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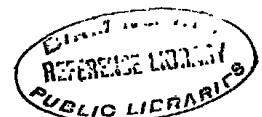
PROVISIONAL SPECIFICATION.

Improvements in and relating to Cinematograph Photography and Projection.

We, WILLIAM FRIESE-GREENE, of 9, Worcester Villas, Hove, Brighton, Sussex, Photographer, and FRIESE-GREENE PATENTS LIMITED, of 7, Little Saint Andrew Street, London, Manufacturers, do hereby declare the nature of this invention to be as follows:—

- 5 This invention relates to improvements in cinematograph apparatus and in the photographing and projection of animated pictures. The object of this invention is to provide improved methods and means for taking and reproducing images in colour as well as in black and white.
- 10 According to one part of this invention we take two or more pictures simultaneously on one film disposed adjacent and consecutively to each other. The film is then moved through a distance equal to the space occupied by the number of pictures taken simultaneously. Each picture is adapted to be taken through colour screens. The images may be projected on to a screen through one lens in succession or all the images may be projected through two or more
- 15 lenses corresponding to the number of lenses employed when taking the pictures. In either case colour screens should be used corresponding in colour to the colour of the screens through which the pictures were taken.
- We have discovered that this approximate correspondence between the colours of the screens used in the production of the negative pictures and those used
- 20 in the exhibition of the positive pictures is not necessary in all cases and that the cinematographic representation of moving objects in so-called natural colours may be satisfactorily effected in a novel manner as about to be described.
- A panchromatic film more sensitive to the orange-red and infra-red light rays than to the blue violet or ultra violet rays is used as the negative film in a
- 25 cinematograph camera. Alternate exposures in successive intervals of time are made on this film in the manner ordinarily practised in cinematographic photography, through an orange-red screen, and in ordinary white light, that is, without the use of any coloured screen at all. From the negative film thus obtained, after development, a positive film is prepared by the usual processes,
- 30 and in the exhibition of this positive film those individual pictures which were originally produced from the negatives exposed in the orange-red light are projected in red coloured light, and those pictures which are produced from the negatives originally exposed to white light or without the use of a coloured screen are projected in green light.
- 35 Similarly by taking a series of negative pictures in sets of three through an orange-red and a blue screen and white light, and projecting the positive film obtained from such a negative film or record with the aid of red, blue, and green light respectively, a close imitation of the original colours of the object or objects to be reproduced may be obtained on the lantern screen.
- 40 In carrying out the present invention we do not limit ourselves to the use of the colours which have been named in the illustrative examples given above,

[Price 8d.]



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but we may use any one or two colours in conjunction with white or approximately white light for the production of the two or three different kinds of negative picture, composing the entire negative film, and we may use any two or three colours in the projection of the positive film prepared from the above negative film, provided always that in the case of the projection of the positive film each of the two or three kinds of positive pictures differentiated by being produced from negative pictures taken in light of one or of two colours and in white or approximately white light are not exhibited in light beams of the same, or approximately the same tint or colour as all of those used in the production of the original negative.

According to another part of our invention, to obtain a stereoscopic effect, a negative film or record is produced of a moving object or objects in which consecutive individual negatives in the series composing the record are produced by the action of light passing through two different lenses selected and arranged as for stereoscopic photography but in which alternate individual negatives are produced by the action of light passing through only one or the other of the two such lenses.

We may obtain such a consecutive series of negative pictures arranged longitudinally along the length of the film in the following way. A shutter of one of the known applicable kinds is so arranged in conjunction with a cinematograph camera that an exposure through the one camera lens which we will call *a* is immediately followed by an exposure through the other camera lens which we will call *b*, and this exposure by another through lens *a*. This alternation of the production of a picture through lenses *a* and *b* is continued so that a sequence of photographs taken alternately through the two camera-lenses *a* and *b* is obtained. The object or objects thus photographed may be either moving or stationary with respect to the camera.

The consecutive pictures produced by alternate exposures through the two lenses of the cinematograph camera arranged as described are caused to fall into correct alignment one beneath the other on the negative cinematograph film by the aid of a mechanical or optical device of any known suitable character, but preferably in one of the following ways:

In accordance with the first way, a simple mechanism is provided and caused to act in such manner that an exposure through lens *a* is followed, during the short period of time within which the shutter of the camera is closed, by a transverse movement of the negative film and which accompanies, precedes or follows the ordinary longitudinal movement in such a way that when the shutter next opens to give an exposure through lens *b*, the impression of the light falls on that portion of the negative film immediately below the portion which, during the previous exposure, received a light impression through lens *a*. The transverse and longitudinal movements of the negative film then again occur during the next short period of time within which the shutter is closed in such a way as to cause the next light impression through lens *a* to fall immediately below the previous one received through the lens *b*. A series of consecutive exposures is made alternately through lenses *a* and *b* in such a manner that the negative pictures obtained are in sufficiently close juxtaposition longitudinally throughout the negative film that the same can be used for the production of a positive film which can be exhibited in a cinematographic projection apparatus.

In accordance with the second way of obtaining the negative film or record, a simple mechanical and optical device of the following kind, is provided and caused to act. The cinematograph camera provided with two lenses selected and arranged as for stereoscopic photography, is provided with a train or optical arrangement of lenses, prisms and mirrors devised in accordance with known principles in such a way that by means of suitable adjustments the image produced by lens *a* may be made co-central with that from lens *b* when the images produced by both lenses are focussed upon the negative film. In

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conjunction with this arrangement and disposition of apparatus, a shutter for making photographic exposures alternately through the two lenses *a* and *b* and a mechanism for shifting the negative film longitudinally within the periods of time which separate two consecutive exposures are provided, and so adjusted
5 that an exposure made through lens *a* is followed by an exposure through lens *b* and the image from lens *b* falls immediately below the image from lens *a* on the negative film. The impression of light from lens *b* is followed by one from lens *a* and the images produced alternately from the two lenses in the manner indicated are caused to form a series of negative pictures on
10 development which are in longitudinal alignment throughout the length of the negative film.

The two manners of producing a negative film of the required kind which have been above described are quoted merely as illustrations, but we may employ any known mechanical or optical principle for obtaining a similar result,
15 namely a negative cinematograph film in which the consecutive negative pictures are produced by the alternate use of two lenses selected and disposed as for stereoscopic photography.

From the negative film obtained substantially as above described a positive film is prepared by any of the known methods. On exhibition in a cinematographic projection apparatus a novel effect is obtained in that the picture
20 exhibits some of those qualities usually associated with stereoscopic vision or observation. We do not limit ourselves to the use of two lenses of which the optical axes are at any specific distance apart.

The impression of solidity conveyed by the exhibition of pictures obtained as described is increased if the negative pictures are produced not in white light or light not varied in colour in successive exposures, but in light of different colours or belonging to different regions of the visual spectrum for different exposures. It is thus advantageous and helpful to the novel effect, to produce
25 the negative photographs consecutively by the action of two, three or more different colours or qualities of light, and to exhibit the positive series of pictures produced from such series of negative photographs in light of the corresponding colours or qualities. Thus for example if in the series of negative photographs exposures are made consecutively through red, blue and green screens, the positive films prepared therefrom may, by means of known
30 mechanism and appliances or of known modes of treating the positive film, be exhibited in red, blue and green light or in light of any other or complementary colours which will render the effect exhibited more realistic or novel.

The impression of solidity conveyed by the series of pictures when exhibited on the screen is further increased if the pictures are allowed to fade away
40 gradually at the edges instead of being exhibited with a sharply defined border or frame demarcating the edges. This result may be attained by placing a vignetting frame in the path of the lantern beam or by any other of the many devices known for bringing about the same result.

According to another part of our invention to obtain a stereoscopic effect, the sensitised film may be oscillated laterally so that the film may be exposed
45 alternately through lenses and colour screens placed side by side of each other. The colour screens may be fixed or they may be adapted to be changed in any known manner. In some cases we may combine means for oscillating the film with means for taking two or more pictures simultaneously but disposed consecutively on one film.
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In projecting the images on a screen the film is not oscillated but colour screens are used to correspond with those employed when taking the pictures.

In some cases the density of the colour screens may be varied so that although for instance orange, green and blue screens are used successively, the density
55 of each colour may vary so that in any given number of exposures or projections, screens of the same colour and different densities are employed in order to produce the proper balance.

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According to another part of our invention we use an orthochromatic filter, which clearly cuts off the blue violet and ultra violet rays, and a good panchromatic film sensitive to the orange red and infra red. With this arrangement we use one screen only, the orange red, and take pictures alternately with the screen and without the screen. When projecting the images, we use a green screen in place of the open shutter and a red screen where the red was employed in taking the pictures. 5

In all cases where applicable, a black screen or prolonged dark interval may be employed between exposures or projections with coloured screens for the purpose described in the Specifications of Letters Patent No. 26,927 of 1910 and No. 3636 of 1912. 10

In some cases the film used for projecting the images may be dyed instead of using colour screens.

Dated this 26th. day of February, 1912.

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Chartered Patent Agents.

COMPLETE SPECIFICATION.

Improvements in and relating to Cinematograph Photography and Projection. 20

We, WILLIAM FRIESE-GREENE, of 9, Worcester Villas, Hove, Brighton, Sussex, Photographer, and FRIESE-GREENE PATENTS, LIMITED, of 7, Little Saint Andrew Street, London, Manufacturers, 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:— 25

This invention relates to the photographic taking and projection of animated pictures. The object of this invention is to provide improved methods for taking and reproducing images in colour.

Methods have been suggested for obtaining and exhibiting cinematograph records or photographs in so-called natural colours, in which methods the desired effect is obtained or sought to be obtained by means of photographs produced in rapid succession in light of two or more artificially produced colours or qualities. In such methods a series of consecutive negative photographs is prepared of an object or objects on a panchromatic film, successive pictures being produced on the film by means of light which has passed through screens or light filters of different colours or qualities. The negative thus produced is used for the preparation of a positive film which carries a corresponding series of pictures. The positive series of pictures is then exhibited in a cinematographic projection apparatus in such a way that each individual picture is projected on to the screen with the aid of a beam of light of approximately the same colour or quality as that used in the production of the corresponding negative picture. The approximate correspondence between the colour of light used in the production of any particular negative picture and that used in the projection on to the lantern screen or otherwise of the corresponding positive picture is thus a feature of the methods of colour cinematography above referred to. 35 40 45

We have discovered that this approximate correspondence between the colours of the screens used in the production of the negative pictures and those used in the exhibition of the positive pictures is not necessary, and that the cinematographic representation of moving objects may be satisfactorily effected in a novel manner as about to be described. 50

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A panchromatic film very sensitive to the orange red and infra-red region of the visual spectrum is used as the negative film in a cinematograph camera. Alternate exposures after successive small intervals of time are made on this film in the manner ordinarily practised in cinematographic photography, through an orange-red screen and in ordinary white light, that is without the interposition of any coloured screen at all. A positive film is then prepared from the negative film after development in the usual manner and in the exhibition of the positive film those individual pictures which were ordinarily produced from the negatives exposed in the orange-red light are projected in red coloured light and those pictures which were produced from the negatives originally exposed in white light or without the interposition of a coloured screen are projected in green light.

Similarly by taking a series of negative pictures in sets of three through an orange-red screen, a blue screen and in white light, and projecting the positive film prepared from such a negative film or record with the aid of red, blue and green light respectively a close imitation of the original colours of the object or objects to be reproduced may be obtained on the lantern screen.

In carrying out this part of the present invention we do not limit ourselves to the use of the colours which have been named in the illustrative examples given above, but we may use any one, two, or more colours in conjunction with white or approximately white light for the production of the series of negative pictures composing the entire negative film, and we may use any one, two or more colours in the projection of the positive film from the above described negative film, provided always that in the case of the projection of the positive film, each of the positive pictures produced from negative pictures taken in white or approximately white light, are exhibited in colored light, whilst the other pictures are projected in light of the same or approximately the same colours or qualities as those respectively used in the production of the original negative.

According to another part of the invention we take two or more pictures simultaneously on one film disposed adjacent and consecutively to each other. The film is then moved through a distance equal to the space occupied by the number of pictures taken simultaneously. Each picture is adapted to be taken through a corresponding colour filter. The images of a positive record prepared from the resulting film may be projected on to a screen through one lens in succession or all the images may be projected through two or more lenses corresponding to the number of lenses employed when taking the pictures. In any case colour filters should be used corresponding in colour to the respective filters through which the pictures were taken.

The methods described with reference to the first part of the invention can be applied in conjunction with a method in which the pictures are taken two or more at a time on the film as described in relation to the second part of the invention, by employing one colour screen and approximately white light, or two or more colour screens and white light for taking the respective pictures of each set of simultaneous pictures, according to the number of pictures taken simultaneously, and projecting the positive pictures with the aid of transparent colour screens, using a coloured screen (for example green) for those pictures which were taken with white light.

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

1. The method of producing the cinematographic negative records which consists in taking successive pictures through an orange-red or other coloured transparent screen and in white light, substantially as described.
2. The photographic printing of a positive cinematographic record in monochrome from a negative record produced as in Claim 1, and the exhibition of

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the positive record with the aid of transparent colour screens, substantially as described.

3. The method of producing cinematographic negative records, which consists in taking consecutive pictures through transparent screens of two or more colours and in white light alternately substantially as described. 5

4. The photographic printing of a positive cinematographic record in monochrome from a negative record produced as in Claim 3, and the exhibition of the positive record with the aid of transparent coloured screens, substantially as described.

5. In the production of a negative cinematograph record, the taking of the pictures two or more simultaneously in consecutive order on the film through corresponding colour filters at each interval between film shifts which feed the film a distance equal to the space occupied by the number of pictures taken simultaneously and the projection of the pictures of a corresponding positive record with the aid of colour filters through one lens in succession or through a number of lenses corresponding to that of the lenses used in taking the negative pictures substantially as described. 10 15

6. The application of the method specified in Claim 5 in conjunction with methods as specified in Claims 1 to 4.

Dated this 26th. day of August, 1912. 20

MEWBURN, ELLIS & PRYOR,
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Reference has been directed, in pursuance of Section 7, Sub-section 4, of the Patents and Designs Act, 1907, to Specification No. 1642 of 1911 and in pursuance of Section 8, Sub-section 2, to Specification No. 1900 of 1912. 25