Oct. 6, 1959 W. HENSCHEL 2,907,868

ILLUMINATION APPARATUS

Filed April 3, 1957

Fig. 5

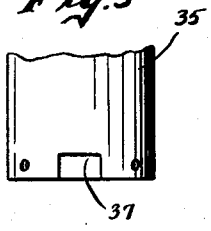


Fig. 1

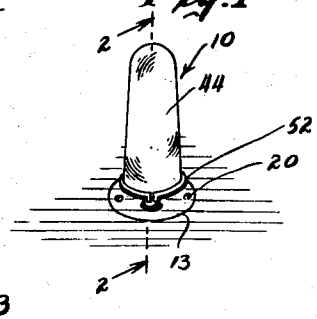


Fig. 2

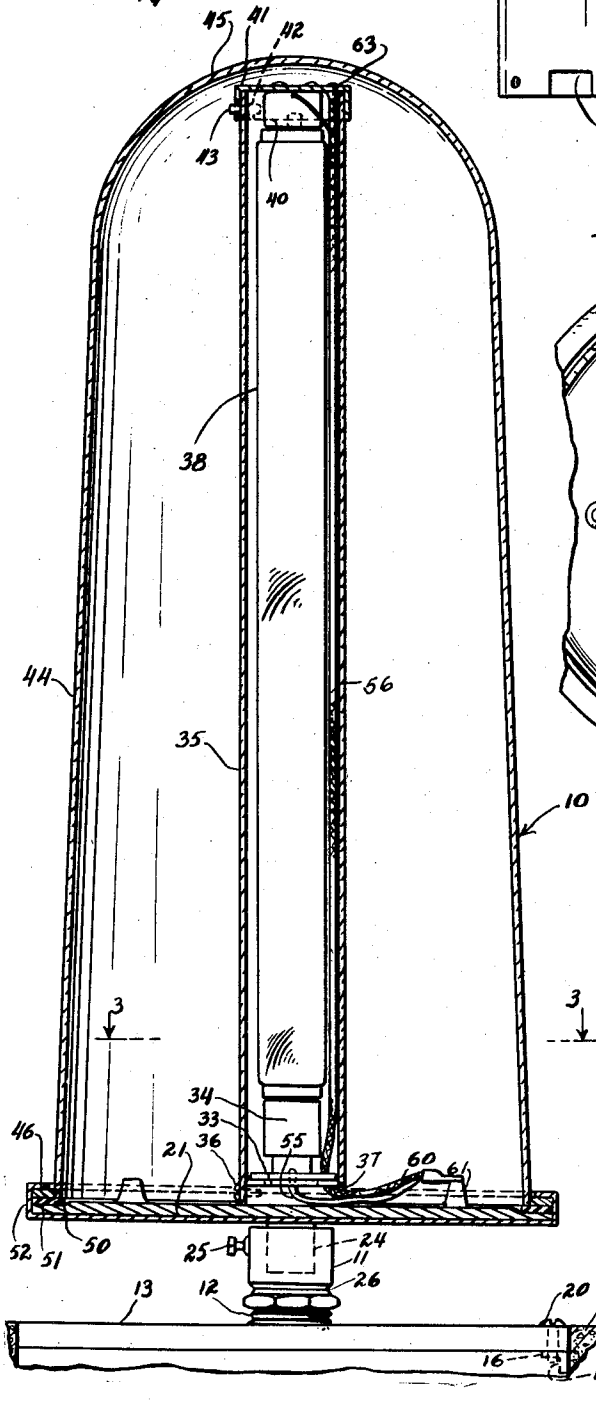


Fig. 3

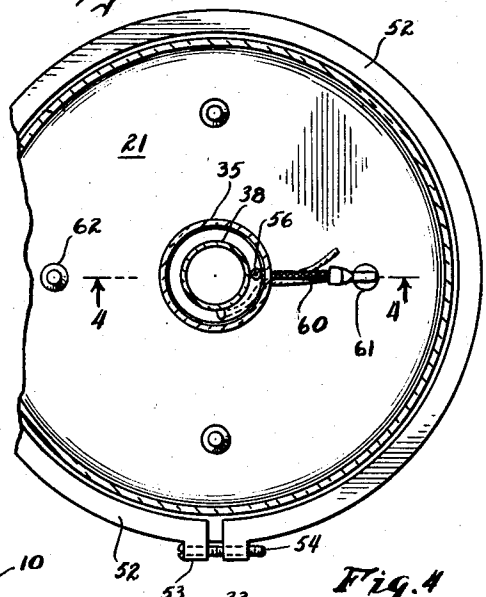


Fig. 4

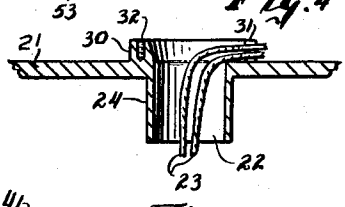
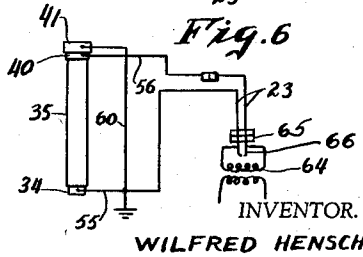


Fig. 6



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ILLUMINATION APPARATUS

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4 Claims. (Cl. 240—1.2)

This invention relates to illumination apparatus and relates more particularly to an improved lighting means for airport taxi-ways although its use is not restricted to any particular locality. Since it is particularly advantageous for lighting airport taxi-ways, the invention will be particularly described in this connection.

In the prior art, airport taxi-ways have been equipped with marker lights defining their boundaries, each consisting of an incandescent lamp enclosed in a glass globe mounted on a conduit stem with a conical skirt. Such lights have relatively low visibility, are expensive to maintain and operate because of the short life and low efficiency of the incandescent lamp and constitute a hazard to the propellers of aircraft hitting them.

Efforts have been made to use fluorescent instead of incandescent lights for the purpose but they have not been satisfactory for the reasons that their light output drops to intolerably low values at low temperatures, that in some cases high voltages make servicing and relamping dangerous, and that the units become inoperative if inundated by flood. Further objections reside in the fact that they have an inherently non-uniform light distribution and their high power consumption and the large circuit capacity required make their application on existing lighting circuits both difficult and expensive. The design of the illuminating device or marker light of the present invention overcomes the foregoing difficulties.

An important object of the present invention is the provision of a lighting apparatus for this purpose which provides a larger light source with increased visibility under all operating conditions than do existing airport taxi-way marker lights.

Another important object of the invention is to provide an improved marker light unit for airports which is waterproof so that even if the landing field is flooded with water up to or even above the top of the unit it will still operate and use of the field may be resumed after the flood without servicing the lights.

A further important object of the invention is to provide a fluorescent lighting fixture whose light output is substantially unaffected by low temperatures, this being accomplished by the combination of an outer transparent cylinder or envelope forming a general housing for the structure, and an inner, closed tubular housing or envelope of smaller diameter which receives and encloses the lighting element. The inner tubular envelope and the outer housing effectively insulate the lighting unit and assure satisfactory operation at its lowest temperature even at low power consumption.

Another important object of the invention is to provide a lighting fixture in which the aforesaid inner tubular housing supports the upper socket support and socket while the socket in turn supports and energizes the lamp. This arrangement prevents electric shock to a workman replacing the lamp since the lamp is accessible only when it is de-energized, while the socket support is at ground potential and the socket is of such design that the workman cannot accidentally touch the live contact.

Another important object of the invention is to provide a lighting fixture which will not damage a whirling propeller if it by chance should hit the light. To this end, the parts above the base, including the inner and outer plastic housings, the fluorescent tube and the other members are easily shattered or displaced by impact of the propeller and the cost of replacement is far less than the cost of repair to the propeller or replacement by a new propeller. The light of the present invention is also so designed that upon being bowled over on coming in contact with a landing wheel or other moving object, the connector of the fixture lead will separate and thereby automatically short circuit the secondary of a series transformer supplying power to it, eliminating the troublesome additional distortion of the alternating current wave of a series circuit when one or more transformer secondaries are open-circuited and which may result in excessive and damaging voltages and cause unsatisfactory starting or operation of the remaining lights on the circuit.

Yet another important object of the invention is to provide a fixture which with its transformer or ballast can be installed on existing series or multiple lighting circuits without change in the circuits and can, if desired, be replaced by a mere substitution of conventional incandescent lights and their transformers or ballasts.

The lighting unit of the present invention would usually be arranged for use in a vertical position and substantially at ground level but it may with minor modification be placed in a horizontal position for certain applications or even in an inverted position or at an angle to the vertical. Also it may be mounted on fences, roof tops or at any other elevation or location. It may also be used with or without minor modification as a route marker or taxi guidance sign for airports or other locations, as a light for the home, for marine use, and for all decorative or utilitarian lighting purposes anywhere.

In the drawings:

Fig. 1 is a perspective view of the lighting unit of the present invention.

Fig. 2 is a central vertical section taken through the unit, the section being taken on line 2—2 of Fig. 1.

Fig. 3 is a horizontal section taken on line 3—3 of Fig. 2.

Fig. 4 is a broken section taken on line 4—4 of Fig. 3.

Fig. 5 is a broken side elevation showing the lower end of the inner tubular envelope.

Fig. 6 is a diagram of the circuit employed.

The lighting unit 10 of the present invention is mounted on a suitable support. If it is to be used as an airport taxi-way marker light it may be mounted on a fracture joint such as a conventional type of frangible coupling shown at 11 and having a threaded section 12 at its lower end which is received in a threaded opening (not shown) in a cover plate 13 formed of metal. The cover plate which is electrically grounded is positioned substantially at ground level on an electrical handhole 14 usually formed from metal and concrete. The handhole may have a metal liner 15 having a horizontal flange 16 at its

upper end and the cover plate is secured thereto by bolts 20. If the cover plate is formed of non-metallic material a separate grounding wire may be supplied.

A circular base plate 21 may be formed as an aluminum casting and it has a central opening 22 (Fig. 4) for wires indicated at 23 which are preferably in the form of a two-conductor cord, the opening being defined by a downwardly extending nipple section 24 which is received in the upper tubular unthreaded portion of the breakable coupling and is secured therein by set screws 25. At the lower end of this tubular portion there is an annular groove 26 generally V-shaped in cross section which forms a thin frangible annular connecting portion which is strong enough to support the unit under conditions of gale or even hurricane but which is readily broken when the unit is struck by a moving object.

Means are provided on the base for detachably mounting in rigid relation an inner tubular envelope forming a housing for the lamp unit. As shown there is aligned with nipple 24 on the upper surface of plate 21 an arcuate boss or pedestal 30 having an opening 31 at one side thereof. The pedestal has blind threaded openings 32 for screws which mount a disc 33 on its upper surface which supports the lower socket 34 which is of the type which is spring loaded so that the lamp is raised into position for convenient ready removal when metal cap 41 is removed. The pedestal is of such diameter as to receive in close fitting engagement the transparent inner tubular envelope 35 which is secured thereto by screws 36. The tube is cut away at 37 (Fig. 5) to form an opening for the wires and this opening is aligned with opening 31 in the pedestal. Instead of the screws a bayonet joint may be used as the mounting means or this may be a screw-threaded arrangement.

An illumination unit such as a straight fluorescent tube 38 is received and supported at its lower end in socket 34 and an upper socket 40 is secured to a metal cap 41 carried at the upper end of tube 35. For the purpose of securing the cap in place it may be formed with bayonet slots 42 which received pins 43 secured to the upper end of tube 35.

The dome-shaped outer envelope 44 is closed at its upper end as shown at 45 and may have a larger diameter at its lower end. It may usually be formed from transparent colored plastic material. The particular color depends upon its use and application. It may be frosted on its inner surface to cause a diffusion of light over the entire inside surface and expanding the light, as it were, from a line source to a columnar source. The dome can be made in a variety of ways, such as being formed in one piece, or it may be formed in two identical halves with two opposed vertical cemented seams extending down the sides. There should be no holes or other openings in the seams or elsewhere in the dome since it should be watertight and airtight.

Means for securing the dome to the base may comprise a ring 46 which is cemented or formed around the lower margin of the dome forming an attaching flange and this ring is received in flat relation on a resilient sealing gasket 50 cemented to a recessed annular seat 51 formed on the periphery of base 21. A split ring 52, U-shaped in cross section, is used to secure the flange to the base. Ears 53 at the ends of the ring receive a tightening screw 54 to draw the terminals of the ring together to securely mount the dome on the base. Alternatively, the dome may have a screw thread at the lower end received on a thread on the base, or a trunk type clamping ring may be used.

Lead-in wires 23 and the clamp which secures them to the base are not shown in Fig. 2 but one of these wires is connected with a wire 55 which is connected with lower socket 34. This wire is also grounded as shown in the circuit diagram of Fig. 6. Accordingly the lower socket is grounded at all times so that the lamp is dead during replacement. The other lead-in wire is connected with a wire 56 of a shielded cable, the wire being connected at

its opposite end to upper socket 40. The metal shield 60 of this cable is connected at its lower end with a grounding boss 61 formed on the base. The upper end of the shield is connected at 63 to cap 41. The other bosses 62 may be used to mount any other desired components on the base.

A transformer 64 is preferably placed within the electrical handhole. A separable connection is shown at 65 and there may be associated with this connection a pair of spring contacts 66 which become connected together if the lighting unit is bowled over, thus short circuiting the transformer secondary.

While there have been described herein what are at present considered preferred embodiments of the invention, it will be obvious to those skilled in the art that many modifications and changes may be made therein without departing from the essence of the invention. It is therefore to be understood that the exemplary embodiments are illustrative and not restrictive of the invention, the scope of which is defined in the appended claims, and that all modifications that come within the meaning and range of equivalency of the claims are intended to be included therein.

What I claim is:

1. A lighting structure for airstrips and the like for mounting at ground level on an electrical handhole, said structure including a base comprising a generally flat disc having an opening, a pedestal extending upwardly therefrom, a frangible coupling secured to the base for mounting the same on the electrical handhole, a transparent dome-shaped housing forming an outer envelope and provided at its lower end with an annular flange mounted on the base, a clamping ring securing the housing thereon in sealed relation, an inner vertical transparent tubular envelope rigidly secured on the outer periphery of the pedestal and a lower socket secured atop the pedestal, a second socket at the upper end of said tubular envelope, an elongated lighting tube in the latter envelope and whose opposed terminals are received in the sockets, and means connecting the sockets with a source of electrical energy.

2. A lighting structure for airstrips and the like for mounting on a cover plate at ground level on an electrical handhole, said structure including a base comprising a generally flat disc having a central opening, a nipple extending downwardly from the opening and an arcuate pedestal extending upwardly therefrom, a frangible coupling mounted on the cover plate and receiving said nipple, a transparent dome-shaped housing forming an outer envelope and secured at its lower end in sealed relation on the base, an inner vertical transparent tubular envelope secured on the outer periphery of the pedestal, a tubular lighting tube in the latter envelope, and means connecting the opposite ends of the lighting tube with a source of electrical energy.

3. A lighting structure for airstrips and the like for mounting on a cover plate at ground level on an electrical handhole, said structure including a base comprising a generally flat disc having a central opening and an arcuate pedestal extending upwardly from the opening, a frangible coupling mounted on the cover plate and supporting said base, a transparent dome-shaped housing forming an outer envelope and provided at its lower end with an annular flange supported on the base, an inner vertical transparent tubular envelope secured on the outer periphery of the pedestal and a lower socket secured atop the pedestal, a removable cap at the top of the inner envelope and an upper socket secured thereto, a fluorescent tube in the latter envelope and whose opposed terminals are received in the sockets, and means connecting the sockets through the nipple and coupling to a source of electrical energy.

4. A lighting structure for airstrips and the like for mounting on a cover plate at ground level on an electrical handhole, said structure including a base comprising a generally flat disc having a central opening defined by a nipple extending downwardly from the opening and an

arcuate pedestal extending upwardly therefrom, a frangible coupling mounted on the cover plate and receiving said nipple, a transparent dome-shaped housing forming an outer envelope and provided at its lower end with an annular flange supported on the base, a resilient sealing gasket between the flange and the base, an inner vertical transparent tubular envelope secured on the outer periphery of the pedestal and a lower socket secured atop the pedestal, a removable cap at the top of the inner envelope and an upper socket secured thereto, a fluorescent tube in the latter envelope and whose opposed terminals are received in the sockets, and means connecting the sockets through the nipple and coupling to a source of electrical energy.

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