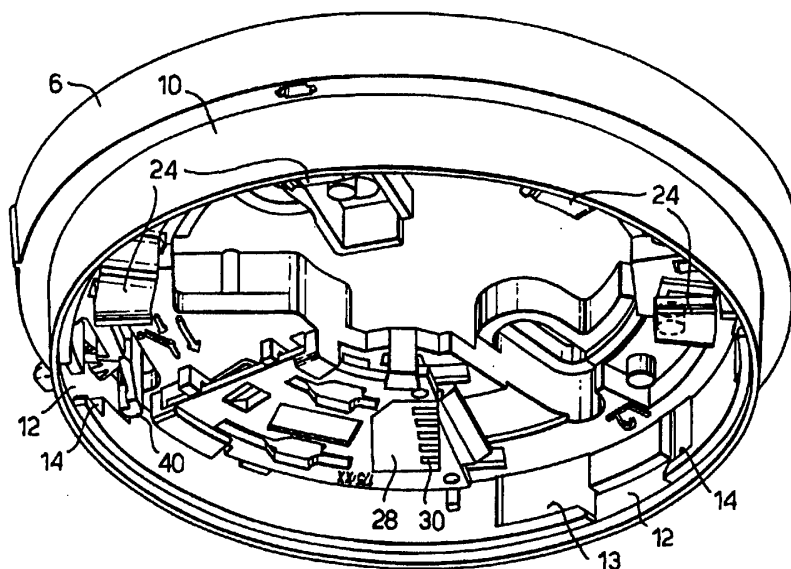




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : G08B 17/113	A1	(11) International Publication Number: WO 97/05586 (43) International Publication Date: 13 February 1997 (13.02.97)
(21) International Application Number: PCT/GB96/01799 (22) International Filing Date: 26 July 1996 (26.07.96) (30) Priority Data: 9515380.5 27 July 1995 (27.07.95) GB (71) Applicant (for all designated States except US): THORN SECURITY LIMITED [GB/GB]; Security House, The Summit, Hanworth Road, Sunbury-on-Thames, Middlesex TW16 5DB (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): BAYLEY, Stephen, John [GB/GB]; 25 West End Gardens, Northolt, Middlesex UB5 6QR (GB). (74) Agent: LUPTON, Frederick; Thorn EMI Patents Limited, Central Research Laboratories, Dawley Road, Hayes, Middlesex UB3 1HH (GB).		(81) Designated States: JP, KR, NO, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

(54) Title: FIRE DETECTOR POSITIONING**(57) Abstract**

In a fire detector (2) having a fixed base unit (6) and a replaceable detector unit (8) which is secured for operation to the base unit by rotating clockwise through a first arc of rotation, an arrangement for permitting the detector unit to be secured to the base unit in a non-operative position or parked position, for installation purposes, comprising a stop mechanism (12, 14, 40) comprising a resilient hook (40) in the base unit which normally engages a stop member in the detector unit so that only clockwise movement of the detector unit is permitted, but the resilient hook being movable by a manually operable member (60) out of engagement with the stop member to permit movement of the detector unit in an anti-clockwise direction through a second arc of rotation to the parked position.

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FIRE DETECTOR POSITIONING

5 The present invention relates to detectors for detecting abnormal conditions, principally smoke or fire, but has in addition application to detectors such as intruder detectors or detectors for noxious gas. In addition, the present invention relates to detectors for detecting or sensing desired parameters, for example in an air conditioning or environmental control system.

10 Fire or smoke detectors responsive to smoke fumes, temperature, radiation, etc. (herein referred to for convenience as "fire detectors") are typically ceiling mounted, and in industrial and commercial applications, form part of large arrays of detectors electrically coupled to a controller unit. The detectors are normally divided into zones for example on a floor by floor basis so that in the event of an alarm, the controller can determine which zone has sent an alarm signal. It is nowadays common in electronic alarm systems for each detector within each zone to be provided with an electronic switch representing the address of that detector, so that the controller can determine the specific detector or detectors from which the alarm originates.

15 Problems arise with such individually addressed fire detectors in initial installation and subsequent maintenance. Fire detectors are normally in two main parts, namely a base unit which is secured to a ceiling or other fixed surface and a detector unit which is releasably secured to the base and carries an appropriate sensor device. The base unit is normally secured to the ceiling and wired to the alarm system by electricians who would not normally handle the delicate detector units. The detector units will normally be fitted in a subsequent operation by trained personnel during commissioning of the system.

20 Subsequent to installation of the base unit, an electrical continuity test is required through the system electrical wiring. This involves applying a high voltage (e.g. about 500 volts) to the base units, which can easily damage any delicate device mounted to the base units.

30 Since the detectors may be mounted on a ceiling which may be high above the ground, for example in an industrial environment, it is a common procedure to fit the detector unit to a base unit by placing the detector unit at the end of a long pole so that an installer, standing on the ground, may position the detector unit adjacent the base unit and then, by a clockwise movement, engage a bayonet fitting between the detector unit and the base unit so that the detector unit is secured onto the base unit.

35 As can be appreciated, the above considerations may result in excessive time spent on installation by personnel; however, the use of personnel is expensive and it is

therefore desirable to minimise for each specific fire detector, the number of visits required, and the amount of time spent by personnel in the commissioning process.

In accordance with the invention, it has been appreciated that further improvements may be made in creating efficiency of installation. The invention is based on the recognition that although it is conventional practice within the security industry to provide fire detectors in two parts as a base unit and a detector unit, which detector unit is secured to the base unit by engaging the detector unit with the base unit and rotating the detector unit clockwise to cause electrical and mechanical interconnection of the two parts, it is nevertheless possible to envisage a further interengaged position of the detector unit and the base unit in an inoperative or parked position of the detector unit, where there is no electrical interconnection.

The advantage of such an arrangement is that for example personnel may be employed to mount the detector unit to the base unit in a parked position wherein the detector unit is not electrically connected to the alarm wiring. As a subsequent operation, during commissioning electrical continuity tests may be carried out on the alarm installation, and when everything is satisfactory, personnel may be employed to rotate the detector unit from the parked inoperative position to the fully operative position. This may be done with a long pole mechanism which is commonly used in the art. Thus substantial improvements in efficiency of use of operators time may be achieved.

The present invention provides a detector comprising:

a base unit for securing to a fixed surface, a detector unit containing means for detecting an abnormal condition or sensing a desired parameter, and means for releasably securing together the base unit and detector unit by placing the units together and rotating the detector unit through a first arc of rotation to a position in which the detector is operative,

and the releasable securing means including a stop means which is arranged such that normally only rotation in the direction of the first arc is permitted but which can be disabled manually to permit rotation of the detector unit in a counter direction through a second arc of rotation to a parked position in which the detector unit is inoperative while the detector unit remains secured to the base unit.

In accordance with the invention, substantial savings in operators' time can be achieved. After the base unit is installed, an operator may affix the detector unit to the base unit in the parked position. Electrical continuity tests and any other inspections required may then be carried out. Subsequently, the detector unit may be moved from

the parked position to the operative position. This movement will be a movement in the normal direction of movement common throughout the industry for fitting a detector unit to the base unit.

5 In accordance with the preferred form of the invention, when the detector unit engages the base unit prior to its rotation to the operative position, said stop means, preferably comprising a flexible latch member engages a cooperating stop member on the detector unit and base unit, so that normally the detector unit may only be rotated to the operative position. A manually operable plunger member projecting to the exterior of the base unit may be provided for engaging the flexible latch member such as to
10 disengage the latch member from the stop member and permitting rotation of the detector unit in a direction counter to that required for normal fitting (alternatively, a tool such as a small screwdriver may be employed for such disengagement). Rotation of the head in this counter direction permits movement to a parked position in order to secure the detector unit in position on the base unit but in a parked position.

15

Brief Description of the Drawings

A preferred embodiment of the invention will now be described with reference to the accompanying drawings wherein:-

- 20 Figure 1 is a three dimensional side view of a fire detector according to the invention;
Figure 2 is a counterpart view to that of Figure 1 but with a detector unit spaced from a base unit of the detector;
Figure 3 is a three dimensional view showing constructional details of the interior of the base unit and with an address carrier assembly mounted on the base unit;
25 Figure 4 is a three dimensional view of the upper side of the detector unit;
Figure 5 is a plan view of the lower side of the base unit with a manually operable plunger for insertion in an aperture in the side of the base unit;
Figure 6 is a fragmentary enlarged view corresponding to that of Figure 5 showing the plunger mounted in the aperture in the side of the base unit;and
30 Figure 7 is a fragmentary three dimensional view of the base unit corresponding to Figure 6.

Description of the Preferred Embodiment

5 In simple terms a fire detector consists of a base unit, which is used to terminate field wiring, and a detector unit which contains electronics and sensing elements, and which is plugged into the base unit to become part of the system.

The base unit in an addressable system holds its unique address, so that the detection of a fire can be pinpointed. The base unit in a conventional system is known as part of a zone and does not hold a unique address.

10 Installation and commissioning is time consuming and a large cost element of the overall cost. The following features of the present invention are aimed at speeding up installation and reducing cost:

- 15 1. The enabling of a detector unit to be fitted to and held in a base unit in a parked position without making electrical contact to the field wiring.
2. Access to such a parked position is made by distorting or moving a portion of the base to allow the detector unit to rotate to this position.
3. This can be done by hand or remotely via a pole and special tool from the ground.
- 20 4. The normal fitting of a detector unit is by plugging in perpendicular to the ceiling and rotating clockwise to a stop. The fitting of a detector unit into the temporary park position is achieved by plugging in as before and rotating anticlockwise to a stop.

Advantages

- 25 1. The visits to the ceiling by commissioning personnel are reduced.
2. Loop wiring can be tested with the detector unit fitted in the temporary park position.

30 Referring now to the drawings and Figures 1 and 2 in particular, a smoke detector 2 is shown (referred to herein for convenience as a fire detector) in an orientation suitable for mounting to a ceiling surface 4. In accordance with the normal convention in the industry, the upper side of the detector is that nearer the ceiling whereas the lower side is that further from the ceiling and nearer the ground; this is the convention used in the present specification. The detector comprises an upper base
35 unit 6 for securing to the ceiling and a lower detector unit 8 containing a smoke sensor arrangement which is releasably engagable with the base unit by engaging the detector unit in the base unit 6 and then rotating the detector unit in a clockwise direction by 17

° in order to engage a bayonet fitting in an operative position of the detector. A means (not shown) for locking together in the operative position the base unit and detector unit is provided and may be unlocked by a special tool introduced into an aperture 9.

5 Details of the bayonet fitting are shown in Figure 3 wherein the lower side of the base unit has around its periphery 10 four slots 12 (only two of which can be seen) to define a bayonet connection arrangement, the slots having extensions 13, 14 extending in opposite directions. The slots 12 are arranged to receive relatively small elongate strips 16 (see Figure 4) mounted on an inner rim 18 of the upper surface of the detector unit. The detector unit has an outer rim 20 for forming a flush surface with the base unit when mounted thereon.

10 In Figures 3, 4 and 5, details of electrical connections for field wiring are shown. The base unit 6 has four terminals 22 spaced around its periphery, and a further inwardly positioned terminal 23. Each terminal 22 has a strip extension 24 with a leaf spring arrangement (not shown) for electrically contacting contact blades 26 (figure 4) mounted on detector unit 8 when the detector unit is rotated to its operative position. Contact blades 26 are coupled to electronics mounted within the detector unit.

15 As shown in Figure 3 the base unit 6 has mounted therein an address carrier assembly 28 carrying an EEPROM device which has encoded therein the address of the detector. The assembly 28 has electrical contacts 30 and is electrically powered from contact strips 32 mounted on the detector unit (Figure 4) in the operative position; otherwise assembly 28 is electrically isolated.

20 Referring now to Figures 5 to 7, these show constructional details of the smoke detector for achieving a park position of the detector unit 8 on the base unit 6. The base unit and detector unit have a park stop mechanism comprising a hook finger 40 formed in the base unit between two slots 42 and having a free end in the form of a hook portion 44, together with a guide portion 46 extending from part way along the length of finger 40. Hook 44 is arranged to engage a stop member 50 (Fig. 4) extending from the inner rim 18 of detector unit 6. A recess 52 is positioned immediately adjacent stop member 50.

25 A plunger member 60 is mounted in a slot 62 in the side wall of the base unit and comprises a manually operable portion 64 which projects from the base unit and an inner head portion 66 which extends into the slot and is held within the slot by resilient barbs 68. The inner end of the plunger is adapted to abut against finger 40 as shown in Figures 6 and 7. Guide portion 46 serves to guide the plunger to the abutting position.

30 Thus in use, the detector unit is engaged in the base unit and rotated clockwise so that the bayonet fittings are located, the rib projections 16 in the detector unit

engaging within slots 12 and slot extensions 13. In the operative position, terminals 22 are connected to blades 26 for powering the detector unit. If it is desired to move the detector unit to the parked position, then an anticlockwise movement is necessary to engage projections 16 in slot extensions 14 in order to maintain the bayonet connection. Normally, rotation in the anticlockwise direction is prevented by stop projection 50 on the inner rim of the detector unit engaging against hook portion 44 of the park stop mechanism. In order to permit movement to the parked position, it is necessary to displace plunger 64 by pushing the free end inwardly. This may be done by means of a suitable tool member at the end of a pole member used by the installer for mounting the detector unit. With the plunger member 64 fully pushed in through slot 62, its end engages against hook portion 44 in order to move the hook portion 44 inwardly against the resilient bias of finger 40. This movement disengages hook 44 from projection 50, and permits anticlockwise movement of the detector unit so that projection 50 moves past hook 44 to a parked position in which hook 44 engages within recess 52 for retaining the head in the parked position. In this position, projections 16 of the bayonet connection are fully engaged in slot extensions 14 for mechanical securing. However, the contact blades 26 are disengaged from terminals 22 and the detector unit is electrically isolated. Thus, in the parked position, there are no electrical connections made between the detector unit and the base unit and electrical continuity tests may be carried out.

When it is desired to make the detector fully operative, it is necessary to rotate the detector unit in a clockwise direction from the parked position to the fully operative position. This may be done simply by an operator by engaging the detector unit with a pole mechanism and making a clockwise rotational movement. The projection 50 and hook 44 have mutually sloping surfaces 80 which will lift the hook 44 in order to permit movement there past and continued clockwise rotation moves the detector unit into the operative position, as has been fully described above.

In an alternative arrangement, plunger member 60 may be omitted, and hook finger 40 may simply be engaged through slot 62 with the end of a small screwdriver to release the stop mechanism.

CLAIMS

1. A detector comprising:
a base unit for securing to a fixed surface, a detector unit containing means for
5 detecting an abnormal condition or sensing a desired parameter, and means for
releasably securing together the base unit and detector unit by placing the units together
and rotating the detector unit through a first arc of rotation to a position in which the
detector is operative,
and the releasable securing means including a stop means which is arranged
10 such that normally only rotation in the direction of the first arc is permitted but which
can be disabled manually to permit rotation of the detector unit in a counter direction
through a second arc of rotation to a parked position in which the detector unit is
inoperative while the detector unit remains secured to the base unit.
- 15 2. A detector according to claim 1, wherein said releasable securing means
comprises a bayonet fitting wherein the detector unit and the base unit include
interengaging projection members and recesses, wherein the recesses extend in two
opposing directions to permit the bayonet fitting to be established by rotation in a
clockwise direction or in an anticlockwise direction.
- 20 3. A detector according to claim 1 or 2, wherein the stop means includes an
interengageable projection member and hook member disposed on the base unit and
detector unit so as normally to prevent rotation of the detector unit through said second
arc of rotation.
- 25 4. A detector according to claim 3, wherein the stop means is accessible from the
exterior of the detector for engaging said hook member for movement of the hook
member to a position out of engagement with said stop member whereby the detector
unit can be rotated to a park position.
- 30 5. A detector according to claim 4, including a manually operable member secured
in the base unit for said engaging of the hook member.
- 35 6. A detector according to any of claims 3 to 5 including a recess means adjacent
the projection member into which the hook member engages for retaining the detector
in the parked position.

7. A detector according to any of claims 3 to 6 wherein the hook member and projection member have mutually cooperating surfaces for permitting disengagement when the detector unit is rotated from the parked position towards the operative position.

5

8. A detector according to any preceding claim wherein the base unit and detector unit have electrical terminal means which interengage in the operative position for conveying electrical power to the detector unit, and the base unit includes an electrical address means which is arranged to be powered by the detector unit in the operative position.

10

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Fig.1.

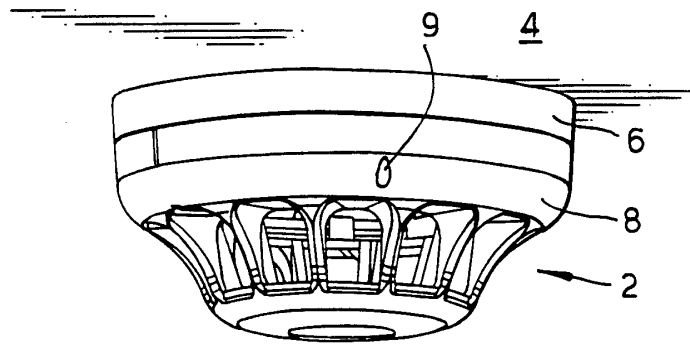
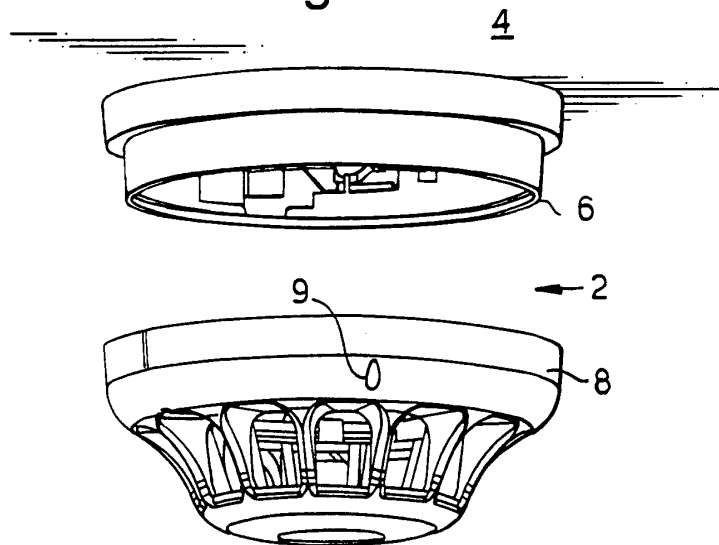


Fig.2.



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Fig.3.

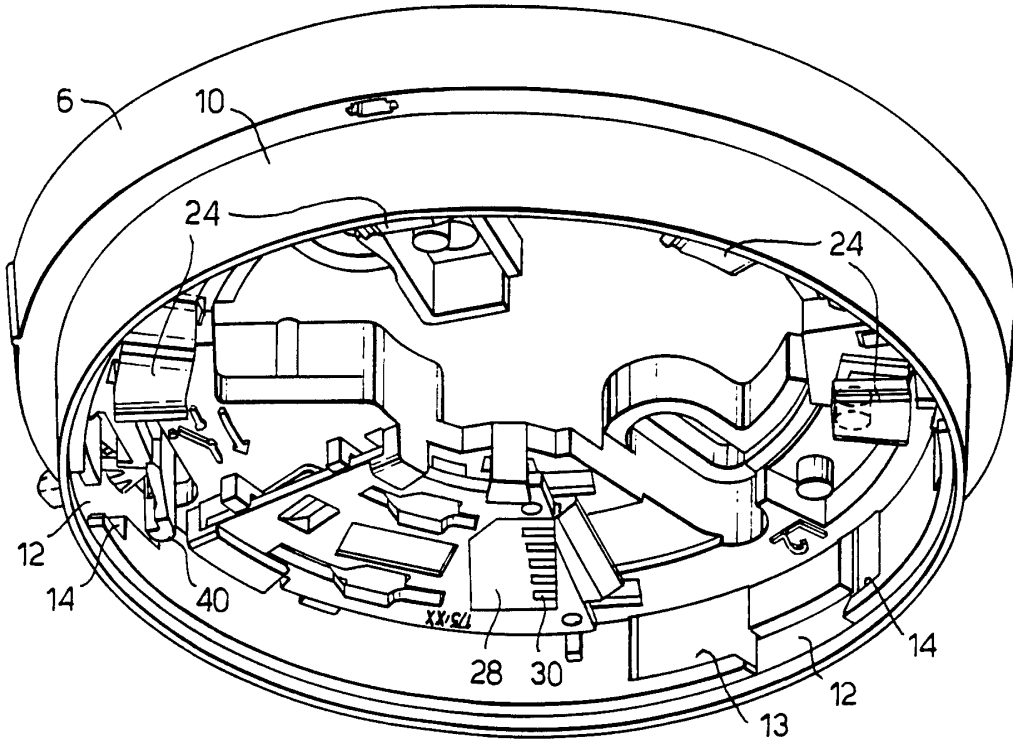
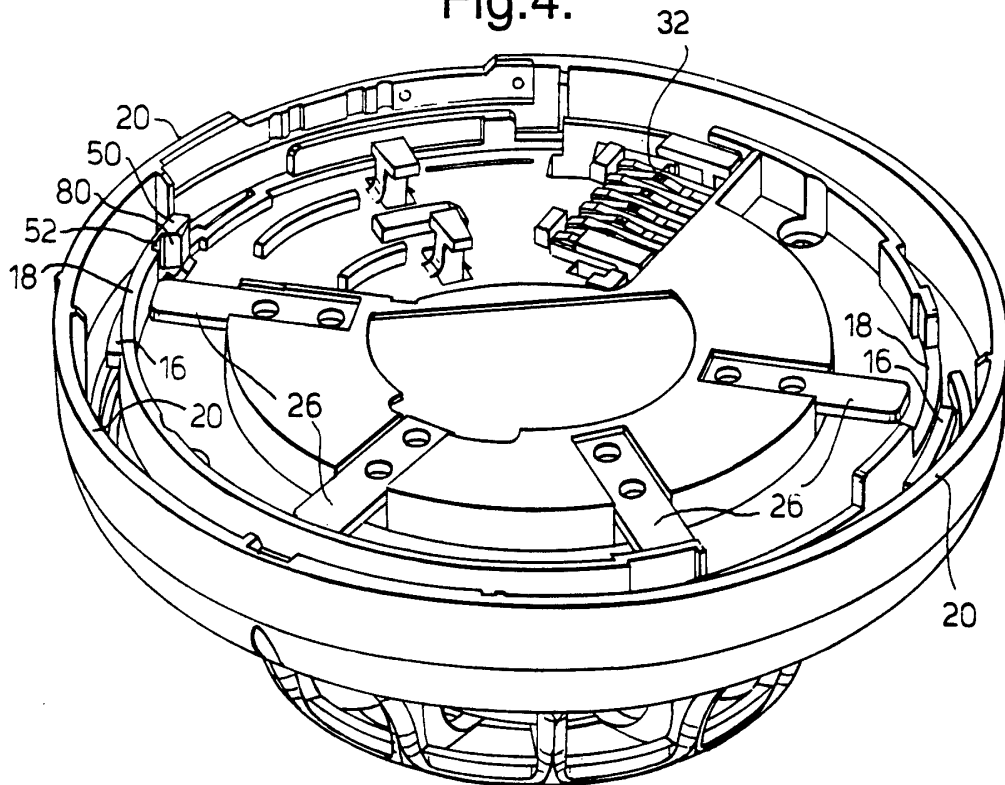
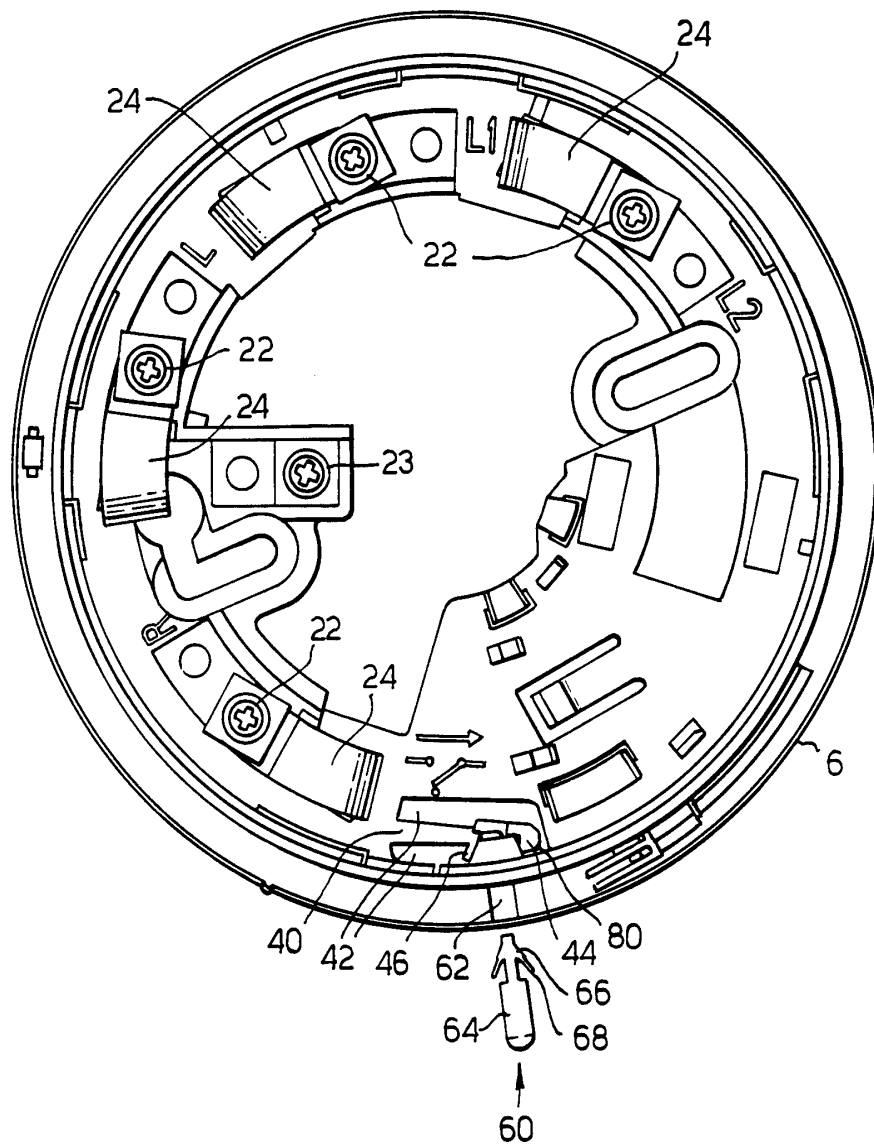


Fig.4.



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Fig.5.



H/H

Fig.6.

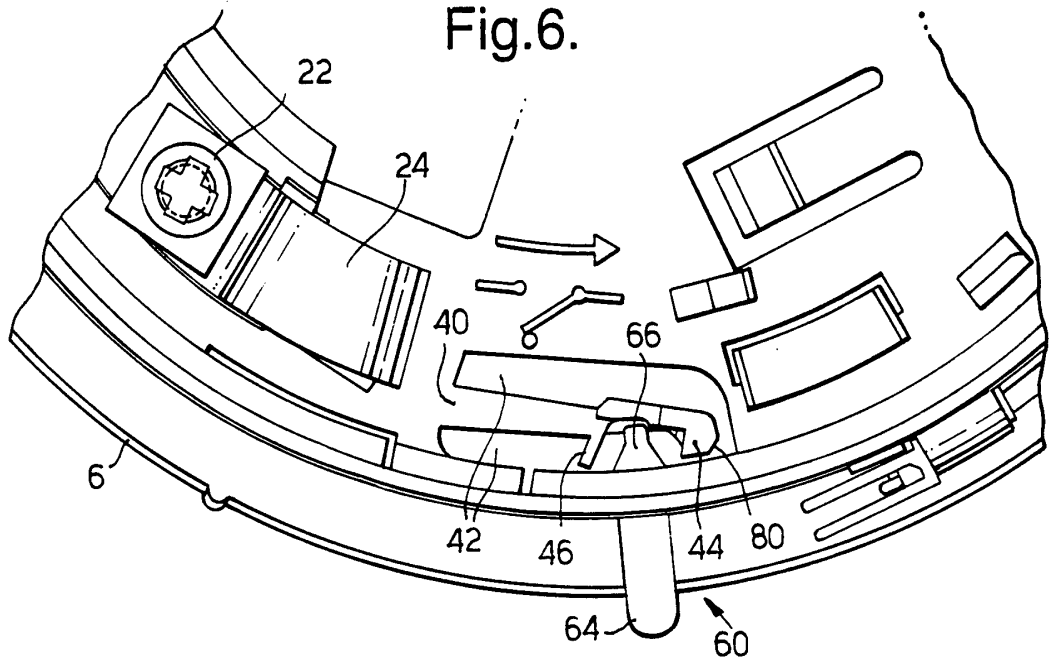
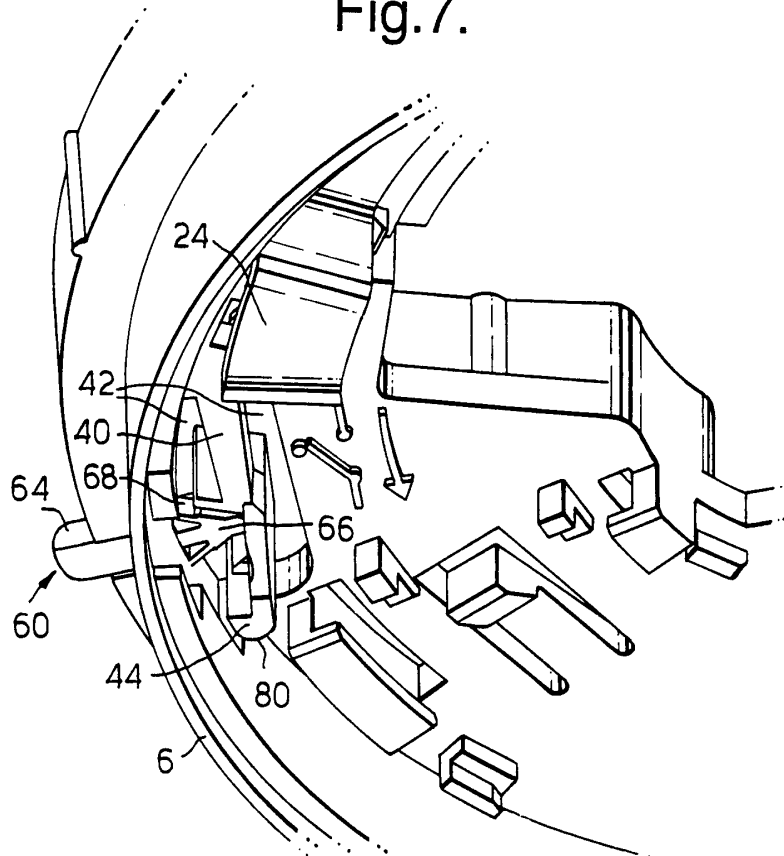


Fig.7.



INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 96/01799

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G08B17/113

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 G08B H01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP,A,0 014 251 (CERBERUS) 20 August 1980 see abstract; figures 5,6 ---	1
Y	FR,A,1 220 035 (SOCIÉTÉ INDUSTRIELLE DE LIAISONS ÉLECTRIQUE) 20 May 1960 see page 3, column 2, line 44 - page 4, column 1, line 26; figure 1 ---	1
A	CH,A,558 963 (CERBERUS) 14 February 1975 see column 2, line 5 - line 14; figure 1 ---	2
A,P	GB,A,2 286 491 (TRANSMOULD) 16 August 1995 see page 6, line 15 - line 30; figure 1 ---	1
A	DE,C,44 00 915 (ZETTLER) 20 April 1995 see abstract; figures 5,6 ---	
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☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

6 December 1996

Date of mailing of the international search report

02.01.97

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP,A,0 616 305 (CERBERUS) 21 September 1994 see column 3, line 1 - line 34; figures 1,2 ---	
A	US,A,3 638 170 (C. H. CLEMENT ET AL) 25 January 1972 see abstract; figure 2 -----	

INTERNATIONAL SEARCH REPORT

Information on patent family members

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PCT/GB 96/01799

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