June 7, 1966 E. W. CHADWICK 3,255,345

LIGHT FIXTURE

Filed Sept. 3, 1963 2 Sheets-Sheet 1

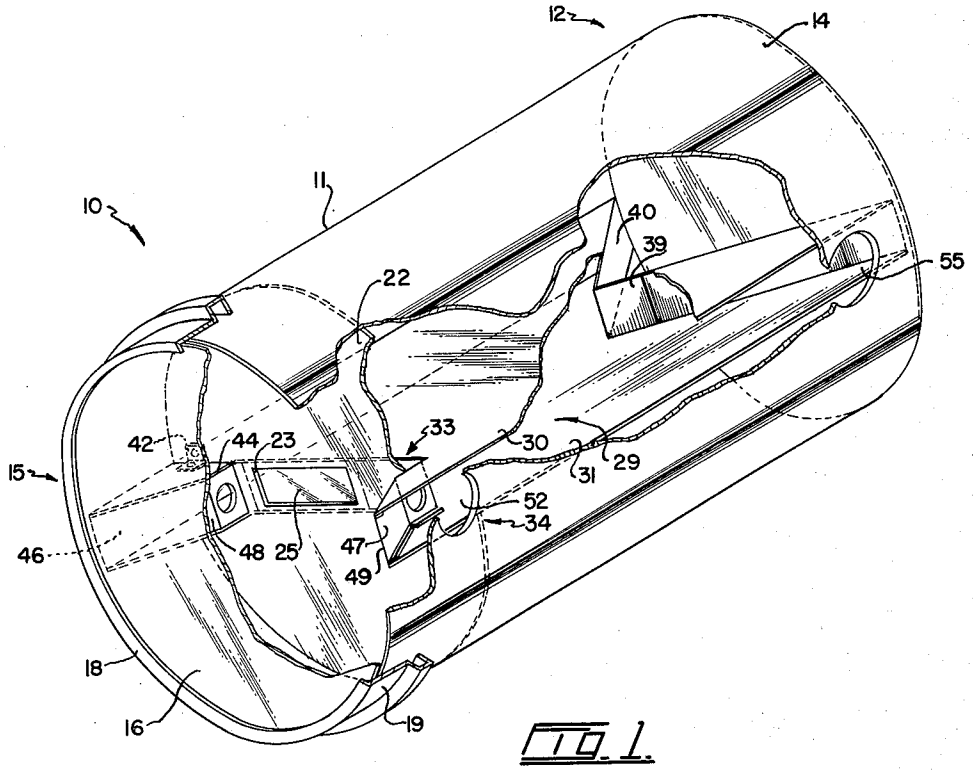


FIG. 1.

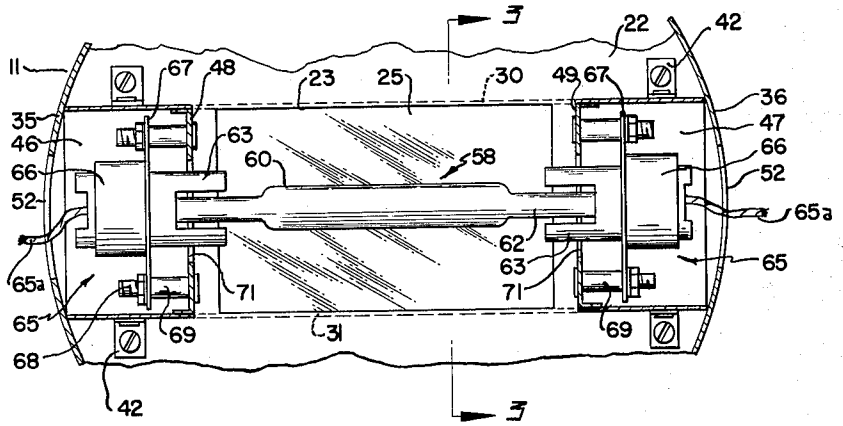


FIG. 2.

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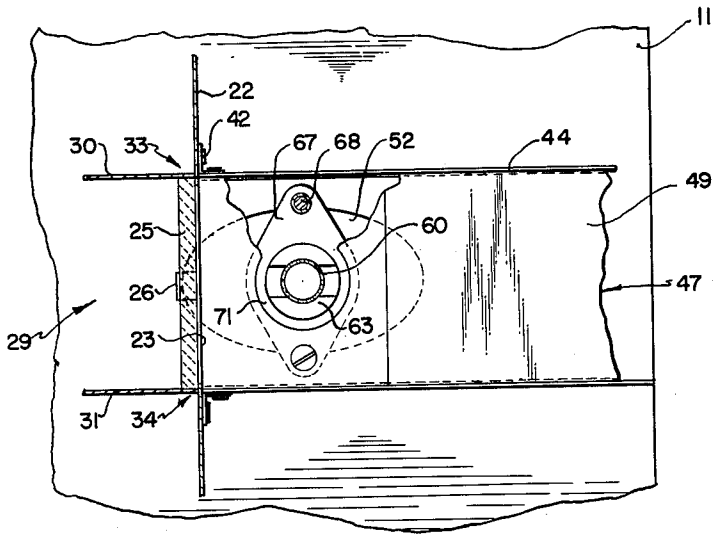


FIG. 3.

FIG. 4.

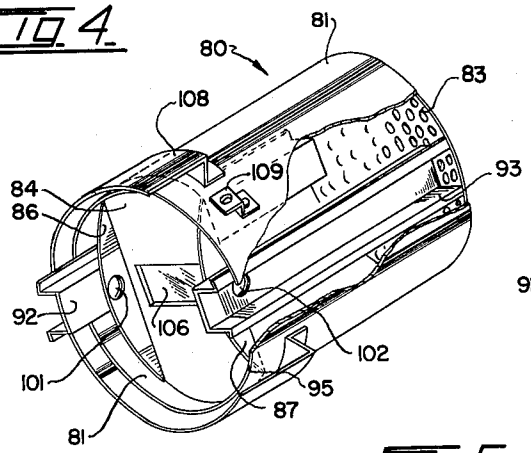
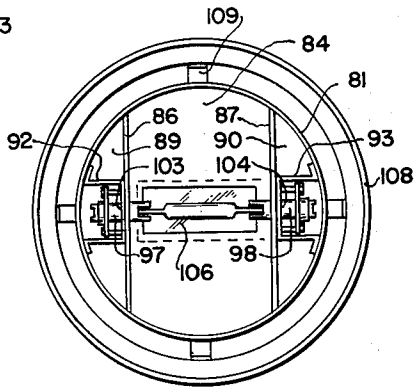


FIG. 5.



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3,255,345

Patented June 7, 1966

3,255,345

LIGHT FIXTURE

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Filed Sept. 3, 1963, Ser. No. 306,212
12 Claims. (Cl. 240—47)

This invention relates to a light fixture which is particularly adaptable and useful to provide proper operation of incandescent lamps, specifically the iodine quartz lamps which provide an extremely high lumen maintenance through the operation of the iodine regeneration cycle, and other light lamps in which high operating temperatures are required.

Most electric lamps, and especially those of the tungsten filament type generate radiant energy having wave lengths encompassing the physical spectrum together with the shorter wave length of ultra violet energy and the longer wave lengths of infra red energy, the latter being the heat energy of radiation.

In the use of artificial illumination, to display wares such as clothing and the like, it is important that as much of the shorter wave length radiation of the light source be directed on the article to be displayed and that as much as possible of the longer wave length radiation be eliminated from the light column which is usually beamed towards articles with suitable reflectors. The recent development of the iodine quartz electric lamp has provided an excellent source of intense light which may be most advantageously used for commercial display purposes due firstly to the relatively high radiant energy output of the filament and due to the high lumen maintenance thereof. The proper operation of the iodine quartz lamp requires operation temperatures in excess of 250° C. (generally 500° C.) in order for efficient operation of the iodine regeneration cycle. It has been found however that this lamp which in the standard form has a tungsten filament centrally located in a cylindrical quartz envelope, the ends of the envelope being sealed and provided with ceramic tips, has a relatively short life span due to the disintegration of the ceramic tips when the lamp is operated at the relatively high temperatures aforesaid. The high temperatures also materially effect the leads to the lamp and their connections thereto.

It is appreciated that a number of attempts have been made to provide light fixtures and reflectors intended to permit the lamp to operate at higher temperatures yet to prevent the heat ordinarily generated by the lamp from affecting the ceramic tips and leads thereof. However, these attempts have not been, in the main, successful and the relatively short life of the iodine tungsten lamp still remains a problem.

The present invention overcomes the above problems by providing a light fixture and reflector in which the longer radiant waves of heat energy are in great measure removed from the visible light beam, being filtered through the reflector and, instead of being dissipated, are used to cause cooling convection currents of air to flow over the end seals and leads of the lamp to thereby cool the latter. The reflector is so arranged to prevent cooling drafts of air from cooling the quartz envelope and effecting the iodine regeneration cycle.

The present invention consists of a light fixture or lamp that operates at high temperatures and has at least one seal at one end thereof, a reflector, a filter in and forming part of the reflector, said filter being adapted to transmit infra-red rays therethrough and to reflect therefrom substantially all other rays having a wave length shorter than said infra-red rays, holding means for supporting a high temperature lamp in front of the reflector and the filter, a heating chamber formed behind the reflector and into which infra-red rays are directed by the filter to heat the air in said chamber, and passage means at said holding means and through which air can travel over each lamp seal held by said holding means, said passage means being located relative to the heating chamber so that heat in the latter causes air to travel through the passage means to cool each end seal during the operation of the lamp and fixture.

In the drawings which illustrate the embodiments of the invention,

FIGURE 1 is an isometric view partially in section of one embodiment of the invention,

FIGURE 2 is a front elevation of a portion of the embodiment as illustrated in FIGURE 1 showing the lamp, filter, and holders for the lamp,

FIGURE 3 is a section on line 3—3 of FIGURE 2,

FIGURE 4 is an isometric view partially cut away of another embodiment of the invention, and

FIGURE 5 is a front elevation of a portion of the embodiment as illustrated in FIGURE 4 showing the lamp, filter and holders for the lamp.

Referring to the drawings and with particular reference to FIGURES 1, 2 and 3, the light fixture **10** which is so arranged so as to project the light therefrom substantially downwardly comprises a vertical tubular casing **11** closed at its upper end **12** by a cover plate **14** and closed at its lower end **15** by a suitable lens or glass plate **16** which is supported in position on an inner annular lip **18** of an annular bracket **19**, said bracket fitting over said lower end **15** of the tubular casing and being secured thereto by screws or by any other suitable means. A reflector **22** which in the present form of the invention is a highly polished metallic plate is mounted within the casing **11** near the lower end thereof and normal to the longitudinal axis of the casing and substantially filling the casing so as to prevent the passage of air thereby.

The reflector **22** is provided with a centrally located substantially rectangular aperture **23** and, mounted on the reflector and substantially filling the aperture is a dichroic filter **25** which has the properties of being able to transmit infra red waves therethrough and to reflect visible light waves and ultra violet light waves therefrom. It may be mentioned here that filters having the foregoing properties are in common usage today and are generally comprised of a transparent carrier such as glass having a metallic coating on one side thereof. The metallic coating provides a reflective surface and dependent upon the thickness thereof will permit the transmission of light waves of predetermined length therethrough. It is desired for the purposes of this invention that the thickness of the metallic coating should be such as to transmit only the longer infra red waves of radiant energy and to reflect the shorter waves of visible and ultra violet radiant energy.

The filter is a little larger than the aperture **23** and is supported by the upper side of the reflector being secured thereon by spring clips **26** which are themselves secured to the reflector by suitable fasteners such as bolts or rivets.

The filter **25** forms the lower end of a heating chamber **29**, the walls of which comprise a pair of substantially rectangular plates **30** and **31** spaced on either side of the aperture **23** at their lower ends **33** and **34** and extending towards the upper end **12** of the casing **11**. The width of the plates are such that they snugly fit within the casing **11** so that those portions of the casings **35** and **36** lying between the edges of the plates **30** and **31** also serve as side walls for the heating chamber. The heating chamber is closed at its upper end by V-shaped deflector baffles **39** and **40**. The plates **30** and **31** are fastened to the reflector by suitable angle connectors **42** and have side portions **44** extending downwardly past the reflector to the lower end of the casing through a suitably fitting aperture formed in the reflector and lying at either

end of the filter **25**, thereby forming passageways **46** and **47** extending from beneath the reflector **22** and communicating with the heating chamber **29** thereof. The lower ends of the said passageways **46** and **47** are closed by reflectorized facing plates **48** and **49** respectively extending along the lower edges of the side portions **44** of the plates **30** and **31** from the casing **11** to the lower surface of the reflector **22**. Apertures **52** formed in the casing **11** near the lower end of the passageways **46** and **47** permit the entry of air into said passageways and thence into the heating chamber **29** to be heated therein and then exhausted through suitable apertures **55** formed near the upper end **12** of said casing.

The lamp **58** is preferably, as hereinbefore mentioned, of the iodine quartz type although it will be appreciated that other lamps of a similar nature might be used. The iodine quartz lamp comprises an elongated tubular quartz envelope **60** in which a long tungsten filament is co-axially mounted, each end of the filament being connected to connectors **62** which pass through ceramic tips **63** at each end of the glass envelope.

A pair of sockets **65** provided with leads **65***a* connected to a suitable source of electrical power composed of a ceramic material are mounted in passageways **46** and **47** respectively, in socket holders **66**, each of said socket holders having a base plate **67** connected to the upper end of the corresponding facing plates **48** and **49** by nuts and bolts **68** and spaced outwardly therefrom by sleeves **69** which are carried over the bolts between the facing plate and base plates. Apertures **71** formed in the upper end of the facing plate provide entry therethrough for the ceramic tips of the lamp to thereby permit installation of the said ceramic tips within the socket **65**.

The light fixture **10** is arranged to be supported in a vertical position with the reflector and lamp disposed to project a beam of light downwardly. In this vertical position, the infra red or heat rays emanating from the lamp are transmitted through the filter **25** to heat the air within the heating chamber **29**. The heated air rises and passes outwardly of the casing through apertures **55**. Cooling air therefor enters into the heating chamber via apertures **53** and passageways **46** and **47**, thereby cooling the sockets **65** and the ceramic sealing tips **63** of the lamp. It will be seen however that the lamp lies within the confines of the reflector and that portion of the casing which lies downwardly from the reflector. The air within the space so defined is heated by the lamp but cannot pass upwardly past the reflector. Consequently, the air within the space so defined remains at a relatively high temperature and no cooling drafts are permitted to pass over the envelope to thereby impair the efficiency of the iodine regeneration cycle. It should be further noted that the removal of a great part of the infra red rays from the light column projected downwardly provides a light which, by reason of its relative lightness is admirably suited to illuminate articles on display.

FIGURES 4 and 5 illustrate another form of the invention. In this form, the light fixture **80** comprises a substantially vertical casing **81** having a perforated cover plate **83** closing the upper end thereof and a reflector **84** near the lower end thereof. The reflector **84** instead of completely filling the casing like reflector **22** hereinbefore mentioned, is provided with a pair of downwardly-turned side panels **86** and **87** which are spaced inwardly from the walls of the casing **81** to form passageways **89** and **90** respectively therebetween. A pair of chimney like brackets **92** and **93** extend longitudinally of the casing from the perforated cover plate **83** at its upper end downwardly through the two passageways **89** and **90** and outwardly beyond the lower edge **95** of the casing **81**. Sockets **97** and **98** are mounted within the chimney like brackets **92** and **93** in somewhat the same manner as sockets **65** are mounted within passageways **46** and **47** of the preceding fixture and are aligned with apertures **101** and **102** in the side panels **86** and **87** and apertures **103** and **104** formed in the lower end of the chimneys **92** and **93** to permit a lamp as hereinbefore described to be mounted within the sockets. The walls of the chimneys **92** and **93** extending above the reflector **84** are anodized to present a surface adapted to absorb heat. A dichroic filter **106** having the same properties as filter **25** is mounted in somewhat the same manner as said filter **25** above an aperture **107** formed in reflector **84**.

Light fixture **80** operates in somewhat a different manner than light fixture **10**. In light fixture **80**, the air above reflector **84**, is heated by the infra red rays passing through the filter **106** and passes outwardly through the perforated cover **83**, cooler air passing upwardly through passageways **89** and **90**. The heated air moving upwardly through the casing also heats the upper part of the anodized chimneys **92** and **93**, said chimneys transmitting heat to the air lying therewithin. Light fixture **80** is provided with lens or glass plate at the lower end thereof and supported in an annular collar **108**, said annular collar being spaced radially outwardly from the casing to permit the passage of air therebetween and being secured thereto by suitable angle connectors **109**. The heated air within chimneys **92** and **93** also passes outwardly through the perforated cover drawing the cooling air through the space between the annular collar **109** and casing **81** and upwardly through the lower ends of said chimneys, said cooling air passing over the lamp sockets contained therein. This latter form of the invention is suitable for outdoor lighting in areas subject to extremely low temperatures where only a minimum amount of cooling air is necessary to maintain proper cooling of the lamp sockets.

What I claim as my invention is:

1. In a light fixture for a lamp that operates at high temperatures and has at least one seal at an end thereof, a reflector, a filter in the forming part of the reflector, said filter being adapted to transmit infra-red rays therethrough and to reflect therefrom substantially all other rays having a wave length shorter than said infra-red rays, holding means for supporting a high temperature lamp in front of the reflector and the filter, a heating chamber formed behind the reflector and into which infra-red rays are directed by the filter to heat the air in said chamber, and passage means at said holding means and through which air can travel over each lamp seal held by said holding means, said passage means being located relative to the heating chamber so that heat in the latter causes air to travel through the passage means to cool each lamp seal during the operation of the lamp and fixture, said filter comprising a transparent carrier having a reflective film coating on at least one surface thereof.

2. In a light fixture for a lamp that operates at high temperatures and has at least one seal at an end thereof, a reflector, a filter in and forming part of the reflector, said filter being adapted to transmit infra-red rays therethrough and to reflect therefrom substantially all other rays having a wave length shorter than said infra-red rays, holding means for supporting a high temperature lamp in front of the reflector and the filter, a heating chamber formed behind the reflector and into which infra-red rays are directed by the filter to heat the air in said chamber, passage means at said holding means and through which air can travel over each lamp seal held by said holding means, said passage means being located relative to the heating chamber so that heat in the latter causes air to travel through the passage means to cool each lamp seal during the operation of the lamp and fixture, and shielding means surrounding the lamp to prevent the passage of air currents thereover.

3. A light fixture for a lamp as claimed in claim **2** in which the shielding means comprises a continuous skirt connected to and surrounding the reflector and defining the periphery thereof, said skirt projecting outwardly in front of the reflector to confine the lamp therewithin.

4. A light fixture for a lamp as claimed in claim 2 in which the lamp has an iodine regeneration cycle.

5. A light fixture for a lamp as claimed in claim 2 in which the passage means communicates with the heating chamber.

6. A light fixture for a lamp as claimed in claim 2 in which the passage means extends through the heating chamber and has a heat transmitting surface whereby heat within the heating chamber is transferred through said surface to heat the air within the passage means, to cause the air therewithin to travel therethrough.

7. In a light fixture for an elongated lamp that operates at high temperatures and has a seal at each end thereof, a vertically disposed tubular casing open at end and, a reflector having a reflectorized lower surface mounted in the casing and substantially filling the latter and spaced downwardly from the upper end to form a heating chamber thereabove, a dichroic filter in and forming part of the reflector, said filter being adapted to transmit infra-red rays therethrough and to reflect substantially all other rays having a wave length shorter than said infra-red rays to thereby heat the air within the heating chamber, a pair of vertical chimneys connected to the casing and communicating with the heating chamber at their upper ends and each having a portion extending below the reflector, said chimneys arranged to permit the passage of air from below the reflector to the heating chamber, a socket mounted in each chimney below the reflector to receive an end seal of, and to support, a high temperature lamp below the reflector and the filter, said sockets being arranged to expose each end seal to the air within the chimney, whereby upon operation of the lamp, heated air within the chamber will move upwardly, thereby drawing air through the chimney to cool the end seals of the lamp.

8. A light fixture for a lamp as claimed in claim 7 in which the casing extends below the lamp to prevent the passage of air currents thereover.

9. A light fixture for a lamp as claimed in claim 7 in which the lamp has an iodine regeneration cycle.

10. In a light fixture for an elongated lamp that operates at high temperatures and has a seal at each end thereof, a vertically tubular casing open at each end, a reflector having a reflectorized lower surface mounted in the casing and substantially filling the latter and spaced downwardly from the upper end to form a heating chamber thereabove, a dichroic filter in and forming part of the reflector, said filter being adapted to transmit infra-red rays therethrough and to reflect substantially all other rays having a wave length shorter than said infra-red rays to thereby heat the air within the heating chamber, a pair of vertical chimneys connected to the casing, each having lower portions extending below the reflector and upper portions extending through the heating chamber, said upper portions having a heat transmitting surface to permit the transfer of heat from the air within the heating chamber to the air within the chimneys to thereby cause circulation of air therethrough, a socket mounted in each of said lower portions of each said chimney to receive and end seal of, and to support, a high temperature lamp below, the reflector and filter, said sockets being arranged to expose each end seal to the air within the chimney, whereby upon operation of the lamp heated air within the chimney will move upwardly thereby drawing air therethrough to cool the end seals of the lamp.

11. A light fixture for a lamp as claimed in claim 10 in which the casing extends below the lamp to prevent the passage of air currents thereover.

12. A light fixture for a lamp as claimed in claim 10 in which the lamp has an iodine regeneration cycle.

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