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PATENT SPECIFICATION



Application Date : April 28, 1924. No. 10,436 / 24. **233,129**

Complete Left : May 21, 1924.

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PROVISIONAL SPECIFICATION.

Improvements in and connected with Colour Kinematography.

I, CLAUDE HARRISON FRIESE-GREENE, of 43, Eltham Road, Lee, S.E. 12, British subject, do hereby declare the nature of this invention to be as follows:—

This invention relates to colour kinematography in which different sections of a surface of a colour sensitive or panchromatic film are exposed alternately to light allowed to pass through filters. In practice it is customary to use a shutter having a pair of apertures one of which is filled entirely with a filter of a particular colour, the other aperture only being partially covered, generally a relatively small proportion thereof, by a filter having a complementary or different colour. The two portions of the spectrum from which these colours are selected are usually from the red end for the wholly covered aperture, and the blue end for the other filter which generally also passes white light. Whilst this principle gives good results there is still room for improvement, particularly in instances where grass and foliage in its natural green state has to be photographed, also when photographing in a hazy or misty light, the latter condition often existing almost unsuspectedly during very warm and fine weather so that distant definition may be registered. The object of this invention is to obviate the foregoing faults whereby a practically perfect reproduction of the object photographed is obtained, and in which the fault, commonly known as fringing is obviated to a minimum, also reduction in speed of projection being obtained.

Broadly this invention is characterised in that the film is exposed through filters all of which are substantially of the same tone of colour, one of the filters having in conjunction with it an opening passing white light.

In the preferred embodiment of this

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invention the colour employed for the filters is selected from the red side of the spectrum. Preferably an ordinary rotating disc is employed, rotating at half the speed of an ordinary shutter but having apertures for filters. One of these apertures is filled entirely with a filter having a colour essentially on the red side of the spectrum. The other aperture is left partially open to allow white light to pass and the remaining portion is filled with a filter having a colour also substantially on the red side of the spectrum. The film is exposed alternately through the two apertures specified.

The results of employing the same colour in each aperture gives a result which is appreciably must better than any other arrangement of filters heretofore employed, particularly with regards to the photography of grass or foliage in its natural green state, the picture projected from the positive giving a good green reproduction of the grass or foliage, as well as finer graduations of other colours with a good distant definition, even when objects at a distance are wrapped in mist.

The area of the colour filter employed with the opening passing white light may be varied also the area of the white light aperture according to the balance required, likewise the density and tone of the two coloured filters may be varied relatively or in common as desired.

Briefly it may be stated the preferred embodiment of this invention resides in employing a shutter having two apertures employing filters selected from the red side of the spectrum, *i.e.* any phase of colour except that in which the green phase related to the red side of the spectrum predominates.

In employing this invention the best results are obtained by bringing each picture into position for exposure in the

gate as quickly as possible, *i.e.* the rate of change of successive sections to be effected as quickly as possible. Also it is distinctly advantageous to carefully balance the luminous values of the colours applied to the positive film. By means of my invention a much more refined and delicate colour graduation is obtained. The quick change feature reduces colour fringing to a minimum, and the balance of luminous values

reduces flicker and running speed during projection. Also owing to the rapid feeding of the film through the gate a longer exposure can be given.

Dated this 28th day of April, 1924.

For HUGHES & YOUNG LTD.

G. HUGHES,

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Agents for the Applicant.

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COMPLETE SPECIFICATION.

Improvements in and connected with Colour Kinematography.

I, CLAUDE HARRISON FRIESE-GREENE, of 43, Eltham Road, Lee, S.E. 12, British subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to colour kinematography in which different sections of the surface of a colour sensitive or panchromatic film are exposed to light alternately allowed to pass through different filters. In practice it is customary to use a disc having a pair of apertures one of which is filled entirely with a filter of a particular colour, the other aperture only being partially covered, generally a relatively small portion thereof, by a filter having a complementary or different colour. It is known that colour sensitive emulsions are more responsive to certain colours than they are to others, so that it is necessary to determine carefully the colour of filters through which the film is exposed, which give the best results. The portions of the spectrum from which these colours are selected are usually from the red side for the wholly covered aperture, and the blue end for the other filter which is associated with the aperture passing white light. Whilst this principle gives good results there is still room for improvement, particularly in instances where grass and foliage in its natural green state has to be photographed also when photographing in a hazy or misty light, the latter condition often existing almost unsuspectedly during very warm and fine weather, so that distant definition may be registered. The object of this invention is to obtain the foregoing desideratum, whereby a more perfect reproduction of the object photographed is obtained, and one in which the fault, commonly known as fringing is obviated to a minimum, also

reduction in speed of projection being obtained together with a finer colour graduation.

Broadly this invention is characterised in that the film is exposed through filters all of which are such that the whole of the light transmitted by them, or the predominating part of the light is from substantially the same part of the spectrum, one of the filters having in conjunction with it an opening passing white light.

In the preferred embodiment of this invention the colour employed for the filters is selected from substantially the red side of the spectrum. Preferably an ordinary rotating disc is employed, rotating at half the speed of an ordinary shutter but having apertures for filters. One of these apertures is filled entirely with a filter having a colour predominating on the red side of the spectrum. The other aperture is utilised to allow the passage of white light with a colour also substantially on the red side of the spectrum. The sections of the film are exposed alternately through the two apertures specified.

The results of employing the same colour in each aperture, one of which has an opening allowing the passage of white light gives a result which is appreciably much better than any other arrangement of filters heretofore employed, particularly with regards to the photography of grass or foliage in its natural green state by employing yellowish red filters, the picture projected from a positive prepared as hereinafter described and by using the ordinary shutter for black and white work giving a good green reproduction of the green grass or foliage, as well as finer gradations of other colours with a good distant definition, even when objects at a distance are wrapped in mist.

The area of the colour filter employed

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with the opening passing white light may be varied, also the area of white light aperture according to the balance required, likewise the density and tone of the two coloured filters may be varied relatively or in common as desired. The colour filter having the white light opening may include a relatively small proportion of colour from the blue part of the spectrum provided that the addition of such blue colour will not affect noticeably the predomination of the approximately red colour of the filter, should it be considered necessary to assist the colour gradations on the blue side. Alternatively a relatively small area of approximately blue filter having the same effect as the aforementioned incorporation of blue with red may be used in conjunction with the red filter and white aperture.

Briefly it may be stated the preferred embodiment of this invention resides in employing a disc having two apertures employing filters substantially red, *i.e.* any colour except that in which the green colour related to the red side of the spectrum predominates, for instance orange, orange red, and yellow may be employed good examples of suitable dyes being flavazine T or roes bengal, which are well known photographic dyes.

In employing this invention the best results are obtained by the use of an intermittent mechanism which brings each picture into position for exposure in the gate as quickly as possible. Also it is distinctly advantageous to carefully balance the luminous values of the colours applied to the positive film, the colours which are applied to the film being an approximately orange red and an approximately blue green, the former colour being applied to those sections of the film which are exposed through the wholly red or approximately red filter, and the other sections being coloured with an approximately blue green in known manner. By means of my invention a much more refined and delicate colour gradation is obtained. The quick change feature reduces colour fringing to a minimum, and the balance of luminous values reduces flicker and running speed during projection. Also owing to the rapid feeding of the film through the gate a longer exposure can be given.

If desired the filter associated with the aperture passing white light may be split up into a plurality of portions in conjunction with a corresponding splitting up of the white light aperture.

The accompanying drawing gives a good example of the proportions of filters

and white opening to give good results under normal fine weather conditions. In the drawing the wholly red or approximately red filter is indicated by the reference letter R, and the other filter by the reference letter *r*, the white light opening being indicated by the reference W.L. The shaded O part indicates an adjustable opaque filling. The proportions shown in the drawing have been found to give good results by employing a flavazine T and red bengal filter for the filter R, and a flavazine filter for the filter *r*.

The following formulæ are suitable for preparing the dyes for the filters and the colouring for applying to the positive film.

For the filter R:—

Base solution No. 1:—Flavazine T 1 gramme dissolved in 2 ozs. of distilled water.

Base solution No. 2:—Rose bengal 1 gramme dissolved in $\frac{1}{2}$ oz. pure alcohol and add distilled water up to 2 ozs.

METHOD.

Immerse a strip of transparent gelatine in base Solution 1 for 30 seconds, rinse rapidly in water and allow the gelatine to dry. When dry immerse same in Solution 2 for one minute then hang up to dry (do not rinse the gelatine after the immersion in Solution 2).

When the gelatine is dry cut same to fit the aperture in the disc.

To make filter *r*. Use the same formula as base Solution 1 immersing a strip of transparent gelatine in it for 45 seconds, rinse and allow same to dry. When dry cut to size desired.

It is always advisable when filters have been made and set, to take a test off first so that it is possible to check the balance. A good way of so doing is to photograph objects white and black, the density on the resultant negative of each should appear equal in each successive picture.

Good formulæ for dyeing the positive pictures are as follows:—

Orange red for the section that has been exposed through the wholly red filter.

SOLUTION 1.

Brilliant red 10 grms. dissolved in distilled water 10 ozs.

SOLUTION 2.

Fast red D 10 grms. dissolved in distilled water 10 ozs.

To 10 ozs. of Solution 1 add and mix 6 ozs. of Solution 2.

Blue green for the section that has

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been exposed through the white opening and flavazine filter.

Lissamine green 10 grms. Disulphine blue 5 grms.

5 Mix with little distilled water into a thin paste then add distilled water up to 35 ozs.

I am aware that heretofore it has been proposed to produce cinematograph negative records by taking successive pictures through an orange red or other coloured transparent screen and in white light. It has also been proposed to project the positive films made from such negatives in such a way that the orange red records are projected in red coloured light and the other records in green light. It will be apparent however that my invention differs from this known method because I propose to photograph definitely through two screens both being of a colour on the one side of the spectrum, one of them having an opening passing white light; so that one picture is photographed wholly through a reddish screen and the other picture through a combination of reddish screen and white light.

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. In the production of colour cinematograph pictures the exposure of the negative film during the photographing of pictures through filters all of which are such that the whole of the light transmitted by them, or the predominating part of the light is from substantially the same part of the spectrum, one of the filters having in conjunction with it an opening passing white light, substantially as and for the purposes described.

2. The production of colour cinematograph films in accordance with Claim 1 characterised in that all the apertures in the shutter through which the film is exposed employ filters coloured substantially red.

3. A process for production of colour cinematograph films in which alternate sections of the negative film are exposed through different filters and the positive films are subsequently coloured alternately with colours approximately orange red and approximately blue green, characterised in that the sections which are coloured with the blue green are

exposed in the negative stage through a filter having an approximately red colour and having associated with it an opening passing white light.

4. In the production of colour cinematograph pictures the employment of a rotating disc having a pair of apertures through which the negative film is adapted to be exposed, one of which is entirely filled with a filter having a colour approximately red, and the other aperture also has a filter coloured approximately red in conjunction with an opening passing white light.

5. In the production of cinematograph pictures according to any of the preceding claims, the employment of filters characterised in that the filter which is associated with the white light aperture is adjustable in effective area, and the effective area of the white light aperture is also adjustable.

6. In the production of cinematograph pictures according to any of the preceding claims the employment of a filter associated with the aperture passing white light which is split up into a plurality of portions and is used in conjunction with a white light aperture which is correspondingly split up.

7. In the production of colour cinematograph pictures according to any of the preceding claims the use in association with the white light aperture or apertures of an approximately red colour filter having incorporated with it a relatively small proportion of a colour which it is desired to transmit to the film.

8. A positive colour cinematograph film prepared substantially in accordance with the method set forth.

9. In the production of colour cinematograph films essentially in accordance with the preceding claims the use for the preparation of the filters and the positive film of dyes prepared in accordance with the formulæ herein set forth.

10. The process for the production of colour cinematograph pictures substantially as set forth.

Dated this 18th day of May, 1924.

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

