March 26, 1940. K. C. WELCH 2,194,841

REFLECTOR

Filed Dec. 21, 1938

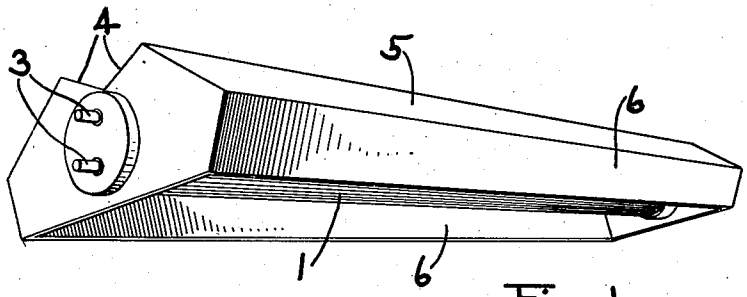

Fig. 1.

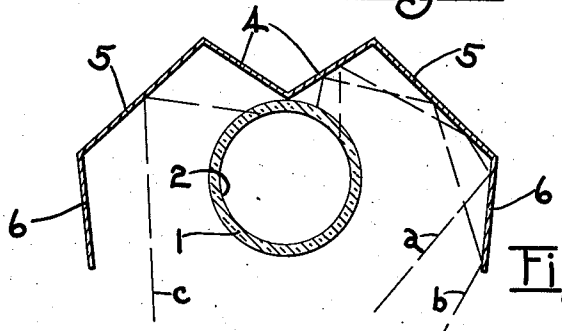

Fig. 2.

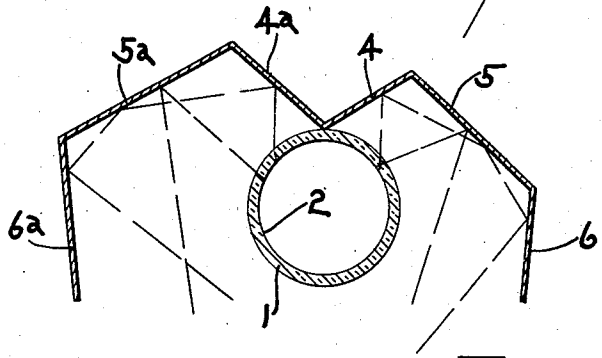

Fig. 3.

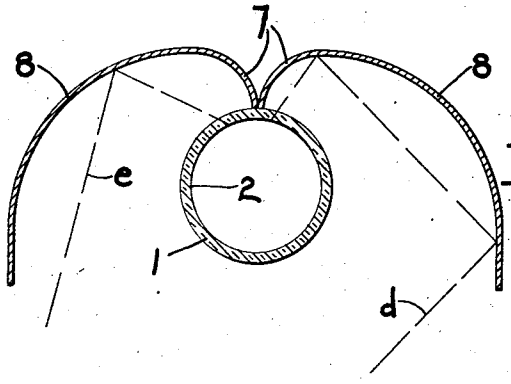

Fig. 4.

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REFLECTOR

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Application December 21, 1938, Serial No. 247,055

1 Claim. (Cl. 240—103)

This invention relates generally to reflectors which are adapted to reflect rays of light emanating from a light source and direct them to a more or less confined or restricted area, and is more particularly directed to a type of reflector which is especially adapted for use with a new form of light source known as the fluorescent type.

This fluorescent type of light, which in and of itself forms no part of the present invention, may be briefly described as consisting of a tube of transparent material which gives off a glowing light from the entire surface thereof due to certain chemicals, both solid and gaseous, contained within the tube. It is to be particularly noted that the actual source of light is the entire surface of the tube in contrast with the incandescent lamp wherein the light source is smaller as in a filament or wire. The fluorescent light has no filament, but the light is produced through the agency of invisible radiation acting on fluorescent powders with which the inside of the tube is coated. An electrode is provided at each end of the tube which sets up invisible waves of energy which become visible through the action of the fluorescent powder with which the inside of the tube is coated. The tube itself is filled with a gas or combination of gases, for example argon or mercury, in order to provide a medium through which the waves may pass. The color of the light produced is dependent upon the type of fluorescent powder used.

In distinguishing this type of light from the commonly known incandescent lamp, it is to be noted that the actual light source of such incandescent lamp is substantially a point, or at most a ball of light, formed by the filament or wire which is heated to a high degree of incandescence; while the source of light of the fluorescent type is actually every point on the inner surface of the illuminated tube.

It will be manifest that the fluorescent type of light source presents entirely new and different problems as far as the reflection of this light is concerned as compared with the reflection of light from a single point, line or comparatively concentrated source.

It is therefore the principal object of the present invention to provide a reflector which is particularly adapted to efficiently reflect light rays emanating from the inner surface of an elongated tubular light source.

Other objects and purposes of the invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claim.

The annexed drawing and following description set forth in detail certain means for carrying out my invention, said means constituting, however, but a few of the various ways in which the principle of my invention may be used.

In said annexed drawing, wherein like reference numerals refer to like parts throughout the various views:

Fig. 1 is a perspective view of the assembled fluorescent light source with one type of reflector.

Fig. 2 is a vertical section through the type of reflector and light source shown in Fig. 1.

Fig. 3 is a slightly modified form of reflector shown in Fig. 2, and

Fig. 4 is still another possible modified form of reflector, but utilizes the same principles.

Referring now more particularly to the drawing, one form which the fluorescent light source may take is denoted in Fig. 1 by way of illustration. It is to be understood that the particular reflector of this invention is to be applied to any type of light source which has its source of illumination on the inner surface of the enclosing tube or other transparent enclosure. It is conceivable that the enclosure may take forms other than the one here illustrated. Gases other than mercury or argon might be used and the waves of energy might be entirely invisible or partially visible. In any event my reflector is particularly adapted for use where the source of light emanates from a large area and is not centralized in any manner such as occurs in the incandescent lamp. The glass tube, which is shown in Fig. 1 as the source of light in this particular embodiment of the invention, is denoted by the numeral 1. The inner surface 2 thereof has a chemical coating for the purpose of rendering visible to the eyes the normally invisible waves set up by the electrodes 3, two of which are located at each end of the tube 1.

One of the preferred forms which the reflector for this type of light takes is shown in Fig. 2 and is provided at substantially the center thereof with a V-shaped portion having upwardly diverging sides 4. Extending outwardly and downwardly from the outer longitudinal edges of each side 4 are additional portions 5, which not only intercept some of the rays reflected from the upwardly extending sides 4 of the V-shaped portion and direct them downwardly, but also directly reflect some of the light received directly from the light source. The outer longitudinal

edges of the additional portions 5 have depending portions 6 extending downwardly therefrom which also not only pick up and reflect some of the rays reflected outwardly from the inner surfaces of the additional portions 5, but also reflect rays received directly from the light source and from the sides 4.

It is to be noted that in the fluorescent type of light source there is an emanation of light rays in every direction from each point along the inner surface 2 of the tube 1 through the transparent enclosure. Some of these light rays will emanate upwardly and will be picked up by the reflecting surface of the sides 4 of the V-shaped portion and will be reflected outwardly to be intercepted by the reflecting surface of the additional portions 5 and will then be further reflected by the reflecting surface of the depending portions 6, such as is donated by the broken lines *a* and *b* in Fig. 2. It will also be evident that some of the rays emanating from the light source will go directly to the additional portions 5 and from there be reflected downwardly as shown by the broken line *c* in Fig. 2. Still other light rays, not shown, may emanate outwardly and be picked up directly by the reflecting surface of the depending portion 6 and from thence be directed downwardly.

It will therefore be seen by this construction that all of the light rays which would ordinarily emanate upwardly or outwardly, are picked up by the various reflecting surfaces and directed downwardly to thereby intensify the light which normally emanates in a downward direction.

It will be evident that in certain instances it may be desirable to reflect the light in such a way that it will not be concentrated evenly, or it may be desirable to concentrate the light more on one side than the other of the surface which is to be illuminated. When a situation of this type occurs, one side of the reflector need not be symmetrical with the other side. An illustration of this type of reflector is shown in Fig. 3. One side is comprised of the usual reflecting sides 4, 5 and 6, such as has been explained with regard to Fig. 2. The opposite side of the reflector, however, will be provided with a side 4*a* of the centrally located V-shaped portion, which may be either shorter or longer than the side 4. Extending from the outer longitudinal edge of the side 4*a* is a portion 5*a* and depending from the longitudinal edge of the portion 5*a* is still another portion 6*a*. It is to be noted that the general configuration of the entire reflector is similar to the symmetrical one shown in Fig. 2, but the lengths of the different corresponding reflecting surfaces have been somewhat varied in order to obtain a slightly different distribution of light.

Still another form which my invention may take is clearly shown in Fig. 4, which form, instead of having a plurality of definite sides as reflecting surfaces, is provided with a continuously curved surface. This type of reflector may be more useful in certain instances than those above described, because it will pick up and reflect practically every ray of light emanating upwardly from the upper portion of the tubular light source 1. In this form of reflector it is provided at substantially its center with a V-shaped portion which has outwardly diverging curved portions 7. These portions continue to curve outwardly and then downwardly to form the two sides of the reflector 8, and the light rays will be reflected from the upper portion of the light source in a manner shown by the broken lines *d* and *e* in Fig. 4.

Although it is possible to place any of these forms of reflectors so that the bottom of the V-shaped portion will be spaced from the outer surface of the tubular member 1, experiment has proven that if this were to be done certain shadows will result and the efficiency of the reflector will also be decreased. It is therefore necessary, for the purpose of obtaining maximum efficiency and to permit some utilization of all the rays of light emanating from the light source through 360°, that the lower longitudinal edge of the V-shaped portion in each case come as close as possible to the outer surface of the tubular member 1. This line of divergence of the V-shaped portion may either be slightly spaced from the light source or may actually contact the outer surface of the light source forming a line contact therewith and when this is done the only light actually lost will be that portion which emanates upwardly the width of the line which forms the contact between the outer surface of the tubular member 1 and the lower longitudinal edge of the V-shaped portion.

It may be interesting to note here that I have found that the designing of a reflector for the fluorescent type of light requires a reverse procedure from that necessary to design a reflector for use with an incandescent lamp. That is to say, it is necessary to first determine the amount of light desired on a given surface and from this point work back to the light source to determine the type of reflector necessary to obtain the desired amount of light at the particular point desired.

From the above explanation it will be seen that I have been able to construct a type of reflector which is particularly adapted for use with the new fluorescent type of light, which type has presented, due to its peculiar characteristics, many problems not heretofore encountered with the incandescent lamp.

Other modes of carrying out my invention may be used instead of the several here explained, change being made as regards the construction here used, provided, however, that the means stated by the following claim or the equivalent of such stated means be employed.

I, therefore, particularly point out and distinctly claim as my invention:

The combination with an elongated fluorescent light source, of a reflector therefor adapted to direct the light rays therefrom downwardly and confine them to a restricted area comprising, a member extending longitudinally of said light source having the cross section thereof substantially V-shaped with its lower edge in contact with said light source, and other members extending outwardly, downwardly and slightly inwardly from each upper edge of said first member and terminating in a plane below said light source.

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