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ANTIHALATION BACKING FOR PHOTOGRAPHIC FILM

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FIG. 1

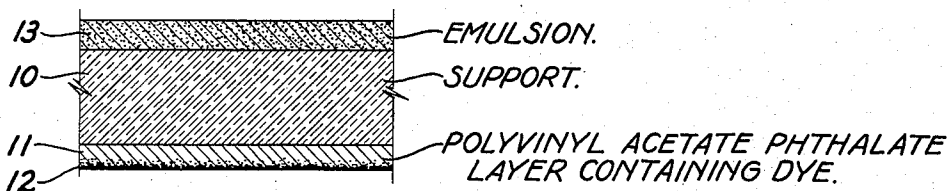


FIG. 2

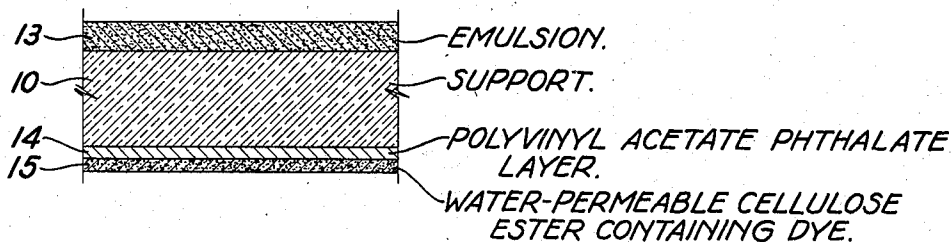
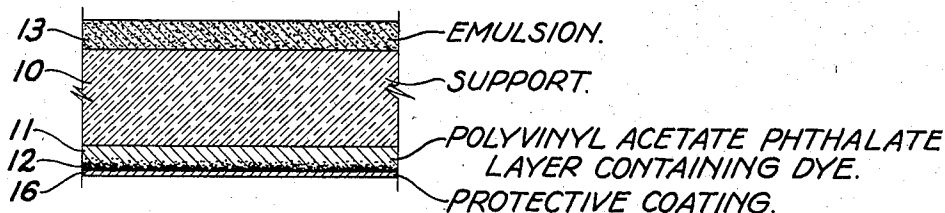


FIG. 3



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ANTIHALATION BACKING FOR PHOTOGRAPHIC FILM

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4 Claims. (Cl. 95—9)

This invention relates to photographic film and more particularly to a backing or overcoating layer for such film for the purpose of reducing the halation or protecting the surface of the film.

Anti-halation backings and layers for photographic films and plates are well known in the photographic art. Such layers are employed for the purpose of absorbing light rays which would otherwise be reflected from surfaces of the film or plate support or from other surfaces of the film thereby preventing the action of these reflected rays on the sensitive emulsion. As applied to photographic films the anti-halation layer is usually a separate layer of gelatin or other colloidal material containing a dye. For various reasons it is preferable to use colloidal materials which are insoluble in water but which may be removed in the regular photographic processing baths. The removal of the backing in the photographic developers which contain alkali and sulfite involves certain difficulties, such as sludging or thickening of the developing bath and in some instances there is a decided restraining action on the development of the silver image so that the development time is greatly increased or the density of the developed image is reduced.

One method of overcoming these difficulties is to use a backing material which is capable of forming water-soluble salts in aqueous alkaline solutions, yet due to its relatively poor solubility in these solutions does not dissolve in the normal alkaline-sulfite developer being restrained from going into solution by the salts normally present in the developing bath. An anti-halation backing containing cellulose acetate phthalate acts in this manner. When a material of this type is immersed in an alkaline-sulfite developing solution it does not dissolve but due to the salting-out action of the salts present remains attached to its support as a coherent film. During its immersion, however, it does react with the alkali present to form the water-soluble alkali metal salt. When immersed in clear water after removal from the developer the cellulose acetate phthalate will dissolve away and is removed from its support. Backings such as cellulose acetate phthalate, are desirable in this respect but when applied to a flexible film these backings are frequently undesirable since they are inherently brittle, are difficult to plasticize and show poor adhesion to the cellulose esters used as photographic film supports.

It is, therefore, an object of the present inven-

tion to provide a film coating or backing layer which has the desirable removal properties of materials, such as cellulose acetate phthalate but which does not possess the undesirable properties of such materials. A further object is to provide a photographic film coating which is soluble in a wide range of solvents and which may be applied readily to a photographic film support. A still further object is to provide a photographic film coating which adheres well to film supports but which does not produce a brittle coating. Other objects will appear from the following description of our invention.

These objects are accomplished by the use of a film coating of a polyvinyl mixed ester, such as polyvinyl acetate phthalate.

In the accompanying drawing

Fig. 1 is an enlarged sectional view of a film having anti-halation layer of polyvinyl acetate phthalate and a dye.

Fig. 2 is an enlarged sectional view of a film having an undercoating layer of polyvinyl acetate phthalate and an anti-halation layer coated over it.

Fig. 3 is an enlarged sectional view of a photographic film having an anti-halation layer of polyvinyl acetate phthalate and a protective coating over it.

The material which we propose to use as anti-halation backing may be made in various ways, such as by dissolving polyvinyl acetate in a suitable solvent and adding water and phthalic anhydride and effecting reaction in an autoclave under pressure. The resulting reaction involves a hydrolysis of the polyvinyl acetate followed by substitution of the hydroxyl group by phthalyl groups. Polyvinyl acetate phthalate is soluble in various solvents, such as ethyl alcohol, methyl alcohol, ethylene dichloride, and in mixtures of acetone and water, methyl alcohol and methyl Cellosolve and water.

Polyvinyl acetate phthalate fulfills the requirements which we consider desirable for use as a carrier for an anti-halation medium. Films of polyvinyl acetate phthalate deposited from solution are flexible, possess good adhesion to flexible photographic film supports, and are not removed in the alkaline sulfite developing bath but in the wash water following the developer. These advantages are of importance when compared with materials hitherto used. Although the film coatings of polyvinyl acetate phthalate are removed as easily as coatings of cellulose acetate phthalate they are less brittle and more adhesive to the film support without inducing brittleness. As com-

pared with coatings of polyvinyl phthalate they are more adhesive to cellulose ester film supports and are more easily removed without producing contamination of the developer.

Film coatings are produced according to our invention by dissolving polyvinyl acetate phthalate in a suitable solvent in amounts from about 5% to about 20% and coating the solution on a support. The amount of polyvinyl acetate phthalate in the solution will depend on various factors such as the speed of coating the thickness of the layer and the amount of dye to be applied for anti-halation protection. The amount of polyvinyl acetate phthalate may vary above or below these limits. For ordinary purposes the range stated has been found to be satisfactory.

An anti-halation backing using our material may be compounded as follows:

	Grams
Polyvinyl acetate phthalate.....	20
Ethyl alcohol.....	50
Acetone.....	30

This solution may be applied to a photographic support by any well known method, the solvents driven off by heat and the resultant film of polyvinyl acetate phthalate dyed by means of a solution composed of a dye in suitable solvents, such as follows:

	Grams
Nigrosine (color index No. 864).....	5
Methyl alcohol.....	95
Aerosol AY (sulphonated dicarboxylic acid ester).....	3

If it is desired to apply the anti-halation backing as a single application, the following formula is satisfactory:

	Grams
Polyvinyl acetate phthalate.....	10
Ethyl alcohol.....	88.5
Nigrosine.....	1
Aerosol AY.....	3

Our invention will now be described by particular reference to the accompanying drawing.

As shown in Fig. 1 of the drawing, a support 10 of any suitable material, such as cellulose nitrate, cellulose acetate, cellulose acetate propionate or cellulose acetate butyrate is coated with an anti-halation layer 11 of polyvinyl acetate phthalate and is then coated with a solution which deposits an anti-halation dye 12. A sensitive emulsion 13 is coated on the opposite side of the support 10. The dye 12 may also be mixed with the resin comprising the layer 11 prior to coating in which case it will be uniformly dispersed throughout the resin layer. As a further alternative the dye layer 12 may be such that it does not penetrate the backing layer and, therefore, forms a separate layer on the surface of the backing layer.

In the modification shown in Fig. 2 the support 10 is coated with a separate layer 14 of polyvinyl acetate phthalate followed by a layer 15 of a water permeable cellulose ester, such as cellulose acetate phthalate containing an anti-halation dye. Emulsion layer 13 is coated on

the opposite side of the support 10. In certain cases removal of the backing is facilitated by applying the layers 14 and 15 in separate coating operations.

Fig. 3 illustrates a film backing having a protective layer. A support 10 is coated with polyvinyl acetate phthalate layer 11 and dye 12 followed by a protective layer 16 of carnauba wax or other suitable material. This layer protects the polyvinyl acetate phthalate layer from abrasion during further coating or other treatment of the film. The sensitive emulsion layer is coated on the opposite side in the customary manner.

Anti-halation backings of the type which we have described may be used on cellulose organic ester film supports, on cellulose nitrate supports, synthetic resin supports or glass supports. In addition to being used with single emulsion layer films as illustrated, they are obviously applicable to use with films having multiple emulsion layers.

In addition to polyvinyl acetate phthalate, other polyvinyl mixed esters are suitable for use according to our invention, such as polyvinyl acetate propionate phthalate, polyvinyl acetate butyrate phthalate, etc. These esters may be used alone or in admixture with small amounts of other colloidal materials, for example, polyvinyl acetate phthalate may be mixed with cellulose acetate phthalate in suitable proportions for use as a backing layer.

In addition to their use as anti-halation layers the materials suggested according to our invention may also be used for photographic film coatings of other types, for example, they may be used as anti-static backings or overcoating layers or as protective layers over the emulsion layer or on the opposite side of the photographic support. Other modifications of our invention may be made within the scope of the appended claims.

What we claim is:

1. A sensitive photographic element comprising a light-transmitting support having thereon a sensitive emulsion layer and an anti-halation layer of polyvinyl ester of a lower fatty acid and a dicarboxylic acid, and a dye.

2. A light-sensitive photographic element comprising a light-transmitting support having on one side thereof a sensitive photographic layer and on the opposite side an anti-halation layer of polyvinyl acetate phthalate and a dye.

3. A light-sensitive photographic element comprising a light-transmitting support having on one side thereof a sensitive emulsion layer and on the opposite side an anti-halation layer of polyvinyl acetate phthalate and a dye complementary to the color to which the emulsion is sensitive.

4. The method of providing a photographic element with an anti-halation coating which comprises dissolving polyvinyl acetate phthalate in a non-aqueous solvent, adding a suitable non-actinic dye, and applying the resulting solution to the rear surface of said photographic element.

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