

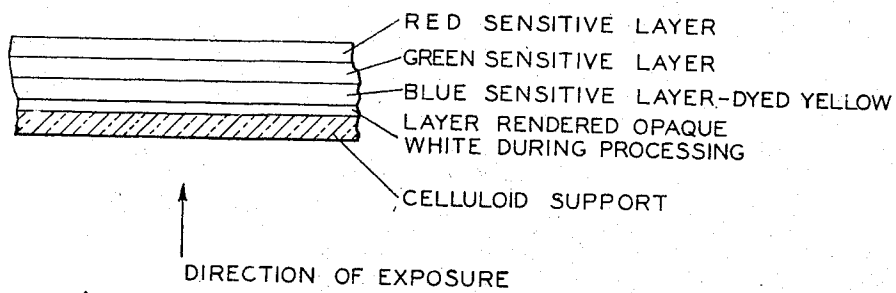
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PHOTOGRAPHIC MATERIAL FOR COLOR PHOTOGRAPHY

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PHOTOGRAPHIC MATERIAL FOR COLOR
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Latta Syndicate Limited, London, England, a
British companyApplication March 19, 1941, Serial No. 384,181
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4 Claims. (Cl. 95—2)

The present invention relates to the production of color photographic records which are to be viewed by reflection similarly to a paper print.

While it is possible to secure a color photographic record to a paper support to form a reflection print, this is not always convenient or satisfactory particularly when the exposure is made through a Celluloid or other transparent base and the original exposure material is processed to a natural color photograph, since the latter must be viewed from the emulsion side to obtain correct lateral rendering of objects and in that case the thickness of the base separates the colored parts of the record from the reflective paper surface and interferes with correct viewing of the picture.

In accordance with the present invention the aforesaid difficulties are overcome by the provision of a layer in front (in the direction of passage of the light during the exposure) of the silver halide coat in which the colored image or images is/are produced, which layer is initially transparent but can be rendered opaque white or other desired light tint during the processing.

Such layer may contain, for instance, zinc hydroxide which is formed in colloidal suspension in a gelatine medium and can be converted to an opaque white, insoluble zinc compound during the processing. For instance, treatment in sodium carbonate solution will convert the zinc hydroxide into zinc carbonate. Potassium ferrocyanide will convert it into zinc ferrocyanide, while a soluble sulphide will form zinc sulphide, all of which zinc salts are insoluble white compounds. Alternatively the layer may contain another metal salt such as lead sulphate or iodide, or calcium phosphate produced in situ in colloidal form, which is converted into lead carbonate or calcium carbonate in a sodium carbonate solution. A layer containing lead iodide is of yellow color and this fact may be advantageous in some cases as it enables the layer to act as a filter layer also.

In the processing of color photographic records, development in a solution containing sodium carbonate is well known and it will be appreciated that such a solution will effect conversion of the zinc hydroxide or other substance into an opaque white deposit. Also in some processes, such as those disclosed in my co-pending applications Serial Nos. 378,301 and 378,302, (now Patent No. 2,320,109 of May 25, 1943), filed February 10, 1941, treatment solutions containing

potassium ferrocyanide are used and such a solution would produce zinc ferrocyanide.

It will be appreciated that it may be unnecessary to use a separate conversion stage for the production of the opaque white layer, while, on the other hand, it may be desirable to use a separate conversion bath containing sodium carbonate or potassium ferrocyanide.

A specific form of material, illustrated on the accompanying drawing, may for example, comprise a support of Celluloid or similar material on which is coated a layer of gelatine containing zinc hydroxide produced in said layer in a colloidal state and as transparent as possible. Such a layer may be produced by dissolving a soluble zinc salt in a quantity of a gelatine solution and adding to another gelatine solution containing caustic soda with constant stirring after which the mixed solution containing the zinc hydroxide precipitated in colloidal form is set, shredded and washed, and coated.

On this layer is coated a non-color sensitised, blue sensitive emulsion which is diffusely dyed yellow with a dye capable of being selectively destroyed, in the presence of and at the points occupied by a silver image, by suitable reagents to form a dye image. On this emulsion there is cast a green sensitive emulsion followed by a red sensitive emulsion and finally there may be an anti-halation layer.

Such a material is exposed through the support so that the different color sensations are recorded in the different layers of emulsion. The processing of such a material may be effected as described in my co-pending application Serial No. 384,180 filed March 19, 1941, the first step being development of the latent images in a developer containing a solvent for silver halide such as potassium thiocyanate, and preferably also containing sodium carbonate whereby the zinc hydroxide in the bottom layer is converted into opaque white zinc carbonate. Alternatively at a later stage the material may be treated in a solution of sodium sulphide to convert the zinc hydroxide or other zinc salt formed therefrom during the processing into zinc sulphide. Further steps might comprise treatment in a solution containing thiourea and potassium ferrocyanide as described in said co-pending application Serial No. 378,301, and containing a proportion of sulphuric acid, which converts the undeveloped halide in the two outer layers into silver ferrocyanide and selectively destroys the yellow dye in the blue sensitive layer to form a positive yellow image therein. Thereupon the

silver ferrocyanide in the two outer layers is converted into a blue-green positive image in the outer layer and a magenta positive image in the middle layer, in a mixed toning bath as described in said co-pending application Serial No. 378,302, now Patent No. 2,320,109, of May 25, 1943. Finally remaining silver and silver salts are removed in Farmer's reducer.

Thereby a natural color positive picture is obtained which can be viewed by reflection from the opaque white layer and which can if desired be stuck to a suitable support or mount with the Celluloid side against the paper.

Of course in the case of a material intended for exposure from the front, the initially transparent layer forms the outermost layer and the finished record, being viewed from the back to obtain correct lateral rendering, may be applied to a final support with the original, transparent support uppermost.

I claim:

1. A method of producing a multi-color photographic picture on a photographic material including a transparent support, a colloid layer coated thereon containing colloidal zinc hydroxide, and superimposed differentially color-sensitive silver halide emulsion layers coated on said colloid layer, which method comprises exposing such material through the support; developing the latent images formed in the sensitive emulsion layers; subjecting the material to a bath containing thiourea and potassium ferrocyanide to convert the residual halide in the layers into an image having a ferrocyanide acid radical; toning the material in a bath containing ferric and uranium salts to produce Prussian Blue and uranium ferrocyanide images in two of said emulsion layers; converting the colloidal zinc hydroxide in the layer next the support into an opaque white layer; and removing silver and silver salts from the sensitive layers.

2. A method of producing a multi-color photographic picture on a photographic material including a transparent support, a colloid layer coated thereon containing colloidal zinc hydroxide, and superimposed differentially color-sensitive silver halide emulsion layers coated thereon, said method comprising exposing such material through the support; developing the latent images formed in said sensitive layers; applying a bath containing thiourea and potassium ferrocyanide, both to convert the residual halide in the said sensitive layers into an image having a ferrocyanide acid radical and to produce in the

layer next the support a uniform opaque white deposit of zinc ferrocyanide; applying a toning bath containing ferric and uranium salts to produce simultaneously toned images of Prussian Blue and uranium ferrocyanide in two of said sensitive layers; and finally removing silver and silver salts from the sensitive layers.

3. A method of producing a multi-color photographic picture on a photographic material including a transparent support, a colloid layer coated thereon containing colloidal zinc hydroxide, and superimposed differentially color-sensitive silver halide emulsion layers coated thereon, said method comprising exposing such material through the support; developing latent images formed in said sensitive layers by exposure; applying a bath containing thiourea and potassium ferrocyanide to convert the residual halide in the sensitive layers into a substance having a ferrocyanide acid radical; applying a toning bath containing ferric and uranium salts to produce Prussian Blue and uranium ferrocyanide images simultaneously in two of said sensitive layers; at any stage applying a bath of a sulphide to convert the colloidal zinc hydroxide to an opaque white zinc sulphide; and finally removing silver and silver salts from the sensitive layers.

4. A method of producing a multi-color photographic image in a photographic material including a transparent support having coated thereon a colloidal zinc hydroxide, and coated successively thereon a blue sensitive silver halide emulsion layer diffusely dyed yellow with a dye capable of being selectively destroyed by the silver dye bleach process, followed by green and red sensitive emulsion layers; said method comprising exposing such material through the support to produce component color record images in the sensitive emulsion layers; applying a bath containing thiourea, potassium ferrocyanide and an acid to convert the residual halide in the two outer layers into silver ferrocyanide, and to simultaneously perform selective imagewise destruction of the dyestuff in the blue sensitive layer; applying a toning bath containing ferric and uranium salts to produce a Prussian Blue image in the outermost layer followed by a uranium ferrocyanide image in the middle layer; at any stage converting the colloidal zinc hydroxide in the layer next the support to an opaque white layer of a zinc salt; and removing silver and silver salts from the sensitive layers.

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