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G. F. NADEAU ET AL

2,211,347

REMOVABLE COATING FOR PHOTOGRAPHIC FILM

Filed May 12, 1939

FIG. 1

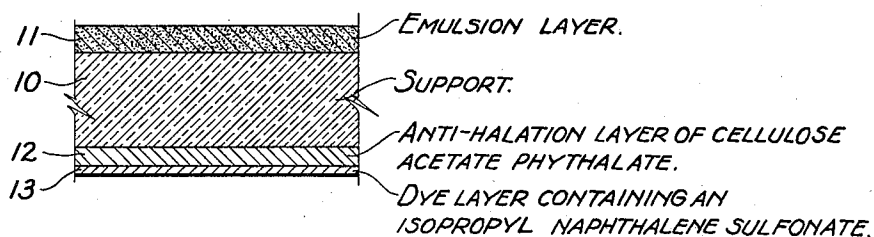
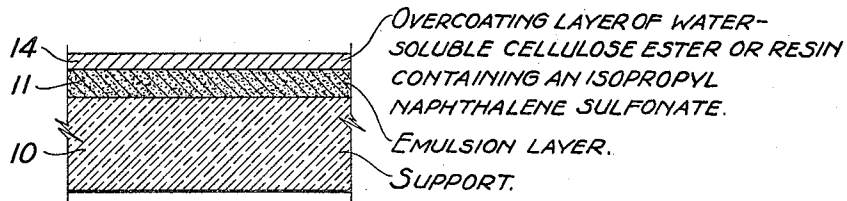


FIG. 2



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REMOVABLE COATING FOR PHOTOGRAPHIC FILM

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10 Claims. (Cl. 95-9)

This invention relates to photographic film and particularly to film having overcoating or backing layers removable in photographic baths.

The desirability of anti-halation layers or overcoating layers for photographic films and plates is well known. It is also known that some of these materials are sometimes difficult to remove due to lack of solubility of one or more of the backing or overcoating constituents in the regular processing baths or to the actual repellancy of the aqueous solutions by one or more of the constituents of the backing or overcoating layer. An example of this is an anti-halation backing which is applied to the film base or plate as a material which swells or dissolves in regular developing solutions, followed by an overcoating of a water-insoluble dyestuff or coloring material. When immersed in the developing baths, the first applied layer is supposed to dissolve or wash away from the film or plate carrying the overcoated dye layer with it. If, however, this dye layer or the carrier itself is either slowly soluble or actually repellant to the developing solutions, removal may be either slow or incomplete, or in some extreme cases there may be no removal at all.

It is, therefore, an object of the present invention to provide novel means for backing or overcoating photographic films or plates. A further object is to provide a backing or an overcoating layer which is readily removable in photographic processing baths. A still further object is to provide a backing or overcoating layer having increased wettability by the processing solutions. A still further object is to provide a backing or overcoating layer which disperses in the wash water or processing baths so that it is not removed in large pieces.

These objects are accomplished by incorporating in or over the backings or overcoatings certain materials which greatly increase the susceptibility of the backing or overcoating to the processing solutions. Materials of this type consist of alkyl aryl sulfonates, such as the sulfonates of an isopropyl naphthalene.

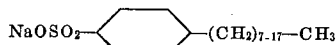
In the accompanying drawing, Fig. 1 is an enlarged sectional view of a film having an anti-halation backing according to our invention, and Fig. 2 is an enlarged sectional view of a photographic film having an overcoating layer according to our invention.

In the practice of our invention a suitable amount of the wetting agent is applied to the overcoating or backing layer from a solvent solution, or in the case of an anti-halation layer,

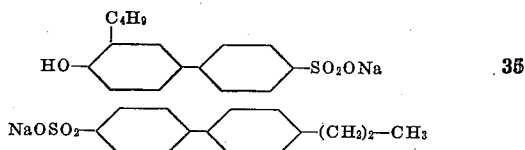
it is convenient to apply it in the dye solution itself. The wetting agent may also be contained in the backing or overcoating layer for the purpose of increasing the susceptibility of the layer to the processing baths. The amount of wetting agent used is determined by the degree of wettability desired, the compatibility of the particular wetting agent with the dye solution (in the case of an anti-halation backing), and the degree to which the given weight of wetting agent will reduce the surface tension at the interface of liquid and solid.

Wetting agents which we have found suitable for this purpose are alkyl aryl sulfonates, in which the aryl group may be benzene, naphthalene, anthracene, diphenyl, etc., and the alkyl group may contain from 3 to 18 carbon atoms. Specific examples of compounds of this type are as follows:

Alkylated phenol sodium sulfonates in which the alkyl groups are a mixture derived from kerosene hydrocarbons. These compounds are sold by National Aniline & Chemical Co., Inc., under the trade-name Nacconal KP, and have a typical structure as follows:



Sulfonated alkyl diphenyls, sold by Monsanto Chemical Co. under the trade-names Areskap, Aresket, and Areskelene. These compounds are believed to have the following typical structure:



Sulfonated isopropyl naphthalenes, sold by The American Cyanamid and Chemical Corporation. Examples are the sodium salt of isopropyl naphthalene sulfonate, sold under the trade-name Aerosol OS, and di-isopropyl naphthalene sulfonate, sold under the trade-name Aquarex.

The material to which these wetting agents may be applied may consist of any substance which is water-soluble or susceptible to the processing baths ordinarily used in the treatment of photographic films or plates. Suitable materials are as follows: Cellulose esters containing a free carboxyl group, such as cellulose acetate phthalate, cellulose acetate succinate, or cellulose acetate maleate, the preparation of which is described in Genung U. S. Patent 2,126,460, August

- 9, 1938; water soluble salts of these esters, such as the ammonium and the amine salts, some of which are described in Malm U. S. Patent 1,884,035, October 25, 1932; cellulose acetate propionate phthalate, described in Blanchard application Serial No. 222,302, filed July 30, 1938; cellulose ethers, such as ethyl cellulose phthalate described in Genung U. S. Patent 2,126,460; polyvinyl phthalate, described in Nadeau U. S. Patent 2,131,747, October 4, 1938; polyvinyl alcohol, described in Sheppard et al. U. S. Patent 1,768,795, July 1, 1930; agar phthalate, described in Malm et al. application Serial No. 230,504, filed September 17, 1938; and others.
- The following specific examples, which are illustrative only, will serve to illustrate our invention.

Example I

- To a photographic film base before or after application of the sensitive emulsion layer, there is applied a layer of cellulose acetate phthalate from organic solvents as follows:

	Grams
Cellulose acetate phthalate	8
Acetone	70
Methyl alcohol	22

- This coating is dried down to form a continuous layer on the film and is then dyed with a solution of Spirit Nigrosine NB containing the sodium salt of isopropyl naphthalene sulfonate and having the following composition:

	Grams
Spirit Nigrosine NB	5
Methyl alcohol	83
Butyl alcohol	10
Sodium salt of isopropyl naphthalene sulfonate	2

- This dye layer is easily wetted by the processing solutions and is completely removed.

Example II

- A photographic emulsion layer, after drying, is coated with a protective layer of polyvinyl phthalate containing a wetting agent and having the following composition:

	Grams
Polyvinyl phthalate	5
Methyl alcohol	46.5
Mutyl acetate	46.5
Di-isopropyl naphthalene sulfonate	2

- This layer is readily removable in the processing baths.

- In the drawing accompanying this application, Fig. 1 shows a film support backed according to our invention. As shown therein, 10 is a support of glass or suitable cellulosic material, such as cellulose nitrate, cellulose acetate, cellulose acetate propionate, cellulose acetate butyrate, or of a suitable synthetic resin, such as a polyvinyl acetaldehyde acetal resin. The support carries an emulsion layer 11 and a backing layer 12 consisting of cellulose acetate phthalate. Over the backing layer 12 there is applied an anti-halation dye or pigment layer 13 containing an isopropyl naphthalene sulfonate. As shown in Fig. 2, the support 10 carried the emulsion layer 11 and an overcoating layer 14 of a water-soluble or water-susceptible cellulose ester or synthetic resin containing an isopropyl naphthalene sulfonate.

- In Staud U. S. 1,954,337, April 10, 1934, there is described a photographic film having an anti-halation backing layer or an overcoating layer

of the acid form of cellulose acetate phthalate containing monoacetin for the purpose of increasing permeability of the coating. We have found, however, that the materials which we propose to use are superior to those described in the Staud patent. When using the wetting agents of the present invention, the backing layer is easily and readily removed and does not contaminate the developing solution or other bath in which the layer is removed. It is important, in processing photographic film, particularly motion picture film which is subjected to continuous treatment, that the backing layer be removed as quickly and completely as possible. A material which makes possible this ready removal of the backing is, therefore, highly useful and is a desirable advance in the photographic art.

The materials and examples of the present specification are illustrative only and it is to be understood that numerous methods and ingredients may be used within the scope of the present description, and that our invention is to be taken as limited only by the scope of the appended claims.

We claim:

1. A sensitive photographic element comprising a water-susceptible superficial coating and over said coating a layer containing on alkyl aryl sulfonate, the composite coating being readily removable in photographic processing baths.

2. A sensitive photographic element comprising a water-susceptible superficial coating and over said coating a dye layer containing an alkyl aryl sulfonate, the composite coating being readily removable in photographic processing baths.

3. A sensitive photographic element comprising a water-susceptible superficial coating and over said coating a layer containing a sulfonate of an isopropyl naphthalene, the composite coating being readily removable in photographic processing baths.

4. A sensitive photographic element comprising water-susceptible superficial coating and over said coating and dye layer containing a sulfonate of an isopropyl naphthalene, the composite coating being readily removable in photographic processing baths.

5. A sensitive photographic element comprising a superficial coating of cellulose acetate phthalate and over said coating a layer containing a sulfonate of an isopropyl naphthalene, the composite coating being readily removable in photographic processing baths.

6. A sensitive photographic element comprising a backing layer of cellulose acetate phthalate and over said layer a dye layer containing a sulfonate of an isopropyl naphthalene, the composite backing being readily removable in photographic processing baths.

7. A sensitive photographic element comprising a superficial coating of a water susceptible material and over said coating a layer containing the sodium salt of isopropyl naphthalene sulfonate, the composite coating being readily removable in photographic processing baths.

8. A sensitive photographic element comprising a backing layer of a water susceptible material and over said layer a dye layer containing the sodium salt of isopropyl naphthalene sulfonate, the composite backing layer being readily removable in photographic processing baths.

9. A sensitive photographic element compris-

ing a superficial coating of cellulose acetate phthalate and over said coating a layer containing di-isopropyl naphthalene sulfonate, the composite coating being readily removable in
5 photographic processing baths.

ing a backing layer of cellulose acetate phthalate and over said backing layer an anti-halation dye or pigment layer containing di-isopropyl naphthalene sulfonate.

10. A sensitive photographic element compris-

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