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(54) **Title: LED LIGHTING FIXTURE**

(57) **Abrégé/Abstract:**
A light fixture comprising a mounting housing comprising a junction box and a first connector component and a light housing comprising at least one light emitting diode contained within the light housing and electrically coupled to a second connector component complementary to the first connector component.

ABSTRACT

A light fixture comprising a mounting housing comprising a junction box and a first connector component and a light housing comprising at least one light emitting diode contained within the light housing and electrically coupled to a second connector component complementary to the first connector component.

LED LIGHTING FIXTURE

Field of the Invention

This invention relates to lighting fixtures. In particular, this invention relates to a mounted LED light fixture.

Background of the Invention

Lighting fixtures are used in many different applications. Indoor mounted lights in particular are used for different purposes, including ambient lighting, decorative lighting and lighting for specific work areas, often known as "task lighting." These different types of lighting have different requirements.

In addition, there are different types of light sources, including incandescent, fluorescent, and more recently, light emitting diodes (LEDs). These different types of light sources are advantageously used in different applications. Within each different type of light source there are also different colours of light, often referred to as the "colour temperature" of the light source. Thus, lighting for any particular purpose can be selected based on the type of light fixture and light source which is most suitable for the application.

LED lighting has certain advantages. LED lights consume significantly less electricity than incandescent lights, up to 80% less in some cases. Furthermore, LEDs are more durable, lasting fifty thousand to one hundred thousand hours as opposed to twenty thousand hours for average incandescent lighting. This makes LED lighting particularly suitable for certain applications were a high degree of illumination is required.

However, commensurate with the high level of illumination is a significant amount of heat which must be dissipated from the fixture. Furthermore, in certain applications where the light fixture is to be mounted into a surface which is not accessible, the light fixture must be completely self-contained including all connections to the electrical wiring, within a housing that meets all regulatory requirements. Furthermore, such a light fixture may need to be maintained or replaced and therefore access to the interior of the light fixture must be relatively easy and safe.

Brief Description of the Drawings

In drawings which illustrate by way of example only a preferred embodiment of the invention,

Figure 1 is a perspective view of a light fixture according to the invention in an assembled state;

Figure 2 is a partially exploded perspective view of the light fixture of Figure 1;

Figure 3 is a perspective view of the light fixture of Figure 1 taken from behind a panel in which the fixture is mounted;

Figure 4 is a partially exploded perspective view of the light fixture being mounted in the panel of Figure 3;

Figure 5 is a side elevation of the light fixture mounted in the panel of Figure 3;

Figure 6 is a rear perspective view of the mounting portion of the housing;

Figure 7 is a partially exploded perspective view of the mounting portion of the housing taken from below;

Figure 8 is a top plan view of a lighting portion of the housing;

Figure 9 is a side elevation of the lighting portion of the housing in Figure 8;

Figure 10 is a bottom plan view of the lighting portion of the housing in Figure 8;

Figure 10A is a bottom plan view of a further embodiment of the lighting portion of the housing without lens retaining clips;

Figure 11 is an exploded perspective view of the lighting portion of the housing in Figure 8; and

Figure 12 is a bottom plan view of lighting emitters mounted to a circuit board in the lighting portion of the housing in Figure 8.

Detailed Description of the Invention

The present invention provides a high-illumination LED lighting fixture 10 for recessed mounting. The lighting fixture 10 of the invention is particularly suitable for use as task lighting in applications which require high illumination and particularly in applications where the light fixture 10 might be exposed to extremes in temperature and/or humidity, for example for lighting within a fume hood above a commercial cook top where heat and steam may be present for prolonged intervals.

A lighting fixture according to the invention is illustrated in Figure 1. Lighting fixture 10 comprises two main housing components: a mounting housing 20 and a lighting housing 40, as illustrated in Figure 2. When the fixture 10 is mounted into a surface, for example a panel 2, the mounting housing 20 of the fixture 10 is recessed behind the surface, as illustrated in Figure 3. As shown in Figure 4, the mounting housing 20 maybe mounted to the panel 2 prior to installation of the panel, for example by affixing nuts 22 to bolts 24 upstanding from the mounting housing flange 26. The mounted fixture 10 is shown in Figure 5.

The mounting housing 20, best seen in Figure 6, comprises a flange 26 circumscribing a lower portion of the housing 20, and preferably providing upstanding bolts 24 for purposes of mounting the fixture 10 as described above. The flange 26 further includes embedded nuts 28 for receiving screws 42a (see Figure 4) for attaching the lighting housing 40 to the mounding housing 20. As shown in Figure 6, the mounting housing 20 further includes a junction box 30 having at least one opening 32 for receiving conductors from a mains power supply (not shown) and a junction box cap plate 34 (seen in Figure 4). The junction box cap plate 34 comprises terminals 34a for coupling the mains power supply conductors (not shown) to the male or female side of a press fit connector 36 mounted within the junction box 30 (best seen in Figure 7). The exterior of the mounting housing 20 is provided with generally radially extending fins 38 substantially circumscribing the junction box 30, to allow for heat dissipation behind the mounting surface 2. An elastomeric (for

example silicon) gasket 39 seals the flange against the panel 2 when the lighting fixture 10 is mounted. The mounting housing is preferably formed from cast aluminium, or another material designed to meet regulatory requirements and allow for effective heat dissipation.

The light housing 40 is illustrated in Figures 8 to 11. The light housing 40 comprises a flange 42 complementary to the flange 26 of the mounting housing 20 and having openings 44 adapted to align with the recessed nuts 28 in the mounting housing flange 26. Mounted on the top surface 46 of the light housing 40 is the other male or female portion of the connector 36, for press fit connection to the complementary portion of the connector 36 mounted into the junction box 30. The flange 42 surrounds a recess 48 within which is mounted the emitter board 60 and a glass lens 70, as shown in Figure 11. The emitter board 60, shown in Figure 12, maybe a standard LED circuit board, designed to withstand the high temperatures generated by prolonged use of the LEDs 62 in the operation of the light fixture 10. The LEDs 62 are preferably arranged generally symmetrically around the emitter board 60, providing for a generally even distribution of heat and light when the light fixture 10 is active. The emitter board 60 fits into the recess 48 and is retained by the wires grommet 54 and Epoxy material (not shown) and the glass lens 70, which is in turn retained by lens retaining clips 50 if used and the Epoxy potting material. The glass lens 70 is preferably a diffusing lens, and is formed from tempered glass capable of withstanding the high heat generated by the LEDs 62 and with suitable impact resistance to meet regulatory requirements.

The emitter board 60 is assembled to the light housing 40 by placing the emitter board 60 within the recess 48 and coupling the ends of the circuit tracks (not shown) to the portion of the connector 36 mounted to the top surface of the light housing 40 via suitable conductors (not shown) extending through opening 54, 64 in the light housing 40 and emitter board 60, respectively. The glass lens 70 is placed over the emitter board 60 and embedded in the potting Epoxy material (not shown) in which the potting material after curing will secure, seal and retain the glass lens 70. In the final assembly of the lighting fixture 10, which comprises the mounting housing 20 and lighting housing 40, the lens retaining clips 50 are swivelled into place and

tightened to retain lens in position. The clips 50 are optional and may be omitted, as in the embodiment of Figure 10A.

The mounting housing 20 is inserted into a suitable opening in the panel 2 and affixed (for example by attaching nuts 22 to upstanding bolts 24). The main power supply conductors (not shown) are introduced into the junction box 30 through opening 32 and retained by a suitable wire clamp. Terminals 34a may be used to connect the mains power supply conductors to the portion of the connector 36 mounted into the junction box 30, and the panel 2 is mounted to the surface (for example, inside a fume hood above a cook surface). The light housing 40 is mounted to the mounting housing 20 by properly aligning the openings 44 in the flange 42 with the nuts 28 in the flange 26, at which point the connector portion 36 attached to the light housing 40 is properly aligned with the complementary portion of the connector 36 mounted inside the junction box 30. The light housing 40 is pressed into the mounting housing 20 so that the complementary portions of the connector 36 are attached in press fit relation, and screws 42a are threaded into the nuts 28 to maintain the light housing 40 in place.

Thereafter, if servicing is required the screws 42a can be removed and the light housing 40 pulled off of the mounting housing 20, allowing access to all wiring connections within the junction box 30. This facilitates maintenance of the light fixture 10, and changing of the complete lighting housing 40 or the emitter board 60 when required.

Preferably once the emitter board 60 has been soldered to the conductors (not shown) for coupling to the connector portion 36 mounted to the light housing 40, a potting compound such as epoxy is poured into the recess 48 over the emitter board 60 and the lens 70 is affixed in place before the potting compound (not shown) hardens. The potting compound encapsulates the emitter board 60 and seals the lens 70 into the recess 48, thus protecting the emitter board 60 and soldered connections from environmental influences such as temperature and humidity. This is particularly advantageous in an application such as a fume hood disposed above a cook top, where high temperature and humidity conditions generally prevail during use. At the same

time, when the light fixture 10 is in use, heat is dissipated by the fins 38 into the fume hood, thus allowing the light fixture 10 to operate at acceptable temperatures.

To ensure an air tight seal after tightening of the 4 screws 72 between the two parts of final assembly of the lighting fixture 10, which comprises the mounting housing 20 and lighting housing 40, an elastomeric (for example silicon) gasket 71 is placed over flange 42 and trapped between flange 42 and flange 26 when the lighting housing 40 is affixed to the mounting housing 20.

The invention has been described in the context of a particular application, however its implementation is not so limited. The light fixture 10 of the invention may be used in other mounted applications.

Various embodiments of the present invention having been thus described in detail by way of example, it will be apparent to those skilled in the art that variations and modifications may be made without departing from the invention.

CLAIMS

1. A lighting fixture comprising:

a mounting housing comprising:

a junction box containing a first connector portion for coupling to a power supply, the first connector portion aligned with an axis of a mounting housing mounting direction, and

at least one mounting housing alignment feature situated on the mounting housing, and

a light housing mountable to the mounting housing in a mounting direction and comprising:

at least one light emitting diode electrically coupled to a second connector portion complementary to the first connector portion and adapted to be electrically coupled thereto, the second connector portion aligned with an axis of a light housing mounting direction, and

at least one light housing alignment feature situated on the light housing,

wherein the first connector portion is in fixed alignment with the at least one mounting housing alignment feature, and wherein the second connector portion is in fixed alignment of the at least one light housing alignment feature, such that positioning the light housing to align the at least one light housing alignment feature with the at least one mounting housing alignment feature aligns the axis of the light housing mounting direction with the axis of the mounting housing mounting direction and aligns the second connector portion with the first connector portion, such that after said positioning pressing the light housing in the light housing mounting direction towards the mounting housing engages and electrically couples the second connector portion with the first connector portion in a press fit relation to thereby supply electrical power to the at least one light emitting diode.

2. The lighting fixture of claim 1 wherein the first or second connector portions are accessible from an open end of the mounting housing, or from the junction box, or both.

3. The lighting fixture of claim 2 whereby the mounting housing is provided with an exposed flange for affixing the lighting housing to the mounting housing.

4. The lighting fixture of claim 3 wherein the lighting housing is provided with a flange complementary to the exposed flange of the mounting housing.

5. The lighting fixture of claim 4 wherein the at least one mounting housing alignment feature comprises fastening members extending toward a mounting surface, whereby the mounting housing can be mounted to the mounting surface with the fastening members extending through the mounting surface.

6. The lighting fixture of claim 2 wherein wiring connections can be accessed through an exposed face of the mounting housing or through the junction box.

7. The lighting fixture of claim 2 comprising an emitter board supporting a plurality of light emitting diodes.

8. The lighting fixture of claim 7 wherein the light housing comprises a flange surrounding a recess containing the emitter board, the recess being substantially filled with potting material and covered by a glass lens, the glass lens being retained in the light housing by the potting material.

9. A process for mounting a lighting fixture comprising:

a mounting housing comprising a junction box containing a first connector portion aligned with an axis of a mounting housing mounting direction and in fixed alignment with at least one mounting housing alignment feature situated on the mounting housing; and

a light housing mountable to the mounting housing in a mounting direction and comprising at least one light emitting diode electrically coupled to a second connector portion complcmcntary to the first connector portion and adapted to be electrically coupled

thereto, the first connector portion aligned with an axis of a light housing mounting direction and in fixed alignment with at least one light housing alignment feature, such that positioning the light housing to align the at least one light housing alignment feature with the at least one mounting housing alignment feature aligns the axis of the light housing mounting direction with the axis of the mounting housing mounting direction and aligns the second connector portion with the first connector portion, and wherein mounting the light housing to the mounting housing, comprises the steps of:

in any order,

connecting a power supply to the first connector portion, and

mounting the mounting housing to a mounting surface;

positioning the light housing to align the at least one light housing alignment feature with the at least one mounting housing alignment feature;

pressing the light housing in the light housing mounting direction into the mounting housing to engage and electrically couple the first connector portion with the second connector portion in a press; and

fastening the light housing to the mounting housing at the at least one light housing alignment feature and aligned at least one mounting housing alignment feature to maintain the light housing in place.

10. A light housing for a lighting fixture for a mounting housing having a junction box containing a first connector portion for coupling to a power supply, the first connector portion aligned with an axis of a mounting housing mounting direction, and at least one mounting housing alignment feature situated on the mounting housing in fixed alignment with the first connector portion, the light housing being mountable to the mounting housing in a light housing mounting direction and comprising:

at least one light emitting diode electrically coupled to a second connector portion complementary to the first connector portion and adapted to be electrically coupled thereto,

the second connector portion aligned with an axis of a light housing mounting direction, and at least one light housing alignment feature situated on the light housing in fixed alignment with the second connector portion,

wherein the light housing is mountable to the mounting housing by positioning the light housing to align the at least one light housing alignment feature with the at least one mounting housing alignment feature thus aligning the axis of the light housing mounting direction with the axis of the mounting housing mounting direction and aligning the second connector portion with the first connector portion, and pressing the light housing in the light housing mounting direction into the mounting housing engages and electrically couples the first connector portion with the second connector portion in a press fit relation.

11. The light housing of claim 10 wherein the first or second connector portions are accessible from an open end of the mounting housing, or from the junction box, or both.

12. The light housing of claim 10 whereby the mounting housing is provided with an exposed flange for affixing the lighting housing to the mounting housing.

13. The light housing of claim 12 wherein the light housing is provided with a flange complementary to the exposed flange of the mounting housing.

14. The light housing of claim 13 wherein the at least one mounting housing alignment feature comprises fastening members extending toward a mounting surface, whereby the mounting housing can be mounted to the mounting surface with the fastening members extending through the mounting surface.

15. The lighting housing of claim 10 wherein wiring connections can be accessed through an exposed face of the mounting housing or through the junction box.

16. The lighting housing of claim 10 comprising an emitter board supporting a plurality of light emitting diodes.

17. The light housing of claim 16 wherein the light housing comprises a flange surrounding a recess containing the emitter board, the recess being substantially filled with

potting material and covered by a glass lens, the glass lens being retained in the light housing by the potting material.

18. A light fixture comprising:

a mounting housing comprising:

a junction box containing a first connector portion for coupling to a power supply, the first connector portion aligned with an axis of a mounting housing mounting direction, the junction box being concealed behind a mounting surface when a mounting portion of the mounting housing is mounted to the mounting surface, and at least one mounting housing alignment feature situated on the mounting housing in fixed alignment with the first connector portion, and an exposed lower portion having an opening accessible when the mounting portion is mounted to the mounting surface; and

a light housing mountable to the exposed lower portion of the mounting housing and comprising at least one light emitting diode electrically coupled to a second connector portion complementary to the first connector portion and adapted to be electrically coupled thereto, the second connector portion aligned with an axis of a light housing mounting direction, and at least one light housing alignment feature situated on the light housing in fixed alignment with the second connector portion;

wherein wiring connections are accessible through both the exposed lower portion of the mounting housing and the junction box;

wherein positioning the light housing to align the at least one light housing alignment feature with the at least one mounting housing alignment feature aligns the axis of the light housing mounting direction with the axis of the mounting housing mounting direction and aligns the second connector portion with the first connector portion, and after said positioning pressing the light housing in the light housing mounting direction towards the mounting housing engages and electrically couples the second connector portion with the first connector portion in a press fit relation.

19. The lighting fixture of claim 18 wherein the light housing comprises a flange surrounding a recess containing an emitter board, the recess being substantially filled with potting material and covered by a glass lens.

20. A lighting fixture comprising:

a mounting housing, comprising:

a junction box containing a first power connector portion;

a plurality of heat dissipation fins extending from the mounting housing;

a flange extending from an exterior of the mounting housing; and

at least one mounting housing alignment feature; and

a light housing, comprising:

at least one light emitting diode electrically coupled to a second power connector portion complementary to the first power connector portion;

at least one light housing alignment feature,

the at least one mounting housing alignment feature and the at least one light housing alignment feature cooperating to direct the second power connector portion into electrical contact with the first power connector portion as the light housing is mounted to the mounting housing in a mounting direction.

21. The lighting fixture of claim 20, wherein the first or second power connector portions are accessible from an open end of the mounting housing, or from the junction box, or from both.

22. The lighting fixture of claim 20, wherein each of the first power connector portion and the second power connector portion comprises a contact surface generally parallel to the

mounting direction, and the contact surface of the first power connector portion slidingly engages the contact surface of the second power connector portion as a flange of the light housing engages the flange of the mounting housing.

23. The lighting fixture of claim 20, wherein the at least one mounting housing alignment feature comprises a recess in an edge of the flange extending from the exterior of the mounting housing, and the at least one light housing alignment feature comprises a corresponding recess in an edge of a flange of the light housing.

24. The lighting fixture of claim 20, wherein the at least one mounting housing alignment feature comprises fastening members disposed in the flange extending from the exterior of the mounting housing, and the at least one light housing alignment feature comprises corresponding openings.

25. The lighting fixture of claim 20 wherein wiring connections can be accessed through an exposed face of the mounting housing or through the junction box.

26. The lighting fixture of claim 20 comprising an emitter board supporting a plurality of light emitting diodes, wherein a flange of the light housing surrounds a recess containing the emitter board, the recess being substantially filled with potting material and covered by a glass lens, the glass lens being retained in the light housing by the potting material.

27. The lighting fixture of claim 20, wherein the at least one mounting housing alignment feature is situated on the flange of the mounting housing in fixed relation to the first power connector portion, and the at least one light housing alignment feature is situated on a flange of the light housing in fixed relation to the second power connector portion, and further wherein the first power connector portion slidingly engages and electrically couples to the second power connector portion as the flange of the light housing engages the flange of the mounting housing.

28. The lighting fixture of claim 20, the lighting fixture being adapted for mounting through a panel, wherein the flange extending from the exterior of the mounting housing

comprises a first face and a second face, the first face engaging a flange of the light housing and the second face contacting a face of the panel when the lighting fixture is mounted,

the junction box and the plurality of heat dissipation fins thereby extending through the panel when the lighting fixture is mounted.

29. The lighting fixture of claim 20, wherein the mounting housing comprises a recess for receiving an emitter board, the plurality of heat dissipation fins extending above the recess and from the junction box.

30. A light housing for use in a lighting fixture, the lighting fixture comprising a mounting housing, the mounting housing comprising a junction box containing a first power connector portion, a flange extending from an exterior of the mounting housing, at least one mounting housing alignment feature situated on the flange in fixed relation to the first power connector portion, and a plurality of heat dissipation fins extending from the mounting housing, the light housing being mountable to the mounting housing and comprising:

at least one light emitting diode electrically coupled to a second power connector portion complementary to the first power connector portion;

at least one light housing alignment feature situated on a flange of the light housing in fixed relation to the second power connector portion,

the at least one light housing alignment feature cooperating with the at least one mounting housing alignment feature to direct the second power connector portion into sliding engagement and electrical contact with the first power connector portion as the light housing is pressed into the mounting housing in a mounting direction and the flange of the light housing engages the flange of the mounting housing.

31. The light housing of claim 30, wherein the second power connector portion comprises a contact surface generally parallel to the mounting direction, the contact surface being

oriented to slidingly engage a corresponding contact surface of the first power connector portion of the mounting housing.

32. The light housing of claim 30, wherein the at least one light housing alignment feature comprises a recess in an edge of the flange of the light housing.

33. The light housing of claim 30, wherein the at least one light housing alignment feature comprises openings corresponding to fastening members disposed in the flange extending from the exterior of the mounting housing.

34. The light housing of claim 30 comprising an emitter board supporting a plurality of light emitting diodes.

35. The light housing of claim 34 wherein the flange of the light housing surrounds a recess containing the emitter board, the recess being substantially filled with potting material and covered by a glass lens, the glass lens being retained in the light housing by the potting material.

36. A method for mounting a lighting fixture, the lighting fixture comprising:

a mounting housing comprising a junction box containing a first power connector portion, a flange extending from an exterior of the mounting housing, at least one mounting housing alignment feature, and a plurality of heat dissipation fins extending from the mounting housing; and

a light housing comprising at least one light emitting diode electrically coupled to a second power connector portion complementary to the first power connector portion and at least one light housing alignment feature,

the method comprising the steps of:

in any order, connecting a power supply to the first power connector portion and mounting the mounting housing to a mounting surface;

positioning the light housing to align the at least one light housing alignment feature with the at least one mounting housing alignment feature;

pressing the light housing into the mounting housing in a mounting direction, the at least one light housing alignment feature cooperating with the at least one mounting housing alignment feature to direct the second power connector portion into electrical contact with the first power connector portion; and

fastening the light housing to the mounting housing to maintain the light housing in place.

37. The method of claim 36, wherein the lighting fixture is mounted through a panel, the panel providing the mounting surface, wherein the flange extending from the exterior of the mounting housing comprises a first face and a second face, the first face engaging a flange of the light housing and the second face contacting the mounting surface,

the junction box and the plurality of heat dissipation fins thereby extending through the panel when the mounting housing is mounted to the mounting surface.

38. The method of claim 37, wherein the each of the first power connector portion and second power connector portion comprises a contact surface generally parallel to the mounting direction, and the contact surface of the first power connector portion slidingly engages the contact surface of the second power connector portion as the flange of the light housing engages the flange of the mounting housing.

39. The method of claim 36, wherein the mounting housing comprises a recess for receiving an emitter board, the plurality of heat dissipation fins extending above the recess and from the junction box.

Fig.1

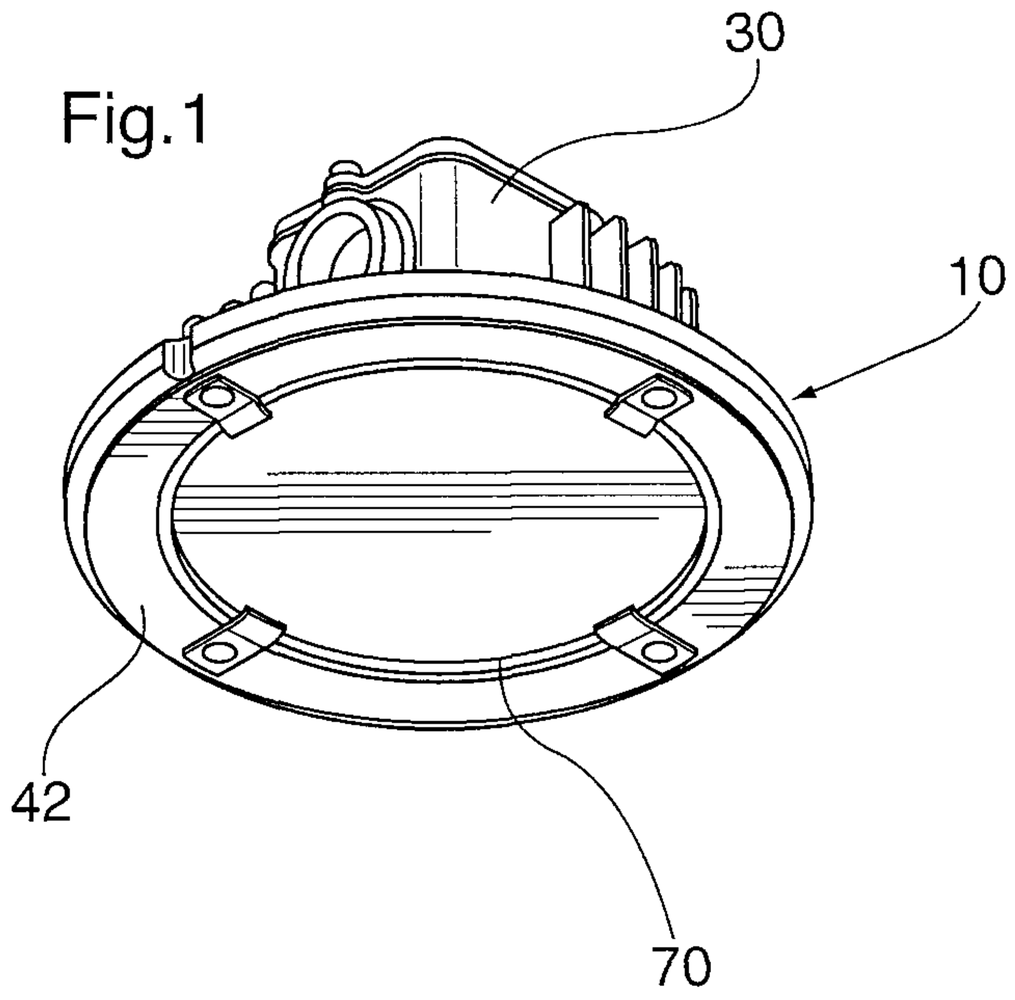
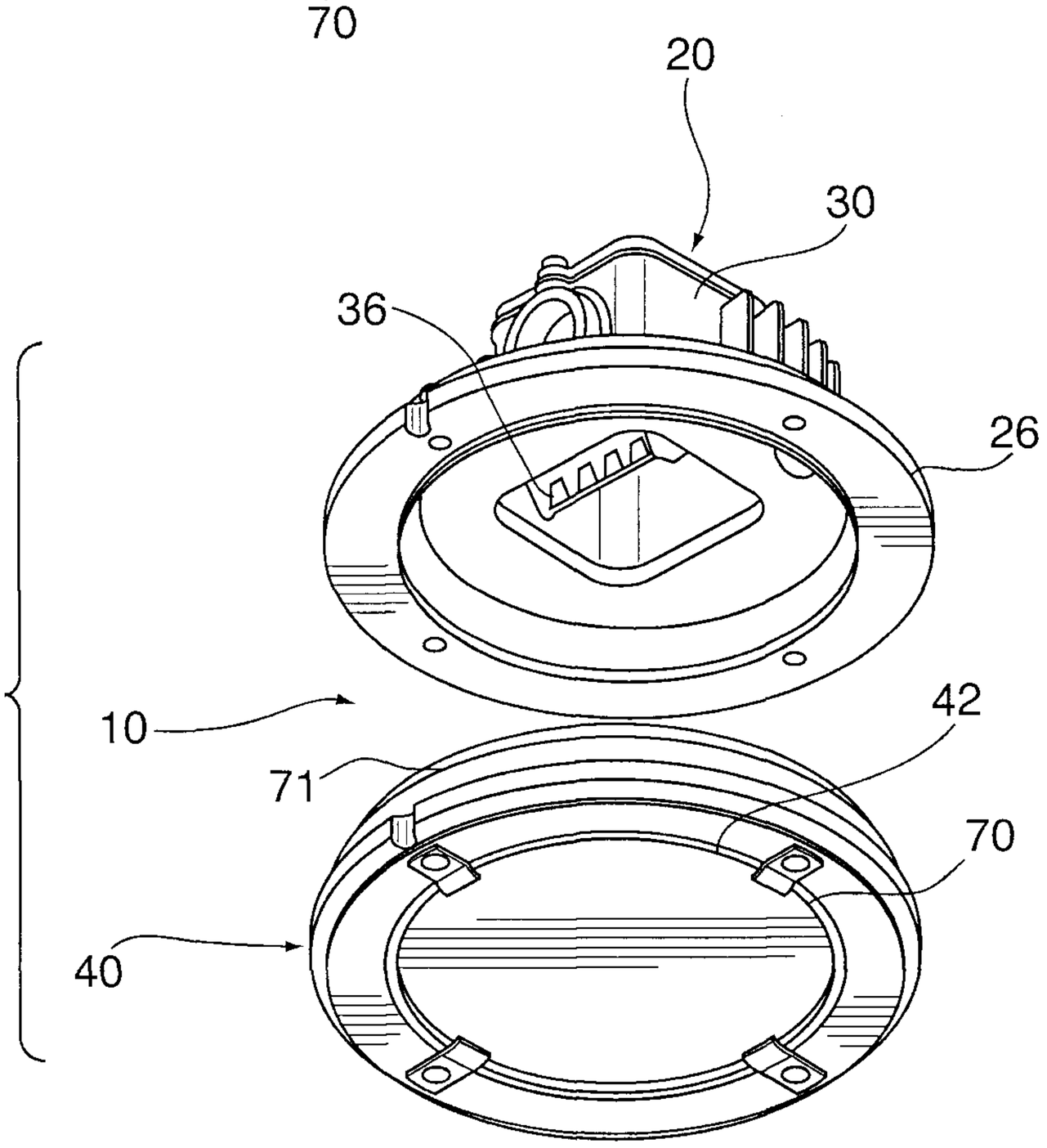


Fig.2



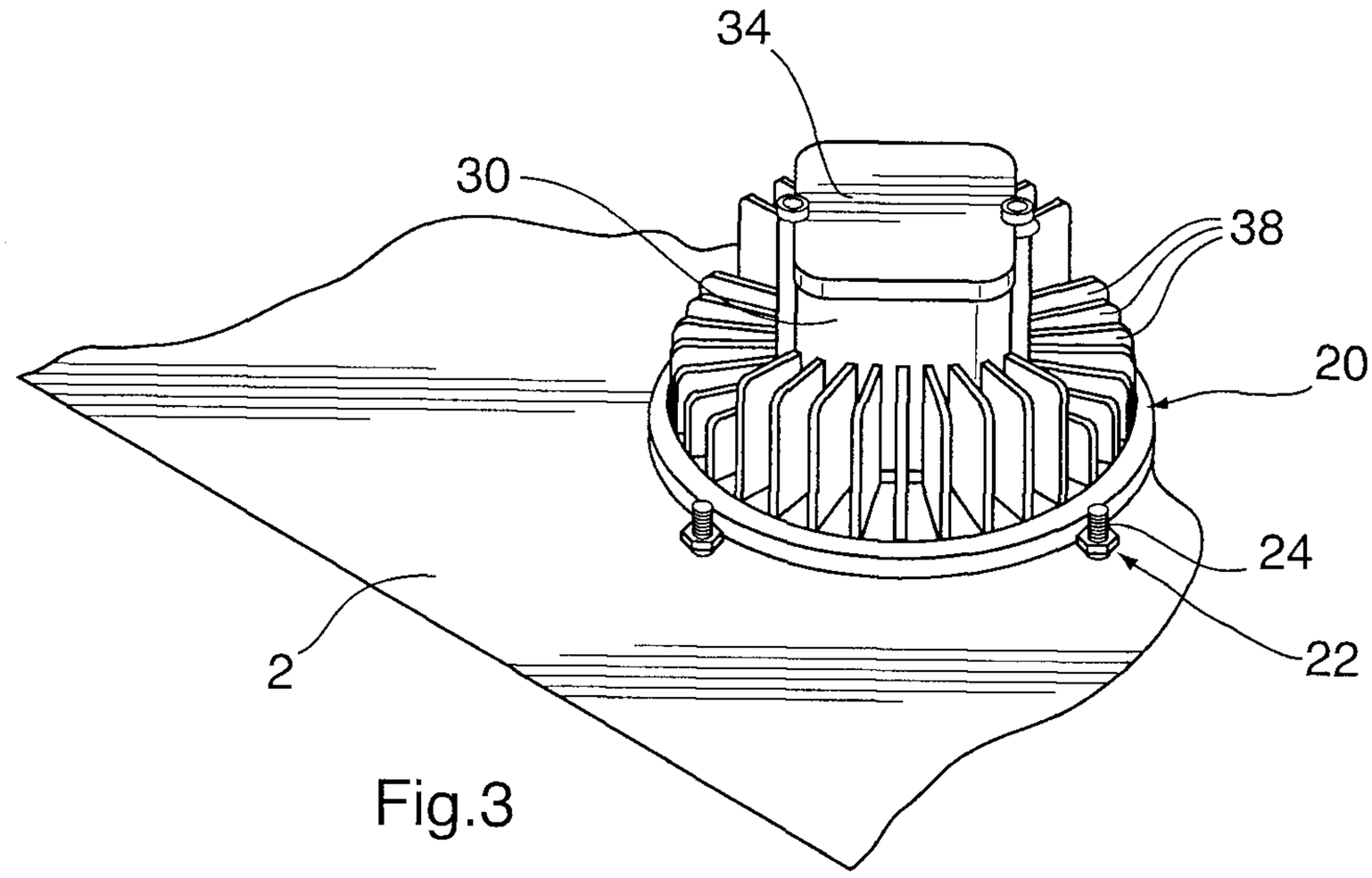
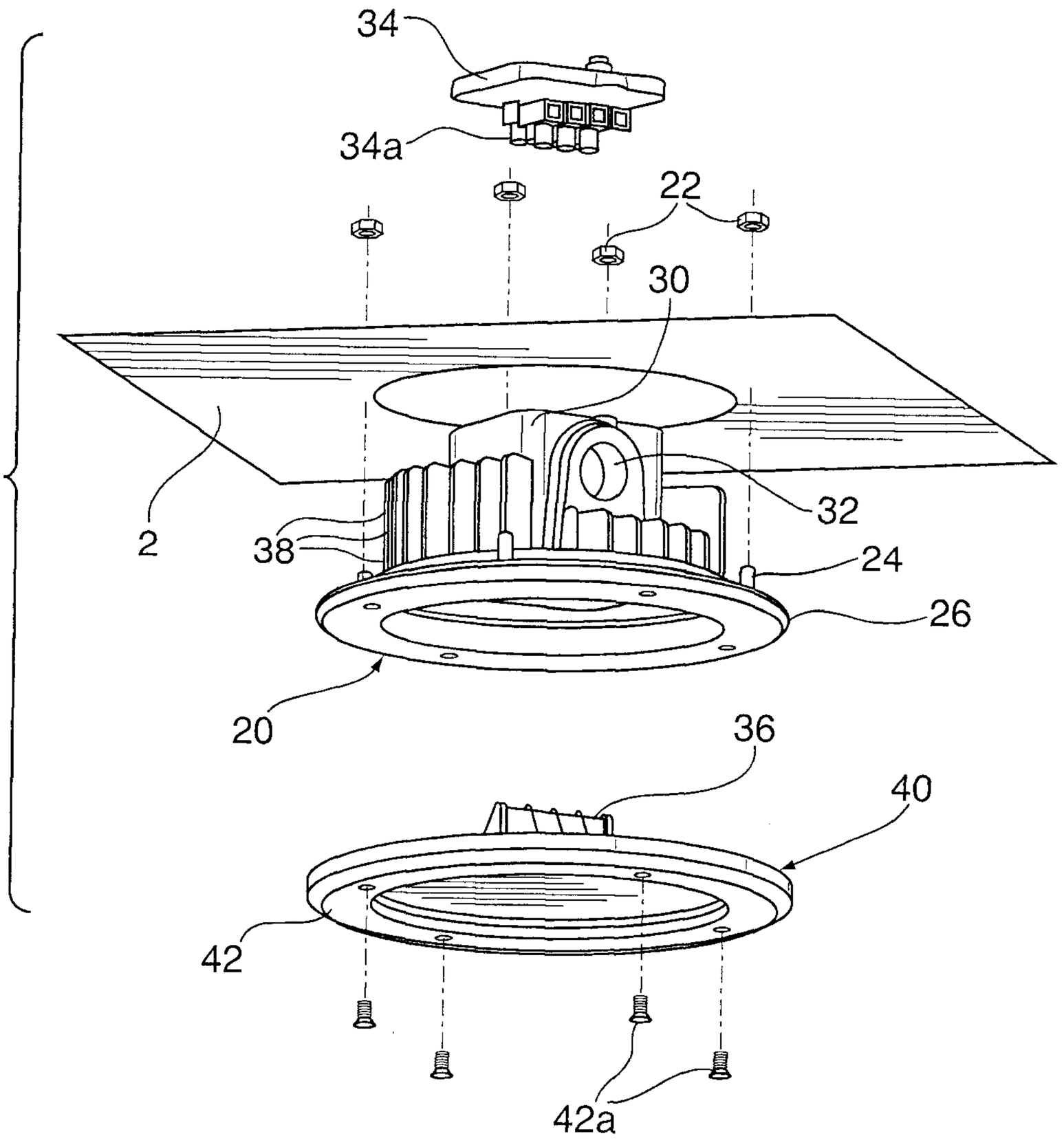


Fig.3

Fig.4



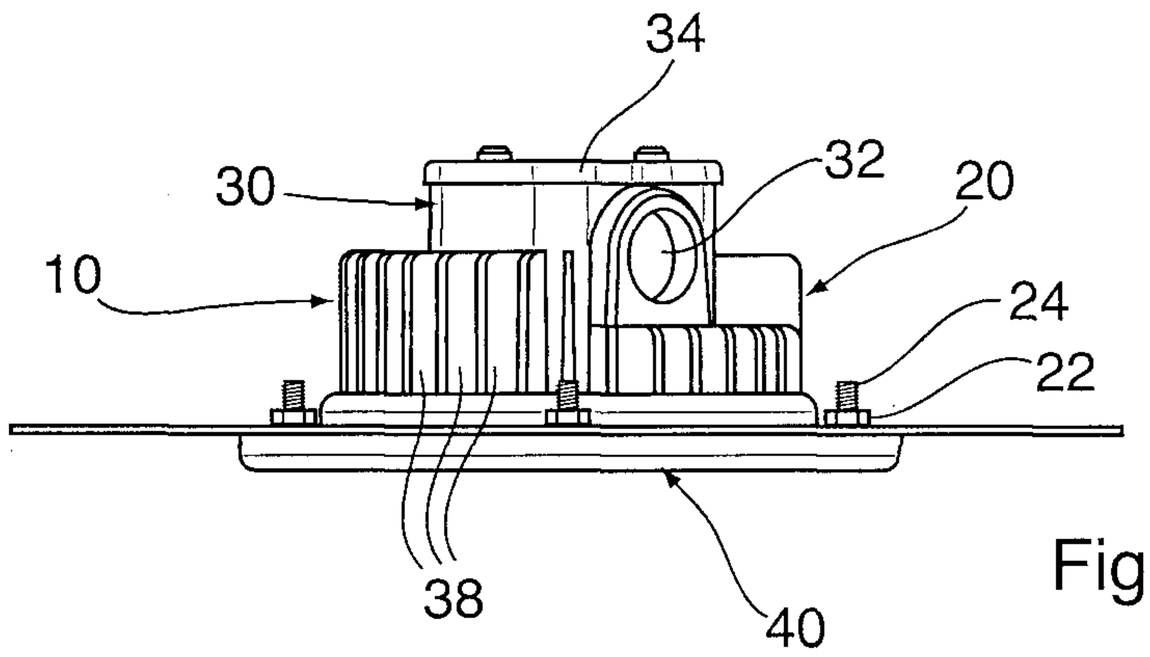


Fig.5

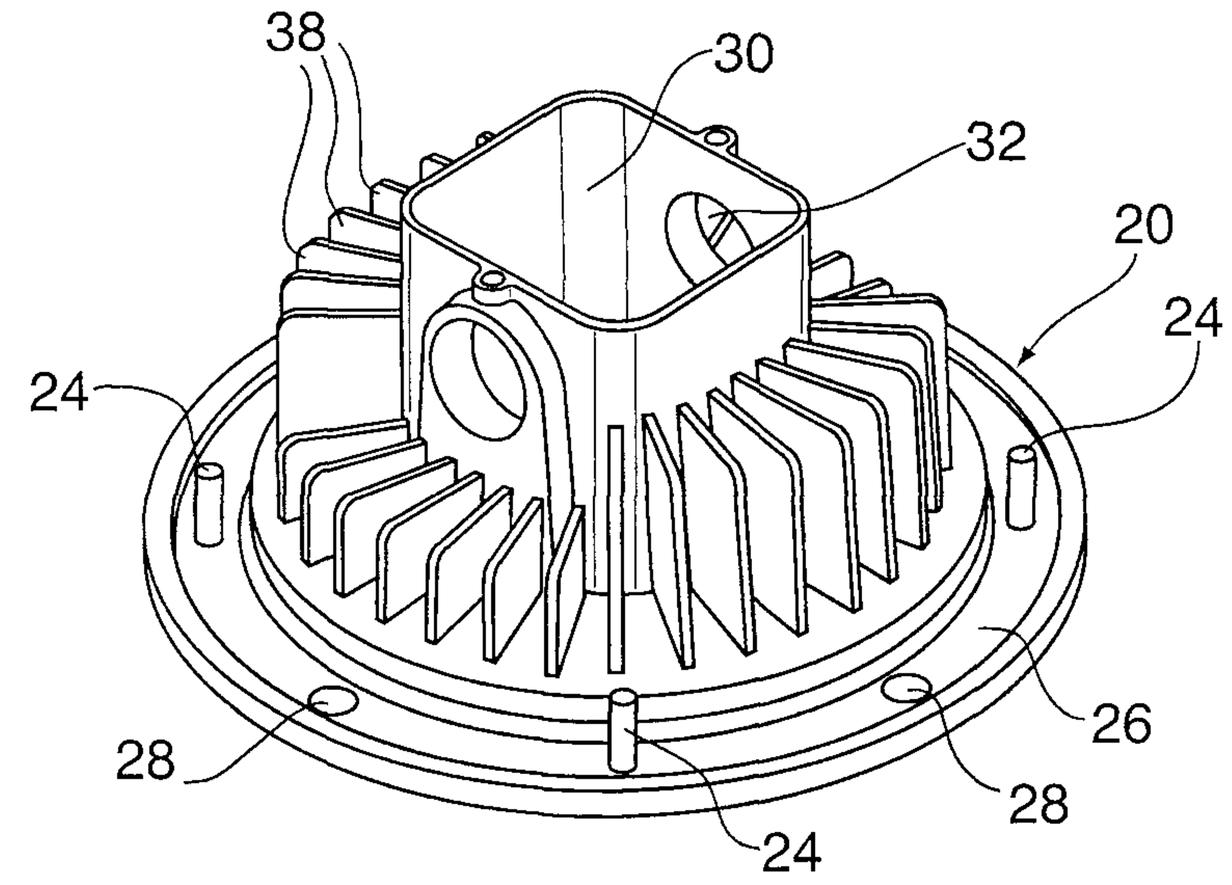
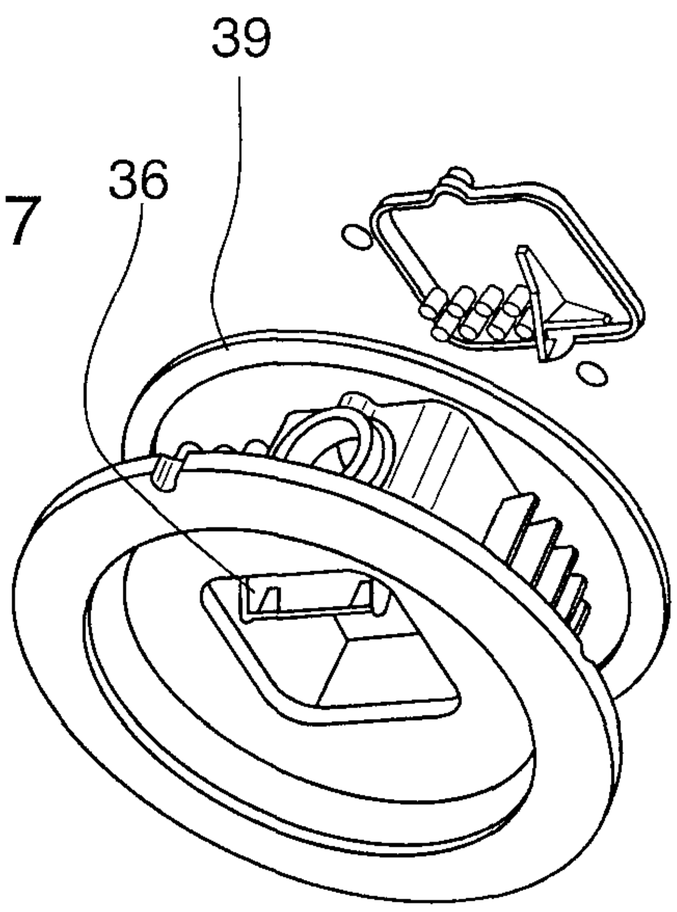


Fig.6

Fig.7



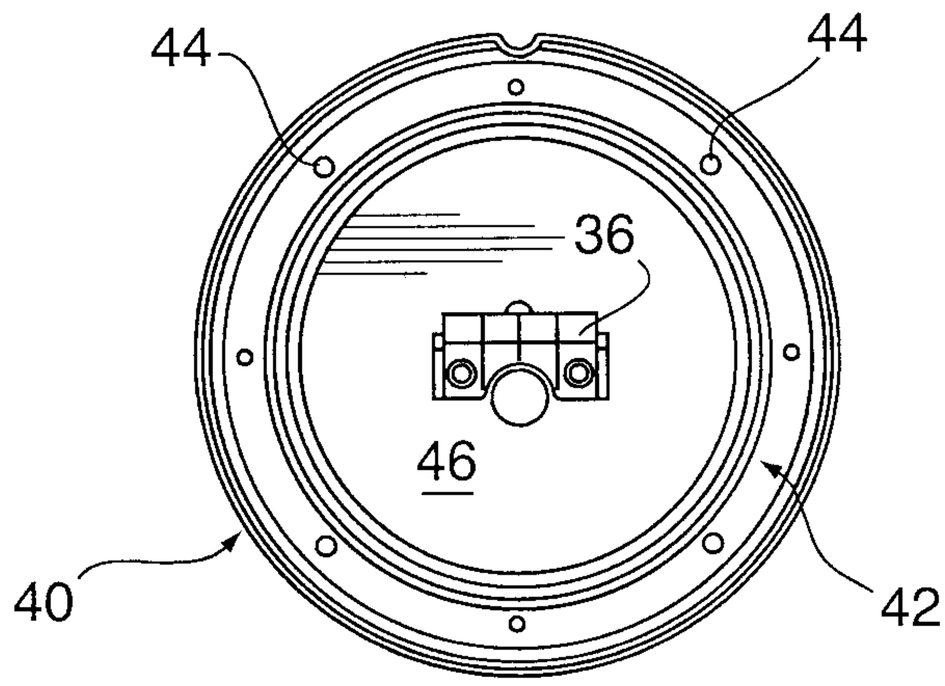


Fig.8

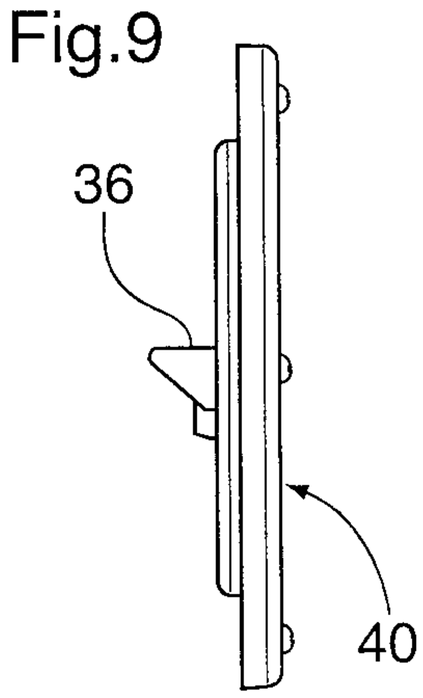


Fig.9

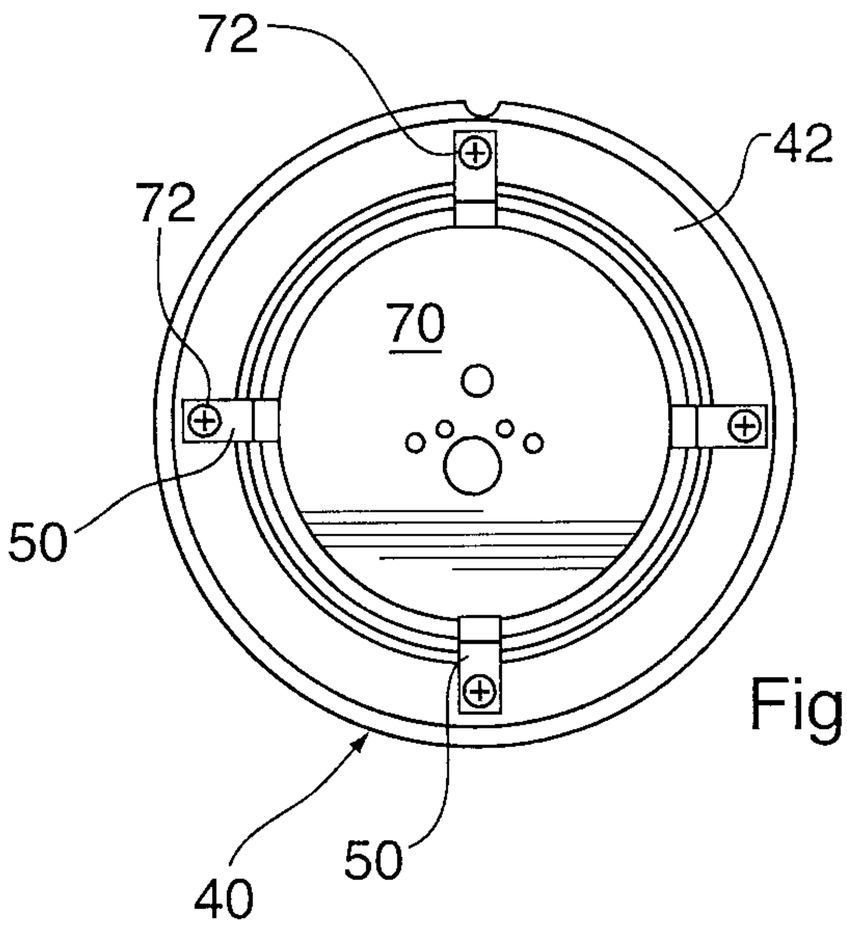


Fig.10

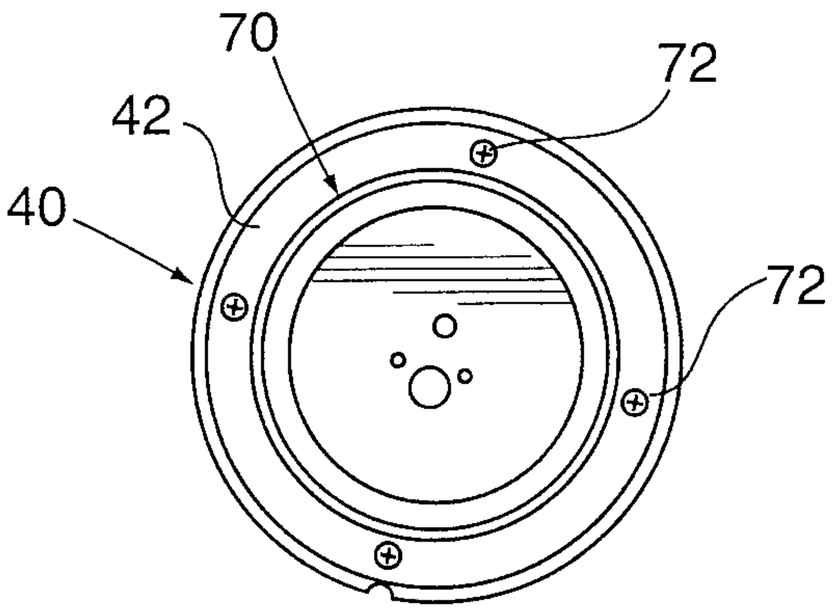


Fig.10A

Fig.11

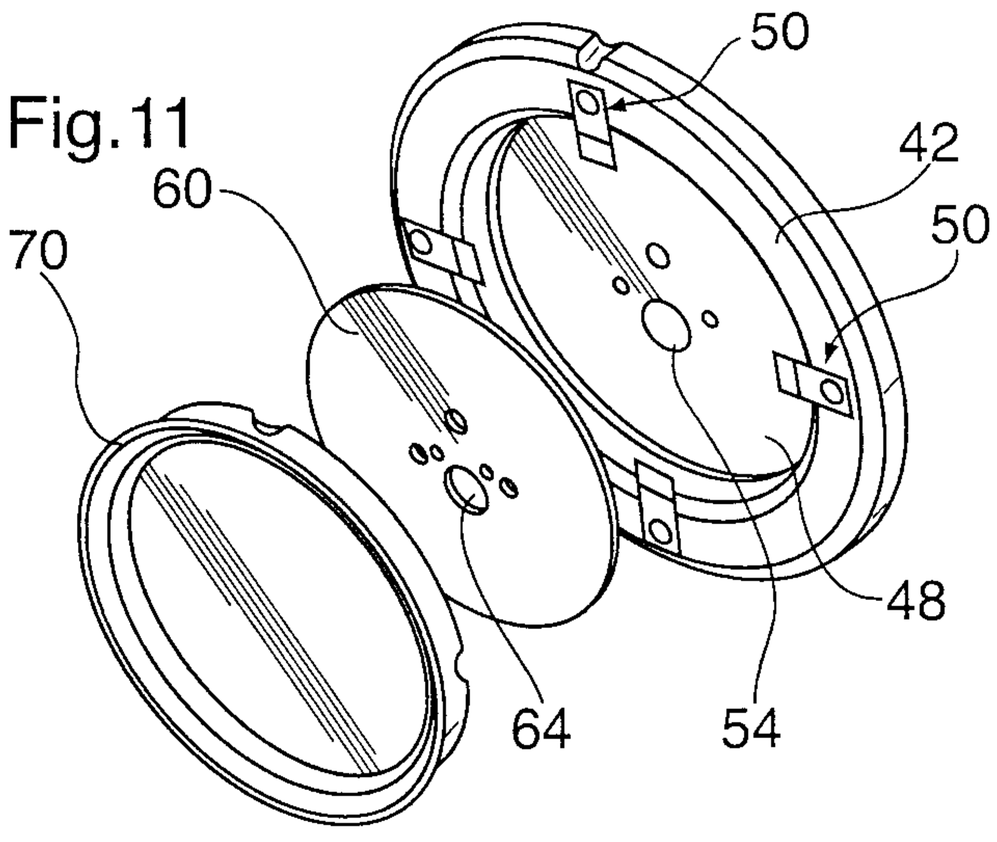


Fig.12