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PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improved Photographic Reversal Processes

We, EASTMAN KODAK COMPANY, a Company organised under the laws of the State of New Jersey, United States of America, of 343, State Street, Rochester 4, New York, United States of America (Assignees of WESLEY TURNELL HANSON Jr. and HOWARD WALTER VOGT) do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to photography, especially to the production of images from photographic silver halide emulsions.

According to the present invention there is provided a process of rendering developable a photographic layer having an image-wise distribution of silver halide which comprises subjecting said layer to treatment with an aqueous solution of a boron compound which has at least one and not more than three hydrogen to boron bonds or which contains two or more amine groups each bonded to a BH_2 group.

In the present invention the photographic layer having the image-wise distribution of silver halide may have been produced by developing an image-wise exposed silver halide layer with a black and white developer. The silver image developed by the black and white developer may then be removed, leaving in the layer a complementary image in silver halide. To produce a reversal silver image in accordance with this invention, the complementary silver halide image is then rendered developable by treatment with the aqueous solution of the boron compound and the developable image developed in a black and white developer. The treatment of the silver halide image with the black and white developer may be carried out simultaneously with the treatment with the aqueous solution of the boron compound by treating the silver halide image with a black and white developer containing the boron compound. Alternatively, treatment of the silver halide image with the

black and white developer may follow after treatment with the aqueous solution of the boron compound.

In one form of a black and white process according to this invention the first, negative development is followed by a water wash, a bleach, clearing bath for removing products of the bleach step, water wash, an aqueous bath containing the boron compounds and positive development.

Thus, in the present invention the above-defined boron compounds may be used in black and white reversal processes to eliminate the need for reversal re-exposure.

The present invention is useful in the processing of colour photographic materials. In this embodiment of the invention the silver halide image which is rendered developable by treatment with the aqueous solution of the boron compound is developed simultaneously or subsequently by a colour developer in the presence of a colour coupler so as to produce a reversal dye image. The colour coupler may be in the silver halide emulsion layer or in the colour developer.

By treating the negatively developed photographic material with an aqueous solution of the boron compound, the previously unexposed and undeveloped silver halide grains are nucleated, that is, rendered developable upon contact with a colour developing agent without being exposed to light.

In an embodiment of this invention, the boron compound is used as the nucleating agent in the colour developer solution so that no separate nucleating bath is required.

In the process of nucleation, no appreciable silver image is produced in the silver halide emulsion layers. However, as soon as the silver halide is nucleated, it is developable upon contact with the colour developer to produce a silver and a colour image. Thus, when the nucleating agent is incorporated in the colour developer, a silver and a colour image forms rapidly upon nucleation.

This invention may be employed in the

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processing of colour photographic materials which contain the colour couplers or in the processing of colour materials which require the presence of the colour couplers in the colour developers.

In the processing of exposed colour photographic materials comprising a support and at least two silver halide emulsion layers sensitive to different regions of the spectrum, the first developer with which the material is treated is a black and white developer. If the colour couplers are present in the silver halide layers the silver halide images remaining in the layers are then rendered developable and simultaneously or subsequently developed in a colour developer.

In colour processing according to the present invention the silver halide is rendered developable by treatment with the aqueous solution of the boron compound.

The present invention is especially valuable in processing colour photographic materials which contain the colour-forming couplers in the emulsion layers because the specified boron compounds are stable in aqueous solutions at the low pHs used in such processes.

The present invention is particularly useful in the production of a colour photographic record by the colour processing of an exposed colour photographic material comprising a support and three silver halide emulsion layers selectively sensitive to blue, green and red light and respectively containing colour couplers substantive to the layers in which they are incorporated and capable of coupling with the oxidation products of an aromatic primary amino colour developing agent formed on development of exposed silver halide with said agent to form dyes. This exposed material is treated to obtain a colour photographic record in the manner already described, i.e. by developing the exposed material in a black and white developer, treating the developed material with the aqueous solution of the boron compound and simultaneously or subsequently treating with the colour developer.

To render the colour record clearly visible the developed silver is removed from all the layers, e.g. by the usual steps of bleaching and fixing.

The preferred colour photographic material containing colour couplers which is exposed and processed according to this invention contains a yellow-forming coupler in the blue sensitive layer, a magenta forming coupler in the green sensitive layer and a cyan forming coupler in the red sensitive layer. The order in which the light-sensitive layers are coated on the support may be first, the red sensitive layer, second, the green sensitive layer and third, the blue sensitive layer. A particularly preferred colour film which may be processed according to the invention comprises a support having coated thereon a red-sensitised photographic silver halide emulsion having

incorporated therein a coupler for the cyan image (e.g. a phenolic coupler), a green sensitised photographic silver halide emulsion having incorporated therein a coupler for the magenta image (e.g. pyrazolone coupler), and a blue sensitised photographic silver halide emulsion containing a coupler for the yellow image (e.g. a coupler containing an open-chain ketomethylene group). The photographic material may also contain interlayers and filter layers, such as a yellow filter layer beneath the blue sensitised emulsion to prevent exposure by blue light of either the red or green sensitised emulsion. Photographic colour films of the above described type can be processed by a technique requiring fewer steps than the processing of colour films of the type not having the couplers in the emulsions. For the processing of the emulsions having coupler compounds incorporated therein, it is only necessary to treat the exposed colour film with the usual type of black and white developer for producing a negative silver image.

In this embodiment of the invention the boron compound may be in the colour developer or may be in a separate solution which is applied to the photographic material before the colour developer.

Another photographic material which may be exposed and processed in accordance with this invention is a multilayer, multicolour, photographic material comprising a support bearing at least two silver halide emulsion layers sensitive to different regions of the spectrum but not containing colour couplers.

Preferably this colour photographic material comprises a support and three silver halide emulsion layers selectively sensitive to blue, green and red light.

The silver halide layers in this material may be coated in the following order on the supports—red sensitive, green sensitive and blue sensitive and may be processed with colour developers containing colour couplers to form in said layers respectively a cyan reversal image, a magenta reversal image and a yellow reversal image.

In processing these materials not containing colour couplers, e.g. 'Kodachrome' film ('Kodachrome' is a registered trade mark) the exposed material is developed in a black and white developer which forms a negative, black and white image and then all the layers but one, are, one at a time, selectively re-exposed and developed with a colour developer containing the appropriate colour coupler. The remaining layer, containing a silver image developed by the black and white developer and the complementary silver halide image, is treated, in accordance with the invention, with the aqueous solution of the boron compound, to render the silver halide image developable and is simultaneously or subsequently developed in a colour developer containing the

appropriate colour coupler. To render the colour reproduction clearly visible the silver is removed from the colour developed layers, e.g. by the usual bleaching and fixing process. Any remaining silver halide is also removed by fixing.

In processing a three colour photographic material as above described, the middle layer (usually green sensitive and containing a magenta colour coupler) is usually the last to be processed to form the reversal colour image. Accordingly in this case, it is this layer which is treated with the aqueous solution of the boron compound to render the reversal silver halide image developable by the colour developer containing the colour (magenta) coupler.

The colour couplers in the colour photographic material processed according to this invention or in the colour developers used to process photographic materials not containing colour couplers in accordance with this invention may be of the type which form the image dyes by coupling with the oxidation products of aromatic primary amine colour developing agents formed on development of the reversibly developable silver halide images to silver images by said agent. Such aromatic primary amino developing agents include p-phenylene diamine type developers.

Particularly useful colour-forming developers are the phenylenediamines and substituted derivatives thereof. Typical of such colour-forming developers are the sulphonamido-substituted p-phenylenediamines disclosed in U.K. specification 651,749, the substituted p-phenylenediamines disclosed in U.K. specifications 551,749, 653,284 and 663,101 and the substituted p-phenylenediamines disclosed in U.K. specification 653,284.

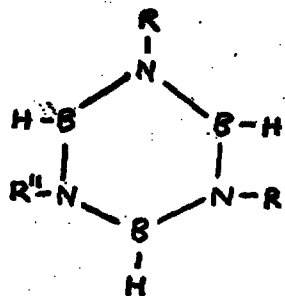
The boron compounds which may be used in the invention include the boranes, e.g. amine boranes such as alkylamino and arylamino boranes and borazines.

Included among the boron compounds containing at least one and not more than three B-H bonds which may be used in the present invention are those of the formula:



in which Z represents ammonia, an amine, such as a mono-, di- or tri-alkylamine or a mono-, di- or tri-hydroxyalkylamine, for example, methylamine, dimethylamine, triethylamine, ethylamine, ethanolamine, diethylamine, triethylamine, diethanolamine, propylamine, 3-hydroxypropylamine, diethylamine, triethylamine, primary-butylamine, secondary-butylamine, tertiary-butylamine, primary-amylamine, secondary-amylamine or tertiary-amylamine; an aryl amine, for example, aniline; a hetero cyclic amine, for example, pyridine, 2,6-lutidine, 3,4-lutidine, 2,4-lutidine, 2-ethylpyridine, 2,4-diethylpyridine, 2,6-diethylpyridine, 3,4-diethylpyridine, 2-propylpyridine, 4-propylpyridine or 3-propylpyridine; a phosphine, such as phosphine itself or an alkylphosphine, for example, methylphosphine, dimethylphosphine, trimethylphosphine, ethylphosphine, diethylphosphine, triethylphosphine, propylphosphine, dipropylphosphine, tripropylphosphine, primary-butylphosphine or secondary-butylphosphine; or an aryl phosphine, for example, or phenylphosphine; an arsine, such as arsine itself or an alkylarsine, for example, methylarsine, dimethylarsine, trimethylarsine, propylarsine, primary-butylarsine, secondary-butylarsine or amylarsine; or an arylarsine, for example, phenylarsine; a stibine, such as stibine itself or an alkylstibine, for example, methylstibine, dimethylstibine, trimethylstibine, ethylstibine, diethylstibine, triethylstibine, propylstibine, primary-butylstibine, secondary-butylstibine, or tertiary-butylstibine; or an arylstibine, for example, phenylstibine.

Further boron compounds containing at least one and not more than three B-H bonds which may be used in the present invention include compounds of the formula:



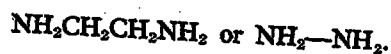
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wherein R, R' and R'' each represent a hydrogen atom; a halogen atom such as chlorine, bromine, fluorine or iodine; an alkyl group such as methyl, ethyl or propyl; an alkoxy group such as methoxy, ethoxy or propoxy and other substituted borazines.

Boron compounds which contain two or more amine groups each bonded to a BH₂ group include compounds of formula



wherein is



Included among the specific boron compounds and other substituted borazines which may be used in the present invention are the following:



- 5 *Amine Boranes*
 trimethylamine borane
 diethylamine borane
 triethylamine borane
 tert-butylamine borane
 pyridine borane
 2,6-lutidine borane
- 10 *Polyamine Boranes*
 ethylenediamine diborane
 hydrazine diborane
- Phosphine Borane*
 dimethylphosphine borane
- Arsine Borane*
 dimethylarsine borane
- 15 *Stibine Borane*
 dimethylstibine borane
- Borazines*
 borazine
 N,N',N''-trimethyl borazine
 N,N',N''-trimethoxy borazine
- 20

- These boron compounds and their preparations have been described in the literature. For example, the monograph "Borax to Boranes" edited by T. Wartik and Heinrich
- 25 Noth Hassobeyer, *Berichte*, Vol. 93, pages 928—38 and 1078—83 (1960) describe the aliphatic amine boranes. The pyridine and lutidine boranes are commercially available from the Callery Chemical Company, in
- 30 Pittsburg, Pennsylvania.

The phosphine boranes, the arsine boranes and stibine boranes are described in U.S. patent 2,999,864.

- 35 The borazines may be synthesised by condensation of diborane with the appropriate nitrogen compound. For example borazine is made by condensing diborane with ammonia.

N,N',N''-trialkyl borazine is produced by condensing diborane with the corresponding N-alkyl amine. An N,N'-dialkyl borazine is produced by condensing diborane with a mixture of ammonia and the appropriate N-alkylamine.

The pH of the solution containing the boron compound used according to the present invention is conveniently adjusted by adding an alkaline material, such as sodium hydroxide or sodium carbonate, or an acidic material such as acetic acid. These boron compounds are sufficiently stable in aqueous solution at pHs as low as 3 and are thus useful in the pH range from 3 to 13, the particular level chosen depending upon the sensitometric results desired. Such solutions are described and claimed in our divisional application 33018/66 (Serial No. 1056455).

The boron compounds may be used in this invention at concentrations from 1 to 1,000 mg per litre of the aqueous solution. In the aqueous solution used to treat a silver halide image which is to be colour developed by a separate colour developing solution the preferred concentration is from 100 to 400 mg per litre.

Colour developers used to simultaneously treat the silver halide with the boron compounds may contain from 1 to 100 mg per litre of solution with the preferred concentration of from 10 to 100 mg per litre.

The following are examples of the present invention.

EXAMPLE 1

A photographic multilayer colour element containing three differentially sensitised photographic silver halide emulsion layers, having colour-forming couplers incorporated therein, was exposed to a step wedge in a sensitometer. The exposed colour film was then developed in a developer having the following composition:

Sodium hexametaphosphate	2.0 g.
N-methyl-p-aminophenol sulphate	6.0 g.
Sodium sulphite, anhydrous	50.0 g.
Hydroquinone	6.0 g.
Sodium carbonate, monohydrate	35.0 g.
Potassium bromide	2.0 g.
Sodium thiocyanate	1.5 g.
0.5% solution of 6-benzimidazole nitrate	12.0 cc
0.1% solution of potassium iodide	10.0 cc
Water to make	1.0 litre

The element was then washed with water and treated in a hardening bath having the composition:

Potassium chrome alum crystals	30.0 g.
Water to make	1.0 litre



The element was then treated for 1 minute in a nucleating bath having the composition:

Sodium hexametaphosphate	1.0 g.
Sodium hydroxide	1.5 g.
<i>Tert.</i> -butylamine borane	0.4 g.
Water to make	1.0 litre
pH	12.3

The element was then treated in a colour developer having the following composition:

Benzyl alcohol	6.0 cc
Sodium hexametaphosphate	2.0 g.
Sodium sulphite, anhydrous	5.0 g.
Trisodium phosphate	40.0 g.
Potassium bromide	0.25 g.
0.1 % solution of potassium iodide	10.0 cc
Sodium hydroxide	6.5 g.
Colour developer*	11.33 g.
Ethylenediamine sulphate	7.8 g.
Citrazinic acid	1.5 g.
Water to make	1.0 litre
*4-amino-N-ethyl-N-(β -methanesulphonamidoethyl-m-toluidine sesquisulphate monohydrate)	

The element was then washed thoroughly with water and treated in a clearing and fixing bath having the following composition:

Sodium thiosulphate	150.0 g.
Sodium bisulphite	20.0 g.
Water to make	1.0 litre

The element was then treated in a bleach bath having the following composition:

Potassium dichromate	5.0 g.
Potassium ferricyanide	70.0 g.
Potassium bromide	20.0 g.
Water to make	1.0 litre

The element was again washed and treated once again with the clearing and fixing bath identified above. The element was again washed and treated in a stabilising bath having the following composition:

Formaldehyde (37% by weight)	7.0 cc
Dispersing agent**	0.5 g.
Water to make	1.0 litre
**Such as Triton-X 100, i.e., an alkylaryl polyether alcohol (octylphenoxy polyethoxy ethanol). ("Triton" is a registered trade mark.)	

Another piece of the same multilayer colour element was given the same exposure and process as described above except that the usual white light reversal re-exposure was used in place of the bath containing the boron compound.

Still another piece of the same multilayer colour element was given the same exposure and process except that no bath containing a boron compound or reversal re-exposure was used.

A comparison of the processed elements showed that the element treated with the bath containing the boron compound had sensitometric quality comparable to the element given the reversal re-exposure. The element that received neither treatment with the nucleating bath or reversal re-exposure during the processing was unsatisfactory.

EXAMPLES 2a) to 2e)

Five photographic multilayer colour materials of the type used in Example 1 were each

exposed and processed as described in Example 1 but using in place of the *tert.*-butylamine borane, a) trimethylamine borane, b) diethylamine borane, c) triethylamine borane, d) pyridine borane and e) 2,6-lutidine borane.

The five processed materials showed that each of the five baths containing the boron compounds gave good sensitometric results.

EXAMPLES 3a) to 3f)

Photographic multilayer colour materials of the type used in Example 1 were exposed to a step wedge in a sensitometer in the usual way. These materials were processed as described in Example 1 with the variation that, the boron compound was added to the colour developer solution to give a concentration of 0.10 gram per litre. No separate bath containing a Boron compound was used (nor was reversal re-exposure used). Good sensitometric results were obtained by processing colour materials through processes in which a) trimethylamine borane, b) diethylamine borane, c) triethylamine borane, d) *tert.*-butylamine borane, e) pyridine borane and f) 2,6-lutidine borane were used as the nucleating borane in the colour developer. Although the pH of these developers was not higher than 11.60, the boron compounds showed no evidence of decomposition.

WHAT WE CLAIM IS:—

1. A process of rendering developable a photographic layer having an image-wise distribution of silver halide which comprises subjecting said layer to treatment with an aqueous solution of a boron compound which has at least one and not more than three hydrogen to boron bonds or which contains two or more amine groups each bonded to a BH_3 .

2. A process according to claim 1, the boron compound being a monoalkyl-amine borane, a dialkyl-amine borane, a trialkyl-amine borane, a monoaryl-amine borane or a heterocyclic-amine borane.

3. A process according to claim 2, the boron compound being trimethyl-amine borane, diethyl-amine borane, triethyl-amine borane, *t*-butyl-amine borane, pyridine borane or 2,6-lutidine borane.

4. A process of producing a reversal silver image in a photographic layer containing an image-wise distribution of silver halide which has been produced by developing an image-wise exposed silver halide layer with a black and white developer and removing the silver image thus formed to leave in the layer a complementary image in silver halide, wherein the silver halide is rendered developable by a process according to claim 2 and, subsequently to the treatment with the aqueous solution of the boron compound, is redeveloped with a black and white developer.

5. A process of producing a reversal dye image in a photographic layer containing an image-wise distribution of silver halide which has been produced by developing an image-wise exposed silver halide layer with a black and white developer, wherein the image-wise distributed silver halide is rendered developable by a process according to claim 2 and, simultaneously with or subsequently to the treatment with the aqueous solution of the boron compound, is redeveloped by a colour developer in the presence of a colour coupler.

6. A process according to claim 5 in which at least two layers each containing an image-wise distribution of silver halide are treated with the aqueous solution of the boron compound and simultaneously or subsequently colour developed by a colour developer in the presence of a colour coupler, the image-wise distribution of silver halide in said layers having been produced by subjecting to black and white development a photographic material comprising a support and at least two silver halide emulsion layers sensitive to different regions of the spectrum.

7. A process according to claim 5 or 6, the colour coupler being present in the or each silver halide image-containing layer.

8. A process according to claim 7 in which three layers each containing an image-wise distribution of silver halide and a colour coupler are treated with the aqueous solution of the boron compound and simultaneously or subsequently colour developed, the image-wise distribution of silver halide in the three layers having been produced by subjecting to black and white development a multilayer photographic material comprising a support and three silver halide emulsion layers selectively sensitive to blue, green and red light respectively containing colour couplers which are substantive to the layers containing them and capable of coupling with the oxidation products of an aromatic primary amine developing agent formed on colour development of said silver halide with said agent to form dyes.

9. A process according to claim 8, the boron compound being trimethyl-amine borane.

10. A process according to claim 8, the boron compound being diethyl-amine borane.

11. A process according to claim 8, the boron compound being triethyl-amine borane.

12. A process according to claim 8, the boron compound being *t*-butyl-amine borane.

13. A process according to claim 8, the boron compound being pyridine borane.

14. A process according to claim 8, the boron compound being 2,6-lutidine borane.

15. A process according to any of claims 7 to 14 in which the silver remaining in the colour developed layers is removed therefrom.



exposed and processed as described in Example 1 but using in place of the *tert.*-butylamine borane, a) trimethylamine borane, b) diethylamine borane, c) triethylamine borane, d) pyridine borane and e) 2,6-lutidine borane.

The five processed materials showed that each of the five baths containing the boron compounds gave good sensitometric results.

EXAMPLES 3a) TO 3f)

Photographic multilayer colour materials of the type used in Example 1 were exposed to a step wedge in a sensitometer in the usual way. These materials were processed as described in Example 1 with the variation that, the boron compound was added to the colour developer solution to give a concentration of 0.10 gram per litre. No separate bath containing a Boron compound was used (nor was reversal re-exposure used). Good sensitometric results were obtained by processing colour materials through processes in which a) trimethylamine borane, b) diethylamine borane, c) triethylamine borane, d) *tert.*-butylamine borane, e) pyridine borane and f) 2,6-lutidine borane were used as the nucleating borane in the colour developer. Although the pH of these developers was not higher than 11.60, the boron compounds showed no evidence of decomposition.

WHAT WE CLAIM IS:—

1. A process of rendering developable a photographic layer having an image-wise distribution of silver halide which comprises subjecting said layer to treatment with an aqueous solution of a boron compound which has at least one and not more than three hydrogen to boron bonds or which contains two or more amine groups each bonded to a BH_2 .

2. A process according to claim 1, the boron compound being a monoalkyl-amine borane, a dialkyl-amine borane, a trialkyl-amine borane, a monoaryl-amine borane or a heterocyclic-amine borane.

3. A process according to claim 2, the boron compound being trimethyl-amine borane, diethyl-amine borane, triethyl-amine borane, *t*-butyl-amine borane, pyridine borane or 2,6-lutidine borane.

4. A process of producing a reversal silver image in a photographic layer containing an image-wise distribution of silver halide which has been produced by developing an image-wise exposed silver halide layer with a black and white developer and removing the silver image thus formed to leave in the layer a complementary image in silver halide, wherein the silver halide is rendered developable by a process according to claim 2 and, subsequently to the treatment with the aqueous solution of the boron compound, is redeveloped with a black and white developer.

5. A process of producing a reversal dye image in a photographic layer containing an image-wise distribution of silver halide which has been produced by developing an image-wise exposed silver halide layer with a black and white developer, wherein the image-wise distributed silver halide is rendered developable by a process according to claim 2 and, simultaneously with or subsequently to the treatment with the aqueous solution of the boron compound, is redeveloped by a colour developer in the presence of a colour coupler.

6. A process according to claim 5 in which at least two layers each containing an image-wise distribution of silver halide are treated with the aqueous solution of the boron compound and simultaneously or subsequently colour developed by a colour developer in the presence of a colour coupler, the image-wise distribution of silver halide in said layers having been produced by subjecting to black and white development a photographic material comprising a support and at least two silver halide emulsion layers sensitive to different regions of the spectrum.

7. A process according to claim 5 or 6, the colour coupler being present in the or each silver halide image-containing layer.

8. A process according to claim 7 in which three layers each containing an image-wise distribution of silver halide and a colour coupler are treated with the aqueous solution of the boron compound and simultaneously or subsequently colour developed, the image-wise distribution of silver halide in the three layers having been produced by subjecting to black and white development a multilayer photographic material comprising a support and three silver halide emulsion layers selectively sensitive to blue, green and red light respectively containing colour couplers which are substantive to the layers containing them and capable of coupling with the oxidation products of an aromatic primary amine developing agent formed on colour development of said silver halide with said agent to form dyes.

9. A process according to claim 8, the boron compound being trimethyl-amine borane.

10. A process according to claim 8, the boron compound being diethyl-amine borane.

11. A process according to claim 8, the boron compound being triethyl-amine borane.

12. A process according to claim 8, the boron compound being *t*-butyl-amine borane.

13. A process according to claim 8, the boron compound being pyridine borane.

14. A process according to claim 8, the boron compound being 2,6-lutidine borane.

15. A process according to any of claims 7 to 14 in which the silver remaining in the colour developed layers is removed therefrom.

16. A process according to claim 5, the colour coupler being present in the colour developer.

5 17. A process according to claim 16 wherein the layer containing the silver halide image which is treated with the aqueous solution of the boron compound and simultaneously or subsequently redeveloped by a colour developer containing a colour coupler is the layer
10 containing unexposed silver halide remaining after exposing image-wise to a coloured subject a photographic material comprising a support bearing three silver halide emulsion layers selectively sensitive to blue, green and
15 red light, developing the exposed material in a black and white developer and selectively re-exposing and developing with a colour developer containing a colour coupler each of two of the said three layers.

20 18. A process according to claim 17 in which the layer which is treated with the aqueous solution of the boron compound is the middle emulsion layer of the three emulsion layers.

25 19. A process according to claim 18, the emulsion layers being in the following order from the support: red-sensitive, green-sensitive and blue-sensitive and being colour developed to form in said layers respectively
30 a cyan reversal image, a magenta reversal image and a yellow reversal image.

20. A process according to any of claims 16-19 wherein the silver remaining in the colour developed layers is removed therefrom
35 after formation of all the reversal dye images.

21. A process according to any of claims 6 to 15 wherein the colour development is effected subsequently to the treatment with the aqueous solution of the boron compound and said solution contains from 100 to 400
40 milligrams of the boron compound per litre.

22. A process according to any of claims 6 to 15 wherein the colour development is effected simultaneously with the treatment
45 with the aqueous solution of the boron compound, said aqueous solution being a colour developer containing from 10 to 100 milligrams of the boron compound per litre.

23. A process according to any of claims 50 16 to 20 wherein the colour development is effected subsequently to the treatment with the aqueous solution of the boron compound and said solution contains from 100 to 400 milligrams of the boron compound per litre.

24. A process according to any of claims 55 16 to 20 wherein the colour development is effected simultaneously with the treatment with the aqueous solution of the boron compound, said aqueous solution being a colour
60 developer containing from 10 to 100 milligrams of the boron compound per litre.

25. A process according to claim 4, the boron compound being dimethyl-amine borane or trimethyl-amine borane.

26. A process according to claim 17, the 65 boron compound being trimethyl-amine borane, diethyl-amine borane, triethyl-amine borane, t-butyl-amine borane, pyridine borane or 2,6-lutidine borane.

27. A process according to any of claims 70 16, 18 to 20, 23 and 24, the boron compound being trimethyl-amine borane, diethylamine borane, triethyl-amine borane, t-butyl-amine borane, pyridine borane or 2,6-lutidine borane.

28. A process of producing a reversal dye image in an image-wise exposed photographic material containing three differentially sensitised photographic silver halide emulsion layers having colour-forming couplers incorporated therein wherein, after black and white development of the exposed material and before the colour development producing the reversal dye image, the material is treated with an aqueous solution of a boron compound which has least one and not more than three hydrogen to boron bonds substantially as described in any of Examples 1 and 2 herein. 75 80 85

29. A process of producing a reversal dye image in an image-wise exposed photographic material containing three differentially sensitised photographic silver halide emulsion layers having colour forming couplers incorporated therein wherein, after black and white development of the exposed material the developed material is treated with an aqueous solution containing a boron compound which has at least one and not more than three hydrogen to boron bonds and a colour developing agent, substantially as described in Example 3 herein. 90 95 100

30. A photographic reversal image which has been produced by a process according to any of claims 4 to 29.

L. E. T. BRANCH,
B.Sc., F.R.I.C.,
Patent Agent.

B.K.

