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COLOR PHOTOGRAPHY

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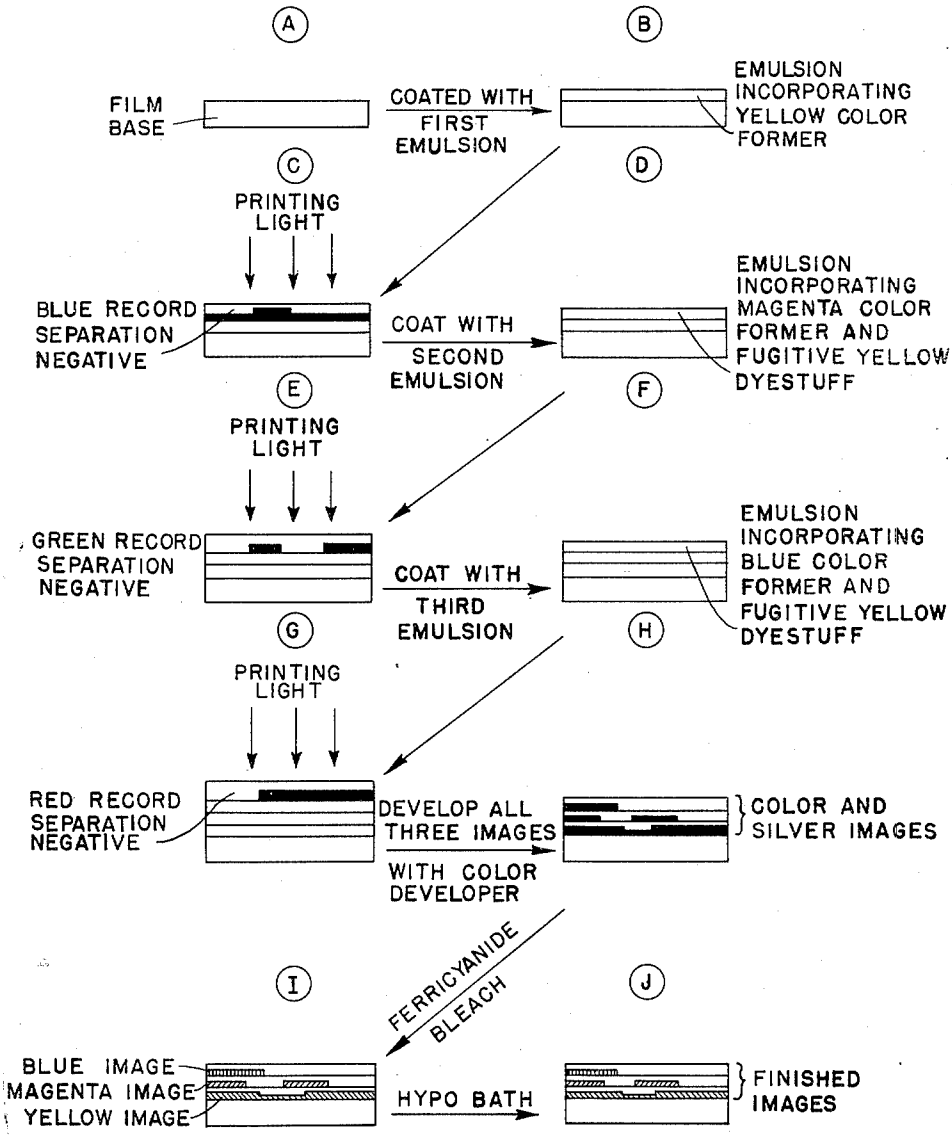


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## COLOR PHOTOGRAPHY

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

In the production of coloured photographic images both two-colour and three-colour reproduction have been extensively utilized as well as, to some extent, the addition of a fourth image for special purposes. There are two principal methods which have been used for the production of coloured photographic images.

In one of these methods a multi-layer sensitive material, usually consisting of three distinct emulsion layers with interposed filter layers, is printed by a single exposure from a multi-coloured image. This method requires the provision of multi-layer material having colour sensitive emulsions and dyed filter layers and requires extreme consistency in the coating of the very thin layers of which it is composed. If the processing of the material is to be in any way comparable with ordinary black and white material appropriate colour-forming materials must also be incorporated in the colour sensitive emulsions; the introduction of these is in addition to that of the necessary sensitizers. Such additions add greatly to the complexity and cost of manufacture of the colour film.

An alternative to the addition of appropriate colour-forming materials is available. This however involves the use of a rather complex processing technique the purpose of which is to convert the component silver images, usually by reversal of the original exposure, into the required coloured images. Such processing involves selective treatment of the superposed emulsion layers with separate colour developing baths. Controlled penetration can be utilized by appropriately loading the colour developing baths. There are also available certain colour sensitizers which retain their distinctive colour sensitivity after development of the multi-layer material; this makes it possible to selectively expose the silver halide layers with the aid of filtered light, and thus in turn to print and tone the layers of the multi-layer material.

The second general method depends upon the successive production of the colour images by means of the transfer of dye images or the successive production of developed silver images which are in turn toned to the appropriate colour images. This general method involves a considerable departure from the technique of black and white work and requires a set of colour separation negatives with which to work. Nevertheless it has many features and advantages which render it of considerable value.

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In one form of operating this second general method for the production of cinematographic film ordinary positive film is used solely for the provision of the sound track and, if desired, to provide a "grey" print from one of the colour separation negatives to emphasize the definition and gradation of the final composite image which is obtained by the transfer of yellow, magenta and blue-green impressions from a set of dyed relief films which are previously prepared, one for each colour image to be impressed, from the corresponding colour separation negatives. Not only have the dyed relief films to be first prepared but the dye transfer processes are difficult to operate since each involves the maintenance to accurate registration for a period of about 1 minute during which the relief film and the receiving film must be held in intimate contact and while they are travelling together at a speed which may be of the order of 100 feet per minute.

A second form of the second general method is described in British Patent 585,477 in which there is disclosed a method of producing a three-colour image which is especially suitable for cinetamographic work when three-colour separation negatives are available. According to the process of this application a multi-coloured photographic image is produced by printing a silver halide emulsion layer from a first colour separation record, developing and colouring to produce the required positive colour record, coating the layer containing the first formed colour record with a composition containing silver halide and the same emulsion colloid as that of the emulsion layer so as to produce, on drying, a second silver halide emulsion layer directly superposed upon the image-containing layer and having a substantially normal weight of silver halide and a colloid/silver ratio (based on the silver nitrate used in its production) of not more than 1.5 to 1, printing from a second colour separation record, developing and colouring to produce the required positive colour record, the sequence of formation of the colour images being chosen with respect to the chemical and image-wise desensitizing properties thereof that the relative density and the normal individual colour characteristics of the first-produced image are maintained substantially unimpaired during the subsequent processing. When this process is used for the production of three colour images, after producing the second image as outlined

above a further coating of emulsion is applied in substantially the same way, printed and coloured to produce the remaining positive colour record to complete the three-colour image, the same properties determining the sequence in which the formation of the colour records is carried out. By using emulsions having a colloid silver ratio of not more than 1.5 to 1 satisfactory adhesion between the emulsions is obtained, reticulation and frilling being avoided and, in addition, washing of the film can be achieved in a minimum of time.

This process has been found to possess several important advantages. Three colour motion pictures can be made utilizing ordinary positive stock as starting material with only two coating steps, both of which are relatively easy to perform. With reasonable attention to processing details extremely good reproduction can be consistently obtained. The process does however involves three separate printing and three separate processing stages and the latter, while not objectionable, tend to make the processing cost high.

The present invention seeks to provide a modification of this prior process in which certain of the processing stages are eliminated.

According to the present invention, a process for the production of a multi-coloured photographic image comprises coating a photographic base material with a first composition containing a silver halide and a substantially non-mobile colour former dispersed in a photographic emulsion colloid, printing from a first color separation record, coating the printed emulsion with a second composition containing a silver halide and a second substantially non-mobile colour former dispersed in the same photographic emulsion colloid as that of said first composition so as to produce, on drying, a second silver halide emulsion layer directly superposed on said printed emulsion, printing from the second colour separation record of said set, simultaneously developing the successively produced latent images and coupling with a colour developer.

As applied to the production of a three-colour subtractive photographic image the process of the invention may comprise coating a photographic base material with a first composition containing a silver halide and a substantially non-mobile colour-former dispersed in a photographic emulsion colloid so as to produce, on drying, an emulsion layer containing a substantially normal coating weight of silver halide, printing from the first colour separation negative of a three-colour set, coating said emulsion layer with a second composition containing silver halide and a second substantially non-mobile colour former dispersed in the same photograph emulsion colloid as that of said first applied composition so as to produce, on drying, a second emulsion layer, superposed upon said first emulsion, and containing a substantially normal coating weight of silver halide, printing from the second colour separation negative of said three-colour set, coating said second emulsion layer with a third composition containing silver halide and a third substantially non-mobile colour former dispersed in the same photographic emulsion colloid as that of the first and second applied compositions so as to produce, on drying, a third emulsion layer superposed upon said second emulsion layer and containing a substantially normal coating weight of silver halide, the first, second and third colour formers being so chosen that upon development and coupling with the said coupler subtractive images of correct hue are obtained, printing from the third colour separation negative of said three-colour set, simultaneously developing the three successively produced latent images and coupling with a coupler to simultaneously produce the three colour images.



According to a feature of the invention the applied emulsion layers may have a colloid/silver ratio (based on the silver nitrate used in their production) of not more than 1.5:1 and, preferably, of approximately 1:1.

The present invention is similar to that described in British Patent 585,477 in that it proceeds by the building up of a multi-layer material each layer of which contains one of the component images of the multi-colour image but differs therefrom in that the colour formers which are present in the emulsion layers are so chosen that they can all be developed with the same colour developer to give the desired colour images. As a result it is not necessary to develop each latent image as it is printed. Instead the additional layers built up, each containing the appropriate latent image until the complete set of latent images have been produced and the whole set developed simultaneously and then coupled with the same colour developer to give a set of colour record images each of which is of the correct hue.

The colour development stage may be carried out directly but on account of the fact that the kind of colour developers contemplated have, in general, a low developing potential it is preferred first to develop the three latent images in an ordinary black and white developer such as one based upon metol and hydroquinone or amidol, to convert the resulting images into silver halide, for example, by treatment with a solution of potassium ferricyanide and potassium bromide, to re-expose and then redevelop with the colour developer after which the silver images may be removed by Farmer's reducer.

Initial development with an ordinary black and white developer has the advantage that the amount of reduced silver can be more easily controlled and greater consistency is possible than when developing agents of the paraphenylene diamine type are used in the first instance as these are extremely susceptible to the bromide concentration, a factor which is extremely difficult to control in processing work. On the other hand redevelopment, the extent of which is determined by the amount of silver halide present in the image, can be fully controlled and is dependent only upon the density of the original black and white image.

The colour formers used according to the present invention should be substantially non-mobile. Several methods have been developed in recent years for rendering colour formers substantially non-mobile, the principal ones being the introduction into the molecule of the colour former of one or more groups which impart substantive properties with respect to the photographic emulsion colloid employed and the chemical and/or physical association of the colour former with some other relatively large molecule which increases the effective size of the molecules and so substantially reduces their mobility. Thus there may be used colour formers containing alkyl substituents having at least five and preferably from twelve to eighteen carbon atoms or the colour former may have been combined by chemical reaction with a suitable residue such as that of a high molecular weight water-permeable but wa-

ter-insoluble natural or synthetic resin, that of a sterol, that of a substance of the cyclic methane series, that of a polypeptide, that of a highly polymeric carboxylic acid, that of a polymeric material of which a carboxylic acid is a component or that of a carbohydrate.

The colour formers are so chosen that upon coupling with the selected colour developer colour images of the correct tone are obtained. Since all the images are developed simultaneously it follows that, in general, any desired order of printing the images may be adopted since such considerations as desensitization and degradation of an already formed colour image do not arise in the present process.

The process can be conveniently carried out using gelatine emulsions of normal characteristics having incorporated therein the said colour formers but preferably the emulsions employed are the emulsions of reduced gelatin silver ratio described in British Patent 585,477. The use of these emulsions not only enables the three distinct images to be accommodated within a minimum of depth but avoids any tendency for reticulation and frilling to occur due to swelling during processing as described in that application and also to be carried out in a minimum of time due to the reduced overall thickness of the multi-layer emulsion being treated.

The process of the present invention utilizes as starting material a film base material (e. g. pyroxylin or cellulose acetate strip material) to which is first applied a conventional primer. After removing the volatile solvent of the primer composition, a silver halide photographic emulsion composition, preferably having a gelatine/silver ratio of about 1:1 and containing a suitable concentration of a substantially non-mobile yellow colour former is applied. Examples of suitable yellow colour formers are terephthalolyl bis-acetanilide, benzoyl acetanilide, 5 - (4' - stearyl - amidobenzoylacetamido) isophthalic acid and 4-methoxybenzoylacet-N-(2'-methylstearylamino - 4' - carboxyphenol) amide. The layer is preferably coated at such a thickness as to produce, on drying, a substantially normal coating weight of silver halide. By substantially normal coating weights of silver halide are meant those containing from 40 to 80 milligrams, and preferably 50 to 60 milligrams, of silver per square decimeter of coating. After drying this layer is printed from the blue record separation negative. The printed material is then coated with a second silver halide emulsion composition, preferably having the same or substantially the same silver/gelatine ratio as that first applied and containing a substantially non-mobile magenta colour former. Examples of suitable magenta colour formers are 1-(4'-stearylamino-phenyl)-3-methyl-5-pyrazolone, 1-(4'-phenoxy - 3' - sulphophenyl)-3-heptadecyl - 5 - pyrazolone, 1-(3'-sulphophenyl - 3 - (4'' - stearyl-amido-phenyl) 5-pyrazolone and 4-(β-stearyl-β-carboxypropionamido)-benzoylacetonitrile. This layer is also preferably coated at such a thickness as to produce an emulsion layer containing a substantially normal coating weight of silver halide. After setting and drying this layer is printed, in register, from the green record separation negative. The multi-layer material, now containing two latent images is coated a third time. The third coating is with a silver halide emulsion composition having emulsion characteristics similar to those of the first and second applied compositions but containing a substantially non-mobile blue-green colour former. Examples of suitable blue-green colour formers are di-(2.8-dihydroxy-3-naphthoic acid) benzidide, naphthalene-1-hydroxy-2-stearyl carbonamido - 4 - sulphonic acid, naphthalene-1-hydroxy - 2 - N - (dodecylcarbonamido)-4 - sulphonic acid, naphthalene - 1 - hydroxy - 2(2'methyl - stearylamino - 5' sulphophenyl) carbonamido and naphthalene 1-hydroxy - 2 - carbon (N - stearyl - N - isophthalyl) amide. This layer is also preferably coated at such a thickness as to produce an emulsion containing a substantially normal coating weight of silver halide. The multi-layer material, after setting and drying, is printed, in register, from the red colour separation negative and is ready for development.

Development, as already indicated may be by either of two methods. In the first method development of all three images may be carried out with a bath containing para-diethyl-aminoaniline as colour developer. This colour developer is used in the present case since with all the above named colour components it gives dye images of the correct hue. Other paradialkyl aminoanilines may be used. The development bath is preferably kept in a state of thorough agitation but free from aeration throughout the development.

In the second and preferred method of development the silver images are simultaneously developed with a conventional metol-hydroquinone developer. This is controlled so as to prevent development being carried too far in view of the intention to subsequently redevelop. The developed material is then treated with a bath containing potassium ferricyanide and potassium bromide to reconvert the developed material to silver bromide. The image is then re-exposed and developed again in the colour developer. By proceeding in this way much better control of the formation of the colour images and greater consistency has been found to be possible.

In printing the second and third images it is desirable to take steps to avoid any further action by the printing light in the stratum or strata of the already formed latent image or images. To this end a fugitive dyestuff such as tartrazine may be incorporated in the second and any subsequently applied emulsion compositions. An alternative is to print the emulsion layers using ultra-violet light or to print the emulsion layers containing a fugitive dyestuff using ultra-violet light. Fugitive dyestuffs such as tartrazine are readily eliminated during the subsequent processing especially when the applied layers are of reduced colloid/silver ratio.

In practising the process of the invention a silver halide emulsion may be prepared as follows. A solution containing the following is prepared and brought to 70° C.:

| | | |
|---|---|---|
| Potassium bromide | gms.. | 165 |
| Potassium iodide | gms.. | 5 |
| Gelatine | gms.. | 50 |
| Water (distilled) | ccs.. | 1700 |

To this solution there is gradually added a solution of 200 gms. of silver nitrate in 2 litres of distilled water. This solution is also at about 70° C. and the addition of the second solution to the first will occupy about 10 minutes. The mixture is stirred and maintained at 70° C. for a further 20 minutes to permit of ripening. At the end of the ripening period the emulsion is cooled as rapidly as possible to 45° C. at which temperature 50 gms. of washed gelatine is added and stirred

into the emulsion. When thorough dispersion of the added gelatine has been achieved anhydrous sodium sulphate is added to the emulsion until the silver halides and the gelatine have been precipitated. When the precipitate has settled it is collected, broken up and washed in water until substantially all the soluble potassium bromide has been removed. The washed material is then redispersed at about 60° C. in sufficient water containing 100 gms. of gelatine to bring the total weight of the emulsion to 3 kgm. After redispersion the emulsion is allowed to after-ripen, the optimum time being determined by preliminary testing. At the conclusion of the after-ripening the emulsion is cooled rapidly to 40° C. and stored until required for use.

Prior to coating the following additional ingredients are mixed into each litre of the emulsion:

1 cc. of a 5% solution of saponin in methyl alcohol
10 ccs. of a 5% aqueous solution of chrome alum
30–50 ccs. of a 5% aqueous solution of the selected colour former obtained by dissolving the colour component in aqueous caustic soda

The choice of the colour former will depend upon the positive colour record which is to be obtained. To secure uniform dispersion of the colour former it is preferred to use a high speed mixer. The pH of the emulsion is brought back to that prior to the additions with hydrochloric acid.

The starting material is a base material, shown at A on the flow sheet such as a nitrocellulose or cellulose acetate. This is first coated with a primer and then with a silver halide emulsion containing the selected colour former. Preferably the emulsion employed is one having a gelatine/silver ratio of not more than 1.5 to 1 and advantageously about 1 to 1. The emulsion is coated in such an amount as to produce on drying an emulsion layer containing a substantially normal coating weight of silver halide i. e. from 40–80 milligrams of silver per square decimeter, preferably 50–60 milligrams per square decimeter. After drying the emulsion is printed from the appropriate colour separation negative. Thus if the selected colour former incorporated into the emulsion is a yellow colour former (as shown at B on the flow sheet) the colour separation negative from which it is printed is the blue record separation negative (as at C on the flow sheet). After printing, and without developing, the printed emulsion is coated with a second emulsion which preferably has been prepared in a similar manner to the first emulsion but contains a colour former from which an appropriately coloured image can be obtained when coupled with the same coupler as the first colour. The second emulsion may have the same gelatine/silver ratio as the first emulsion or it may differ therefrom. In order to avoid reticulation and frilling in the developing stages it is preferred to use an emulsion having a gelatine/silver ratio of not more than 1.5 to 1 and preferably about 1 to 1. The second emulsion may have incorporated therein a fugitive dyestuff, such as tartrazine, which restricts the action of the printing light to the emulsion. Alternatively the second image may be printed using ultra-violet light. The second emulsion may contain the magenta colour former (D on the flow sheet) and, in that case, it is printed from the green record separation negative, as shown at E on the flow sheet.

After the second printing, and again without developing, the second printed emulsion is coated with a third emulsion which preferably has been prepared in the same manner as the first and second emulsions but contains a colour former for the remaining colour image which has yet to be obtained and which will yield the correct hue when coupled with the same coupler as the first and second colour former. Preferably the emulsion has the same gelatine/silver ratio as the second emulsion. This emulsion also may have incorporated therein a fugitive dyestuff, such as tartrazine, which restricts the action of the printing light to the emulsion. Alternately, it also may be printed using ultra-violet light. The third emulsion may contain the blue colour former (F on the flow sheet), in which case it is printed from the red record separation negative (as shown at G on the flow sheet).

It will be understood that the order of printing the images need not necessarily be that outlined. The essential point is to obtain three emulsion layers each of which contains an appropriate colour former and has been printed from a colour separation record which is complementary to the positive colour record which will be obtained on developing (or redeveloping) with the coupler. The colour formers employed must be non-mobile or substantially so and it is preferred to use those containing at least one long aliphatic chain, such as a stearyl group, and at least one solubilising group, such as a sulphonic or carboxylic group in the molecule. Examples of such colour components have been given above.

The three layer film containing the three latent images is now ready for development and this may proceed as follows. A bath is made up containing:

| | | |
|---|---|---|
| Para-diethylaminoaniline sulphate | gms | 3 |
| Sodium sulphite | gms | 2 |
| Potassium carbonate | gms | 75 |
| Potassium bromide | gms | 2.5 |
| Water to make | litre | 1 |

The time for development using the colour components containing at least one long aliphatic carbon chain has been found to be 10–20 minutes depending upon the characteristics of the emulsion layers and the degree of contrast required. The developed material is shown at H on the flow sheet.

After development the film is rinsed in running water for a short time and the metallic silver images are removed by treating the film in the following bleaching bath:

| | | |
|---|---|---|
| Potassium ferricyanide | gms | 10 |
| Ammonia 28% | ccs | 10 |
| Water to make | litre | 1 |

after which the film is again rinsed (I on the flow sheet) and then treated with a strong aqueous solution (about 20%) of sodium thiosulphate (G on the flow sheet).

As previously indicated, however, it is preferred first to develop all three images to silver in a metol-hydroquinone developer. This is made as follows:

| | | |
|---|---|---|
| Metol | gms | 1.5 |
| Sodium sulphite | gms | 75 |
| Hydroquinone | gms | 2.5 |
| Potassium bromide | gm | 0.5 |
| Water to make | litre | 1 |

The above solution is adjusted to a pH of 10.2 by addition of sodium or potassium carbonate. The film carrying the three latent images is developed

in this solution, washed and fixed. The three metallic silver images are then converted to silver bromide by treatment with the following bath:

| | | |
|---|---|---|
| Potassium ferricyanide | gms. | 20 |
| Potassium bromide | gms. | 10 |
| Water to make | litre | 1 |

when fully bleached, the film is rinsed and exposed to white light and then the colour images are developed in the para-diethylaminoaniline bath given above, after which the images are bleached and silver removed with sodium thiosulphate as outlined above.

More than one colour component may be incorporated into any one of the applied emulsions so long as upon colour development an image of the correct hue is obtained. Thus a mixture of 5-(4'-stearylamidobenzoylacetamido) isophthalic acid and 4-methoxybenzoylacet-N-(2'-methylstearylamino-4'-carboxyphenyl) amide may be used together as the colour components for the yellow image when the developer is a paradialkylaminoaniline such as paradiethylaminoaniline.

The process is applicable also to the formation of colour positives from the negatives of a two-colour process. Such process may be operated in the same general way as that described using the appropriate colour components. A suitable colour component from which to produce a yellowish-red positive colour record, when using diethylaminoaniline as the colour developer, is 1(5'-sulpho-3'-stearylaminophenyl)-3-methyl-5-pyrazolone. The blue-green colour components previously exemplified may be used in the emulsion for the second image.

At any stage after the final coating of the film a protective outer supercoating of emulsion or of a lacquer may be applied to the film to preserve it from damage by abrasion. A gelatine emulsion may be employed or a transparent lacquer having a basis of a film-forming material which will adhere to gelatine, such as a polyvinyl alcohol lacquer.

The invention can also be used for the production of images in which two or four images are produced on a single side of a base material and also when three or more images are produced by coating both sides of the base material. The general procedure is exactly as outlined, a suitable choice of colour components for coupling with a single coupler being made depending upon the colours desired in the positive records to be produced.

What I claim is:

1. A process for the production of a multicoloured photographic image which comprises coating a photographic base material with a first composition containing a silver halide and a colour former which is substantially non-diffusing under the process conditions dispersed in a photographic emulsion colloid, printing from a first colour separation record, coating the printed emulsion with a second composition containing a silver halide and a colour former of said non-diffusing type but adapted to produce a different coloured image, dispersed in the same photographic emulsion colloid as that of said first composition so as to produce, on drying, a second silver halide emulsion layer directly superposed on said printed emulsion, printing in register from a second colour separation record, simultaneously developing the successsively produced latent images with a developer capable of forming dyes from said colour formers and removing developed silver from the images.



2. A process according to claim 1 in which the concentration of the ingredients of the second applied composition is such as to produce a silver halide emulsion layer having a colloid/silver ratio based on the silver nitrate used in its production of not more than 1.5:1.

3. The process according to claim 1 in which the photographic emulsion colloid is gelatine.

4. The process according to claim 1 in which the colour formers employed each contain at least one aliphatic group containing at least five carbon atoms and at least one water-solubilizing group in the molecule.

5. A process for the production of a multicoloured photographic image which comprises coating a photographic base material with a first composition containing a silver halide and a colour former which is substantially non-diffusing under the process conditions dispersed in a photographic emulsion colloid, printing from a first colour separation record, coating the printed emulsion with a second composition containing a silver halide and a colour former of said non-diffusing type but adapted to produce a different coloured image, dispersed in the same photographic emulsion colloid as that of said first composition so as to produce, on drying, a second silver halide emulsion layer directly superposed on said printed emulsion, printing in register from a second colour separation record, simultaneously developing the successively produced latent images with a developer incapable of forming dyes from said colour formers, removing unused silver halide, reconverting the developed silver images into silver halide, reexposing and developing with a developer capable of forming dyes from said colour formers and removing developed silver from the images.

6. A process according to claim 5 in which the concentration of the ingredients of the second applied composition is such as to produce a silver halide emulsion layer having a colloid/silver ratio based on the silver nitrate used in its production of not more than 1.5:1.

7. The process according to claim 5 in which the photographic emulsion colloid is gelatine.

8. The process according to claim 5 in which the colour formers employed each contain at least one aliphatic group containing at least five carbon atoms and at least one water-solubilizing group in the molecule.

9. A process for the production of a three-coloured subtractive photographic image which comprises coating a photographic base material with a first composition containing a silver halide and a colour former which is substantially non-diffusing under the process conditions dispersed in a photographic emulsion colloid so as to produce, on drying, an emulsion layer containing a substantially normal coating weight of silver halide, printing from the first colour separating negative of a three colour set, coating the printed emulsion with a second composition containing silver halide and a second colour former of said non-diffusing type dispersed in the same emulsion colloid as that of said first applied composition so as to produce, on drying, a second emulsion layer, superposed upon the first printed emulsion and containing a substantially normal coating weight of silver halide, printing in register from the second colour separation negative of said three colour set, coating the second printed emulsion with a third composition containing silver halide and a third colour former of said non-diffusing type dispersed in the same

emulsion colloid as that of the first and second applied compositions so as to produce, on drying, a third emulsion layer superposed upon the second printed emulsion and having a substantially normal coating weight of silver halide, printing, in register, from the third colour separation negative of said three colour set, the first, second and third colour formers being so chosen that upon development with a developer capable of forming dyes coloured images of correct hue are obtained, thereupon simultaneously developing the successively produced latent images with said developer and removing developed silver from said images.

10. A process according to claim 9 in which all three emulsion layers have a colloid/silver ratio based on the silver nitrate used in their production of not more than 1.5 to 1.

11. A process for the production of a three-coloured subtractive photographic image which comprises coating a photographic base material with a first composition containing a silver halide and a colour former which is substantially non-diffusing under the process conditions dispersed in a photographic emulsion colloid so as to produce, on drying, an emulsion layer containing a substantially normal coating weight of silver halide, printing from the first colour separating negative of a three colour set, coating the printed emulsion with a second composition containing silver halide and a second colour former of said non-diffusing type dispersed in the same emulsion colloid as that of said first applied composition so as to produce, on drying, a second emulsion layer, superposed upon the first printed emulsion and containing a substantially normal coating weight of silver halide, printing in register from the second colour separation negative of said three colour set, coating the second printed emulsion with a third composition containing



silver halide and a third colour former of said non-diffusing type dispersed in the same emulsion colloid as that of the first and second applied compositions so as to produce, on drying, a third emulsion layer superposed upon the second printed emulsion and having a substantially normal coating weight of silver halide, printing, in register, from the third colour separation negative of said three colour set, the first, second and third colour formers being so chosen that upon development with a developer capable of forming dyes coloured images of correct hue are obtained, simultaneously developing the successively produced latent images with a developer incapable of forming dyes from said colour formers, removing unused silver halide, reconverting the developed silver images into silver halide, re-exposing and developing with a developer capable of forming dyes from said colour formers and removing developed silver from the images.

12. A process according to claim 11 in which all three emulsion layers have a colloid/silver ratio based on the silver nitrate used in their production of not more than 1.5 to 1.

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