

PATENT SPECIFICATION

377,411

Convention Date (Belgium): July 16, 1930.

Application Date (in United Kingdom): July 11, 1931. No. 19,999/31.

Complete Accepted: July 28, 1932.

COMPLETE SPECIFICATION.



Improvements in Process of Preparing Coloured Photographic and Cinematographic Pictures.

I, LÉON JOSSE DASSONVILLE, a Belgian subject, of 35, avenue Paul de Jaer, Brussels, 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:—

This invention relates to the preparation of coloured photographic and cinematographic positives by the superimposition of several photographic images of different colours upon one support.

In this connection it has already been proposed inter alia to print positive images in register on both sides of a transparent film coated with emulsion on each face and according to another pro-

other in the reproduction of natural colours.

The object of this invention is to overcome said difficulty and to provide a sequence of operations using reagents adapted to render working quick and easy, and whereby images complying with the conditions set forth may be formed upon one and the same sensitised face of a film or plate.

To this end, according to the invention, after the first silver image has been printed developed and fixed the coat is re-sensitised by means of an iron salt adapted to discolour said silver image and render it capable of being mordanted, whereupon the second image is printed upon the

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SPECIFICATION No. 377,411.

Page 3, line 2, for " cable " read
" capable "

PATENT OFFICE,

August 30th, 1932.

40 proposed to produce one image on each face of the coat of emulsion, for which purpose the image borne upon the inner face thereof had to be printed through the celluloid support. According to other known processes, two or three images are 45 superimposed upon one and the same face of the coat, each said image being tinted before the emulsion is resensitised in order to print the next image.

50 The main difficulty encountered by inventors hitherto has been that of uniting two images whose characteristics are such that they will not impair each other during treatment, and which supplement each

which would be lost if the second image were printed upon a black or a previously tinted first image. The ferric salt likewise has the advantage of acting upon the silver salt of the first image in a manner favourable to the mordanting thereof.

The double cyanide used to develop the second image may be ferrocyanide or a ferricyanide, according whether such image was printed from a positive or from a negative film. In either case, the image developed in blue is insensitive both to the substance, iodide of potassium for example, used to mordant the silver salt of the first image, and to the aniline

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[Price 1/-]

Price 25p

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Improvements in Process of Preparing Coloured Photographic and Cinematographic Pictures.

I, LÉON JOSSE DASSONVILLE, a Belgian subject, of 35, avenue Paul de Jaer, Brussels, 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:—

This invention relates to the preparation of coloured photographic and cinematographic positives by the superimposition of several photographic images of different colours upon one support.

In this connection it has already been proposed inter alia to print positive images in register on both sides of a transparent film coated with emulsion on each face and, according to another process, to superimpose two or three positive images on one side of film by covering the coat of exposed emulsion in each instance with a new coat of fresh emulsion. The first process abovementioned necessitates special preparation of the film blank to coat it on both sides and special apparatus to allow the two images to be printed developed and toned separately. The film thus obtained is very costly and wears rapidly owing to the delicacy of its two faces. The second process referred to suffers from the inconvenience that the film shrinks after each coating with fresh emulsion and that the superimposed images do not remain in perfect register whilst, on the other hand, the aniline dyes used to tint the various images almost invariably disperse among the several coats of emulsion and thus make the images vague or "woolly." It has likewise been proposed to produce one image on each face of the coat of emulsion, for which purpose the image borne upon the inner face thereof had to be printed through the celluloid support. According to other known processes, two or three images are superimposed upon one and the same face of the coat, each said image being tinted before the emulsion is resensitised in order to print the next image.

The main difficulty encountered by inventors hitherto has been that of uniting two images whose characteristics are such that they will not impair each other during treatment, and which supplement each

other in the reproduction of natural colours.

The object of this invention is to overcome said difficulty and to provide a sequence of operations using reagents adapted to render working quick and easy, and whereby images complying with the conditions set forth may be formed upon one and the same sensitised face of a film or plate.

To this end, according to the invention, after the first silver image has been printed developed and fixed the coat is resensitised by means of an iron salt adapted to discolour said silver image and render it capable of being mordanted, whereupon the second image is printed upon the same coat face, said second image is developed by double cyanide in colour by the precipitation therein of a coloured salt of iron, and the first image is then dyed by interpenetration with said second image.

According to a preferred manner of carrying out the invention, the emulsion coat bearing the silver image is resensitised by means of ferric chloride in an acid solution. Other ferric salts such as ferric oxalate, tartrate and citrate, may however prove suitable likewise. The effect of said salts being not only that of resensitising the coat of emulsion but likewise that of discolouring the silver image by converting the silver into white silver chloride, the second image is printed under particularly favourable conditions, since the rays of light are not appreciably intercepted by the first image and hence half-tones may be obtained, which would be lost if the second image were printed upon a black or a previously tinted first image. The ferric salt likewise has the advantage of acting upon the silver salt of the first image in a manner favourable to the mordanting thereof.

The double cyanide used to develop the second image may be ferrocyanide or a ferricyanide, according whether such image was printed from a positive or from a negative film. In either case, the image developed in blue is insensitive both to the substance, iodide of potassium for example, used to mordant the silver salt of the first image, and to the aniline

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[Price 1/-]

colourings used to dye the first image.

Two superimposed images of different tints suffice to create an illusion of natural colours but, if desired, a third image of a different colour may be superimposed for example, by the mechanical printing of colouring matter, as by the dye-impression or imbibition processes for example.

10 In order that my invention may be more clearly understood I now shall describe an example of its application to cinematographic films:

I shall assume firstly that two negative 15 films have been exposed by any suitable process through two screens of different colours, for example one such film reproducing the orange-red portions of the subject filmed and the other reproducing the 20 blue-green portions of the same subject. With the first negative I print an ordinary positive in the ordinary manner, on a usual commercial silver-salt coated film. After development, fixing and 25 washing, I obtain a first positive image of reduced silver, in which the orange-red portions of the subject are shown in black.

This film is then immersed, without being 30 toned, in a solution of ferric chloride and oxalic acid, in order to saturate with said solution the gelatine coat bearing the image. After having been dried, said 35 coat, impregnated with ferric chloride and with the acid intended to reduce and to accelerate the resensitising action of the same, is again sensitive to light. I have 40 found that the ferric chloride likewise acts upon the reduced silver of the first image and renders it suitable for subsequent mordanting, previous to dyeing.

I then again expose the film under the 45 second negative which shows the blue-green portions of the subject, care being taken that the second image thus printed on the resensitised coat is in exact register with the first image. Under the action of light and in the presence of the acid the ferric chloride FeCl_3 is converted into 50 ferrous chloride FeCl_2 . I develop this second image by immersing it in a solution of potassium ferricyanide which reacts with the ferrous chloride, forming a ferrous ferricyanide precipitate (Turnbull blue) which stains in blue the 55 gelatine portions previously exposed to light through the clear portions of the negative film. The blue tint of this image, more or less marked according to the quantity 60 of light received during exposure under the negative, is unaffected by the reagents used during subsequent treatment of the film.

Such further treatment consists in 65 washing the film and immersing the same

in a solution of iodide of potassium to mordant the silver of the first image, i.e., to prepare it to take and to retain a suitable aniline dye. This image then is 70 dyed through the second image, merely by passing the film thus prepared through a bath of aniline dye, of orange-red colour for example. After having been washed in slightly acidulated water to 75 remove excess dye, the film then bears two sharp and well-defined superimposed images of which one is orange-red and the other is blue and which produce a single image in natural colours when projected upon a screen. 80

If, instead of printing the second image by exposure to light beneath a negative, it be printed by means of a positive and the film be subsequently treated 85 with ferrocyanide instead of with ferricyanide, then a blue image still results, but in that event the blue tint is assumed by those portions of the image which were sheltered from light during exposure and 90 said blue tint consists of a ferric ferrocyanide precipitate, or Prussian blue. Such blue image is likewise unaffected by subsequent reagents and, as in the former alternative, the first image may be mordanted and dyed through the Prussian 95 blue image.

The two-colour film obtained as described above may be projected as it is, by existing cine projectors, without any 100 alterations thereto, and its cost price is but slightly higher than that of an ordinary black-and-white film.

As has been explained, it is possible to superimpose a third image, in yellow for 105 instance, by dye-impression or imbibition printing processes.

In the appended claims the word "photographic positive" is intended to 110 cover cinematographic as well as photographic positives, and it also should be understood that the performance of my improved process may be varied without departing from the scope of my invention as defined in said claims, whatever be 115 the nature of the support used.

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 120 claim is:—

1. A process of preparing coloured 125 photographic positives by successive exposures from the same side, under two complementary negatives, of a coat sensitised by means of silver salt and thereafter resensitised by the use of salt of another metal, said process being characterised by firstly printing and developing 130 and fixing the silver image, resensitising the coat of emulsion by means of an iron

- salt adapted to discolour said silver image and render the same capable of being mordanted, printing the second image upon the same face of the coat, developing said second image in colour by the precipitation therein of a coloured salt of iron, and then dyeing said first image by interpenetration with said second image.
2. A process as claimed in claim 1, wherein the coat bearing the silver image is resensitised by the use of ferric chloride in an acid solution.
3. A process as claimed in claim 2, wherein the second image is printed under a negative film, upon the coat bearing the first discoloured image, whereupon the second image is developed in blue with a ferricyanide.
4. A modification of the process claimed in claim 3, wherein the second image is printed under a positive film and a ferrocyanide is used to develop said image.
5. A process as claimed in Claim 1 or claim 2, characterised in that, for the purpose of mordanting, use is made of a solution of iodide of potassium which does not impair the transparency of the discoloured silver image.
6. A process for securing coloured photographic positives, substantially as above described.

Dated this 11th day of July, 1931.

MARKS & CLERK.