PATENT SPECIFICATION

629,266

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Index at acceptance:—Classes 75(iv), C8h2; and 97(i), Z6.

PROVISIONAL SPECIFICATION

Improvements in Colour Filters and Projection Apparatus for Using such Filters

I, JAMES ELDRED SKEWES, of 63, Aberdare Gardens, Hampstead, London, N.W.6, a subject of the King of Great Britain, do hereby declare the nature of this invention to be as follows:—

The well known methods of controlling the intensity of electrical stage lighting units by means of variable resistance or variable reactance apparatus in order to obtain changes of colour and other desired effects can be applied only to certain types of illuminant, for example incandescent filament lamps.

These methods of control cannot be applied easily to such illuminants as carbon arc lamps or fluorescent discharge tubes, and it is with this latter form of illuminant that this invention is particularly concerned since it will render possible the application of discharge lighting to the illumination of theatrical stages and the like.

This invention relates to a system of colour lighting control which can be employed in conjunction with any type of light source and in which the source of light itself can be allowed to remain at its full brightness.

One feature of this invention is that it will facilitate the delicate and precise adjustment of colour lighting effects without employing heavy high voltage currents at the control panel, which panel could therefore be situated in a convenient position for viewing the stage, for example in any part of the auditorium.

A further feature of this invention is that with the use of a small number of colour filters, a larger variety of colour effects can be obtained compared to that obtained by the electrical dimming of circuits, because this invention overcomes a disadvantage of the electrical dimming method due to the fact that incandescent filament lamps, when they are dimmed, radiate light which is deficient in the shorter wavelengths corresponding to the blue and green parts of the spectrum; therefore the true colour of some filters is lost when the lamps are dimmed and this handicaps efficient colour mixing and blending.

One form of this invention deals with apparatus consisting of a light source with or without an optical reflecting and condensing system and with which is incorporated a magazine of colour filters so arranged that the whole of the light falling upon the stage passes through these filters. Means are provided to move independently each of these filters into a number of different positions in relation to one another and in relation to the beam of light passing through them.

Each filter is of sufficient width to cover the aperture of the beam of light and is constructed of glass, gelatine, plastic or other suitable transparent or translucent coloured medium.

One end of the filter is completely colourless over an area corresponding to the aperture of the beam, the opposite end of the filter is completely coloured over a like area. The remaining portion of the filter between these two areas is partly colourless and partly coloured in such a manner that the proportion of coloured area to colourless area progressively increases from the colourless end to the completely coloured end.

This progressive increase in coloured area and corresponding decrease in colourless area from one end to the other can be in the form of a straight line, but a logarithmic or exponential curve will provide more satisfactory colour mixing and blending.

If, therefore, a filter as described be placed so that the colourless area first intercepts the beam of white light, and the filter be then moved through its length, then the beam, after passing through the filter, will at first be tinged

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with a pale shade of the colour, which will progressively increase until full colour saturation is obtained when the filter has travelled its full length.

In order to obtain an even tint of mixture of colours in the transmitted beam of light falling upon the stage, it is preferable to construct the filters so that the progressively increasing coloured areas are in the form of several narrow strips approximately parallel to one another. The filters can, of course, be of any desired colour, and can be used singly or in any desired combination of colours, but in particular if three filters as described be placed so that they superpose one another in the same beam of light, and if one filter be coloured the complementary colour of red, i.e. blue-green, and if the second filter be coloured the complementary colour of green, i.e. magenta, and if the third filter be coloured the complementary colour of blue, i.e. yellow, then according to well known principles of subtractive colour mixing any desired colour or paler shade of a colour can be obtained by adjusting the positions of the filters relative to one another and relative to the beam of originally white light passing through them.

In order to economise space it may be desirable in some instances to bend the filters into a curved form, for example, a disc or a cylinder.

Filters as described can be built into a lighting unit as an integral part of the whole unit, alternatively they can be incorporated into a frame or other device of suitable size and shape to be fitted on to an existing lighting unit such as a spotlight, flood lantern or compartment batten.

Any method of direct or remote control can be employed to move the filters, but in particular the invention permits the employment of mechanical methods or electrical methods making use of small currents such as would not be objectionable in a control panel situated in the auditorium of a theatre.

Dated the 10th day of August, 1946.
JAMES ELDRED SKEWES.

COMPLETE SPECIFICATION

Improvements in Colour Filters and Projection Apparatus for Using such Filters

I, JAMES ELDRED SKEWES, British subject, of 63, Aberdare Gardens, London, N.W.6, 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 filters and to apparatus for using such filters in effecting colour projection; while the invention is concerned with colour projection in general, it is especially concerned with colour projection for the illumination with different colour effects of theatrical stages and the like.

At the present time variation in colour effects is commonly obtained by variation of the intensity of illumination of electrical stage lighting units as by variable resistances or reactances. Such a control imposes a limitation on the type of illuminant which can be employed and is not suitable for employing carbon arc lamps or fluorescent discharge tubes; it also involves the use of high voltage control current which limits the positioning of a control panel; it also limits to some degree the true colour value of some filters due to the fact that, the illuminant usually employed being an incandescent filament lamp, such lamps on being dimmed radiate light which is deficient in the shorter wave lengths corresponding to the blue and green parts of the spectrum.

Now the object of this invention is to provide a filter which is capable of being used with a source of illumination of fixed intensity to avoid the defects consequent upon requiring variation of the intensity of illumination.

A further object of this invention is to provide a colour filter which can be used not only with any type of illuminant but also with illuminants of the carbon arc-lamp type and the discharge tube type.

According to the present invention a colour filter is formed by a support which is intended to be moved past a source of light and this support is formed with a number of filter strips having a constant specific spectral colour-absorption value and with a number of non-filter strips which intercalate the filter strips, and the width of the filter strips decreases continuously in the intended sense of movement of the support from a maximum to a minimum with a corresponding increase

of the non-filter strips from a minimum to a maximum.

The strips would be so dimensioned in reference to the projection aperture with which the filter is to be used that at any position a number of the strips would register with the opening so that depending on the position to which the support is moved, the filter effect, represented by a summation of the filter and non-filter areas in register at the time with the aperture, can be varied continuously.

It is preferred to provide the support with areas which are total filter areas and total non-filter areas and these areas are spaced apart in the intended sense of movement and the filter and non-filter strips extend between these spaced areas.

The variation of filter and non-filter areas can follow any desired law, i.e. it can follow a linear law, a logarithmic law or an exponential law.

A number of such filters, in different colours, can be employed in combination so enabling an extremely wide range of colour mixing and blending to be obtained especially when the filters are used in conjunction with a carbon arc lamp or a discharge tube.

Reference will now be made to the accompanying drawings, in which Figures 1—3 are views of filters of different form but all embodying the colour filter gradation of this invention while Figures 4—7 illustrate a convenient form of apparatus which may be employed to use the colour filter shown in Figure 2, Figure 4 being a longitudinal section, Figure 5 a plan, Figure 6 an end elevation and Figure 7 a detail elevation.

Referring firstly to Figures 1—3, in each of these figures the colour filter areas are indicated by the stippled areas 1 and the non-filter areas by the unstippled areas 2.

In Figure 1 the filter support is of rectangular form and the filter areas 1 which have a constant spectral colour-absorption value extend as triangular strips from a maximum filter area 3 at one end of the support while the non-filter areas 2 extend out as triangular strips intercalating the strips of filter area from a maximum non-filter area 4 at the other end of the filter. The filter is intended to be moved in the direction of the arrow A across a projection aperture shown diagrammatically at B so that in the different positions of the filter the area covered by it may have zero filter effect when the area 4 registers with the aperture, maximum filter effect when the area 3 registers with the aperture, and between these two extremes varying ratio of areas 1 and 2 and hence a corresponding variation of filter effect.

Clearly at any position of the support between its extreme position in which the tongues 2, 3 register with the projection aperture B a number of the tongues cover the projection area and the total filter effect depends on the summation of the area of the tongue 1 in that position at any time: due to the triangular formation of the tongues, the ratio of the width of the tongues 1 and 2 varies continuously along the length of the support and hence movement of the support will effect a continuous change in the filtering effect from a maximum at one end to a minimum at the other.

In Figure 2 the filter and non-filter strips 1, 2 are of curved form on a disc which is mounted to be adjusted about its centre about which the strips are curved, the filter and non-filter strips being as in Figure 1 respectively of increasing and decreasing width and extending from a maximum filter area 3 to a maximum non-filter area 4.

In Figure 3 the same general form of intercalated strips of increasing and decreasing filter and non-filter areas is used but in this case the strips are formed on a colour filter which is of cylindrical form to be adjusted about the axis of the cylinder.

Referring now to Figures 4—7 which are intended to employ the disc form of filter shown in Figure 2, three such filters 5, 6, 7 of different colours are employed. The filters are supported one in front of the other in a casing 8 having a lighthouse 9 and a projection aperture 9^1, the discs being so supported that their peripheral portions with the colour and non-colour areas register with the lighthouse and the aperture 9^1. The lamp 10 shown is for convenience of the conventional filament type but it is intended that this lamp shall be of any form. Any usual optical projection system can be employed to concentrate light from the lighthouse through the filter and thence to a screen.

The various discs 5, 6, 7, are arranged for independent rotation and this can as shown, be effected by securing the discs to supports 11 mounted one within the other and each having a pinion 12 in mesh with a gear 13 on one adjusting handle 14. The various handles 14 extend out through an enclosing casing 15 and have a pointer to move over a setting scale 16 on the casing, the scale indicating the degree of colour filtering which is given by the associated colour filter in its different positions.

It may in particular be noted that, when three filters are employed, if one

filter has a colour complementary to red (i.e. blue-green), the second has a colour complementary to green (i.e. magenta) and the third be coloured complementary to blue (i.e. yellow) then, according to the well known principles of colour mixing, any desired colour or pale shade of a colour can be obtained by adjusting the filters with respect to one another across a beam of white light.

The filter support can be constructed of any convenient transparent or translucent material e.g. glass, gelatine or a plastic.

The apparatus to employ the filters can be built into a lighting unit or it can be fitted as a unit in itself, to an existing lighting unit. The arrangement shown in figures 4—7 employs direct hand control of the filters but obviously a remote control system could be used and such remote control could be either mechanical or electrical for in the latter case only low electrical power would be required so that there would be no danger in having the control panel located in the auditorium.

It has been proposed for a vehicle headlamp or for similar lamps, a cover having plain glass and yellow glass, the yellow glass extending from a segment down in the form of strips which are parallel with one another. These strips were spaced apart to leave clear glass strips between them and the strips were terminated abruptly i.e. by a cut-off on a transverse line. The concern of this proposal was to afford a beam of " white " light and of coloured light in a fixed ratio: it was not concerned with moving a filter to effect variation of the ratio of filtered and non-filtered light.

The present invention on the other hand is not concerned with producing a fixed ratio of filtered and unfiltered light, but with the production of light in which the ratio can be smoothly varied as is required for example for varying colour effects in stage lighting for which purpose the cover of the proposal referred to would be more or less useless since it was not intended to be used as a movable filter and even if so used would not give the results obtained by the filter of this invention.

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. A colour filter constituted by a support which is intended to be moved past a source of light and which is formed with a number of filter strips having a constant specific spectral colour-absorption value and with a number of non-filter strips which intercalate the filter strips, the width of the filter strips decreasing continuously in the intended sense of movement of the support from a maximum to a minimum with a corresponding increase in width of the non-filter strips from a minimum to a maximum.

2. A colour filter as claimed in claim 1 and wherein the support is formed also with total filter and total non-filter areas which are spaced apart in the intended sense of movement of the support, the strips extending between these areas with the maximum width of each filter strip merging to the total filter area.

3. Apparatus comprising a light projector and a colour filter as claimed in either of the preceding claims or a series of such filters having respectively filter areas of different colours, the said apparatus including means to move the filter or each filter independently across the light projected by the apparatus.

4. Apparatus as claimed in claim 3 and adapted to employ one or more colour filters of disc form, the said apparatus including means to support the disc or each disc for rotation to carry the disc with its filter and non-filter areas progressively past the light projected.

5. A colour filter substantially as described with reference to any one of figures 1—3 of the accompanying drawings.

6. Apparatus employing a filter substantially as described with reference to Figures 1—3.

7. A projection apparatus substantially as described with reference to Figures 4—7.

Dated this 10th day of September, 1947.

R. F. COWLING,
Chartered Patent Agent,
Bank Chambers,
329, High Holborn, London, W.C.1.

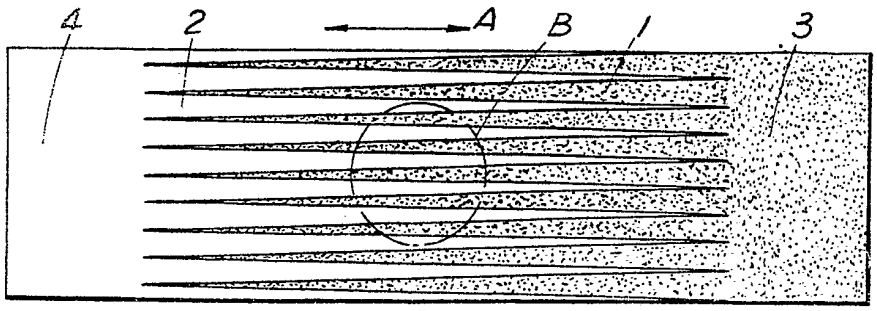


FIG. 1.

FIG. 2.

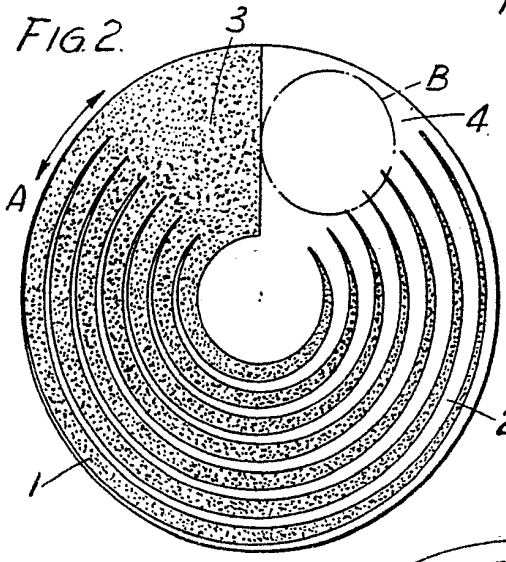


FIG. 3.

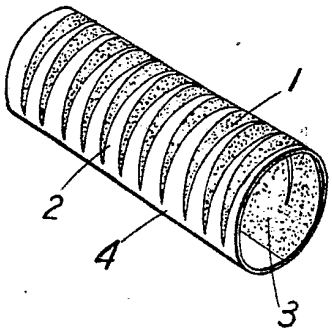
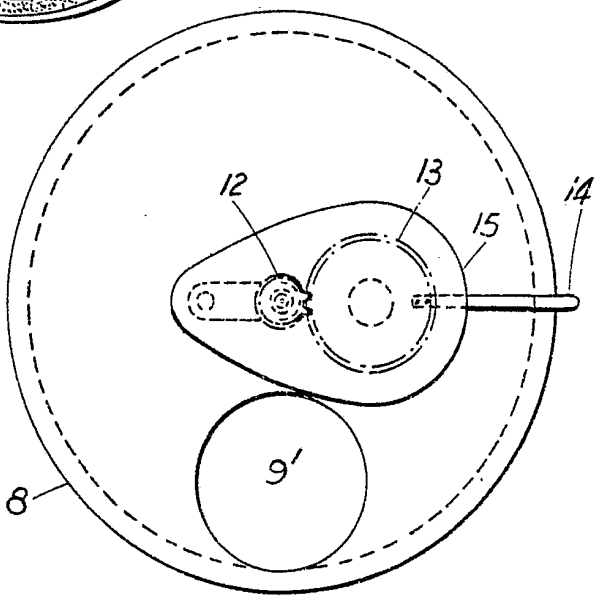


FIG. 6.



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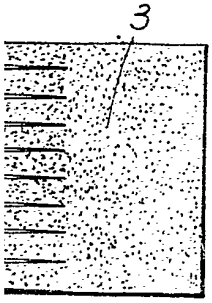
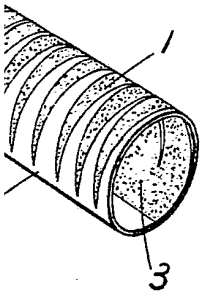


FIG. 3.



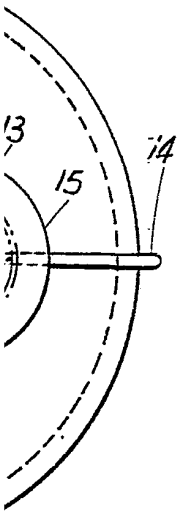


FIG. 4.

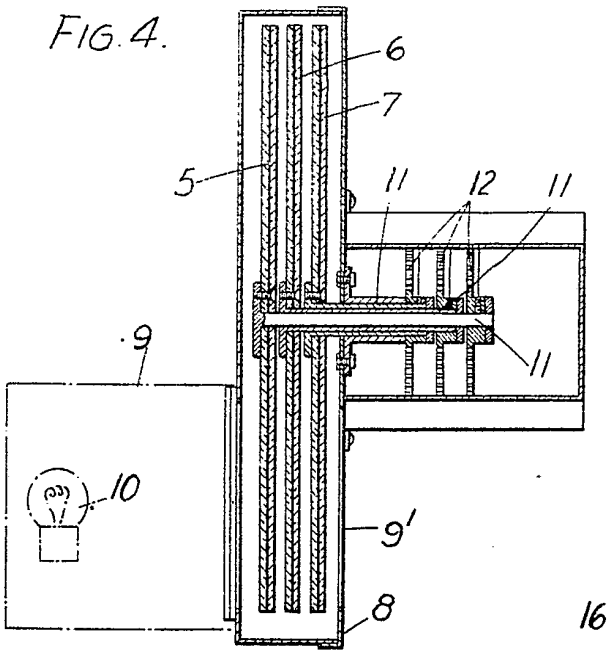


FIG. 7.

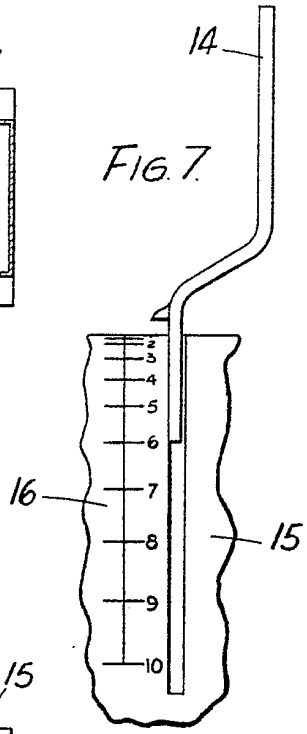
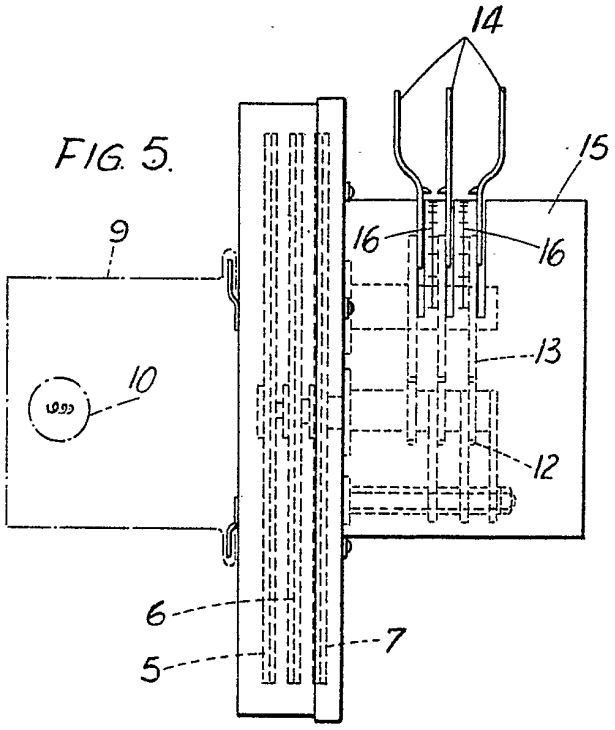


FIG. 5.



629,266 COMPLETE SPECIFICATION

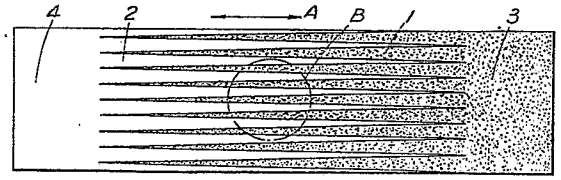


FIG. 1.

FIG. 2.

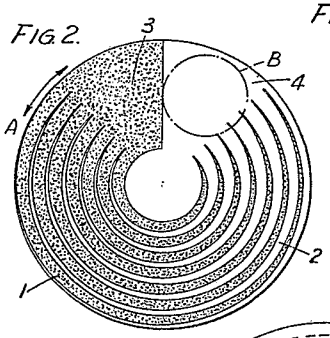


FIG. 3.

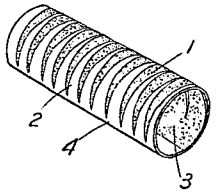
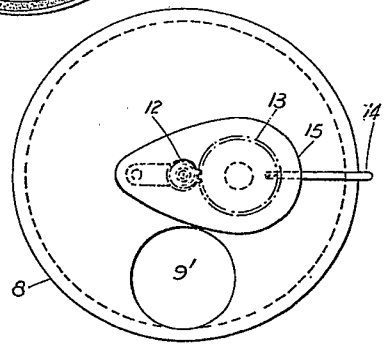


FIG. 6.



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

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FIG. 4.

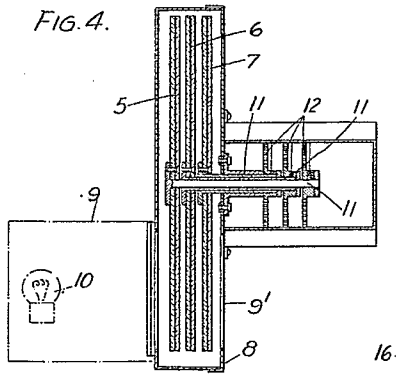


FIG. 7.

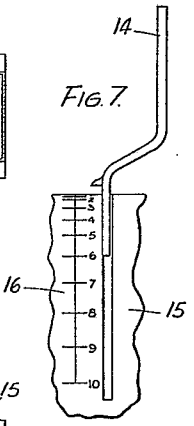
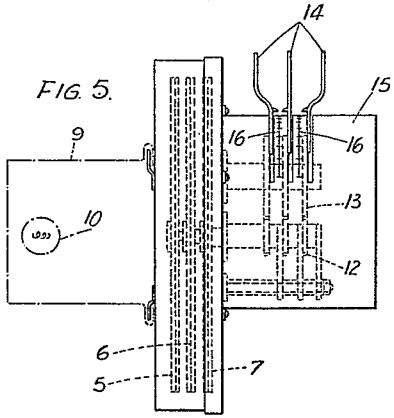


FIG. 5.



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