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Complete Specification Left, 26th Oct., 1909—Accepted, 4th May, 1910

PROVISIONAL SPECIFICATION.

Improvement in Three-colour Photographic Processes.

I, RODOLPHE BERTHON, of Assieu, in the Republic of France, Engineer, do hereby declare the nature of this invention to be as follows:—

The present invention has for its object a process for obtaining photographic prints which can be projected and reproduced in colours by means of a diaphragm objective provided with three-colour screens and of plates or films the surface of which is covered with transparent and refracting lines or points.

It is known that when a diaphragm with three apertures provided with red, green and violet screens appropriately selected are arranged at the optical centre of an objective the colours of the images projected are not modified but remain identical with those given by the same objective without a three colour diaphragm. In addition when the image thus projected is viewed it is found that the brilliancy of the various screens of the diaphragm varies in accordance with the tints of the part of the image in question and the components of this tint. Thus in the case of a red point only the red screen is luminous; for a yellow point only the red and green screens are luminous the violet screen appearing black and so forth.

The result is that if at each point of a single sensitised layer it is possible to record a complete and infinitely small image of the objective with its three screens a three-colour selection is obtained which is analogous to that given by processes with juxta-posed coloured pigments and which when projected by means of the apparatus which has served for the exposure will reproduce the exact colours of the original. This is the process which forms the object of the present invention. It may be carried into practice by different means but I prefer to employ an objective which at its optical centre comprises a diaphragm provided with a red screen, a green screen and a blue screen and some convenient refracting surface carrying a microscopic spherical embossing each point acting as an actual objective. This refracting surface is arranged between the objective and the surface carrying a panchromatic emulsion very close to the latter. Obviously the same result will be obtained by replacing the embossing by colourless spheroidal refracting grains which will play the same part as the facets of the embossing.

When the screens of the diaphragm are arranged along parallel slots the complete micrographic images of the objective may be replaced by linear images of the latter. The embossed surfaces indicated above are preferably replaced in this case by semi-cylindrical striated fluted surfaces; or the spheroidal grains are replaced by colourless cylindrical threads with a single strand.

Whatever the arrangement employed may be it is advisable in order to avoid the necessity for guide or registration marks when a projection is desired that the sensitised layer and the surface serving for the selection of the coloured rays emanating from the three-colour diaphragm of the objective should be

[Price 8d.]



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carried by the same support of glass celluloid, gelatine or the like. In this manner plates and films for ordinary views, cinematographic films and so forth can be prepared.

Commercial plates on a glass support and films with a celluloid support may be utilised in this process in the following manner; the emulsion is rendered 5 panchromatic in making it sensitive by dipping it and a system of microscopic refracting elements is added to their supports; a moulding in gelatine or in celluloid is specially suitable for the plates while in the case of films with a plastic support merely rolling them at an appropriate temperature and pressure between a smooth cylinder and a cylinder carrying in intaglio the engraving of 10 the embossing to be formed will be sufficient.

The curvature of the microscopic elements of the refracting system should of course be proportionate to the thickness of the support for the emulsion. These plates and films are exposed with the embossed side next the objective.

The images obtained by this process may be utilised for the projection in 15 different ways; when merely developed after exposure through the objective with three-colour diaphragm a plate, film or the like of this kind when replaced in the exposure apparatus gives a negative image in which the colours of the objects are represented by their complementary colours; inverted after the first development the projected image is positive and the colours the actual 20 colours; finally the direct negative image and the inverted image may be projected with the objective with which the picture was taken the screens of the diaphragm being replaced however, by screens of complementary tints. In the first case a negative projection is obtained but its tints are similar to those of the original and in the second case a positive projection is obtained 25 with colours complementary to those of the objects photographed.

Certain of these methods of projection give various methods of reproducing these images. The negative image (not inverted) projected by means of the photographing apparatus upon a plate or film comprising a similar and similarly arranged embossing gives upon this latter plate by simple development a positive 30 image visible in colours when replaced in the apparatus and capable of projection in colours likewise. The positive image (obtained by print or invention) projected on to a similar surface enables another positive print to be obtained by inversion. Finally if a sensitised decolouration paper of three primary colours red, yellow, and blue be arranged either beneath the projection pencil of light 35 or beneath the photographic image itself powerfully illuminated through the three-colour screen objective, the paper assumes the tints of the object; this method therefore, gives reproductions in colours on paper.

The phototypes obtained upon embossed surfaces may always be reproduced by contact upon layers provided with the same embossing owing to the faculty 40 of perfect registration ensured by the relief of the microscopic elements of the refracting system.

Dated this 4th day of May, 1909.

HASELTINE, LAKE & Co.,
7 & 8, Southampton Buildings, London, England, and 45
60, Wall Street, New York City, U.S.A.,
Agents for the Applicant.

COMPLETE SPECIFICATION.

Improvement in Three-colour Photographic Processes. 50

I, RUDOLPHE BERTHON, of Assieu, in the Republic of France, Engineer, do hereby declare the nature of this invention and in what manner the same is

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to be performed, to be particularly described and ascertained in and by the following statement:—

5 The present invention has for its object a process for obtaining photographic prints which can be projected and reproduced in colours by means of a diaphragm objective provided with three-colour screens and of plates or films the surface of which is covered with transparent and refracting lines or points.

10 It is known that when a diaphragm with three apertures provided with red, green and violet screens appropriately selected are arranged at the optical centre of an objective the colours of the images projected are not modified but remain identical with those given by the same objective without a three colour diaphragm. In addition when the image thus projected is viewed it is found that the brilliancy of the various screens of the diaphragm varies in accordance with the tints of the part of the image in question and the components of this tint. Thus in the case of a red point only the red screen is luminous; for a yellow point only the red and green screens are luminous
15 the violet screen appearing black and so forth.

The result is that if at each point of a single sensitised layer it is possible to record a complete and infinitely small image of the objective with its three screens a three colour selection is obtained which is analogous to that given
20 by processes with juxta-posed coloured pigments and which when projected by means of the apparatus which has served for the exposure will reproduce the exact colours of the original.

The improved process in accordance with the present invention consists in the employment of photographic plates films or bands carrying on one side a sensitised panchromatic layer and on the other side lines or a transparent embossed, striated or grained surface in combination with a three-colour screen
25 of the fundamental colours arranged in the objective.

The characteristic feature of the invention resides in the fact that the lines or embossed surface are transparent upon a transparent background so that all
30 the light is utilised whereas in the known arrangements opaque lines upon a transparent background or else transparent lines upon a background which is more or less opaque are employed.

In the accompanying drawing:—

35 Figure 1 is a sectional view of an anastigmat objective and its three colour screen.

Figure 2 is a front elevation of the screen.

Figure 3 is an elevation and

40 Figure 4 a section on the line 4—4 to a considerably larger scale of a plate or film provided with transparent and refracting projections hemispherical in form.

Figure 5 is an elevation and

Figure 6 a section on the line 6—6 of a plate or film provided with parallel transparent and refracting lines.

45 In order to carry the invention into practice an objective is employed which at its optical centre comprises a diaphragm provided with a red screen A, a green screen B and a blue screen C (Figures 1 and 2) and some convenient refracting surface carrying a microscopic spherical embossing, D, (Figures 3 and 4) each point acting as an actual objective. This refracting surface is arranged between the objective and the surface carrying a panchromatic emulsion
50 very close to the latter. Obviously the same result will be obtained by replacing the embossing by colourless spheroidal refracting grains which will play the same part as the facets of the embossing.

55 When the screens of the diaphragm are arranged along parallel slots the complete micrographic images of the objective may be replaced by linear images of the latter. The embossed surfaces indicated above are preferably replaced in this case by semi-cylindrical striated flated surfaces E (Figures 5 and 6);

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or the spheroidal grains are replaced by colourless cylindrical threads with a single strand.

Whatever the arrangement employed may be it is advisable in order to avoid the necessity for guide or registration marks when a projection is desired that the sensitised layer F and the surface serving for the selection of the coloured rays emanating from the three-colour diaphragm of the objective should be carried by the same support G of glass celluloid, gelatine or the like. In this manner plates and films for ordinary views, cinematographic films and so forth can be prepared.

Commercial plates on a glass support and films with a celluloid support may be utilised in this process in the following manner; the emulsion is rendered panchromatic in making it sensitive by dipping it and a system of microscopic refracting elements is added to their supports; a moulding in gelatine or in celluloid is specially suitable for the plates while in the case of films with a plastic support merely rolling them at an appropriate temperature and pressure between a smooth cylinder and a cylinder carrying in intaglio the engraving of the embossing to be formed will be sufficient.

The curvature of the microscopic elements of the refracting system should of course be proportionate to the thickness of the support for the emulsion. These plates and films are exposed with the embossed side next the objective.

The images obtained by this process may be utilised for the projection in different ways; when merely developed after exposure through the objective with three-colour diaphragm a plate; film or the like of this kind when replaced in the exposure apparatus gives a negative image in which the colours of the objects are represented by their complementary colours; inverted after the first development the projected image is positive and the colours the actual colours; finally the direct negative image and the inverted image may be projected with the objective with which the picture was taken the screens of the diaphragm being replaced however, by screens of complementary tints. In the first case a negative projection is obtained but its tints are similar to those of the original and in the second case a positive projection is obtained with colours complementary to those of the objects photographed.

Certain of these methods of projection give various methods of reproducing these images. The negative image (not inverted) projected by means of the photographing apparatus upon a plate or film comprising a similar and similarly arranged embossing gives upon this latter plate by simple development a positive image visible in colours when replaced in the apparatus and capable of projection in colours likewise. The positive image (obtained by print or inversion) projected on to a similar surface enables another positive print to be obtained by inversion. Finally if a sensitised decolouration paper of three primary colours, red, yellow and blue be arranged either beneath the projection pencil of light or beneath the photographic image itself powerfully illuminated through the three-colour screen objective, the paper assumes the tints of the object; this method therefore, gives reproductions in colours on paper.

The phototypes obtained upon embossed surfaces may always be reproduced by contact upon layers provided with the same embossing owing to the faculty of perfect registration ensured by the relief of the microscopic elements of the refracting system.

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 process for obtaining photographic prints capable of projection and reproduction in colours by means of photographic plates films or bands carrying on one side a sensitised panchromatic layer and on the other side lines or a transparent embossed striated or grained surface in combination with a three-colour screen of the fundamental colours arranged in the objective the device

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permitting of separating by refraction the images of the screens projected in a microscopic condition at points very close together upon the sensitive layer.

2. A process of obtaining photographic prints substantially as hereinbefore described and for the purpose specified.

5. Dated this 26th day of October, 1909.

HASELTINE, LAKE & Co.,
7 & 8, Southampton Buildings, London, England, and
60, Wall Street, New York City, U.S.A.,
Agents for the Applicant.

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

FIG-1

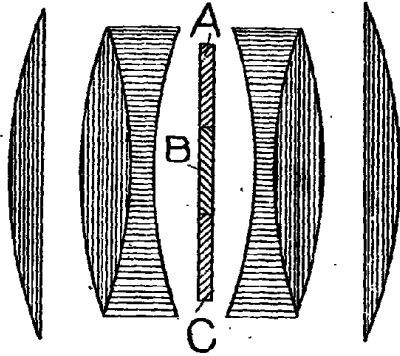


FIG-2

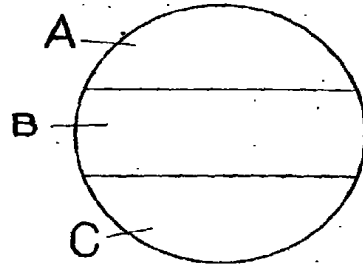


FIG-3

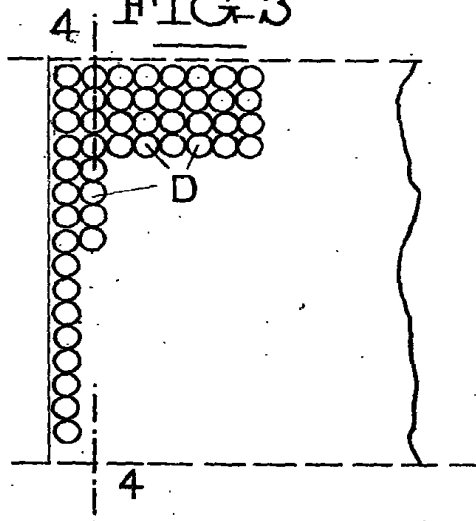


FIG-4

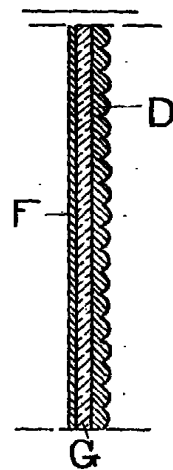


FIG-5

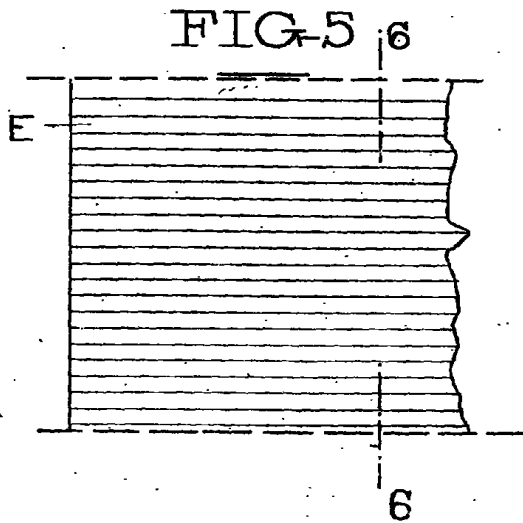
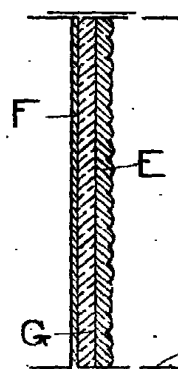


FIG-6



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