

PATENT SPECIFICATION



Convention Date (United States): April 3, 1936.

489,185

Application Date (in United Kingdom): Feb. 5, 1937.

No. 3449/37.

Complete Specification Accepted: July 21, 1938.

COMPLETE SPECIFICATION

Improvements in and relating to Colour Photography

We, KODAK LIMITED, a Company registered under the Laws of Great Britain, of Kodak House, Kingsway, London, W.C.2 (Assignees of CHARLES EDWARD KENNETH MEES, a British Subject, of Kodak Park, Rochester, New York, United States of America), 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 processes and in particular to photographic processes utilizing highly sensitive elements, especially films, wherein the colour records are produced in a set of differentially colour sensitized emulsions, which colour processing involves a series of steps which have to be carried out under carefully controlled conditions, of which the first is a simple step such as ordinary development.

The type of process to which the invention can with advantage be applied is particularly well illustrated by certain colour processes wherein different colour images are formed in superimposed layers. Processes of this type are described for example, in Specifications Nos. 440,032 and 440,089. In the colour photographic processes therein described, the colour component latent images which are formed in the superimposed layers are preferably all developed to silver images. The images are then reversed in all the layers and the film subjected to a sequence of controlled steps whereby the images in the different layers are differentially transformed into different colour images. Since these differential steps require careful control and must be carried out with a high degree of accuracy under standardized conditions, it is almost essential to employ a standard equipment which can best be maintained at a centrally located processing station. It is most economical to have a comparatively small number of such stations, each one equipped to carry out the whole of the processing and to send to these stations all films to be treated by the process.

[Price 1/-]

When working with highly sensitive elements, such as the multilayer elements employed in the colour processes referred to above, unsatisfactory results have sometimes been unexpectedly encountered.

Investigation has shown that these unsatisfactory results can arise even when the element, so far as can be ascertained is quite correct as regards light sensitivity, e.g. colour sensitivity at the time of camera exposure, and even when such exposure is correct. It has appeared, from the results of our assignor's experiments, that one or more of the latent images in the layer can undergo degradation subsequent to exposure and before processing. Our assignor has found that not only do latent images in highly sensitized layers tend to degrade, but they may do so to a different degree in different layers; this results, on processing, in an unbalanced rendering of the colour. It appears to be because of this that if a traveller on a long journey is unable to have his films processed en route and he keeps them for a considerable time before he reaches a place where they can be treated, the results are frequently unsatisfactory.

It has now been found that, whatever may be the cause of the latent image degradation, unsatisfactory results, and especially unsatisfactory rendering of colour, on this account, can be avoided by developing all the latent images shortly after exposure, i.e. before substantial degradation of any of them and then drying the element. Since after the development no latent image remains in the element, such element can be kept for a very considerable time without alteration of the image or images and can be subjected to the further steps in the processing at a properly equipped and staffed station at any convenient time.

According to the present invention, therefore, the method of avoiding unsatisfactory rendering of colour liable to be caused by latent image degradation in a multi-layer colour sensitive film having colour component latent images in the layers which are to be developed to silver images then reversed and then

converted into positive coloured images by differential treatment of the layers in controlled steps, consists of developing all the latent images to silver images shortly after exposure, i.e. before substantial degradation of any of them, and then drying the film so that the subsequent colour processing can be accomplished at a later time without further substantial degradation of the colour records due to storage of the film prior to such colour processing.

It will be appreciated that in the direct production of a colour photograph, as described in the aforementioned prior patents, the first step is the development of the latent images to silver images. This, indeed, is generally the first step in processing a highly sensitive photographic element. Accordingly a step of simple development shortly after exposure does not introduce any difficulty into the subsequent processing since this step would, in any case, have to be carried out in the normal processing. However when this step is performed in the present invention it is followed by a drying step so that the film may be stored without risk of alteration in the character of the images until the further processing can be performed upon it.

For the development of the latent images, a simple development apparatus may be used and a standard black-and-white developer. Such equipment and materials could be carried by explorers or campers, who would then be able to carry out the step of development shortly after exposure, just as some tourists, it is said, after having developed their negatives, merely wash and dry them while on tour, the fixation being postponed until the return home. If this were not convenient, the step is one which could be carried out at a photographic finishing station equipped with very simple apparatus.

The step of drying the film after its first development does not impair the quality of the results obtained by later steps in the reversal and colour processing. It is unnecessary even to protect the films from light after completion of the development, since the silver has to be removed, and the areas which were left unexposed in the camera have to be developed. If necessary, these areas can be re-sensitized in the subsequent processing, and then subjected to controlled re-exposure, such as is described in Specification No. 176,357, which is particularly useful in the type of colour process employed for lenticulated film.

Since the element is to be subjected to a reversal treatment the first development

must not be followed by fixing.

The present invention includes the method of colour photography which consists in processing to colour an element treated by the process described above and, in particular, the method of colour processing a multi-layer colour sensitive film which consists in producing positive coloured images by differential treatment in controlled steps of the reversed silver halide images remaining after developing all the latent images to silver shortly after exposure i.e. before substantial degradation of any of them, and after drying the film.

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 minimizing the detrimental effect caused by degradation, after exposure of one or more of the colour record latent images, formed by such exposure in a highly sensitive photographic element, especially a film, having a plurality of differentially colour sensitized emulsions which consists in developing all the latent images to silver images shortly after the exposure by which such latent images were produced, then drying the element and subsequently producing positive (reversed) images from the unexposed areas of the emulsions.

2. The method as claimed in claim 1 in which the element treated is one having a plurality of differentially colour sensitized layers superimposed on the same side of a support.

3. The method of colour photography which consists in processing to colour an element treated by the process claimed in either of the preceding claims.

4. The method of avoiding unsatisfactory rendering of colour liable to be caused by latent image degradation in a multi-layer colour-sensitive film having colour component latent images in the layers which are to be developed to silver images, then reversed, and then converted into positive coloured images by differential treatment of the layers in controlled steps, which consists in developing all the latent images shortly after exposure, i.e. before substantial degradation of any of them, then drying the film and subsequently producing positive (reversed) images from the unexposed areas of the emulsions so that the colour processing can be accomplished at a later time without further substantial degradation of the colour records due to storage of the film prior to such colour processing.

5. The method of colour processing a

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- multi-layer colour sensitive film which consists in producing positive coloured images by differential treatment in controlled steps of the reversed silver halide images remaining after developing all the latent images to silver shortly after exposure, i.e. before substantial degradation of any of them, and after drying the film.
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6. In a method of colour processing a multi-layer colour sensitive film having latent images in the layers which are to be converted to positive coloured images by differential treatment of the layers in controlled steps, the step which consists
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- in developing such latent images with a black and white developer shortly after exposure and then drying the film, substantially as and for the purpose described.
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7. A multi-layer colour photographic film whenever treated by the method claimed in any of the preceding claims.
8. The photographic process, substantially as herein described.
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Dated this 4th day of February, 1937.
W. P. THOMPSON & CO.,
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Chartered Patent Agents.