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PATENT SPECIFICATION



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COMPLETE SPECIFICATION.

Improvements in or relating to Colour Photography.

We, TECHNICALOR MOTION PICTURE CORPORATION, a corporation of the State of Maine, United States of America, of 110, Brookline Avenue, Boston, Massachusetts, United States of America, assignees of LEONARD THOMPSON TROLAND, a citizen of the United States of America, of 110, Brookline Avenue, Boston, Massachusetts, aforesaid, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to photographic films, and more particularly to films employed in the art of color photography.

It has been proposed before to produce color photographs by coating a base with an emulsion sensitive to a certain part of the spectrum, then recoating this emulsion with a second layer sensitive to a different part of the spectrum, and so on if desired, then exposing the whole unit to the object to be photographed and subsequently separating the emulsions for reproducing the image records. Various methods have been proposed for separating the emulsions, but none of them is quite satisfactory in actual practice, or at least they involve more or less complicated operations and great care.

It is therefore the principal object of our present invention to provide a photographic film with superimposed differentially color sensitive emulsions of peculiar construction, which permits a relatively convenient separation of the color records, and to provide a method of separating the color aspects recorded on this film, in a commercially feasible manner.

The invention involves a photographic sensitive material e.g. a photographic film having several light sensitive layers e.g. photographic emulsions of different color sensitiveness to light, these coatings having in addition different characteristics with respect to their solubility. The layers may have different solubility either in one and the same solvent at different temperatures or in different solvents. Emulsions of different compositions may be employed for this purpose, as for example in a two-color film a collodion emulsion superposed

on a gelatine emulsion. The collodion layer can be removed with such solvents as alcohol or ether which do not effect the gelatine. It is obvious that for three-color photography three differentially water soluble gelatine coatings can be combined, or two coatings of gelatine soluble in water of different temperature with a coating of different material as for instance collodion, which would most conveniently be the uppermost layer. After the light sensitive strata have been simultaneously exposed, the layers are removed consecutively, with the exception of the layer immediately upon the base, by dissolving each layer in a solvent not affecting the remaining layers, and prints are made prior to each process of removing one layer, and from the last layer, for the purpose of deriving from these prints correct reproductions of the various color aspects as originally recorded on the different strata of emulsion by known methods, of which examples will be given. The invention will be explained by describing a simple, specific embodiment thereof by referring to the appended drawing, which shows a section through a film according to our invention.

B is the base of the film on which the first emulsion coating P is laid, which is sensitized to a particular color aspect as, for instance, to the red and blue rays, but not to green rays of the spectrum. This first emulsion P comprises a hard gelatine which is insoluble or relatively insoluble in water. This insolubility in water can be obtained by any well known means, as, for instance, by treating the layer with chrome alum or with formalin, whereby great care must be taken to prevent any penetration of the hardening agent to adjacent layers, which can be attained by using the minimum amount of hardening material necessary to impart the desired degree of hardness to the particular kind of gelatine employed. A second emulsion coating S is then applied over the first coating P, this second coating comprising an emulsion sensitized to a complementary color aspect, in this case, blue-green, by dyeing it with a suitable dye as, for instance, pinaffavol (I.G.F.).

[Price 1/-]

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This emulsion comprises gelatine readily soluble in warm water of about 80 or above degrees Fahrenheit. If desired, a coating of color, for example, congo red or rose bengal, F may be superimposed on the ultimate layer, to act as a filter. The film prepared in this manner is now exposed in the usual way, developed and a print made thereof which will preserve the composite picture contained in the emulsion. This print will be referred to as "composite positive". The negative is then subjected to the action of water of proper temperature, and the surface layer containing the blue-green color aspect to be referred to as "green negative", is thereby removed. The layer comprising the hardened gelatine, to be referred to as "red negative" is now isolated.

An auxiliary duplicate negative can now be made from the "composite positive" and used for printing a red-orange positive together with a glue-green positive printed from the "red negative". This will not produce a theoretically perfect two-color positive, but one which will be sufficiently accurate for many purposes.

If the color separation thus obtained is inadequate, another method can be utilized for obtaining better results. This method comprises the following steps: The red negative is superimposed in registry upon the "composite positive", and a print made therefrom. This print will be a negative of the blue green color aspect which had been removed by dissolving its emulsion in warm water, the red aspect having been subtracted from the "composite positive". A "green negative" can now be made from this print so that, together with the original "red negative" two regular negatives are now available which can be further utilized by any desired process.

From the foregoing it will be apparent to any one skilled in the art that our invention is not limited to the embodiment above described, but that it can also be employed for films containing more than two layers of differential color sensitiveness and with differentially soluble emulsions. For example, three emulsion layers can be superposed, the topmost layer being sensitive only to blue and containing a yellow filter dye, the middle layer being sensitive also to green and containing a magenta filter substance, and the layer next to the support being sensitive also to red. The uppermost coating is soluble in water of comparatively low temperature, the middle coating in water of higher temperature while the innermost coating may be entirely insoluble. After exposure and development a "three-color composite positive" of the superposed color aspect negatives is first made, the uppermost (blue) layer dissolved, and the remaining "two-color composite negative" printed together with the "three-color composite positive", the resulting print being a negative of the blue color aspect. A "two-color composite positive" is then made from the remaining two superposed negative aspects, and the middle (green) layer dissolved, so that the "red negative" remains. By printing the "two-color composite positive" with the "red negative" a green negative is obtained so that finally separate negatives of the three aspects are obtained, from which three-colour prints can be made by any method which is suitable for use with color separation negatives.

It will also be understood that it is not essential whether the combination emulsion is exposed in the manner described or through the film, provided that the strata and filter coatings have been arranged accordingly.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. The method of making color photographs by simultaneously recording different color aspects of a scene on different superimposed layers of light sensitive emulsion, characterized in that the color aspects are subsequently separated by individually dissolving off one or more layers and taking a print from said emulsion before and after each dissolving step.
2. The method according to claim 1 further characterized in that two layers containing color aspect records of the kind described are treated to separate the aspects by copying the combined images, dissolving the outer layer and copying the remainder together with the copy of the combined images for obtaining a copy of the dissolved image.
3. A film for making color photographs according to the preceding claims by recording different color aspects on different superimposed layers with different color sensitiveness of the emulsion of the film, characterized in that the different layers have different characteristics of solubility.
4. A film according to claim 3 characterized in that the different layers have a different solubility in one and the same solvent, the solubility increasing from the innermost towards the outer layer.
5. A film according to claim 4 further characterized that the solubility of said layers in said solvent increases from the

layer next to the base toward the innermost layer with regularly increasing temperatures of said solvent.

6. A film according to claim 3, further characterized in that it has two layers of emulsion, one of which is insoluble and the other soluble in hot water.

7. A photographic film comprising

superimposed layers of different sensitiveness to spectrum colors, each layer being soluble in a different solvent.

Dated the 12th day of January, 1931.

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[This Drawing is a reproduction of the Original on a reduced scale]

