Patented Nov. 5, 1940 2,220,178

UNITED STATES PATENT OFFICE

2,220,178

PROCESS OF PRODUCING A SOUND TRACK ON A LIGHT-SENSITIVE COLOR FILM

Wilhelm Schneider, Dessau, Anhalt, and Gerd Heymer, Wolfen, Kreis Bitterfeld, Germany, assignors, by mesne assignments, to General Aniline & Film Corporation, New York, N. Y., a corporation of Delaware

No Drawing. Application January 5, 1937, Serial No. 119,078. In Germany January 9, 1936

1 Claim. (Cl. 95—2)

The present invention relates to a process of producing a photographic color film having a sound track.

One of its objects is an improved process of producing photographic color films having a sound track. Another object is the photographic color film having a sound track. Further objects will be seen from the detailed specification following hereafter.

In the production of black and white sound films the sound track has been treated in a manner different from the treatment for producing the picture. For example, in order to obtain a definite gradation of the sound track for any particular sound system it would produce unfavorable picture gradation if the picture and the sound track were developed simultaneously.

The present invention is based on the observation that in the development of color pictures a sound track which is produced by color development, is strongly transparent to infrared rays. Such films is ill fitted for the modern sound film machine which is operated with caesium cells sensitive to the infra-red ray.

This invention relates to a process for treating the sound track of a silver halide emulsion layer containing color components in one or more of the development operations necessary for producing the color picture, separately from the picture and so that the sound track is non-transparent to infra-red. By color components there are to be understood components of quinoneimine and azomethine dyestuffs as they are described in U. S. Patent 1,102,028. These are particularly suited for the present purpose, if they are fast to diffusion, that is to say if they contain special groups which prevent these components from wandering in the emulsion. Such groups are specified for instance in French Patent 803,566, French Patent 807,792, Italian Patent 343,581, U. S. A. applications Ser. No. 111,250 filed November 17, 1936, Ser. No. 72,718 filed April 4, 1936, Ser. No. 90,726 filed July 15, 1936 and Ser. No. 94,340 filed August 5, 1936. Other color components which may also come into question are components of azo-dyestuffs and from these particularly those which are fast to diffusion.

In the production of a color sound film by the reversal process, for example, the sound track, after the first development which in known manner produces a pure silver negative, is covered by a varnish insoluble in the subsequently applied baths and this varnish is only removed after completely finishing the color reversal picture and the track is then fixed and there is obtained a silver black sound track on the negative.

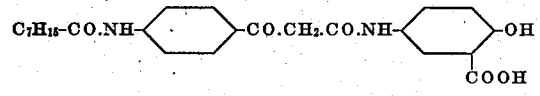
In a negative positive process, the negative film needs no treatment separate from the sound track, there being obtained a sound track formed of dyestuff. In copying this film, one must according to the invention, after the development and before the silver picture is removed by dissolution, varnish the sound track, then finish the picture by bleaching or dissolution of the silver, dissolve away the varnish and fix the film. There is then obtained in addition to a sound track in silver a superimposed sound track in dyestuff. Obviously the picture and the sound track can be treated together, in which case after the dissolution of the silver picture there is obtained a sound track in pure dyestuff.

Instead of varnishing the track the separate treatment for the picture and the sound track may consist in developing the film in horizontal upright position and only immersed so far in the liquid as is necessary for the separate development of picture and track. This method is of particular advantage and may be simplified if the sound track lies outside the perforations.

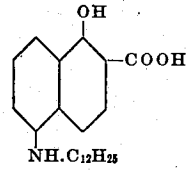
Instead of producing a color sound track superimposed upon a silver sound track the infra-red absorption of the dyestuff produced by the development can also be strengthened by treatment of the color sound track with a metal salt, for instance, a salt of chromium, iron or copper, in which case the silver may remain in the color sound track or be dissolved therefrom in known manner. In this case there is used with advantage a dyestuff containing an atom grouping which is suitable for complex combination with a metal salt. Such dyestuffs are sufficiently well known in color chemistry [see for instance Fierz-David: "Künstliche organische Farbstoffe (1926)", page 170]; generally they contain an OH-group having a tendency for the complex formation, produced by another group, for example a carboxylic or a hydroxyl group. The following are examples of color components which combine with the oxidized products of a suitable

developing substance, as for instance of a developing substance containing a free amino-group, such as diethylamino-aniline-hydrochloride, to form such dyestuffs.

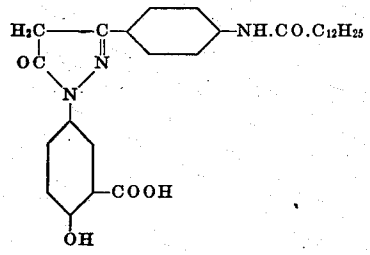
A suitable component for a yellow dyestuff is for instance p-capronyl-amino-benzoyl-acetyl-amino-salicylic acid of the following formula:



A component for a blue dyestuff is the 1-hydroxy-2-carboxy-5-dodecylamino-naphthalene of the following formula:



A component for a red dyestuff is 1(4'.hyroxy-3-carboxy-phenyl) 3-4':dodecoyl-aminophenyl-5-pyrazolone of the following formula:



Another possibility to make the sound track of a color film non-transparent to infra-red rays is to color the silver of the sound track by a toning process. The following examples serve to illustrate this part of the invention:

1. A film with three silver halide emulsion layers containing color components fast to diffusion arranged in superimposed relationship on one or both sides of a support is after exposure to light subjected to a color forming development during which besides the dyestuff images formed by the combination of the components a superimposed silver image is formed in the three single layers. This silver image has to be moved in order to obtain the pure dyestuff images in the picture area of the film. Before the baths necessary for this purpose are applied the sound track which has also been developed during the first developing process is transformed into a compound non-transparent to infra-red rays by leading the film in horizontal upright position and only so far immersed that the sound track is covered through known treating liquids by which the silver of the sound track is transformed into a blue silver ferro-cyanide image. After this treatment the sound track is not attacked by the liquids which are applied for oxidizing the silver so that the film may be finished without any intermediate drying process.

2. If the color pictures of the photographic material described in Example 1 are to be produced according to a reversal process the following two processes may be applied:

a. After the first development which is carried out by means of a non-color forming developer, a film of the type described above in the area of the sound track is transformed into a blue silver ferro-cyanide picture by leading it in upright position through the treating liquors. Thereafter the second development is carried through with a color forming developer which transforms the components incorporated in the film layers into the dyestuff image. In the following process for removing the silver the sound track remains unchanged so that in this manner a positive with a glue silver ferro-cyanide sound track is obtained.

b. If the dyestuff image is produced after the silver image obtained by the first non-color forming development has been removed, the toning of the sound track takes place after the second development has been carried out.

Good results are also obtained if the silver of the sound track is toned by means of sulfur toning baths. According to these two examples the silver of the sound track before the transformation of the silver of the picture area into a compound soluble in the ordinary treating baths is protected from the removal by transforming it into compounds which may easily be scanned during the production of the film. If the dyestuffs produced during the developing process lie in the area of the sound track and are detrimental to the scanning of the sound track they may be destroyed at the same time as the transformation image of the sound track silver or in a separate bath.

What we claim is:

The method of producing three-color cinematographic sound films in a three-layer material for color forming development, said multi-layer material comprising a support and a silver halide emulsion containing p-capronyl-amino-benzoyl-acetyl-amino-salicyclic acid, a second layer containing 1-hydroxy-2-carboxy-5-dodecyl-amino-naphthalene, and a third layer containing 1-(4'-hydroxy-3-carboxy-phenyl)-3-4'-dodecyl-aminophenyl-5-pyrazolone, which method comprises separately exposing the picture and sound area of said film, developing all three layers of the picture area and the sound area by color forming development in a single developing operation, treating the sound area with a salt of a metal selected from the group consisting of chromium, iron and copper and removing the silver developed in all the layers.

WILHELM SCHNEIDER.
GERD HEYMER.