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(54) **Fire detectors with external power supply indication means**

(57) A fire detection alarm system has a central controller (10) and three fire detectors (12a), (12b), (12c) located in parallel in a zone (14). An end of line device (16) is used to indicate the integrity of the zone electrical

circuit through the fire detector (12a) to (12c). In order to determine which of the series of fire detectors is or is not functioning, LED's (24a) to (24c) are provided, which LED's (24a) to (24c) illuminate when the respective fire detector is receiving power.

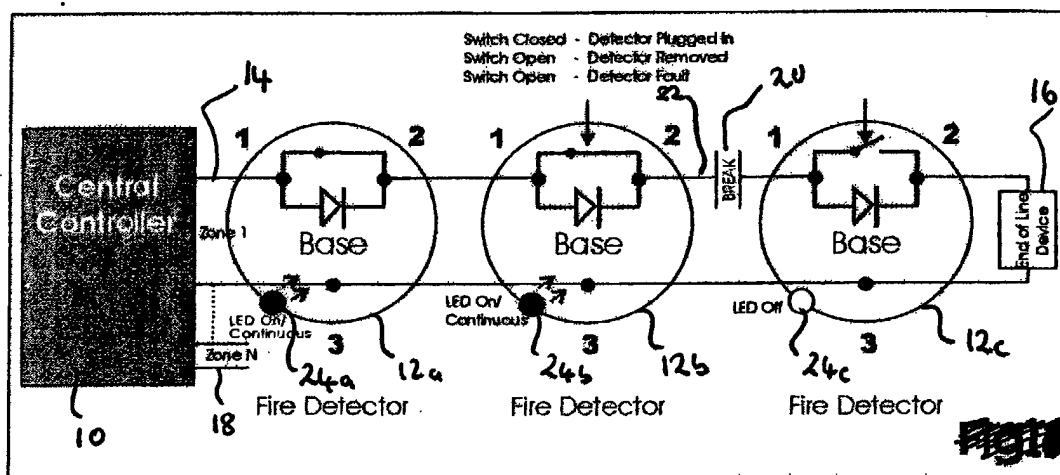


Figure 1

Description

[0001] This invention relates to a fire detector, a fire detector system and to a method of monitoring the functioning of a fire detector.

[0002] Existing fire detection systems typically comprise a central controller to which are attached in parallel a number of fire detection devices in a zone/loop configuration. At the end of the fire detection devices is an end of line device, which is used, in an "active" form, to send a pulse back to the central controller as confirmation that the electrical circuit through all of the fire detectors in the given loop/zone is complete. A "passive" form of end of line device simply comprises a resistor. Both types are known in the art.

[0003] If there is a break in wiring between two fire detectors, or a fault in one of the detectors, then the end of line device will not receive the electrical signal from the central controller and so no signal will be sent back from the end of line device to the central controller, thus indicating to the central controller that there is a fault in that particular loop/zone.

[0004] Disadvantages arise with this type of system because finding the location of the fault is typically time consuming, because the location of the break in the loop/zone is not known.

[0005] It is an object of the present to address the above mentioned disadvantage.

[0006] According to a first aspect of the present invention there is provided a fire detector comprising indication means operable to indicate that the fire detector is receiving power from a separate power supply.

[0007] Preferably, the indication means are visual indication means, preferably a light, most preferably an LED.

[0008] The visual indication means may be operable to give a visual indication when the fire detector is receiving power. The visual indication means may be operable to flash when the fire detector is receiving power. The visual indication means may be operable to give no indication when the fire detector is not receiving power and/or is malfunctioning.

[0009] The visual indication means may be operable to indicate whether the fire detector is receiving power on receipt of a signal from a control panel. Thus, the visual indication means may be operable to illuminate on receipt of a signal from the control panel.

[0010] The fire detector is advantageously operable to indicate when it is receiving power to facilitate visual inspection of a plurality of fire detectors in a zone arrangement. This feature assists the inspection because it indicates at what point in a zone there is a break in electrical supply or a fault in a detector.

[0011] The fire detector may be operable to detect heat, smoke and/or a specified gas. Thus the fire detector may be a smoke detector, a heat detector and/or a gas detector operable to trigger an alarm.

[0012] The fire detector may be a plug in type fire de-

tector, preferably arranged to be fitted in a zone of a fire detector system controlled by a control panel of the fire detector system. The fire detector preferably receives power from electrical wiring if said zone, preferably supplied by the control panel. The fire detector is preferably a conventional-type fire detector, preferably with passive fire detection means that is operable to complete an electrical circuit on detection of heat, smoke or gas.

[0013] According to a second aspect of the invention a fire alarm system comprises at least one fire detector in a zone arrangement and a central controller, wherein the at least one fire detector is arranged to receive power from the central controller and wherein the at least one fire detector includes indication means operable to indicate that the at least one fire detector is receiving power from the central controller.

[0014] Preferably, the indication means are visual indication means, preferably an LED.

[0015] The indication means may be adapted to operate on receipt of a signal from the central controller, where said signal may be a test signal arranged to cause the visual indication means of all functioning fire detectors in a fire detector zone to illuminate, where a fire detector zone comprises at least one fire detector electrically connected to the central controller. Preferably, a plurality of fire detectors is connected in parallel to form a zone. The fire alarm system preferably includes a plurality of zones.

[0016] Alternatively the signal may be generated by the central controller on receipt of an indication that at least one fire detectors is not receiving power and/or is malfunctioning. The indication received by the central controller may result from an end of line device not receiving a signal and/or the central controller not receiving a signal from the end of line device.

[0017] The central controller may be operable to receive a command, from input means of the central controller, to test the at least one fire detector.

[0018] The command may be a coded command, requiring entry of a code via the input means.

[0019] According to a third aspect of the invention, a method of indicating the functioning of a fire detector comprises signalling indication means of the fire detector to indicate that the fire detector is receiving power from a separate power supply.

[0020] The indication is preferably visual.

[0021] The indication may be a pulsed illumination of visual indication means or may be a continuous illumination thereof.

[0022] The indication may be caused on receipt of a signal from a central controller supplying power to the fire detector.

[0023] If a fire detector is not receiving power from the central controller then the indication means will not function.

[0024] All of the features described herein may be combined with any of the above aspects, in any combination.

[0025] A specific embodiment of the present invention will now be described, by way of example and with reference to the accompanying drawings, in which:

Figure 1 is a schematic diagram of a fire detection system.

[0026] Figure 1 shows a fire detection alarm system having a central controller 10 and three fire detectors 12a,b,c located in parallel in a zone 14. An end of line device 16 is used to indicate the integrity of the zone electrical circuit through the fire detectors 12a to 12c.

[0027] Further zones 18 may also be controlled by the central controller 10, but are not shown in detail in this Figure, in order to aid simplicity.

[0028] A break 20 is shown in an electrical wire 22 between the fire detectors 12b and 12c. As a result of the break 20, a signal from the central controller to the end of line device 16 will not be received by the end of line device 16, because of the incomplete electrical circuit. However, power will be supplied to the fire detectors 12a and 12b from the central controller because those devices are connected in parallel. It would not normally be apparent which of the fire detectors 12a to 12c had failed.

[0029] In order to determine which of the series of fire detectors 12a to 12c is not functioning, or where a break in wiring has occurred, it is normally necessary to manually inspect each device to check whether current is being received from the central controller 10.

[0030] However, in Figure 1 each fire detector 12a to 12c includes an LED 24a to 24c.

[0031] The LEDs 24a to 24c are set up to flash or be turned on continuously by the central controller 10 when the central controller 10 detects a fault, for example that caused by the break 20. In the example shown in Figure 1, the LEDs 24a and 24b will illuminate, but the LED 24c will not illuminate, because of the break 20 in the wiring.

[0032] Thus, it will be easy by visual inspection to determine that either the fire detector 12c is malfunctioning or there is a break in the wiring, as is in fact the case, between the fire detector 12b and the fire detector 12c. In this way, it is not necessary to closely inspect the fire detectors 24a and 24b, because it will be clear that they are receiving power and functioning because of the illuminated LEDs 24a, 24b.

[0033] A further alternative for the illumination of the LEDs 24a to 24c (rather than by automatic action of the central controller 10 on detection of a fault,) is to include a manual feature in the central controller 10, whereby a button may be pressed to illuminate the LEDs 24a to 24c to indicate that they are receiving power correctly. Thus, in the situation shown in Figure 1 on pressing of the button on the central controller 10 only the LEDs 24a and 24b would illuminate, whereas the LED 24c would not illuminate, because of the break 20. This feature may be further developed by the use of a code which must be tapped into a keypad on the central controller

10 in order to cause illumination of the LEDs 24a to 24c in a particular zone, or at least those LEDs 24a to 24c having a fully functioning fire detector 12a to 12c.

[0034] The fire detection system disclosed herein can operate using fire detectors 12a to 12c, which may optionally detect heat, smoke or other undesired gases. Thus, any reference to fire detector is a reference to any of the heat, smoke or gas detectors mentioned.

[0035] The fire detection system disclosed herein has significant advantages over previous systems because the task of identifying where a failure is in a zone/loop of the fire alarm system is made considerably easier because visual inspection provides great assistance in determining which of a series of fire detectors has failed, or where there is a break in wiring.

[0036] The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

[0037] All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

[0038] Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

[0039] The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

Claims

1. A fire detector comprises indication means operable to indicate that the fire detector is receiving power from a separate power supply.
2. A fire detector as claimed in claim 1, in which the indication means are visual indication means.
3. A fire detector as claimed in either claim 1 or claim 2, in which the visual indication means are operable to flash when the fire detector is receiving power.
4. A fire detector as claimed in any preceding claim, in which the visual indication means are operable

to give no indication when the fire detector is not receiving power and/or is malfunctioning.

5. A fire detector as claimed in any preceding claim, in which the visual indication means are operable to indicate whether the fire detector is receiving power on receipt of signal from a control panel. 5
6. A fire detector as claimed in any preceding claim, which is operable to detect heat, smoke and/or a specified gas. 10
7. A fire alarm comprises at least one fire detector in a zone arrangement and a central controller, wherein the at least one fire detector is arranged to receive power from the central controller and wherein the at least one fire detector includes indication means operable to indicate that at least one fire detector is receiving power from the central controller. 15
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8. A fire alarm system as claimed in claim 7, in which the indication means are adapted to operate on receipt of a signal from the central controller.
9. A fire alarm system as claimed in either claim 7 or claim 8, in which the signal is generated by the central controller on receipt of an indication that at least one fire detector is not receiving power and/or is malfunctioning. 25
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10. A fire alarm system as claimed in claim 9, in which the indication received by the central controller results from an end of line device not receiving a signal and/or the central controller not receiving a signal from the end of line device. 35
11. A method of indicating the functioning of a fire detector comprises signalling indication means of the fire detector to indicate that the fire detector is receiving power from a separate power supply. 40
12. A method as claimed in claim 11, in which the indication is caused on receipt of a signal from a central controller supplying power to the fire detector. 45

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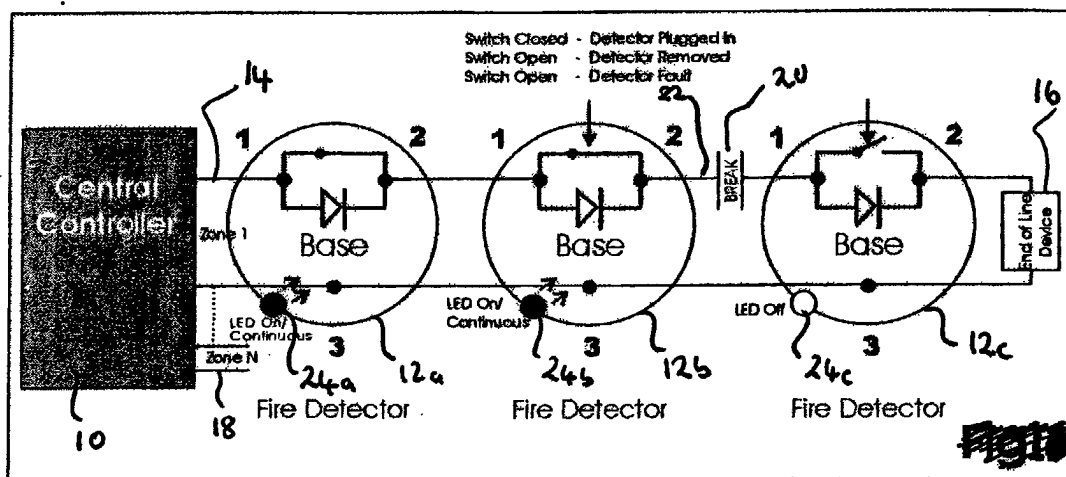


Figure 1



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 02 25 3890

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.7)
X	US 5 621 394 A (GARRICK GILBERT A ET AL) 15 April 1997 (1997-04-15)	1-8,11, 12	G08B17/00 G08B29/18 G08B7/06
Y	* column 1, line 11 - line 21 * * column 2, line 51 - line 54 * * column 3, line 21 - line 23 * * column 3, line 33 - line 38 * * column 3, line 45 - line 49 * * column 6, line 43 - line 47; figure 1 * * column 6, line 60 - line 65; figure 1 * * column 7, line 7 - line 10 * * column 7, line 16 - line 24 * * column 9, line 19 - line 29; figures 5,6 * * column 11, line 40 - line 41; figure 5 * * column 12, line 50 - line 54; figure 5 * * column 13, line 7 - line 9; figure 5 * ---	9,10	
Y	DE 43 22 841 A (ZETTLER GMBH) 26 January 1995 (1995-01-26) * column 1, line 1 - line 13 * * column 3, line 29 - line 32 * * column 3, line 60 - line 63 * * column 11, line 24 - line 30 * * column 12, line 20 - line 27; claim 1 * -----	9,10	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 November 2002	Examiner Meister, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 02 25 3890

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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