Feb. 9, 1937. C. H. BISSELL ET AL 2,070,195

EXPLOSION RESISTING LIGHTING FIXTURE

Filed Nov. 5, 1934 2 Sheets-Sheet 1

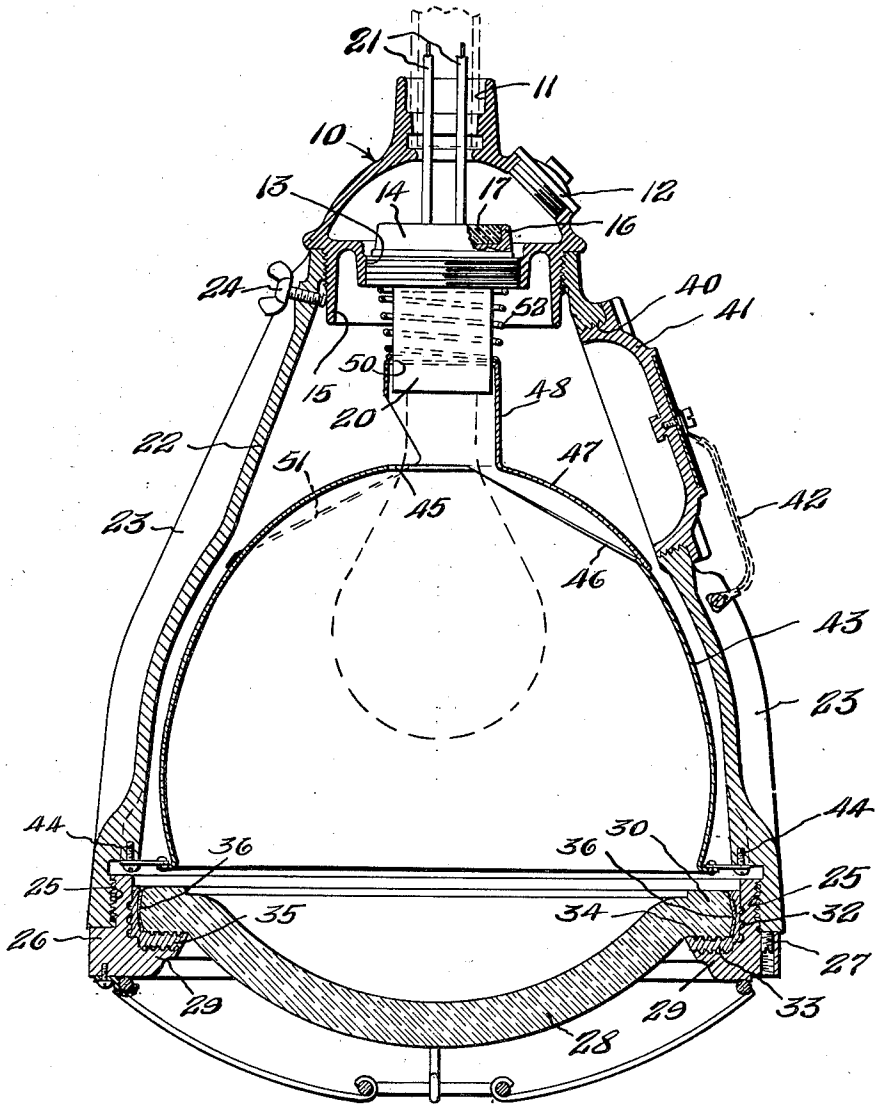


Fig. 1

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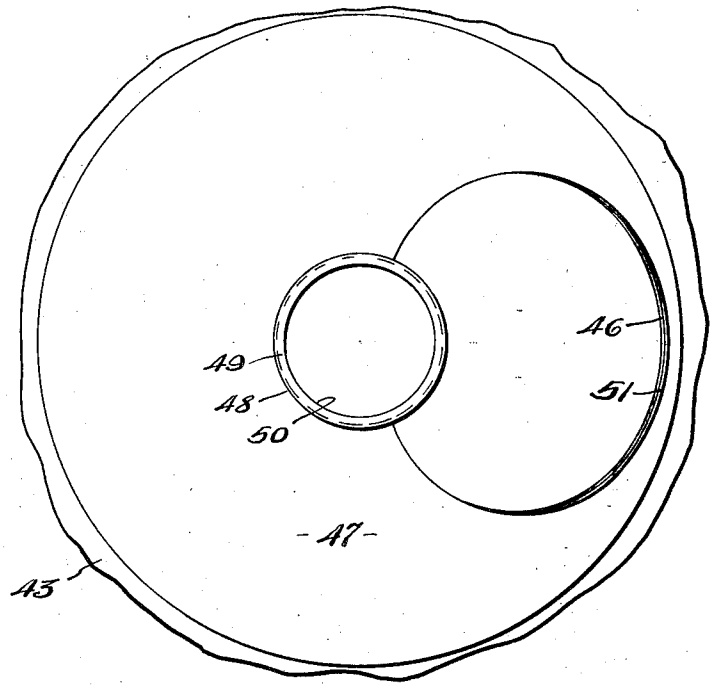


Fig-2-

Fig-4-

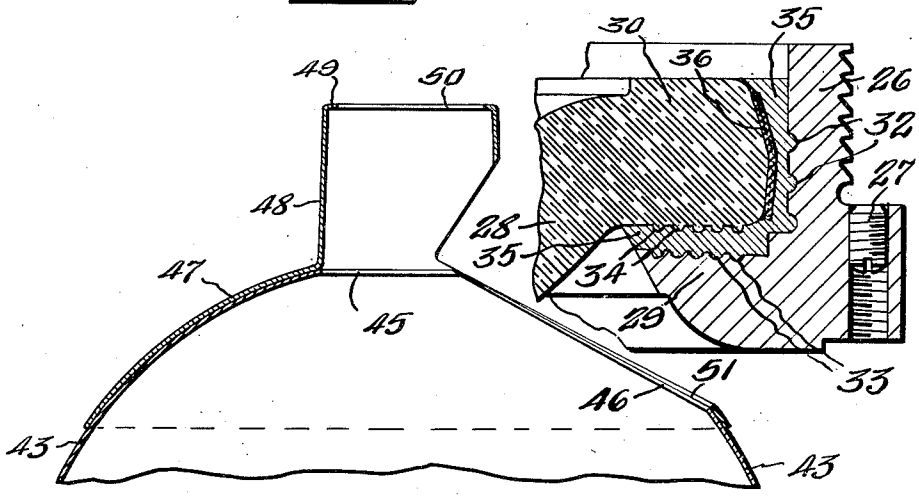


Fig-3-

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2,070,195

UNITED STATES PATENT OFFICE

2,070,195

EXPLOSION RESISTING LIGHTING FIXTURE

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Application November 5, 1934, Serial No. 751,500

10 Claims. (Cl. 240—11.3)

This invention relates to what is known as explosion resisting lighting units which are of such construction as to withstand any explosion within the unit and prevent the egress of flames or burning gases at a temperature above the ignition point of inflammable gases in the surrounding atmosphere.

The invention has as an object an explosion resisting lighting fixture having a glass lens detachably secured to the body of the fixture and means for mounting the lens in the lens supporting means to provide for expansion and contraction of the lens without affecting the flame tight joint between the lens and the lens supporting means, and without creating any undue stress or strain on the lens.

The invention has as a further object a construction by which the unit may be relamped without disturbing the connection between the lens and the body of the fixture and whereby the relamping operation may be carried out when the fixture is supplied with a reflector.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings in which like characters designate corresponding parts in all the views.

Figure 1 is a vertical, sectional view of the explosion resisting lighting fixture.

Figure 2 is a top, plan view of the reflector shutter showing a contiguous portion of the reflector.

Figure 3 is a vertical, sectional view of the reflector shutter and contiguous portion of the reflector.

Figure 4 is an enlarged, fragmentary, sectional view disclosing the mounting of the lens in the lens supporting ring.

The upper portion 10 of the fixture is herein designated as a canopy, and as here shown is bell-shaped in general form provided at the upper end with a passage 11 which may be internally threaded to receive the end of a conduit enclosing the service wires to the fixture. The canopy is formed with an opening in its side which is closed by a removable plug 12. The lower portion of the canopy is provided with an internally threaded bore 13 to receive the receptacle support 14 provided with complemental external threads. The canopy is also formed with an annular depending flange 15, the upper outer portion of which is externally threaded.

The lamp receptacle support 14 is provided with an upwardly extending flange 16 forming a well to receive the sealing compound 17 which, together with the threaded connection at 13, effectively seals off the lamp chamber from the conduit line. A lamp receptacle 20 is secured to the support 14 and is provided with suitable feed wires 21 which supply the necessary current for the lamp mounted in the receptacle 20.

As here shown, the body 22 of the fixture consists of a casting, bell-shaped in general appearance, and provided with lengthwise extending ribs 23 which increase the effective radiation of the body, and thus assist in cooling the fixture by rapidly dissipating the heat generated by the lamp. The ribs 23 also strengthen the casing or body of the fixture against explosions from within. The upper end of the body 22 is threaded internally and screwed upon the flange 15 of the canopy 10, and when screwed in place is held from relative movement by the set screw 24 threading through the wall of the body and engaging the flange 15 of the canopy. The lower portion of the body 22 is threaded internally, as at 25, to receive the externally threaded lens supporting ring 26. The threads 25 and the complemental threads of the ring 26 are of the abutment type, as more clearly indicated in Figure 4, in order to prevent radial stress, as would occur with V threads in the event of an explosion from within the fixture. After the ring 26 is screwed into the open end of the bell-shaped body 22, it is held from relative movement by the set screw 27.

The ring 26 supports a lens 28. The ring and the lens form a closure for the open end of the body. In order to withstand the appreciably high pressure in the event of an explosion in the fixture, the lens is comparatively thick and is concavo-convex in cross section, and in order to withstand the comparatively high heat generated by the lamp in the lamp chamber is preferably formed of a glass composition having a very low coefficient of expansion, such as pyrex glass.

Due to the fact that the unit is entirely enclosed, an appreciable amount of heat is generated over and above that dissipated by radiation by the body and ribs 23 with the result that the ring 26 has a considerably high degree of expansion and contraction. This expansion and contraction of the ring 26 relatively to the glass lens 28, which, as before stated, has a very low coefficient of expansion, results in a considerable problem in maintaining at all times a flame tight joint between the lens and the fixture.

As here shown, the ring 26 is provided with an inwardly extending flange 29 and is of such dimensions as to overlap the peripheral flange 30 of the lens 28. The bore of the ring 26 is somewhat larger than the over-all diameter of the lens and is provided with a series of grooves 32, and the upper surface of the flange 29 is provided with a plurality of concentric grooves 33 and the bottom surface of the flange 30 of the lens 28 is provided with a plurality of concentric ribs 34.

In order to maintain at all times a flame tight joint between the lens 28 and the ring 26, a metallic seal 35 is interposed between these two elements. The seal 35 is preferably a ductile metal or metallic alloy, usually a lead alloy is employed. In order that the metallic seal 35 may properly fill the space between the lens and the ring including the grooves 32, 33 and properly surround the ribs 34, the lens and ring are arranged in the proper position and the metal poured in the intervening space, in order that the metal will not chill too quickly and cause voids therein, preferably, the ring 26 and the lens 28 are preheated so that the molten metal will readily flow between the lens and ring and properly fill the intervening space. Immediately after the pouring operation, the bottom or flange portion 29 of the ring is chilled so that the metal seal between the flanges 29, 30 solidifies first and the metal then gradually freezes upward between the periphery of the lens and the vertical bore of the ring. However, at the time the metallic seal solidifies or freezes, a considerable amount of heat is still retained in the ring 26 with the result that there is, thereafter, a considerable amount of contraction. This contraction of the ring is apt to break the lens 28, or in any event, set up initial stress and strain on the same, which materially weakens its resistance to an internal explosion. This is true, particularly in view of the fact that the lens is of the concavo-convex type. To avoid such stress or strain in the lens, upon cooling of the ring, a fibrous band 36 is placed about the periphery of the lens previous to the pouring of the metallic seal. This fibrous band is usually of asbestos composition, and has sufficient compressibility to allow for the contraction of the ring without placing undue stress upon the lens. The periphery of the lens is provided with a double or negative bevel which aids mechanically in maintaining the lens in the ring. The upper bevel prevents the lens from being pushed upwardly out of the ring in the event the whole unit should rest upon the lens, as when it is placed upon the floor or during shipment.

With this structure described, a flame tight joint is always maintained between the lens and the ring. The threads 25 effect such a joint between the ring and the lower end of the body.

The metallic seal in conjunction with the grooves 32, 33 and ribs 34 provide a long tortuous path through which any ignited gases must pass in escaping from within the fixture. The seal effects a substantially gas-tight joint at all times between the flange 29 of the ring and the flange 30 of the lens.

After the lamp has been burning a considerable time, the ring 26 is permitted to expand relative to the lens, because of the ductability of the metallic seal, the upper portion of the seal being held by the ribs 34 on the lens and the lower portion being held by the grooves 33 in the flange 29. When the ring is expanded, there is a slight clearance between the vertical wall of the ring and the metallic seal. However, the chief function of the grooves 32 is to form a mechanical lock to hold the seal from vertical movement relative to the ring 26 and the second function to provide a longer tortuous path for the escape of the ignited gases. Due to the fact that the metallic seal is drawn tightly against the walls of the grooves 33 and ribs 34, there is practically no clearance at any time at these locations and the gases are either trapped within the fixture which is of the explosion proof type and built to withstand the pressure, or the escapement is through such a restricted passage that the gases are cooled well below the ignition point before they escape.

In assembling the fixture, the lamp socket is secured to the receptacle support 14 and the wires 21 extended through the support and the well filled with the sealing compound 17. The support 14 is then screwed into the canopy. The body is then screwed under the flange 15 of the canopy and secured with the set screw 24. The reflector, hereinafter to be described, is merely secured in place and the ring and lens assembly screwed into the open end of the body. The unit is installed by the wireman by attaching the canopy to a conduit line, if such is used, and splicing the wires 21 to the feed wires, the splicing being effected through removal of the handhold plug 12. Accordingly, the unit is installed without the necessity of disturbing any of the flame tight joints and further, provision is made for relamping the fixture without disturbing such joints.

The body 22 is provided in the side with an opening 40 which is closed by a detachable closure in the form of a screw plug 41 which is flexibly secured to the body 22 by means of a chain 42, or other similar means, thereby obviating the necessity of the electrician having to care for the closure during the relamping operation.

This invention relates particularly to explosion resisting units of the larger size in which it is generally desirable to incorporate a reflector in order to obtain the most efficient and proper distribution of the light.

As here shown, the elliptical reflector 43 is mounted within the body and secured to the lower end thereof by means of screws 44. The reflector 43 is provided with a circular opening 45 at the top thereof to permit the shank of the lamp to be inserted in the receptacle 20. It is also provided with an additional circular opening 46 in one side thereof, arranged adjacent of and communicating with the central opening 45. The purpose of the opening 46 is to permit the fixture to be relamped. That is, the opening 46 is of sufficient dimensions to permit insertion and removal of the lamp through the opening 40 in the side of the body. In instances where it is desirable to maintain a uniform effect from the reflector, provision is made to cover the opening 46, or to provide continuity of the surface of the reflector. This result is effected by means of an adjustable shutter 47, the body portion of which is formed on a curvature complemental to the top portion of the reflector 43, and is provided with an upwardly extending hub portion 48 with an inwardly extending flange 49 provided with an opening 50 to receive the lower end of the lamp receptacle 20. The shutter 47 is also provided with an additional opening 51 complemental with the opening 46 in the reflector. The shutter 47 is mounted on top of the reflector 43 with the

flange 49 surrounding the lower portion of the socket 20, and a spring 52 is interposed between the flange 49 and the receptacle support 14 exerting a downward pressure to hold the shutter 47 in contact with the upper surface of the reflector 43. Obviously, the shutter 47 may be revolved about the vertical axis of the fixture, or the socket 20, bringing the opening 51 into and out of register with the opening 46.

To relamp the unit, the screw plug 41 is removed from the side of the body 22. The operator reaches through the opening 40, grasps the shutter by the hub 48, turning it on the reflector 43 until the opening 51 is in register with the opening 46, as indicated in Figure 3. He may then remove the lamp from the lamp receptacle 20 and insert a new lamp, after which the shutter 47 is again turned to the position shown in Figure 1, thus closing the opening 46 and providing a continuous reflecting surface.

What we claim is:

1. In an explosion resisting lighting fixture, a body open at one end, lamp receptacle mounted in the body, and a lens detachably secured to the open end of the body, the body being provided with an opening in one side thereof, a reflector mounted within the body and being provided with an opening arranged in alinement with the opening in the body to permit insertion and removal of a lamp, a reflector shutter having an opening therein complemental to the opening in the reflector, and being movable relative to the reflector to bring said opening in register with the opening in the reflector, and a detachable flame tight closure for the opening in the side of the body.

2. In an explosion resisting lighting fixture, the combination of a body open at one end, and being provided with an opening in one side thereof, a lamp socket mounted in the body, a lamp reflector mounted within the body and provided with an opening arranged in alinement with the opening in the body to permit relamping of the unit, a reflector shutter provided with an opening complemental to the opening in the reflector, said shutter being movable relative to the reflector to bring said opening into and out of register with the opening in the reflector.

3. An explosion resisting lighting unit, a body provided with an opening in one side thereof, a reflector mounted within the body, a reflector shutter, the reflector and the reflector shutter being provided with openings to permit the insertion and removal of a lamp, one of said members being arranged with its opening in alinement with the opening in the side of the body, and the other of said members being movable to bring its opening into and out of register with the opening of the other member.

4. In an explosion resisting lighting fixture, the combination of a body provided with an opening in one side thereof, a lamp reflector member mounted in the body and being provided with an opening to permit the insertion and removal of a lamp, a reflector shutter member provided with an opening complemental to the opening in the reflector and being adjustable relative to the reflector to bring its opening into and out of register with the opening in the reflector, and means for maintaining the shutter in adjusted position.

5. In an explosion resisting lighting fixture, the combination of a canopy, a body, means for attaching the upper end of the body to the canopy in flame tight relation thereto, the lower end of the body being open, and a lens detachably secured to the open end of the body in flame tight relationship thereto, an opening in the side of the body, a lamp socket carried by the canopy and depending into the body, a lamp reflector mounted in the body and having an opening to permit insertion and removal of a lamp, said opening being in alinement with the opening in the side of the body, a reflector shutter having an opening complemental to the opening in the reflector, and being adjustable relative to the reflector to bring the opening into and out of register with the opening in the reflector, means for holding the shutter in adjusted position, and a detachable closure for the opening in the side of the body.

6. In an explosion resisting lighting fixture, the combination of a body open at one end and being provided with an opening at one side thereof, a lens secured to the open end of the body and forming a closure therefor, a lamp socket mounted in the body, a lamp reflector mounted within the body and provided with an opening arranged in alinement with the opening in the body to permit relamping of the unit without removing said lens, or disturbing the mounting of the lamp socket and a detachable closure for the opening in the side of the body.

7. In an explosion resisting lighting fixture, the combination of a base, a bell shaped body having an opening in one side thereof and being provided with means at the small end thereof for attaching the body to the base, a lamp receptacle mounted on the base and depending into the body, a lens detachably secured to the large end of the body and forming a closure therefor, a lamp reflector mounted within the body and provided with an opening arranged in alinement with the opening in the body to permit relamping of the unit without removing said lens, or disturbing the mounting of the lamp socket and a detachable closure for the opening in the side of the body.

8. In an explosion resisting lighting fixture, a body, a lamp receptacle mounted in the body, a lens, a lens supporting ring detachably secured to the body, said ring being provided with an inwardly extending flange and the lens having a peripheral flange overlapping the flange of the ring, the periphery of said lens flange being beveled inwardly toward the top and bottom surfaces of the same, and a metallic seal cast between said flanges and between the periphery of the lens flange and the ring.

9. In an explosion resisting lighting fixture, a cast metal body, a lamp receptacle mounted in the body, a lens unit detachably secured to the open end of the body and forming a closure therefor, said lens unit comprising a ring detachably secured to the body and being provided with an inwardly extending flange and a lens having a peripheral flange overlapping the flange of the ring with the periphery of the lens flange being spaced apart from the inner surface of said ring, a band of fibrous material encircling the periphery of the flange of the lens, and a metallic seal cast between the lens flange and the ring and between the periphery of the lens flange and the inner surface of the ring.

10. In an explosion resisting lighting fixture, the combination of a metallic body open at one end and being provided with an opening in one side thereof, a lens secured to the open end of the body and forming a closure therefor, a lamp socket mounted in the opposite end of the body, a reflector mounted within the body, means for securing the reflector within the body with the

large open end of the reflector adjacent the periphery of said lens, said reflector being provided with an opening at the small end thereof to receive the shank portion of an incandescent light bulb, and being also provided with an opening in its side and communicating with said lamp shank receiving opening, with the latter opening arranged in alinement with the opening in the side of the body to permit relamping of the unit without removing said lens or disturbing the mounting of the lamp socket, and a detachable closure for the opening in the side of the body.

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