

Nov. 5, 1935.

L. D. MANNES ET AL

2,019,718

DIFFERENTIAL TREATMENT OF COLOR COMPONENT IMAGES

Filed Dec. 3, 1932

Fig. 1.

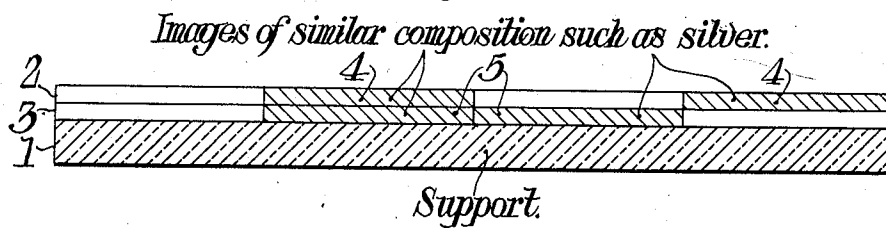
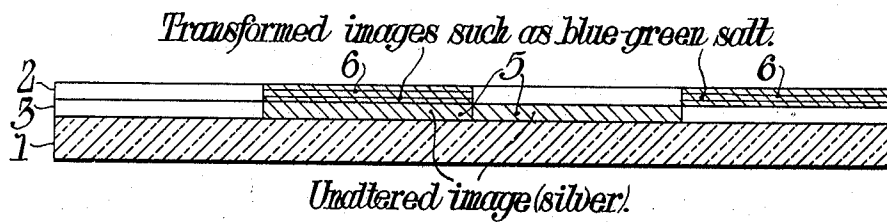


Fig. 2.



Inventors:

*Leopold D. Mannes &
Leopold Godowsky, Jr.,*

By

*Newton M. Mannes
Attorney*

UNITED STATES PATENT OFFICE

2,019,718

DIFFERENTIAL TREATMENT OF COLOR
COMPONENT IMAGESLeopold D. Mannes and Leopold Godowsky, Jr.,
Rochester, N. Y.

Application December 3, 1932, Serial No. 645,514

12 Claims. (Cl. 95—88)

This application relates to color photography and more particularly to a process involving (first) the formation of two or more silver color-component images in different strata coated one upon another to constitute a substantially unitary element, (second) the bleaching or toning of the uppermost image or images only, leaving lower images or image unaffected and (third) the further treatment of the several images thus differentiated.

The present application relates to the second of the three steps above mentioned, that is, the differential bleaching processing or toning of two silver images carried in different strata of a substantially unitary layer. This is accomplished by applying to the element a bleaching bath which attacks the silver images and, when the upper image is substantially completely bleached or toned and before the lower one is substantially attacked, applying to the element a bath which stops the process at once at that point.

One form, described but not claimed in our prior Patent Number 1,997,493, issued April 9, 1935, of which this application is a continuation in part, comprises submitting a layer containing two silver color-component images to a blue-green toning solution such as a known ferric-vanadium solution and the action of this solution is permitted to continue until the upper image has been completely colored when the element is removed from the toning solution and immersed in a weak "hypo" solution which acts as a stop bath, renders the image transparent and removes the residue of ferricyanide which may have been deposited in the film. We have found that this toning process permits of minute regulation and that ample time is afforded to remove and wash the film after the coloring of the upper image is completed and before the coloring of the lower image takes place. A suitable toning bath is the following:

Formula A

Ferric chloride.....	1 gm.
Oxalic acid.....	6 gms.
Vanadium chloride.....	2 gms.
Nitric acid.....	5 gms.
Water.....	200 ccs.

Formula B

Potassium ferricyanide.....	5 gms.
Water.....	200 ccs.

The bath of Formula B is to be added to that of Formula A. Other suitable baths are given in

the Fox patents, 1,166,121, 1,166,122 and 1,207,527. A suitable stop bath is a 3 per cent solution of sodium thiosulfate.

Reference is made to the accompanying drawing which is applicable to the various processes described and in which Fig. 1 indicates a section of film with similar images in two layers prior to treatment, and Fig. 2 shows the same element after the controlled treatment.

In Fig. 1 is shown a support 1 having a gelatine layer consisting of two strata 2 and 3 containing respectively images 4 and 5 of similar composition. In Fig. 2, the image in stratum 2 has been converted into an image 6 of altered composition while the image 5 in the lower stratum 3 remains intact and may be further treated by processes, not a part of the present invention disclosed in said application.

Other embodiments involve the use of a bleaching (oxidizing) bath which is allowed to penetrate a limited distance into the gelatine emulsion and arresting the further action by immediate immersion of the film in a reducing bath. Examples are the following:

Example A

Bleaching bath:	
Quinone.....	5 gms.
Potassium chloride.....	6 gms.
Water.....	1000 ccs.
Sulfuric acid.....	3 ccs.

followed by

Stop bath:	
Sodium bisulfite.....	20 gms.
Water.....	1000 ccs.

Example B

Bleaching bath:	
Potassium iodide.....	50 gms.
Iodine.....	15 gms.
Acetic acid (glacial).....	25 ccs.
Water.....	1000 ccs.

followed by sodium bisulfite as in Example A. This last named bath converts the upper image into silver iodide having the lower silver image intact. The silver image may then be converted into silver ferrocyanide by immersion of the element in a solution of potassium ferrocyanide; and this in turn may be converted by the use of ferrous chloride into an image of ferric-ferrocyanide (Turnbull's blue) while a dye such as rosaniline (fuchsin) may be mordanted to the upper silver iodide image.

It is obvious that the use of a stop bath can be

used with any processing step such as stopping the action of an alkaline developer with an acid stop bath, thus developing only the upper of the two latent images in different strata of a sensitive layer.

It is to be noted that, of the four processes herein described, two involve a stop bath which penetrates the photographic layer more rapidly than the processing bath which it terminates. These are, first, the one in which a hypo bath follows a ferric-vanadium solution and, second, the formulæ given under Example B.

What we claim as new and desire to be secured by Letters Patent of the United States is:

1. The method of treating differentially two photographic images of similar structure lying in different strata of the same photographic layer that comprises submitting said layer to a photographic bath capable of acting on the images until the outermost image is substantially completely transformed and the inner image is not substantially affected, then removing the layer from the bath and at once submitting it to a stop bath that immediately stops the action of the first bath.

2. The method of treating differentially two photographic silver images representing two color components and lying in different strata of a single photographic layer that comprises submitting said layer to a bath capable of transforming silver into a silver salt, until the upper image only is transformed and then at once submitting the layer to a bath that immediately stops the action of the first bath.

3. The method of treating differentially two photographic strata lying directly one upon another upon the same side of a common support that comprises submitting said layer to a photographic bath capable of acting on the images until the outermost image is substantially completely transformed and the inner image is not substantially affected, then removing the layer from the bath and at once submitting it to a stop bath that immediately stops the action of the first bath.

4. The method of treating differentially two photographic strata lying directly one upon another upon the same side of a common support that comprises submitting said layer to a bath capable of transforming silver into a silver salt, until the upper image only is transformed and then at once submitting the layer to a bath that immediately stops the action of the first bath.

5. The method of treating differentially two photographic images of similar structure in different strata lying on the same side of a common support and of similar physical characteristics as to their permeability to photographic baths which comprises submitting the element including said support and layers to a photographic bath capable of acting on the images until the outermost image is substantially affected, then removing the element from the bath and at once submitting it to a stop bath that stops the action of the first bath.

6. The method of treating differentially two photographic strata lying directly one upon the

other and of similar physical characteristics as to their permeability to photographic baths and comprising submitting said layer to a bath capable of transforming silver into a silver salt, until the upper image only is transformed and then at once submitting the layer to a bath that stops the action of the first bath.

7. The method of differentially treating images superposed in different depths of an emulsion, which comprises bathing the emulsion in a strong solution of iodine until a complete image is bleached, and in then quickly interrupting the bleaching action by bathing the emulsion in a solution of bisulfite.

8. The method of differentially treating images superposed in different depths of an emulsion, which comprises subjecting the emulsion to the action of a substance having a certain speed of penetration and interrupting said action upon reaching the desired depth by subjecting the emulsion to the chemical action of a substance having a speed of penetration greater than that of said first substance and capable of promptly and completely stopping the chemical action of said first substance.

9. The method of differentially treating images superposed in different depths of an emulsion, which comprises bathing the emulsion in a bleaching solution having a certain speed of penetration until a region intermediate successive images is reached and interrupting the action of said solution by bathing the emulsion in a bath having a speed of penetration greater than that of said bleaching solution and capable of promptly and completely stopping the chemical action of said bleaching solution.

10. The method of differentially treating images superposed in different depths of an emulsion, which comprises treating the emulsion in a substance adapted to oxidize said images and interrupting the oxidizing action upon reaching a region intermediate successive images by treating the emulsion with a substance adapted promptly and completely to inactivate said oxidizing substance and having a greater speed of penetration than said oxidizing substance.

11. The method of differentially treating images superposed in different depths of an emulsion, which comprises treating the emulsion with a substance adapted to oxidize the emulsion and interrupting said oxidation upon reaching a certain depth of the emulsion by subjecting the emulsion to the chemical action of a reducing substance having a speed of penetration greater than that of said oxidizing substance and capable of promptly and completely stopping said oxidation.

12. The method of differentially treating images superposed in different depths of an emulsion, which comprises bathing the emulsion in a halogen bleach until a complete image is bleached, and then interrupting the bleaching action by bathing the emulsion in a solution of bisulfite.

LEOPOLD D. MANNES.
LEOPOLD GODOWSKY, JR.