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ANTIHALATION FILM

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FIG. 1.

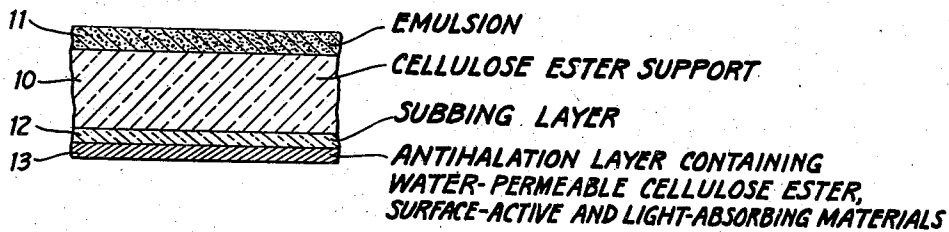
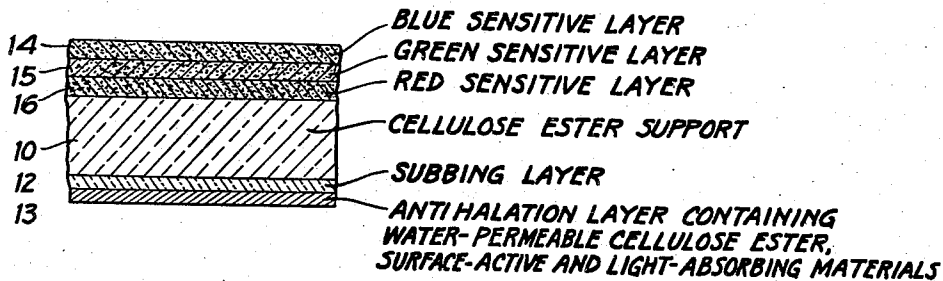


FIG. 2.



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ANTIHALATION FILM

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7 Claims. (Cl. 95—9)

This invention relates to photographic film and more particularly to photographic film protected against halation.

This application is a continuation in part of the Nadeau and Slack U. S. Patent application, Serial No. 381,694, filed March 4, 1941, now Patent No. 2,289,799, of July 14, 1942.

Light-absorbing coatings on the backs of photographic films are well known in the art of halation prevention. Generally, these antihalation coatings consist of a carrier material and a light-absorbing material such as a dye or pigment, and are removable or non-removable according to the solubility characteristics of the carrier material. The coatings are applied, as a rule, to the rear side of a film support which may be a cellulose ester, a synthetic resin, or other material.

Coatings on the backs of films containing a dye or a superficial dye layer removable in photographic processing solutions are well known for antihalation purposes. Less well known are antihalation layers which are designed to be non-removable in aqueous or alkaline photographic processing solutions. The disadvantages of the removable types of coatings are the tendency of some coatings to deposit sludge in processing solutions, the tacky nature of some coatings, the known thermo-plastic qualities of other coatings which are in general undesirable, and furthermore, in the case of certain resinous coatings their tendency to form insoluble products with the antihalation dye. Non-removable antihalation layers have been designed to avoid the difficulties and to a certain extent prevent the penetration of the dye into and the subsequent staining of the support. The success of this practice depends upon the selection of a material, for the dye carrier, which is sufficiently permeable to processing solutions, yet not soluble, that the dye giving antihalation protection may be completely discharged when desired.

In previous patents surface-active materials for facilitating the removal of hydrophilic backings have been disclosed. These backings in general consist of an alkali or water soluble material such as cellulose acetate phthalate as the carrier material for the dye, and the known property of the dye to stain the base is controlled by the thickness of the cellulose acetate phthalate layer. In other words, a given thickness of cellulose acetate phthalate was found to be required for a fixed density of dye to be applied to the support. If for another purpose the dye density was to be increased, it was found necessary to increase the

thickness of the backing layer. In other words, the backing acted as a sort of mordant for the dye and prevented it striking into the permanent support. Once the dye has penetrated the permanent support, it is not removable by any photographic processing treatment.

We have found in the course of investigating various surface-active materials, that it is possible to control the degree of base stain by the use of these materials. This is of special importance in connection with the design of water-permeable but non-removable antihalation backing layers. A backing of this type offers distinct advantages over a removable backing in that materials possessing lesser water-susceptibility may be used. This fact is important in determining the ferrotyping tendency of the film.

For some time it has been possible to make a film using, for example, a cellulose acetate of low acetyl as a carrier for an antihalation dye, as disclosed in Nadeau and Slack U. S. Patent 2,311,073, granted February 16, 1943. There has been in this instance, however, definite residual stain which, although not particularly objectionable in the case of black-and-white film, is serious in a case of a film used for carrying a colored image. A more detailed investigation of the properties of various surface-active materials has shown that this residual stain can be controlled by adding surface-active agents to the antihalation backing layer. Of the known types of surface-active agents, all are active in the prevention of base stain, whether of the anionic, cationic or non-ionic type.

The object of the present invention, is therefore, to provide photographic films with antihalation backings of water-permeable cellulose esters containing a surface-active agent and a light-absorbing material, the surface-active agent cooperating with the carrier material to prevent base stain.

This object is accomplished by the methods, examples, and materials hereinafter described.

Surface-active agents representative of the anionic type useful in the backings of our invention, are the commercial products, Arctic Syntex T, Igepon T, (alkyl sodium taurides) etc., described in the prior U. S. Patent No. 2,139,778 for use in static prevention. Other agents of this type are sodium alkyl sulfates, such as Gardinol, and sodium sulpho di-alkyl succinates such as Aerosol AY (sodium sulpho di-amyyl succinate) and Aerosol OT (sodium sulpho-di-octyl succinate).

Surface-active agents of the cationic type are

the quaternary ammonium salts such as Triton K-60 (dimethyl cetyl benzyl ammonium chloride).

Agents of the non-ionic type are the esters or ethers of polyethylene glycols, such as those known commercially as Igepal C, Triton NE (p-iso-octyl phenoxy ethoxy ethanol), Emulphor O, and the esters and ethers of the polyglycerols, such as polyglycerol monolaurate, polyglycerol naphthenate.

The following specific examples will illustrate methods of applying the antihalation materials to the film, according to our invention, it being understood that these examples represent the preferred embodiment, but are not to be considered as limiting our invention thereto.

Example 1

An antihalation backing can be prepared by applying the following solution of cellulose acetate phthalate to a support such as cellulose acetate propionate or cellulose nitrate:

	Per cent
Cellulose acetate phthalate (23% acetyl, 13% phthalyl) -----	13
Water -----	17
Methyl Cellosolve -----	26
Ethanol -----	44

To the above formula is added a surface-active agent such as Aerosol AY, in the amount of from about 1 per cent to about 5 per cent of the weight of the solution. Over this layer is applied a dye solution containing a dye such as Acid Blue 3R, or other fugitive dye, in suitable amounts to obtain the desired density in the backing layer, from a solvent combination consisting of 90 per cent methyl alcohol and 10 per cent water. If desired the surface-active agent may be applied in the dye solution instead of in the carrier coating solution.

Example 2

A cellulose acetate propionate film support may be coated with a solution of the following composition:

	Per cent
Cellulose acetate (34% acetyl) -----	2
Methyl Cellosolve -----	20
Ethylene dichloride -----	30
Methyl alcohol -----	33
Acetone -----	15

To this formula may be added a surface-active agent such as Arctic Syntex T to the extent of about 1 per cent to about 5 per cent of the weight of the solution. The layer can be dyed by the same dye formula mentioned in the previous example.

Example 3

A film base may be coated with a solution of the composition shown in Example 2 except that a more extensively hydrolyzed cellulose ester, such as cellulose acetate propionate (15.9 per cent acetyl and 5.3 per cent propionyl) may be used instead of cellulose acetate. The dye solution of Example 1 may also be used for coloring this layer.

As carrier materials in the antihalation backing layers prepared in the manner of our invention, other water-permeable but water-insoluble cellulose organic acid esters may be used, such as those disclosed in Nadeau and Slack U. S. Patents 2,289,799, granted July 14, 1942 and 2,311,073, granted February 16, 1943. The technique described therein for obtaining adequate adhesion between the antihalation layers and supports of well esterified cellulose organic acid and mixed

organic acid esters, may be used in the present invention for effecting adhesion between water-swelling carriers containing a surface-active agent and a light-absorbing material, and said supports. As light-absorbing materials, fugitive dyes and mixtures of fugitive dyes, are suitable.

The figures of the accompanying drawing shows in cross-sectional view two sensitive photographic films provided with the antihalation layer of the invention.

In the drawing accompanying this application, Fig. 1 shows a cellulose ester film support 10, carrying an emulsion layer 11 on one side, and on the opposite side thereof, a subbing layer 12, and over this the antihalation layer 13 containing a water-permeable cellulose ester, surface-active and light-absorbing materials.

Fig. 2 shows a multilayer color film having a support 10 of a cellulose ester, and on one side thereof, emulsion layers 14, 15, and 16 sensitized, respectively, to the blue, green, and red regions of the spectrum. On the opposite side of the support is the antihalation layer 13, of the invention, containing a water-permeable cellulose ester, surface-active and light-absorbing materials, adhesively joined to the support by means of a subbing layer 12.

A color film constructed in this general manner may contain intermediate filter and masking emulsion layers. The emulsions may also contain color-forming compounds developable to colored images in a known manner, or may be sensitized to different regions of the spectrum and be colored complementary to their sensitivity for the production of colored images by well-known bleach-out processes. Films carrying emulsion layers of these types are disclosed in the prior patent Mannes and Godowsky U. S. 2,252,718, granted August 19, 1941, Ehrenfried U. S. Patent 2,322,001, granted June 15, 1943, and Jelley and Vittum U. S. patent application 371,612, filed December 26, 1940.

It is to be understood that the disclosure herein is by way of example and that we consider as included in our invention all modifications and equivalents falling within the scope of the appended claims.

What we claim is:

1. A photographic film comprising a cellulose ester support having on one side thereof a light-sensitive emulsion layer, and on the opposite side an antihalation layer of a cellulose organic acid ester permeable but not soluble in photographic processing solutions, containing a surface-active agent and a light-absorbing material.

2. A photographic film comprising a cellulose ester support having on one side thereof a light-sensitive emulsion layer, and on the opposite side an antihalation layer of a cellulose organic acid ester permeable but not soluble in photographic processing solutions, containing an anion surface-active agent and a light-absorbing material.

3. A photographic film comprising a cellulose ester support having on one side thereof a light-sensitive emulsion layer, and on the opposite side an antihalation layer of a cellulose organic acid ester permeable but not soluble in a photographic developing solution, containing sodium sulpho di-amyl succinate and a light-absorbing material.

4. A photographic film comprising a cellulose ester support having on one side thereof a light-sensitive emulsion layer, and on the opposite side an antihalation layer of a cellulose organic acid ester permeable but not soluble in photographic

processing solutions, containing a cation surface-active agent and a light-absorbing material.

5. A photographic film comprising a cellulose ester support having on one side thereof a light-sensitive emulsion layer, and on the opposite side an antihalation layer of a cellulose organic acid ester permeable but not soluble in photographic processing solutions, containing dimethyl cetyl benzyl ammonium chloride and a light-absorbing material.

6. A photographic film comprising a cellulose ester support having on one side thereof a light-sensitive emulsion layer, and on the opposite side an antihalation layer of a cellulose organic

acid ester permeable but not soluble in photographic processing solutions, containing a non-ion surface-active agent and a light-absorbing material.

5 7. A photographic film comprising a cellulose ester support having on one side thereof a light-sensitive emulsion layer, and on the opposite side an antihalation layer of a cellulose organic acid ester permeable but not soluble in a photographic
10 developing solution, containing an ether of polyethylene glycol and a light-absorbing material.

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