United States Patent [19]

Blaylock

[11] **3,731,082**

[45] **May 1, 1973**

[54] **EMERGENCY WARNING LIGHT APPARATUS**

[75] Inventor: **Arnold O. Blaylock,** Fort Worth, Tex.

[73] Assignee: **Lectric Lites Company,** Fort Worth, Tex.

[22] Filed: **Sept. 30, 1970**

[21] Appl. No.: **76,662**

[52] **U.S. Cl.** **240/10.5,** 240/1.2, 340/25

[51] **Int. Cl.**.....**B64f 1/20,** F21v 21/00

[58] **Field of Search**.....240/1.2, 10.5, 52.15, 240/52 B, 3, 10.66, 6.4, 52 HT, 41.3, 41.36; 340/25, 26, 27, 50; 248/206 A; 211/DIG. 1

[56] **References Cited**

UNITED STATES PATENTS

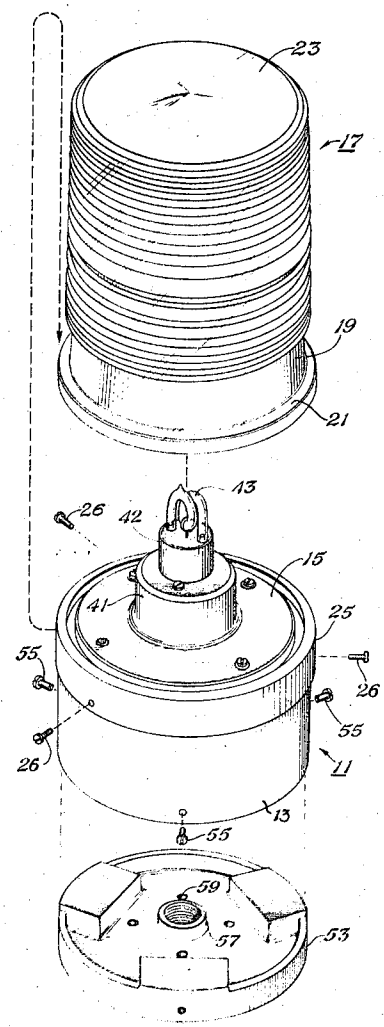
1,473,375	11/1923	Kyle	240/1.2 UX
2,015,442	9/1935	Sprung	240/1.2 UX
2,413,628	12/1946	Hinds	240/52.15
2,492,837	12/1949	Briggs	340/52 B UX
2,773,172	12/1956	Pennow	240/1.2
2,875,324	2/1959	Camp et al	248/206 A X
3,501,627	3/1970	Macemon	240/1.2
3,593,014	7/1971	Vesely	240/3

Primary Examiner—Louis J. Capozi
Attorney—Wofford and Felsman

[57] **ABSTRACT**

An emergency warning light apparatus having a high-intensity bulb carried on a base and covered by a translucent, substantially cylindrical dome, one portion of which has the form of a Fresnel, ribbed pattern on a cylindrical wall surface and a conical deflector in its upper portion, with its apex disposed from the base of the cone toward the bulb. The base includes a lower plate adapted for essentially universal mounting, including a central aperture that is threaded to receive a support bar, a plurality of smaller apertures clustered around the central aperture, and a plurality of sockets on a lower surface to receive permanent magnets. The high-intensity bulb carried by the base inside the dome is intermitently actuated,being a strobe light connected with a power transistor of a circuit means, the heat generated by the transistor being conducted to the base by a heat conductive fastener which with the base defines a heat sink to dissipate the heat generated by the power transistor.

6 Claims, 5 Drawing Figures



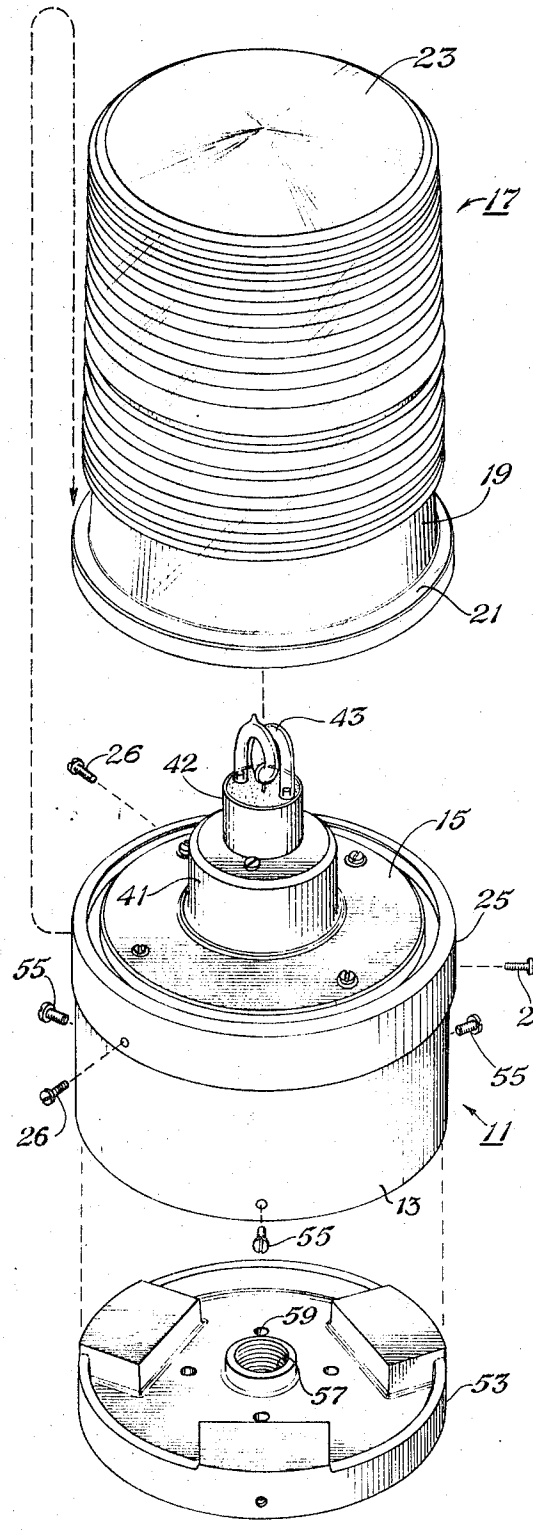


Fig. 1

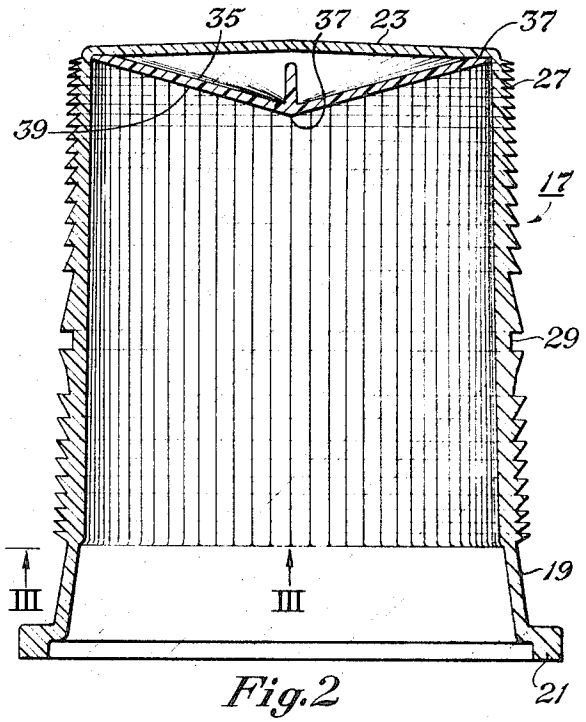


Fig. 2

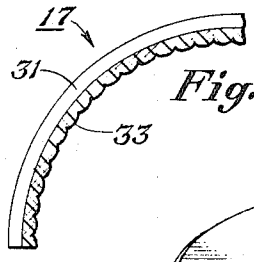


Fig. 3

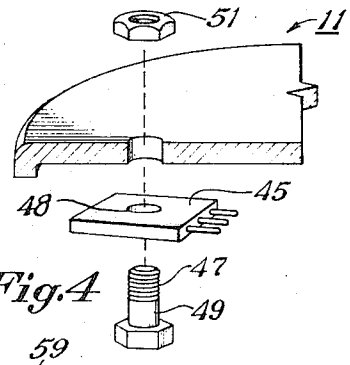


Fig. 4

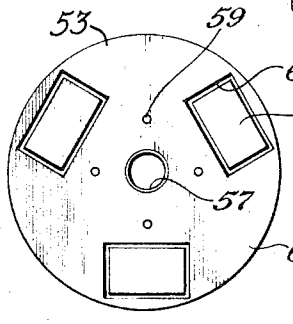


Fig. 5

INVENTOR
ARNOLD O. BLAYLOCK
BY
Wofford & Felsman
ATTORNEYS

EMERGENCY WARNING LIGHT APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention:

This invention relates in general to emergency or warning lights, particularly intermittently operated strobe lights that are especially adapted for emergency vehicles.

2. Description of the Prior Art:

Previously, there have been commercially available in the United States intermittently flashing warning lights that draw attention to an emergency vehicle such as a fire truck, police car or ambulance. Similar warning devices are used in other applications such as in aircraft for night flying, for example, or on warning barricades for highway or street construction or repair projects.

There are a number of significant disadvantages associated with previously known such lights, one being that the transfer effectiveness of light from the bulb to persons to whom the warning communication is intended is often low. Light rays defuse from the bulb in directions from which a visible warning signal is not needed. For example, essentially all the light transmitted vertically upward from the bulb or those directed obliquely from the bulb constitute a significant energy loss, since the persons to be warned occupy a generally horizontal plane surrounding the warning device. Thus, one purpose involved in this invention is the provision of a warning light that limits light transmission to effective directions.

In addition, intermittently flashing warning lights of the type generally identified as strobe lights are commonly actuated by a circuit utilizing solid state components including a power transistor that generates a significant quantity of heat, which if not efficiently transferred from the apparatus is capable of decreasing the life span of certain circuit components. What is provided with this invention, therefore, is a rugged and fail-safe manner of transferring heat from the power transistor of such a circuit to the atmosphere surrounding the emergency or warning light apparatus.

Another problem commonly encountered in previously known emergency or warning lights is that associated with the attachment of the apparatus to an emergency vehicle or other supporting structure. Since there are a number of methods for attaching such a light to the support base, it is frequently necessary to extensively alter the base of the light apparatus for installation, or else provide a number of models which vary from one another only in the base. This adds significantly to the installation time, or to inventory costs, and is another problem to which this invention is directed.

OBJECTS OF THE INVENTION

Accordingly, it is the general object of this invention to provide improved emergency or warning light apparatus.

Another object of the invention is to provide an emergency or warning light apparatus that includes means for directing light from the bulb in horizontal planes surrounding the light such that light energy is not needlessly dissipated in directions where persons needing the warning are unlikely to be located.

Another object of the invention is to provide in an emergency or warning light apparatus, especially one classified as a strobe light operated by a circuit including solid state components, a means for dissipating heat in effective, rugged and reliable manner.

Another object of the invention is to provide in an emergency or warning light apparatus a mounting means that approaches universality, meaning that it is capable of attachment to a wide variety of supporting structures without need for substantial modification, or necessity for keeping an inventory of various models that differ from one another only with respect to the mounting base.

These and other objects, as well as advantages, of this invention will become apparent in the following.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an exploded, perspective view of warning or emergency light apparatus embodying the principles of the invention;

FIG. 2 is a view of the dome or lens of the apparatus as seen in longitudinal section to better expose its construction;

FIG. 3 is a fragmentary sectional view as seen looking along the lines III—III of FIG. 2; and

FIG. 4 is a fragmentary, exploded, perspective view of means for securing a power transistor to the housing in a manner to efficiently transfer heat generated by the transistor to the atmosphere to prevent component damage.

FIG. 5 is a bottom view of a base plate of the apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The emergency or warning light apparatus shown in FIG. 1 includes a base 11 having a cylindrical bottom portion 13 and a transverse, generally horizontal upper portion 15, both such portions preferably being constructed of a highly heat conductive metal such as aluminum or aluminum alloy (both referred to hereinafter as being substantially aluminum).

Supported upon the base is a translucent, substantially cylindrical dome 17 having a lower cylindrical wall portion 19, an outwardly extending flange 21 protruding thereform, and a transversely or horizontally extending top enclosure 23. The flange 21 of the dome or lens is secured to the base 11 by an annular fastener 25 which is secured to the base by a plurality of suitable fastener devices such as the screws 26 that are received in suitable mating apertures in the annular fastener 25 and the cylindrical bottom portion 13 of the base. The lens is constructed of a translucent, sometimes transparent material, such as clear plastic or glass, to which a suitable dye is added during construction to provide the selected lens color. As perhaps best seen in FIG. 2, the exterior wall of the upper cylindrical portion has a ribbed configuration, with ribs 27 extending circumferentially around the lens, such ribs forming discrete triangles as seen in the longitudinal section of FIG. 2, such that the hypotenuse of the ribs increases in length and decreases in angle relative to vertical progressively from the upper and lower cylindrical portions of the lens, toward a groove 29 in the approximate mid-section of the lens, such groove having essentially

vertical bottom surfaces and horizontal side surfaces as shown. This lens configuration is generally known as the "Fresnel" lens, named in honor of Augustin Jean Fresnel (1788–1827), the celebrated French physicist. Light rays radiating from a bulb placed in a central location on the interior of the lens are deflected horizontally by the surfaces seen as hypotenuses in the cross-sectional view of FIG. 2, thus minimizing dissipation of energy in upward or downward directions where light transmission is not needed or required.

As shown in the fragmentary sectional view of FIG. 3, the circumference 31 of each section of the Fresnel lens forms a continuous, circular line, while the interior, circumferential surface 33 of the lens comprises a series of abutting, segments of circles to diffuse the light for the purpose of making it appear to fill the dome rather than radiate from one point.

Inserted into the upper portion of the Fresnel lens shown in FIG. 2 is a conical reflector 35 carried in the upper portion of the dome by attachment with a suitable epoxy resin 37 secured to the base of the conical reflector and to the peripheral interior surface of the top 23 of the dome. The apex 37 of the conical reflector is disposed toward the bulb, said reflector thus limiting light energy dissipation through the top of the dome, and rather, deflecting upwardly traveling light in a transverse or horizontal direction, generally complimentary with the ribs of the Fresnel lens. While the conical reflector does not reflect light rays radiating from the bulb in parallel, horizontal paths in the manner of the Fresnel portion of the lens, it nonetheless deflects the light rays toward the cylindrical Fresnel portion of the lens such that this latter portion directs the light rays in the finally desired, generally horizontal or transverse directions, where the rays are easily seen by a viewer. A conical reflector 35 may be constructed of any suitable light reflecting material, or alternatively may have a light reflective coating 39 placed on the interior conical section. Preferably, the angle of the cone with the base of the cone, as seen in FIG. 2, lies within a range of 20° to 30°.

As seen in FIG. 1 and extending upwardly from the transverse upper portion 15 of the base is a pedestal 41 which receives and supports a bulb 42 that preferably is a "Xenon" bulb of a type and configuration commonly used as a strobe light. Such bulbs are commercially available and when energized with a suitable quantity of electrical energy create light through the process of ionizing the xenon gas inside a transparent or translucent tube 43. While xenon filled bulbs are presently preferred, the invention is not limited to use with any particular light source.

When utilizing a strobe type light source, the electrical energy transmitting circuit commonly utilizes solid state circuitry that includes a power transistor 45 which generates significant quantities of heat. Since the circuitry (not shown) is enclosed within the base 11, which is preferably sealed to prevent the ingress of moisture and other matter potentially harmful to the circuitry the heat generated by the circuitry is capable of increasing to such an extent that damage to circuit components is possible. A significant portion of the heat build-up is caused by the power transistor, and thus FIG. 4 discloses a means for transferring the heat from the power transistor to the exterior of the base, where it may be better dissipated into the atmosphere.

If the base 11, shown partially in FIG. 4, is constructed of a highly heat conductive metal such as aluminum or aluminum alloy, the power transistor 45 may be secured directly thereto with a fastener means 49, in this instance a bolt with threads 47, extending through aperture 48, and nut 51, also constructed of a highly heat conductive metal, preferably an aluminum alloy, though possible of a less conductive material such as steel, such that the heat in the transistor is transmitted through the heat sink which consists of the fastener metal and the metal of the base. By this means, heat is dissipated into the atmosphere and thus, does not rise to levels capable of damaging the other, frequently heat sensitive, components of the circuitry.

With reference to FIG. 1, the base includes a lower plate 53 secured to the remainder of the base with fasteners 55 that extend into mating apertures respectively located in the plate 53 and the cylindrical bottom portion 13 of the base. A central aperture 57 is formed in the base and threaded as indicated to receive a threaded support bar (not shown), which is common means of mounting emergency or warning lights to vehicles or other supporting structure. In addition, a plurality of smaller aperture 59, threaded if desired, are clustered around the central aperture for the purpose of receiving fasteners for securement to a mounting plate or bracket in the support structure.

Finally, a plurality of sockets 61 that protrude inwardly from a bottom surface 63 of the base plate each receive a magnet 65, secured therein by suitable means such as epoxy resins for the purpose of enabling magnetic attachment to a support structure.

Hence, the light apparatus may be secured to support structure in any one of a number of convenient manners.

It should be apparent from the foregoing that an invention having significant advantages has been provided. A combination of a translucent or transparent dome having a Fresnel lens configuration and a conical reflector increases the operating efficiency and effectiveness of the light apparatus by minimizing the radiation of light energy in directions where those persons needing warning are uncommonly located. Moreover, the problem of heat increase and component damage is minimized by the above-described method of securing a power transistor to a heat conductive housing to dissipate heat into the atmosphere. In addition, the base structure described above enables connection of the light apparatus to a supporting structure by a variety of methods, a time conserving and inventory saving feature of the invention.

While the invention has been shown in only one of its forms, it should be apparent to those skilled in the art that it is not so limited but is susceptible to various changes and modifications without departing from the spirit thereof.

I claim:

1. An emergency or warning light apparatus comprising:

a base;

a high intensity bulb carried by and extending generally outward from said base;

a translucent, substantially cylindrical dome secured to the base to cover said bulb, said dome having a Fresnel, ribbed pattern on its cylindrical wall surface to direct light rays from the bulb in transverse planes to optimize eye level light intensity; and

a conical reflector carried in the upper portion of the dome, having the apex disposed from the base of the cone toward the bulb, said reflector limiting light energy dissipation through the top of the done, but rather, deflecting upwardly traveling light rays in a transverse direction.

2. The apparatus of claim 1 in which one half the included angle of said conical deflector is within a range of 20° to 30°.

3. An emergency or warning light apparatus comprising:

a base;

a high intensity bulb carried by and extending generally outward from said base;

a translucent, dome secured to the base to cover said bulb;

said base including a cylindrical bottom portion and a transverse upper portion constructed of highly heat conductive metal;

a power transistor;

a fastener means constructed from a highly heat conductive metal securing the power transistor to said base and defining therewith a heat sink to transfer to the atmosphere the heat generated by the power transistor.

4. The apparatus of claim 3 in which said power transistor has an aperture and the fastener means extends through said aperture.

5. The apparatus of claim 3 in which said highly heat conductive metal of the base is substantially aluminum.

6. The apparatus of claim 5 in which said fastener means is constructed substantially of aluminum.

* * * * *