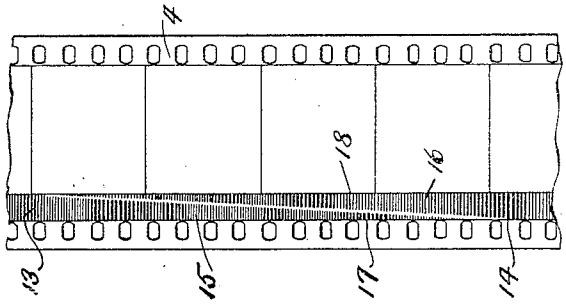


Fig. 2.

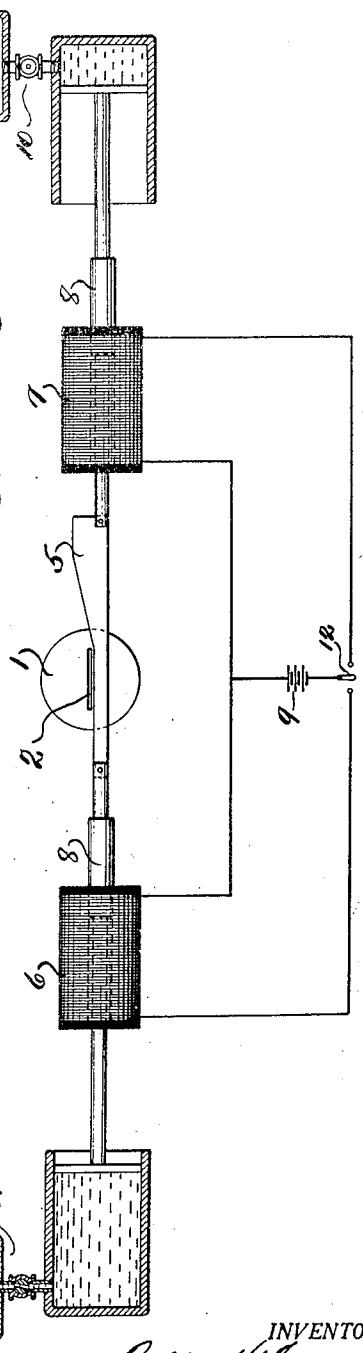
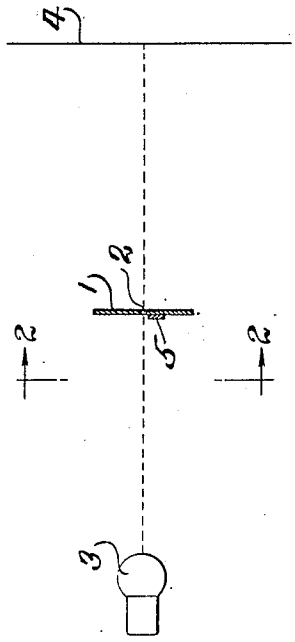


Fig. 1.



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METHOD AND APPARATUS FOR USE IN CONNECTION WITH THE MAKING OF SOUND RECORDS

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My invention relates to an apparatus for use in connection with the making of sound records, more specifically with the making of sound records wherein sound is recorded on the light-sensitive surface of a flexible support such as a film.

One of the objects of my invention is the provision of a method and apparatus for the making of sound records whereby a sound record or sound track is produced which gradually and uniformly varies in width in the direction of its length and likewise in the direction of the length of the film or other flexible supporting surface for the track.

A still further object of my invention is the provision of a method and apparatus for use in connection with the making of sound records in which two sound tracks are produced on the light-sensitive surface of a flexible support, the tracks uniformly varying in width in the direction of their length and lengthwise of the film, the variation in width being in opposed directions. In other words one sound track is wedge shaped, being of normal width at one end and gradually and uniformly tapering to zero at its other end, the other sound track tapering in the opposite direction.

More specifically my invention provides a method of and apparatus for the making of sound records wherein two sound tracks lying side by side are produced upon the light-sensitive surface of a flexible support such as a film, each sound track or record uniformly varying in width in the direction of its length, the composite track presenting a sound record extending lengthwise of the film and having parallel sides.

A still further object of my invention is the production of a sound record or sound track in which on reproduction the sounds recorded will gradually increase or decrease in volume depending upon the direction in which the track is moving.

Furthermore, I provide a composite track in which as the volume of sound decreases at one portion of the track the volume at the same time is increased at another portion of the track. It will be seen, therefore, that by the use of my record effects can be reproduced comparable to the effects produced by dissolves in moving picture projection.

Various types of apparatus may be employed in the practice of my improved method, one form of apparatus which I have found practicable being illustrated in the accompanying drawings.

In the drawings, Fig. 1 is a diagram schematically illustrating my improved method;

Fig. 2 is a more detailed view taken substantially on the line 2—2 of the diagram; and

Fig. 3 is a plan view representing a flexible support such as a motion picture film with my improved sound record or track thereon.

Referring more specifically to the drawings in detail, 1 designates a plate provided with aperture 2, this construction providing the well known mechanical slit employed in the sound recording art.

3 is a light source which, as is usual in the making of sound records photographically, is controlled by the sound to be recorded. Such a light source is shown for example in Patent No. 1,446,246 of February 20, 1923.

4 designates a film or flexible support for a light-sensitive surface. In practice the supporting member 4 may be the usual film employed in the making of sound records for use in connection with motion pictures, and supporting the sound track alone or the track and motion picture images. Ordinarily this support 4, which of course is behind the plate 1, is advanced across the opening 2 in the plate so as to be exposed by the action of the light rays emanating from the sound-controlled light source 3 and passing through the aperture 2. In such apparatus the sound record or sound track takes the form of a rectangular shaped exposed area at the side of the film and extending lengthwise of the film. In reproduction with such a sound track there is no variation of course in the volume of the sound reproduced except in so far as the volume may have been varied during recording.

In addition to the plate 1 with its aperture 2 and the sound-controlled light source 3 above referred to, I provide means for uni-

formly varying the effective area of the aperture 2 during recording, i. e., while making the exposure. This area varying means as illustrated takes the form of a triangular shaped plate or valve 5, interposed between the light-sensitive surface of the support 4 and the light rays emanating from the sound-controlled light source 3. In practice this plate is interposed between the light source and the plate 1, or between the plate and film.

The control plate or valve is adapted to be reciprocated or moved longitudinally in opposed directions at a uniform speed through the medium of dash pot controlled electro magnets 6 and 7. As will be seen from Fig. 2 the control plate or valve is secured to the armature 8 of each magnet and when current from a suitable source such as battery 9 is supplied to one magnet movement of the plate 5 in one direction will be effected, while de-energizing this magnet and energizing the other will move the plate in the opposite direction. The movement of the plate under the action of the magnet 7 is uniform, as above mentioned, being controlled by dash pot mechanism 10, and uniform movement of this plate under the action of the magnet 6 is assured by similar dash pot mechanism 11. The circuits to the magnets are controlled conveniently by a switch 12.

The valve 5 as it is moved under the action of the magnet 6 or 7, as the case may be, transversely of the light rays emanating from the sound-controlled light source 3 will gradually and uniformly vary the effective area of the aperture 2. This uniform variation in effective area of this aperture is not only uniform but as will appear hereinafter the area is increased uniformly by movement of the valve 5 in one direction and decreased uniformly upon movement of the valve in the opposite direction. For example movement of valve 5 to the left as viewed in Fig. 2 will uniformly decrease the effective area of the aperture 2, while movement of the plate or valve 5 in the opposite direction uniformly increases this effective area.

In operation the film or support 4 is moved upwardly let us assume as viewed in Fig. 3. With the support moving upwardly behind the aperture 2 and with the plate or valve 5 in the position of Fig. 2 it will be apparent that an exposure will be made on the face of the film support for the full width of the aperture. Let us assume that the film at this instant is in a position to be exposed at 13 in Fig. 3. As the film continues its forward movement let us assume that the magnet 6 is excited so that the plate or valve 5 will gradually and uniformly move to the left as viewed in Fig. 2. This will gradually cut off the aperture 2, in other words decrease its effective area, with the result that the width of the exposure made on the surface of the support 4 will correspondingly gradually uniformly decrease, in the direction of its length. This movement of the plate or valve 5 may continue until the aperture 2 is entirely closed. At this time the film will have advanced to a point where that portion thereof designated 14 is immediately behind the aperture 2.

The foregoing procedure obviously will produce a sound track designated 15 extending longitudinally of the support 4 and uniformly varying in width in the direction of its length. In the operation assumed the track 15 will uniformly decrease in width from the point 13 to the point 14.

With aperture 2 completely closed off the support 4 is reversed in direction until that portion of the film at 13 is behind the aperture 2. The film is then again moved forward as before and at the same time the magnet 7 energized to move the plate or valve 5 to the right as viewed in Fig. 2 gradually to uncover the aperture 2, i. e., uniformly increase its effective area, it being understood of course that at this time the light source 3 is again sound controlled by the sound being recorded. The uniform movement of plate or valve 5 to the right gradually increases the width of the exposed portion of the support 4 until the point 15 is again reached at which time the aperture 2 is full open. This second step of my method, therefore, produces a track 16 adjacent the track 15 both tracks or records varying uniformly in width in the direction of their length, but in opposed directions. If the one reproducing apparatus is to be used with both tracks 15 and 16, the tracks are recorded side by side as illustrated in Fig. 3, from which figure it will be seen that while the two tracks gradually and uniformly vary in width from one end to the other they are so disposed relatively as to produce a rectangular composite track having parallel sides designated 17 and 18.

On reproduction, and assuming for the moment that only one track 15 is recorded on the support 4 which is moving in the same direction as in the recording operation, it will be apparent that the volume of sound on reproduction will gradually decrease. On the other hand with two tracks arranged so far as their direction of variation in width is concerned as shown on Fig. 3 it will be apparent that on reproduction as the volume of sound from track 15 decreases the volume of sound from track 16 will increase. This enables effects in sound to be produced on reproduction comparable to effects produced in the projection of motion pictures, wherein the intensity of one scene may diminish simultaneously with an increase in intensity of another scene being projected on the same screen at the same time.

Obviously this invention provides great

possibilities so far as the use thereof in connection with the projection of motion pictures is concerned where so-called dissolves are employed, enabling music or other recorded sounds to be reproduced, so far as volume is concerned, in conformity with the pictures being projected.

It is to be clearly understood that the present invention is for use not only in the recording of the sound, but also in printing from the usual sound track record. The same apparatus and procedure are employed as above described, except in such a case the light source 3 obviously would not be sound-controlled. The appended claims therefore are to be interpreted with this understanding.

It is evident that various modifications may be made in the construction above described within the purview of this invention.

What I claim is:—

1. In the making of sound records the method which comprises the step of gradually varying the area of an aperture through which light rays from a light source under the influence of the sound to be recorded pass to a moving film to expose a gradually varying area of the film.

2. In the making of sound records the method which comprises uniformly varying the area of an aperture and simultaneously moving a light sensitive film through light rays passing through said aperture from a light source controlled by the sound to be recorded.

3. In the making of sound records the method which comprises moving a light sensitive film past an aperture, simultaneously gradually varying the area of said aperture, and projecting sound controlled light rays therethrough during the varying of said aperture area, to make an exposure on said surface of uniformly varying width, returning the film to its original position and then moving the same forward again and simultaneously varying the area of the said aperture reversely to the first-mentioned variation.

4. In the making of sound records the method which comprises varying the area of an aperture simultaneously moving a light sensitive film through light rays passing through said aperture from a light source controlled by the sound to be recorded, and thereafter passing the same length of film past said aperture and simultaneously varying the area of said aperture in a direction opposite to its first variation in area.

5. In the making of sound records the method which comprises exposing a light sensitive film to the action of sound controlled light rays simultaneously uniformly varying the width of the exposure on the film, and thereafter making a similar exposure of an adjacent section of the film and simultaneously varying the width of the exposure in the reverse direction.

6. Apparatus for making sound records comprising in combination, a plate having an aperture, a sound controlled light source for supplying light to said aperture, and means for effecting a gradual variation in the area of said aperture.

7. Apparatus for making sound records comprising in combination, a plate having an aperture, a sound controlled light source for supplying light to said aperture, and means for effecting a uniform variation in the area of said aperture.

8. Apparatus for making sound records comprising in combination, a plate having an aperture, a sound controlled light source, and means intermediate the light source and plate for effecting a uniform variation in the area of said aperture.

9. Apparatus for making sound records comprising in combination, a plate having an aperture, a sound controlled light source for supplying light to said aperture, and means controlled automatically for effecting a uniform variation in the area of said aperture.

10. Apparatus for making sound records comprising in combination, a plate, a sound controlled light source, and a valve intermediate the light source and plate and movable automatically to vary uniformly the area of the valve opening.

11. Apparatus for making sound records comprising in combination, a plate, having an elongated slot or aperture, a light source for supplying light to said aperture, and a triangular plate movable lengthwise of said aperture transversely of the light rays from said light source for effecting a uniform variation in the area of said aperture.

12. Apparatus for making sound records comprising in combination, a plate provided with an aperture, a sound controlled light source for projecting light rays through said aperture, a light valve, and means for moving said valve in opposed directions transversely of the light rays from said light source to vary uniformly the area of said aperture first in one direction and then in the opposite direction.

13. Apparatus for making sound records comprising in combination, a plate having an aperture, a sound controlled light source adapted to project light rays through said aperture upon a film, a member movable across said aperture transversely of said light rays to vary the area of the aperture, and dashpot controlled electromagnets for effecting uniform movement of said area controlling member, one dashpot moving the member in one direction and the other moving the member in the opposite direction.

14. In the method of making sound records

the method which comprises the step of gradually varying the area of an aperture through which light rays from a light source pass to a moving film in the recording of the sound to expose a gradually varying area of the film.

15. In the making of sound records the method which comprises uniformly varying the area of an aperture and simultaneously moving a light sensitive film through light rays passing through said aperture from a light source.

16. In the making of sound records the method which comprises the step of so varying the area of an aperture through which light rays from a light source pass to a moving light sensitive surface as to make an exposure on the light sensitive surface of gradually varying area.

This specification signed this 9th day of January, 1929.

RALPH H. TOWNSEND.