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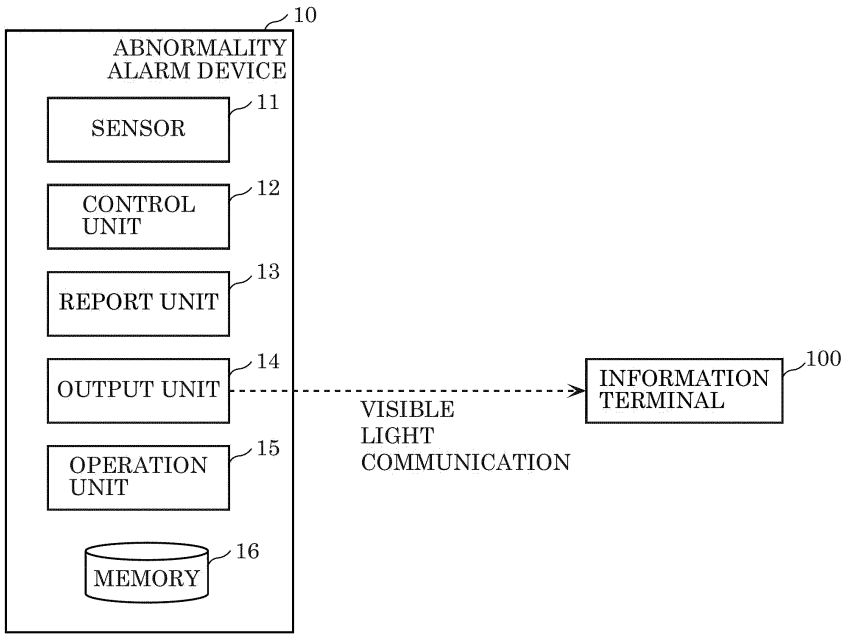
(54) **ABNORMALITY ALARM DEVICE**

(57) An abnormality alarm device (10) including: a sensor (11) which detects an abnormality; a report unit (13) configured to report occurrence of the abnormality in accordance with a result of the detection performed by the sensor (11); and an output unit (14) configured to output information regarding the abnormality alarm device (10) through visible light communication.

FIG. 1



EP 3 806 060 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to an abnormality alarm device.

BACKGROUND ART

[0002] Conventionally disclosed is a system which notifies information regarding an abnormality alarm device (for example, abnormality (failure) of a fire alarm device) to an external information terminal such as a smartphone or a tablet via a gateway (for example, PTL 1). Consequently, a user can check the aforementioned information on the information terminal.

Citation List

Patent Literature

[0003] PTL 1: Japanese Unexamined Patent Application Publication No. 2012-181814

SUMMARY OF INVENTION

PROBLEM TO BE SOLVED

[0004] However, it is required to provide the system disclosed in PTL 1 with a gateway separately from an abnormality alarm device. Thus, it takes labor and cost to form such a system, which brings about a problem that the system can be hardly brought into general households.

[0005] Thus, it is an object of the present invention to provide an abnormality alarm device capable of outputting information regarding the abnormality alarm device to an information terminal without using a gateway.

SOLUTION TO PROBLEM

[0006] An abnormality alarm device according to one aspect of the present invention includes: a sensor which detects an abnormality; and a report unit configured to report occurrence of the abnormality in accordance with a result of the detection performed by the sensor; and an output unit configured to output information regarding the abnormality alarm device through visible light communication.

ADVANTAGEOUS EFFECT OF INVENTION

[0007] An abnormality alarm device according to one aspect of the present invention makes it possible to output information regarding an abnormality alarm device to an information terminal without using a gateway.

BRIEF DESCRIPTION OF DRAWINGS

[0008]

FIG. 1 is a configuration diagram illustrating one example of an abnormality alarm device according to an embodiment.
FIG. 2 is an outer perspective view illustrating one example of the abnormality alarm device according to the embodiment.
FIG. 3 is a diagram illustrating one example of a conventional abnormality alarm system.

DESCRIPTION OF EXEMPLARY EMBODIMENT

Knowledge as Basis of Present Invention

[0009] First, the knowledge as a basis of the present invention will be described with reference to FIG. 3.

[0010] FIG. 3 is a diagram illustrating one example of a conventional abnormality alarm system.

[0011] Abnormality alarm device 10a is a fire alarm device which is installed in a housing, an office, or a facility such as a commercial facility, detects, for example, smoke or heat in fire as an abnormality, and reports by sound or the like that the abnormality has occurred. Moreover, abnormality alarm device 10a includes, for example, an operation unit (buttons, etc.) operated by a user, and checks a self-state (for example, an abnormality (failure or the like) of abnormality alarm device 10a) as a result of operation performed on the operation unit. For example, there have been demands for checking, from information terminal 100 such as a smartphone or a tablet, information such as results of the aforementioned check and information regarding another abnormality alarm device 10a. Information terminal 100 needs to receive the aforementioned information via, for example, a wireless network, which therefore requires gateway 200. Gateway 200 is a device which has a function as a network node for connecting together networks with mutually different protocols like, for example, a wired network connectable to abnormality alarm device 10a and a wireless network in information terminal 100.

[0012] Thus, gateway 200 needs to be separately prepared to form such an abnormality alarm system, which takes labor and cost and brings about a problem that it can be hardly brought into general households, etc.

[0013] Hereinafter, the embodiment of the present invention will be described in detail with reference to the drawings. Note that each embodiment described below indicates one detailed and favorable example of the present invention. Therefore, numerical values, shapes, components, arrangement and connection modes of the components as well as steps (processes) and a sequence of the steps, etc. indicated in the embodiment below form one example and are not intended to limit the present invention in any manner. Therefore, of the components in the embodiment described below, those not

described in any independent claim indicating the highest concept of the present invention will be described as optional components.

[0014] Moreover, each of the drawings is a schematic diagram and does not necessarily provide a precise illustration. Moreover, same components will be provided with same marks in each drawing.

EMBODIMENT

[0015] Hereinafter, the embodiment will be described with reference to FIGS.1 and 2.

[0016] FIG. 1 is a configuration diagram illustrating one example of abnormality alarm device 10 according to the embodiment. Note that FIG. 1 illustrates information terminal 100 in addition to abnormality alarm device 10. Information terminal 100 is an external information terminal which is located outside of abnormality alarm device 10.

[0017] Abnormality alarm device 10 is an alarm device which is installed in a housing, an office, or a facility such as a commercial facility, detects an abnormality, and reports that the abnormality has occurred. Abnormality alarm device 10 is, for example, a fire alarm device which reports that fire has occurred. Abnormality alarm device 10 is installed, for example, on the ceiling of the facility but may also be installed, for example, on a wall of the facility. Note that abnormality alarm device 10 may detect not only fire but also an abnormality other than the fire in the facility and report the aforementioned abnormality.

[0018] Abnormality alarm device 10 includes sensor 11, control unit 12, report unit 13, output unit 14, operation unit 15, and memory 16.

[0019] Sensor 11 is a sensor which detects an abnormality in a facility (room or the like) where abnormality alarm device 10 is installed. Sensor 11 is a sensor which detects, for example, fire. A method for detecting fire by sensor 11 is not specifically limited. For example, sensor 11 may be a smoke detection sensor of an optical type, which may detect smoke generated upon fire by use of defuse reflection to thereby detect the fire. Moreover, for example, sensor 11 may be a heat detection sensor, which may detect heat generated upon fire to thereby detect the fire. Moreover, for example, sensor 11 may be a carbon monoxide detection sensor, which may detect the concentration of carbon monoxide generated through combustion in fire to thereby detect the fire. Moreover, for example, sensor 11 may be an infrared detection sensor, which may detect infrared radiated through combustion upon fire to thereby detect the fire. Note that sensor 11 may detect not only fire but also an abnormality other than fire occurring in the facility.

[0020] Control unit 12 is a processing unit which determines, in accordance with a result of the detection performed by sensor 11, whether or not any abnormality has occurred. In accordance with the type of sensor 11, control unit 12 determines whether or not, for example, the intensity of the diffuse reflection, heat, carbon monoxide concentration, infrared concentration, etc. detected by sensor 11 are greater than or equal to predetermined threshold values to thereby determine whether or not an abnormality (fire) has occurred. Moreover, control unit 12 checks the state of abnormality alarm device 10. The state of abnormality alarm device 10 refers to, for example, the states of sensor 11 and report unit 13 (whether sensor 11 and report unit 13 are normal or abnormal) or the state of a remaining battery amount of abnormality alarm device 10. For example, control unit 12 checks whether or not sensor 11 and report unit 13 are normal and checks the remaining battery amount of abnormal alarm device 10. For example, the aforementioned checks are achieved when operation unit 15 to be described later on is operated. Control unit 12 is a functional component which realizes a sensor for detecting an abnormality in order to check the state (abnormality) of abnormality alarm device 10. For example, control unit 12 is realized by a microcomputer. Control unit 12 (microcomputer) is, for example, an LSI composed of: a ROM which holds a program; a RAM as a temporary storage region; a processor which executes the program; input and output circuits such as an A/D converter and a D/A converter; a counter timer; etc. Control unit 12 controls report unit 13, output unit 14, and memory 16 in accordance with the result of the detection performed by sensor 11 and the operation performed on operation unit 15.

[0021] Report unit 13 reports the occurrence of an abnormality when control unit 12 has determined that the abnormality has occurred. A method for reporting the occurrence of the abnormality by report unit 13 is not specifically limited. For example, report unit 13 may be a speaker or a buzzer, which may report the occurrence of the abnormality by sound or buzzer sound. Moreover, report unit 13 may be a light-emitting device, which may report the occurrence of the abnormality by blinking light or the like. For example, the number of times report unit 13 has reported or time at which the reporting has been performed are stored into memory 16.

[0022] Output unit 14 includes a light source such as, for example, an LED and lights up or blinks. The outer appearance of output unit 14 will be described in FIG. 2 to be described later on. Output unit 14 visually notifies (displays), to the user, the state of abnormality alarm device 10 by the lighting or blinking of the light source. For example, when there is any abnormality in the state of abnormality alarm device 10, output unit 14 notifies, through, for example, blinking, the user that abnormality alarm device 10 is in the aforementioned state. Note that the type of the abnormality may be discriminated through, for example, a mode of blinking (for example, a cycle) to notify the state of abnormality alarm device 10 to the user.

[0023] Moreover, output unit 14 outputs the information regarding abnormality alarm device 10 through visible light communication. The information regarding abnormality alarm device 10 will be described later on. Abnormality alarm device 10 includes, for example, a mod-

ulation circuit (not illustrated) for visible light communication so that output unit 14 outputs the information through the visible light communication. Control unit 12 may function as part of the modulation circuit. The modulation circuit includes a switching element for turning on and off the light source. For example, based on a signal for visible light communication determined by a built-in program or the like, control unit 12 outputs a drive signal for turning on and off the switching element. Light is modulated by turning on and off the light source at a high speed with a predetermined modulation frequency by the switching element.

[0024] Information terminal 100 is a portable terminal such as a smartphone or a tablet and includes a camera or the like capable of acquiring a visible light signal outputted from abnormality alarm device 10. Moreover, information terminal 100 includes a display, a sound output device (speaker), etc. For example, information terminal 100 stores an application (program) for causing the display or the speaker to output an image or sound according to the visible light signal outputted from abnormality alarm device 10.

[0025] Consequently, the user can check the information regarding abnormality alarm device 10 by information terminal 100 only by holding information terminal 100 over output unit 14 which outputs the information regarding abnormality alarm device 10 through the visible light communication. That is, information terminal 100 is not required to wirelessly receive the aforementioned information, so that gateway 200 is no longer required. As described above, according to the present invention, the information regarding abnormality alarm device 10 can be outputted to information terminal 100 without using gateway 200.

[0026] Moreover, when information terminal 100 acquires the aforementioned information via gateway 200, pairing operation between information terminal 100 or gateway 200 and abnormality alarm device 10 is required. At this point, when the pairing is erroneously performed, information regarding an abnormality alarm device different from abnormality alarm device 10 which the user desired to check is transmitted to information terminal 100. However, even when the information regarding abnormality alarm device 10 includes identification information for identifying abnormality alarm device 10, the aforementioned identification information is information such as address information (for example, a media access control (MAC) address or a logical address) of information terminal 100. Thus, it is difficult for the user to notice that the pairing is erroneously performed even when the address information is checked. On the contrary, with the present invention, the pairing is not required from the beginning and the user holds information terminal 100 over abnormality alarm device 10 currently installed and thus can intuitively recognize for which abnormality alarm device 10 the information is to be checked.

[0027] Operation unit 15 is a button or the like which is provided in a housing of abnormality alarm device 10 and is subjected to, for example, press operation performed by the user. The outer appearance of operation unit 15 will be described with reference to FIG. 2 to be described later on. As described above, when operation unit 15 has been operated, control unit 12 checks the state of abnormality alarm device 10. Note that as one of checks of the state of abnormality alarm device 10, the abnormality check of report unit 13 (speaker) cannot be performed without actually outputting sound from the speaker in many cases. There is a risk that sound is suddenly outputted from the speaker and the user is surprised when the abnormality of the speaker has been checked regardless of user's intent without, for example, the operation performed on operation unit 15. With the present embodiment, the operation is performed on operation unit 15 (that is, the abnormality of the speaker is checked) depending on user's intent, which therefore makes it possible to suppress the surprise of the user. Then output unit 14 outputs the information regarding abnormality alarm device 10 through the visible light communication while displaying the state of abnormality alarm device 10 by, for example, lighting up or blinking based on an instruction provided from control unit 12 in accordance with the operation performed on operation unit 15.

[0028] Consequently, the user can check the state of abnormality alarm device 10 and the information regarding abnormality alarm device 10 at timing desired by the user through the operation performed on operation unit 15. Moreover, the human cannot sense the turn-on and -off of the light source through light modulation, so that the light source at output unit 14 can also be used for data communication for the information regarding abnormality alarm device 10 while being used for visual notification of the state of abnormality alarm device 10. For example, only by changing a program for operating the control unit (microcomputer) without adding, for example, any new component to an existing abnormality alarm device having a display unit (a light source or the like) for notifying the state of the abnormality alarm device, the display unit can be caused to function as output unit 14, which permits the realization of abnormality alarm device 10.

[0029] Memory 16 is a ROM, a RAM, or the like, which stores the information regarding abnormality alarm device 10.

[0030] For example, the information regarding abnormality alarm device 10 may include information regarding the operation history of abnormality alarm device 10. Consequently, the user can check the operation history of abnormality alarm device 10. The information regarding the operation history of abnormality alarm device 10 refer to, for example, the number of times operation unit 15 is operated; an accumulated operation time of abnormality alarm device 10, the accumulated number of times report unit 13 has reported the occurrence of the abnormality, or the number of times report unit 13 has reported

the occurrence of the abnormality in a predetermined period.

[0031] Moreover, the information regarding abnormality alarm device 10 may include, for example, the number of times operation unit 15 is operated. The state of abnormality alarm device 10 is checked when operation unit 15 is operated, which therefore makes it possible for the user to check the number of times the state of abnormality alarm device 10 has been checked so far.

[0032] Moreover, the information regarding abnormality alarm device 10 may include, for example, an accumulated operation time of abnormality alarm device 10. Consequently, the user can check the accumulated operation time (for example, years of operation) of abnormality alarm device 10 and judge whether or not it is time to replace abnormality alarm device 10.

[0033] Moreover, for example, the information regarding abnormality alarm device 10 may include the accumulated number of times report unit 13 has reported the occurrence of the abnormality. For example, upon every reporting by report unit 13, what has been reported is stored into memory 16, so that the information regarding abnormality alarm device 10 can include the accumulated number of times described above. Consequently, the user can check the accumulated number of times report unit 13 has reported the occurrence of the abnormality.

[0034] Moreover, for example, the information regarding abnormality alarm device 10 may include the number of times report unit 13 has reported the occurrence of the abnormality in the predetermined period. The predetermined period is, for example, an immediate one week but is not limited thereto. Moreover, the predetermined period may be changed by the setting. For example, upon reporting by report unit 13, the time at which the reporting was performed is stored into memory 16, so that the information regarding abnormality alarm device 10 can include the aforementioned number of times in the predetermined period. Consequently, for example, it is possible for the user to check the number of times the occurrence of the abnormality has been reported in one week (the number of times erroneous report has been done if no abnormality has actually occurred) when the user is away for a long period such as one week.

[0035] Moreover, for example, as described above, sensor 11 may be a smoke detection sensor of an optical type, and the information regarding abnormality alarm device 10 may include information indicating the degree of dirtiness of the smoke detection sensor. For example, the smoke detection sensor is composed of a chamber, a light-receiving element (photodiode or the like), and a light-emitting element (an LED or the like). The chamber rejects external light and can receive smoke and has a black inner wall. The light-receiving element and the light-emitting element are arranged in the chamber so as not to oppose each other. Since the light-receiving element and the light-emitting element do not oppose each other, under the absence of smoke in the chamber, light outputted from the light-emitting element does not hit the light-receiving element and the smoke detection sensor does not detect that the smoke (fire) has been generated. However, when the inner wall of the chamber is dirty with white dust or the like, light outputted from the light-emitting element is reflected by the dust or the like even under the absence of smoke in the chamber, which increases the reception amount of the light-receiving element, leading to a risk of erroneous detection. Therefore, the user can check the degree of dirtiness of the smoke detection sensor and judge whether or not to clean or replace the smoke detection sensor.

[0036] Moreover, there is a system which has an abnormality alarm device installed for each room of a facility and which can operate the aforementioned abnormality alarm devices in conjunction therewith to thereby notify an abnormality to a person present in each room even upon the occurrence of the abnormality in any of the rooms. Abnormality alarm device 10 is applicable to such a system. At this point, each abnormality alarm device 10 needs to be wirelessly connected, but each abnormality alarm device 10 may not be operated in conjunction due to communication failure, depending on the state of the facility (for example, the position of a radio wave shield). Thus, for example, abnormality alarm device 10 may perform wireless communication with another abnormality alarm device 10, and the information regarding abnormality alarm device 10 may include the intensity of wireless communication with another abnormality alarm device 10. The intensity of the wireless communication is received signal strength indication (RSSI). Consequently, the user can check the intensity of the wireless communication with another abnormality alarm device 10 and can check whether or not communication can be made with a margin. When the intensity of the wireless communication is low, a blocking object between abnormality alarm devices 10 can be moved or the installation position of abnormality alarm device 10 can be moved to improve the intensity of the wireless communication.

[0037] Moreover, for example, the information regarding abnormality alarm device 10 may include the state of abnormality alarm device 10. When expressing the state of abnormality alarm device 10, there is limitation with only simple, visual lighting and blinking of output unit 14 and it is possible to express the state of abnormality alarm device 10 in more detail through display on the display of information terminal 100.

[0038] Next, the outer appearance of abnormality alarm device 10 will be described.

[0039] FIG. 2 is an external perspective view illustrating one example of abnormality alarm device 10 according to an embodiment.

[0040] FIG. 2 illustrates holes 18 for supplying the air (smoke) to housing 17, output unit 14, operation unit 15, and sensor 11 (for example, the smoke detection sensor) of abnormality alarm device 10 and holes 19 through which sound from report unit 13 (for example, speaker) passes. Output unit 14, operation unit 15, holes 18, and holes 19 are provided in housing 17.

[0041] As illustrated in FIG. 2, output unit 14 also functions as operation unit 15. In other words, output unit 14 is operation unit 15, and further in other words, output unit 14 and operation unit 15 are provided at the same place in housing 17. Operation unit 15 is, for example, a press button as described above, and formed of a semi-transparent member. Moreover, a light source of output unit 14 is arranged inside of the aforementioned button. That is, the button portion is lit up by the light source of output unit 14.

[0042] As described above, since output unit 14 also functions as operation unit 15, components of abnormality alarm device 10 can be collected at one place, which permits downsizing and cost reduction. Moreover, light for visible light communication is outputted from operation unit 15, which therefore makes it easy for the user to recognize where information terminal 100 is held over.

[0043] As described above, abnormality alarm device 10 according to the present embodiment includes: sensor 11 which detects an abnormality; and report unit 13 which reports the occurrence of the abnormality in accordance with a result of the detection performed by sensor 11. Abnormality alarm device 10 includes output unit 14 which outputs information regarding abnormality alarm device 10 through visible light communication.

[0044] As a result, the user can check the information regarding abnormality alarm device 10 by information terminal 100 only by holding information terminal 100 over output unit 14 which outputs the information regarding abnormality alarm device 10 through the visible light communication. That is, information terminal 100 is not required to receive the aforementioned information via, for example, a wireless network, which no longer requires gateway 200. As described above, according to the present invention, the information regarding abnormality alarm device 10 can be outputted to information terminal 100 without using any gateway.

[0045] Moreover, the information regarding abnormality alarm device 10 may include information regarding the operation history of abnormality alarm device 10.

[0046] As a result, the user can check the operation history of abnormality alarm device 10.

[0047] Moreover, abnormality alarm device 10 further includes: operation unit 15; and control unit 12 which checks the state of abnormality alarm device 10 when operation unit 15 has been operated. Output unit 14 may output the information regarding abnormality alarm device 10 through the visible light communication while displaying the state of abnormality alarm device 10.

[0048] As a result, the user can operate operation unit 15 to thereby check the state of abnormality alarm device 10 and the information regarding abnormality alarm device 10 at timing desired by the user. Moreover, since the turn-on and turn-off of the light source through light modulation is not sensed by a human, it is possible to use the light source in output unit 14 for data communication for the information regarding abnormality alarm device 10 while using the light source for visual notification of the state of abnormality alarm device 10.

[0049] Moreover, output unit 14 may also function as operation unit 15.

[0050] As a result, the components of abnormality alarm device 10 can be collected at one place, which permits the downsizing and the cost reduction. Moreover, light for the visible light communication is outputted from operation unit 15, which therefore makes it easy for the user to recognize over which the user can hold information terminal 100.

[0051] Moreover, the information regarding abnormality alarm device 10 may include the number of times operation unit 15 is operated.

[0052] As a result, the user can check the number of times the state of abnormality alarm device 10 has been checked so far.

[0053] Moreover, the information regarding abnormality alarm device 10 may include an accumulated operation time of abnormality alarm device 10.

[0054] As a result, the user can check the accumulated operation time (for example, the number of operation years) of abnormality alarm device 10 and can judge whether or not it is time to replace abnormality alarm device 10.

[0055] Moreover, the information regarding abnormality alarm device 10 may include the accumulated number of times report unit 13 has reported the occurrence of the abnormality.

[0056] As a result, the user can check the accumulated number of times report unit 13 has reported the occurrence of the abnormality.

[0057] Moreover, the information regarding abnormality alarm device 10 may include the number of times report unit 13 has reported the occurrence of the abnormality in a predetermined period.

[0058] As a result, the user can check the number of times the occurrence of the abnormality has been reported in the predetermined period (the number of times erroneous reporting has been done unless any abnormality actually occurs).

[0059] Moreover, sensor 11 is a smoke detection sensor of an optical type and the information regarding abnormality alarm device 10 may include information indicating the degree of dirtiness of the smoke detection sensor.

[0060] As a result, the user can check the degree of dirtiness of the smoke detection sensor and can judge whether or not to clean or replace the smoke detection sensor.

[0061] Moreover, abnormality alarm device 10 may perform wireless communication with another abnormality alarm device 10 and the information regarding abnormality alarm device 10 may include the intensity of wireless communication with another abnormality alarm device 10.

[0062] As a result, the user can check the intensity of the wireless communication with another abnormality alarm device 10 and can check whether or not the com-

munication can be made with a margin. When the intensity of the wireless communication is low, it is possible to move a blocking object between abnormality alarm devices 10 or move the installation position of abnormality alarm device 10 to improve the intensity of the wireless communication.

OTHER EMBODIMENT

[0063] Abnormality alarm device 10 according to the embodiment has been described above, but the present invention is not limited to the aforementioned embodiment.

[0064] For example, abnormality alarm device 10 includes operation unit 15 in the embodiment described above but may not include operation unit 15. In this case, displaying the state of abnormality alarm device 10 by output unit 14 and optical output for visible light communication are performed, for example, at regular timing.

[0065] Moreover, for example, output unit 14 may not function as operation unit 15. That is, output unit 14 and operation unit 15 may be provided at different places in housing 17.

[0066] Moreover, the present invention can be realized not only as abnormality alarm device 10 but also as a method including steps (processes) performed by components forming abnormality alarm device 10.

[0067] For example, these steps may be executed by a computer (computer system). Then the present invention can be realized as a program which causes the computer to execute the steps included in the method. Further, the present invention can be realized as a non-transitory, computer-readable recording medium such as, for example, a CD-ROM in which the aforementioned program is recorded.

[0068] For example, when the present invention is realized as a program (software), as a result of executing the program by use of hardware resources such as a CPU, a memory, and input and output circuits of the computer, each of the steps is executed. That is, the CPU acquires data from, for example, the memory or the input and output circuits for calculation and outputs a calculation result to, for example, the memory or the input and output circuits to thereby execute the steps.

[0069] Moreover, each of the components included in abnormality alarm device 10 of the embodiment described above may be realized as a dedicated or general-purpose circuit.

[0070] Moreover, each of the components included in abnormality alarm device 10 of the embodiment described above may be realized as a large-scale integration (LSI) as an integrated circuit (IC).

[0071] Moreover, the integrated circuit is not limited to the LSI and may be realized with a dedicated circuit or a general-purpose processor. A field programmable gate array (FPGA) or a reconfigurable processor may be used in which the connection and setting of circuit cells inside the LSI are reconfigurable.

[0072] Further, it is needless to say that the advancement of semiconductor technologies or the appearance of a technology of providing an integrated circuit in place of an LSI through another derived technology permits the use of the aforementioned technologies to provide an integrated circuit of each of the components included in abnormality alarm device 10.

[0073] The present invention also includes: a mode obtained by making various modifications conceivable by those skilled in the art to the embodiments; and a mode realized by combining together the components and functions in the embodiments in a desired manner within a range not departing from the spirits of the present invention.

REFERENCE MARKS IN THE DRAWINGS

[0074]

10, 10a	abnormality alarm device
11	sensor
12	control unit
13	report unit
14	output unit
15	operation unit

Claims

1. An abnormality alarm device, comprising:

a sensor which detects an abnormality;
a report unit configured to report occurrence of the abnormality in accordance with a result of the detection performed by the sensor; and
an output unit configured to output information regarding the abnormality alarm device through visible light communication.

2. The abnormality alarm device according to claim 1, wherein the information regarding the abnormality alarm device includes information regarding an operation history of the abnormality alarm device.

3. The abnormality alarm device according to claim 1 or 2, further comprising:

an operation unit; and
a control unit configured to check a state of the abnormality alarm device when the operation unit is operated,
wherein the output unit is configured to output the information regarding the abnormality alarm device through the visible light communication while displaying the state of the abnormality alarm device.

4. The abnormality alarm device according to claim 3,

wherein the output unit is configured to further function as the operation unit.

5. The abnormality alarm device according to claim 3 or 4,
wherein the information regarding the abnormality alarm device includes a number of times the operation unit is operated.

6. The abnormality alarm device according to any one of claims 1 to 5,
wherein the information regarding the abnormality alarm device includes an accumulated operation time of the abnormality alarm device.

7. The abnormality alarm device according to any one of claims 1 to 6,
wherein the information regarding the abnormality alarm device includes an accumulated number of times the report unit has reported the occurrence of the abnormality.

8. The abnormality alarm device according to any one of claims 1 to 7,
wherein the information regarding the abnormality alarm device includes an accumulated number of times the report unit has reported the occurrence of the abnormality in a predetermined period.

9. The abnormality alarm device according to any one of claims 1 to 8,
wherein the sensor is a smoke detection sensor of an optical type, and
the information regarding the abnormality alarm device includes information indicating a degree of dirtiness of the smoke detection sensor.

10. The abnormality alarm device according to any one of claims 1 to 9,
wherein the abnormality alarm device performs wireless communication with another abnormality alarm device, and
the information regarding the abnormality alarm device includes intensity of the wireless communication with the another abnormality alarm device.

FIG. 1

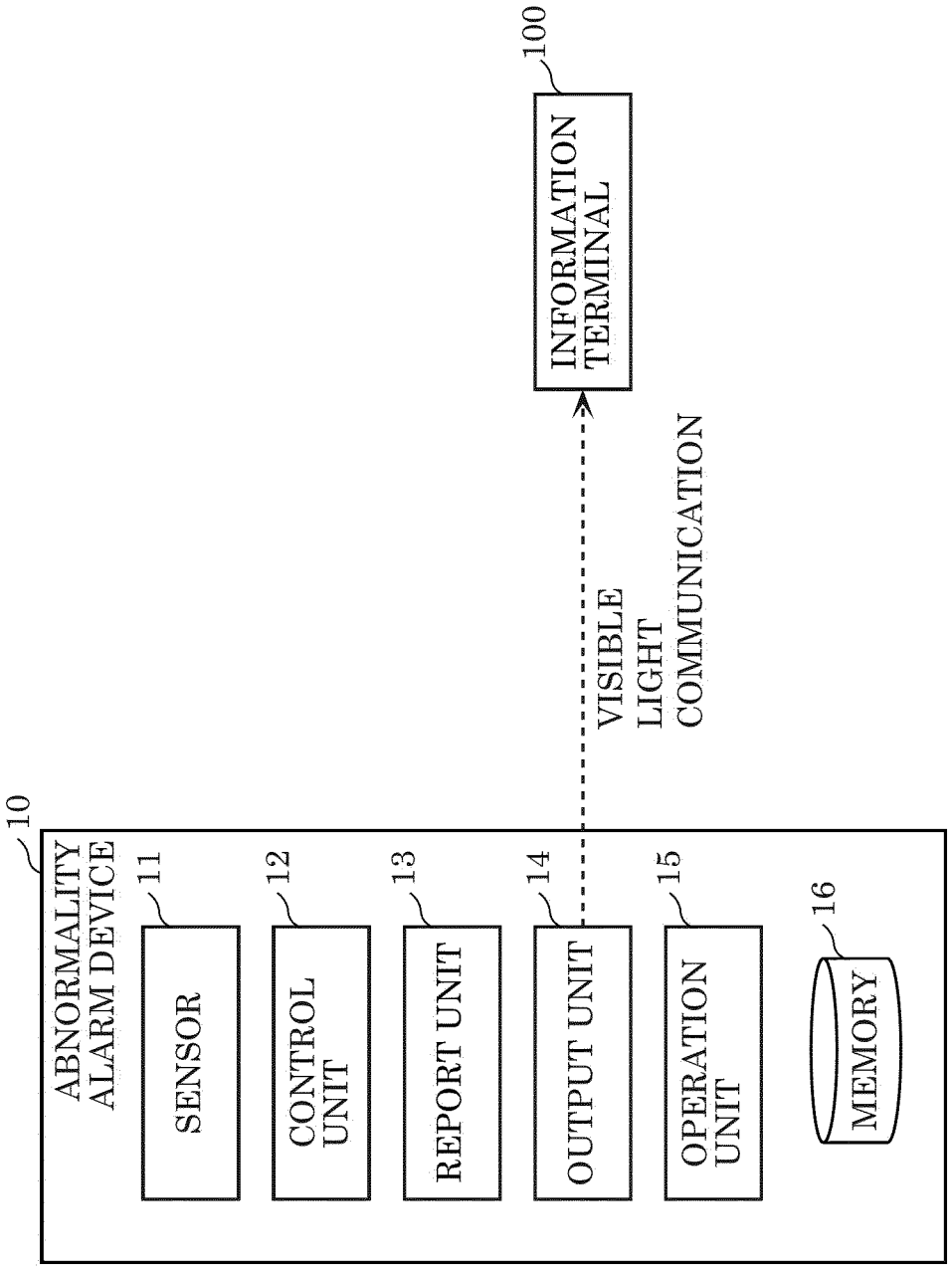

10
ABNORMALITY ALARM DEVICE
11
SENSOR
12
CONTROL UNIT
13
REPORT UNIT
14
OUTPUT UNIT
15
OPERATION UNIT
16
MEMORY
VISIBLE LIGHT COMMUNICATION
100
INFORMATION TERMINAL

FIG. 2

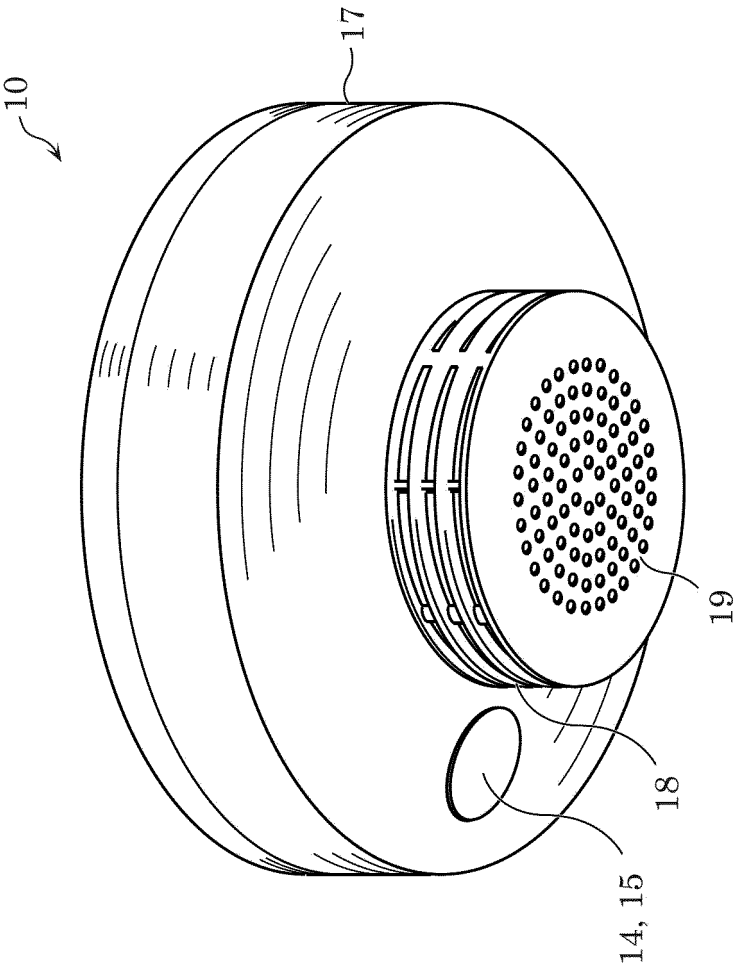
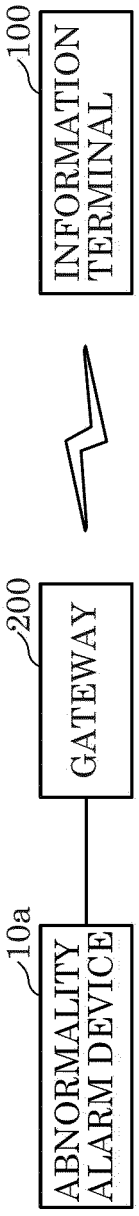


FIG. 3


100
INFORMATION TERMINAL
200
GATEWAY
10a
ABNORMALITY ALARM DEVICE

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2019/011964

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl. G08B25/00(2006.01)i, G08B17/10(2006.01)i, G08B23/00(2006.01)i

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)
Int. Cl. G08B17/00-31/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2019
Registered utility model specifications of Japan 1996-2019
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Electronic data base consulted during the international search (name of data base and, where practicable, 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.
X Y	JP 2006-99263 A (OSAKA GAS CO., LTD.) 13 April 2006, paragraphs [0019], [0022], [0023], [0029]-[0032], [0038]-[0041], [0049]-[0054], [0065], [0069] (Family: none)	1-2, 6-7 3-5, 8-10
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☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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28.05.2019	04.06.2019
Name and mailing address of the ISA/ Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2019/011964

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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REFERENCES CITED IN THE DESCRIPTION

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