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(54) An alarm device

(57) An alarm device 1 comprises a base (2) which is secured to a ceiling using screw fasteners (11). A mains cable (12) is trained in through the base (2) at an aperture (19) and electrical connections are made to a terminal block (14). An alarm body (3) is then electrically and mechanically connected to the base (2) by simply sliding it in the plane of the base (2) until electrical and mechanical connections are automatically made. The alarm body (3) may be separated to insert a back-up battery or for maintenance by initially releasing a safety catch using a screwdriver and pushing in the opposite direction.

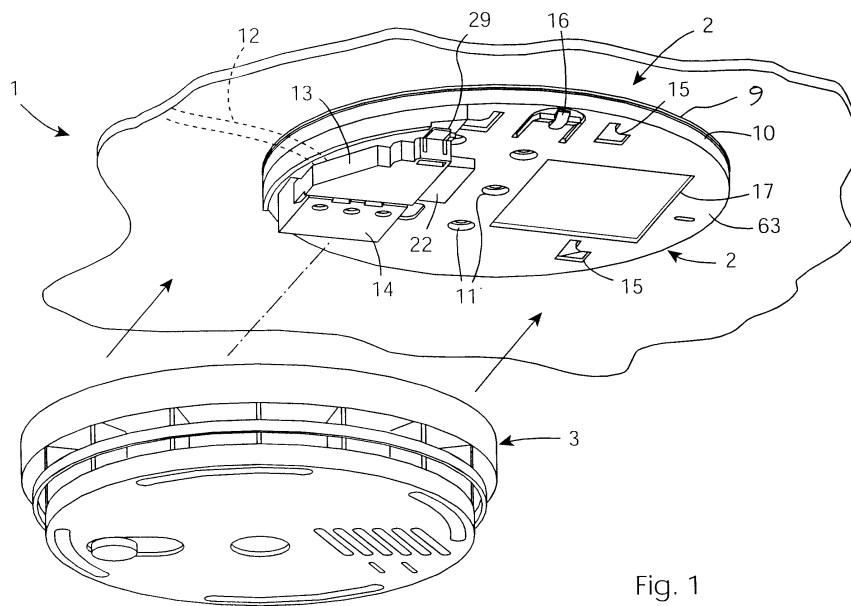


Fig. 1

Description

[0001] The invention relates to an alarm device, such as a smoke or heat alarm device.

[0002] For safety reasons, it is increasingly the situation that such alarm devices are mains-powered and usually have a battery back-up. However, such alarm devices must be installed by a qualified electrician and the user must be extremely careful when opening the device to change a back-up battery or for any other maintenance.

[0003] United States Patent Serial No. 4315594 (Cerberus) describes a fire alarm device having a socket portion for connection to a ceiling and a fire alarm insert for mechanical and electrical connection to the socket portion. Connection is made by virtue of mutual rotations.

[0004] The invention is directed towards providing a mains-powered alarm device which is simpler to install and which may be opened after installation in a simpler and more convenient manner. Another object is to provide for improved safety by minimising possible exposure to mains supply.

[0005] According to the invention, there is provided an alarm device comprising:-

a base comprising means for attachment to a wall or ceiling and mains terminals for electrical connection to a mains power supply, and an alarm body comprising a housing containing a sensor and a sensor circuit, characterised in that,

the base and the alarm body comprise co-operating mechanical and electrical connection means whereby the alarm body may be mechanically and electrically connected to the base in a push-fitting action.

[0006] In one embodiment, the mechanical and electrical connection means comprise means for providing connection in a mutual sliding action.

[0007] Preferably, the sliding action is in the plane of the base.

[0008] In one embodiment, the mechanical connection means comprises engagement members which interleave and are configured to press the alarm body against the base as they slide relative to each other.

[0009] Preferably, the base comprises an aperture and the alarm body comprises a lip extending in the plane of the base and spaced-apart from the alarm body, the aperture and the lip being configured so that the lip is initially pushed into the aperture and is subsequently pushed across in the plane of the base to overlie the base adjacent the aperture.

[0010] In another embodiment, the mechanical connection means further comprises a snap-fitting safety catch which automatically engages when the mechanical connection is complete and may be disengaged only with use of a tool.

[0011] Preferably, the electrical connection means comprises a plurality of alarm body terminals in the base terminal block, each alarm body terminal comprising a pair of leaves spring-biased together, and terminal spades on the alarm body each associated with an alarm body terminal, the terminals and terminal spades being configured whereby the leaves press against a terminal spade which has been pushed into the terminal.

[0012] In another embodiment, the alarm body terminal leaves are splayed to form a mouth to receive a spade.

[0013] Preferably, the leaves are housed in a terminal block cover which comprises a tapered mouth for receiving a spade for each terminal.

[0014] In another embodiment, the base terminal block comprises a protective cover which covers the mains terminals and comprises lock means for snap-fitting engagement with the base.

[0015] In a further embodiment, the cover lock means is configured for opening only with a tool.

[0016] Preferably, the base terminal block comprises an integral component comprising the alarm body terminals and the mains terminals.

[0017] In a further embodiment, the alarm body comprises a compartment in an upper side for a back-up battery.

[0018] In a further embodiment, the battery compartment comprises safety means to prevent connection of the alarm body to the base without a battery present.

[0019] Preferably, the safety means comprises a spring-biased prong which is retracted by a battery inserted in the compartment.

[0020] In another embodiment, the sensor circuit comprises a battery power supply comprising an alarm body terminal whereby the power is drawn from the battery only when the alarm body is electrically connected to the base and mains power is absent.

[0021] The invention will be more clearly understood from the following description of some embodiments thereof, given by way of example only with reference to the accompanying drawings in which:-

Fig. 1 is a perspective view showing an alarm device of the invention being installed;

Fig. 2 is a perspective view showing a rear surface of a base of the device;

Fig. 3 is a perspective view showing the front of the base;

Fig. 4 is a more detailed perspective view showing a terminal block of the base;

Figs. 5 and 6 are plan views of alternative terminal units;

Fig. 7 is a perspective view showing the manner in

which electrical connection is made in the device;

Fig. 8 is a perspective exploded view of an alarm body of the device; and

Fig. 9 is a perspective view showing the rear surface of the alarm body.

[0022] Referring to the drawings and initially to Figs. 1 to 7, there is shown an alarm device 1 comprising a base 2 and an alarm body 3. The base 2 comprises a base plate 10 having screw fastener apertures 11 for connection to a wall or ceiling. In Fig. 1, the base 2 is shown connected to a ceiling. A mains cable 12 is connected beneath a protective cover 13 to a terminal block 14. A foam pad 9 overlies the base plate 10, and is pressed into position by the base plate 10 against the ceiling. This prevents air draughts and dust from cable openings from affecting performance of the device 1 by, for example, blowing smoke away from the sensor.

[0023] The base 2 also comprises means for mechanical connection to the alarm body 3, namely a set of four connection apertures 15 and a snap-fitting fastener 16. The base 2 also comprises a recess 17 for a warning and/or instruction indicia. Referring in particular to Fig. 2, the rear of the base plate 10 has ribs 18. This view also shows a mains cable aperture 19 which receives a mains cable 12 connected to the terminal block 14. The base 2 also comprises a side wall 20 having a rectangular section 21 which can be broken out for receiving a mains cable 12 from the side. A rectangular-shaped protruding block 21 is integrally moulded with the base plate 10.

[0024] Referring particularly to Figs. 4 to 7, the terminal block 14 comprises mains terminals 25 which are of the type having a leaf terminal 26 which is pressed under the action of a screw against individual wires 27 of the mains cable 12. Referring again to Fig. 1, the mains terminals 25 are covered by the protective cover 13. The cover 13 snap-fits into place with a fastener 29 which may only be opened by use of a tool, in this case a screwdriver.

[0025] The terminals 25 are formed by terminal units 30 which provide both the mains terminals 25 (with the leaf terminals 26) and alarm body terminals on the opposite side of the block 14. As shown in Fig. 5, each terminal unit 30 comprises a pair of resilient leaves 31 which are pressed together and splayed outwardly at the front to form a mouth 32. The leaves 31 are connected by a bridge 33 to the mains terminal leaf 26 within the block 14. The base 2 also comprises, as shown most clearly in Fig. 4, a terminal 40 for "parking" an earth wire if required for looping purposes.

[0026] Referring now to Fig. 6 a terminal unit 35 for connection of the battery is illustrated. This comprises a pair of splayed leaves 36, much like the leaves 31 of the unit 30. In this case, the leaves 36 connect by a transverse bridge 38 to a mains terminal leaf 37.

[0027] When the alarm body 3 is introduced to the base 2, spades 39 on the alarm body are pushed into the mouths 32 as shown in Fig. 7. It is clear from this drawing that the leaves 31 press against the sides of the terminal spades 39 to cause good electrical contact.

[0028] Referring now to Figs. 8 and 9 the alarm body 3 is now described. Fig. 8 shows the two main parts of the alarm body 3, and Fig. 9 shows the side which engages the cover 2. The alarm body 3 comprises a front ventilated casing part 50 and a rear circuit support part 51. The front part 50 comprises circumferential vents 50 and front vents 53. This part also comprises a test button 54 and two LED openings 55. The alarm body 3 also comprises a battery compartment 60 and it houses a sensor circuit 56 which supports the terminal spades 39. The battery compartment is not needed in a different version of the product having rechargeable batteries which do not need to be replaced.

[0029] As shown most clearly in Fig. 9, the alarm body 3 comprises a safety catch 71 for engagement with the catch 16 of the base 2. Once these are connected, they may only be opened by use of a screwdriver. The battery compartment 60 comprises a safety catch 61 having a prong 62 which protrudes upwardly and prevents the alarm body 3 from being engaged to the base 2 unless a battery is present and presses the prong 62 into a retracted position. The base 2 comprises an aperture 63 for receiving the prong 61 if it is not retracted. Finally, the alarm body 3 comprises a set of four lips 70 which are spaced-apart from the rear surface of the alarm body and which are in the plane of this surface and of the base 2. The lips 70 are tapered.

[0030] In operation, the electrician installs the alarm device 1 by training a mains cable 3 through the aperture 19 of the base 2 and subsequently securing the base 2 to the ceiling or wall using the screw fastener apertures 11. He or she then uses a screwdriver to disengage the safety catch 29 and remove the mains terminals protective cover 13. The individual wires 27 of the mains cable 12 are connected to the terminals 25 in a conventional manner. The protective cover 13 is then snap-fitted into position again.

[0031] All that then remains is that the alarm body 3 be brought into proximity to the base 2 and pushed against it until the lips 70 of the alarm body 3 are engaged within the apertures 15 of the base 2. Then the electrician simply pushes the alarm body 3 in a sliding action sideways (as shown in Fig. 1) in the plane of the wall or ceiling. This pushing action causes the lips 70 to overlie the edges of the apertures 15. The corresponding surfaces are tapered so that the sliding action causes the alarm body to be pressed tighter against the base 2. Also, this action causes the terminal spades 39 to enter the mouths 32 and 35 of the alarm body terminals to create an electrical connection as shown in Fig. 7. The leaves 31 and 36 of the alarm body terminals are housed within the body of the terminal block 14, which itself includes tapered openings which tend to guide the spades

39 towards the mouths 32 of the alarm body terminals. When the alarm body 3 has been pushed home. The fixtures 16 and 71 of the base and the alarm body respectively snap into engagement. This gives a positive indication to the electrician that the alarm body has been fully pushed home.

[0032] When it is necessary to remove the alarm body 3 at a later stage, such as to replace a battery in the compartment 60, the user can do this very simply without exposure to mains power. He or she simply disengages the fixtures 71 and 16 using a screwdriver and then pushes the alarm body 3 in the opposite direction until the lips 70 disengage from the sides of the apertures 15 and the terminal spades 39 have separated from the alarm body terminals in the base. The battery may then be simply replaced or any other maintenance action may be carried out. The alarm body 3 is then reconnected in the same manner as during installation.

[0033] It will be appreciated that the invention provides for installation of an alarm device in a very simple and effective manner. An electrician may connect the base mechanically and electrically in a simple and conventional manner. All that is then necessary is that the alarm body 3 be pushed into engagement. This provides excellent safety by virtue of the manner in which the mains terminals are covered and also because the electrical contacts are automatically made by pushing the mains body home.

[0034] The invention is not limited to the embodiments described but may be varied in construction and detail within the scope of the claims.

Claims

1. An alarm device comprising:-

a base (2) comprising means (11) for attachment to a wall or ceiling and comprising mains terminals (26) for electrical connection to a mains power supply (12), and an alarm body (3) comprising a housing containing a sensor and a sensor circuit (56), characterised in that,

the base (2) and the alarm body (3) comprise co-operating mechanical and electrical connection means whereby the alarm body (3) may be mechanically and electrically connected to the base in a push-fitting action.

2. An alarm device as claimed in claim 1, wherein the mechanical and electrical connection means comprise means (15, 70, 39, 30, 35) for providing connection in a mutual sliding action.

3. An alarm device as claimed in claim 2, wherein the sliding action is in the plane of the base (2).

4. An alarm device as claimed in any of claims 1 to 3, wherein the mechanical connection means comprises engagement members (70) which interleave and are configured to press the alarm body against the base as they slide relative to each other.

5. An alarm device as claimed in claim 4, wherein the base comprises an aperture (15) and the alarm body comprises a lip (70) extending in the plane of the base and spaced-apart from the alarm body, the aperture and the lip being configured so that the lip is initially pushed into the aperture and is subsequently pushed across in the plane of the base to overlie the base adjacent the aperture.

6. An alarm device as claimed in any preceding claim, wherein the mechanical connection means further comprises a snap-fitting safety catch (71) which automatically engages when the mechanical connection is complete and may be disengaged only with use of a tool.

7. An alarm device as claimed in any preceding claim, wherein the electrical connection means comprises a plurality of alarm body terminals (30, 35) in a base terminal block (14), each alarm body terminal comprising a pair of leaves (31, 36) spring-biased together, and terminal spades (39) on the alarm body (3) each associated with an alarm body terminal, the terminals and terminal spades being configured whereby the leaves press against a terminal spade which has been pushed into the terminal.

8. An alarm device as claimed in claim 7, wherein the alarm body terminal leaves (31, 36) are splayed to form a mouth (32) to receive a spade (39).

9. An alarm device as claimed in claim 8, wherein the leaves are housed in a terminal block (14) cover which comprises a tapered mouth for receiving a spade (39) for each terminal.

10. An alarm device as claimed in any preceding claim, wherein the base terminal block (14) comprises a protective cover (13) which covers the mains terminals (26) and comprises lock means (29) for snap-fitting engagement with the base.

11. An alarm device as claimed in claim 10, wherein the cover lock means (29) is configured for opening only with a tool.

12. An alarm device as claimed in any preceding claim, wherein the base terminal block (14) comprises an integral component (30) comprising the alarm body terminals and the mains terminals.

13. An alarm device as claimed in any preceding claim,

wherein the alarm body comprises a compartment (60) in an upper side for a back-up battery.

14. An alarm device as claimed in claim 13, wherein the battery compartment (60) comprises safety means (61, 62) to prevent connection of the alarm body to the base without a battery present. 5
15. An alarm device as claimed in claim 14, wherein the safety means comprises a spring-biassed prong (62) which is retracted by a battery inserted in the compartment (60). 10
16. An alarm device as claimed in any preceding claim, wherein the sensor circuit comprises a battery power supply comprising an alarm body terminal (35) whereby the power is drawn from the battery only when the alarm body is electrically connected to the base and mains power is present. 15

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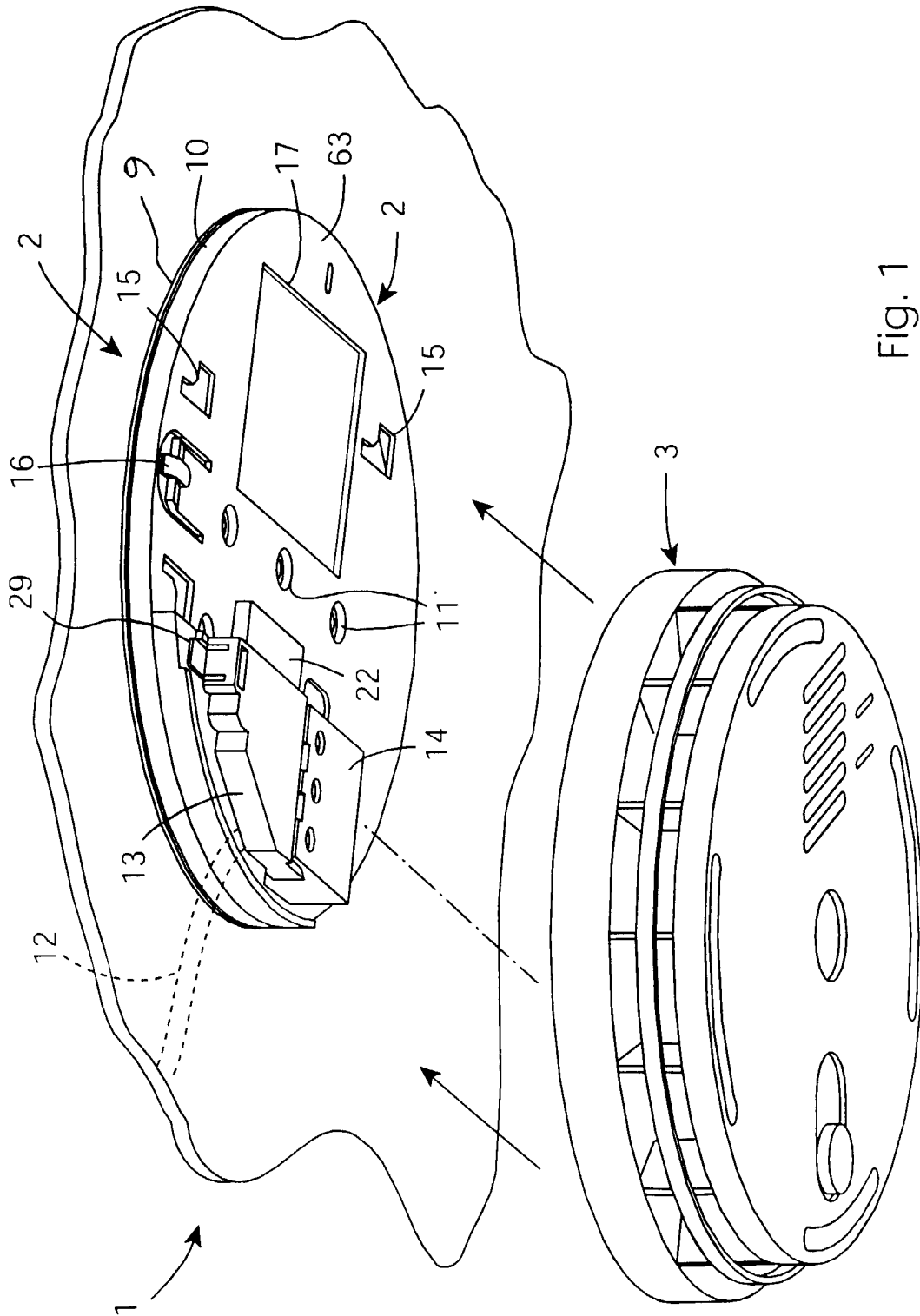
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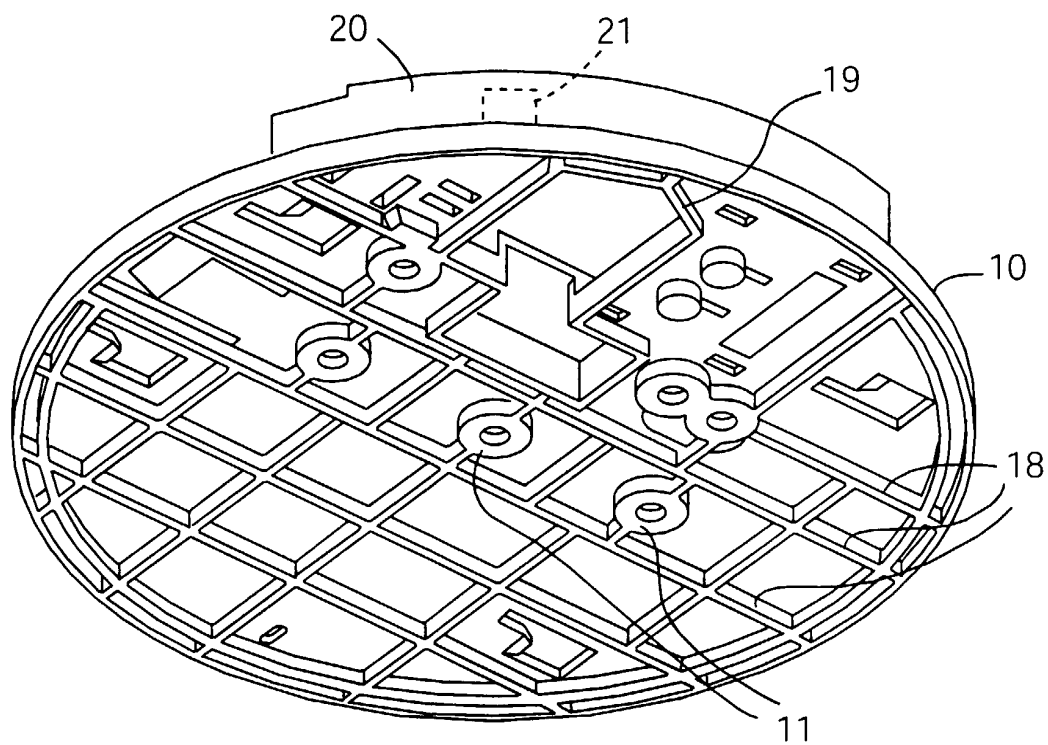


Fig. 2

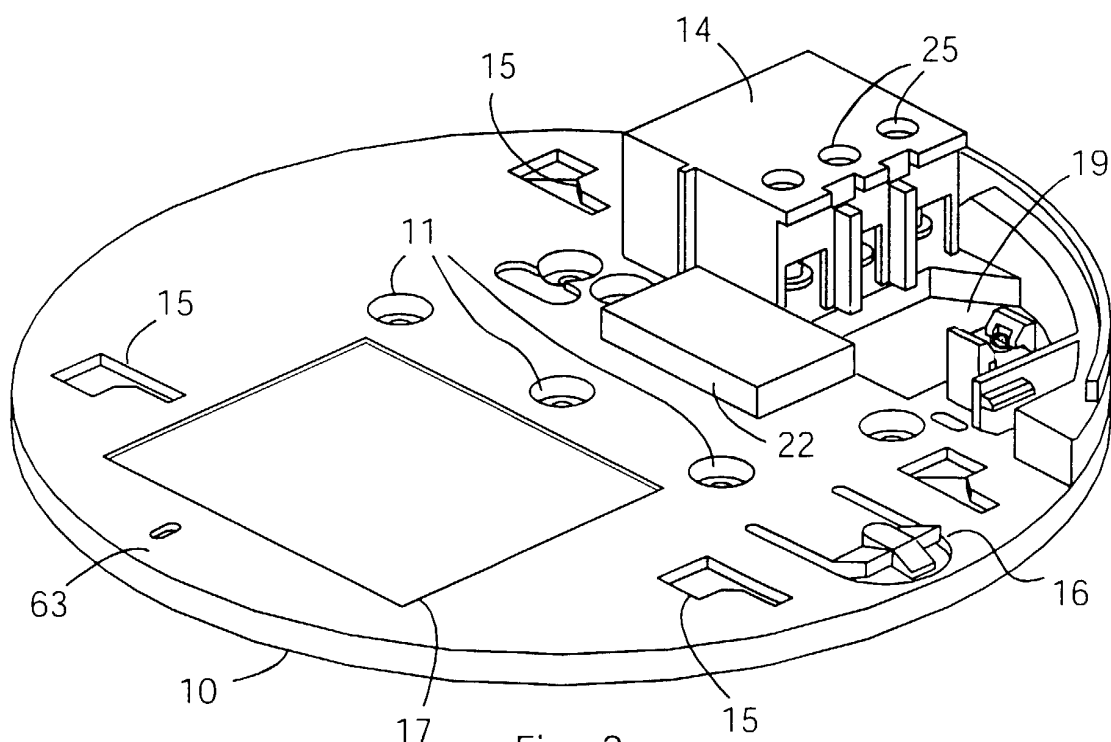


Fig. 3

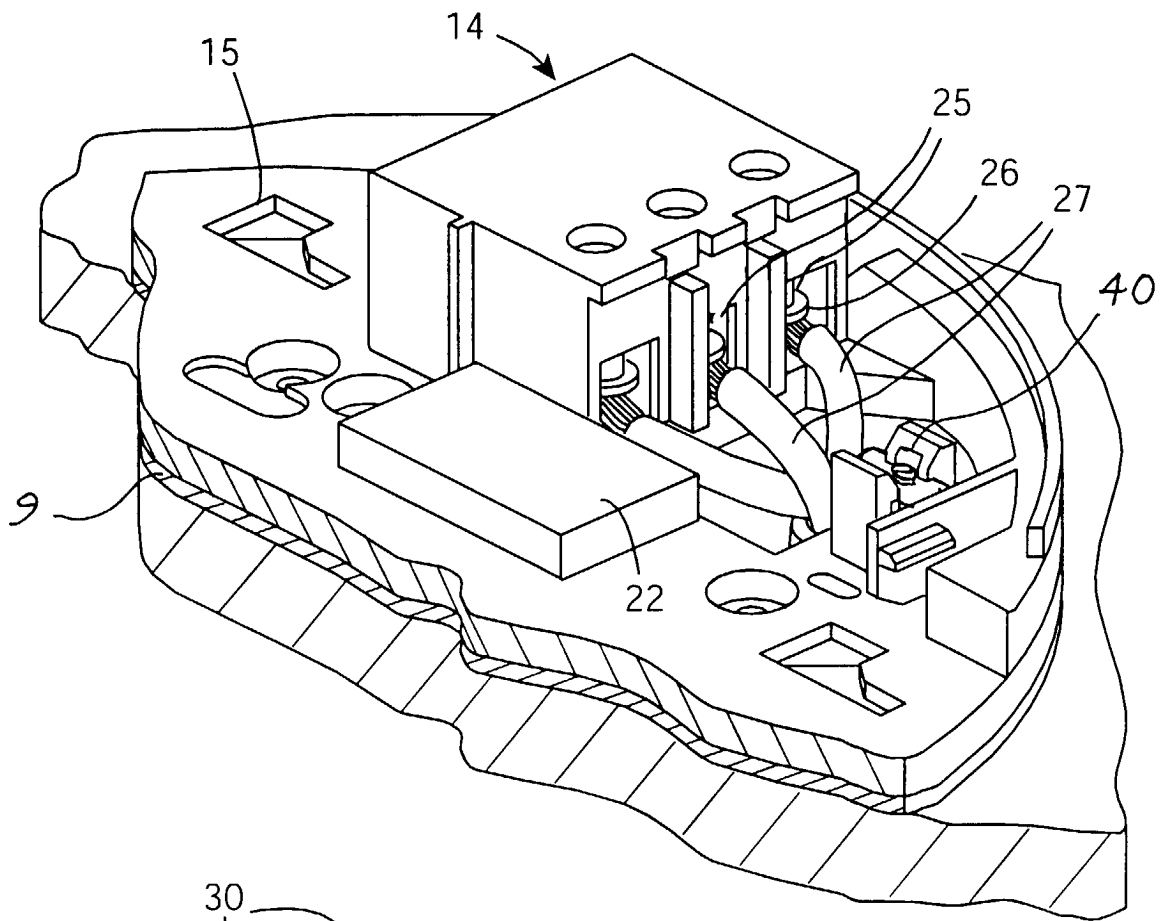


Fig. 4

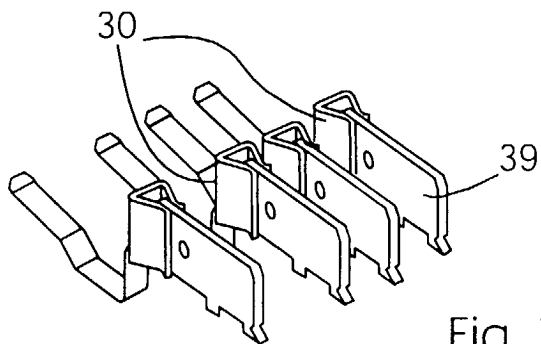


Fig. 7

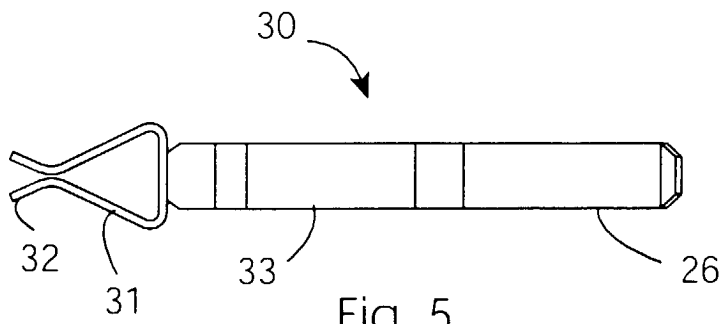


Fig. 5

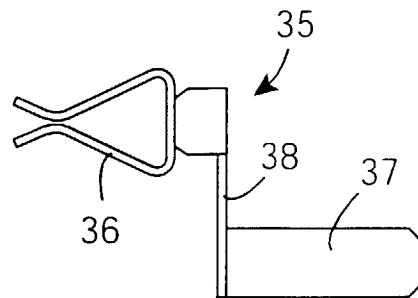


Fig. 6

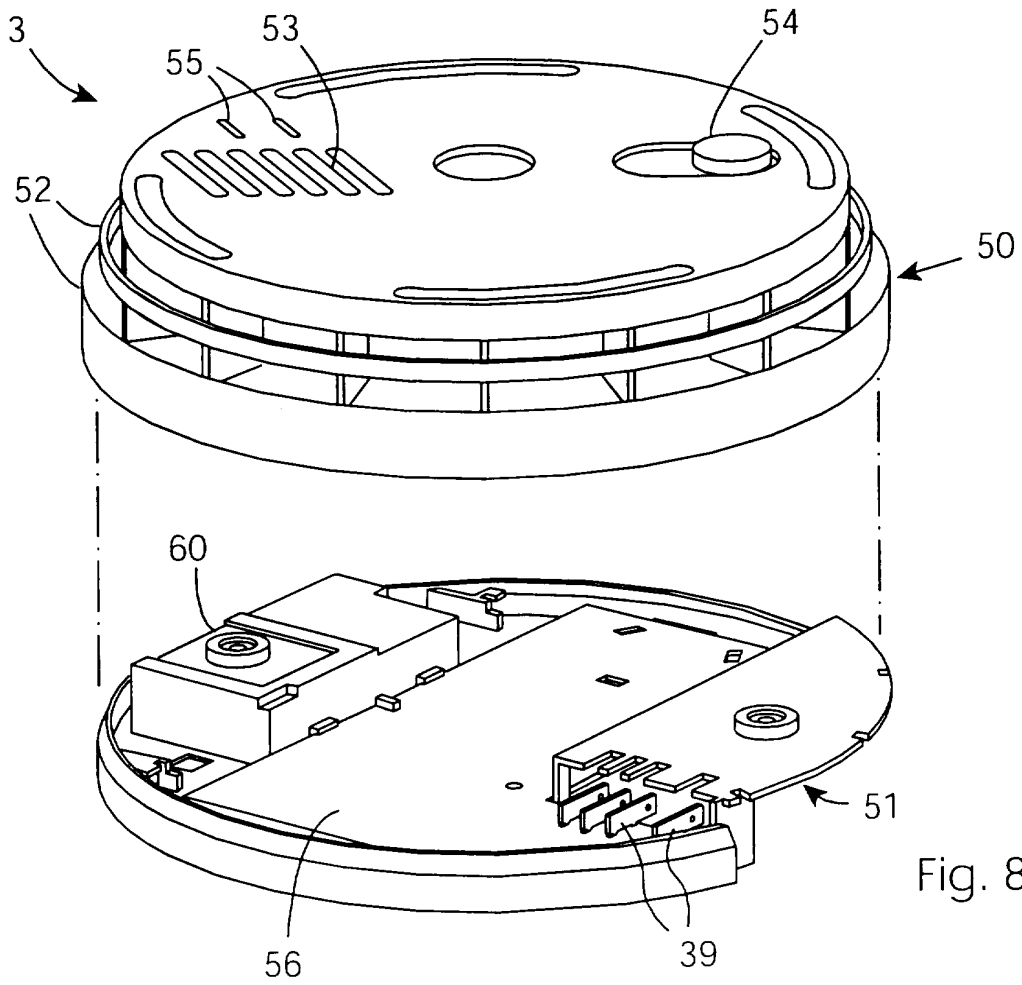


Fig. 8

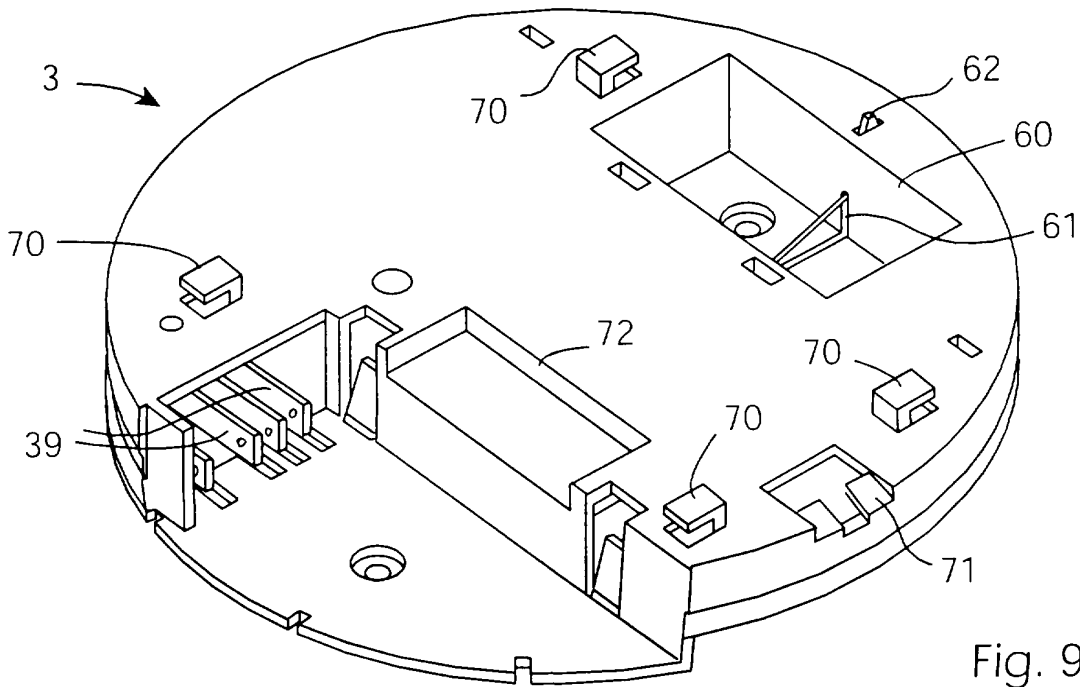


Fig. 9