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RECORDING SOUND PHOTOGRAPHICALLY

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Our present invention relates to photographic sound recording.

One of its objects is to provide a process of producing a photographic sound record according to the reversal method. Further objects will be seen from the detailed specification following hereafter.

In developing by the reversal method a film on which sounds have been photographically recorded by projecting on the film an image of a source of light modulated in accordance with sounds a sound track is obtained which yields a very bad rendition of frequencies. This is particularly so in the case of a sound track recorded according to the variable area method and is probably caused by the fact that for obtaining a minimum of fog in the reversed film the first exposure must be extraordinarily intense. This is clear when considering that in a section of film in which after reversal there shall remain only the blackening caused by the minimum fog, the emulsion layer must be blackened throughout its thickness in the first exposure and the first development, so that the silver is completely removed from this section in the bleaching operation. In the reversal processes usual in the making of cinematographic pictures, the lowest possible blackening, after reversal, is obtained only with blackenings of between 2.5 and 3 density units, measured after the first development. The density D is calculated from the formula:

$$D = \log_{10} \frac{\text{incident light}}{\text{transmitted light}}$$

Considering the extraordinarily large amounts of light to which the layer, for obtaining so intense a blackening must be exposed, it is evident that the reproduction of high frequencies is heavily impaired owing to over-radiation.

According to this invention the rendering of frequencies of sound records produced on film to be developed by the reversal method is greatly improved by using a film having means for preventing or minimizing the formation of halation effects. The halation effect produced by diffusion may practically be avoided by using, for instance, a light-sensitive material provided with a particularly fine-grained silver halide emulsion layer or with a silver halide emulsion layer which contains a filter dye or the like or with both such

layers. Suitable dyes for the purpose are, for instance, Tartrazine, Orange I (Schultz, Farbstofftabellen, 6th edition, Vol. I, No. 144), Pinacyanol; furthermore, dyes which are simultaneously sensitizers, for instance, a selenocarbocyanine or a naphthothiocarbocyanine or an unsymmetrical thioselenocarbocyanine substituted at the trimethenyl chain by ethyl.

The rendering of the frequencies may further be improved by preventing the production of halation effects caused by reflection, by means of an anti-halation layer. The anti-halation layer may be arranged as a backing layer or as an intermediate layer between the emulsion layer and the support; it may be a layer of finely subdivided glassmaker's soap or it may be made of a suitable red dye which is soluble in the photographic treating baths, for instance, Aurine (Schultz, Farbstofftabellen, 6th edition, Vol. I, No. 555), or it may be a layer of colloidal silver. If the light-sensitive material is exposed through the support, the anti-halation layer is applied on the light-sensitive layer.

The process of recording sounds on film to be developed by the reversal method as described may be used for the production of films bearing besides a sound record also a picture record.

What we claim is:

1. A process of manufacturing a sound record which comprises projecting a slot-like picture of a source of light modulated in accordance with sounds on a reversal film while preventing halation effects by reflection as well as diffusion, exposing said reversal film so that the parts of the film having received the longest exposure show after the first development a blackening of 2.5 to 3, developing said film, bleaching said developed film, exposing said film a second time, and developing said film a second time.

2. A process of manufacturing a sound record which comprises projecting a slot-like picture of a source of light modulated in accordance with sounds on a reversal film bearing a fine-grained silver halide emulsion layer and an anti-halation layer dyed with a dye soluble in the photographic treating baths, exposing said reversal film so that the parts of the film having received the longest exposure show after the first development a blackening of 2.5 to 3, developing said film, bleaching said developed film, exposing said film so

a second time, and developing said film a second time.

5 3. A process of manufacturing a sound record which comprises projecting a slot-like picture of a source of light modulated in accordance with sounds on a reversal film provided with a filter dye preventing halation by diffusion and soluble in the photographic treating baths, and an anti-halation layer dyed with a dye soluble

in the photographic treating baths, exposing said reversal film so that the parts of the film having received the longest exposure show after the first development a blackening of 2.5 to 3, developing said film, bleaching said developed film, exposing said film a second time, and developing said film a second time. 8

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