

RESERVE COPY

PATENT SPECIFICATION



Application Date: Dec. 11, 1935. No. 34397/35.

471,586

Complete Specification Left: Nov. 20, 1936.

Complete Specification Accepted: Sept. 8, 1937.

PROVISIONAL SPECIFICATION

Improvements in or relating to Colour Photography

I, (Dr.) GEOFFREY BOND HARRISON, a British Subject, of Ilford Limited, 23, Roden Street, Ilford, Essex, do hereby declare the nature of this invention to be as follows:—

This invention consists in improvements in or relating to colour photography and has for its object to combine features of the additive and subtractive processes of colour photography in advantageous form.

Light sensitive photographic material has already been proposed (see for example Specification No. 371,009) comprising two light sensitive layers, one sensitive, or rendered sensitive, substantially to only one of the three primary colours, and the second layer sensitive, or rendered sensitive, substantially to at least the other two primary colours in combination with a two-colour screen associated with the second layer in such manner that the second layer may be exposed through the screen. When the second layer is sensitive to a wider range than the two primary colours referred to, means are also provided for ensuring that the second layer is exposed only to light of these two primary colours. For example when the second emulsion is to be exposed through the first then a suitable removable dye may be incorporated in the first emulsion.

The colour screen may have coloured elements of any desired shape but elements in the form of parallel lines are to be preferred.

According to the present invention light sensitive photographic material of the kind described above is characterised in that the two colours of the screen are *a*) one of the two primary colours other than that to which the first layer is sensitive and *b*) the colour complementary to *a*). The first light sensitive layer may be coated upon one side of a transparent support and the second light sensitive layer upon the other side of the same support whilst the two colour screen is situated between the two light sensitive layers and preferably at that surface of the support bearing the second light sensitive layer. The light sensitive layers are preferably

silver halide emulsions but they may be bichromated colloid or diazotype layers when they are to be used to record images of the colours to which these layers are sensitive (e.g. blue), or they may be of other light sensitive materials.

The invention includes the method of processing exposed light sensitive photographic material of the characteristic kind according to the invention to produce an image in approximately natural colours which comprises the steps of treating the first layer (the layer sensitive to only one primary colour) to produce a photographic image in a colour complementary to the colour recorded by it and treating the other layer to produce an image in the colour to which the first layer is sensitive. The developed images may be coloured by dye toning or by chemical toning or by other known suitable colouring means or the original emulsions may contain dyes or pigments which are differentially removed by suitable treatment.

The invention is particularly suitable for the production of coloured copies from colour separation negatives (or positives) which may be in the form of three separate records or in the form of a single record on multi-colour screen material. In one example of the invention as applied to the production of a copy from a master multi-colour screen negative record—the colours of the screen on the master being blue, red and green—the printing stock may consist of a line screen having alternating lines of red and minus red (blue-green), the screen being prepared by dyeing a cellulosic film. Over the screen is coated a layer of a panchromatic emulsion and on the opposite side of the support is coated a layer of a blue sensitive emulsion incorporating a removable yellow dye.

The master is printed on to the printing stock with its emulsion in contact with the blue sensitive emulsion using white light. The light passed by the blue elements of the master screen (constituting the blue record) prints on to the blue sensitive emulsion but is prevented from affecting the panchromatic emulsion

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by the yellow dye included in the first emulsion. The red and green lights pass through the first emulsion and through the two-colour screen and print on to the panchromatic emulsion thus recording the red and green elements of the master picture behind the red and blue-green lines of the two-colour screen respectively. Both emulsions are then developed and fixed and in place of the two silver images are formed colour images, the image in the blue sensitive layer being converted to yellow and the image in the panchromatic layer being converted to blue. The yellow image may be produced, for example, by mercury toning and the blue image may be produced, for example, by using a tanning developer washing the emulsion with hot water and bleaching to remove the silver to give a relief image in gelatin which is stained with a blue dye.

In a second example separate red, green and blue colour separation negatives are printed successively on to the printing stock using for each negative light of the colour of which it is a record.

The printing stock consists of a silver chloride gaslight emulsion sensitized to the red (it will also be sensitive to ultra-violet but not to the near blue), the colour screen has lines of blue and yellow and the second emulsion is orthochromatic (i.e. sensitive to blue and green, but not to red light). The stock is printed by means of appropriately coloured light devoid of ultra-violet rays with the gaslight emulsion in contact with each of the negatives in turn. After exposure and development the first image is coloured blue-green by dye mordanting or chemical toning and the second emulsion is developed with a tanning developer, is hot water washed and stained red.

If desired the master record or records may be in the form of a positive and in that case the images produced in the printing stock are developed and reversed to form positives.

Various combinations of the sensitivities of the two emulsions and the colours of the two-colour screen which may be employed are given in the following table:—

Light used in printing first emulsion (i.e. the colour of the light to which the emulsion is sensitive).	Image thus produced is coloured.	Two line screen of colours		Light used in printing second emulsion through screen.	Image thus produced in second emulsion is coloured.
		1	2		
Blue	Yellow	Red	Blue-green	Yellow	Blue
Green	Magenta	Red	Blue-green	Magenta	Green
Red	Blue-green	Blue	Yellow	Blue-green	Red
Green	Magenta	Blue	Yellow	Magenta	Green
Red	Blue-green	Green	Magenta	Blue-green	Red
Blue	Yellow	Green	Magenta	Yellow	Blue

The record printed on the second emulsion should be of only two of the three primary colours and if this emulsion is sensitive to more than these two colours it is necessary to employ a removable dyed layer between the second emulsion and the master. This layer may be prepared in the manner already described by dyeing the first emulsion with a removable dye or a separate layer incorporating a removable dye may be employed underneath the first layer or between the second layer and the support.

Taking the case in which the first emulsion is sensitive to blue, the screen colours are red and blue-green and the second emulsion is sensitive to red and green, it will be seen that the red of a positive master will produce on the negative copy a black image only behind the

red elements of the screen because the first emulsion is not sensitive to red and the blue-green elements of the screen will not pass red light. Similarly the green of the master will only be recorded behind the blue-green elements of the screen because the first emulsion is not sensitive to green and the red elements of the screen will not pass green light. The blue of the master will be recorded only on the first blue sensitive layer and not at all on the second layer because the yellow dye associated with the first emulsion either in the emulsion or coated in a separate layer beneath the emulsion prevents any blue light from reaching the second emulsion. When the copy has been developed and reversed and the first and second emulsions toned yellow and blue respectively the red of the picture

will be reproduced on projection with white light by the selective action of the red elements of the screen. This red light will pass freely through the yellow
 5 toned first layer. Dilution of the red by blue-green light will be prevented by the blue image behind the adjacent blue-green elements of the screen and by the
 10 green of the picture will be produced by the subtractive action of the blue-green elements of the screen combined with the subtractive action of the yellow toned image. No red light will be passed by
 15 the red elements of the screen because the blue image will have been formed behind those elements. The blue of the picture will be produced by the light passed by the blue image and the blue-green
 20 elements of the screen. This blue image will extend behind the adjacent red elements of the screen and will prevent light being passed by those elements.

When the invention is used for printing multi-colour screen master records, filters may be employed if desired in the light beam to ensure that the light does not contain any components of colour which would be passed by two or more of
 30 the master screen elements of different colour.

In order to produce the minimum of diffusion in the second layer due to the scatter of the light taking place in the
 35 first layer and the separation between the two layers, the first emulsion should be as transparent (non-scattering) as possible, for example, a fine grained silver halide emulsion of low coating
 40 weight or a transparent light sensitive layer such as diazotype. If a light sensitive layer is used which produces some scatter such as a fine grained silver halide emulsion, the effect of the scatter on the
 45 definition of the finished print can be minimised by making the first layer (the one sensitive to only a single primary colour) sensitive to red light, and toning it or colouring it blue-green because it is
 50 the blue-green image which is usually regarded as giving definition to the picture. The blue-green image would then be focussed on to the screen when projecting, giving definition to the
 55 picture (since the image is produced by printing in direct contact and will be perfectly sharp). A further feature of this procedure would be that the two colour screen would itself be to a certain
 60 extent out of focus and the geometrical structure of the screen would be practically invisible if its dimensions on the film were sufficiently small, for example, a two line screen bearing 40 lines to the
 65 millimetre.

It is to be understood that although the principal application of the invention is to the production of copies in colour the invention may also be applied to the
 70 taking of master photographs in the camera. In this application of the invention a bipack may be used having on one film base the emulsion sensitive to only one of the primary colours and on the other film base a two-colour screen
 75 and the second emulsion. The two films may then be placed in the camera, emulsion to emulsion with the colour screen facing the lens. In this case both emulsions would be exposed through the colour
 80 screen. The records produced in this way would then be used as negatives in the process described above for printing on to the printing stock described which would then be processed and coloured to
 85 produce a coloured positive. Alternatively the master records could be developed and reversed to form positives and then coloured in the manner already described to produce a coloured positive,
 90 means being employed to secure the two images in registration.

In a further alternative method material as previously described and comprising a transparent support bearing
 95 light sensitive silver emulsion layers on each side and a two-colour screen between the emulsion layers may be exposed in a camera to form negative images in both emulsion layers which are then chemically
 100 reversed to yield positive images which in turn are converted into dye images as described to give a positive photograph in colour for direct viewing or projection purposes.

An alternative material suitable either for taking or for copying has the two emulsion layers coated on the colour screen side of the base and the emulsion layers are developed and coloured by a
 110 method similar to that employed in the process known under the Registered Trade Mark "Kodachrome". That is to say the two layers would have their developed images bleached and then both
 115 toned to the colour required for the layer next to the screen, the upper layer would then again be bleached and would finally be dyed to the colour required for that
 120 layer. Any other known method of selectively colour toning two superposed emulsions could be employed.

This invention has many advantages over the usual three colour screen additive process, one of which is that the
 125 luminosity of images projected on to a screen can be substantially increased. In the three-colour additive screen process owing to the introduction of the colour screen, the light intensity of the trans-
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mitting beam and the projected image is reduced theoretically to one third because each colour element of the screen transmits only one third of the total light incident upon it, and in practice owing to imperfections and practical difficulties in the filters, the actual reduction may be considerably greater than this. In the present invention since only a two colour screen is involved, the theoretical reduction in intensity of the transmitted beam and the projected image is only one half and in practice owing to the nature of the screen and the process this figure should be more nearly approached than the figure of one third can be in the three-colour additive screen process.

An advantage over most three-colour subtractive processes is the ease with which a three-colour record can be obtained using two sides of a single support in one printing operation and obviating the practical difficulties attendant upon any process involving superimposition of three separate colour records in exact register.

Dated this 11th day of December, 1935.

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Chartered Patent Agents.

COMPLETE SPECIFICATION

Improvements in or relating to Colour Photography

I, (Dr.) GEOFFREY BOND HARRISON, a British Subject, of Ilford Limited, 23, Roden Street, Ilford, Essex, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention consists in improvements in or relating to colour photography.

The invention is concerned with light sensitive photographic material of the kind (hereinafter referred to as the kind described) comprising two light sensitive layers, one (for convenience referred to as the first layer) arranged on exposure to record substantially only one of the three primary colours, and the other (referred to as the second layer) arranged on exposure to record substantially only the other two primary colours in combination with a two-colour screen associated with the second layer in such manner that the second layer is exposed through the screen, the two colours of the screen being (a) one of the two primary colours other than that which the first layer is arranged to record, and (b) the colour complementary to (a). It is an object of the present invention to provide a method of processing exposed material of this kind to produce positive colour photographs which combine features of the additive and subtractive processes of colour photography in advantageous form.

The invention consists in the method of processing photographic material of the kind described which has been exposed to record in the first layer one of the primary colours and in the second layer the other two primary colours which comprises the steps of treating the first layer

to produce the record it contains as an image in the colour complementary to that primary colour of which it is a record and of treating the second layer to produce the two records it contains as images in the colour which the first layer is arranged to record and, when the images and colour screen are not already in register, registering the images in the two layers in superposed position with the images in the second layer in register with the corresponding elements of the colour screen.

The light sensitive material preferably comprises a transparent support coated on one side with the first layer and on the other side with the second layer and having the two-colour screen located between the two layers preferably at the surface of the support bearing the second layer. Alternatively, the two layers may be coated upon separate supports and combined together with the colour screen, after processing, with their images in register.

The colour screen may have elements of any desired shape but elements in the form of parallel lines are to be preferred.

The light sensitive layers are preferably silver halide emulsions but they may be bichromated colloid or diazotype layers when they are to be used to record images of the colours to which these layers are sensitive (e.g. blue) or they may be of other light sensitive materials.

When either layer is sensitive to a wider range than the primary colour (or colours) which it is intended to record it is arranged to record only that colour (or colours) by employing means, e.g. suitable filters, to restrict the exposure to light of that colour (or colours). For example, when the second emulsion is

sensitive to more than the two colours it is to record and is to be exposed through the first emulsion then a suitable removable filter dye may be incorporated in the first emulsion.

The developed images may be coloured by dye toning or by chemical toning or by other known suitable colouring means or the original emulsions may contain dyes or pigments which are differentially removed by suitable treatment.

The invention is particularly suitable for the production of coloured copies from colour separation negatives (or positives) which may be in the form of three separate records and each printed by means of light of the colour of which it is a record or in the form of a single record on multi-colour screen material in which case white light is used for printing.

Some specific examples of the invention will now be described with reference to the accompanying drawings in which:—

Figure 1 is a cross-section through one form of photographic material according to the invention;

Figure 2 is a diagram of the subject and negative colour records;

Figure 3 is a diagram of the positive produced by reversal and toning of the records illustrated in Figure 2, showing the effect on projection and

Figure 4 is a diagram illustrating a method of taking and printing coloured photographs.

The example illustrated in Figures 2 and 3 is of the application of the invention to the production of a copy from a master multi-colour screen positive record—the colours of the screen on the master being blue, red and green. In this example the printing stock consists of a line screen having alternating lines of red and minus red (blue-green). Over the screen is coated a layer of a panchromatic emulsion (constituting the "second" emulsion) and on the opposite side of the support is coated a layer of blue sensitive emulsion (constituting the "first" emulsion) incorporating a removable yellow dye (shown in Figure 2 as a separate dyed layer for convenience in illustration).

The master is printed on to the printing stock with its emulsion in contact with the blue sensitive emulsion, using white light. The light passed by the blue elements of the master screen (constituting the blue record) prints on to the blue

sensitive emulsion but is prevented from affecting the panchromatic emulsion by the yellow dye included in the first emulsion. The red and green components of the light pass through the first emulsion and through the two-colour screen and print on to the panchromatic emulsion thus recording the red and green elements of the master picture behind the red and blue-green lines of the two-colour screen respectively. Both emulsions are then developed, reversed and fixed and in place of the two silver images are formed colour images, the image in the blue sensitive layer being converted to yellow and the image in the panchromatic layer being converted to blue. The yellow image may be produced, for example, by mercury toning and the blue image may be produced, for example, by using a tanning developer washing the emulsion with hot water and bleaching to remove the silver to give a relief image in gelatin which is stained with a blue dye. The final positive produced in this manner is illustrated in Figure 3.

If desired the master record or records may be in the form of a negative and in that case the images produced in the printing stock are developed without reversal to form positives.

In a second example separate red, green and blue colour separation negatives are printed successively on to the printing stock using for each negative light of the colour of which it is a record. The printing stock consists of a silver chloride gaslight emulsion sensitized to the red (it will also be sensitive to ultraviolet but not to the near blue), a second emulsion which is orthochromatic (i.e. sensitive to blue and green, but not to red light) and an intermediate colour screen which has lines of blue and yellow. The stock is printed by means of appropriately coloured lights devoid of ultraviolet rays with the gaslight emulsion in contact with each of the negatives in turn. After exposure and development the first image is coloured blue-green by dye mordanting or chemical toning and the second emulsion is developed with a tanning developer, is hot water washed and stained red.

Various combinations of the sensitivities of the two emulsions and the colours of the two-colour screen which may be employed are given in the following table:—

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	Light used in printing first emulsion (i.e. the colour of the light to which the emulsion is sensitive).	Image thus produced is coloured.	Two line screen of colours	1	2	Light used in printing second emulsion through screen.	Image thus produced in second emulsion is coloured.
5	Blue	Yellow	Red	Blue-green	Yellow	Blue	
10	Green	Magenta	Red	Blue-green	Magenta	Green	
15	Red	Blue-green	Blue	Yellow	Blue-green	Red	
	Green	Magenta	Blue	Yellow	Magenta	Green	
	Red	Blue-green	Green	Magenta	Blue-green	Red	
	Blue	Yellow	Green	Magenta	Yellow	Blue	

The record printed on the second emulsion should be of only two of the three primary colours and if this emulsion is sensitive to more than these two colours it is necessary as in the first example described above to employ a removable dyed layer between the second emulsion and the master. This layer may be prepared in the manner already described by dyeing the first emulsion with a removable dye or a separate layer incorporating a removable dye may be employed underneath the first layer or between the second layer and the support.

Taking the case illustrated in Figures 2 and 3 in which the first emulsion is sensitive to blue, the screen colours are red and blue-green, and the second emulsion is sensitive to red and green, it will be seen that the red of the subject or a positive master will produce on the negative copy a black image only behind the red elements of the screen because the first emulsion is not sensitive to red and the blue-green elements of the screen will not pass red light. Similarly the green of the master will only be recorded behind the blue-green elements of the screen because the first emulsion is not sensitive to green and the red elements of the screen will not pass green light. The blue of the master will be recorded only on the first blue sensitive layer and not at all on the second layer because the yellow dye associated with the first emulsion either in the emulsion or coated in a separate layer beneath the emulsion prevents any blue light from reaching the second emulsion. When the copy has been developed and reversed and the first and second emulsions toned yellow and blue respectively the red of the picture will be reproduced on projection with white light as illustrated in Figure 3 by the selective action of the red elements of the screen. This red light will pass freely through the yellow toned first layer. Dilution of the red by blue-green light will be prevented by the blue

image behind the adjacent blue-green elements of the screen and by the yellow image of the first layer. The green of the picture will be produced by the subtractive action of the blue-green elements of the screen combined with the subtractive action of the yellow toned image. No red light will be passed by the red elements of the screen because the blue image will have been formed behind those elements. The blue of the picture will be produced by the light passed by the blue image and the blue-green elements of the screen. This blue image will extend behind the adjacent red elements of the screen and will prevent light being passed by those elements.

When the invention is used for printing multi-colour screen master records, it is preferred to employ filters in the light beam to ensure that the light does not contain any components of colour which would be passed by two or more of the master screen elements of different colour. Light of such composition may also be obtained by the method described in Specification No. 417,860, and the expression "white light" as used herein is intended to include light having such composition.

In order to produce the minimum of diffusion in the second layer due to the scatter of the light taking place in the first layer and the separation between the two layers, the first emulsion should be as transparent (non-scattering) as possible, for example, a fine grained silver halide emulsion of low coating weight or a transparent light sensitive layer such as diazotype. If a light sensitive layer is used which produces some scatter such as a fine grained silver halide emulsion, the effect of the scatter on the definition of the finished print can be minimised by making the first layer (the one sensitive to only a single primary colour) sensitive to red light, and toning it or colouring it blue-green because it is the blue-green image

which is usually regarded as giving definition to the picture. The blue-green image would then be focussed on to the screen when projecting, giving definition to the picture (since the image is produced by printing in direct contact and will be perfectly sharp). A further feature of this procedure is that the two colour screen would itself be to a certain extent out of focus and the geometrical structure of the screen would be practically invisible if its dimensions on the film were sufficiently small, for example, a two line screen bearing 40 lines to the millimetre. It is to be understood that although the principal application of the invention is to the production of copies in colour the invention may also be applied to the taking of master photographs in the camera. In the example of this application of the invention which is illustrated in Figure 4 a bipack is used having on one film base the emulsion sensitive to only one of the primary colours and on the other film base a two-colour screen and the second emulsion. The two films are placed in the camera, as shown in Figure 4, with the base of the first emulsion facing the lens and the colour screen between the two emulsions. The records produced in this way are then used as negatives either untoned or colour toned as described above for printing on to the printing stock described which is then processed and coloured to produce a coloured positive. Alternatively, the master records could be developed and reversed to form positives and then coloured in the manner already described to convert the master material to a coloured positive, means being employed to secure the two images in registration. In a further alternative method material as previously described and comprising a transparent support bearing light sensitive silver emulsion layers on each side and a two-colour screen between the emulsion layers may be exposed in a camera to form negative images in both emulsion layers which are then chemically reversed to yield positive images which in turn are converted into dye images as described to give a positive photograph in colour for direct viewing or projection purposes. An alternative material suitable either for taking or for copying has the two emulsion layers coated on the colour screen side of the base and the emulsion layers are developed and coloured by a method similar to that employed in the process known under the Registered Trade Mark "Kodachrome". That is to say, the two layers would have their developed images bleached and then both

toned to the colour required for the layer next to the screen, the upper layer would then again be bleached and would finally be dyed to the colour required for that layer. Any other known method of selectively colour toning two superposed emulsions could be employed.

In cases where during exposure the emulsion sensitive to only one of the primary colours is further from the subject than the emulsion layer sensitive to the other two colours it is important that the emulsion recording the two colours should be sensitive to those two colours only as otherwise a correcting filter would be required which would interfere with the recording of the third colour by the layer sensitive to that colour.

This invention has many advantages over the usual three colour screen additive process, one of which is that the luminosity of images projected on to a screen can be substantially increased. In the three-colour additive screen process owing to the introduction of the colour screen, the light intensity of the transmitting beam and the projected image is reduced theoretically to one third because each colour element of the screen transmits only one third of the total light incident upon it, and in practice owing to imperfections and practical difficulties in the filters, the actual reduction may be considerably greater than this. In the present invention since only a two-colour screen is involved, the theoretical reduction in intensity of the transmitted beam and the projected image is only one half and in practice owing to the nature of the screen and the process this figure should be more nearly approached than the figure of one third can be in the three-colour additive screen process.

An advantage over most three-colour subtractive processes is the ease with which a three-colour record can be obtained using two sides of a single support in one printing operation and obviating the practical difficulties attendant upon any process involving superimposition of three separate colour records in exact register.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. The method of processing photographic material of the kind described which has been exposed to record in the first layer one of the primary colours and in the second layer the other two primary colours which comprises the steps of treating the first layer to produce the record it contains as an image in the colour com-

plementary to that primary colour of which it is a record and of treating the second layer to produce the two records it contains as images in the colour which the first layer is arranged to record and, when the images and colour screen are not already in register, registering the images in the two layers in superposed position with the images in the second layer in register with the corresponding elements of the colour screen.

2. The method claimed in Claim 1 in which the layers are treated to produce the records as positive coloured images.

3. The method of producing a multi-colour photograph which consists in printing from a master in the form of a multi-colour screen photograph or of separate colour records or of a combination of multi-colour screen records and one or more separate colour records onto material of the kind described to record in the first layer one of the primary colours and in the second layer the other two primary colours and then processing the material in the manner claimed in Claim 1 or Claim 2.

4. The method of processing as claimed in Claim 1 or Claim 2 or the method of producing a multi-colour photograph as claimed in Claim 3 in which the images are developed as negatives and are then reversed and colour-toned.

5. The method of producing a multi-colour photograph which comprises the steps of exposing photographic material of the kind described having the two layers on opposite sides of a single base with the colour screen between the layers to record in the first layer one of the primary colours and in the second layer the other two primary colours, developing the images in the two layers, reversing the images to form positives and chemically or dye-toning the image in the first layer to the colour complementary to that

primary colour of which it is a record and chemically or dye-toning the images in the second layer to the colour which the first layer is arranged to record.

6. A photograph in colours comprising two superposed record layers with a two-colour screen between them, the first layer containing a record of one of the primary colours toned to the colour complementary to that primary colour and the second layer containing separate records of the other two primary colours in the form of separate minute areas toned to the colour which is recorded by the first layer, the screen being combined with the second layer and the two colours of the screen being respectively (a) one of the two primary colours other than that which is recorded in the first layer and (b) the colour complementary to (a), and the screen being superposed on the second layer with the screen elements of colour (a) in registration with the minute areas recording that colour and the screen elements of colour (b) in registration with the minute areas recording the other primary colour in the layer.

7. The method of processing exposed photographic material of the kind described substantially as set forth in any of the foregoing examples.

8. For use in carrying out the method according to any one of Claims 1 to 5, photographic material of the kind described characterised in that the two-colour screen is located between the light sensitive layers.

9. A multi-colour photograph when processed by the method claimed in Claim 1.

Dated this 20th day of November, 1936.
BOULT, WADE & TENNANT,
111 & 112, Hatton Garden,
London, E.C.1,
Chartered Patent Agents.

Fig. 1.



Fig. 2.

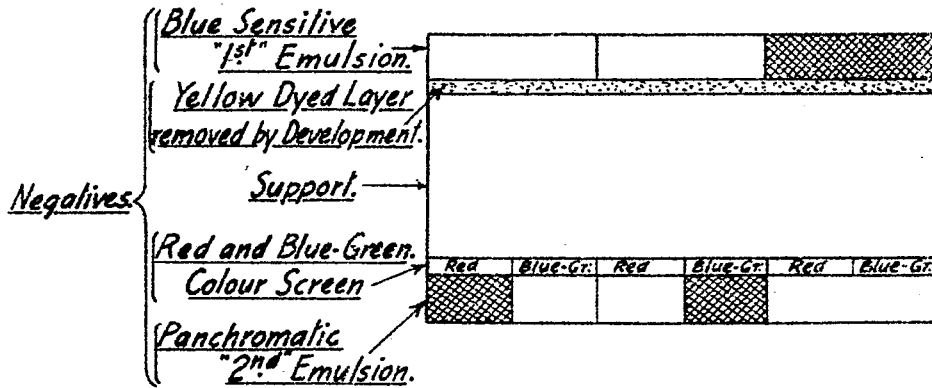
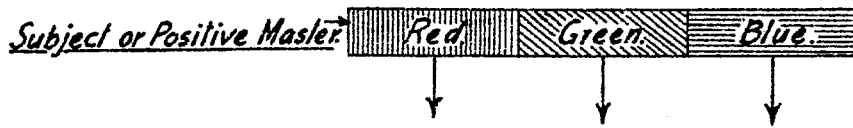
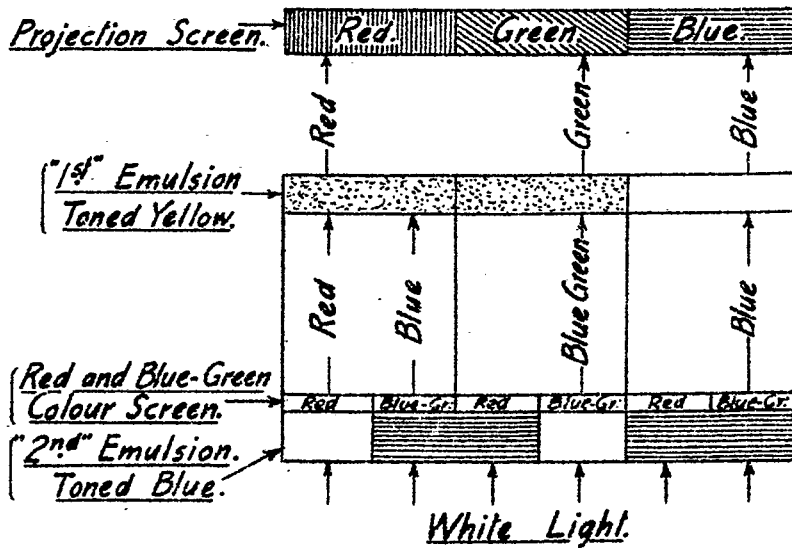


Fig. 3.



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

Fig. 4.

Subject or Positive Master. → 

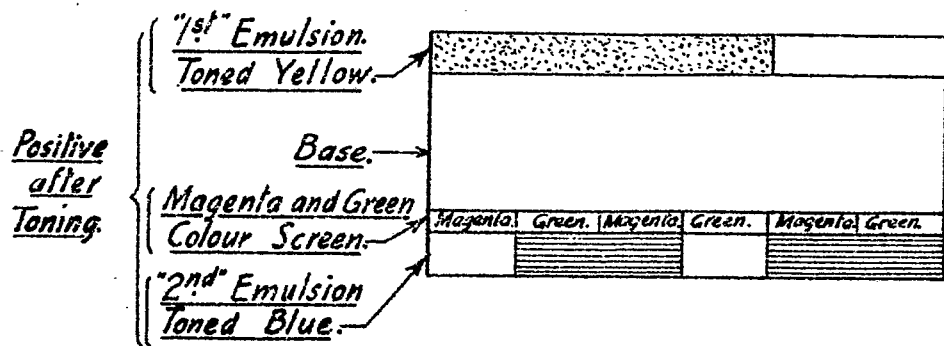
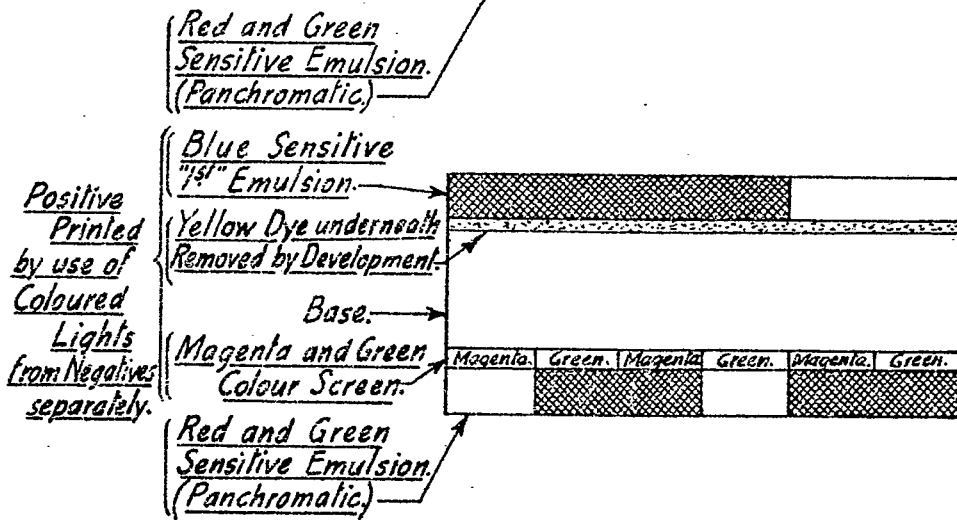
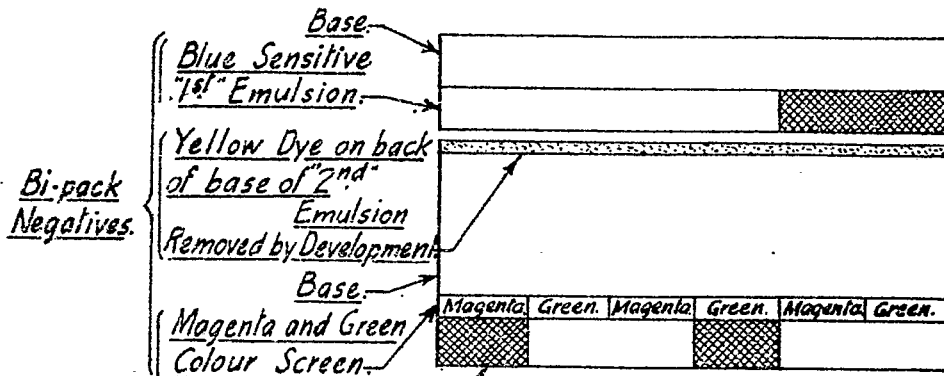


Fig. 1.

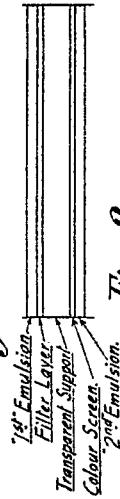


Fig. 2.

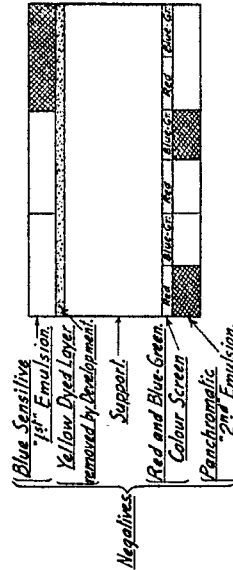
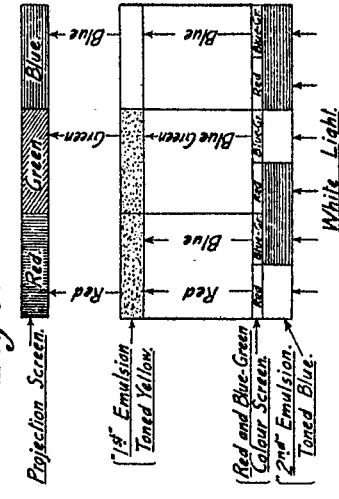


Fig. 3.



[This drawing is a reproduction of the original on a reduced scale.]

Fig. 4.

