

PATENT SPECIFICATION

339,238



Application Date : Aug. 1, 1929. No. 23,705 / 29.

„ „ Aug. 14, 1929. No. 24,809 / 29.

One Complete Left : May 1, 1930.

Complete Accepted : Dec. 1, 1930.

PROVISIONAL SPECIFICATION.

No. 23,705, A.D. 1929.

Improvements in Colour Photography.

We, Dr. JOHN NAISH GOLDSMITH, a British Subject, of 67, Chancery Lane, London, W.C. 2, THOMAS THORNE BAKER, a British Subject, of The Hut, Hatch End, Middlesex, CHARLES BONAMICO, a French Citizen, of 19, New Bridge Street, London, E.C. 4, and SPICERS LIMITED, a British Company, of 19, New Bridge Street, London, E.C. 4, do hereby declare the nature of this invention to be as follows:—

This invention consists of improvements in or relating to colour photography, and cinematography, and particularly to the production of photographic films which carry a reseau or multicolour screen as well as a sensitised emulsion. Films of this type can be used for taking still or motion photographs or for reproduction of such photographs in natural colours.

By means of the process described in British Patent Specification No. 22,607/28, (Serial No. 322,432) successful results have been achieved in applying the multicolour screen to a film made of cellulose acetate composition.

The object of this invention is to enable the multicolour screen to be successfully applied to films made from celluloid or cellulose nitrate.

Taking the case where a film is to receive

(1) a dye of one colour, say green;
(2) a series of lines of a resist (such as for example fatty ink);

(3) a treatment with a bleaching or colour-discharging liquid; and

(4) a dye of another colour in the spaces thus bleached; difficulties arise if ordinary celluloid or nitrocellulose film is used.

For example, the original dyeing may be found to lack that uniformity which is essential for good photography in natural colours. Again, it may be necessary to conduct the bleaching or discharging operation at a comparatively slow rate

(i.e. with a lengthy period of contact with the discharging liquid) or the original dye (e.g. green dye) may penetrate too far into

the film with the result that effective discharge is not achieved.

According to this invention, when applying a multicolour screen to a film of celluloid or nitrocellulose the dye (particularly the first dye, such as the green dye) is applied to the film in such a way that it does not penetrate deeply into the film but is confined to the surface thereof. At the same time, to ensure proper colour values, care is taken that the intensity of the colour elements is such as to give proper selection.

In one form of this invention in applying a dye to the film say from a roller fed with the dye, the time of contact or the linear extent of contact between the film and the dyeing roller is so short that the dye is applied only to the surface of the film. The surface of the dyeing roller may be absorbent and charged with the dye so that the dye passes from the roller to the film simply by adsorption or surface transfer.

The required very thin layer of dye may be produced by spreading or rubbing a powdered dye-stuff on to the film or a finely-divided dyed substance may be forced into contact with the film to transfer a thin layer of dye thereto.

We have further found that the slow penetration desirable to ensure a very thin layer of colour can be effected by applying to the film a viscous solution of the dye such as a solution in castor oil, castor oil and alcohol, or in gum arabic. Here again the required intensity of colour in the reseau is ensured by using a strong solution of the dye, or alternately a dye of very intensive dyeing properties.

Alternatively, we may use a dye which is in suspension and not in actual solution (e.g. cochineal) or which by reason of its large molecular dimensions will penetrate or migrate very slowly.

If desired, the solution of the dye may be sprayed on to the film. Or the required thin layer of dye may be obtained by pressing the film into contact with a

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transfer paper, or with a carrier coated with a thin layer of the dye required.

Assuming that the thin layer of a first colour has been applied to the film by any of the methods described, the film is then led through a printing machine by means of which fine parallel lines of a resist are printed on it. The film is then subjected to the action of a liquid which discharges the colour from the spaces between the lines. A second colour is now applied to the interline spaces. Here again the colour may be applied by any of the methods above described so that only a thin surface layer of colour is provided.

The resist lines are then removed. A fresh series of parallel lines of resist is printed at right angles to those formerly made. Again, the colour is bleached from the spaces between the resist lines. A third colour is now applied to the interline spaces and the resist lines are removed. Finally, the dried film is coated with a suitable substratum and then with a layer of a colour-sensitive emulsion.

Dated this 1st day of August, 1929.

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PROVISIONAL SPECIFICATION.

No. 24,809, A.D. 1929.

Improvements in Colour Photography.

We, Dr. JOHN NAISH GOLDSMITH, a British Subject, of 67, Chancery Lane, London, W.C. 2, THOMAS THORNE BAKER, a British Subject, of The Hut, Hatch End, Middlesex, CHARLES BONAMICO, a French Citizen, of 19, New Bridge Street, London, E.C. 4, and SPICERS LIMITED, a British Company, of 19, New Bridge Street, London, E.C. 4, do hereby declare the nature of this invention to be as follows:—

This invention consists of improvements in or relating to colour photography, and cinematography, and particularly to the production of photographic films which carry a reseau or multicolour screen as well as a sensitised emulsion. Films of this type can be used for taking still or motion photographs or for reproduction of such photographs in natural colours.

By means of the process described in British Patent Specification No. 22,607/28, (Serial No. 322,432) successful results have been achieved in applying the multicolour screen to a film made of cellulose acetate composition.

Difficulties are met with if it is sought to apply a coloured reseau to non-flam (cellulose acetate) film. Either the dyes may not stain the film adequately in the time available for a continuous process or alternatively the film may be stained too deeply to permit of correct discharging in subsequent stages; or again the nature of the film may be such as when dyed to retard the discharging operation.

This difficulty has previously been overcome by applying a layer of collodion to the non-inflammable film.

According to the present invention, however when applying a multicolour

screen to a film of cellulose acetate the dye (particularly the first dye, such as the green dye) is applied to the film in such a way that it does not penetrate deeply into the film but is confined to the surface thereof. At the same time, to ensure proper colour values, care is taken that the intensity of the colour elements is such as to give proper selection. To this end the unrestricted employment of penetrative solvents to carry the dye may be avoided.

In one form of this invention in applying a dye to the film say from a roller fed with the dye, the time of contact or the linear extent of contact between the film and the dyeing roller is so short that the dye is applied only to the surface of the film. The surface of the dyeing roller may be absorbent and charged with the dye so that the dye passes from the roller to the film simply by adsorption or surface transfer.

The required very thin layer of dye may be produced by spreading or rubbing a powdered dye-stuff on to the film or a finely-divided dyed substance may be forced into contact with the film to transfer a thin layer of dye thereto.

We have further found that the slow penetration desirable to ensure a very thin layer of colour can be effected by applying to the film a viscous solution of the dye such as a solution in castor oil, castor oil and alcohol, or in gum arabic. Here again the required intensity of colour in the reseau is ensured by using a strong solution of the dye, or alternately a dye of very intensive dyeing properties.

Alternatively, we may use a dye which is in suspension and not in actual solution

(e.g. cochineal) or which by reason of its large molecular dimensions will penetrate or migrate very slowly.

Again, the dye may be sprayed upon the film in the form of a very fine mist so as to produce a uniformly coloured thin layer of the required intensity. Or the required thin layer of dye may be obtained by pressing the film into contact with a transfer paper, or with a carrier coated with a thin layer of the dye required.

Assuming that the thin layer of a first colour has been applied to the film by any of the methods described, the film is then led through a printing machine by means of which fine parallel lines of a resist are printed on it. The film is then subjected to the action of a liquid which discharges the colour from the spaces between the lines. A second colour is

now applied to the interline spaces. Here again the colour may be applied by any of the methods above described so that only a thin surface layer of colour is provided. The resist lines are then removed. A fresh series of parallel lines of resist is printed at right angles to those formerly made. Again, the colour is bleached from the spaces between the resist lines. A third colour is now applied to the interline spaces and the resist lines are removed. Finally, the dried film is coated with a suitable substratum and then with a layer of a colour-sensitive emulsion.

Dated this 14th day of August, 1929.

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COMPLETE SPECIFICATION.

Improvements in Colour Photography.

We, Dr. JOHN NAISH GOLDSMITH, a British Subject, of 67, Chancery Lane, London, W.C. 2, THOMAS THORNE BAKER, a British Subject, of The Hut, Hatch End, Middlesex, CHARLES BONAMICO, a French Citizen, of 19, New Bridge Street, London, E.C. 4, and SPICERS LIMITED, a British Company, of 19, New Bridge Street, London, E.C. 4, 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 consists of improvements in or relating to colour photography, and cinematography, and particularly to the production of photographic films which carry a reseau or multicolour screen as well as a sensitised emulsion. Films of this type can be used for taking still or motion photographs or for reproduction of such photographs in natural colours.

By means of the process described in British Patent Specification No. 322,432, successful results have been achieved in applying the multicolour screen to a surface layer of collodion coated on a film base of cellulose acetate composition. Similarly in Specification No. 333,865 there is described a method according to which the multicolour screen is applied to the surface of a cellulose ester film which has been pretreated with a solution of a liquid alkaline reagent.

The object of this invention is to enable the multicolour screen to be applied directly to the surface of films made from cellulose acetate, celluloid, cellulose

nitrate or other ester or ether of cellulose, without the necessity of first applying to the film base a layer of collodion or other material to receive the multicolour screen; or of pretreating the film with an alkaline or other liquid reagent.

The present invention is limited to a process of making a colour screen of the type in which the colour screen is applied directly to the surface of a film of cellulose acetate, celluloid, cellulose nitrate or other ester or ether of cellulose, without first treating the surface of the film with a solvent or other liquid reagent, and without first applying thereto a layer of collodion or other material to carry the screen, and in which the film receives:—

- (1) a dye of one colour, say green;
- (2) a series of lines of a fatty resist (such as a fatty ink);
- (3) a treatment with a bleaching or colour-discharging liquid;
- (4) a dye of another colour in the spaces thus bleached;
- (5) a treatment to remove the fatty resist;
- (6) a series of lines of a fatty resist imprinted across the previous lines;
- (7) a treatment with a bleaching or colour-discharging liquid;
- (8) a dye of yet another colour in the spaces thus bleached; and
- (9) a treatment to remove the fatty resist.

We have found that difficulties arise if it is sought to apply a multicolour screen directly to the surface of an ordinary celluloid or a commercial nitro cellulose

film by a process of this type. The original dye lacks that uniformity which is essential for good photography in natural colours. Again we have found that it is necessary to conduct the bleaching or discharging operation at a comparatively slow rate (i.e. with a lengthy period of contact with the discharging liquid) which gives rise to great disadvantages, and finally we have found that the dyes readily penetrate too far into the film with the result that effective discharge was not achieved. These difficulties have previously been overcome by applying a layer of pure cellulose acetate to the surface of the film as described in Specification No. 334,265.

Similar difficulties are also met with in applying a coloured screen by the above process directly to non-inflammable (cellulose acetate) film. We have found that the film is normally stained too deeply to permit of correct discharging in subsequent stages; and again the nature of the film is often such as when dyed to retard the discharging operation. These difficulties have previously successfully been overcome by applying a layer of collodion to the non-inflammable film as described in Patent No. 322,432.

In Patent No. 217,557 it is suggested that the first dyeing colours shall penetrate deeply into the celluloid support, then a second colour, yellow, is applied all over the film and the yellow colour penetrates the thickness of the celluloid only to a slight extent so that when the decolouring agent is applied all the yellow colour and only a portion of the previously applied blue or red colour is removed. We make no claim to this process or to any process in which one colour penetrates deeply and another is superimposed.

In Patent No. 225,659 one surface of the film is coloured, then coated with a protective coating, such as gelatine. Then the protective coating and underlying coloured surface is removed in lines by rotary milling cutters. In that process care is taken not to make the dye solution too active or to leave the film too long in the solution as otherwise the tinting will penetrate to a depth greater than desired. We make no claim to this process or to any process in which a gelatine coating is used or in which a coloured layer is removed by cutting.

With a view to overcoming the above and other difficulties, the present invention provides a method of the above described type of applying a multicolour screen directly to a film of celluloid, nitro cellulose, cellulose acetate or other ester or ether of cellulose, in such a way that the dyes do not penetrate into the film,

but are confined to the surface layers thereof; which method consists in applying the dyes to the immediate surface layers only of the film, by applying the dye not in a penetrative solvent but in a non-penetrative condition or medium.

The required very thin layer of dye may be produced by spreading or rubbing a powdered dye-stuff on to a film or a finely-divided dyed substance may be forced into contact with the film to transfer a thin layer of dye thereto.

We have further found that the slow penetration desirable to ensure a very thin layer of colour can be effected by applying to the film a viscous solution of the dye such as a solution in castor oil, castor oil and alcohol, or in gum arabic. Here again the required intensity of colour in the screen is ensured by using a strong solution of the dye, or alternately a dye of very intensive dyeing properties.

Alternatively, we may use a dye which is in suspension and not in actual solution (e.g. cochineal) or which by reason of its large molecular dimensions will penetrate or migrate very slowly.

Again, the non-penetrative medium containing the dye may be sprayed upon the film in the form of a very fine mist so as to produce a uniformly coloured thin layer of the required intensity.

Assuming that the thin layer of a first colour has been applied to the film by any of the methods described, the film is then led through a printing machine by means of which fine parallel lines of a resist are printed on it. The film is then subjected to the action of a liquid which discharges the colour from the spaces between the lines. A second colour is now applied to the interline spaces. Here again the colour is applied by any of the methods above described so that only a thin surface layer of colour is provided. The resist lines are then removed. A fresh series of parallel lines of resist is printed at right angles to those formerly made. Again the colour is bleached from the spaces between the resist lines. A third colour is now applied to the interline spaces and the resist lines are removed. Finally, the dried film is coated with a suitable substratum and then with a layer of a colour-sensitive emulsion.

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. A method of the type described of applying a multicolour screen directly to the surface of a film of celluloid, nitro cellulose, cellulose acetate or other ester or ether of cellulose, wherein, for the

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purpose specified, the dyes are applied to the immediate surface layers only of the film, by applying the dye not in a penetrative solvent, but in a non-penetrative condition or medium.

5 2. A method according to Claim 1, wherein a powdered dyestuff is rubbed or spread on to the film, or a finely divided dyed substance is forced into contact with the film to transfer a thin layer of dye thereto.

10 3. A method according to Claim 1, wherein a viscous solution of a dye, for example a solution in castor oil, castor oil and alcohol, or gum arabic is applied to the film.

4. A method according to Claim 1, wherein a dye which is in suspension but not in actual solution (for example cochineal) is applied to the film.

5. A method of applying a multicolour screen to a film of celluloid, nitro cellulose, cellulose acetate or other ester or ether of cellulose, substantially as described.

Dated this 1st day of May, 1930.

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