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(54) Title of the Invention: **Fire rated LED down-light that dissipates the excess heat via a front bezel trim heat-sink**

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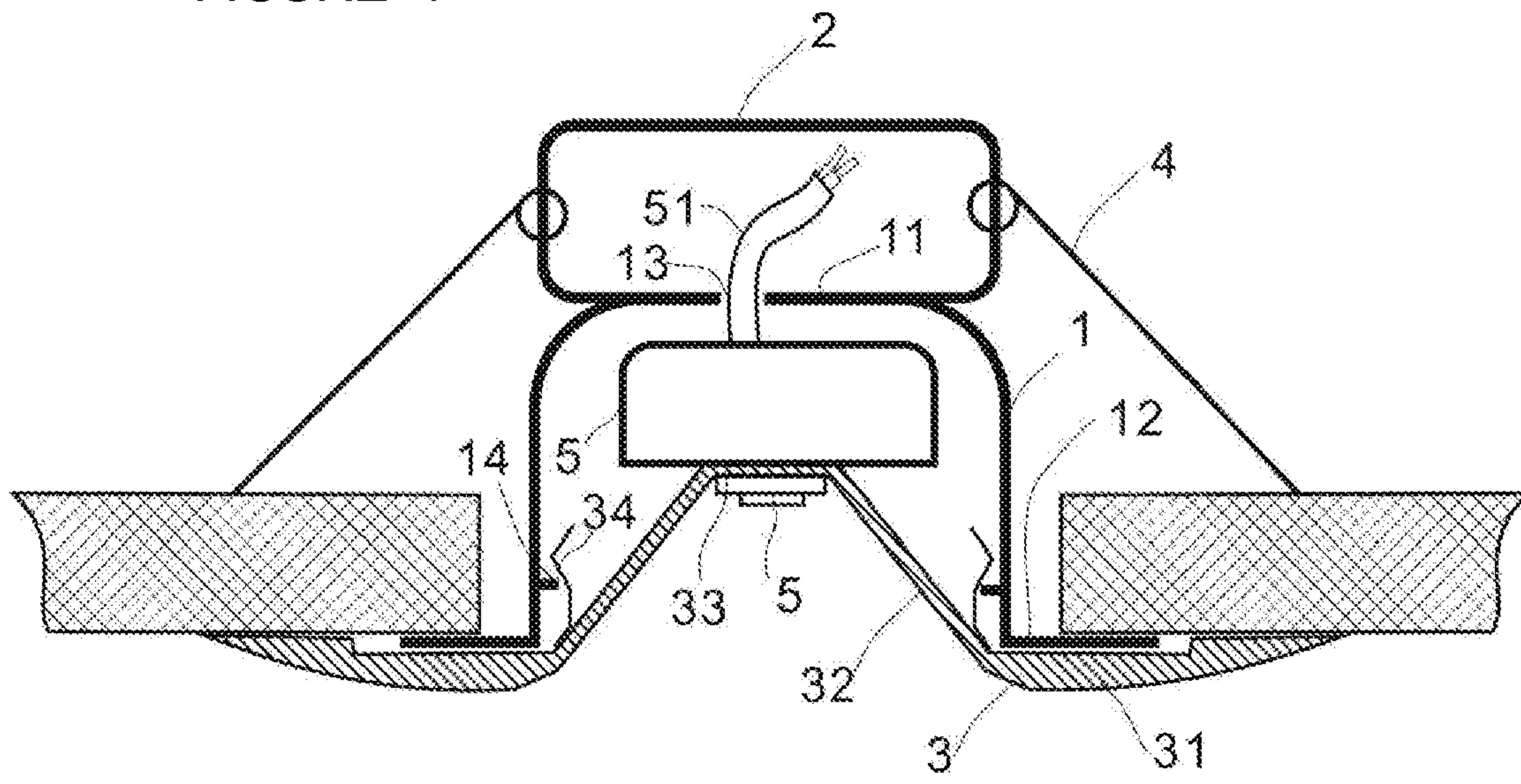
Additional Fields

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Other: **None**

GB 2509772 B

FIGURE 1



Description:

. Fire rated LED down-light that dissipates the excess heat via a front bezel trim heat-sink.

[a] Background to the Invention

Previously the conventional way to construct a fire rated LED down-lighter was to place a heat-sink on top of the LED circuit board within the main body of the Luminaire. Controlling the LED from an external Driver [electronic control gear]

[b] Detailed Description of Invention

[a] An LED self contained Down lighter with a fire rated construction, integral driver [electronic control gear] and reflector housing trim bezel heat sink/ dissipater.

[c] Examples:

An example of the invention will now be described by referring to the accompanying drawing Fig. 1

Figure 1 illustrates a typical arrangement of the current invention. Figure 1, shows a fire rated LED recessed downlight, it consists of [1] a steel can with enclosed back [11], a small wiring cable entry hole [13], extended circular flanged edge at the front opening [12] and a steel ring [14] welded to internal wall of the steel can. Steel spring holder [2] that is attached to the top of the steel can [1]; a pair of spring clips that are attached to the side of the spring holder; an cylindrical aluminium inverted dish in the shape of a brimmed hat. The aluminium unit further consists of, back plate [33] where led/led pcb is attached to, wall [32], which may also be shaped to function as reflector, front decorative ring that also functions as the heat sink, elastic clips [14] that holds the aluminium unit [3] to the steel can [1]. An LED driver [4] that is attached to the back of the aluminium unit with electrical cable [41] that connects to external mains power source.

The outer body canister sometimes referred as a fire can is made from materials that can sustain a high temperature [over 1000degrees], usually steel. The spring holder is fixed to the outer canister, [2], on both sides of the spring holder there are two apertures, as shown in the diagram, allowing the spring clips to be attached to. As shown in Figure 1, the fire can is inserted to an opening in the ceiling, where the diameter of the opening is smaller than the maximum outer diameter of the flanged lower edge. The spring clips lifts the fire can upwards, locating the fire can in the ceiling. Once the fire can is in position, it covers the opening in the ceiling completely, forming a fire resistant layer.

Patent Application Submission

2

The aluminium unit including a large decorative ring at the front opening serve the main purpose of heat dissipation. The LED is attached to the aluminium can, the heat conducts through the wall, reaches the front ring where heat exchange with surrounding air takes place. The LED driver[4] is fixed to the back of the aluminium can. The electric input cable of the driver goes through the wiring hole [13] connecting to external power supply. The input electrical cable is wired to the driver through internal terminals in the driver box.

The Aluminium can [3] with the LED chip [5] and LED driver[4] forms a LED lighting module that can be attached/detached to/from the fire can. When attaching the said lighting module, it is pushed into the fire can [1]. The clips are first pushed towards the centre of the lighting module by the steel ring[14], and then extend outwards to hold on to the steel ring once the lighting module is fully inserted into position. The lighting module can be detached from the fire can[1] by pulling it out. During the movement the elastic clips are again pushed inwards by the steel ring, allowing the LED lighting module to be fully detached from the fire can.

Drawing Key :

FIG: 1: CROSS SECTION OF LUMINAIRE LOCATED IN CEILING

1 -STEEL BODY OF LUMINAIRE

11 - ENCLOSED STEEL BACK OF LUMINAIRE BODY

12 - FLANGE ON BASE OF STEEL BODY

13 - SMALL CABLE ENTRY IN 11

14 -STEEL FIXING RING ON INSIDE OF BODY

2 - FRAME FOR SPRING CLIPS, WHICH RETAIN LUMINAIRE IN CEILING

3 - Trim Bezel heat sink /dissipater

31 - bezel /heat sink base flange.

32 - bezel descending wall/ reflector

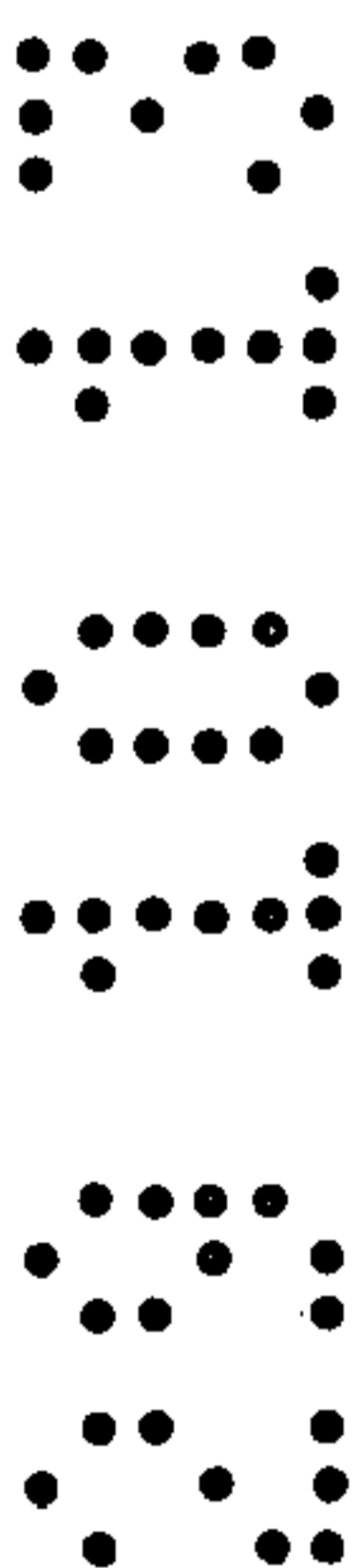
33 - heat sink attached to LED circuit board

34 - bezel retention system

4 - LUMINAIRE SUSPENSION AND RETENTION SYSTEM

5 - driver for LED

51 - MAINS SUPPLY CABLE



CLAIMS

1. A fire-rated recessed downlight comprising:

a fire-resistant outer body insertable in a ceiling aperture, the fire-resistant outer body comprising securing means for retaining the fire-resistant outer body within the ceiling aperture and a flanged edge at a front opening that sits on the surface of the ceiling in use; and

an LED lighting module which can be attached/detached to/from the fire-resistant outer body, the LED lighting module comprising: an aluminium heat conductive unit, and an LED light source locatable in the aluminium heat conductive unit;

the aluminium heat conductive unit comprising: a back plate to which the LED light source is attachable; a descending wall shaped to function as a reflector; and a front bezel that covers the flanged edge of the fire-resistant outer body and sits on the surface of the ceiling in use,

the aluminium heat conductive unit shaped as a dish with a brim and providing a heat conduction path therethrough from the back plate through the descending wall to the front bezel;

such that, in use, heat generated by the LED light source conducts through the aluminium heat conductive unit and dissipates to the open air via the front bezel of the aluminium heat conductive unit.

2. A fire-rated recessed downlight as claimed in claim 1, in which the outer body comprises a steel can.

3. A fire-rated recessed downlight as claimed in any preceding claim, in which the LED light source comprises an LED chip and an LED driver.

4. A fire-rated recessed downlight as claimed in claim 3, in which the LED driver is attached to a back of the aluminium heat conductive unit and sits between the aluminium heat conductive unit and the outer body.

5. A fire-rated recessed downlight as claimed in any preceding claim, in which the outer body comprises an internal ring, and the aluminium heat conductive unit

comprises spring clips for engaging the internal ring of the outer body to hold the aluminium heat conductive unit to the outer body.

6. A fire-rated recessed downlight as claimed in any preceding claim, in which the outer body has an enclosed back with a cable entry hole.

7. A fire-rated recessed downlight as claimed in any preceding claim, further comprising a spring holder fixed to the outer body and a pair of spring clips attached to the spring holder for retaining the outer body in a ceiling.

8. A ceiling fitted with one or more fire-rated recessed downlights, the or each fire-rated recessed downlight according to any preceding claim.