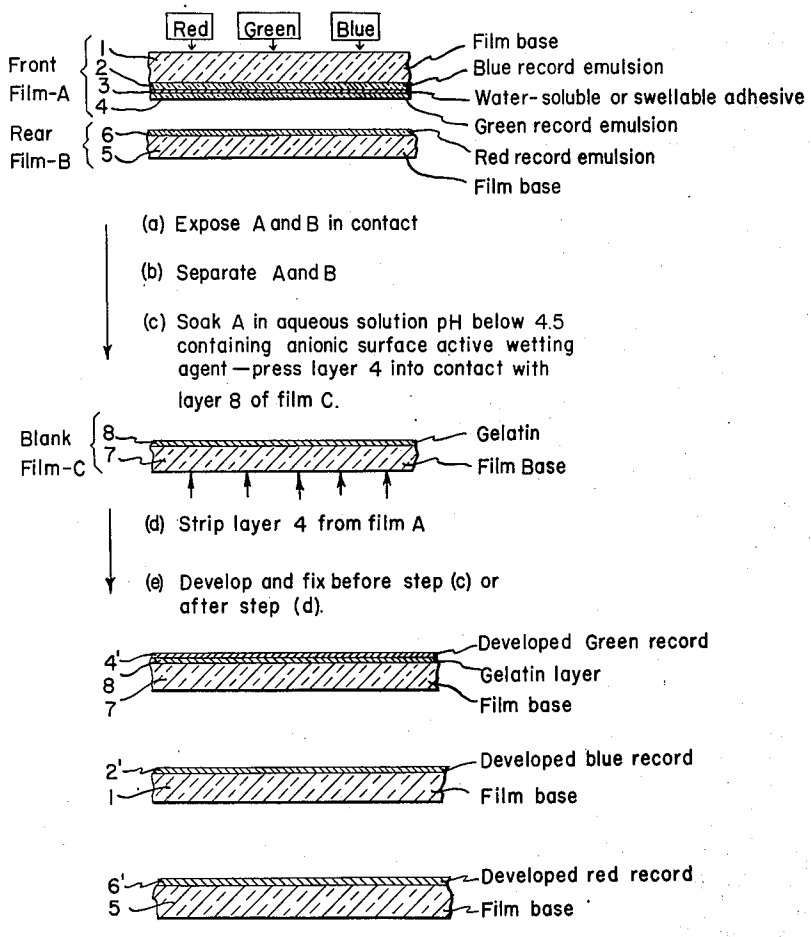
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PROCESS FOR TRANSFERRING A GELATIN IMAGE BEARING FILM

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PROCESS FOR TRANSFERRING A GELATIN IMAGE BEARING FILM

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This invention relates to photography and more particularly to a process of increasing the adherence of gelatin layers to each other. Still more particularly it relates to a process of transferring a gelatino silver halide or silver image-bearing layer to a gelatin-blank film, improving the adherence between such layers, and to processing solutions therefor.

An object of this invention is to improve the anchorage between gelatin-blank films and transferred gelatino silver halides or silver image-bearing layers. Another object is to improve a process of transferring a gelatin silver halide or silver image-bearing layer from a stripping film to a gelatin-blank film. A further object is to provide a simple and economical process for improving such anchorage. Still other objects will be apparent from the following description of the invention.

Various types of stripping films are known which consist of a gelatino silver halide layer which is releasably joined to a support such as a cellulose derivative, superpolymer, e. g., polyvinyl acetal or nylon film, baryta-coated paper, glass, etc., or to another gelatino silver halide emulsion layer or other layer on such a support by means of a water-soluble or other adhesive. The outer gelatin or image-bearing layer is transferred either before or after development to a gelatin-blank film. This film consists of a film base which has a thin gelatin layer often containing an acid, e. g., acetic, lactic, citric, etc., coated on it. The two gelatin layers of the respective films are pressed into contact and the image-bearing layer which adheres to the gelatin-blank is stripped from its original support. The washing water generally weakens or dissolves the stripping layer which allows the stripping action to take place. The normal washing operation is frequenly not sufficient to loosen the bond between the layers so a special aqueous transferring bath or treatment is used with films to be transferred after development. The processing can be interrupted after normal development, fixation and washing and the film dried for use at a later time.

It has been found that the anchorage between the gelatin surfaces of the gelatin-blank and the gelatin image-bearing layer of the stripping film can be markedly improved by adding to the aqueous transferring bath an anionic water-soluble surface active wetting agent and adjusting the pH to 4.5 or below, e. g., 1.0 to 4.5. The improved anchorage is surprising since wetting agents produce a slippery or slimy surface which

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one might expect to reduce the anchorage between layers. The preferred wetting agents are the sodium alkyl sulfates of 8 to 18 carbon atoms.

It has been further found that if the stripping and transfer operation is carried out after exposure and prior to development that a more efficient process is obtained. Each light-sensitive stratum containing latent images may be given individual treatment thus giving the photographic technician greater latitude in the operation whereas if stripping is done after development individual control of each latent image-bearing layer cannot be accomplished.

The stripping films which can be used in accordance with the procedures of this invention may contain various water-soluble, water-insoluble or water-swellable adhesives. Thus, they may be composed of water-soluble cellulose ethers, e. g., methyl cellulose, ethyl cellulose, cellulose glycolic acid and its water-soluble salts such as alkali metal, ammonium and amine salts, water-soluble starch derivatives, e. g., starch glycolic acid and its water-soluble alkali metal, ammonium and amine salts; polyvinyl alcohol, etc. The process is particularly useful with the stripping films disclosed in Jennings U. S. Patent 2,462,503. The stripping films of that patent constitute the front film (A) of a bipack. The stripping layer which is disposed between two gelatino silver halide emulsion layers is composed essentially of a water-soluble macromolecular acetal of a hydroxyl polymer containing a plurality of recurring intralinear

$$-CH_2-\underset{|}{C}HOH-$$

or vinyl alcohol units. These acetals are water-soluble by virtue of the fact that the hydrocarbon nucleus which is linked to the hydroxyl polymer nucleus through an acetal linkage has a hydrogen atom substituted by a group taken from the class consisting of —COOX and —SO_3X groups wherein X is a hydrogen atom or a water-soluble cation, e. g., alkali metal, ammonium or an amine salt group.

The sodium salt of the o-benzaldehyde sulfonic acid acetal of polyvinyl alcohol constitutes the preferred stripping layer of the films disclosed in U. S. Patent 2,462,503. The alkali metal salts of the aliphatic sulfo-aldehydes of the formula $HSO_3(CH_2)_nCHO$, where n is 2 to 10, e. g., beta-sulfopropionaldehyde, aliphatic carboxyaldehydes of the formula $HOOC(CH_2)_nCHO$, where n is 2 to 10, e. g., beta-formylpropionic acid; benzaldehyde-parasulfonic acid, terephthalaldehydic acid, p-(beta-formylethyl)-

benzoic acid and o-carboxymethoxybenzaldehyde are also described in the aforesaid application and are beneficially employed in accordance with this invention.

In the schematic drawing, which constitutes a part of this specification, there is shown the front film A of a bipack consisting of film base 1, blue record emulsion 2, stripping layer 3 composed of the aforementioned water-soluble or water-swellable adhesive and green record emulsion 4; the rear film of the bipack consisting of base 5 and red record emulsion 6; and a gelatin blank film consisting of film base 7 and gelatin layer 8. The drawing also contains legends and arrows to indicate the exposing, developing, soaking, and transferring steps. In addition, there is shown the resulting three developed green, blue and red records 4', 2' and 6' on their respective bases 7, 1 and 5.

The invention will be further illustrated but is not intended to be limited by the following examples:

EXAMPLE I

A cellulose nitrate film base having a thin gelatin coating was coated to a weight of 52 mg. silver halide per sq. dec. with a gelatino-silver iodobromide emulsion which had admixed therewith 50% by weight based on the silver salt of yellow colloidal silver (0.7% silver dispersed in aqueous gelatin solution). After drying, a solution containing 50 grams of a polyvinyl acetal per 1,000 grams of 20% ethanol, obtained by heating the mixture 45 minutes at 125° F., and cooling to 90° F. was coated to form a layer 0.0001 inch thick. This acetal was prepared by stirring a mixture of 44 parts of 100% hydrolyzed polyvinyl acetate (medium viscosity - molecular weight 15,000 to 20,000), 40 parts of glacial acetic acid, 40 parts of sodium o-benzaldehyde sulfonatemonohydrate, and 6 parts of 85% phosphoric acid at 75° to 80° C. for one to two hours. The product is then precipitated by the addition of 1,000 parts of acetone, and dried to give 75 parts of a white solid. Next, a gelatino-silver iodobromide emulsion containing 1,1'-diethyl-2,2'-cyanine iodide as an ortho-sensitizing dye was coated on the acetal layer to a weight of 48 mg. silver halide per sq. dec. A gelatin solution containing 450 grams of gelatin per 14,400 grams of water was coated in like manner to form a thin anti-abrasion layer. This film element constitutes the front film (A) of a bipack. It is slit and perforated to form a motion picture film.

A similar film base was coated with a thin gelatin substratum and dried. A gelatino-silver iodobromide emulsion containing as a green blind sensitizing dye 1,1' - diethyl -2,4- carbocyanine iodide was coated on the gelatin substratum. It constitutes the rear film of a bipack and is slit and perforated in like manner to form a motion picture film.

The front film was processed as follows:

(1) Developed for 10 minutes at 68° F. in a developer made by admixing the following components:

Water (125° F. or 53° C.)	cc..	500.0
N-p-methylaminophenol sulfate	grams..	3.0
Sodium sulfite, desiccated	do....	45.0
Hydroquinone	do....	12.0
Sodium carbonate, desiccated	do....	67.5
Potassium bromide	do....	1.9

Cold water added to make 1.0 liter.

(2) Rinsed for 30 seconds at 68° F. in a solution made by admixing the following components:

Sodium sulfate, desiccated	grams..	100.0
Borax	do....	10.0

Water added to make 1.0 liter.

(3) Fixed for 8 minutes at 68° F. in a fixer made by admixing the following components:

Sodium thiosulfate	grams..	240.0
Sodium sulfite, desiccated	do....	15.0
Acetic acid, 28% pure	cc..	48.0
Boric acid, crystals	grams..	7.5
Potassium alum	do....	15.0

Water to 1.0 liter.

(4) Soaked for 2 minutes at 70° F. with agitation in a solution made by admixing the following components:

Sodium dodecyl sulfate, dry	grams..	1 to 10
Water (90° F.)	cc..	400
Ethyl alcohol (95% by weight)	cc..	600

(5) The outer layer of the film (A) was then pressed into intimate contact with a second registered or unregistered support comprising a transparent film base coated with a gelatin layer having a gelatin coating weight of about 70 mg. per sq. dec. Hereinafter this gelatin-coated transparent film will be referred to as a gel blank. The gelatin layer was coated from a 6% solution of gelatin containing saponin as a wetting agent and also containing 10 to 20 cc. 80% lactic acid per liter of gelatin solution.

(6) After the film (A) was in contact with the gel-blank film for about 2 minutes, the films were separated with the result that the outer emulsion transferred to the gel-blank. The anchorage between the gelatin layers of the two films was excellent and better than that resulting when the solution was free of wetting agent.

EXAMPLE II

A film element similar to that described in Example I was exposed and processed by steps 1, 2 and 3 of that example. The film was then soaked for 2 minutes at 68° F. with agitation in a solution made by mixing the following components:

Sodium dodecyl sulfate, dry	grams..	50

Water, 90° F. to make 1 liter.

The outer emulsion layer of film (A) was pressed into intimate registered contact with a gel-blank film as described in Example I, and excellent anchorage was obtained between the two gelatin surfaces. The films were stripped after about 2 minutes of contact with the result that the outer emulsion layer of film (A) was transferred to the gel-blank.

EXAMPLE III

Samples of a film like that of Example I were exposed, processed, transferred and stripped after the manner described in said example except that the following transferring baths were substituted for the bath described in step 4.

Bath A

Sodium dodecyl sulfate, dry	grams..	50.0
Citric acid, U. S. P. granulated	do....	15.0

Water to make 1.0 liter.

Conc. sulfuric acid to lower pH to 2.0± 0.1

Bath B

Sodium dodecyl sulfate, dry ____grams__	50.0
Citric acid, U. S. P. granulated ____do____	15.0
Water to make 1.0 liter.	
Disodium monohydrogen phosphate added to raise pH to 3.0± ____	0.1

Bath C

Sodium dodecyl sulfate, dry ____grams__	50.0
Citric acid, U. S. P. granulated ____do____	15.0
Water to make 1.0 liter.	
Disodium monohydrogen phosphate added to raise pH to 4.0± ____	0.1

Bath D

Sodium dodecyl sulfate, dry ____g__	50.0
Citric acid, U. S. P. granulated ____g__	15.0
Water to make 1.0 liter.	
Disodium monohydrogen phosphate added to raise pH to 4.5± ____	0.1

It was found that if the pH of Bath D was raised to either 7 or 10 with ammonium hydroxide, the anchorage was quite poor.

Bath E

Sodium dodecyl sulfate, dry ____g__	50.0
Monosodium dihydrogen phosphate monohydrate ____g__	5.0
Citric acid, U. S. P. ____g__	16.0
Water to make 1.0 liter.	
85% phosphoric acid added to lower pH to ____	2.0

Bath F

Sodium tetralin sulfonate ____g__	50.0
Monosodium dihydrogen phosphate monohydrate ____g__	5.0
Citric acid, U. S. P. ____g__	16.0
Water to make 1.0 liter.	
85% phosphoric added to lower pH to ____	2.0

Bath F was found to be faster acting than E requiring only 45 seconds to soften the film preparatory to rolling in contact with the gel-blank. However, the anchorage to the gel-blank was somewhat less than with Bath E.

Bath G

Four cc. 85% phosphoric acid diluted to 250 cc. with distilled water and having a pH of about 1.7.

Bath H

Four cc. 85% phosphoric acid plus 15 grams of a mixture of primary and secondary higher alkane sulfonic acid sodium salts predominating in a secondary alkane monosodium sulfonates of 15 to 16 carbon atoms and distilled water to 250 cc. of solution. This solution had a pH of 2.05.

Bath I

Four cc. 85% phosphoric acid plus 35 cc. of a 30% aqueous mixture of sodium alkane sulfonates of 8 to 10 carbon atoms and distilled water to 250 cc., said solution having a pH of 1.7.

Bath G produced poor anchorage of the transferred image-bearing layer to the gel-blank film. Bath H had anchorage greatly superior to Bath G while Bath I was intermediate in properties.

EXAMPLE IV

Front and rear films similar to those of Example I were exposed as a bipack. The front film (A) was then developed, rinsed, and fixed as in Example I except the fixing time was extended to 20 minutes. The film (A) was then washed five minutes and promptly dried.

At a later time, the dried film (A) was soaked for 70 sec. at 73° F. in the solution produced by mixing equal volumes of baths E and F of Example III and pressed into intimate contact with a gel-blank similar to that of Example I but with an coating weight of 150 mg. gelatin per square decimeter.

After a contact time of only 30 seconds, the films were separated with resultant emulsion transfer as in Example I.

EXAMPLE V

A front film element of the type described in Example IV was processed as described in that example except that in place of the gel-blank there was substituted a gel-blank having 70 mg. per square decimeter of gelatin coated from a 6% solution of gelatin containing saponin as a wetting agent and adjusted to pH 2 with sulfuric acid prior to coating. With two minute contact time, emulsion-transfer occurred as before.

EXAMPLE VI

A front film element of the type described in Example IV was processed as described in that example except that in place of the gel-blank there was substituted a gel-blank having 70 mg. per square decimeter of gelatin coated from a 6% solution of gelatin containing saponin as a wetting agent and adjusted to pH 7.5 with sodium hydroxide prior to coating. With two minutes contact time, emulsion-transfer occurred as before, because the acid of the wet film (A) was sufficient to overcome the alkalinity of the gel-blank film.

EXAMPLE VII

A front film element of the type described in Example IV but free from the abrasion gel coat of film (A) was processed in like manner with similar results.

EXAMPLE VIII

A front film element of the type described in Example IV was processed as described in that example except that in place of the gel-blank there was substituted a gel-blank having 70 mg. per square decimeter of gelatin coated from the following solution:

4.60% gelatin
0.80% chrome alum aqueous solution 10%
0.02% saponin
Remainder water. Adjusted to pH 4.7 with sulfuric acid.

EXAMPLE IX

A front film element of the type described in Example IV was processed as described in that example except that in place of the gel-blank there was substituted a gel-blank having 70 mg. per square decimeter of gelatin coated from the following solution:

4.60% gelatin
0.23% formalin (40% formaldehyde)
0.02% saponin
Remainder water. Adjusted to pH 4.5 with hydrochloric acid.

EXAMPLE X

A stripping film and gel-blank film similar to that of Example I were soaked for 20 seconds at 70° F. in a transfer bath made by admixing equal volumes of baths E and F. The gelatin surfaces of the soaked films were rolled into contact and stripped apart after the manner described in Example I, then washed five minutes in water to remove excess of the o-sulfobenzalde-

hyde acetal of polyvinyl alcohol. There was excellent anchorage between the two gelatin surfaces.

The wet film bearing the transferred latent image-bearing layer was then: (1) developed for 10 minutes at 68° F. in a developer made by admixing the following components:

Water (125° F.)	cc.	500.0
N-p-methylaminophenol sulfate	grams	2.5
Sodium sulfite, desiccated	do	75.0
Hydroquinone	do	3.0
Borax (granular)	do	5.0

Add cold water to make 1.0 liter.

(2) Washed in water for a period of one minute.
(3) Fixed five minutes at 68° F. in a hardening fixer made by admixing the following components:

Water (125° F.)	cc.	750.0
Sodium thiosulfate	grams	300.0
Sodium sulfite (desiccated)	do	11.0
Acetic acid (glacial)	cc.	17.0
Potassium alum	grams	10.0

Cold water to make 1.0 liter.

(4) Washed for 30 minutes in water at 60 to 70° F. The anchorage of the transferred emulsion layer to the gelatin blank film was excellent during all stages of the process.

EXAMPLE XI

Strips of film similar to that of Example I were soaked for about 20 to 30 seconds in the following transfer solutions at 70° F. and then rolled in contact with gel-blank film of the kind described in Example I.

Bath G of Example III
Bath H of Example III
Bath I of Example III

The films treated in baths H and I had improved anchorage as compared to that treated in bath G. Similar results were obtained by increasing the soaking time of the stripping film to 90 seconds and keeping the gelatin blank film dry until the two films were rolled into contact.

In place of the specific film elements described in the foregoing examples there may be substituted other films of the type described above and those described in the Jennings Patent 2,462,503.

The stripping layers need not be wholly composed of the water-soluble polyvinyl acetals described above which contain a solubilizing —COOZ or —SO_3Z group. However, such polymers constitute the essential and predominant part of the stripping layers. There may be mixed with such acetals water-soluble or hydrophilic hydroxyl polymers, e. g., polyvinyl alcohol of low, medium, or high viscosity, or partially hydrolyzed vinyl esters, polyvinyl acetate and polyvinyl chloracetate, polyvinyl acetals of formaldehyde, acetaldehyde, benzaldehyde, etc., wherein there are sufficient free hydroxyl groups to confer water-soluble or hydrophilic properties.

In place of the anionic surface-active wetting agents described in the above examples, there may be substituted a large number of other specific wetting agents of this type. Suitable agents include the sodium, potassium, ammonium, triethanolamine, triethylamine, cyclohexylamine, piperidine, and tetraethylammonium salts of decyl, dodecyl, tetradecyl, hexadecyl, octadecyl and oleyl sulfates and sulfonic acids, and mixtures of any two or more of such salts. A good commercial mixture is composed of the sodium salts of the sulfated alcohols obtained by the hydrogenation of coconut oil. Still other useful salts are the water-soluble salts, e. g., the sodium, potassium, and ammonium salts of isopropyl naphthalene sulfonate; the sulfonated esters of unsaturated carboxylic acids, e. g., dioctyl sulfosuccinate; sodium tetralin sulfonate, etc.

The amount of anionic surface active wetting agent used in the treating baths may vary over a fairly broad range and is higher than that used for a wetting effect. A practical range is 10 to 100 grams per liter of solution.

The sodium dodecyl sulfate used in the foregoing examples was electrolyte-free but contained minor amounts of other sodium n-alkyl sulfates of 10 to 18 carbon atoms, being made by sulfating a fraction of higher alcohols obtained from coconut oil as described above.

The pH of the transfer solutions can readily be regulated by the addition of buffering agents. In addition to those of the examples there may be used sodium hydrogen sulfate; potassium acid phthalate; potassium acid tartrate; acetic acid; mixtures of mineral acids with sodium acetate, trisodium phosphate, sodium citrate, sodium tartrate, or sodium lactate. Additional suitable buffers are described in Britton: "Hydrogen Ions," volume I, ed. III, pp. 301–305, D. Van Nostrand, New York, 1943.

In addition to its usefulness in the stripping process described above, it is also applicable to the "carbon" and "Carbro" processes of photographic reproduction. The improved adhesion attained between gelatin layers is of value in all of the well-known stripping processes, e. g., those of Potter U. S. P. 2,126,137, Butement U. S. P. 2,197,994 and Marasco U. S. P. 2,182,814.

The present invention has the advantage that it provides a practical process for improving the anchorage between gelatin layers during a transfer stripping operation. It has the further advantage that it is simple and economical. A further advantage is that it utilizes readily available chemicals. A still further advantage is that the acid solution of anionic surface-active agent tends to harden the transferred emulsion layer making it less susceptible to tearing, abrasion, or deformation during the transfer operations.

In assignee's related application Ser. No. 27,607, filed May 17, 1948, now Umberger and Grumbine U. S. Patent No. 2,609,290, there is disclosed and claimed a method of insolubilizing certain stripping layers and transferring the outer gelatin layer utilizing transfer baths of the type disclosed above.

This application is a continuation-in-part of my copending application Ser. No. 27,608, filed May 17, 1948, abandoned November 11, 1950.

As many widely different embodiments of this invention can be made without departing from the spirit and scope thereof, it is to be understood that the invention is not to be limited except as defined by the claims.

What is claimed is:

1. In a process of transferring a gelatin image-bearing layer which is adhesively joined to a support by means of a water-soluble to water-swellable adhesive taken from the group consisting of water-soluble cellulose ethers, cellulose glycolic acid and its water-soluble alkali metal, ammonium and amine salts, starch glycolic acid and its water-soluble alkali metal ammonium and amine salts, polyvinyl alcohol, and water-soluble macromolecular acetals of a hydroxyl

polymer having a plurality of recurring intralinear

$$-CH_2-\underset{|}{C}HOH$$

groups with an aldehyde containing a solubilizing group taken from the class consisting of —COOZ and —SO_3Z where Z is a member taken from the group consisting of hydrogen and the water-soluble salt-forming metals, which aldehyde is otherwise unsubstituted, to a gelatin-blank film, the step which comprises soaking said image-bearing layer in an aqueous solution having a pH below 4.5 and containing at least one gram per liter of an anionic surface active wetting agent prior to pressing the gelatin surfaces in transfer contact and stripping the image-bearing layer from the original support.

2. In a process of transferring a gelatin image-bearing layer which is adhesively joined to a support by means of a water-soluble to water-swellable adhesive taken from the group consisting of water-soluble cellulose ethers, cellulose glycolic acid and its water-soluble alkali metal, ammonium and amine salts, starch glycolic acid and its water-soluble alkali metal ammonium and amine salts, polyvinyl alcohol, and water-soluble macromolecular acetals of a hydroxyl polymer having a plurality of recurring interlinear

$$-CH_2-\underset{|}{C}HOH$$

groups with an aldehyde containing a solubilizing group taken from the class consisting of —COOZ and —SO_3Z where Z is a member taken from the group consisting of hydrogen and the water-soluble salt-forming metals, which aldehyde is otherwise unsubstituted, to a gelatin-blank film, the step which comprises soaking said image-bearing layer in an aqueous solution having a pH of 1.0 to 4.5 and containing at least one gram per liter of a water-soluble salt of an alkyl sulfate of 10 to 18 carbon atoms prior to pressing the gelatin surfaces in transfer contact and stripping the image-bearing layer from the original support.

3. In a process of transferring a gelatin image-bearing layer which is adhesively joined to a support by means of a water-soluble to water-swellable adhesive taken from the group consisting of water-soluble cellulose ethers, cellulose glycolic acid and its water-soluble alkali metal, ammonium and amine salts, starch glycolic acid and its water-soluble alkali metal ammonium and amine salts, polyvinyl alcohol, and water-soluble macromolecular acetals of a hydroxyl polymer having a plurality of recurring intralinear

$$-CH_2-\underset{|}{C}HOH$$

groups with an aldehyde containing a solubilizing group taken from the class consisting of —COOZ and —SO_3Z where Z is a member taken from the group consisting of hydrogen and the water-soluble salt-forming metals, which aldehyde is otherwise unsubstituted, to a gelatin-blank film, the step which comprises soaking said image-bearing layer in an aqueous solution having a pH of 1.0 to 4.5 and containing from 10 to 100 grams per liter of a sodium alkyl sulfate of 10 to 18 carbon atoms prior to pressing the gelatin surfaces in transfer contact and stripping the image-bearing layer from the original support.

4. In a process of transferring a gelatin image-bearing layer which is adhesively joined to a support by a water-soluble macromolecular acetal of a hydroxyl polymer having a plurality of recurring intralinear

$$-CH_2-\underset{|}{C}HOH$$

groups with an aldehyde containing a solubilizing group taken from the class consisting of —COOZ and —SO_3Z where Z is a member taken from the group consisting of hydrogen and the water-soluble salt-forming metals, which aldehyde is otherwise unsubstituted, to a gelatin-blank film, the step which comprises soaking said image-bearing layer in an aqueous solution having a pH of 1.0 to 4.5 and containing from 10 to 100 grams per liter of an anionic surface active wetting agent prior to pressing the gelatin surfaces in transfer contact and stripping the image-bearing layer from the original support.

5. In a process of transferring a gelatin image-bearing layer which is adhesively joined to a support by a water-soluble macromolecular acetal of a hydroxyl polymer having a plurality of recurring intralinear

$$-CH_2-\underset{|}{C}HOH$$

groups with an aldehyde containing a solubilizing group taken from the class consisting of —COOZ and —SO_3Z where Z is a member taken from the group consisting of hydrogen and the water-soluble salt-forming metals, which aldehyde is otherwise unsubstituted, to a gelatin-blank film, the step which comprises soaking said image-bearing layer in an aqueous solution having a pH of 1.0 to 4.5 and containing from 10 to 100 grams per liter of a water-soluble salt of an alkyl sulfate of 10 to 18 carbon atoms prior to pressing the gelatin surfaces in transfer contact and stripping the image-bearing layer from the original support.

6. In a process of transferring a gelatin image-bearing layer which is adhesively joined to a support by a water-soluble macromolecular acetal of a hydroxyl polymer having a plurality of recurring intralinear

$$-CH_2-\underset{|}{C}HOH$$

groups with an aldehyde containing a solubilizing group taken from the class consisting of —COOZ and —SO_3Z where Z is a member taken from the group consisting of hydrogen and the water-soluble salt-forming metals, which aldehyde is otherwise unsubstituted, to a gelatin-blank film, the step which comprises soaking said image-bearing layer in an aqueous solution having a pH of 1.0 to 4.5 and containing from 10 to 100 grams per liter of a sodium alkyl sulfate of 10 to 18 carbon atoms prior to pressing the gelatin surfaces in transfer contact and stripping the image-bearing layer from the original support.

7. In a process of transferring a gelatin image-bearing layer which is adhesively joined to a support by a water-soluble sodium-o-sulfobenzaldehyde acetal of polyvinyl alcohol to a gelatin-blank film, the step which comprises soaking said image-bearing layer in an aqueous solution having a pH of 1.0 to 4.5 and containing from 10 to 100 grams per liter of a water-soluble salt of an alkyl sulfate of 10 to 18 carbon atoms prior to pressing the gelatin layers of the two respective films in transfer contact and stripping the image-bearing layer from the original support.

8. In a process of transferring a gelatin image-bearing layer which is adhesively joined to a support by a water-soluble sodium-o-sulfobenzal-

dehyde acetal of polyvinyl alcohol to a gelatin-blank film, the step which comprises soaking said image-bearing layer in an aqueous solution having a pH of 1.0 to 4.5 and containing from 10 to 100 grams per liter of a water-soluble salt of a sodium alkyl sulfate of 10 to 18 carbon atoms prior to pressing the gelatin layers of the two respective films in transfer contact and stripping the image-bearing layer from the original support.

9. A photographic transfer and developing process which comprises soaking a multilayer film having a gelatin latent-image-bearing layer adhesively joined to another latent-image-bearing layer by means of a water-soluble macromolecular acetal of a hydroxyl polymer having a plurality of recurring intralinear

$$-CH_2-\underset{|}{C}HOH$$

groups with an aldehyde containing a solubilizing group taken from the class consisting of —COOZ and —SO_3Z where Z is a member taken from the group consisting of hydrogen and the water-soluble salt-forming metals, which aldehyde is otherwise unsubstituted, to a gelatin-blank film, the step which comprises soaking said film in an aqueous solution having a pH of 1.0 to 4.5 and containing from 10 to 100 grams per liter of an anionic surface active wetting agent, pressing the outer gelatin latent-image-bearing layer into contact with the gelatin surface of a gelatin blank film stripping the outer latent-image-bearing layer from the original multilayer film and developing and fixing the gelatin blank film with its adherent latent-image-bearing layer.

10. A photographic transfer and developing process which comprises soaking a multilayer film having a gelatin latent-image-bearing layer adhesively joined to another latent-image-bearing layer by means of a water-soluble sodium-o-sulfobenzaldehyde acetal of polyvinyl alcohol, in an aqueous solution having a pH of 1.0 to 4.5 and containing from 10 to 100 grams per liter of an anionic surface active wetting agent, pressing the outer gelatin latent-image-bearing layer into contact with the gelatin surface of a gelatin-blank film stripping the outer latent-image-bearing layer from the original multilayer film and developing and fixing the gelatin blank film with its adherent latent-image-bearing layer.

ARTHUR WILLIAM GRUMBINE.
JACOB QUENTIN UMBERGER.

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