AMENDED SPECIFICATION

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PATENT SPECIFICATION

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446,392

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COMPLETE SPECIFICATION

Improvements in Colour Photography and Cinematography

I, Dr. Bela Gaspar, a Subject of the King of Roumania, of 42, Avenue Victor Rousseau, Bruxelles-Forest, Belgium, 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:—

The present invention has for its object to provide a method for producing colour photographic partial images. It has already been proposed to print individual colour component records in the form of single partial images from multi-coloured originals. It has also already been proposed for the purpose of producing partial images to produce separately the different colour sensation images, to colour them and then to print them with the aid of suitable printing light. The present invention concerns a particularly simple method of producing black and white colour part images of the different colour sensations.

According to the invention a multi-layer light sensitive material is employed for this purpose, the layers of which contain colour-forming substances suitable for the process of colour development. While hitherto such light sensitive material, developed in several colours, has been utilized for direct printing upon printing material which yields directly a coloured picture, the multi-colour image produced by colour development is utilized, according to the invention, for producing, with the aid of suitable colour filters, black and white prints, particularly black and white positives, for the individual partial colours. These black and white positives are afterwards utilized as final or as intermediate master images in the production of a multi-colour picture by a method other than colour development.

The method of colour development is already known. It has been utilized for producing multi-coloured photographs, the colours obtained by the colour developing process giving either the final colours directly, or colours complementary thereto. On the other hand, it is also known to produce with the aid of multi-colour screen negatives black and white positives which were required as printing matrices for photo-mechanical processes. The invention is based on the fact that it is of great advantage to produce from the multi-colour photographic picture obtained through the process of colour development black and white partial images corresponding to the various colours, and to utilize these black and white positives—and not the original multi-colour picture—as final master images or intermediate master images in the preparation of the multi-colour picture. The main advantage resides in the fact that it is possible to take advantage of the colour development process for producing the original picture, and that all the advantages of this process, particularly the transparency of the light sensitive material, can be made use of in full. On the other hand, by the preparation of the black and white part images the defects attaching to the colour development process may be avoided, inasmuch as the coloured pictures are only used transitionally for printing the single black and white partial images, while in the further treatment the separated black and white part images replace the original multi-colour picture. The black and white pictures are durable and may be printed with any light upon suitably sensitized print-

[Price 1/-]

ing paper, while a coloured picture may only be printed on paper the sensitization of which is in definite relationship to the light absorption properties of the colours contained in the multi-colour picture.

It is known that colour development has the disadvantage that the colours obtained thereby are very fugitive and poor, and that it is very difficult to find suitable dyestuffs of a shade appropriate for three-colour reproduction.

According to this invention it is sufficient, by this process, to use dyestuffs which are sufficiently absorbent within a spectral range and sufficiently permeable in another spectral range to prevent any mutual overlapping of the individual partial pictures.

With this invention, the multi-colour pictures produced by colour development of the exposure material only serve as master images and the colours of the individual partial pictures are independent of the sensitization of the individual partial layers of the exposure material. Positive copies are printed from the colour pictures obtained by different printing lights obtained by the use of colour filter, each of which only prints one of the colour components of the multi-colour image. The copies thus obtained are so-called intermediate positives which are then used to produce the final colour picture. They can, for example, be used as master images for producing colour pictures according to the process described in my Patents Nos. 408,991 and 415,040. The positives produced can be used as intermediate copy for producing duplicate negatives which may be used for printing on to a material as described in my Patent No. 379,679.

EXAMPLE:

For producing a three-colour photograph, use is made of a bipack in which one film contains two differently colour sensitized partial layers poured on top of one another, and the other film comprises an ordinary film. Each of the partial layers contains a coupling component for colour development. A bipack, the front film of which is turned towards the objective on the celluloid side, is provided, for instance, with a blue sensitive, i.e., unsensitized silver bromide layer which contains thioindoxylcarboxylic acid as component for the dyestuff-forming development. On said layer, another layer is poured which is green sensitive and contains a yellow filter dyestuff which can be easily washed out or is destructible in the developing liquid. Alphachloroacetoacetic-ester, for instance, is used as dyestuff forming component in the development. Development is obtained, for instance, with

2 grs. of diethylparaphenylenediamine
30 grs. of soda
1000 cubic cms. of water.

The back film contains a layer sensitive to red without dyestuff forming components and is developed and copied in the normal way.

The arrangement may also be varied. For instance, a blue sensitive film is used as front film without dyestuff-forming components and a double layer film is used as back film, the uppermost layer being green sensitive and the lower layer red sensitive. The layer sensitive to green contains, for instance, a yellow filter dyestuff and a substance yielding a yellow colour in the colour development, for instance, alphachloroacetoacetic-ester. The layer sensitive to red contains thioindoxylcarboxylic acid, which yields a purple colour.

A film with layers on both sides may also be applied for the same purpose, each layer receiving another dyestuff forming component. By treatment with the above-mentioned developer the dyestuff is formed during the development.

After exposure, development and fixing, the metallic silver is removed, for instance, with Farmer's reducer, whereupon a pure dyestuff image remains.

From two-colour pictures comprising yellow and purple part images, a black and white part image is produced with a strict yellow or green filter when a film sensitive to green is used as copying material. In this case, a positive is obtained corresponding to the purple red negative. From the second part picture, a black and white part image is printed with a strict blue filter. The purple red part picture is highly permeable to blue rays, and then only a positive corresponding to the yellow negative is obtained.

This method of producing multi-colour images by the colour development process and producing black and white partial pictures from the multi-colour images makes it possible to advantageously use dyestuff pictures which, due to their not being fast, are not suitable for final photographic pictures.

Another advantage of the invention lies in that the partial images can be adapted to the requirements of the copying materials used, whilst the gradation and likewise the density can be made to vary as desired. This is obtained by varying the printing light by the use of suitable copying filters, the permeability of which is within the maximum of absorption of the coloured part image to be printed or farther removed there-

from.

Colour developument it is well known may be performed by the use of a chemical substance of reducing properties which, when reducing the latent silver image is oxidized to yield a dyestuff. Such a developer may be incorporated in the layer and a second developer yielding a different dyestuff may be incorporated into another layer. It is further possible as stated in British Patent No. 2562/1913 to add to the developer or to the layer a substance or substances which combine with the oxidation product of the developer thus yielding a wide range of colours depending upon the particular kind of substance used. These known methods may obviously be used in carrying out the present invention.

The material may also contain dyestuffs to act as filter dyestuffs on exposure in the layer. The components for the colour development may also be present in the developer. The colour development may be performed by fractional colour development, in the multi-layer differently sensitized material. This is done in such a way that in the first place the upper layer is developed with a colour developer which gives a red picture and then washed and then the second picture which lies in the deeper layer is developed with a second colour developer which gives another colour. The silver image in already finished black and white pictures may also be transformed into silver halide and the colour formation may be effected by colour development as above described.

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

1. A method of producing colour photographs and colour kinematograph films, characterised in that black and white partial images are produced by printing from a multi-colour picture, itself produced in a known manner on a multi-layer light sensitive material by colour development, the black and white partial pictures of the colour sensations being printed on to separate colour sensitive material through coloured filters transmitting light which is absorbed only by the colour of the part layer in the multi-layer material and the said black and white partial pictures being subsequently used as master images or as intermediate master images in printing on to a multi-layer light sensitive material and producing the multi-colour image therein by a method other than colour development.

2. The improved method of producing colour photographs and colour kinematograph films substantially as hereinbefore described.

Dated this 9th day of August, 1935.

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