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PRODUCTION OF SOUND AND SOUND PICTURE RECORD

Filed Sept. 15, 1931

Fig. 1

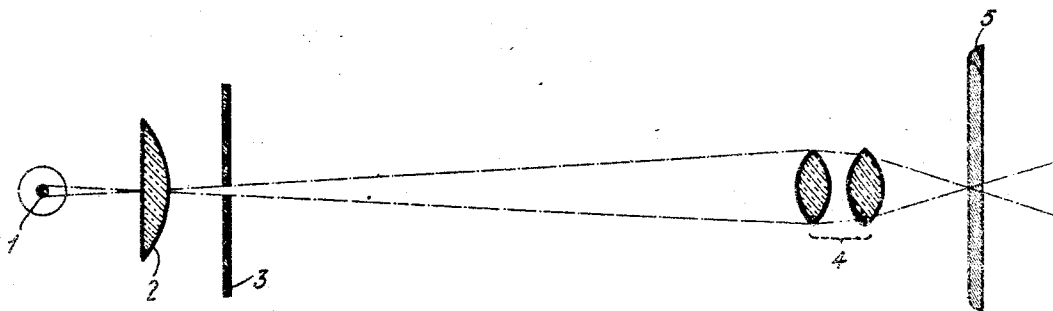


Fig. 2

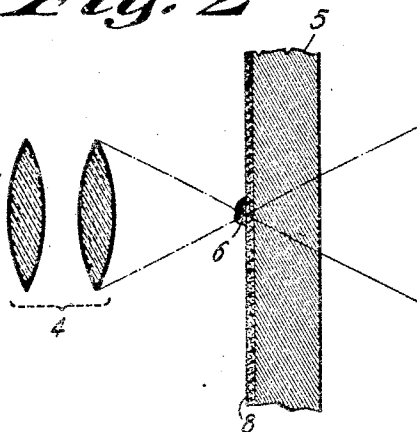
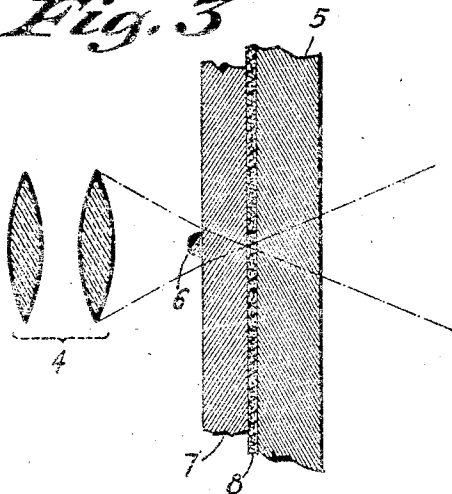


Fig. 3



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PRODUCTION OF SOUND AND SOUND PICTURE RECORD

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This invention relates to the production of sound and sound picture records and has for its principal object the provision of an improved record and method of operation whereby the extraneous noises due to dust particles, scratches, finger marks and the like are eliminated or greatly reduced.

A difficulty commonly encountered in the reproduction of sound has been an extraneous noise commonly designated as ground noise. In the reproduction of sound from a photographic record this noise assumes the form of a crackling or roar and is due largely to dust and scratches on the sound track of the film. Where the sound track is very narrow, for example, of the order of three or four thousandths of an inch, the interference of ground noise with the reproduced sound is especially serious since dust particles or scratches may obliterate large parts of the normally white portion of the sound track.

In accordance with the present invention, the elimination of the undesired noise is effected by means of the film upon which the sound or the sound picture is recorded. To this end the emulsion side of the film is provided with a protective coating or layer which may be made of varnish, collodion, or the like, and which serves to raise the scratches and dust particles out of the focal point of the optical system utilized in the reproduction of the record and reduce their effect on the reproduced sound. As hereinafter explained, this coating differs from the protective coatings heretofore provided in that it is made of appreciable magnitude as compared to the focal length of the lens system through which light is applied to the record, that is, thick enough to space the dust particles and scratches from the focal point of the optical system by a distance sufficiently great to obviate or greatly reduce the ground noise otherwise produced during reproduction.

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

Referring to the drawing:

Fig. 1 is a partial illustration of a sound reproducing apparatus in connection with which my invention may be utilized;

Fig. 2 illustrates the effect of dust and the like on the reproduction of the usual photographic film; and,

Fig. 3 illustrates a film or record wherein the present invention has been embodied.

The apparatus illustrated by Fig. 1 includes an exciting lamp 1 and a sound record 5 on to which an image of the light source 1 is projected through a condensing lens 2, a mechanical slit 3 and objective lenses 4. It will be readily understood that the image of the light source is focused at the emulsion side of the film 5 which bears the sound record, that the light is modulated in accordance with the sound record as the film is moved transversely of the light beam, and that the modulated light is received by a light sensitive cell which controls the operation of one or more amplifiers through which a loudspeaker is energized.

As illustrated by Fig. 2 the effect of extraneous matter such as a dust particle 6 on the emulsion 8 on the film 5, is to obliterate the light which would otherwise be transmitted through the film at the point where the dust particle is located. This gives rise to a crackling noise or dull roar in the reproduced sound and is serious in sound records of the micro-photographic type.

Fig. 3 illustrates the film 5 as provided on its emulsion side with a protective coating 7 which has a thickness such that the dust particle 6 is raised from the focal point of the lens system to a point where the light beam is of considerable thickness. It therefore follows that a relatively small portion

of the light is obscured by the dust, the remainder being focused on the sound track. It will be apparent that under these circumstances very much less noise is produced by the dust particles.

The protective coating 7 may be made of varnish, collodion, an extra film cemented to the emulsion side of the film 5, or any kind of flexible transparent medium of sufficient thickness to space the dust particles from the emulsion by the proper distance. If desired it may also be a film of the same thickness as the film 5 but arranged to have its grain located oppositely to the grain of the film 5 so that shrinkage of the two films tend to oppose one another and prevent warping of the composite film. The protective coating may of course be applied by spraying, by pasting, or in any other suitable manner.

While the invention has been described as applied to transparent film, it is apparent that it is equally useful in connection with opaque film from which the modulated light is reflected to a light sensitive cell.

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

1. The method of reducing ground noise during reproduction of sound from a photographic record located in an emulsion supported on a base which includes covering said emulsion with a protective layer of a thickness which is of appreciable magnitude as compared to the objective focal length of the lens system through which light is applied to said record.

2. The method of reducing ground noise during reproduction of sound from a photographic sound record located in an emulsion supported on a base which includes covering said emulsion with a protective coating of sufficient thickness to provide a material distance of separation between the said emulsion and the opposite surface of the protective coating.

3. The method of reducing ground noise during reproduction of sound from a photographic sound record located in an emulsion supported on a base which includes applying to said emulsion a coating whereby the projected areas of foreign particles located on said coating are made substantially smaller than the real areas of said particles.

4. A sound record adapted to cooperate with an optical system including an objective lens, comprising an emulsion bearing a sound track located at the focus of said lens and a protective coating upon said emulsion having a thickness of appreciable magnitude as compared with the focal length of the said objective lens.

5. A sound record adapted to cooperate with an optical system including an objective lens, comprising an emulsion bearing a sound track located at the focus of said lens

and a protective coating upon said emulsion having a thickness of appreciable magnitude as compared with the focal length of the said objective lens whereby the surface of the said protective coating is removed from the focal point of said objective lens when the sound record is arranged in cooperative relation therewith.

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