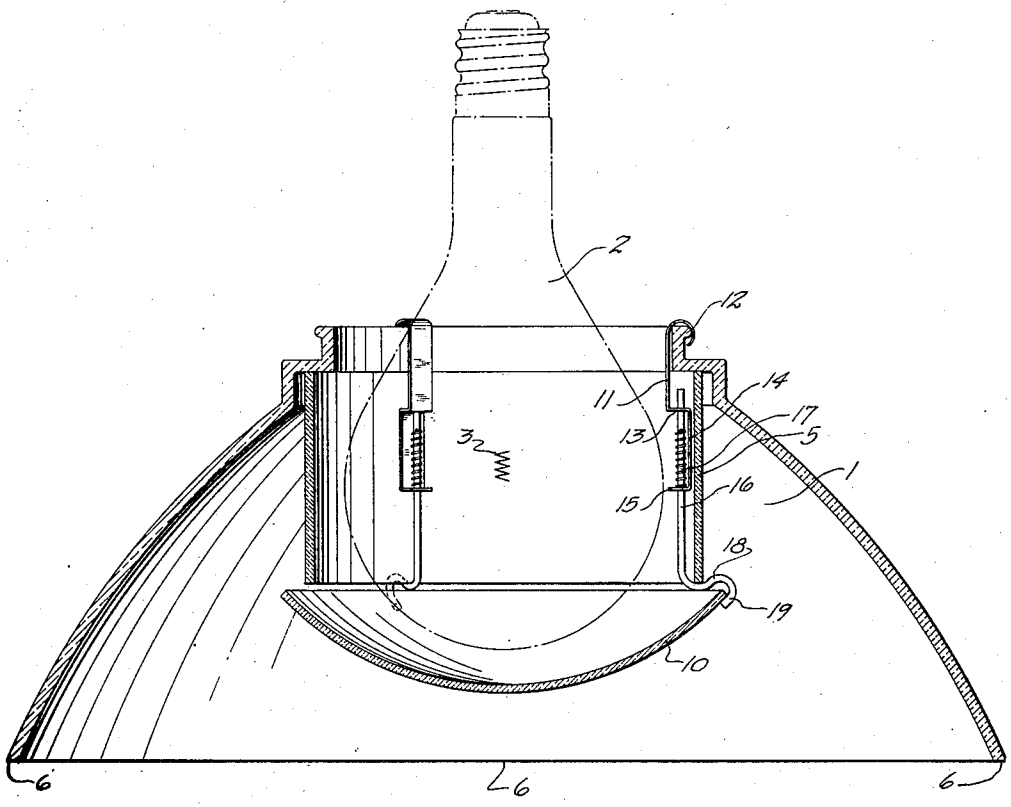
Sept. 29, 1931. A. HOPKIN, JR 1,824,894

COLOR SCREEN FOR REFLECTORS

Filed July 16, 1928




INVENTOR.
Alfred Hopkin, Jr.
BY
Erwin, Wheeler & Woolard
ATTORNEYS

Patented Sept. 29, 1931 1,824,894

# UNITED STATES PATENT OFFICE

ALFRED HOPKIN, JR., OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO PITTSBURGH REFLECTOR COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

## COLOR SCREEN FOR REFLECTORS

Application filed July 16, 1928. Serial No. 293,115.

This invention relates to improvements in color screens for reflectors.

It is an object of the invention to completely differentiate in color the beam projected from a reflector and the direct or spilled light which is unreflected.

I am aware of the fact that attempts have heretofore been made to control the color of light rays in such a way as to color differently the rays issuing at different angles from a single source. There are advantages, however, in so designing the color screening structure as to differentiate more or less exactly between direct and reflected light. These advantages are particularly apparent when the screen is used in connection with a substantially parabolic reflector such as is used indoors as a spot-light for illuminating a particular object or area in a show-window and such as is used out of doors for the flood-lighting of tall buildings. It is possible by means of this invention to illuminate the nearby lower portions of a building with the spilled or direct light of one color and to illuminate the top of the building with a shaft or beam of light of a different color, all from the same lamp source. It is also possible to produce in a show-window a diffused direct light of one color and a spot or beam of a different color, all from a single source. To accomplish these results simply and directly and with inexpensive but effective screens, is one of the purposes of this invention.

Further objects of the invention contemplate the provision of a color screen device mounted upon the reflector itself rather than the lamp so as to permit adjustment of the lamp for focusing without affecting the light-tight relation of the screen to the reflector; the provision of a two part color screen so designed and mounted as to facilitate lamp replacement by an arrangement such that the outer portion of the screen is independently removable and gives adequate access to the lamp; and finally the important provision of a color screen so designed as to permit of adequate air circulation for cooling.

Where lamp and reflector units are employed for flood lighting they may be arranged to project light upwardly, downwardly, or at some intermediate angle. Each light of the bank must be individually focused and directed. The heat developed by the bulbs in a few minutes operation is such as to blister the hands of an operator making the necessary adjustments in previously known constructions. It will be noted, however, that the present device is so designed that in any position of the reflector air will circulate through the large neck thereof and will necessarily pass between the bulb and the color screen in so doing. The slight overlap of the convex portion of the screen beyond and in spaced relation to the margin of the tubular portion thereof makes this circulation possible while preventing the escape of light.

The drawing shows in axial section a reflector of approximately parabolic contour equipped with screens embodying this invention, a lamp comprising a source of light being indicated in its proper relative position by means of broken lines.

The reflector 1 may be made to receive any desired light source such as the lamp indicated at 2. The drawing shows the lamp bulb so disposed within the reflector that its filament indicated at 3 will be approximately at the focus of the reflector to the end that the reflected rays of light from the lamp may be substantially parallel. It is not essential to this invention that the reflector be parabolic or that the rays issuing therefrom be parallel, since it is frequently desirable to have the rays converge or diverge to produce different effects. In referring herein to a beam of light, it is intended to specify merely the reflected rays irrespective of whether they are parallel or not, unless otherwise specified.

In accordance with this invention two separate color screens are employed, either one of which may be omitted or else made of colorless transparent material where it is desired that the color of the light emitted from the source at 3 should be unchanged. That screen shown at 5 comprises a tube of glass, celluloid, mica, quartz or other material which is light transmitting in the sense that it is either transparent or translucent. As above

indicated, the tubular screen 5 may be colored or clear according to the desired effect.

The particular diameter of the tubular screen 5 is unimportant, if it is not so large as to cut down the effective reflecting surface, but its relation of length to diameter is important in connection with the dimensions of the reflector with which the screen is used. It will be noted that the screen 5 is of such a length that it intercepts substantially exactly the light passing through source 3 to the reflector 1, and no other light. The particular reflector illustrated is a well known type made of glass of which the outer surface is silvered to provide a mirror having a circular outer margin in one plane. When used with such a reflector, the tubular screen 5 will be of such a length as to extend exactly to an imaginary cone described within the reflector from the margin 6 of the reflecting surface at the base of the cone to the filament 3 at its apex. This arrangement insures that screen 5 will act on all of the light to be reflected and upon none other. The screen 5 is seated in a shoulder in the reflector to insure against the escape of any uncolored light.

Screen 10 is so designed as to transmit substantially all of the direct or spilled light issuing from the source at 3 without affecting in any material degree any of the reflected light. To this end the dimensions of screen 10 are likewise such that irrespective of its position within the reflector, it will overlap the margin of tubular screen 5 and terminate substantially at the imaginary cone referred to above. The particular form of screen 10 which is illustrated is preferred, all parts of such screen being substantially equidistant from the light source so that there will be a minimum of refraction of light passing through the screen.

It will be found possible to use a variety of different means for fixing screens 5 and 10 in place within reflector 1. The mounting device illustrated comprises a hook 11 which engages over the reflector bead 12. The hook is offset at 13 and extends axially along the interior wall of screen 5 at 14 to a further offset at 15. The two offset portions of the hook are apertured and a rod 16 is slidable through the aligned apertures under the compression of spring 17.

The rod 16 is curved back upon itself at 18 for engagement with the outer peripheral margin of screen 5 and is reversely curved at 19 to engage the peripheral margin of screen 10. The device is thus adapted to maintain the screens in their proper relative positions, not only with respect to each other, but also with respect to the neck of reflector 1 toward which spring 17 clamps screen 5. It will be obvious that other forms of screen mounting devices may be used.

One of the important advantages of the structure illustrated is the fact that the screen 10 is readily removable for lamp replacement or adjustment without disturbing screen 5. Also the two screens are so spaced as to permit air circulation without making it possible for white light to escape. White light of full intensity will ruin the color effect desired if permitted to escape.

As an example of the utility of a device embodying this invention, attention is called to the fact that during the Christmas holiday season a green screen may be used at 10 and a red screen at 5 to produce from a single lamp source a green general illumination in a show-window and a red beam directed upon a particular object or set of objects within the window.

By way of further example, it is pointed out that a single lamp source may be used to illuminate the base of a building with direct light of one color, while the more distant summit may be illuminatel by a beam of light of a different color. Of course, in any case one of the two colors may be clear white light transmitted by an uncolored screen or transmitted through the space where such screen would be if it were used. Ordinarily it will be necessary to screen or otherwise reduce the intensity of uncolored light to avoid the possibility of subordinating the color.

I desire to make it clear, moreover, that in referring to the illumination of certain objects from a single lamp source, I do not mean to infer that only a single lamp and reflector may be employed within the contemplation of this invention. On the contrary, I refer merely to the production of two different types of colors of illumination segregated from each other in each individual unit and thereby distinguished from illumination which might be effected by lighting one object entirely from one source and another object or area entirely from a different source.

I claim:

1. The combination with a reflector, of a tubular screen and a concave screen therein, togethed with a clamp provided with a hook for engaging the reflector and reversely curved portions for engaging said screens.

2. The combination with a reflector having a lamp receiving opening in its neck, of a color screen applied to said reflector about the neck thereof, and comprising a lamp encircling annular portion and a closure portion, said color screen being formed to provide a marginal opening between said portions, in communication through said first mentioned portion with said neck, whereby air is adapted to circulate about a lamp within said reflector and color screen.

3. The combination with a reflector having an apertured neck, of an annular color screen element applied to the reflector about the neck, and a second color screen element mounted in spaced relation to said first element, whereby to permit air circulation

through said first element and said neck while intercepting substantially all useful light other than that intercepted by the first element.

4. In a device of the class described a light source, a reflector associated with said light source, a light transmitting means positioned to intercept substantially all light passing from said source to the reflector, a light transmitting screen within said reflector and spaced from said light transmittting means, said light transmitting means and transmitting screen being of different colors whereby to differentiate between the beam of light leaving the reflector and the light passing through the screen.

5. In a device of the class described a light source, a reflector associated with said light source, a light transmittting means positioned to intercept substantially all light passing from said source to the reflector, and a colored light transmitting screen within said reflector and spaced from said light transmitting means whereby to differentiate between the light leaving the reflector and the light passing through the screen.

6. In a device of the class described a light source, a reflector associated with said light source, a light transmitting means positioned to intercept substantially all light passing from said source to the reflector, a removable supported light transmitting screen within said reflector and spaced from said light transmitting means, said light transmittting means and transmitting screen being of different colors whereby to differentiate between the beam of light leaving the reflector and the light passing through the screen.

ALFRED HOPKIN, JR.