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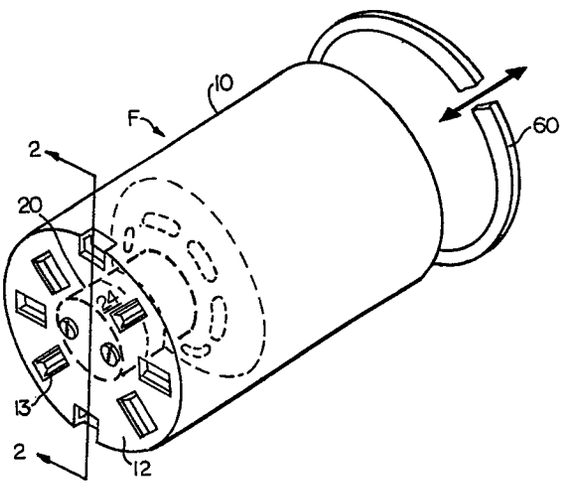
(54) Improved lighting fixture.

(57) A lighting fixture primarily for use in a recessed environment includes a thermoplastic, tubular canister (10) having an open, light-emitting end and an opposite, substantially closed end (12) with a plurality of vents (13) in said closed end for permitting the escape of excess heat. For further prevention of heat buildup, a perforated metal reflector surrounds the light bulb to reflect heat outwardly through the open end of the canister. The socket (20) which receives the light bulb is releasably secured within the canister and includes a strain relief means for preventing accidental damage and/or disconnection of the electrical wires which connect the power source to the fixture.



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IMPROVED LIGHTING FIXTURE

Background and Summary of Present Invention

Electrical lighting fixtures of a type designed to be recessed into a wall or ceiling structure are well known and are found in many forms. Most of the fixtures include a housing having an open, light-emitting end, the terminal edges of which are mounted flush in a common plane with the surrounding wall. The major portion of the housing including the socket and the light bulb are concealed within the wall. A diffuser and/or decorative flange or cover plate may conceal the bulb and the adjoining edges of the fixture and the surrounding wall or ceiling opening. A major problem with such fixtures is the buildup of heat within the canister, particularly if the canister is made of metal. Such heat buildup causes damage to the fixture and/or the bulb and may on occasion create a fire hazard.

In addition to room lighting, such fixtures have found a popular place in furniture and cabinets such as those used in dining rooms, or other types of display cabinets. Because of the wide variety of cabinet styles, previously known recessed fixtures have been expensive to produce for a variety of reasons. First, there has been the necessity of fabricating the canister and the socket from different, relatively expensive materials. For example, the canisters are traditionally formed from a variety of metals such as aluminium. The sockets are primarily of a ceramic nature.

A second disadvantage is in providing the canisters in a wide range of sizes and lengths. While a standard diameter is relatively simply accommodated, the desired length of canister is subject to much fluctuation, particularly in the furniture industry.

The only previous way to supply the variety of lengths was pre-cutting the metal canisters in a number of stock lengths. However, maintaining an adequate inventory of sizes is expensive in both the purchase of units and in the provision of space for stock.

On the other hand, the present invention is directed to a recessable light fixture having a canister and a screw socket both formed of a moldable, thermoplastic material. While the two elements, in a preferred embodiment, are molded in separate processes, and are later assembled into one unit, the overall production costs of molding are considerably less expensive than production of prior known fixtures. The preferred unit includes a heat resistant thermoplastic canister having a hollow, tubular shape with one open end and an opposite, substantially closed end as will be detailed below. The canister is molded to one stock length, but is of a material which can be easily cut to any desired shorter length by use of simple tools at the installation site. Although the preferred embodiment is used in recessed lighting, the fixture is also adaptable for use in track lighting systems.

The improved molded socket member which receives the light bulb is assembled by screw attachment to a receiving seat in the closed end of the canister. The receiving seat is molded integrally into the closed, upper end of the canister. A strain relief means is integral to the combined socket husk receiving seat and provides adequate UL-approved protection against damage to electrical wires and connections from the accidental pulling or application of force. All outer elements of the socket, as mentioned before are molded from an electrically non-conductive, heat resistant and flame

retardant material. The preferred material has a heat distortion temperature greater than 300°F and provides improved protection from both electrical shock and damage to the fixture from buildup of excess heat from extended periods of use. The material also is compatible with use of standard size light bulbs.

As a further protective device to prevent excessive heat buildup within the canister, a perforated metal reflector surrounds the light bulb and acts to reflect both heat and light outwardly from the open, lower end of the canister. The perforations provide means for heat to escape backwardly out of the vented rear wall of the canister. The tubular neck portion of the reflector is designed to slip over the outer surface of the socket where it is held in place by friction. When thus emplaced, the perforated portion of the reflector lies between the light bulb and the wall of the canister.

The objects of the present invention include: the provision of an improved recessed light fixture having means to substantially reduce heat buildup inside the fixture; the provision of a fixture wherein the primary elements are all formed of heat resistant thermoplastic material; the provision of a canister, socket, and reflector which are economically manufactured and easily and quickly assembled; and the provision of a canister and socket having an improved, built in strain relief means.

Other and further objects and advantages will become apparent as the following detailed description is studied in conjunction with the accompanying drawings of which:

Figure 1 is a perspective view of a preferred embodiment;

Figure 2 is a sectional view taken along lines 2-2

of Figure 1; and

Figure 3 is an exploded perspective view of the socket portion with portions of the light fixture broken away.

Detailed Description of A Preferred Embodiment

Looking first at Figure 1, the light fixture F includes a canister 10 and an inner socket member 20 attached to the upper end thereof. The preferred canister 10 is shown in a cylindrical shape although other shapes are possible. The basic cylinder 10 includes an upper, substantially closed end wall 12, and an opposite, open end 14. The open end, of course, is the light emitting end and provides access for removing and replacing light bulbs into the socket 20. The end wall 12 includes a plurality of slots 13 for heat to escape therethrough. The slots are designed to allow maximum dissipation of heat while inhibiting the escape of light to some degree. The end wall 12 further includes a socket receiving seat 24 molded integrally therein.

The socket member 20 basically comprises the bulb receiving segment or husk 22, and the receiving seat 24 which is molded integrally to the canister end wall 12. The bulb receiving segment or husk 22 of the socket member includes an outer cylindrical wall 26 molded from a non-conductive, flame retardant, thermoplastic material, as is the seat 24 in the end wall 12. In the preferred embodiment metallic, conductive liner 28 is inserted and secured into the cylindrical outer wall 26, and has positive and negative electrical contacts for the bulb base. The metallic liner 28 also includes screw threads 30 for receiving the light bulb. Alternatively the cylindrical wall 26 could be threaded and the electrical connection assembled separately therein.

The receiving seat portion 24 of the socket is molded integrally to canister end wall 12 and formed from the same non-conductive thermoplastic material as the socket 22. The receiving seat 24 joins the husk 22 to the canister. Receiving seat 24 is formed by shortened cylindrical wall 36 extending inwardly from the closed end 12 and an annular ledge 37. To join the socket member 20 thereto, the peripheral edge of the closed end of husk 22 is positioned within the wall 36, with the screw holes 40 aligned with the threaded apertures 42 in the socket member 20. Screws 38 are then inserted and threaded into apertures 42 and, thus connected, the two members 22, 24 are secured to each other as shown in Figure 2.

The cylindrical wall of husk 22 is tapered inwardly and downwardly in a direction away from the closed end of the husk 22 a very slight degree to permit easy removal from the mold as well as to more easily mount reflector R. The reflector neck 44 of the reflector R has a corresponding taper equivalent to that of the socket 22 so that the two can be slipped together and maintained as an assembled unit as will be described below.

Before describing the reflector R, it should be noted that the socket also includes the aforementioned strain relief means. As explained above, obtaining UL approval requires that a strain relief mechanism be supplied on lamps and fixtures. The wiring must have a resistance to pull-out equivalent to thirty-five pounds. Prior approaches have included various kinds of clamps and/or other additional elements to secure the wiring. The elements of the present strain relief mechanism are, however, molded into the socket receiving seat and husk members and require no further elements such as clamps to be added thereon. As shown

in Figures 2 and 3, the electrical wiring 50 is placed in channels 52 which are on either side of the top surface of the bulb portion 22 and inserted through adjacent aperture 54 into the husk for connection to the respective electrical contacts. After wires 50 are laid in place in the channels, the seat 24 is aligned for screw attachment to bulb portion 22. When the screws are fastened into place, wall bosses 56 are compressed onto the wires in the channels and securely clamp the wires therein. Connections of wiring to the metal husk are conventional and do not require detailed description herein.

The reflector R as best seen in Figures 1 and 2 includes an upper neck portion 44 and a flared, reflecting portion 46 having a plurality of perforations 48 therein. The reflector is formed of a metallic material such as aluminum, and has a reflective inner surface. The perforations 48 are spaced around the circumference of the flared portion 46 and may be in the form of an elongated slot as shown, or alternatively in the form of round apertures, spaced equidistantly around the flared surface. Thus arranged, the heat which is created by the light bulb is dissipated through the apertures 48 and out the slots 13 in canister wall 12.

Heat tests performed by an independent testing laboratory reveal a significant decrease in heat buildup in the light fixture when the reflector is included. The thermoplastic fixture as herein described was tested with and without the reflector, and temperature measurements were made of the various components of the fixture. The results are detailed

in the table below.

Component	Without Reflector	With Reflector
Screw Shell	146°C	76°C
Top Screws	70°C	57°C
Canister	69°C	71°C
Canister Front Lip	71°C	64°C
Reflector		59°C

While the preferred embodiment is shown to include the metal liner 28 which is secured into the socket after the socket is molded, the material used for molding the socket and canister is a type which can be threaded to receive a light bulb directly. Preferably the material is a thermoplastic having a heat distortion factor greater than 300°F, is very rigid, and can be threaded directly. Further, it is electrically non-conductive and flame retardant.

A preferred such thermoplastic is sold under the tradename of Valox 752 manufactured by G.E. Valox is a mineral-filled thermoplastic polyester that has superior electrical compatibility, has improved rigidity and impact strength, and superior processing characteristics in many environments.

For the canister 10 a thermoplastic material known by the trade name of Lexan is preferred because the canister can be injection molded in one or a few standard sizes and then cut to desired shorter size by use of simple, conventional cutting tools. Inventory and storage requirements are thus significantly decreased when a few standard sizes suffice for a variety of applications. The thermoplastic material also eliminates the problem of rust which occurs with metal canisters. Additionally, the use of plastic to form the canister allows utilization of standard size light bulbs without concern about excess heat, rather than being required to use specially made, small, non-stock bulbs.

When the canister is cut to the desired length and installed in the recessed environment, the exposed edges may be concealed by a decorative flange 60 which fits thereover. The flange can be of metal, plastic or other material suitable for a variety of decors. Such flanges are conventionally known.

While the socket and canister are shown and described according to a preferred embodiment, other changes and modifications are foreseen, and the scope of the invention is to be limited only by the claims below.

WHAT IS CLAIMED IS:

1. A lighting fixture including:

a) a hollow canister having at least one side wall, a first, open end for emission of light therethrough, and an opposite, substantially closed second end;

b) a socket member including a threaded husk portion for receiving a light bulb and means for attaching said socket member to said closed end of said canister; and electrical wiring connecting a source of electrical energy with said light bulb;

c) a reflector means within said canister releasably attached to said socket and interposed between said light bulb and said closed end for reflecting substantially all light emitted by said bulb outwardly through said open end; said reflector including a plurality of perforations for dissipation of heat therethrough;

d) said substantially closed end of said canister including a plurality of vents therethrough for emission of heat from within said canister.

2. A lighting fixture according to claim 1 wherein said means for attaching said socket member comprises:

a) a receiving seat integral with said closed end of said canister;

b) means for releasably attaching said husk portion to said receiving seat;

c) a strain relief means formed by the attachment of said husk member to said receiving seat for clamping said electrical wiring therebetween according to required safety

standards;

d) said socket being formed of a thermoplastic material having the characteristics of resisting electrical conductivity and having a heat distortion temperature greater than 300°F.

3. A lighting fixture according to claim 1 wherein said husk portion includes a closed end adjacent said receiving slot and a cylindrical wall tapering inwardly and downwardly therefrom; said reflector is of a substantially funnel-shape formed by a neck portion and an outwardly flared reflecting portion; said neck portion being of a hollow tubular shape and tapering inwardly in a corresponding manner to the taper of the cylindrical wall of said husk portion, the inner dimensions of said tapering neck portion being such that said neck will slip over and fit tightly around said tapering socket husk portion and remain in place by friction; said reflecting portion including said plurality of apertures therethrough.

4. A lighting fixture according to claim 1 wherein said vents in said closed end of canister comprise a plurality of elongated slots positioned around the periphery of said closed end.

5. A lighting fixture according to claim 2 wherein said husk portion includes a closed end adjacent said receiving seat and a cylindrical wall extending toward the open end of said canister therefrom, said closed end including openings therein through which said electrical wires extend to the interior of said husk portion to operatively communicate with said light bulb, and said strain relief means comprises: a pair of opposing channels formed one each on opposing

sides of the closed end of said husk portion for receiving therethrough said electrical wires; a pair of opposing bosses positioned on the inner surface of said socket cap and adjacent said channels such that when said husk portion is assembled to said receiving seat of said canister said bosses will clamp to the closed end of said canister and hold said electrical wires in said channels.

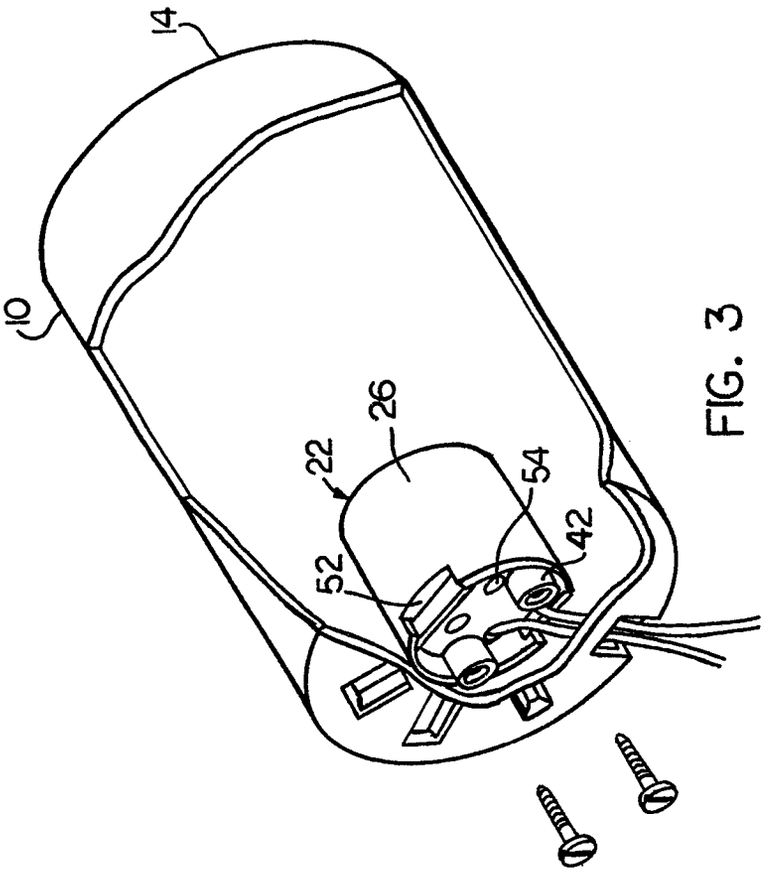

FIG. 3

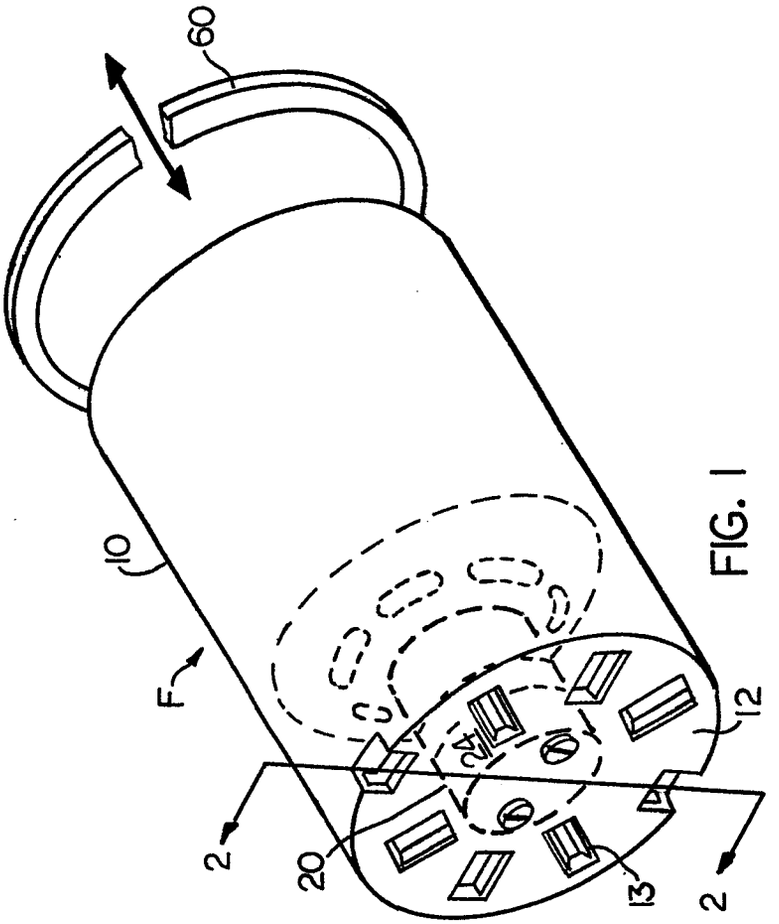

FIG. 1

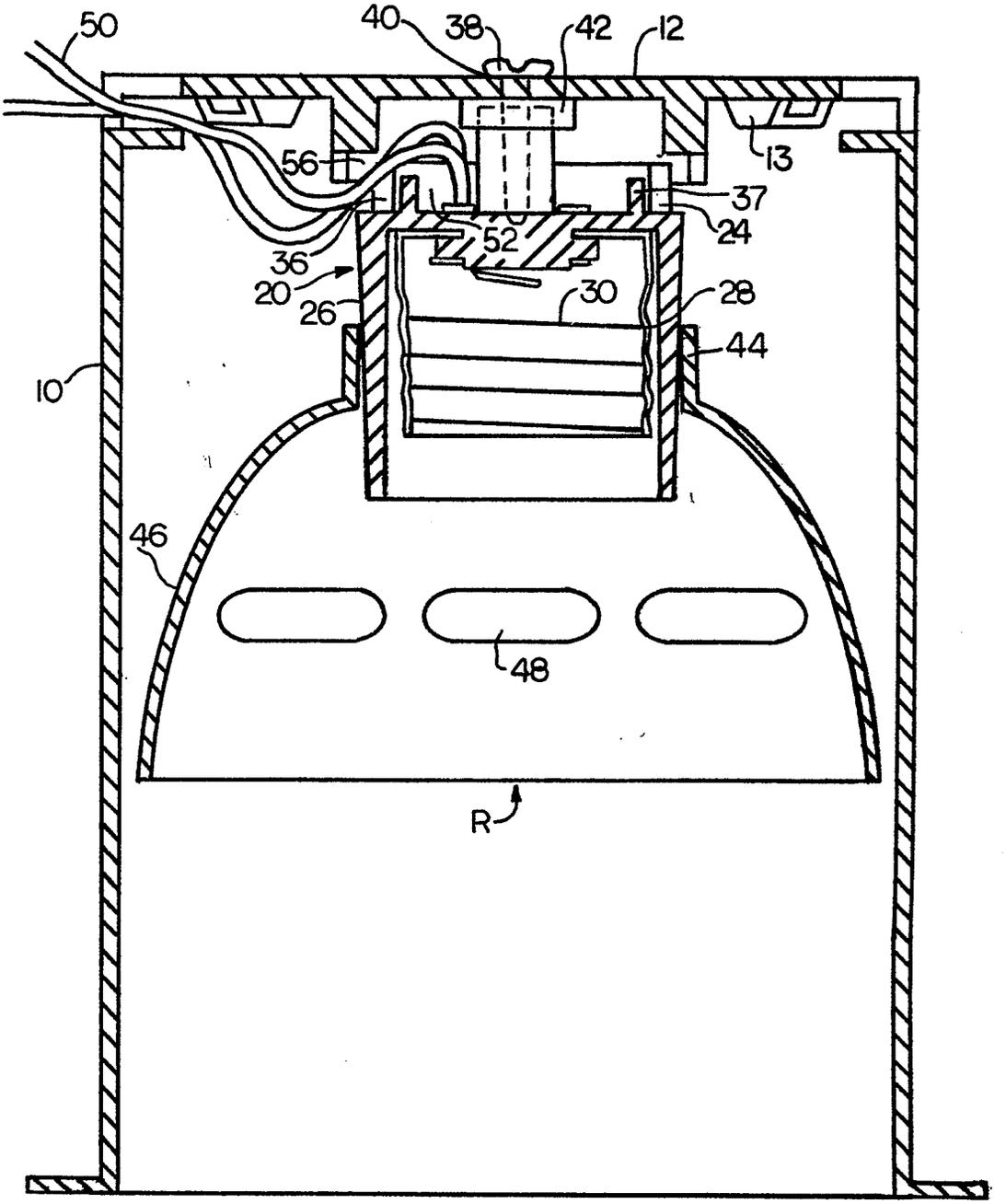

FIG. 2

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EUROPEAN SEARCH REPORT

Application number

EP 84 30 0196

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
X	US-A-3 388 249 (SIEGEL) * Column 5, lines 24-27 *	1,3	F 21 S 1/02
A	US-A-4 337 508 (MOFFATT) * Column 3, lines 10-19 *	1,2	
A	US-A-4 025 779 (AHRONI) * Figure 2 *	1,4	
A	GB-A- 963 569 (SHAW) * Page 2, line 84 *	1,2	
A	GB-A- 905 249 (SHAW) * page 2, lines 39-43 *	1,2	
A	DE-A-2 100 527 (JACOBSEN) * Page 3, lines 17-22 *	5	TECHNICAL FIELDS SEARCHED (Int. Cl. ³) F 21 S F 21 V H 01 R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	06-04-1984	FOUCRAY R.B.F.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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