July 15, 1947. W. GLASS 2,423,884

REFLECTOR SHIELD UNIT FOR GERMICIDAL LAMPS

Filed July 31, 1944 2 Sheets-Sheet 1

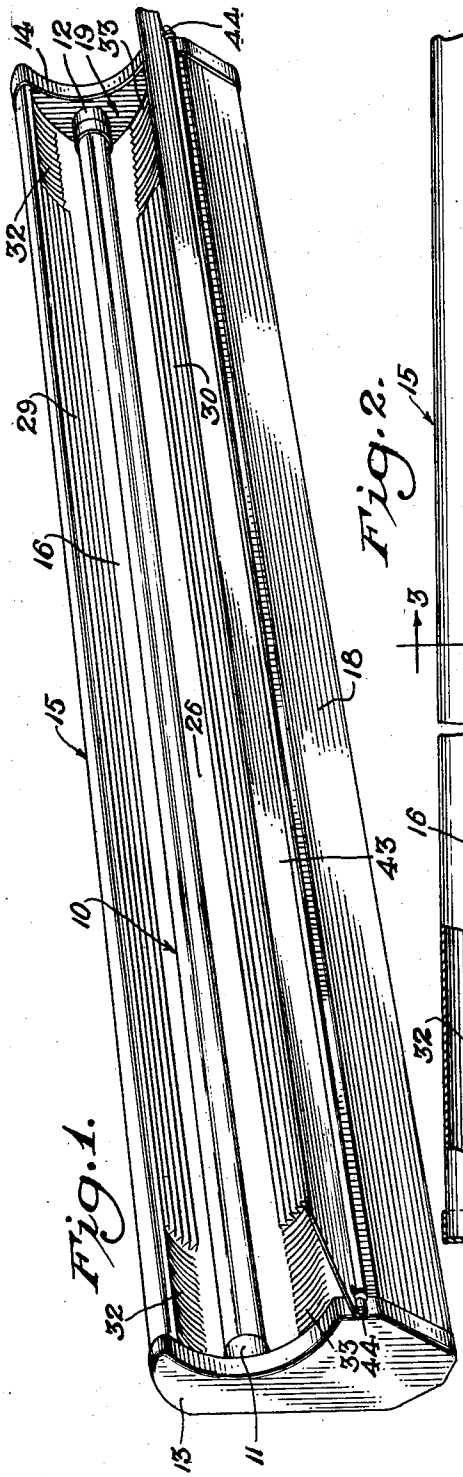


Fig. 1.

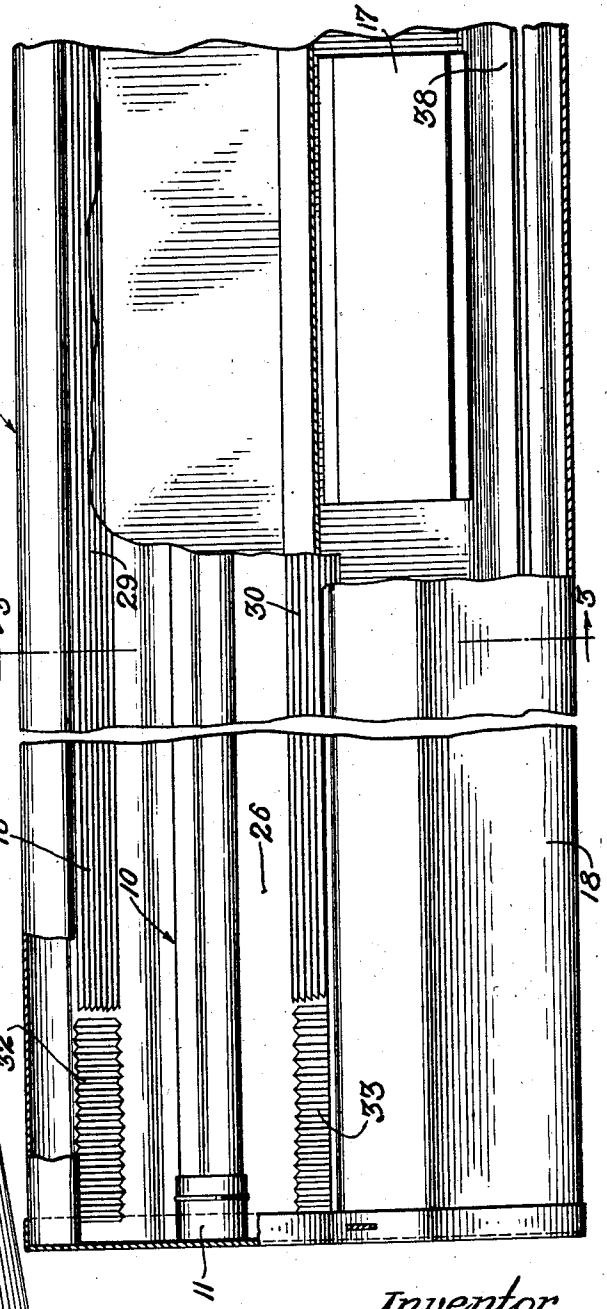


Fig. 2.

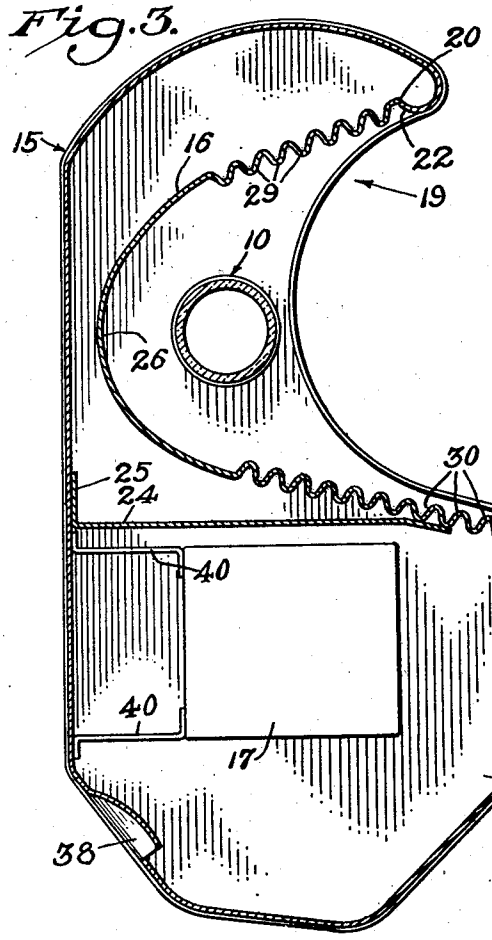
Inventor
Walter Glass
BY
Carlson, Pitzner, Hulbert & Wolfe
Attorneys.

July 15, 1947. W. GLASS 2,423,884

REFLECTOR SHIELD UNIT FOR GERMICIDAL LAMPS

Filed July 31, 1944 2 Sheets-Sheet 2

Fig. 3.



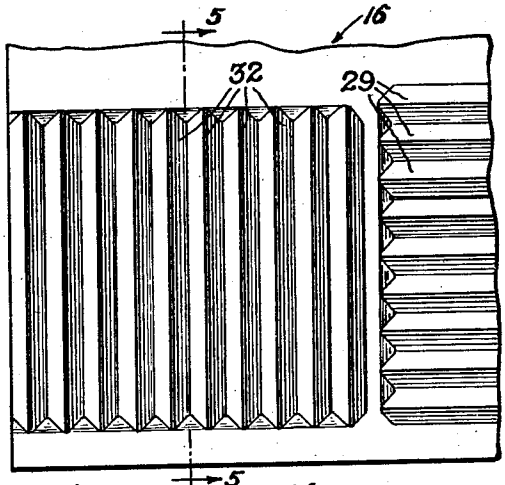


Fig. 4.

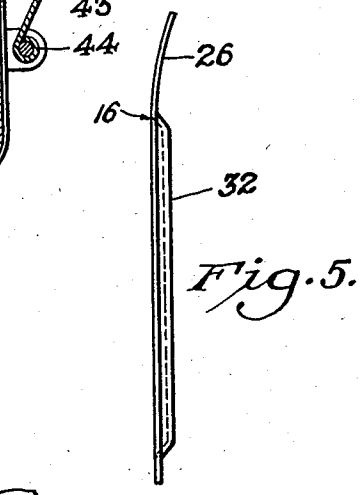
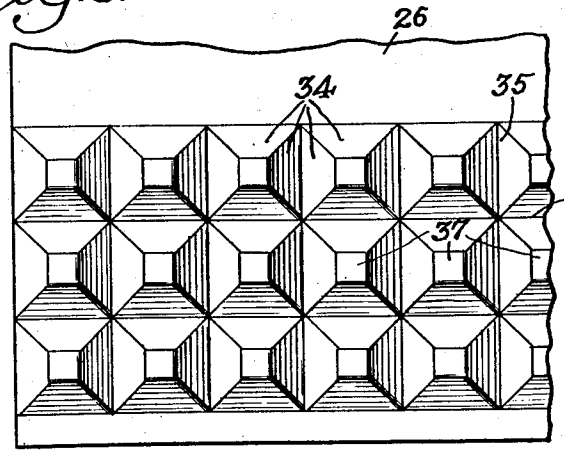


Fig. 5.

Fig. 6.



Inventor
Walter Glass
BY
Carlson, Pitzner, Hubbard & Wolfe
Attorneys

Patented July 15, 1947

2,423,884

UNITED STATES PATENT OFFICE

2,423,884

REFLECTOR SHIELD UNIT FOR GERMICIDAL LAMPS

Walter Glass, Northbrook, Ill.

Application July 31, 1944, Serial No. 547,503

4 Claims. (Cl. 240—1)

1

The present invention relates to reflector shield units or fixtures for germicidal lamps, its general aim being the provision of such a device for accomplishing not only the safe but efficient concentration of the lethal rays from such a lamp in a zone adjacent the latter for the destruction of air-borne bacteria.

More particularly, it is an object of the invention to provide such a germicidal lamp reflector shield unit for reflectively directing the rays of the lamp in a beam and embodying an arrangement bordering the main or central portion of the reflector shield for minimizing fringing and enhancing the concentration of rays by reflecting those falling on it back toward the main portion of the reflector and generally transversely of the beam axis.

Another object of the invention is to utilize the otherwise wasted heat generated in the ballast or the like used in the supply circuit for the lamp in inducing a flow of air through a zone of maximum concentration of lethal rays emanating from the lamp.

Further objects and advantages of the invention will become apparent as the following description proceeds, taken in connection with the accompanying drawings in which:

Figure 1 is a perspective view of a reflector shield unit for a germicidal lamp and which embodies a preferred form of the present invention.

Fig. 2 is a fragmentary front view of the structure shown in Fig. 1 with parts cut away to show certain features of the internal construction.

Fig. 3 is a transverse sectional view taken substantially along the line 3—3 in Fig. 2.

Fig. 4 is a fragmentary detail view, on an enlarged scale, of a portion of the reflector shield incorporated in the unit of Fig. 1.

Fig. 5 is a detail sectional view taken substantially along line 5—5 in Fig. 4.

Fig. 6 is a fragmentary view similar to that of Fig. 4 but showing a modified form of multiple surface reflector contour suitable for use on the border portions of the reflector shield.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and will herein describe in detail the preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

2

The unit or fixture herein disclosed is intended primarily for the reception of germicidal lamps which have been developed to emit ultraviolet energy or radiations of sufficient intensity to kill air-borne bacteria subjected to such radiations for a reasonably short period of time. Such lamps have a variety of fields of application in hospitals, schools, theatres, factories, offices, homes, etc., where communicable diseases may be spread by air-borne bacteria. Since ultraviolet energy is not itself useful for illuminating purposes and is, in fact, harmful in some respects to human beings, careful shielding of the lamps is necessary in order to expose the air in only unoccupied portions of a room or other space to the rays emanating from the lamp. The present invention is primarily concerned with the problem of not only effecting such shielding for safety purposes, but also the efficient concentration of the rays as well as the circulation of air through the zone of ray concentration in order that any air-borne bacteria present may be quickly killed.

Referring to the preferred embodiment of the invention shown in the accompanying drawings, the unit or fixture there illustrated is adapted to receive a germicidal lamp 10 of conventional tubular form and construction (Fig. 1). The unit includes a pair of sockets 11, 12 into which the usual end terminals (not shown) are inserted. These sockets are carried by flanged end plates 13, 14 fixed to the opposite ends of a sheet metal housing 15 of generally C-shaped cross-section (Fig. 3) having an open side 19. Inset within the housing 15 and fixed to the latter in position to face toward the open side 19 of the housing is a reflector shield 16 of novel form and construction.

The reflector shield 16 extends longitudinally of the lamp 10 and is of trough-shape, being curved transversely to partially surround or embrace the lamp on the side thereof opposite the housing opening 19. To secure the reflector shield 16 in place its upper edge 20 is welded or otherwise fixed to the adjacent inwardly curled edge 22 of the housing 15. A sheet metal partition 24 extending longitudinally throughout the length of the housing 15 and secured to the latter by attachment of an edge flange 25 to the housing underlies and supports the reflector shield 16. The material of which the reflector shield 16 is made should be impervious to, and highly reflective of, the ultraviolet rays, sheet aluminum being suitable for the purpose.

For projecting the rays from the lamp 10 in a dense bundle or beam through the housing open-

ing 19, the mid portion 26 of the reflector shield 16 is concave and preferably smooth. This smooth mid portion 26 of the reflector shield extends from end to end of the latter and lies behind the lamp 10, facing directly toward the housing opening 19. The curvature of the mid portion 26 and its spacing from the lamp are such that a beam of desired span is produced.

In order to create a zone of concentration of the rays at a point in the path of the beam closely adjacent the lamp 10, and to minimize fringing or dispersion at the edges of the beam, the upper and lower marginal edge portions of the reflector shield 16 are shaped to provide a multiplicity of reflecting surfaces facing inwardly generally toward the lamp. In the present instance (Figs. 1 to 4) such supplemental reflecting surfaces are provided by longitudinal corrugations or flutes 29 and 30 in the respective upper and lower edge portions of the reflector shield. To further enhance the concentration of rays, transverse corrugations or flutes 32 and 33 are provided in the reflector shield at opposite ends of the longitudinally corrugated portions. The beam-directing central reflecting surface 26 is thus bordered top and bottom by a multiplicity of reflecting surfaces angled to turn the rays falling thereon more or less transversely of the beam back into the central portion of the reflector to produce a maximum concentration of rays close in front of the lamp 10. Such an arrangement is substantially the opposite of that usually required in a reflector for an illuminating lamp.

In Fig. 6 is shown a modified form of multiple angled reflecting surfaces which may be fashioned in the border portions of the reflector shield 16 of Fig. 1 in lieu of the corrugations 29, 30 and 32, 33. In this modified arrangement a multiplicity of reflecting surfaces is provided by the side faces of a plurality of rows of truncated pyramid protuberances 37 fashioned in the sheet metal reflector shield and defined by a plurality of rows of double or transverse corrugations, such as 35 and 36, intersecting each other at right angles. Since the pyramidal shapes provide transversely disposed reflecting surfaces on each pyramid, the pattern may be continuous throughout the margins of the smooth central reflector portion 26.

To augment the normal circulation of air through the zone of maximum ray concentration, the otherwise wasted heat incident to the operation of a ballast 17 for the lamp 10 is utilized. For that purpose the ballast 17 is mounted on bracket legs 40 secured to the rear wall of the housing 15 so that the ballast is located beneath the partition 24 and above an air supply louver or opening 38 in the housing. Air entering the louver 38 is warmed by heat from the ballast and thus caused to rise, emerging from an opening 39 defined between the lower edge of the reflector shield 16 and the adjacent edge 23 of the housing 15. As the stream of air emerges from the opening 39 the overhanging lip or edge 23 of the housing directs it inwardly of the reflector shield so that it passes upward and inward adjacent the lamp 10 and into the zone of maximum ray concentration for the destruction of bacteria carried by the air.

As a further precaution against entry of the lethal rays from the lamp 10 into the occupancy zone of a room or the like where the fixture is mounted, a supplementary shield 43 may be provided. This shield comprises a rectangular portion of sheet metal pivoted at its lower corners at

44 on the housing end plates 13, 14 for vertical swinging adjustment. The friction of the pivots is sufficiently great to maintain the auxiliary shield 43 in a desired position of adjustment. When it is swung upward into position to partially block the beam emerging from the unit the rays which it intercepts are reflected back to the main reflector shield 16.

The unit or fixture shown may be installed in a room or other place of use by mounting the same at a suitable height, as for example on a wall of the room. The supplemental shield 43 is adjusted to a position suited to cutting off any rays that might otherwise pass to an adjacent occupancy zone in the room. Of course if the fixture is high enough, the auxiliary shield 43 may be swung down to completely clear the housing opening 19 or removed entirely. The lamp 10 is connected to a suitable source of alternating current through the use of conventional supply connections which are well-known, and consequently need not be detailed here. Normally the same include a so-called ballast or iron core choke coil which remains in series with the lamp throughout the latter's period of operation which has been indicated herein at 17. As heretofore explained, the otherwise wasted heat given off by this ballast is utilized in the present unit for augmenting the circulation of air into the zone of lethal rays emanating from the lamp. When the unit is installed as described, and the lamp 10 is in operation, the ultraviolet radiations or rays from the latter are directed outward through the housing opening 19 in a dense bundle or beam with a maximum concentration of such rays close in front of the lamp or, in other words, approximately at the opening or mouth of the unit. The air circulating in the room or other space passes through the beam of ultraviolet radiations so that the bacteria borne by this air are exposed to the radiations and quickly killed. In any room there is usually some convection circulation of air even though no fans or the like happen to be in use to induce a forced circulation. Such normal convection circulation is, however, rather slow and gentle and the unit herein disclosed serves to speed up the passage of air through the active zone for the ultraviolet radiations in the manner heretofore described.

I claim as my invention:

1. In a fixture for elongated tubular germicidal lamps, the combination of an elongated sheet metal housing closed at its ends and having a longitudinally extending opening in an upper side portion thereof, a trough-shaped reflector shield mounted in said housing to extend longitudinally of the latter in position to face toward said opening, the upper edge of said shield being in engagement with said housing and the lower edge being spaced from the edge of said housing defining the lower edge of said opening to provide an air exit passage therebetween, said shield having a central longitudinally extending portion presenting a smooth, highly reflective surface and the longitudinal marginal portions of said shield being configurated to present a multiplicity of reflective surfaces facing generally inward toward the central portion of said reflector shield, means for supporting a germicidal lamp in front of said shield for beaming of its rays by the latter out of said opening, a ballast for said lamp mounted in said housing beneath said shield, and said housing having a louver therein in the lower portion of its side wall opposite said opening for the admission of air,

whereby air entering said louver is warmed by heat generated by said ballast as a normal incident to its operation and upon being warmed rises to emerge through said exit passage into the zone of rays concentrated by said multiplicity of reflective surfaces.

2. In a fixture for elongated tubular germicidal lamps, the combination of an elongated sheet metal housing closed at its ends and having a longitudinally extending opening in an upper side portion thereof, a trough-shaped reflector shield mounted in said housing to extend longitudinally of the latter in position to face toward said opening, the upper edge of said shield being in engagement with said housing and the lower edge being spaced from the edge of said housing defining the lower edge of said opening to provide an air exit passage therebetween, means for supporting the lamp in front of said shield for beaming of its rays by the latter out of said opening, a ballast for said lamp mounted in said housing beneath said shield, and said housing having a louver therein in the lower portion of its side wall opposite said opening for the admission of air, whereby air entering said louver is warmed by heat generated by said ballast as a normal incident to its operation and upon being warmed rises to emerge through said exit passage into the path of rays emanating from said lamp.

3. In a fixture for germicidal lamps, the combination of transversely elongated housing and reflector elements, said housing element having an open side therein extending along the upper portion thereof, said reflector element being mounted in said housing element and covering said open side for beaming the rays from a lamp mounted in front of said reflector element, means in said housing element for mounting the lamp within the housing element and in front of said reflector element, said housing element having an elongated opening extending along the lower rear portion thereof, there being a second elongated opening communicating between the interior of said housing element and the front of the reflector element, and a ballast mounted in said housing element below said reflector element and above said elongated opening in the rear portion of said housing element, said ballast constituting a source of heat during the normal operation thereof in connection with the lamp for producing a thermally-induced flow of air through the housing element, whereby air entering the elongated opening in the rear portion of said housing element is warmed by heat generated by said ballast as a normal incident to its operation, said air, upon being warmed, emerging through the opening between the interior of said housing

element and the front of said reflector element forwardly of the lamp and into the path of rays emanating from said lamp and beamed by the reflector element.

4. In a fixture for elongated tubular germicidal lamps, the combination of an elongated sheet metal housing closed at its ends and having a longitudinally extending opening in an upper side portion thereof, a trough-shaped reflector shield mounted in said housing to extend longitudinally of the latter in position to face toward said opening, there being an air exit passage communicating between the interior of the housing and that side of said reflector shield which faces toward said opening, said reflector shield having a central longitudinally extending portion presenting a smooth, highly reflective surface and the longitudinal marginal portions of said shield being configurated to present a multiplicity of reflective surfaces facing generally inward toward the central portion of said reflector shield, means for supporting a germicidal lamp in front of said shield for beaming of its rays by the latter out of said opening, a ballast for said lamp mounted in said housing beneath said shield and beneath said air exit passage, and said housing having an air inlet opening therein beneath said ballast and beneath said air exit passage, whereby air entering said air inlet opening is warmed by heat generated by said ballast as a normal incident to its operation and upon being warmed rises to emerge through said air exit passage into the zone of rays concentrated by said multiplicity of reflecting surfaces.

WALTER GLASS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,016,474	Wood	Oct. 8, 1935
2,348,617	Furedy	May 9, 1944
1,993,147	Cathrill	Mar. 5, 1935
2,335,951	Mansell	Dec. 7, 1943
2,313,131	Elias	Mar. 9, 1943
2,313,983	Yost et al.	Mar. 16, 1943
2,339,010	Greenwald	Jan. 11, 1944
1,900,551	Guth	Mar. 7, 1933
1,621,312	Crandall	Mar. 15, 1927
2,381,450	Hrabak	Aug. 7, 1945
1,823,535	Frutlow	Feb. 15, 1931
1,281,754	Beck	Oct. 15, 1918
2,006,402	Maxson	July 2, 1935
2,338,077	Scribner	Dec. 28, 1943
2,350,664	Alexander	June 6, 1944