

[54] **PHOTOGRAPHIC OVERCOAT  
COMPOSITION OF AN ALKENYL HALF  
ESTER OF STARCH**  
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[22] Filed: **Dec. 15, 1972**

[21] Appl. No.: **315,485**

[52] **U.S. Cl.**..... 96/67, 96/50 PL, 96/114.3  
[51] **Int. Cl.**..... **G03c 1/76**  
[58] **Field of Search**..... 96/114.3, 114.8, 50 PL,  
96/67; 117/6, 144

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[57] **ABSTRACT**  
Photographic elements having antiblocking and antiferrotyping properties as well as improved slippage, are provided by employing in at least one outer layer, an improved protective overcoat composition containing gelatin and certain polysaccharide derivatives of substituted dicarboxylic acids, for example the octenyl succinate ester of starch.

**5 Claims, No Drawings**

# PHOTOGRAPHIC OVERCOAT COMPOSITION OF AN ALKENYL HALF ESTER OF STARCH

This invention relates to a protective overcoat. This coating substantially inhibits any offset, ferrotyping, which is the production of variable gloss patterns on elements when they are pulled apart, or blocking, which is sticking together of surfaces in contact, between the front sensitized portion of the element and the back of the element or any other surface that comes in contact with the front sensitized portion. Further, greatly improved slippage properties are imparted to the element. The transfer inhibition enables the elements to be stored in tightly wound rolls, or in other ways where contact is permitted between the sensitized side of the element and juxtaposed surfaces which may be the unsensitized back side of the film or some other surface, with little or no offset, thus reducing or eliminating a primary cause for the loss of photographic elements and obscuring of information. The improved slippage properties are very desirable when the element is in continuous strip form. This property reduces or prevents excessive adhesion and cohesion when the long length strips are inserted in magazines or cassettes.

In some cases photographic elements may be interleaved with paper layers or the like which separate the back of the elements from the sensitizing layer to prevent transfer. In many instances, however, certain film is tightly wound into rolls for insertion into magazines or the like so that the sensitive layer is of necessity in direct and intimate contact with the back of the adjacent element or film. In this situation it is not practical to use an intermediate paper layer. Further, the element which is thus in contact with itself experiences both cohesive and adhesive forces which cause sticking and abrasion as the roll is unwound. A single overcoating composition which overcomes both of these problems is thus seen to be extremely desirable.

The use of overcoat layers for photographic elements containing silver halide emulsions is well known. These layers have been used for many different purposes, are often of varied compositions and frequently contain a matte agent, such as fine particles of starch, or starch derivatives, resins, such as polystyrene, or inorganic compounds such as silicon dioxides, titanium dioxide, barium sulfate, and the like. Generally, such a matting composition included within the protective surface is to prevent abrasion, unevenness of exposure or projection caused by adhesion of the layer to other smooth surfaces during printing, and to provide a surface which can be readily written upon. Additionally, some of these protective surface compositions of the art are employed to prevent or inhibit interaction between the sensitive surface of a photographic material and the support or antihalation side of the material, when the material is stored in rolls or stacks. The prior art has attempted to solve this problem of interaction in many ways — see for example, T. T. Baker's, *Photo Emulsion Technique* — (1948 American Photographic Publishing Company), Page 215; U.S. Pats. Nos. 2,739,891; 2,173,480; 2,322,177; 3,507,678; 2,173,480; 3,589,908; 3,591,379; 3,026,202; 2,322,037 and British Pats. Nos. 1,055,713 and 1,028,529. Many of these patents are concerned with the addition of selected hydrophilic colloids and particulate agents to gelatin — generally, these methods have not been completely satisfactory.

For example, in modern instrumentation film or elements which are used to record the characters of a cathode ray tube, the protective layer must be devoid of matte or opacity which would interfere with projection or print reception. Thus, many of the well known approaches using a matte containing protective layer are unsatisfactory because the particle shows as a discrete image upon projection. Additionally, the slippage properties of many of these coatings are not completely satisfactory. Further, certain additives used in the silver halide emulsions cause haze, which is attributed to light scattering within the protective layer or at the interface of the layer and the air. Accordingly, the indiscriminate use of particulate solids and hydrophilic colloids in coating layers is frequently detrimental to the high resolution requirements of modern type photographic elements.

It is, therefore, an object of this invention to provide a transfer inhibiting protective coating composition having improved slippage properties and a silver halide gelatin emulsion photographic element coated with same, which will not be subject to one or more of the above disadvantages.

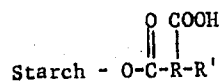
Another object of this invention is to provide a protective overcoat composition incorporating selected additives to inhibit the transfer, offset, blocking, and ferrotyping of the sensitive portion of the film to a contacting or juxtaposed surface.

A further object is to provide a method of insuring against obscuring information and loss of film elements, due to transfer of sensitive components from the front of the film to the back of the juxtaposed film when stored in tightly wound rolls or multilayered stacks.

Yet another object is to provide a more efficient photographic element by reducing or eliminating waste due to the offset of sensitive materials from the sensitive portion to the back portion of the film or to other contacting or juxtaposed surfaces.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same become better understood by reference to the following description:

The attainment of the above objects is made possible by a composition of matter for use with a photographic element comprising an aqueous dispersion, the solids content of which comprises (A) a soluble alkenyl half ester of starch of the formula:



wherein R is a radical selected from the group consisting of dimethylene and trimethylene and wherein R' is C<sub>2-8</sub> alkyl, C<sub>2-8</sub> alkenyl, aralkyl or aralkenyl radical, the preferred embodiment being a C<sub>2-8</sub> alkenyl radical, and (B) gelatin, in weight proportions of about 1.1 to 2.0 parts of (A) per 1 part of (B).

The subject invention, employing at least one overcoat layer on a photographic element which layer contains gelatin and a polysaccharide derivative of a substituted dicarboxylic acid, overcomes one or more of the disadvantages of the prior art heretofore described. This is accomplished with the advantage that such element has greatly improved slippage characteristics and is rendered capable of being stored in tightly wound or

other juxtaposed condition for extended periods of time at ambient conditions. The efficiency of such element is greatly increased as by reduction of the amount of unusable material due to transfer, blocking, offset and ferrotyping.

In the practice of this invention, it has been found that an overcoat composition comprised of gelatin and certain selected film forming starch esters produce surprising results in the production of a photographic element having an excellent combination of slippage, abrasion resistance and antiblocking properties. The overcoat composition of the invention can be conveniently prepared by dissolving the film forming polysaccharide derivative and gelatin in a solvent solution, usually water, in sufficient quantities to provide a solids ratio of more than one part by weight of polysaccharide derivative to one part by weight of gelatin. The amount of such derivative used may vary up to about 2 parts by weight per part of gelatin, but it has been determined that, to provide the advantages of this invention, a major proportion of polysaccharide derivative which is at least greater than 1 to 1 weight/weight ratio is essential, preferably from 1.1 to 2.0 times the amount of gelatin. Further, it is essential that the type of polysaccharide derivative used is both soluble and non-particulate in use, to form a clear non-hazy dispersion to substantially prevent light scattering. The coating, to reduce or prevent offset, transfer and the like, must conform to certain parameters. It must be strongly bonded to the base film, and it must have an index of refraction close to or identical to the base film; it must be compatible with the base film; it must form a substantially continuous film, and it must effectively reduce or inhibit transfer of the sensitive material to other juxtaposed or other contacting surfaces.

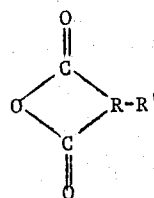
In summary, the photographic element of the invention is generally composed of a support, one or more silver halide layers covering either or both sides of the support, and one or more protective overcoat layers of the invention covering at least one of said silver halide layers and usually at least all of the silver halide layers, which would otherwise form the exterior surface of the photographic element. The photographic element may also contain other auxiliary layers such as are generally found in photographic elements. For example, subbing layers, antihalation layers, and the like. The protective overcoat layer solution, as well as the silver halide emulsion, may contain additional chemicals, such as hardeners and coating aids. The photographic element is prepared in a conventional manner by coating the support with the emulsion and overcoat layer in the sequence required to give the desired photographic element layer combination. While the photographic emulsion can be dried and stored before coating with the overcoat, simultaneous coating is preferred. Coating machines and methods such as those described in U.S. pat. No. 2,761,419 and 2,761,791 may be used.

The particular support material used in the invention is not critical though desirably this material should be firm, stable, inert and preferably flexible. The material familiar to the art are suitable support materials, and include cellulose nitrate, cellulose esters, such as cellulose triacetate; mixed cellulose esters, such as cellulose acetate butyrate and cellulose acetate propionate; synthetic resins, such as polyvinyl chloride acetate, polyvinyl acetal, polystyrene, polyethylene terephthalate, and bis phenol-A polycarbonate; as well as glass, paper,

metal, wood and the like. Supports such as paper which are coated with Alpha-olefin polymers, particularly polymers of Alpha-olefins containing two or more carbon atoms, as exemplified by polyethylene, polypropylene, ethylenebutene copolymers, and the like, may be used. Paper and other opaque supports, of course, are not used for projection, and graininess is not as much of a factor as with the transparent or translucent supports which are used for projection, but the invention provides significant benefits when paper supports are used, such as transfer inhibition and improved slippage characteristics. The above materials are, of course, only illustrative and not limiting, as other materials having the desired properties can be used. Further, it is contemplated that additional suitable support materials will be developed in the future. As before mentioned, the support can be coated on either or both sides.

The polysaccharide substituted dicarboxylic acids of this invention are the reaction products resulting from the treatment of a polysaccharide with a reagent which introduces both a hydrophilic and a hydrophobic group, so that each substituent radical of the resultant polysaccharide derivative contains both a hydrophilic, as well as a hydrophobic group. The polysaccharides used are starch, gelatinized or ungelatinized from any source, including corn, partially hydrolyzed corn, tapioca, potato, wheat, sago, rice, waxy maize, and other well known types; also included are modified or thin boiling starches and starch derivatives, dextrins, cellulose, such as wood pulp, cotton, linters, regenerated cellulose and hemi cellulose, in the form of their water soluble derivatives.

The reaction product referred to above is formed from a polysaccharide treated with a substituted dicarboxylic acid anhydride of the following structural formula:

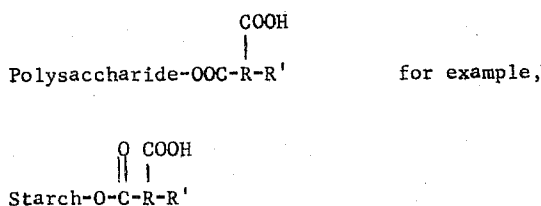


Wherein R represents a dimethylene or trimethylene radical and wherein R' is the substituent hydrophobic group. Substituted cyclic dicarboxylic acid anhydrides falling within the above structural formula are the substituted succinic and glutaric acid anhydrides.

The hydrophobic substituent group R' may be C<sub>2-8</sub> alkyl or C<sub>2-8</sub> alkenyl, aralkyl, or aralkenyl. R' may be joined to the anhydride moiety R through a carbon-to-carbon bond (as in alkenyl succinic anhydride) or through two carbon-to-carbon bonds (as in the adduct of maleic anhydride with methyl pentadiene, or as in the cyclo-paraffinic cyclodicarboxylic acid anhydrides, such as, for example, cyclohexane 1,2-dicarboxylic acid anhydride), or may be linked through an ether or ester linkage (as, for example, in octyloxy succinic anhydride or in capryloxy succinic anhydride). Regardless of the particular linkage between the hydrophobic substituent R' and the anhydride proper, all of the abovelisted types fall within the class of substituted succinic or glutaric anhydrides. In place of the organic

acid anhydrides mentioned above, one may also use the substituted dicarboxylic acid chlorides of those dicarboxylic acids which form cyclic anhydrides, such as, for example, alkenyl succinic acid chloride. Therefore, in the specification, examples and claims, it is to be understood that whenever the organic acid anhydride is referred to, the substituted dicarboxylic acid chloride may be used as the equivalent thereof. In all cases, the remaining free carboxyl radical present after the reaction of the reagents with the polysaccharide represents the hydrophilic group.

The products formed by the reaction of polysaccharides with any of the above-listed reagents are the acid half esters of the substituted dicarboxylic acids and, more specifically, they are the acid half esters of either substituted succinic or glutaric acid. The degree of substitution on the starch is about 0.005 to 0.02. These acid esters may be represented by the following structural formulae:



Wherein R is a dimethylene or trimethylene radical and R', the substituent hydrophobic group is a C<sub>2-8</sub> alkyl or C<sub>2-8</sub> alkenyl, aralkyl, or aralkenyl group, preferably wherein R' is C<sub>2-8</sub> alkenyl. As previously stated, the hydrophilic group in all cases is the remaining free carboxyl group (COOH) resulting from the esterification of only one carboxyl group of the dicarboxylic acid.

The preparation of these compounds is fully described in U.S. Pat. No. 2,661,349 which is hereby incorporated by reference into the instant specification.

It should, of course, be appreciated that the overcoat composition is applied to the silver halide or other layer, within a volatile solvent or carrier, usually water, and that such solutions or dispersions are encompassed by the invention.

Any of the well known gelatin photographic silver halide emulsions can be employed in the practice of this invention, including, for example, photographic silver halide emulsions used in X-ray and camera films and the like. Suitable photographic emulsions contain silver halides, such as silver chloride, silver bromide, silver bromiodide, silver chloriodide, silver chlorobromide and the like.

The photographic emulsions used in the elements described herein can be chemically sensitized with compounds of the sulfur group, noble metal salts, such as gold salts, reduction sensitized with reducing agents, and combinations of these.

The photographic silver halide emulsions can also contain additional additives, particularly those known to be beneficial in photographic emulsions. For example, the emulsion can contain speed increasing compounds, such as quaternary ammonium salts, polyalkylene glycols, thioethers, and the like. The photographic silver halide emulsion can be stabilized with mercury compounds, azaindenes quaternary benzothiazolium

compounds, hydroxy substituted aromatic compounds, and the like.

The photographic silver halide elements described herein can contain light absorbing dyes in the emulsion layer or in an auxiliary layer, such as a layer coated between the support and the emulsion layer, or the light absorbing dyes can be included in both the emulsion and the auxiliary layer.

The photographic silver halide emulsions disclosed herein can also contain non-ionic, anionic and/or amphoteric coating aids. Some useful coating aids include, for example, saponin, alkyl substituted aryloxy alkylene ether sulfonates of the type described in U.S. Pat. No. 2,600,831; maleopimarates of the type described in U.S. Pat. No. 2,823,123; taurine derivatives of the type described in U.S. Pat. No. 2,739,891 and alkyl aminopropionates of the types described in U.S. Pat. No. 3,133,816. The emulsions and photographic elements described herein can contain incorporated developing agents such as polyhydroxy benzenes, aminophenols and 1,3 pyrazolidones. The photographic emulsions can also contain spectral sensitizers, such as, cyanines, merocyanines, complex (trinuclear) cyanines and complex (trinuclear) merocyanines, styryls and hemicyanines. These emulsions can be blue sensitive emulsions or they can be orthochromatic, panchromatic or X-ray emulsions.

The silver halide layers gelatin overcoat or other layers in the photographic elements of this invention can also contain plasticizers or lubricating materials, such as long chain fatty acids, silicone resins, N-alkyl beta amino propionates, palmityl palmitate, and the like. Further, the emulsion layers and other layers present in photographic elements made according to this invention can be hardened with any suitable hardener, such as aldehyde hardeners, aziridine hardeners, hardeners which are derivatives of dioxane, oxypolysaccharides, such as oxystarch oxy plant gums, inorganic hardeners, such as chromium salts, hardeners having reactive vinyl groups, such as the vinyl sulfonyl ethers and the like.

Further, although as is evident from the above, the silver halide layer will be usually applied as what is referred to by the art as an emulsion; it can also be applied by other means, such as, for example, by vapor deposition.

Generally, as is customary in the art, in the practice of this invention, about 1.0 to 8.0 grams dry weight of silver halide, in the photographic emulsion are deposited per square meter. The compositions of this invention are generally applied at a rate of about 0.75 to 2.0 grams dry weight of overcoat solids per square meter.

The following examples will more fully illustrate the embodiments of this invention. All proportions referred to herein and in the appended claims are by weight, unless otherwise indicated.

#### EXAMPLE I

An overcoat composition is prepared according to this invention and compared with two types of conventional compositions as follows:

A. Ninety grams of acidic photographic grade gelatin supplied by Kind and Knox, Inc. is added in powdered form to a suitable container. One hundred grams of the octenyl succinate half ester of partially hydrolyzed waxy cornstarch, is powdered form, prepared in the manner described in Example II of U.S. Pat. No. 2,661,349 is added to the gelatin. The half ester has a

degree of substitution on the starch of 0.015. Three liters of distilled water is added to the solids. The mixture is then allowed to stand at room temperature for one-half hour or long enough to swell both of the additives. The mixture is then agitated and the temperature gradually raised to 60°C. The agitation and heating is maintained until the additives dissolve and a clear dispersion is obtained. The dispersion is cooled to 38°C, then at this point, 15 grams of formaldehyde hardener and a coating additive composed of 15 grams of nonyl phenoxy polyethyleneoxy ethanol having 9 ethylene oxide moieties per molecule are added with stirring. This dispersion is then used as the protective overcoat of this invention.

B. A conventional overcoat solution containing 3% by weight gelatin is prepared by forming a dispersion of acidic, photographic grade gelatin in the conventional manner. That is by admixing the gelatin with water, swelling, agitating and heating to effect dissolution. The dispersion is cooled and 0.5% by weight of nonyl-phenoxy polyethyleneoxy ethanol having 9 ethylene oxide moieties per molecule and 0.5% by weight formaldehyde is then added, with continued heat and agitation. One-half of this solution is then set aside for use as a conventional gelatin overcoat.

C. To the other half of the solution remaining from B, 1% by weight of silicon dioxide having an average particle size of 5 microns is added and dispersed to form a conventional matte overcoat. This matte overcoat is then cooled for use.

A conventional base film is formulated as follows:

A photographic emulsion of silver iodo-bromide and gelatin is prepared in the following manner: Two solutions are prepared containing the following components:

Solution 1

|         |             |
|---------|-------------|
| gelatin | 250 grams   |
| KI      | 50 grams    |
| K Br    | 1,500 grams |
| water   | 7 liters    |

A portion of the water is added to the gelatin to swell it; the balance is then added to the solution heat to 50°C and stirred to dissolve the gelatin. The KI and K Br are then added with stirring to form Solution 1.

Solution 2

|                   |           |
|-------------------|-----------|
| Water             | 10 liters |
| AgNO <sub>3</sub> | 800 grams |

The silver nitrate is dissolved in the water at 50°C to form Solution 2.

Both solutions are heated to 60°C and Solution 2 is then added to Solution 1, over a 20 minute period. The solution is then ripened at 65°C for 45 minutes. 10,000 grams of Na<sub>2</sub>SO<sub>4</sub> are then added to coagulate the gelatin salt complex. The coagulum is then washed with cold water to remove most of the Na<sub>2</sub>SO<sub>4</sub> and other undesirable soluble salts. Eleven liters of a 10% by weight gelatin solution is then added to the coagulum with stirring and heating. The final gelatin emulsion is then diluted to 20 liters to form the final emulsion. The final emulsion is then coated on a cellulose acetate support in sufficient amount so that 3.5 grams dry weight of silver are disposed over one square meter of support. Each of the coating dispersions A, B, and C are individually coated on separate portions of the base film, simultaneously with the silver iodo-bromide emulsion according to the methods described in U.S. Pat. Nos. 2,761,419 and 2,761,791, thus resulting in three separate products overcoated with the coating dispersions A, B, and C at the rate of 1.4 grams of dry solids per square meter.

The overcoated films are then dried, slit, wound on a spool and stored for 3 days at 120°F and 60% relative humidity. After this period the films are unwound and visually observed. The results are as follows:

| Overcoat | Result                           |
|----------|----------------------------------|
| A.       | No ferrotyping or blocking.      |
| B.       | Severe ferrotyping and blocking. |
| C.       | No ferrotyping or blocking.      |

Samples of the overcoated films A, B, and C, are used to photograph characters projected onto the face of a cathode ray tube. The samples are then processed in conventional photographic developer and fixer solutions; the films are projected at a magnification of 40X in a GAF Model 220 viewing device which utilizes a specular light source, to observe the images of the characters recorded on the films. Sample coating C exhibits a background grain pattern which interferes with the interpretation of the original character which appears on the face of the cathode ray tube. Coatings A and B show no such background grain patterns.

From the above data, it is readily apparent that the addition of the starch ester of this invention to the overcoat layer produces a film with superior antiferrotyping properties as well as one which is free from a disturbing background grain pattern.

A number of experiments are run exactly as described in Example I, except that the constituents and the placement of the coating on the element are varied. A listing of these variations follows in Table I:

TABLE I

| PROTECTIVE COATING |                                            |                                              |                                     | PLACEMENT OF | PHOTOGRAPHIC EMULSION | BASE ELEMENT                                                 |                                                                                    |
|--------------------|--------------------------------------------|----------------------------------------------|-------------------------------------|--------------|-----------------------|--------------------------------------------------------------|------------------------------------------------------------------------------------|
| COATING            |                                            |                                              |                                     |              |                       |                                                              |                                                                                    |
| Ex-ample           | Starch Ester                               | Ester/ Gelatin Ratio & Dispersion Solids     | Coating Weight Dry Basis            | Additives    | Type                  | Emulsion Weight Dry Basis                                    |                                                                                    |
| II.                | Tapioca Starch triisobutyl succinate ester | 1.2 to 1.0<br><br>8% total dispersion solids | 1.8<br><br>grams per m <sup>2</sup> | None         | Back side of element  | Silver chloro-iodide<br><br>2.5 g. silver per m <sup>2</sup> | Polyethylene terephthalate precoated with polyethylene terephthalate subbing layer |

TABLE I—Continued

| PROTECTIVE COATING |                                                           |                                                      |                                         | PLACEMENT<br>OF                                            | PHOTOGRAPHIC EMULSION          |                         | BASE ELEMENT                            |                                  |
|--------------------|-----------------------------------------------------------|------------------------------------------------------|-----------------------------------------|------------------------------------------------------------|--------------------------------|-------------------------|-----------------------------------------|----------------------------------|
| COATING            |                                                           |                                                      |                                         |                                                            |                                |                         |                                         |                                  |
| Ex-amp-<br>le      | Starch<br>Ester                                           | Ester/<br>Gelatin<br>Ratio &<br>Dispersion<br>Solids | Coating<br>Weight<br>Dry<br>Basis       | Additives                                                  |                                | Type                    | Emulsion Weight<br>Dry Basis            |                                  |
| III.               | Waxy maize<br>starch<br>isopropenyl<br>succinate<br>ester | 1.6 to 1.0<br><br>5% total<br>dispersion<br>solids   | 0.75<br><br>grams<br>per m <sup>2</sup> | Formalde-<br><br>hyde<br>0.5%<br>Surfactant<br>(a)<br>0.8% | Over sensitive<br><br>emulsion | Silver bromide          | 3.5 g. silver<br><br>per m <sup>2</sup> | Polyethylene<br><br>coated paper |
| IV.                | Cornstarch<br>methyl<br>pentadienyl<br>succinate<br>ester | 1.8 to 1.0<br><br>dispersion<br>solids               | 2.0<br><br>grams<br>per m <sup>2</sup>  | Triacryl-<br>formal<br>0.2%<br>Surfactant<br>(b)<br>3.0%   | Over sensitive<br><br>emulsion | Silver<br>chlorobromide | 1.5 g. silver<br><br>per m <sup>2</sup> | Cellulose acetate<br>butyrate    |
| V.                 | Cornstarch<br>ethenyl<br>glutarate<br>ester               | 2.0 to 1.0<br><br>7% total<br>dispersion<br>solids   | 1.5<br><br>grams<br>per m <sup>2</sup>  | Glyoxal<br>3.0<br>Surfactant<br>(c)<br>1.2%                | Over sensitive<br><br>emulsion | Silver<br>chloride      | 2.5 g. silver<br><br>per m <sup>2</sup> | Cellulose Acetate<br>propionate  |

Surfactants

- (a) Dinonyl phenoxy polyethyleneoxy ethanol -- ethylene oxide moieties 11.  
(b) Sodium N-cyclohexyl N-palmitoyl taurate.  
(c) Sodium nonylphenoxy polyethyleneoxy ethanol - ethylene oxide moieties 9.

Results obtained from the Examples of Table I are similar to the results of Example I.

EXAMPLE VI

An overcoat dispersion is prepared in exactly the same manner as A in Example I and coated over an identical photographic film. A second identical photographic film is overcoated with a coating identical with coating B of Example I. Both coated films are stored for 3 days at 120°F and 60% relative humidity. These samples are then tested for slippage properties.

Both films are of 16mm size. They are placed on a flat surface and a 500 gram weight is placed on the coated surface of the film. This weight is then attached to a spring balance and the minimum force required to manually impart a steady lateral movement of the weight on the surface of the film is recorded. Results of these tests are as follows:

Film overcoated with the starch derivative composition of

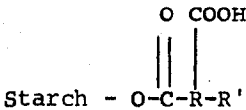
- Example I — Overcoat A — 100 g. drag force;  
Control film — Overcoat B — 200 g. drag force.

The starch ester makes the film twice as slippery as the control.

This invention has been described with respect to certain preferred embodiments, and various modifications and variations thereof will become obvious to persons skilled in the art and art to be included within the spirit and purview of this application and the scope of the appended claims.

What is claimed is:

1. In a photographic element comprising a support, at least one silver halide layer, and at least one overcoat layer, the improvement comprising said overcoat layer containing a composition comprising an aqueous dispersion, the solids content of which comprises (A) a soluble alkenyl half ester of starch of the formula:



wherein R is a radical selected from the group consisting of dimethylene and trimethylene and wherein R' is a C<sub>2-8</sub> alkenyl radical, and (B) gelatin, in weight proportions of about 1.1 to 2.0 parts of (A) per 1 part of (B), said overcoat layer being capable of protecting the exterior surface of at least one silver halide layer which is furthestmost from said support.

2. A photographic element as defined in claim 1, wherein R' is selected from the group consisting of octenyl, triisobutenyl, isopropenyl, methyl pentadienyl and ethenyl.

3. A photographic element as defined in claim 1 wherein said element is film, disposed in layered assemblies in such a manner that said silver halide layer is in at least close proximity to said overcoat layer.

4. A photographic element as defined in claim 3 wherein said film is disposed in rolls.

5. A photographic element as defined in claim 3 wherein said film is disposed in stacks.

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