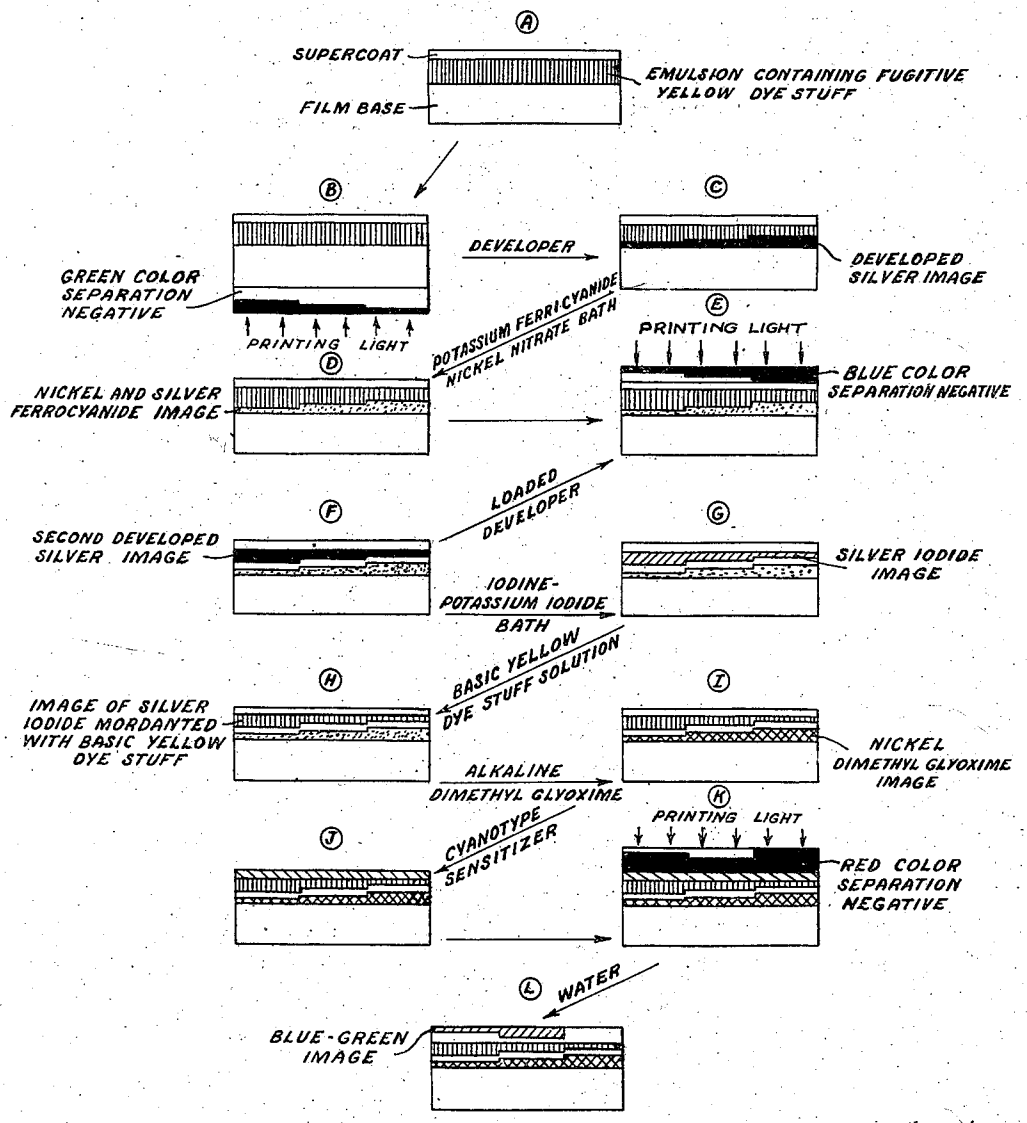
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PRODUCTION OF THREE-COLOR SUBTRACTIVE PHOTOGRAPHIC IMAGES

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PRODUCTION OF THREE-COLOUR SUBTRACTIVE PHOTOGRAPHIC IMAGES

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This invention relates to the production of coloured photographic images and more particularly to the production of motion pictures in full colour.

In the production of coloured photographic images both two-colour and three-colour reproduction have been utilized. In some methods the respective colour images have been produced each in a separate layer of emulsion whilst in others all have been produced in two or even one layer of emulsion. Owing to the limitations of two-colour reproduction three colour reproduction is much to be preferred but the addition of the third colour, whilst improving the quality of reproduction, greatly increases the difficulty and expense thereof. The most satisfactory types of three-colour reproduction so far evolved are those in which three colour images are produced in three separate layers of emulsion and those in which the separate images are produced on transfers and then, in turn, transferred to a common base.

Great difficulty has hitherto been encountered in the production of a plurality of coloured photographic images in a single emulsion due to the fact that the toning agents employed in the production of a desired image have deleteriously affected an already toned image present thereby affecting the correctness of the form and density of that image and/or its normal colour characteristics. To overcome this difficulty it has previously been proposed to form a single colour image of a desired set in one emulsion layer, to coat that emulsion layer with a film of impermeable nature and then apply a second sensitized emulsion layer, print the second image, tone that image to desired colour and repeat the whole procedure again for the production of the third image. However, the emulsion layer does not readily adhere to the impermeable film and it was found necessary to insert an additional layer at each stage which served to bond the impermeable film to the emulsion layer which was to be next applied. A very complicated structure had accordingly to be provided to accommodate three toned positive records which was of very substantial thickness while the images were too far separated from each other to be useful in motion picture work. Recently such process has been modified to combine the functions of impermeability and bonding power in a single intermediate layer, without, however, eliminating the fundamental objections involved.

In the case of motion picture films attempts were made to overcome the difficulty by providing sensitized emulsions on both sides of the base and printing and processing these separately. Reasonably satisfactory two-colour reproduction could be achieved in this way but since the images were on opposite sides of the base they were relatively far apart and this objection also obtained when an image was produced on one side of the base and two on the other side of the base.

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In the case of cinematographic films there is an important advantage in having the three colour images very closely adjacent to one another since this permits of accurate focussing in conventional projectors. Films in which the three colour images are present in separate layers of emulsion, especially when disposed on opposite sides of a common support, obviously cannot be as accurately focussed (unless a complicated optical system is provided) as those in which the three colour images are very closely adjacent to each other in a single layer of emulsion and accordingly the latter type of film is to be preferred.

The most successful process so far evolved has been the inhibition process which involves the production of three separate transfer bases (one corresponding to each colour separation negative) by means of which subtractive images are, in turn, produced by applying the appropriately dye-impregnated transfers, in register, to the film emulsion. This process involves the relatively expensive production of the three transfers.

It is the object of the present invention to provide a process for the production of tri-colour subtractive motion picture film, in which the use of impermeable layers or of separate emulsions on opposite sides of a common base is entirely avoided by a suitable choice of transparent images, which will give accurate reproduction and which can be produced in the presence of each other, without detriment to the form, density and quality of each of the component images by a process which permits full penetration of the emulsion by all or substantially all of the reagents employed, which is relatively easy to operate, and which is economical and expeditious in character.

A further object is to use ordinary silver halide emulsion motion picture positive film of the supercoated type in the production of tri-colour subtractive motion picture film.

A still further object is to provide a process for the production of a set of three transparent subtractive images in closely adjoining strata each of which images comprises a metallic component.

The chemical properties of the various known

magenta, blue-green and yellow image-forming substances and the intermediates necessarily obtained in the production thereof set definite, but not generally known or properly understood, limitations upon the selection of suitable combinations and upon the order and manner in which they can be formed if treating solutions are to be employed which can be allowed to penetrate throughout the whole depth of the image-bearing layer. In the case of motion picture work the selection is still further restricted by the fact that a primary requirement is the transparency of the final colour toned images and the necessity that the three chosen images shall accurately cover the visible spectrum. In such work special toning of selected lengths of film without regard to the requirements of theoretical three-colour reproduction would give rise to very great difficulties.

According to the present invention a process for the production of a three-colour photographic image comprises producing in different strata within a single silver halide emulsion layer bearing a supercoat of an organic hydrophilic colloidal material and containing a fugitive dyestuff which restricts the action of printing light, those subtractive images of a tri-colour set obtained by printing, in register, from the green and blue separation negatives and respectively toning said images to a transparent magenta image of nickel dimethylglyoxime and to a transparent yellow image formed of silver iodide dyed with a basic yellow dyestuff by means of developing and toning reagents applied in such sequence that the form and relative density of the initially formed silver images are preserved and the normal individual colour characteristics of the fully toned magenta and yellow images are correctly reproduced and maintained, sensitizing the supercoat with a cyanotype sensitizer, printing from the outer side of the supercoat and in register from the third separation record and developing the blue-green image.

The invention provides a method of producing three-coloured photographic images using as starting material film comprising a single silver halide emulsion layer having a supercoat. The emulsion layer has present therein a fugitive dyestuff, usually yellow, by means of which it is ensured that the action of the printing light is restricted to that part of the emulsion which is adjacent to the surface first exposed thereto. The film is exposed from opposite sides in turn through the green and blue colour separation negatives and the respective latent images developed and toned to a magneta image of nickel dimethylglyoxime and to a yellow image of silver iodide dyed with a basic yellow dyestuff. The supercoat is then sensitized with a cyanotype sensitizer, exposed through the red colour separation negative and developed: alternatively, if desirable, a red colour separation positive may be employed. This gives the third or blue-green image.

A preferred method of practising the invention will now be described with reference to the accompanying flow sheet which illustrates successive stages in the process.

The expression "supercoated film" as herein employed has reference to film in which the silver halide emulsion layer has a protective coating of an organic hydrophilic colloidal material, which is preferably the same material as that utilized in the emulsion layer, e. g. gelatin. Commercially available material of this type is intended, for example, for sound track records and, in that case, the purpose of the supercoat is to avoid imperfections in sound reproduction arising from abrasion of the sound track in use. The supercoat is usually about one-half the thickness of the silver halide emulsion layer (i. e. about 0.0005 inch).

Methods already known may be used for the production of the three separation records required for use in the process of the invention. Blue, green and red records are employed, the blue and green being negative records whilst the red record may be either a positive or negative record. A supercoated positive film, as shown at A on the flow sheet, consisting of a transparent base material, such as Celluloid, and silver halide emulsion layer, containing a fugitive yellow dyestuff, such as tartrazine, and a supercoating layer, such as a gelatine layer, is exposed (B on the flow sheet) through the base and the green record separation negative (from which the magenta image is to be obtained). As already indicated the presence of a fugitive yellow dyestuff restricts the action of the light passed by the negative to that part of the emulsion layer most proximate to the negative. After exposure the silver image is developed in a positive film developing solution such as the following:

Water	cubic centimeters	750
Sodium sulphite (anhydrous)	grams	65
Metol	do	1.5
Hydroquinone	do	8.5
Sodium carbonate	do	25
Potassium bromide	do	0.75
Water to make	cubic centimeters	1000

The developed film is washer to remove any retained developer. This washing also serves to remove most, if not all, of the fugitive yellow dyestuff. The film then carries a single developed silver image as shown at C on the flow sheet.

The silver image is next converted into a mixture of nickel and silver ferrocyanides by treatment in a bath containing potassium ferricyanide and a soluble nickel salt, such as nickel nitrate or nickel chloride. The following formula illustrates a suitable bath:

Nickel nitrate	grams	50
Potassium citrate	do	300
Citric acid	do	30
Formaldehyde (40%)	cubic centimeters	100
Potassium ferricyanide	grams	3
Water to make	cubic centimeters	1000

When this bath has been allowed to act on the silver image the film is again washed and dried. At this stage the film bears the converted image as shown at D on the flow sheet.

The latent image from which a yellow image is to be obtained is next printed from the blue separation negative in that part of the silver halide emulsion layer adjoining the supercoat (E on the flow sheet) and the corresponding image developed in a positive film developing solution of the loaded type e. g.

Water	cubic centimeters	750
Sodium sulphite (anhydrous)	grams	180
Metol	do	20
Hydroquinone	do	40
Sodium hydroxide	do	40
Sodium sulphate	do	100
Water to make	cubic centimeters	1000

Such developing solution has a low rate of diffusion and is intended to develop the image without redeveloping the silver ferrocyanide of the other image: this ensures that the image is located near the supercoat face of the emulsion and it is thus in a different stratum from the nickel and silver ferrocyanide image and there is consequently no interference with that image (F on the flow sheet). When development is complete the film is transferred to an acid stop bath and thence into a normal fixing bath, which may, for example, having the following composition:

Sodium thiosulphate	grams	300
Sodium sulphite	do	15
Acetic acid (glacial)	cubic centimeters	15
Potassium alum	grams	15
Water to make	cubic centimeters	1000

The film is then washed.

All the operations so far described should be carried out in darkness or in the absence of actinic light. The further treatment of the two images so far formed may, however, be carried out in white light, if desired.

The next step is to convert the silver image into silver iodide. The silver iodide image (G on the flow sheet) may be obtained by treatment with an iodine-potassium iodide solution, for example

Potassium iodide	grams	20
Iodide	do	2
Water to make	cubic centimeters	1000

or with a potassium iodide-potassium ferricyanide solution, such as:

Potassium ferricyanide	grams	40
Potassium iodide	do	20
Water to make	cubic centimeters	1000

The use of the above toning solutions results in the production of a transparent silver iodide image. When formation of the image is complete, the film is washed in water and then immersed in a solution of a basic yellow dyestuff. Suitable dyes are Auramine (Colour Index No. 655), Photophor Basic Yellow, Thioflavine (Colour Index No. 815) and Chrysoidin (Colour Index No. 20) which may be used in the following dye-toning bath:

Dye	gram	1
Acetic acid (glacial)	cubic centimeters	5
Water to make	do	1000

When mordanting is complete the film is removed from the bath and cleared in running water until all the highlights of the yellow image are entirely freed from colour. The film now bears the mordanted yellow image (H on the flow sheet). It is extremely important that the toning solutions used for the production of the yellow image should result in that image being transparent.

The magenta image is next obtained by treatment of the nickel and silver ferrocyanide image. For this purpose the image is converted to the nickel salt of dimethylglyoxime by immersing the film in a strongly alkaline solution of dimethylglyoxime. A bath of suitable concentration is as follows:

Dimethylglyoxime	grams	10
Methyl alcohol	cubic centimeters	100
Sodium hydroxide	grams	5
Water to make	cubic centimeters	1000

This solution is applied for a time sufficient for the magenta toning to proceed to completion. Times of the order of 4 minutes are required.

The film is then again washed and dried and now has the complete yellow image and the complete magenta image (I on the flow sheet) present in different strata within the single emulsion layer.

It will be apparent that at this stage the original silver halide emulsion layer has been printed and toned to the magenta and yellow components of a three-colour subtractive image assembly and that by reason of the particular sequence of steps employed these two images are present in distinct strata. Each image correctly reproduces the form and relative density of the silver image from which it has been toned, the sequence of steps employed having avoided any degradation of either image at any stage in the production thereof. There now remains to be added the blue-green component to complete the image assembly. This is produced in the following manner.

The supercoat of the film is now sensitized with a cyanotype sensitizer, a concentrated high speed sensitizer being preferably employed and applied for such time as to avoid a material degree of penetration into the original emulsion layer. This operation is carried out in the dark or in the absence of actinic light. The following is an example of a suitable cyanotype sensitizer:

Ferric ammonium citrate	grams	125
Potassium ferricyanide	do	45
Oxalic acid	do	50
Water to make	cubic centimeters	1000

In the above formula the ferric ammonium citrate and oxalic acid may be replaced by corresponding quantities of ferric chloride and tartaric acid. Such concentrated sensitizers give satisfactory results when applied for from ½ to 1 minute. The sensitized film is dried in the dark (J on the flow sheet) and the supercoat is printed from the red colour separation negative (K on the flow sheet) (i. e. the one from which the blue-green image is to be obtained) and the blue-green image is developed by the application of running water (L on the flow sheet). The film is completed by a final drying and comprises three subtractive images in different strata which are extremely close together.

As indicated it is preferred to use a high speed cyanotype sensitizer; this is due to the fact that ferric salts are reduced to ferrous salts somewhat slowly under the action of light. In commercial processing it is desirable to use, in addition, a high intensity source of illumination, as for example a high pressure mercury vapour discharge lamp (with an intensity of some 20,000 candles per sq. cm.), in order to reduce the time of exposure to a minimum.

Experiment has demonstrated that it is essential to the present invention that the blue-green image should be produced in the supercoat layer. If non-supercoated film is processed as outlined above, then sensitized with a cyanotype sensitizer, printed and developed there is a masking effect in the printing due to the already formed images and consequently the correct blue-green colour values are not obtained. By utilizing supercoated film, sensitizing this with a cyanotype sensitizer and printing from the supercoat side of the film this masking effect is entirely avoided and, on development, the correct colour values of the blue-green image are obtained.

In the process outlined above redevelopment of the silver ferrocyanide in the nickel and silver ferrocyanide image is avoided by the use of controlled penetration. Whilst such a step is not

unduly difficult to operate on a commercial scale the necessity for adopting controlled penetration may be entirely avoided by proceeding in the following manner:

The image consisting of silver and nickel ferrocyanides is washed and the silver ferrocyanide is then redeveloped in an ordinary developing solution such as that outlined above. The treated film is again washed and the silver removed in a bath such as the following:

Potassium permanganate	grams	3
Concentrated sulphuric acid	cubic centimeters	5
Water to make	do	1000

After treatment with this solution, which removes the silver in the form of a soluble silver salt, the film is cleared in a 1% solution of sodium or potassium bisulphite and again washed. The image then remaining in the emulsion consists of nickel ferrocyanide.

Having produced the nickel ferrocyanide image as outlined above the succeeding procedure may be that already outlined (i. e. printing from the blue separation negative and toning to yellow followed by toning the nickel image to magenta but it will of course be appreciated that it is no longer necessary to use the loaded developer previously described which is therefore replaced by an ordinary positive developer) or the nickel image may now be first toned to magenta followed by printing from the blue separation negative and toning to yellow. If this alternative is adopted care should be taken to see that the pH value of the acid yellow dye mordant bath does not fall below about 3 since it has been found that more strongly acid solutions tend to degrade the magenta image.

With respect to the magenta toning bath which must be maintained in contact with the film for sufficiently long for complete penetration and toning to take place, on account of the alkalinity thereof it has a strong tendency to swell the emulsion layer and may affect the bonding thereof with the base. It is desirable to minimize such tendency as far as possible. For this purpose the concentration of alcohol in the magenta toning bath may be higher than that indicated in the specific bath set forth above. Monohydric aliphatic alcohols other than methyl alcohol may be used inasmuch as these are sufficiently water-miscible and the resulting mixtures are able to support good concentrations of the dimethylglyoxime in solution. It is preferred to use methanol, ethanol or isopropanol, in an amount of from 10% to 30%, preferably 15% to 20%, of the volume of a saturated solution of dimethylglyoxime in about 4% aqueous alkali. The concentration of dimethylglyoxime in such baths is about 4% by weight. The toning baths thus prepared give improved penetration and better tone reproduction in the heavier densities where toning normally reaches a maximum which is insufficient for accurate translation of the silver image into the magenta toned image.

In an alternative form of practising the invention a positive film bearing a supercoat and containing a fugitive yellow dyestuff in the silver halide emulsion layer is printed through the base from a blue record separation negative. The image is developed but not fixed. That part of the emulsion adjoining the supercoat is then printed, through the supercoat and in register, from the green record separation negative. This image is then developed with a loaded developer and both images are fixed. The second printed image is then converted into an image of nickel and silver ferrocyanides using a loaded potassium ferricyanide-soluble nickel salt bath containing glycerine, sodium sulphate or other agent which will control penetration into the emulsion. It is important that the outer silver image be completely converted while the inner silver image remains unaffected for accurate reproduction. The inner silver image is then converted to silver iodide as hereinbefore described. After this conversion and further washing the film is immersed in an acid solution of basic yellow dyestuff and when mordanting is completed the film is cleared in running water until the highlights of the yellow image are entirely freed from colour. The magenta image is then obtained by converting the image of nickel and silver ferrocyanides into the nickel compound of dimethylglyoxime as previously described. The resulting film is then dried, the supercoat sensitized with a cyanotype sensitizer and the blue-green image printed, in register, and developed as previously described. It will be appreciated that in a film so produced the positions of the yellow and magenta images are interchanged.

The above alternative procedure is less easy to practise satisfactorily than the previously disclosed embodiments of the invention on account of the use of two controlled penetration steps and accordingly it is preferred to use the other procedures disclosed.

In a modified form of the invention the blue-green image may be obtained by exposing the supercoated film (obtained by either process), sensitized in a weakly acid ferric chloride bath, e. g. a bath having the following composition:

Ferric chloride	grams	200
Oxalic acid	do	50
Water to make	cubic centimeters	1000

through a red record separation negative and developing with a solution of a substance which will convert the photochemically produced ferrous image into a strong blue-green ferroferricyanide image i. e. a 10% aqueous solution of potassium ferricyanide.

In a further modification the blue-green image may be obtained by exposing the film, after formation of the yellow and magenta images and sensitizing of the supercoat, through a red record separation positive and subsequently developing in an aqueous solution of potassium ferrocyanide.

It will be understood that any known means may be employed to secure accurate registration of the respective images. It will also be understood that the invention may be applied both in the production of standard and substandard motion pictures.

With the usual types of commercial silver halide positive emulsion film the fugitive yellow dyestuff employed to restrict the action of the printing light need only be present during the first exposure as it is found that the emulsion layer is normally of such thickness that the second formed image does not interfere with the first. If, however, films are employed having a thin emulsion layer it may be desirable to have incorporated in the emulsion a yellow dyestuff which is not so fugitive as to be substantially completely eliminated during the processing which precedes the formation of the second silver image, for example, Brilliant Yellow (Colour Index No. 364), in order to limit, to some extent, the depth of the second image. Obviously it is unnecessary and undesirable to use a dyestuff

which is appreciably retained in the emulsion after formation of the second image.

It is found that by forming the respective colour images of the components herein specified exceptionally faithful colour reproduction is obtained. The combination is an exceptionally satisfactory one from the standpoint of complete visible spectrum reproduction, high transparency and correct density and perfection of definition of the images. Due to the very small separation between the images no unsharpness or fringing is observed when motion picture film made in accordance with the invention is screened using conventional projection apparatus.

It will be seen that the process according to the invention results in the dye-toned yellow image sharing the available silver halide with the silver image required for the magenta toning and the blue-green image is then produced in the supercoating layer. The three images are thus in distinct strata but they are very much closer together than would be possible with the prior practices employing impermeable layers or a double coated base. The images are so close together (they are accommodated in a depth of about 0.0015 inch) that they can be accurately focussed without any difficulty in conventional projection apparatus.

It is important to note that the blue-green image is produced last. It is impossible to produce it at any other stage because the strongly alkaline solution required for the magenta toning would destroy this image if it were formed prior to such toning. Moreover, its presence in the supercoat would act as a screen in the printing of the second printed image so that it is not, in any event feasible to produce it until after both images have been printed in the emulsion layer.

Whilst the invention has been more particularly described with reference to the production of coloured cinematographic films it will be understood that it is not limited thereto but is equally applicable to the production of stills which can be suitably mounted for viewing.

This application is a continuation-in-part of my application Serial No. 461,160, filed October 7, 1942.

What I claim is:

1. A process for the production of a three-colour photographic image which comprises producing in different strata within a single silver halide emulsion layer bearing a supercoat of an organic hydrophilic colloidal material and containing a fugitive dyestuff which restricts the action of printing light, those subtractive images of a tri-colour set obtained by printing, in register, from the green and blue separation negatives and respectively toning said images to a transparent magenta image of nickel dimethylglyoxime and to a transparent yellow image formed of silver iodide dyed with a basic yellow dyestuff by means of developing and toning reagents applied in such sequence that the form and relative density of the initially formed silver images are preserved and the normal individual colour characteristics of the fully toned magenta and yellow images are correctly reproduced and maintained, sensitizing the supercoat with a cyanotype sensitizer, printing from the outer side of the supercoat and in register from the red separation record of said set and developing the blue-green image.

2. A process for the production of a three-colour photographic image which comprises producing in closely adjacent strata within a single silver halide emulsion layer bearing a supercoat of an organic hydrophilic colloidal material and containing a fugitive dyestuff which restricts the action of printing light subtractive images of a tri-colour set obtained by printing, in register, from the green and blue separation negatives of said set and respectively toning said images to a transparent image of nickel dimethylglyoxime and to a transparent yellow image formed of silver iodide dyed with a basic yellow dyestuff, the printing of the second printed image being carried out at such a stage and the developing and toning reagents used in the production of both toned images being applied in such requence that the form and relative density of the initially printed silver images are preserved and the normal individual colour characteristics of the fully toned transparent magenta and yellow images are correctly reproduced and maintained, sensitizing the supercoat with a cyanotype sensitizer, printing from the outerside of the supercoat and in register with the already formed images from the red separation record of said set and developing the blue-green image.

3. A process for the production of a three-colour photographic image which comprises producing in closely adjacent strata within a single silver halide emulsion layer bearing a supercoat of an organic hydrophilic colloidal material and containing a fugitive dyestuff which restricts the action of printing light, subtractive images of a tri-colour set obtained by printing, in register, from the green and blue separation negatives of said set and respectively toning said images to a transparent image of nickel dimethylglyoxime and to a transparent yellow image formed of silver iodide dyed with a basic yellow dyestuff by means of developing and toning reagents applied in such sequence that the form and relative density of the initially formed silver images are preserved and the normal individual colour characteristics of the fully toned magenta and yellow images are correctly reproduced and maintained, sensitizing the supercoat with a cyanotype sensitizer, printing from the outer side of the supercoat and in register with the already formed images from the red separation negative of said set and developing the blue-green image.

4. A process for the production of a three-colour photographic image which comprises producing a set of blue, green and red colour separation negatives, printing in register and in closely adjacent strata within a single silver halide emulsion layer bearing a supercoat of an organic hydrophilic colloidal material and containing a fugitive dyestuff which restricts the action of printing light, images from the green and blue colour separation negatives and respectively toning said images to a transparent magenta image of nickel dimethylglyoxime and to a transparent yellow image formed of silver iodide dyed with a basic yellow dyestuff, the developing and toning reagents being applied in such sequence that the form and relative density of the initially formed silver images are preserved and the normal individual colour characteristics of the fully toned transparent magenta and yellow images are correctly reproduced and maintained, sensitizing the supercoat with a cyanotype sensitizer, printing from the outer side of the supercoat and in register with the already formed images from the red colour separation negative and developing the blue-green image.

5. A process for the production of a three-colour photographic image which comprises pro-

ducing in a single silver halide emulsion layer bearing a supercoat of an organic hydrophilic colloidal material and containing a fugitive dyestuff which restricts the action of printing light, silver images, by printing in register through the base carrying said emulsion layer from the green separation negative of a tri-colour set and through the supercoat from the blue separation negative of said set and respectively toning said silver images to a transparent magenta image of nickel dimethylglyoxime and to a transparent yellow image formed of silver iodide dyed with a basic yellow dyestuff, the developing and toning reagents being applied in such sequence that the form and relative density of the initially formed silver images are preserved and the normal individual colour characteristics of the fully toned transparent images are correctly reproduced and maintained, sensitizing the supercoat with a cyanotype sensitizer, printing from the outer side of the supercoat, in register, from the red separation record and developing the blue-green image.

6. A process for the production of a three-colour photographic image which comprises producing in a single silver halide emulsion layer bearing a supercoat of an organic hydrophilic colloidal material and containing a fugitive dyestuff which restricts the action of printing light, silver images, by printing in register through the base carrying said emulsion layer from the green separation negative of a tricolour set and through the supercoat from the blue separation negative of said set and respectively toning said silver images to a transparent magenta image of nickel dimethylglyoxime and to a transparent yellow image formed of silver iodide dyed with a basic yellow dyestuff, the printing from the blue separation negative being carried out at such a stage and the developing and toning reagents used in the production of both toned images being applied in such sequence that the form and relative density of the initially printed silver images are preserved and the normal individual colour characteristics of the fully toned transparent magenta and yellow images are correctly reproduced and maintained, sensitzing the supercoat with a cyanotype sensitizer, printing from the outer side of the supercoat and in register with the already formed images from the red separation record of said set and developing the blue-green image.

7. A process for the production of a three-colour photographic image which comprises producing in a single silver halide emulsion layer bearing a supercoat of an organic hydrophilic colloidal material and containing a fugitive dyestuff which restricts the action of printing light, a silver image by printing through the base carrying said emulsion layer from the green separation negative of a tricolour set, developing the latent silver image, converting the developed silver image to one of silver and nickel ferrocyanides, redeveloping and removing the redeveloped silver, toning the nickel ferrocyanide to magenta with an alkaline bath of dimethylglyoxime of reduced gelatine-swelling characteristics, printing in register through the supercoat from the blue separation negative of said set, developing the latent silver image and toning to a transparent silver iodide image dyed with a basic yellow dyestuff, sensitizing the supercoat with a cyanotype sensitizer, printing from the outer side of the supercoat and in register from the red separation negative of said set and developing the blue-green image.

8. A process for the production of a three-colour photographic image which comprises producing in a single silver halide emulsion layer bearing a supercoat of an organic hydrophilic colloidal material and containing a fugitive dyestuff which restricts the action of printing light, a silver image by printing through the base carrying said emulsion layer from the green separation negative of a tricolour set, developing the latent silver image, converting the developed silver image to one of silver and nickel ferrocyanides, printing through the supercoat from the blue separation negative of said set, developing the latent silver image without redeveloping the silver ferrocyanide already present in the emulsion layer, toning the developed silver image to a transparent image of silver iodide dyed with a basic yellow dyestuff, then toning the nickel ferrocyanide to magenta with an alkaline bath of dimethylglyoxime of reduced gelatine-swelling characteristics, sensitizing the supercoat with a cyanotype sensitizer, printing from the outer side of the supercoat and in register from the red separation negative of said set and developing the blue-green image.

9. A process for the production of a three-colour photographic image which comprises producing a set of blue, green and red colour separation negatives, printing, in a single silver halide emulsion layer bearing a supercoat of an organic hydrophilic colloidal material and containing a fugitive dyestuff which restricts the action of printing light, through the base carrying said emulsion layer from the green separation negative, developing the latent silver image, converting the developed silver image to one of silver and nickel ferrocyanides, removing the silver ferrocyanide from said image, toning the remaining nickel ferrocyanide to magenta with an alkaline bath of dimethylglyoxime containing from 10–30% of a water-miscible monohydric alkanol, printing in register through the supercoat from the blue separation negative, developing the latent silver image and toning to a transparent silver iodide image dyed with a basic yellow dyestuff, sensitizing the supercoat with a cyanotype sensitizer, printing from the outer side of the supercoat and in register from the red separation negative and developing the blue-green image.

10. A process for the production of a three-colour photographic image which comprises producing a set of blue, green and red colour separation negatives, printing, in a single silver halide emulsion layer bearing a supercoat of an organic hydrophilic colloidal material and containing a fugituve dyestuff which restricts the action of printing light, through the base carrying said emulsion layer from the green separation negative, developing the latent silver image, converting the developed silver image to one of silver and nickel ferrocyanides, printing in register through the supercoat from the blue separation negative, developing the latent silver image without redeveloping the silver ferrocyanide of the silver and nickel ferrocyanide image, toning the developed silver image to a transparent image of silver iodide dyed with a basic yellow dyestuff, then toning the nickel ferrocyanide to magenta with an alkaline bath of dimethylglyoxime containing from 10–30% of a water-miscible monohydric alkanol, sensitizing the supercoat with a cyanotype sensitizer, printing from the outer side of the supercoat and in register from the red separation negative and developing the blue-green image.

11. A process for the production of a three-

colour photographic image which comprises producing in a single silver halide emulsion layer bearing a supercoat of an organic hydrophilic colloidal material and containing a fugitive dyestuff which restricts the action of printing light a silver image by printing through the base carrying said emulsion layer from the green separation negative of a tricolour set, developing the latent silver image, converting the developed silver image to one of silver and nickel ferrocyanides, redeveloping and removing the redeveloped silver, printing in register through the supercoat from the blue separation negative, developing the latent image and toning said image to a transparent image of silver iodide dyed with a basic yellow dyestuff, toning the nickel ferrocyanide to magenta with an aqueous-alcoholic alkaline bath of dimethylglyoxime in which the alcohol is a saturated alcohol containing from 1 to 3 carbon atoms in the molecule, sensitizing the supercoat with a cyanotype sensitizer, printing from the outer side of the supercoat and in register from the red separation negative and redeveloping the blue-green image.

12. A process for the production of a three-colour photographic image which comprises producing a set of blue, green and red colour separation negatives, printing, in a single silver halide emulsion layer bearing a supercoat of an organic hydrophilic colloidal material and containing a fugitive dyestuff which restricts the action of printing light, through the base carrying said emulsion layer from the green separation negative, developing the latent silver image, converting the developed silver image to one of silver and nickel ferrocyanides, removing the silver ferrocyanide from said image, printing in register through the supercoat from the blue separation negative, developing the latent silver image and toning that silver image to a transparent image of silver iodide dyed with a basic yellow dyestuff, toning the nickel ferrocyanide to magenta with an aqueous-alcoholic alkaline bath of dimethylglyoxime in which the alcohol is a saturated alcohol containing from 1 to 3 carbon atoms in the molecule, sensitizing the supercoat with a cyanotype sensitizer, printing from the outer side of the supercoat and in register from the red separation negative and developing the blue-green image.

13. A process for the production of a three-colour photographic image which comprises printing, in a single silver halide emulsion layer bearing a supercoat of an organic hydrophilic colloidal material and containing a fugitive dyestuff which restricts the action of printing light, through the base carrying said emulsion layer from the green separation negative of a tri-colour set, developing the latent silver image, converting the developed silver image to one of nickel and silver ferrocyanides, redeveloping the silver ferrocyanide, and removing the redeveloped silver with an acid oxidizing solution the acid of which forms a water-soluble silver salt, toning the nickel ferrocyanide to magenta with an alkaline bath of dimethylglyoxime containing from 10–30% of a monohydric alcohol containing from 1 to 3 carbon atoms in the molecule, printing in register through the supercoat from the blue separation negative of

said tri-colour set, developing the latent silver image and toning to a transparent silver iodide image dyed with a basic yellow dyestuff, sensitizing the supercoat with a cyanotype sensitizer, printing in register from the red separation negative of said tri-colour set and developing the blue-green image.

14. A process for the production of a three-colour photographic image which comprises printing, in a single silver halide emulsion layer bearing a supercoat of an organic hydrophilic colloidal material and containing a fugitive dyestuff which restricts the action of printing light, through the base carrying said emulsion layer from the green separation negative of a tri-colour set, developing the latent silver image, converting the developed silver image to one of nickel and silver ferrocyanides, redeveloping the silver ferrocyanide, and removing the redeveloped silver with an acid oxidizing solution the acid of which forms a water-soluble silver salt, printing in register through the supercoat from the blue separation negative of said tri-colour set, developing the latent silver image and toning to a transparent silver iodide image dyed with a basic yellow dyestuff, toning the nickel ferrocyanide with an alkaline bath of dimethylglyoxime containing from 10–30% of a monohydric alcohol containing from 1 to 3 carbon atoms in the molecule, sensitizing the supercoat with a cyanotype sensitizer, printing in register from the red separation negative of said tri-colour set and developing the blue-green image.

15. A process for the production of a three-colour photographic image which comprises printing, in a single silver halide emulsion layer bearing a supercoat of an organic hydrophilic colloidal material and containing a fugitive dyestuff which restricts the action of printing light, through the base carrying said emulsion layer from the green separation negative of a tri-colour set, developing the latent silver image, printing in register through the supercoat from the blue separation negative of said tri-colour set, developing the latent image by means of a loaded developer, fixing both images, converting the second printed image to an image of nickel and silver ferrocyanides by means of a loaded soluble ferricyanide-soluble nickel salt bath, toning the first printed image to a transparent yellow image of silver iodide dyed with a basic yellow dyestuff, toning the nickel ferrocyanide to a transparent magenta image with an aqueous-alcoholic alkaline bath of dimethylglyoxime containing from 10–30% of a monohydric alcohol having from 1 to 3 carbon atoms in the molecule, sensitizing the supercoat with a cyanotype sensitizer, printing in register from the red separation negative of said tricolour set and developing the blue-green image.

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