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(54) **Fire device addressing**

(57) A method of operating a fire detection system includes arranging a plurality of fire devices in an array. Each fire device includes a base portion fixed in a location in the array and a replaceable device portion installed to the base portion; the device portion configured to detect fire and/or smoke. A radio frequency identification (RFID) tag is affixed to the base portion and uniquely identifies a location of the fire device in the array. A transceiver is located at the device portion to receive a signal from the RFID tag. The location of each fire device is communicated to a control panel operably connected to the plurality of fire devices.

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Description

BACKGROUND

[0001] The subject matter disclosed herein relates to fire detection systems. More particularly, the present disclosure relates to systems for addressing devices of fire detection systems and applications of the addressing systems.

[0002] Fire detection systems, especially those in large facilities, such as office buildings or industrial facilities, have multiple fire devices located throughout the facility, often connected to a central control panel, which in turn, can communicate with firefighting authorities. In some systems, the fire device has a unique identifier, or address, assigned to it, such that when the fire device communicates with the control panel, the location of the device in the facility is known. These addresses are typically established via rotary switches or DIP switches located in the fire device. When a fire device is replaced, such as when broken or obsolete, the fire device is removed from its base, which remains installed, and a new fire device is installed to the base. When the new fire device is installed, the address of the previous fire device in that location must be duplicated, which can lead to errors in addressing.

[0003] Further, while firefighting authorities can be directed to a site of fire based on the address or addresses of fire devices sounding alarms, nothing in present fire detection systems allows them to efficiently locate personnel in a building, whether they are firefighters or personnel in need of assistance or rescue.

BRIEF SUMMARY

[0004] In one embodiment, a method of operating a fire detection system includes arranging a plurality of fire devices in an array. Each fire device includes a base portion fixed in a location in the array and a replaceable device portion installed to the base portion; the device portion configured to detect fire and/or smoke. A radio frequency identification (RFID) tag is affixed to the base portion or to the physical device and uniquely identifies a location of the fire device in the array. A transceiver is located at the device portion to receive a signal from the RFID tag. The location of each fire device is communicated to a control panel operably connected to the plurality of fire devices.

[0005] Additionally or alternatively, in this or other embodiments the method includes receiving a personnel RFID signal emitted from personnel RFID tag in a vicinity of a select fire device of the plurality of fire devices.

[0006] Additionally or alternatively, in this or other embodiments the method includes communicating the personnel RFID signal and the location of the fire device to the control panel, and identifying a location of the personnel RFID tag.

[0007] Additionally or alternatively, in this or other embodiments the method includes communicating the location of the personnel RFID tag to a selected communication device.

[0008] Additionally or alternatively, in this or other embodiments the selected communication device is one of a smartphone, personal computer or tablet.

[0009] In another embodiment, a fire device includes a base portion fixed in a location and a replaceable device portion installed to the base portion; the device portion configured to detect fire and/or smoke. A radio frequency identification (RFID) tag is affixed to the base portion or to the physical device. The RFID tag uniquely identifies a location of the fire device in a structure. A transceiver is located at the device portion to receive a signal from the RFID tag and is operably connected to a control system.

[0010] Additionally or alternatively, in this or other embodiments the RFID tag includes a programmed unique address to uniquely identify the location of the fire device.

[0011] Additionally or alternatively, in this or other embodiments the transceiver is configured to read the unique address.

[0012] Additionally or alternatively, in this or other embodiments the RFID tag is positioned at a recess or ridge of the base portion.

[0013] Additionally or alternatively, in this or other embodiments an antenna of the transceiver is disposed at a same vertical axis relative to the RFID tag.

[0014] Additionally or alternatively, in this or other embodiments the transceiver is configured to receive an RFID signal emitted from personnel RFID tag in a vicinity of the fire device, or emitted from the diagnostic tool.

[0015] Additionally or alternatively, in this or other embodiments the transceiver is configured to communicate the personnel RFID stored information to a control panel.

[0016] These and other advantages and features will become more apparent from the following description taken in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The subject matter, which is regarded as the invention, is particularly pointed out and distinctly claimed in the claims at the conclusion of the specification. The foregoing and other features, and advantages of the invention are apparent from the following detailed description taken in conjunction with the accompanying drawings in which:

FIG. 1 is a schematic view of an embodiment of a fire detection system;

FIG. 2 is a partial cross-sectional view of an embodiment of a fire device;

FIG. 3 is a perspective view of an embodiment of a base for a fire device; and

FIG. 4 is a schematic view of another operational mode of an embodiment of a fire detection system.

[0018] The detailed description explains embodiments of the invention, together with advantages and features, by way of example with reference to the drawing.

DETAILED DESCRIPTION

[0019] Shown in FIG. 1 is a schematic view an embodiment of a fire detection system 10 for, for example, a building 12 or a portion of a building. The system 10 includes a plurality of fire devices 14 arranged in an array 16 in the building 12, each fire device 14 configured to detect fire, smoke and/or other properties in the area near the fire device's location in the array 16. The fire devices 14 are connected to a central control panel 18. In some embodiments, the fire detection system 10 is connected with, for example, a fire department 20 to communicate a status of the fire detection system 10 and/or sound an alarm in the case of a fire.

[0020] Shown in FIG. 2 is a partial cross-sectional view of the fire device 14. Some fire devices 14 includes a base 22 fixed to the building 12, and a replaceable device 24 installed to and connected to the base 22, and in communication with the control panel 18. The base 22 or the device 24 includes a passive radio frequency identification (RFID) element, or RFID tag 26 secured thereto. The RFID tag 26 contains a programmed unique address and/or other information, utilized by the control panel 18 to define the location of the fire device 14 in the array 16 and to facilitate communication between the control panel 18 and the fire device 14. The device 24 includes an RFID circuit 28, which is an active element connected to and capable of communicating with the RFID tag 26 to read the address on the RFID tag 26. The RFID circuit 28 is also connected to and communicates with the control panel 18. The RFID tag 26 acts as a transmitter, while the RFID circuit 28 acts as a transceiver. In the cases where the tag 26 is located in the device 24, the tag 26 and the transceiver are in the same circuitry.

[0021] Referring now to FIG. 3, the base 22 is shown. The base 22 could include a tag location 30, such as a recess or ridge, to assist in locating the RFID tag 26 in the base 22. The tag location 30 assures that the RFID tag 26 is placed such that the RFID circuit 28 can read the RFID tag 26 when the device 24 is installed to the base 22. For an installation of an array 16 of fire devices 14 in a building 10, in some embodiments, the RFID tags 26 could be preprogrammed at a manufacturing facility and distributed to an installer in, for example, sheets or rolls with the associated addresses. The installer will place the appropriate RFID tag 26 in each base 22 before installing the device 24 to the base 22. Referring again to FIG. 2, the device 24 is positioned such that an antenna 30 of the RFID circuit 28 is in close proximity, in some embodiments at a minimum distance along the same vertical axis relative to the RFID tag 26 thereby simplifying the design and optimizing communication between the RFID tag 26 and the RFID circuit 28. If the device 24 needs to be replaced, the RFID tag 26 remains fixed to the base 22, so the RFID circuit 28 in the replacement device 24 will read the same RFID tag 26. Keeping the RFID tag 26 with the base 22 allows for a reduction in installation time of the system 10 and improved management of installations. Further, addressing errors occurring during maintenance or service are eliminated. Other information, such as a type of device 24 that is supposed to be installed in a particular location, may be stored in the RFID tag 26 further reducing installation and/or maintenance errors. In addition, the RFID circuit 28 may be utilized to communicate and report data stored in the device 24 to the control panel 18 for maintenance, service or calibration purposes. In addition, the RFID circuit 26 may be utilized to store manufacturing data during manufacture of the device 24.

[0022] Alternatively the tag 26 can be located at the device 24 itself. The address of the device 24 in this case will be programmed using an external tool via RFID communication. No reader will be installed on the device 24 in this case. The rest of functionality is the same as in the previous point.

[0023] Referring to FIG. 4, the antenna 30 of the RFID circuit 28 can detect signals 36 of RFID tags 26 in the vicinity of the antenna 30. In the case of an alarm, the antenna 30 and RFID circuit 28 of the device 24 will detect the signals 36 from personnel RFID tags 46, such as those embedded in identification cards carried by personnel in vicinity 40 of the antenna 30. In some embodiments, the vicinity 40 is a circular area having a diameter of a number of meters covering the maximum distance between two devices 24 in a fire installation. The RFID circuit 28 communicates the signal 36 to the control panel 18 along with the address of the fire device 14 where the signal 36 has been detected, allowing the system 10 to identify a location or locations where a person is located in the building 10. This information may be sent to a selected communication device 42, such as smartphone, personal computer or tablet, and/or to a building management system (not shown) and may be utilized to direct evacuation and/or rescue operations.

[0024] While the invention has been described in detail in connection with only a limited number of embodiments, it should be readily understood that the invention is not limited to such disclosed embodiments. Rather, the invention can be modified to incorporate any number of variations, alterations, substitutions or equivalent arrangements not heretofore described, but which are commensurate with the spirit and scope of the invention. Additionally, while various embodiments of the invention have been described, it is to be understood that aspects of the invention may include only some of the described embodiments. Accordingly, the invention is not to be seen as limited by the foregoing description, but is only limited by the scope of the appended claims.

Claims

1. A method of operating a fire detection system comprising:

   arranging a plurality of fire devices in an array, each fire device including:

   a base portion fixed in a location in the array;
   a replaceable device portion installed to the base portion, the device portion configured to detect fire and/or smoke;
   a radio frequency identification (RFID) tag affixed to the base portion or to the fire device itself, the RFID tag uniquely identifying a location of the fire device in the array; and
   a transceiver disposed at the device portion to receive a signal from the RFID tag; and

   communicating the location of each fire device to a control panel operably connected to the plurality of fire devices.

2. The method of Claim 1, further comprising receiving a personnel RFID signal emitted from personnel RFID tag in a vicinity of a select fire device of the plurality of fire devices.

3. The method of Claim 2, further comprising:

   communicating the personnel RFID signal and the location of the fire device to the control panel; and
   identifying a location of the personnel RFID tag.

4. The method of Claim 3, further comprising communicating the location of the personnel RFID tag to a selected communication device.

5. The method of Claim 4, wherein the selected communication device is one of a smartphone, personal computer or tablet.

6. A fire device comprising:

   a base portion fixed in a location;
   a replaceable device portion installed to the base portion, the device portion configured to detect fire and/or smoke;
   a radio frequency identification (RFID) tag affixed to the base portion, the RFID tag uniquely identifying a location of the fire device in a structure; and
   a transceiver disposed at the device portion to receive a signal from the RFID tag, the transceiver operably connected to a control system.

7. The fire device of Claim 6, wherein the RFID tag includes a programmed unique address to uniquely identify the location of the fire device.

8. The fire device of Claim 7, wherein the transceiver is configured to read the unique address.

9. The fire device of any of Claims 6-8, wherein the RFID tag is positioned at a recess or ridge of the base portion.

10. The fire device of any of Claims 6-9, wherein an antenna of the transceiver is disposed at a same vertical axis relative to the RFID tag.

11. The fire device of any of Claims 6-10, wherein the transceiver is configured to receive an RFID signal emitted from personnel RFID tag in a vicinity of the fire device.

12. The fire device of Claim 11, wherein the transceiver is configured to communicate the personnel RFID signal to a control panel.

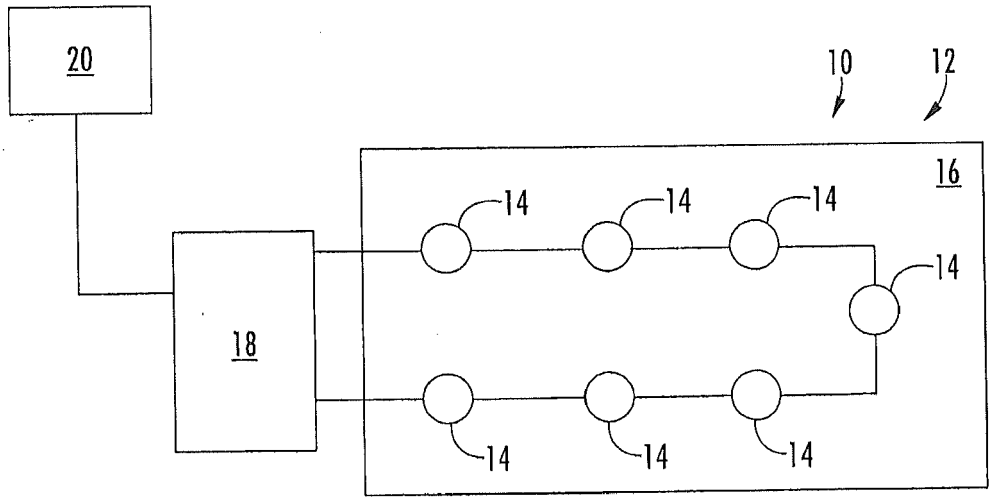

FIG. 1

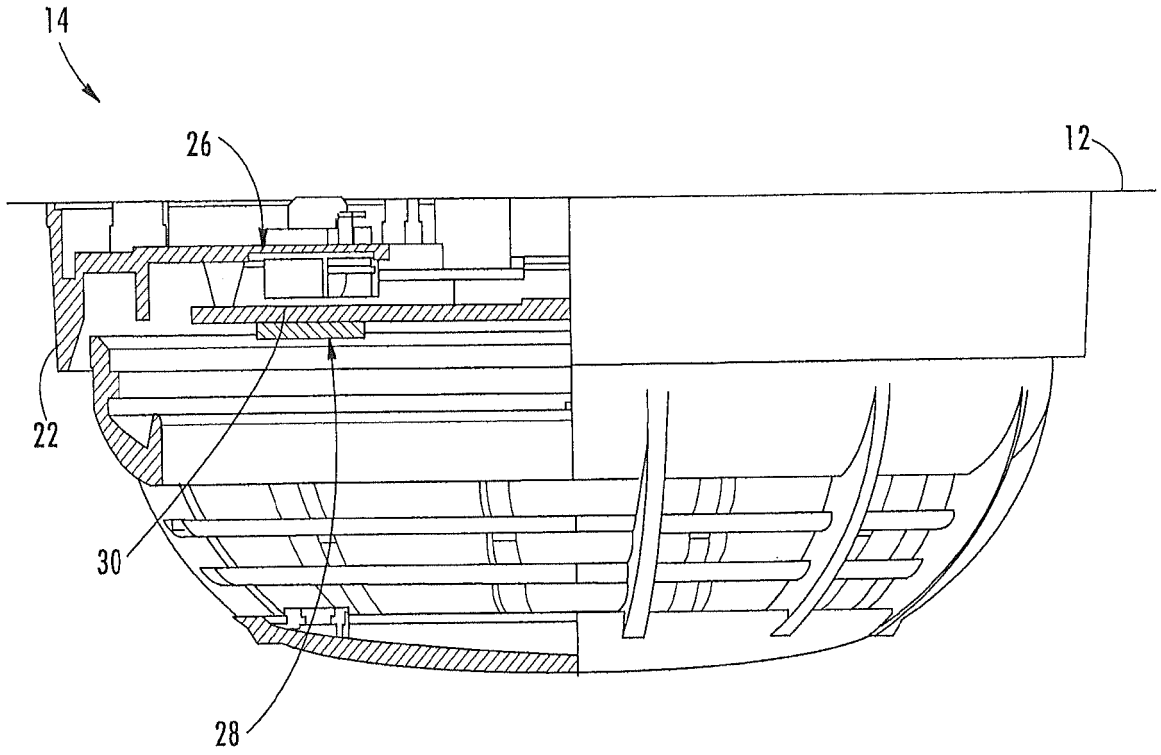

FIG. 2

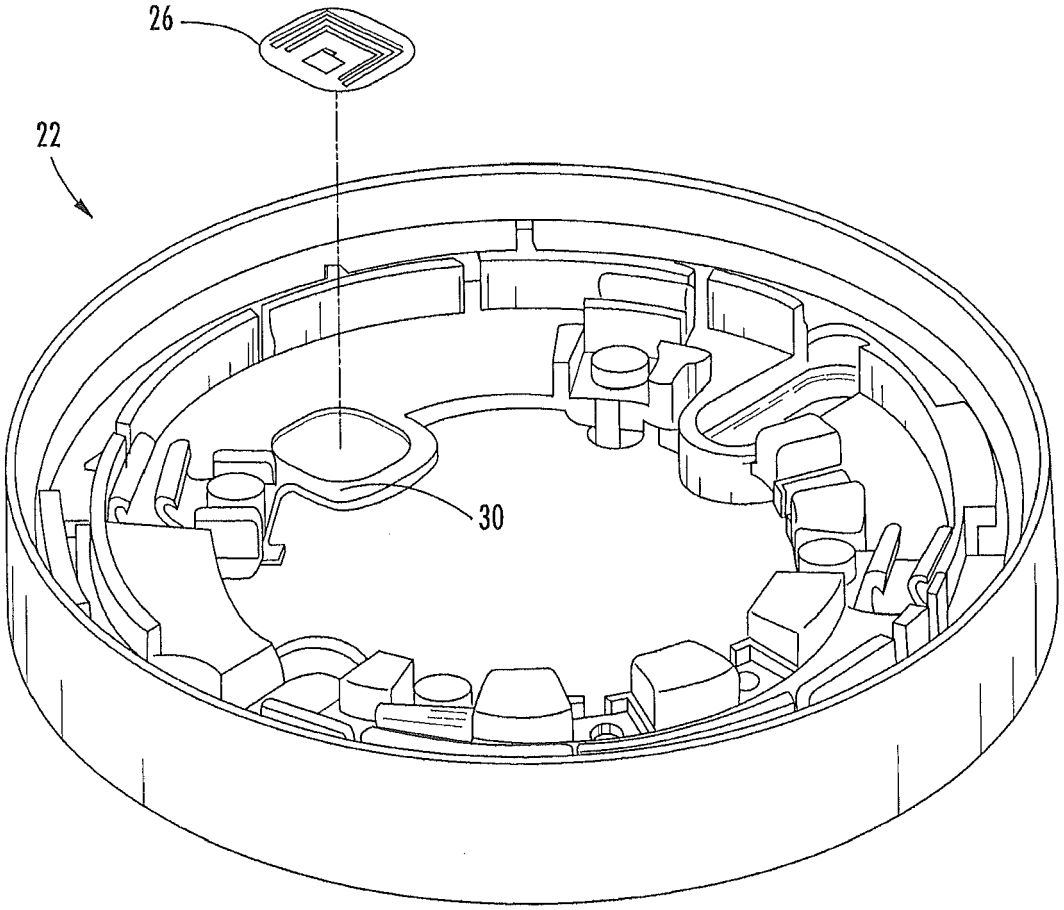

FIG. 3

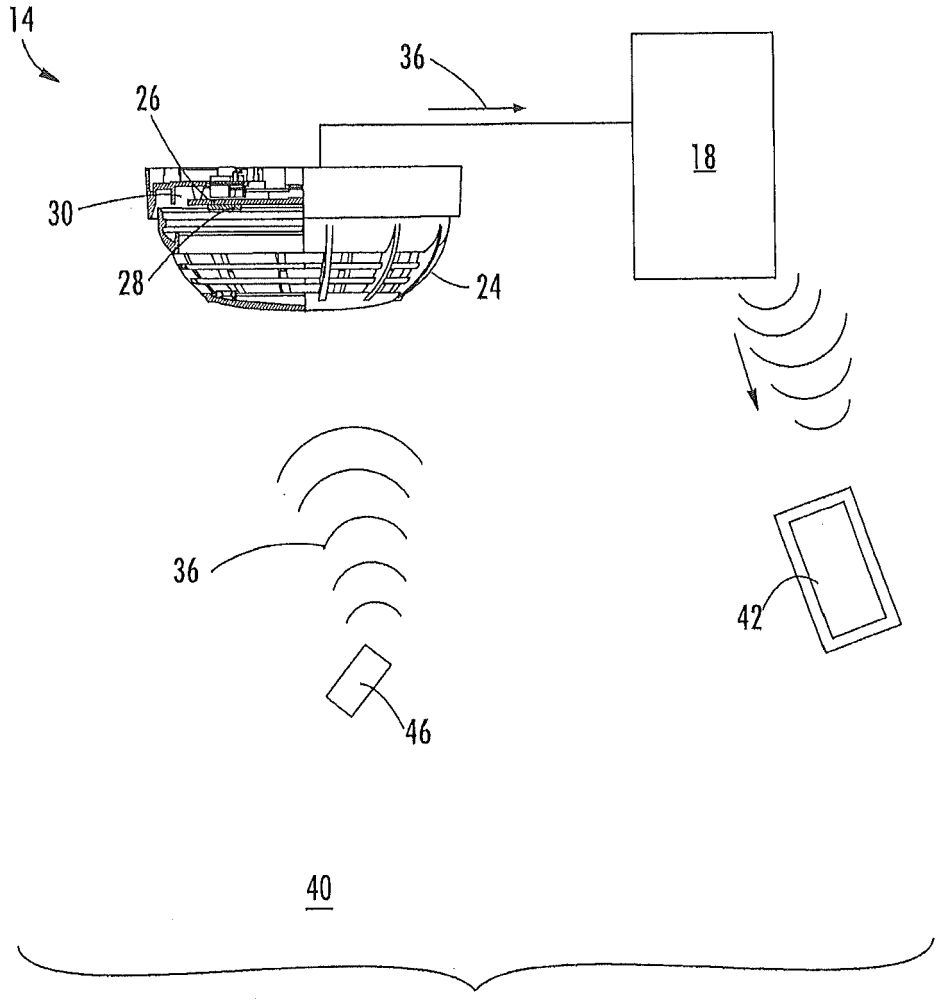

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 14 38 2225

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2006/226970 A1 (SAGA SUSUMU [JP] ET AL) 12 October 2006 (2006-10-12) * figures 2-4 * * paragraphs [0004] - [0008], [0024], [0027], [0038] - [0040], [0074] * -----	1-12	INV. G08B27/00 G08B7/06

TECHNICAL FIELDS SEARCHED (IPC)

G08B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	5 November 2014	Coffa, Andrew

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
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 38 2225

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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05-11-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006226970 A1	12-10-2006	JP 4634207 B2	23-02-2011
		JP 2006293774 A	26-10-2006
		US 2006226970 A1	12-10-2006

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