

(19)



(11)

EP 3 937 148 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

12.01.2022 Bulletin 2022/02

(51) Int Cl.:

G08B 25/10 (2006.01)**G08B 25/00** (2006.01)(21) Application number: **21184224.0**(22) Date of filing: **07.07.2021**

(84) Designated Contracting States:

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Designated Extension States:

BA ME

Designated Validation States:

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• **TAKAHASHI, Hideaki****Osaka, 540-6207 (JP)**(54) **ALARM SYSTEM, APPARATUS, SETTING METHOD, AND SETTING PROGRAM**

(57) An object of the present disclosure is to more efficiently perform a setting process for operation of a master device and a slave device in an interconnected manner than before. An alarm system (1) has a plurality of alarms including a first apparatus (10) and at least one second apparatus (20), and the plurality of alarms cooperate with each other to achieve alarming in an interconnected manner between the alarms. The first apparatus (10) includes a first controller (106). The first controller (106) is configured to execute a setting process between the at least one second apparatus (20) and the first apparatus (10). The second apparatus (20) includes a sec-

ond controller (206). The second controller (206) is configured to execute a setting process between the first apparatus (10) and the at least one second apparatus (20). The first controller (106) is configured to transmit individual setting information to the at least one second apparatus (20) in the setting process, and the second controller (206) is configured to, when receiving the individual setting information, make, based on the individual setting information, a setting of the at least one second apparatus (20) including the second controller (206) in the setting process.

EP 3 937 148 A1

Description

Technical Field

[0001] The present invention relates to an alarm system configured to detect an abnormality, an apparatus, a setting method, and a program.

Background Art

[0002] In general, an alarm system has been provided which uses a radio signal to cause a plurality of alarms to operate in an interconnected manner. In such an alarm system, the plurality of alarms are installed at a plurality of locations, and when any of the alarms detects a fire, the alarm outputs an alarm and transmits information for notification of the detection of the fire as a radio signal to the other alarms. For example, Document 1 (JP 2011-133979 A) discloses a system including a plurality of alarms. One specific alarm of the plurality of alarms is defined as a master device, and the other alarms of the plurality of alarms are defined as slave devices. The master device is configured to transmit a warning message for notification of a fire to each of the slave devices. Thus, the plurality of alarms, but not only the alarm at the location of the fire, operate in an interconnected manner to output alarms to quickly and reliably notify a person of the presence of the fire.

Summary of Invention

[0003] Incidentally, it is known that a setting between a master device and a slave device relating to an alarm system is made by registering pieces of information to be set in the master device and the slave device respectively on the master device and the slave device, and then, sharing and setting the pieces of information between and in the master device and the slave device. In the known alarm system, a user gives operations so as to register respective pieces of installation location information with all of the master device and the slave device, and thereafter, the pieces of installation location information thus registered are exchanged between the master device and the slave device to make a setting of the alarm system. That is, the known alarm system stores necessary pieces of information in the master device and the slave device, and then, the pieces of information are exchanged between the master device and the slave device to complete the setting, and therefore, the setting of the alarm system requires an increased time and a significant amount of effort.

[0004] In view of the foregoing, it is an object of the present invention to provide an alarm system, an apparatus, a setting method, and a program configured to more efficiently perform a setting process for interconnected operation between the master device and the slave device.

[0005] To solve the problem, an alarm system accord-

ing to one aspect of the present disclosure is an alarm system in which a plurality of apparatuses including a first apparatus and at least one second apparatus cooperate with each other to achieve alarming in an interconnected manner between the plurality of apparatuses. The first apparatus includes a first controller configured to execute a setting process of making a setting for interconnected operation between the first apparatus and the at least one second apparatus. The at least one second apparatus includes a second controller configured to execute the setting process between the first apparatus and the at least one second apparatus. The first controller is configured to transmit individual setting information which is information regarding a setting of the at least one second apparatus to the at least one second apparatus in the setting process, and the second controller is configured to, when receiving the individual setting information, make, based on the individual setting information, a setting of the at least one second apparatus in the setting process.

[0006] An apparatus used as the first apparatus in the alarm system of the one aspect of the present invention is configured to store individual setting information required for a setting of the at least one second apparatus.

[0007] A setting method according to one aspect of the present invention is a setting method of an alarm system in which a plurality of apparatuses including a first apparatus and at least one second apparatus cooperate with each other to achieve alarming in an interconnected manner between the plurality of apparatuses. The first apparatus includes a first controller configured to execute a setting process of making a setting for interconnected operation between the first apparatus and the at least one second apparatus. The at least one second apparatus includes a second controller configured to execute the setting process between the first apparatus and the at least one second apparatus. The setting method of the alarm system includes: a transmission step of transmitting, from the first controller, individual setting information which is information regarding a setting of the at least one second apparatus to the at least one second apparatus in the setting process; and a setting step of, when the second controller receives the individual setting information, making, based on the individual setting information, a setting of the at least one second apparatus.

[0008] A setting program of the alarm system of the one aspect of the present invention is configured to cause a computer to execute the setting method of the alarm system.

Brief Description of Drawings

[0009]

FIG. 1 is a schematic diagram illustrating an alarm system according to a first embodiment;

FIG. 2 is a block diagram illustrating a master device and slave devices according to the first embodiment;

FIG. 3 is a view illustrating a data table of individual setting information which is on the slave device and which is included in the master device according to the first embodiment;

FIG. 4 is a view illustrating a variation of the data table of the individual setting information which is on the slave device and which is included in the master device according to the first embodiment;

FIG. 5 is a time chart illustrating a setting process performed between the master device and each of the slave devices in the alarm system according to a first embodiment;

FIG. 6 is a view illustrating a variation of the time chart illustrating a setting process performed between the master device and each of the slave devices in the alarm system according to a first embodiment;

FIG. 7 is a time chart illustrating a reset process performed between the master device and each of the slave devices in the alarm system according to a first embodiment;

FIG. 8 is a block diagram illustrating a master device and slave devices according to the second embodiment;

FIG. 9 is a view illustrating an alarm system disposed in a building having a multi-story structure according to the second embodiment;

FIG. 10 is a block diagram illustrating a master device and slave devices according to the third embodiment;

FIG. 11 is a view illustrating an alarm system disposed in a building having a multi-story structure according to the third embodiment;

FIG. 12 is a diagram schematically illustrating an alarm system according to a fourth embodiment; and

FIG. 13 is a block diagram illustrating a master device and slave devices according to the fourth embodiment.

Description of Embodiments

[0010] Embodiments will be described below with reference to the drawings. The embodiments described below provide comprehensive or specific examples. Numerical values, components, disposition locations and connection configurations of the components, the orders of steps, and the like described in the following embodiments are mere examples and are not intended to limit the present invention. Moreover, of the components in the following embodiments, components which are not recited in the independent claim representing the most significant concept will be described as optional components.

[0011] Note that each drawing is a schematic diagram and is not necessarily precise. Moreover, in each drawing, substantially the same components are denoted by the same reference signs, and redundant description thereof may be omitted or simplified.

<Basic Concept of Each Embodiment>

[0012] A basic concept common to the embodiments will be described. Each of alarm systems 1 to 4 according to first to fourth embodiments is a system which includes a plurality of apparatuses, one of which detects an abnormality shares the abnormality with the other apparatuses to inform a user of the abnormality. The alarm systems 1 to 4 respectively include a first apparatus(es) 10, 30, 50, and 70 (hereinafter referred to as a master device(s) 10, 30, 50, and 70) and second apparatuses 20, 40, 60, and 80 (hereinafter referred to as slave devices 20, 40, 60, and 80) configured to communicate with the first apparatus(es) 10, 30, 50, and 70. Here, the "apparatus" is, for example, an alarm configured to detect an abnormality. That is, the first apparatus(es) 10, 30, 50, and 70 and the second apparatuses 20, 40, 60, and 80 are, for example, alarms.

[0013] Each of the alarm systems 1 to 4 in the respective embodiments is a system applied to a facility A1 which is a residential building and detects and reports the presence of a fire.

[0014] The master device(s) 10, 30, 50, and 70 and the slave devices 20, 40, 60, and 80 respectively in the alarm systems 1 to 4 may arbitrarily select apparatuses to be applied. Moreover, any communication means may be used between each of the master device(s) 10, 30, 50, and 70 and each of the slave devices 20, 40, 60, and 80 and for example, wireless, wired, or optical communication may be used.

[0015] An object of the alarm systems 1 to 4 according to the respective embodiments is to simplify setting work for causing the master device(s) 10, 30, 50, and 70 and the slave devices 20, 40, 60, and 80 to function, and a feature of the alarm systems 1 to 4 is that each of the master device(s) 10, 30, 50, and 70 make settings of the slave devices 20, 40, 60, and 80. Schematically speaking, a feature is that the master device(s) 10, 30, 50, and 70 transmits, to the slave devices 20, 40, 60, and 80, individual setting information 90 (including, for example, location information 91, a re-output time 92, latch information 93, language information 94, and sound information 95) which is information on the settings of the slave devices 20, 40, 60, and 80, and the slave devices 20, 40, 60, and 80, which have received the individual setting information 90 make the settings of the slave devices 20, 40, 60, and 80 respectively in accordance with the individual setting information 90.

[0016] This configuration minimizes an operation given to the apparatuses belonging to the alarm systems 1 to 4 to complete the settings of the apparatuses, which can omit a time and effort required for work.

First Embodiment

<Schema>

[0017] The alarm system 1 of a first embodiment will

be described with reference to FIGS. 1 to 7. FIG. 1 is a view schematically illustrating the alarm system 1. FIG. 2 is a block diagram illustrating the master device 10 and the slave devices 20. FIG. 3 is a view illustrating the data table 98 of the individual setting information 90 which is on the slave devices 20 and which the master device 10 has. FIG. 4 is a view illustrating a variation of the data table 98 of the individual setting information 90 which is on the slave devices 20 and which the master device 10 has. FIG. 5 is a time chart illustrating a setting process to be performed between the master device 10 and each of the slave devices 20 in the alarm system 1. FIG. 6 is view illustrating a variation of the time chart illustrating the setting process to be performed between the master device 10 and each of the slave devices 20 in the alarm system 1. FIG. 7 is a time chart illustrating a reset process to be performed between the master device 10 and each of the slave devices 20 in the alarm system 1.

[0018] Note that any apparatus may be used as the master device 10 and the slave devices 20 in each embodiment as described above, but in the first embodiment, an example is described in which the master device 10 and the slave devices 20 are applied to wireless detectors for residential use (hereinafter referred to as detectors) configured to detect and report the presence of a fire. The detector are installed on ceilings and the like of the facility A1 but may be installed on walls and the like.

[0019] As shown in FIG. 1, the alarm system 1 includes one master device 10 and a plurality of (in the example shown in the figure, three) slave devices 20 (20A, 20B, and 20C). The plurality of slave devices 20 communicate with the master device 10. For description of matters common to the slave devices 20, the slave devices are denoted by the slave devices 20, and for description of each of the plurality of slave devices 20, the slave devices are individually denoted by the slave device 20A, the slave device 20B, and the slave device 20C. The number of slave devices 20 is not limited to three.

<Description of Configuration of Master Device 10>

[0020] As illustrated in FIG. 2, the master device 10 includes a transceiver 101, a detection unit 102, a notifier 103, an operation input receiving unit 104, a power source 105, a first controller 106 configured to execute various kinds of control (hereinafter referred to as a controller 106), and a storage 107.

[0021] The transceiver 101 wirelessly communicates with each of the slave devices 20. The transceiver 101 transmits and receives a radio signal, such as a fire detection signal, in, for example, a 426-MHz band (a frequency band used by a specified low power radio station) via an antenna 108 included in the master device 10.

[0022] The detection unit 102 at least detects the presence of a fire and uses a publicly known technology. For example, the detection unit 102 may use an optical smoke detection sensor configured to detect a fire by detecting smoke in the case of the fire based on random

reflection of light, a heat detection sensor configured to detect a fire by detecting heat in the case of the fire, a carbon monoxide detection sensor configured to detect a fire by detecting carbon monoxide generated by combustion in the case of the fire, or an infrared detection sensor configured to detect a fire by detecting infrared rays emitted by combustion in the case of the fire.

[0023] The notifier 103 informs a user of the presence of a fire by outputting, from a loudspeaker, a fire warning in the form of an alarm sound or a voice message. The notifier 103 outputs the alarm sound or the voice message in accordance with control by the controller 106 when the detection unit 102 of the master device 10 detects a fire or when the detection unit 102 of the master device 10 receives the fire detection signal transmitted from any slave device 20 of the plurality of slave devices 20. When the notifier 103 outputs the voice message, location information on the installation location of the master device 10 or the slave device 20 which has detected the fire is preferably included into the voice message, which is output.

[0024] The operation input receiving unit 104 includes, for example, a switch 109 such as a push button or a dip switch. When an operation is given to the switch 109, the operation input receiving unit 104 receives an operation input corresponding to the switch 109 and outputs, to the controller 106, an operation signal corresponding to the operation input. In the first embodiment, the operation input receiving unit 104 is provided with a role of, when receiving a prescribed operation input, outputting an operation signal which causes the controller 106 to execute a setting process described later.

[0025] The power source 105 includes a battery, such as a dry battery, as a power supply and supplies operation power to each component.

[0026] When receiving a fire detection signal from the detection unit 102, the controller 106 controls the notifier 103 such that the notifier 103 outputs an alarm sound or a voice message, and the controller 106 controls the transceiver 101 such that the transceiver 101 transmits a radio signal including the fire detection signal to the slave devices 20 which are the other detectors. Moreover, when the transceiver 101 receives a fire detection signal provided by wireless communication from the slave device 20 at a location where a fire is present, the controller 106 controls the notifier 103 such that the notifier 103 outputs the alarm sound or the voice message, and the controller 106 controls the transceiver 101 such that the transceiver 101 transmits the fire detection signal to the slave devices 20 other than the slave devices 20 located at the location where the fire is present. Further, the controller 106 executes the setting process, which is a setting related to the interconnect operation between the master device 10 and each of the slave devices 20. Details of the setting process will be described later.

[0027] Note that to the master device 10, a unique first identification code 96 (hereinafter referred to as the master device identification code 96) is assigned during man-

ufacturing or the like. The master device identification code 96 is stored in the storage 107 described later. The identification code enables each of the slave devices 20 to identify the master device 10 as a destination of the radio signal and a transmission source of the fire detection signal and the like. The master device identification code is the IP address, MAC address, name, or the like of the master device 10.

[0028] The storage 107 stores and records, in the data table 98, the master device identification code 96 described above and the individual setting information 90, which is information necessary for making settings of the slave devices 20. Moreover, the storage 107 receives a slave device identification code 97 from each slave device 20 and then stores the slave device identification code 97.

[0029] As illustrated in FIG. 3, the individual setting information 90 includes the location information 91 on the slave device 20, the re-output time 92 of the slave device 20, the information 93 regarding whether or not a latch is provided to the slave device 20 (hereinafter referred to as latch information 93), the language information 94, and the sound information 95. Note that the storage 107 does not have to store all of the pieces of information described above as the individual setting information 90 but at least stores one of the pieces of information. Moreover, the individual setting information 90 is not limited to these examples. The form in which the individual setting information 90 is stored is not limited to the data table 98.

[0030] The location information 91 is information on the installation location of the slave device 20 and is, for example, name information indicating the name of an installation floor. In this embodiment, the storage 107 stores pieces of name information such as "first floor" and "second floor". By registering the location information 91 with the slave device 20, the location information 91 can be included in the voice message and can be output when the slave device 20 detects a fire.

[0031] The re-output time 92 is an amount of time from when the alarm sound is stopped by giving an operation to the switch 109 of the master device 10 or the switch 209 of the slave device 20 which outputs the alarm sound and to when the slave device 20 restarts outputting the alarm. The re-output time may be set, for example, within the range from 2 minutes to 15 minutes, and the storage 107 stores pieces of time information such as "2 minutes", "3 minutes", and the like. The re-output time can be accordingly changed depending on an area of the facility in which the alarm system 1 is to be installed, a security zone, and/or application of the building.

[0032] The latch information 93 includes pieces of information each regarding whether or not the latch is provided to the slave device 20. In the case where the latch is provided, the slave device 20 continues outputting an alarm sound even when the master device 10 or another slave device 20 which has detected a fire stops outputting the alarm sound, or even when the slave device 20 no

longer receives the fire detection signal transmitted from the master device 10 or the another slave device 20 which has detected the fire. In the case where the latch is not provided, the slave device 20 stops outputting an alarm sound when the master device 10 or another slave device 20 which has detected a fire stops outputting the alarm sound, or when the slave device 20 no longer receives the fire detection signal transmitted from the master device 10 or the another slave device 20 which has detected a fire. That is, in the case where the latch is provided, the slave device 20 continues outputting an alarm sound regardless of the operation or the communication state of a detection source of the fire, whereas in the case where the latch is not provided, the slave device 20 stops outputting the alarm sound in accordance with the operation or the communication state of the detection source of the fire. The storage 107 stores "latch is provided" or "latch is not provided".

[0033] The language information 94 is information regarding the language of the voice message output by the notifier 203 of the slave device 20. The language information 94 is information corresponding to, for example, Japanese, English, Chinese, or German and can be appropriately changed according to the language used by a user.

[0034] The sound information 95 is information regarding the output pattern of the alarm sound output by the notifier 203 of the slave device 20. The sound information 95 is information for generating sounds in patterns conforming to standards such as "ISO 8201" international standard, "DIN 33404-3" in Germany, "BS 5839-1" in the UK, "NF S32-001" in France, and "NEN 2575" in the Netherlands, and can be changed according to the country in which the system is used.

[0035] As described above, the individual setting information 90 is information regarding the slave device 20, and when a plurality of slave devices 20 are provided, the individual setting information 90 may be commonly set to the slave device 20A, the slave device 20B, and the slave device 20C. In this case, the individual setting information 90 including one information set is stored in the master device 10 as shown in FIG. 3. The individual setting information 90 is transmitted to each of the slave device 20A, the slave device 20B, and the slave device 20C, and based on the information. Based on the information, the slave device 20A, the slave device 20B, and the slave device 20C can be set, and the setting efficiency can thus be improved.

[0036] As shown in FIG. 3, if the controller 106 of the master device 10 transmits, to each of the slave device 20A, the slave device 20B, and the slave device 20C, the individual setting information 90, which includes location information 91 of a "first floor", a re-output time 92 of "two minutes", latch information 93 of "latch is provided", language information 94 of "Japanese", sound information 95 of "an alarm sound in accordance with international standard ISO 8201", the slave device 20A, the slave device 20B, and the slave device 20C set in them-

selves that the location information 91 is the "first floor", the re-output time 92 is "two minutes", the latch information 93 is "latch is provided", the language information 94 is "Japanese", and the sound information is "alarm sound in accordance with international standard ISO 8201". The slave device 20A, the slave device 20B, and the slave device 20C which have completed the settings recognize that the slave device 20A, the slave device 20B, and the slave device 20C are installed on the first floor. In addition, when any of the slave device 20A, the slave device 20B, and the slave device 20C detects a fire, any alarm which has received the fire detection signal outputs a voice message in Japanese or an alarm sound conforming to the international standard in order to report the presence of the fire on the first floor. Further, even after the alarm is stopped by, for example, the switch 209 being pressed, the alarm is output again two minutes thereafter. Furthermore, after the alarm, which has detected the fire, stops outputting the voice message or the alarm sound, or after the fire detection signal is no longer output from the alarm, which has detected the fire, the voice message or the alarm sound is continued to be output.

[0037] The method for storing the individual setting information 90 in the master device 10 is that a user gives an operation to the master device 10. However, the method is not limited to this example but may be specified at the manufacturing stage, or the individual setting information 90 may be input via an external apparatus 99 described in the fourth embodiment described later.

[0038] Moreover, the individual setting information 90 to be set in the slave device 20A, the slave device 20B, and the slave device 20C does not need to be common. As shown in FIG. 4, the master device 10 may have the data table 98 that stores the individual setting information 90 including a plurality of information sets. The data table 98 stores a plurality of combinations of the location information 91, the re-output time 92, the latch information 93, the language information 94, and the sound information 95. The master device 10 can select required individual setting information 90 according to the slave device 20 as a target and can transmit the selected information from the master device 10 to the slave device 20. Note that the combination of the location information 91, the re-output time 92, the latch information 93, the language information 94, and the sound information 95 as shown in FIG. 4 is an example, and the number of combinations stored in the data table 98 may be increased or reduced.

<Description of Configuration of Slave Device 20>

[0039] The slave device 20 has a similar configuration to the master device 10. As illustrated in FIG. 2, the slave device 20 includes a transceiver 201, a detection unit 202, a notifier 203, an operation input receiving unit 204, a power source 205, a second controller 206 configured to execute various kinds of control (hereinafter referred

to as a controller 206), and a storage 207.

[0040] The transceiver 201 wirelessly communicates with the master device 10. The transceiver 201 transmits and receives a radio signal, such as a fire detection signal, in, for example, a 426-MHz band (a frequency band used by a specified low power radio station) via an antenna 208 included in the slave device 20.

[0041] The detection unit 202 at least detects the presence of a fire and uses a publicly known technology. For example, the detection unit 202 may use an optical smoke detection sensor configured to detect a fire by detecting smoke in the case of the fire based on random reflection of light, a heat detection sensor configured to detect a fire by detecting heat in the case of the fire, a carbon monoxide detection sensor configured to detect a fire by detecting carbon monoxide generated by combustion in the case of the fire, or an infrared detection sensor configured to detect a fire by detecting infrared rays emitted by combustion in the case of the fire.

[0042] The notifier 203 informs a user of the presence of a fire by outputting, from a loudspeaker, a fire warning in the form of an alarm sound or a voice message. The notifier 203 outputs the alarm sound or the voice message in accordance with control by the controller 206 when the detection unit 202 of the slave device 20 detects a fire or when the slave device 20 receives the fire detection signal transmitted from another slave device 20 or the master device 10. When the notifier 203 outputs the voice message, location information on the installation location of the master device 10 or the slave device 20 which has detected the fire is preferably included into the voice message, which is output.

[0043] The operation input receiving unit 204 includes, for example, a switch 209 such as a push button or a dip switch. When an operation is given to the switch 209, the operation input receiving unit 204 receives an operation input corresponding to the switch 209 and outputs, to the controller 206, an operation signal corresponding to the operation input. In the first embodiment, the operation input receiving unit 204 is provided with a role of, when receiving a prescribed operation input, outputting an operation signal which causes the controller 206 to execute a setting process described later.

[0044] The power source 205 includes a battery, such as a dry battery, as a power supply and supplies operation power to each component.

[0045] When receiving a fire detection signal from the detection unit 202, the controller 206 controls the notifier 203 such that the notifier 203 outputs an alarm sound or a voice message, and the controller 206 controls the transceiver 201 such that the transceiver 201 transmits a radio signal including the fire detection signal for notification of the presence of the fire to the master device 10. Moreover, when receiving the fire detection signal provided by wireless communication from the master device 10, the controller 206 controls the notifier 203 such that the notifier 203 outputs an alarm sound or a voice message. Further, the controller 206 executes the setting

process, which is a setting related to the interconnect operation between the master device 10 and each of the slave devices 20. Details of the setting process will be described later.

[0046] Note that to each slave device 20, a second identification code 97 (hereinafter referred to as a slave device identification code 97) is assigned during manufacturing or the like, and the slave device identification code 97 enables the master device 10 to identify the slave device 20 as a destination of the radio signal and a transmission source of the fire detection signal and the like. The slave device identification code is the IP address, Mac address, name, or the like of the slave device 20.

[0047] Unlike the master device 10, the storage 207 stores only the slave device identification code 97. Further, the storage 207 stores the individual setting information 90 after receiving the individual setting information 90 from the master device 10. Moreover, the storage 207 receives the master device identification code 96 from the master device 10 and then stores the master device identification code 96.

<Description of Setting Process>

[0048] A setting process of the slave device 20 in the present embodiment will be described below with reference to FIGS. 5 to 6. The setting process includes an interconnect setting process and an individual setting process. The interconnect setting process includes causing the slave device 20 to recognize the master device identification code 96 of the master device 10 to interconnect the slave device 20 and the master device 10. The individual setting process includes storing, in the slave device 20, the individual setting information 90 including the location information 91, the re-output time 92, the latch information 93, the language information 94, and the sound information 95.

[0049] Note that in the interconnect setting process, the master device 10 transmits the master device identification code 96 to the slave devices 20, and each slave device 20 transmits the slave device identification code 97 to the master device 10. The interconnect setting process is completed when the master device 10 stores the slave device identification code 97 received from each slave device 20, and each slave device 20 stores the master device identification code 96 received from the master device 10. Moreover, the individual setting process is completed at a time point at which the master device 10 transmits the individual setting information 90 to the slave devices 20, and the slave devices 20 complete settings in accordance with the individual setting information 90.

[0050] Examples of a method of the setting process include a method of substantially simultaneously performing the interconnect setting process and the individual setting process, a method of performing the individual setting process after the interconnect setting process, and a method of performing only the individual setting

process without the synchronization setting process being performed. Note that these methods are mere examples, and the methods are not limited to these examples.

[0051] As the setting process, the case where the interconnect setting process and the individual setting process are substantially simultaneously performed will be described below at first with reference to FIG. 5.

[0052] When the operation input receiving unit 104 of the master device 10 receives an operation given to the switch 109, the controller 106 of the master device 10 transitions to a setting registration mode of setting the slave devices 20 (20A to 20C). Moreover, when the operation input receiving units 204 of the slave devices 20 (20A to 20C) receive operations given to the switches 209, the controllers 206 of the slave devices 20 (20A to 20C) transition to a setting reception mode of setting the slave devices 20 (20A to 20C) itself.

[0053] When the master device 10 transitions to the setting registration mode and the slave devices 20 (20A to 20C) transition to the setting reception mode, the controller 106 of the master device 10 transmits a setting registration message including the master device identification code 96 and the individual setting information 90 from the transceiver 101 to the transceivers 201 of the slave devices 20 (20A to 20C). Here, the master device identification code 96 and the individual setting information 90 may be included in a packet of the same radio signal or may be transmitted continuously with a slight time difference.

[0054] Subsequently, when the controller 206 of each of the slave devices 20 (20A to 20C) in the setting reception mode receives the setting registration message, the master device identification code 96 and the individual setting information 90 are stored in the storage 207 of a corresponding one of the slave devices 20. Then, the controllers 206, in which the individual setting information 90 has been stored, make settings of the slave devices 20 (20A to 20C) in accordance with the individual setting information 90.

[0055] Thereafter, the slave devices 20 (20A to 20C) transmit reply messages from the transceivers 201 of the slave devices 20 (20A to 20C) to the master device 10. Each reply message represents reception of the master device identification code 96 and the individual setting information 90 from the master device 10 and completion of storing the master device identification code 96 and setting the individual setting information 90. In this embodiment, the reply messages include the slave device identification codes 97 of the slave devices 20 (20A to 20C).

[0056] Note that the reception of the master device identification code 96 and the individual setting information 90 from the master device 10 and the completion of storing the master device identification code 96 and setting the individual setting information 90 may be transmitted as separate response messages to the master device 10. In this case, at the time point of the reception of the master device identification code 96 and the indi-

vidual setting information 90 from the master device 10, a reply message meaning reception completion may be transmitted to the master device 10, and subsequently, a reply message meaning setting completion may be transmitted to the master device 10 at the time point of the completion of storing the master device identification code 96 and setting the individual setting information 90.

[0057] Furthermore, a response message meaning the completion of storing the master device identification code 96 and a response message meaning completion of the setting the individual setting information 90 may be transmitted as separate response messages. Naturally, the reply messages may include the respective slave device identification codes 97 of the slave devices 20 (20A to 20C).

[0058] After transmission of the reply messages, the slave devices 20 (20A to 20C) end the setting registration mode. Moreover, after reception of the reply messages from the slave devices 20 (20A to 20C), the master device 10 stores the slave device identification codes 97 and ends the setting registration mode. At this time point, the interconnect setting process and the individual setting process are completed.

[0059] The above is a basic flow of the setting process performed between the master device 10 and each of the slave devices 20, and the slave devices 20 can complete the settings of themselves simply by setting the master device 10 to the setting registration mode and the slave devices 20 to the setting reception mode.

[0060] Subsequently, the method of performing the individual setting process after the interconnect setting process is performed will be described with reference to FIG. 6. The master device 10 may separately transmit the master device identification code 96 and the individual setting information 90. The method for causing the master device 10 to transition to the setting registration mode and causing the slave devices 20 to transition to the setting reception mode is as described above, and the description thereof is omitted.

[0061] When the master device 10 transitions to the setting registration mode and the slave devices 20 (20A to 20C) transition to the setting reception mode, the controller 106 of the master device 10 transmits the master device identification code 96 from the transceiver 101 to the transceivers 201 of the slave devices 20 (20A to 20C).

[0062] Subsequently, when the controller 206 of each of the slave devices 20 (20A to 20C) in the setting reception mode receives the master device identification code 96, the controller 206 stores the master device identification code 96 in the storage 207. The controller 206 transmits a response message from the transceiver 201. The response message is a message that informs the reception of the master device identification code 96 and the completion of storing the master device identification code 96. In this embodiment, the reply messages include the slave device identification codes 97 of the slave devices 20 (20A to 20C). Note that separate response messages may be transmitted when the master device iden-

tification code 96 is received and when the master device identification code 96 is stored.

[0063] After receiving the response message, the master device 10 stores the slave device identification code 97 to complete the interconnect setting process. Thereafter, the transceiver 101 of the master device 10 transmits the individual setting information 90 to the slave devices 20 (20A to 20C). When receiving the individual setting information 90, the controllers 206 of the slave devices 20 (20A to 20C) make settings of the slave devices 20 (20A to 20C) in accordance with the individual setting information 90.

[0064] Thereafter, the slave devices 20 (20A to 20C) transmit reply messages from the transceivers 201 of the slave devices 20 (20A to 20C) to the master device 10. Each reply message represents reception of the individual setting information 90 and completion of the setting. At this time point, the individual setting process is completed. Here, the reply messages may include the respective slave device identification codes 97 of the slave devices 20 (20A to 20C).

[0065] Note that the reception of the individual setting information 90 and the completion of the setting may be transmitted as separate reply messages to the master device 10. In this case, at the time point of the reception of the individual setting information 90 from the master device 10, a reply message meaning reception completion may be transmitted to the master device 10, and at the time point of the completion of setting the individual setting information 90, a reply message meaning setting completion may be transmitted to the master device 10. Naturally, either of the reply messages may include the slave device identification code 97 of each of the slave devices 20 (20A to 20C).

[0066] Then, each of the slave devices 20 (20A to 20C) ends the setting reception mode after transmitting the response message, and the master device 10 ends the setting registration mode after receiving the response message from each of the slave devices 20 (20A to 20C).

[0067] Moreover, only the individual setting process may be performed without the interconnect setting process being performed. In this case, after the master device 10 transitions to the setting registration mode and the slave devices 20 transition to the setting reception mode, the transceiver 101 of the master device 10 transmits the individual setting information 90 to the slave devices 20 (20A to 20C). When receiving the individual setting information 90, the controllers 206 of the slave devices 20 (20A to 20C) make settings of the slave devices 20 (20A to 20C) in accordance with the individual setting information 90.

[0068] Thereafter, the slave devices 20 (20A to 20C) transmit reply messages from the transceivers 201 of the slave devices 20 (20A to 20C) to the master device 10. Each reply message represents reception of the individual setting information 90 and completion of the setting. At this time point, the individual setting process is completed. Here, the reply messages may include the re-

spective slave device identification codes 97 of the slave devices 20 (20A to 20C).

[0069] Note that the reception of the individual setting information 90 and the completion of the setting may be transmitted as separate reply messages to the master device 10. In this case, at the time point of the reception of the individual setting information 90 from the master device 10, a reply message meaning reception completion may be transmitted to the master device 10, and at the time point of the completion of setting the individual setting information 90, a reply message meaning setting completion may be transmitted to the master device 10. Naturally, either of the reply messages may include the slave device identification code 97 of each of the slave devices 20 (20A to 20C).

[0070] Then, each of the slave devices 20 (20A to 20C) ends the setting reception mode after transmitting the response message, and the master device 10 ends the setting registration mode after receiving the response message from each of the slave devices 20 (20A to 20C).

[0071] Note that another method may be used as the method for causing the master device 10 to transition to the setting registration mode and causing the slave devices 20 to transition to the setting reception mode. In the method described above, operations are given to the switch 109 of the master device 10 and the switches 209 of the slave devices 20, thereby causing the transition to each mode, but alternatively available methods are, for example, a method in which within a prescribed time period (e.g., 5 minutes) after power supply to the master device 10 and the slave devices 20, the power supply triggers transition of the master device 10 to the setting registration mode, and the power supply triggers transition of the slave devices 20 (20A to 20C) to the setting reception mode without any operation given to any of the switches 109 and 209. Note that the time period of the setting registration mode is not limited to the time period described above.

[0072] Moreover, a method when the switch 109 or the switches 209 respectively of the master device 10 and the slave devices 20 to which power has been supplied is pressed, all of the master device 10 and the slave devices 20 to which the power has been supplied automatically transition to the setting registration mode or to the setting reception mode.

[0073] Moreover, for mutual recognition of the transition to the setting registration mode or the setting reception mode, the master device 10 may output, to the slave devices 20,

[0074] Thus, limiting a time period during which setting registration is possible can prevent erroneous setting registration of an alarm which does not belong to the alarm system 1 of the present embodiment.

[0075] As shown in FIG. 5, when a plurality of slave devices 20 are provided and the plurality of slave devices 20 are in the setting reception mode, the process may be performed on the slave device 20B and the slave device 20C at a time point at which the process on the slave

device 20A ends. In this case, at a time point at which the master device 10 receives, from the slave device 20A, a reply message representing the completion of storing the master device identification code 96 and setting the individual setting information 90, the master device 10 transmits a setting registration message including the master device identification code 96 and the individual setting information 90 to another slave device, for example, the slave device 20B, thereby starting the setting process. Moreover, the master device 10 may transmit the setting registration message to the slave device 20B to start the setting process without waiting for the reply message from the slave device 20A.

[0076] Further, even when the individual setting process is performed after the interconnect setting process as shown in FIG. 6, at least one of the master device identification code 96 or the individual setting information 90 may be transmitted to the slave device 20A, the slave device 20B, and the slave device 20C at different timings to proceed with the settings of the slave devices 20.

[0077] Incidentally, for example, the master device identification code 96 set in the slave devices 20 (20A to 20C) remains unchanged, and only the individual setting information 90 may be modified (hereinafter referred to as a reset process). In this case, the individual setting information 90 stored in the master device 10 has to be erased once, and the master device 10 has to store modified individual setting information 90 and then set the modified individual setting information 90 in the slave devices 20 (20A to 20C). The reset process in the present embodiment will be described below. Note that the following description assumes that the master device 10 and the slave devices 20 have completed transmission and reception of respective identification codes.

[0078] First, the master device 10 transitions to the resetting registration mode by receiving an operation given to its switch 109, and the slave devices 20 (20A to 20C) transition to the resetting reception mode by receiving operations given to their respective switches 209. Note that in the reset process, giving an operation to the switch 109 of any one of the master device 10 and the plurality of slave devices 20 (in this embodiment, the master device 10) may cause the master device 10 to transition to the resetting registration mode and the slave devices 20 to transition to the resetting reception mode.

[0079] When the master device 10 transitions to the resetting registration mode and the slave devices 20 (20A to 20C) transition to the resetting reception mode, a controller 106 of the master device 10 transmits resetting registration messages each including individual setting information 90 to the slave devices 20 (20A to 20C) belonging to the system. Then, when respective controllers 206 of the slave devices 20 (20A to 20C) receive the resetting registration messages, the controllers 206 store new individual setting information 90 and transmit response messages from their transceivers 201 to the master device 10, each of the response messages representing completion of settings. Also in this case, regarding

the reply messages to be transmitted to the master device 10 after reception of the new individual setting information 90, the reception of the individual setting information 90 and completion of the settings may be transmitted as separate reply messages to the master device 10. In this case, at the time point of the reception of the new individual setting information 90 from the master device 10, a reply message meaning reception completion may be transmitted to the master device 10, and at the time point of the completion of setting the new individual setting information 90, a reply message meaning setting completion may be transmitted to the master device 10.

[0080] Moreover, as illustrated in FIG. 7, when the system includes a plurality of slave devices 20, a resetting registration message including the new individual setting information 90 may be multicast to the slave device 20A, the slave device 20B, and the slave device 20C.

[0081] The reset process can be shortened more by multicasting the individual setting information 90 from the master device 10 to the slave device 20A, the slave device 20B, and the slave device 20C than by sequentially transmitting the individual setting information 90 from the master device 10 to the slave device 20A, to the slave device 20B, and then to the slave device 20C.

[0082] As described above, in the first embodiment, transmitting the individual setting information 90 stored in the master device 10 to the slave devices 20 causes the slave devices 20 to store the individual setting information 90. The controllers 206 of the slave devices 20 can make settings of the slave devices 20 based on the individual setting information 90. That is, storing the individual setting information 90 common to the plurality of slave devices 20 in the master device 10 in advance and transmitting the individual setting information 90 to the slave devices 20 enables settings of the plurality of slave devices 20 at once. Thus, in the alarm system 1 according to the present embodiment, work required for the setting can be simplified, and a time required for registration can be reduced as compared to the case where operations are given one-by-one to store pieces of information required for the setting in the master device 10 and the slave devices 20, and thereafter, the pieces of information thus stored are exchanged between the master device 10 and each of the slave devices 20 to perform the setting process.

Second Embodiment

<Schema>

[0083] The alarm system 2 of a second embodiment will be described with reference to FIGS. 8 and 9. FIG. 8 is a block diagram illustrating a master device 30 and a slave device 40. FIG. 9 is a view illustrating the alarm system 2 installed in a building A having a multi-story structure.

[0084] Note that any apparatus may be used as the master device 30 and the slave devices 40 in each em-

bodiment as described above, but in the second embodiment, an example is described in which master devices 30 are applied to relays and slave devices 40 are applied to wireless detectors for residential use (hereinafter referred to as detectors). As used herein, the relays are assumed to be apparatuses configured to wirelessly exchange signals between the relays. Since the second embodiment is the same as the alarm system 1 of the first embodiment except that the master devices 30 are the relays, the common description thereof is omitted.

[0085] As shown in FIG. 9, the alarm system 2 includes a plurality of (in the example shown in the figure, two) master devices 30 (30A and 30B) and a plurality of (in the example shown in the figure, six) slave devices 40 (40A, 40B, 40C, 40D, 40E, and 40F). The master device 30A of the plurality of master devices 30 is connected to three slave devices 40 (40A, 40B, and 40C). The master device 30B of the plurality of master devices 30 is connected to three slave devices 40 (40D, 40E, and 40F). The slave devices 40A to 40C wirelessly communicate with the master device 30A. The slave devices 40D to 40F wirelessly communicate with the master device 30B. In addition, the master device 30A and the master device 30B wirelessly communicate with each other. As a result, for example, when the slave device 40A detects the presence of a fire, a fire detection signal indicating the presence of the fire is transmitted to the master device 30A, and the master device 30A executes a fire warning. The fire detection signal is transmitted to the slave device 40D via the master device 30B, and the slave device 40D executes a fire warning. Thus, a detection result is shared with a plurality of slave devices 40, and the plurality of slave devices 40 execute the fire warnings in an interconnected manner.

[0086] For description of matters common to the slave devices 40, the slave devices are denoted by the slave devices 40, and for description of each of the plurality of slave devices 40, the slave devices are individually denoted by the slave devices 40A to 40F. In this embodiment, the number of master device 30 is not limited to two, and the number of slave devices 40 is not limited to six.

<Description of Configuration of Master Device 30>

[0087] As illustrated in FIG. 8, each master device 30 includes a first transceiver 301, a second transceiver 302, a notifier 303, an operation input receiving unit 304, a power source 305, a first controller 306 (hereinafter referred to as a controller 306), and a storage 307.

[0088] The first transceiver 301 wirelessly communicates, by using a channel frequency f corresponding to a group to which the master device 30 belongs, with the slave device(s) 40 belonging to the same group as the master device 30. The first transceiver 301 transmits and receives a radio signal, such as a fire detection signal, in, for example, a 426-MHz band (a frequency band used by a specified low power radio station) via a first antenna 308 included in the master device 30. In this embodiment,

the group includes the master device 30 and the plurality of slave devices 40 configured to communicate with the master device 30.

[0089] The second transceiver 302 transmits and receives a signal, such as a fire detection signal, to and from an adjacent master device 30 via a second antenna 309 included in the master device 30. In a similar manner to the first transceiver 301, for example, a specified low power radio frequency in the 426-MHz band is used.

[0090] The notifier 303 informs a user of the presence of a fire by outputting, from a loudspeaker, a fire warning in the form of an alarm sound or a voice message. When receiving the fire detection signal transmitted from the slave device 40, the notifier 303 outputs the alarm sound or the voice message in accordance with control by the controller 306. When the notifier 303 outputs the voice message, location information on the installation location of the slave device 40 which has detected the fire is preferably included into the voice message, which is output.

[0091] The operation input receiving unit 304 includes, for example, a switch 310 such as a push button or a dip switch. When an operation is given to the switch 310, the operation input receiving unit 304 receives an operation input corresponding to the switch 310 and outputs, to the controllers 306, an operation signal corresponding to the operation input. In the second embodiment, the operation input receiving unit 304 is provided with a role of, when receiving a prescribed operation input, outputting an operation signal which causes the controller 306 to execute a setting process.

[0092] The power source 305 includes a battery, such as a dry battery, as a power supply and supplies operation power to each component.

[0093] When the first transceiver 301 receives the fire detection signal provided by wireless communication from the slave device 40 at a location where a fire is present, the controller 306 controls the notifier 303 such that the notifier 303 outputs an alarm sound. Moreover, when the controller 306 receives the fire detection signal from the slave device 40 belonging to the same group, the controllers 306 transmits the fire detection signal to another adjacent master device 30 from the second transceiver 302 and controls the first transceiver 301 such that the fire detection signal is transmitted to the slave device(s) 40 belonging to the same group but being located at location(s) except for the location where the fire is present. When the controller 306 receives a fire detection signal from another master device 30, the controllers 306 controls the notifier 303 such that an alarm sound is output, and the controllers 306 controls the first transceiver 301 such that the fire detection signal is transmitted to the slave device(s) 40 belonging to the same group. Further, the controller 306 executes the setting process, which is a setting related to the interconnect operation between the master device 30 and each of the slave devices 40.

[0094] The storage 307 stores master device identification code 96 which is unique and individual setting in-

formation 90, which is information necessary for setting the slave device 40. Note that the master device identification code 96 is stored in the storage 307 during manufacturing or the like. The master device identification code 96 enables the slave device 40 to identify the master device 30 as a destination of the radio signal and a transmission source of the fire detection signal and the like. The master device identification code 96 is the IP address, MAC address, name, or the like of the master device 30. Moreover, the individual setting information 90 is stored by, for example, an operation given to the master device 30 by a user. However, this should not be construed as limiting, but the individual setting information 90 may be specified at the manufacturing stage or may be input via an external apparatus 99 described in the fourth embodiment described later.

<Description of Configuration of Slave Device 40>

[0095] Subsequently, the configuration of each slave device 40 which is a detector will be described. As illustrated in FIG. 8, the slave device 40 includes a transceiver 401, a detection unit 402, a notifier 403, an operation input receiving unit 404, a power source 405, and a second controller 406 (hereinafter referred to as a controller 406). The transceiver 401 transmits and receives a radio signal using a radio wave as a medium via an antenna 408. The detection unit 402 detects smoke and the like. The notifier 403 informs a user of the presence of a fire by outputting an alarm sound or a voice message. The operation input receiving unit 404 has a switch 409 and performs the setting process and an alarm stop process when receiving a predetermined operation input. The power source 405 supplies operating power to each component (each of the transceiver 401, the detection unit 402, the notifier 403, the operation input receiving unit 404, and the controller 406). The controller 406 has a storage 407 and controls each component (each of the transceiver 401, the detection unit 402, the notifier 403, and the operation input receiving unit 404). As described above, the slave device 40 has a similar configuration and similar functions to the slave device 20, and the detailed description of the components thereof is omitted.

<Description of Setting Process>

[0096] The setting process includes an interconnect setting process and an individual setting process. The interconnect setting process is a process of interconnecting the master device 30 and the slave devices 40 with each other. The individual setting process is a process of storing, in the slave device 40, the individual setting information 90 including location information 91, a re-output time 92, latch information 93, language information 94, and sound information 95. The setting process of the present embodiment is a process in which when an operation is given to the operation input receiving unit 304 of the master device 30, the controller 306 of the

master device 30 transitions to a setting registration mode of setting the slave devices 40 and starts the setting process. A specific method is similar to the method of the setting process of the alarm system 1 according to the first embodiment, and the description thereof is omitted.

<Description of System Configuration across Floors>

[0097] The alarm system 2 described above may be used as shown in FIG. 9. The alarm system 2 is installed in, for example, a two-story building A, where one master device 30 (30A and 30B) which functions as a relay and three slave devices 40 (40A to 40F) which function as detectors are installed on each floor.

[0098] In this embodiment, one master device 30 and three slave devices 40 installed on each of a first floor and a second floor form a group for each floor. The one master device 30 and the three slave devices 40 installed on the first floor form group 1 (G1), and the one master device 30 and the three slave devices 40 installed on the second floor form group 2 (G2). To the groups G1 and G2, different channel frequencies f (f_1 and f_2) are assigned. and the groups G1 and G2, an apparatus belonging to each of the groups transmits and receives a signal by using the channel frequency f assigned to a corresponding one of the groups to which the apparatus belongs. Each of the slave devices 40 installed in the groups G1 and G2 is configured to, when detecting a fire, output an alarm sound and transmit a fire detection signal to the master device 30 belonging to the group to which a corresponding one of the slave devices 40 belongs.

[0099] Moreover, the master device 30, which is the relay, is wirelessly communicatively connected to another adjacent master device 30. That is, the master device 30 serves as a relay between the groups set for respective floors. For example, when a fire breaks out on the first floor, any slave device 40 of a plurality of slave devices 40 (40A to 40C) installed in the group G1 detects the fire, and the slave device 40 (40A to 40C) provided in the group G1 transmits a fire detection signal to the master device 30A by using a channel frequency f_1 . When the master device 30A receives the fire communication signal, the master device 30A itself outputs an alarm sound and transmits the fire detection signal to the master device 30B in the adjacent group G2. After the master device 30B in the group G2 receives the fire detection signal, the master device 30B itself outputs an alarm sound and transmits the fire detection signal to the slave devices 40 (40D to 40F) installed in the group G2 by using the channel frequency f_2 . The slave devices 40 (40D to 40F) which have received the fire detection signal output alarm sounds.

[0100] Thus, even in the case where the slave device 40 belonging to any group of the plurality of groups detects a fire, a warning is output from the slave device 40 on another floor in an interconnected manner via the master device 30, and therefore, it becomes possible to reli-

ably inform a user in the building A of the outbreak of the fire and to prompt the user to take an appropriate action such as evacuation.

[0101] In the case of the system configuration across floors as illustrated in FIG. 9, the setting process is performed for each of the groups G1 and G2. That is, the individual setting information 90 stored in the master device 30 in each of the groups is transmitted to the slave devices 40 belonging to the same group, and thereby, the slave devices 40 store the individual setting information 90. Then, the controllers 406 of the slave devices 40 makes settings of the slave devices 40 based on the individual setting information 90 transmitted from the master device 30 belonging to the group of the slave devices 40. At this time, the master devices 30 in the respective groups are assumed to store different pieces of individual setting information 90. However, this should not be construed as limiting, and all the master devices 30 may store the same individual setting information 90.

[0102] As described above, in the second embodiment, the case where the master devices 30 are the relays has been described, but even when the master devices 30 are replaced with various products, a similar effect to that in the first embodiment can be obtained. That is, the individual setting information 90 stored in each master device 30 can be transmitted to the slave devices 40, and the slave devices 40 can make settings of the slave devices 40 based on the individual setting information 90. Thus, work required for the setting can be simplified and a time required for registration can be reduced as compared to the case where operations are given one-by-one to store pieces of information required for the setting in the master device 30 and the slave devices 40, and thereafter, the pieces of information thus stored are exchanged between the master device 30 and each of the slave devices 40 to perform the setting process.

Third Embodiment

<Schema>

[0103] The alarm system 3 of a third embodiment will be described with reference to FIGS. 10 and 11. FIG. 10 is a block diagram illustrating a master device 50 and a slave device 60. FIG. 11 is a view illustrating the alarm system 3 installed in a building having a multi-story structure.

[0104] Note that any apparatus may be used as the master device 50 and the slave devices 60 in each embodiment as described above, but in the third embodiment, an example is described in which master devices 50 are applied to relay receivers and slave devices 60 are applied to wireless detectors for residential use (hereinafter referred to as detectors). As used herein, the relay receivers are assumed to be apparatuses configured to exchange signals between the same apparatuses. Since the third embodiment is the same as the alarm system

of the first embodiment except that the master devices 50 are the relays, the common description thereof is omitted.

[0105] As shown in FIG. 11, the alarm system 3 includes a plurality of master devices 50 (50A, 50B, and 50C) and a plurality of slave devices 60 (60A, 60B, 60C, 60D, 60E, 60F, 60G, 60H, and 60I). The master device 50A of the plurality of master devices 50 is connected to three slave device 60 (60A, 60B, and 60C). The master device 50B of the plurality of master devices 50 is connected to three slave devices 60 (60D, 60E, and 60F). The master device 50C of the plurality of master devices 50 is connected to three slave device 60 (60G, 60H, and 60I). The slave devices 60A to 60C wirelessly communicate with the master device 50A. The slave devices 60D to 60F wirelessly communicate with the master device 50B. The slave devices 60G to 60I wirelessly communicate with the master device 50C. In addition, the master device 50A, the master device 50B, and the master device 50C communicate with one another via wires. As a result, for example, when the slave device 60A detects the presence of a fire, a fire detection signal indicating the presence of the fire is transmitted to the master device 50A, and the master device 50A executes a fire warning. The fire detection signal is further transmitted to the slave device 60D via the master device 50B, and the slave device 60D executes a fire warning. Thus, a detection result is shared with the plurality of slave devices 60, and the plurality of slave devices 60 execute the fire warnings in an interconnected manner.

[0106] For description of matters common to the slave devices 60, the slave devices are denoted by the slave devices 60, and for description of each of the plurality of slave devices 60, the slave devices are individually denoted by the slave devices 60A to 60I. In this embodiment, the number of master device 50 is not limited to three, and the number of slave devices 60 is not limited to nine.

<Description of Configuration of Master Device 50>

[0107] As illustrated in FIG. 10, each master device 50 includes a wireless transceiver 501, a wired transceiver 502, an operation unit 503, a notifier 504, a display section 505, an operation input receiving unit 506, a power source 507, an indicator light 508, a first controller 509 (hereinafter referred to as a controller 509) configured to execute various kinds of control, and a storage 510.

[0108] The wireless transceiver 501 wirelessly communicates, by using a channel frequency f corresponding to a group to which the master device 50 belongs, with the slave device(s) 60 belonging to the same group as the master device 50. The wireless transceiver 501 transmits and receives a radio signal, such as a fire detection signal, in, for example, a 426-MHz band (a frequency band used by a specified low power radio station) via an antenna 511 included in the master device 50. In this embodiment, the group includes a master device 50 and

a plurality of slave devices 60 that is configured to communicate with the master device 50.

[0109] The wired transceiver 502 transmits and receives a signal such as a fire detection signal to and from an adjacent master device 50 via a communication line 512 included in the master device 50.

[0110] The operation unit 503 is a push switch which receives, when a fire is present in a building A, a push operation given by a user who uses the building A. The operation unit 503 receives the push operation, and thereby, the notifier 504, which will be described later, outputs an alarm sound.

[0111] The notifier 504 informs a user of the presence of the fire by outputting, from a loudspeaker, a fire warning by a sound in the form of an alarm sound or a voice message. The notifier 504 outputs the alarm sound or the voice message in accordance with control by the controllers 509 when the operation unit 503 receives the push operation or when the master device 50 receives a fire detection signal transmitted from the slave device 60 at, for example, the outbreak of a fire. When the notifier 504 outputs the voice message, location information on the installation location of the apparatus which has detected the fire is preferably included into the voice message, which is output.

[0112] The display section 505 displays, for example, the presence of a fire. The display section 505 includes, for example, a liquid crystal display. When the operation unit 503 receives a push operation or when the master device 50 receives the fire detection signal transmitted from the slave device 60 at, for example, the breakout of a fire, the display section 505 displays textual information for notifying the fire in accordance with control by the controller 509. The textual information may be, for example, "A fire is present" or may be information on the location such as "A fire is present on the first floor". Moreover, the display section 505 may display textual information such as "operation, normal" or "operation, abnormal" in accordance with results of operation inspection.

[0113] The operation input receiving unit 506 includes, for example, switches 513 such as a push button or a dip switch. When an operation is given to the switch 513, the operation input receiving unit 506 receives an operation input corresponding to each switch 513 and outputs, to the controllers 509, an operation signal corresponding to the operation input. In the present embodiment, the operation input receiving unit 506 is provided with a switch 513 for setting, and the switch 513 is configured to, when receiving a prescribed operation input, output an operation signal which causes the controller 509 to execute a setting process.

[0114] The power source 507 converts 100 V AC for commercial use into direct-current power and includes a battery as an auxiliary power supply as necessary.

[0115] The indicator light 508 includes, for example, LEDs and a dome-shaped cover covering the front of the LEDs. The cover has a light transmitting property. The indicator light 508 is kept ON to clearly show the location

of the master device 50 even in the dark.

[0116] When the wireless transceiver 501 receives a fire detection signal provided by wireless communication from the slave device 60 at a location where a fire is present, the controller 509 controls the notifier 504 such that an alarm sound is output, and controls the display section 505 such that the presence of a fire is displayed.

[0117] Moreover, when receiving the fire detection signal, the controller 509 causes the wired transceiver 502 to transmit the fire detection signal to another adjacent master device 50. When the controller 509 receives a fire detection signal from another master device 50, the controller 509 controls the notifier 504 such that an alarm sound or a voice message is output, and controls the display section 505 such that the presence of a fire is displayed. Then, the controller 509 controls the wireless transceiver 501 such that the wireless transceiver 501 transmits the fire detection signal to the slave device 60 belonging to the same group. Further, the controller 509 executes the setting process, which is a setting related to the interconnect operation between the master device 50 and each of the slave devices 60.

[0118] The storage 510 stores a master device identification code 96 and individual setting information 90, which is information necessary for setting the slave device 60. Moreover, the storage 510 receives a slave device identification code 97 from each slave device 60 and then stores the slave device identification code 97.

[0119] Note that the master device identification code 96 is stored in the storage 510 during manufacturing or the like. The master device identification code 96 enables the slave device 60 to identify the master device 50 as a destination of the radio signal and a transmission source of the fire detection signal and the like. The master device identification code 96 is the IP address, MAC address, name, or the like of the master device 50. Moreover, the individual setting information 90 is stored by, for example, an operation given to the master device 50 by a user. However, this should not be construed as limiting, but the individual setting information 90 may be specified at the manufacturing stage or may be input via an external apparatus 99 described in the fourth embodiment described later.

<Description of Configuration of Slave Device 60>

[0120] Subsequently, the configuration of each slave device 60 which is a detector will be described. As illustrated in FIG. 10, the slave device 60 includes a transceiver 601, a detection unit 602, a notifier 603, an operation input receiving unit 604, a power source 605, and a second controller 606 (hereinafter referred to as a controller 606). The transceiver 601 transmits and receives a radio signal using a radio wave as a medium via an antenna 608. The detection unit 602 detects smoke and the like. The notifier 603 informs a user of the presence of a fire by outputting an alarm sound or a voice message. The operation input receiving unit 604 has a switch 609

and performs the setting process and an alarm stop process when receiving a predetermined operation input. The power source 605 supplies operating power to each component (each of the transceiver 601, the detection unit 602, the notifier 603, the operation input receiving unit 604, and the controller 606). The controller 606 has a storage 607 and controls each component (each of the transceiver 601, the detection unit 602, the notifier 603, and the operation input receiving unit 604). As described above, the slave device 60 has a similar configuration and similar functions to the slave device 20, and the detailed description of the components thereof is omitted.

<Description of Setting Process>

[0121] The setting process includes an interconnect setting process and an individual setting process. The interconnect setting process is a process of interconnecting the master device 50 and the slave devices 60 with each other. The individual setting process is a process of storing, in the slave device 60, the individual setting information 90 including location information 91, a re-output time 92, latch information 93, language information 94, and sound information 95. The setting process of the present embodiment is a process in which when an operation is given to the operation input receiving unit 506 of the master device 50, the controller 509 of the master device 50 transitions to a setting registration mode of setting the slave devices 60 and starts the setting process. A specific method is similar to the method of the setting process of the alarm system 1 according to the first embodiment, and the description thereof is omitted.

<Description of System Configuration across Floors>

[0122] A group of systems described above may be used, for example, in a system configuration shown in FIG. 11. The alarm system 3 is installed in, for example, a three-story building A, where one master device 50 (50A, 50B, 50C) which functions as a relay receiver and three slave devices 60 (60A to 60I) which function as detectors are installed on each floor.

[0123] In this embodiment, one master device 50 and three slave devices 60 installed on each of first to third floors form a group. The one master device 50 and the three slave devices 60 installed on the first floor form group 1 (G1), the one master device 50 and the three slave devices 60 installed on the second floor form group 2 (G2), and the one master device 50 and the three slave devices 60 installed on the third floor form group 3 (G3). To the groups G1, G2, and G3, different channel frequencies f (f_1 , f_2 , and f_3) are assigned. An apparatus belonging to each of the groups G1, G2, and G3 transmits and receives a signal by using the channel frequency f assigned to a corresponding one of the groups to which the apparatus belongs. Each of the slave devices 60 installed in the groups G1, G2, and G3 is configured to, when

detecting a fire, output an alarm sound and transmit a fire detection signal to the master device 50 belonging to the group to which a corresponding one of the slave devices 60 belongs.

[0124] Moreover, the master device 50, which is the relay receiver, is communicatively connected to an adjacent master device 50 via a wire. That is, the master device 50 serves as a relay between the groups set for respective floors. Thus, in a similar manner to the second embodiment, even in the case where the slave device 60 belonging to any group of the plurality of groups detects a fire, a warning is output from the slave device 60 on another floor in an interconnected manner via the master device 50, and therefore, it becomes possible to reliably inform a user in the building A of the outbreak of the fire and to prompt the user to take an appropriate action such as evacuation.

[0125] In the case of the system configuration across floors as illustrated in FIG. 11, the setting process is performed for each of the groups G1, G2, and G3 in a similar manner to the second embodiment. That is, the individual setting information 90 stored in the master device 50 in each of the groups is transmitted to the slave devices 60 belonging to the same group, and thereby, the slave devices 60 store the individual setting information 90. Then, the controllers 606 of the slave devices 60 makes setting of the slave devices 60 in accordance with the individual setting information 90. Here, the master devices 50 in the respective groups are assumed to store different pieces of individual setting information 90. However, this should not be construed as limiting, but all of the master devices 50 may store the same individual setting information 90.

[0126] As described above, in the third embodiment, the case where the master devices 50 are the relay receivers has been described, but even when the master devices 50 are replaced with various products, a similar effect to that in the first embodiment can be obtained. That is, the individual setting information 90 stored in each master device 50 can be transmitted to the slave devices 60, and the slave devices 60 can make settings of the slave devices 60 in accordance with the individual setting information 90. Thus, work required for the setting can be simplified and a time required for registration can be reduced as compared to the case where operations are given one-by-one to store pieces of information required for the setting in the master device 50 and the slave devices 60, and thereafter, the pieces of information thus stored are exchanged between the master device 50 and each of the slave devices 60 to perform the setting process.

[0127] Thus, as long as apparatuses serving as the master devices store pieces of individual setting information of the slave devices, the slave devices can, no matter which apparatus serves as the master device, be compatible with the master device by transmitting, to the slave devices, the individual setting information stored in the master device, and individual settings are thus possible

by the slave devices themselves.

Fourth Embodiment

5 <Schema>

[0128] The alarm system 4 of a fourth embodiment will be described with reference to FIGS. 12 and 13. FIG. 12 is a view schematically illustrating the alarm system 4. FIG. 13 is a block diagram illustrating a master device 70 and a slave device 80.

[0129] Note that any apparatus may be used as the master device 70 and the slave devices 80 in each embodiment as described above, but in the fourth embodiment, an example is described in which master devices 70 are applied to relay devices and slave devices 80 are applied to wireless detectors for residential use (hereinafter referred to as detectors). As used herein, the relay device is assumed to be an apparatus including a first relay device 70A and a second relay device 70B. One or more slave devices 80 are connected to each of the first relay device 70A and the second relay device 70B. Since the present embodiment is the same as the alarm system of the first embodiment except that the master devices 70 are the relay devices and that an external apparatus 99 is provided, the common description thereof is omitted.

[0130] As shown in FIG. 12, the alarm system 4 includes the external apparatus 99, one master device 70 including the first relay device 70A and the second relay device 70B, and a plurality of (in the example shown in the figure, six) slave devices 80 (80A, 80B, 80C, 80D, 80E, and 80F). The first relay device 70A is connected to the three slave devices 80 (80A, 80B, and 80C). The second relay device 70B is connected to the three slave devices 80 (80D, 80E, and 80F). The slave devices 80A to 80C wirelessly communicate with the first relay device 70A. The slave devices 80D to 80F wirelessly communicate with the second relay device 70B. Moreover, the first relay device 70A and the second relay device perform wired communication.

[0131] Note that the external apparatus 99 may be connected to plurality of first relay devices 70A. The first relay device 70A may be connected to a plurality of second relay devices 70B.

[0132] The external apparatus 99 is, for example, a mobile terminal or a personal computer. The external apparatus 99 is connected to the first relay device 70A and performs wired communication or wireless communication with the first relay device 70A. That is, the external apparatus 99 is configured to directly communicate with the first relay device 70A and is configured to communicate with the second relay device 70B and the slave devices 80 (80D to 80F) connected to the second relay device 70B via the first relay device 70A.

[0133] Thus, for example, when the slave device 80A detects the presence of a fire, a fire detection signal indicating the presence of the fire is transmitted via the first

relay device 70A to the second relay device 70B, and from the second relay device 70B to the slave device 80D, and then, the slave device 80D executes a fire warning. Thus, a detection result is shared with a plurality of slave devices 80, and the plurality of slave devices 80 execute the fire warnings in an interconnected manner. Moreover, the first relay device 70A transmits a fire detection signal to the external apparatus 99. The external apparatus 99 may manage the detection result and display the detection result on a display (not shown) of the external apparatus 99. Moreover, the external apparatus 99 may control the operation of the second relay device 70B and the slave devices 80 via the first relay device 70A.

[0134] For description of matters common to the slave devices 80, the slave devices are denoted by the slave devices 80, and for description of each of the plurality of slave devices 80, the slave devices are individually denoted by the slave devices 80A to 80F. The number of slave devices 80 is not limited to six.

<Description of Configuration of Master Device 70>

[0135] As illustrated in FIG. 15, the first relay device 70A included in the master device 70 includes a first transceiver 701, a second transceiver 702, a wired transceiver 703, a power source 704, an operation input receiving unit 705, a first controller 706 (hereinafter referred to as a controller 706), and a storage 707.

[0136] The first transceiver 701 wirelessly communicates with the slave devices 80. The first transceiver 701 transmits and receives a radio signal, such as a fire detection signal, in, for example, a 426-MHz band (a frequency band used by a specified low power radio station) via a first antenna 708 included in the first relay device 70A.

[0137] The second transceiver 702 wirelessly communicates with, for example, the external apparatus 99. The second transceiver 702 uses, for example, 920-MHz wireless communication compliant with the standard (international standard IEEE 802.15.4g) of Wi-SUN (registered trademark) to transmit and receive a radio signal such as a fire detection signal via the second antenna 709 included in the first relay device 70A. This should not be construed as limiting, but wired communication may be executed.

[0138] The wired transceiver 703 executes wired communication with the second relay device 70B and transmits and receives a signal such as a fire detection signal via a communication line 710 connected to the first relay device 70A.

[0139] The power source 704 converts 100 V AC for commercial use into direct-current power and includes a battery as an auxiliary power supply as necessary.

[0140] The operation input receiving unit 705 includes, for example, a switch 711 such as a push button or a dip switch. When an operation is given to the switch 711, the operation input receiving unit 705 receives an operation

input corresponding to the switch 711 and outputs, to the controller 706, an operation signal corresponding to the operation input. In the fourth embodiment, the operation input receiving unit 705 is provided with a role of, when receiving a prescribed operation input, outputting an operation signal which causes the controller 706 to execute a setting process. Note that the master device 70 does not have to include the operation input receiving unit 705, and in this case, the setting process may be performed at the timing of operating the external apparatus 99, or at a timing at which the master device 70 receives the individual setting information 90 from the external apparatus 99.

[0141] When the first transceiver 701 receives the fire detection signal provided by wireless communication from the slave device 80 at a location where a fire is present, the controller 706 controls the first transceiver 701 such that the first transceiver 701 transmits the fire detection signal to another slave device 80 other than the slave device 80 at the location where the fire is present. Moreover, when receiving the fire detection signal, the controller 706 transmits the fire detection signal from the wired transceiver 703 to the second relay device 70B. When receiving the fire detection signal from the first relay device 70A, the second relay device 70B controls the first transceiver (not shown) of the second relay device to transmit the fire detection signal to the slave device 80 with which the second relay device 70B can communicate. Moreover, when receiving the fire detection signal, the controller 706 transmits the fire detection signal to the external apparatus 99. Further, the controller 706 executes the setting process, which is a setting related to the interconnect operation between the master device 70 and each of the slave devices 80.

[0142] The storage 707 stores the master device identification code 96 and individual setting information 90, which is information necessary for setting the slave device 80. Moreover, the storage 707 receives a slave device identification code 97 from each slave device 80 and then stores the slave device identification code 97.

[0143] Note that the master device identification code 96 is stored in the storage 707 during manufacturing or the like. The master device identification code 96 enables the slave device 80 to identify the master device 70 as a destination of the radio signal and a transmission source of the fire detection signal and the like. The master device identification code 96 is the IP address, MAC address, name, or the like of the master device 70. Moreover, the individual setting information 90 adopts a configuration in which a user gives an operation to the external apparatus 99 such that the individual setting information 90 is stored in the external apparatus 99, which will be described later in detail.

[0144] Moreover, since the second relay device 70B included in the master device 70 is not directly connected to the external apparatus 99, the second transceiver 702 of the first relay device 70A is not provided, but the other configuration is the same, and thus, the description there-

of is omitted.

<Description of Configuration of Slave Device 80>

[0145] As illustrated in FIG. 13, the slave device 80 includes a transceiver 801, a detection unit 802, a notifier 803, an operation input receiving unit 804, a power source 805, and a second controller 806 (hereinafter referred to as a controller 806). The detection unit 802 transmits and receives a radio signal using a radio wave as a medium via an antenna 808. The detection unit 802 detects, for example, smoke. The notifier 803 informs a user of the presence of a fire by outputting an alarm sound or a voice message. The operation input receiving unit 804 has a switch 809 and performs a setting process and an alarm stop process when receiving a prescribed operation input. The power source 805 supplies operation power to each component. The controller 806 includes a storage 807 as a main component and controls each component. As described above, the slave device 80 has a similar configuration and similar functions to the slave device 20, and the detailed description of the components thereof is omitted.

<Description of Setting Process>

[0146] The setting process includes an interconnect setting process and an individual setting process. The interconnect setting process is a process of interconnecting the master device 70 and the slave devices 80 with each other. The individual setting process is a process of storing, in the slave devices 80, the individual setting information 90 including location information 91, a re-output time 92, latch information 93, language information 94, and sound information 95. In the setting process of the fourth embodiment, the external apparatus 99 at first transmits the individual setting information to the master device 70, the master device 70 stores the individual setting information, and then, the setting process of the master device 70 and the slave devices 80 is started.

[0147] As described above, the external apparatus 99 is configured to directly communicate with the first relay device 70A. Moreover, the external apparatus 99 is also configured to communicate with the second relay device 70B via the first relay device 70A. That is, the external apparatus 99 can control the operation of the master device 70 via the first relay device 70A, and more specifically, the external apparatus 99 can transmit the individual setting information 90 to the master device 70, thereby causing the master device 70 to store the individual setting information 90.

[0148] First of all, a user gives an operation to the external apparatus 99 to identify the individual setting information 90 including location information 91, a re-output time 92, latch information 93, language information 94, and sound information 95. Then, the individual setting information 90 identified by the external apparatus 99 is

transmitted to the first relay device 70A, and thereby, the individual setting information 90 is stored in the storage 707 of the first relay device 70A. Moreover, the first relay device 70A transmits the individual setting information 90 to the second relay device 70B via the wired transceiver 703, and thereby, the second relay device 70B can store the individual setting information 90.

[0149] When the master device 70 stores the individual setting information 90, the setting process of the slave device 80 can be started. When an operation is given to the external apparatus 99, the controller 706 of the master device 70 transitions to a setting registration mode of setting the slave devices 80 and starts the setting process. A specific method is similar to the method of the setting process of the alarm system 1 according to the first embodiment, and the description thereof is omitted.

[0150] Moreover, the external apparatus 99 can transmit a slave device identification code 97 of the slave device 80 to the master device 70 to cause the master device 70 to recognize the slave device 80 on which the setting process is to be executed. That is, the master device 70 transmits the individual setting information 90 only to the slave device 80 conforming to the slave device identification code 97 received from the external apparatus 99 and executes the setting process of the slave device 80.

[0151] As described above, in the fourth embodiment, the external apparatus 99 can set the details of the individual setting information 90 regarding the setting of the slave device 80. Further, the individual setting information 90 can be transmitted to the master device 70, and the individual setting information 90 can finally be stored in the slave device 80. That is, the plurality of slave devices 80 can be set at once by giving an operation to the external apparatus 99. Therefore, in the alarm system 4 according to the fourth embodiment, work required for the setting can be simplified and a time required for registration can be reduced as compared to the case where operations are given one-by-one to store pieces of information required for the setting in the master device 70 and the slave devices 80, and thereafter, the pieces of information thus stored are exchanged between the master device 70 and each of the slave devices 80 to perform the setting process.

(Variations)

[0152] The embodiments described above are merely examples of a variety of embodiments of the present disclosure. The embodiments described above may be modified variously depending on design and the like as long as the object of the present disclosure is achieved.

[0153] In the embodiment described above, the master device(s) 10, 30, 50, 70 is respectively connected to the slave devices 20, 40, 60, 80 each having both a fire detection function and a report function of outputting an alarm sound or a voice message. However, this should not be construed as limiting, but the slave devices 20,

40, 60, 80 may have only a fire detection function. Moreover, an event subject to disaster prevention is not limited to a fire. The detection unit may be a sensor configured to detect water damage, earthquake, gas leakage, or the occurrence of carbon monoxide (CO) due to unburning. Moreover, the facility A1 in which the alarm system 1, 2, 3, 4 is installed is not limited to a residential building but may be a commercial, that is, non-residential facility. Examples of such non-residential facilities include office buildings, theaters, movie theaters, recreation halls, restaurants, department stores, schools, hotels, and stations. According to this variation, the degree of freedom of the configuration can be improved.

[0154] In the above embodiments, the report at the time of warning a fire by the notifier 103, 203, 303, 403, 504, 603, 803 is not limited to a report by a sound but may be a report by light or may be a report by a combination of a sound and light.

[0155] In the above embodiments, the switch 109, 209, 310, 409, 513, 609, 809 not only functions to cause the setting process to be executed but may also relate to an alarm stop process for stopping the fire warning and an inspection process for inspecting the apparatus. Thus, receiving a plurality of operation inputs by a single switch 109, 209, 310, 409, 513, 609, 809 can reduce the number of switches.

[0156] In the above embodiments, the storage 107, 207, 307, 407, 510, 607, 707, 807 stores a control program executed by the controller 106, 206, 306, 406, 509, 606, 705, 806. The control program may be implemented by causing a processor such as a Central Processing Unit (CPU) and the like to execute the program, that is, by software, may be implemented by hardware such as an Integrated Circuit (IC), or may be implemented by using the software and the hardware in combination. Moreover, the control program may be recorded as a file in installable format or executable format in a computer readable recording medium such as a CD-ROM, a flexible disk (FD), a CD-R, or a Digital Versatile Disk (DVD). Alternatively, the control program may be stored on a computer connected to a network such as the Internet and may be provided by being downloaded over the network or may be provided or distributed via a network such as the Internet.

[0157] The external apparatus 99 of the fourth embodiment may be configured to be included in each of the alarm systems 1 to 3 of the first to third embodiments. In that case, the external apparatus 99 is configured to be connected to the master devices 10, 30, and 50 and corresponds to an upper side component in the tree structure of each of the alarm systems 1 to 3. Moreover, the external apparatus 99 is not limited to a portable terminal or a personal computer but may be a controller of a Home Energy Management System (HEMS) installed in a facility.

(Summary)

[0158] As described above, an alarm system 1, 2, 3, 4 according to a first aspect is an alarm system in which a plurality of apparatuses including a first apparatus 10, 30, 50, 70 and at least one second apparatus 20, 40, 60, 80 cooperate with each other to achieve alarming in an interconnected manner between the plurality of apparatuses. The first apparatus 10, 30, 50, 70 includes a first controller 106, 306, 509, 706 configured to execute a setting process of making a setting for interconnected operation between the first apparatus 10, 30, 50, 70 and the at least one second apparatus 20, 40, 60, 80. The at least one second apparatus 20, 40, 60, 80 includes a second controller 206, 406, 606, 806 configured to execute the setting process between the first apparatus 10, 30, 50, 70 and the at least one second apparatus 20, 40, 60, 80. The first controller 106, 306, 509, 706 is configured to transmit, to the at least one second apparatus 20, 40, 60, 80, individual setting information 90 which is information regarding a setting of the at least one second apparatus 20, 40, 60, 80 in the setting process. The second controller 206, 406, 606, 806 is configured to, when receiving the individual setting information 90, make, based on the individual setting information 90, a setting of the at least one second apparatus 20, 40, 60, 80 including the second controller in the setting process. In the case where a plurality of slave devices are provided and pieces of information are set in the respective slave devices, the first aspect enables the plurality of slave devices to be set at once by storing individual setting information common to a plurality of slave devices in a master device in advance and transmitting the individual setting information to the slave devices. This simplifies work required for the setting and reduces a time required for registration.

[0159] An alarm system 4 of a second aspect referring to the first aspect further includes an external apparatus 99 configured to communicate with the first apparatus 70. The external apparatus 99 is configured to transmit the individual setting information 90 to the first apparatus 70. The second aspect enables the external apparatus 99 to set the details of the individual setting information 90 regarding the setting of the second apparatuses 80. Further, the external apparatus 99 is configured to transmit the individual setting information 90 to the first apparatus 70, and the individual setting information 90 can finally be stored in the second apparatuses 80. That is, in the case where a plurality of slave devices are provided and pieces of information are set in the respective slave devices, the second apparatuses 80 can be set at once by giving an operation to the external apparatus 99. Thus, work required for the setting can be simplified and a time required for registration can be reduced.

[0160] In an alarm system 4 of a third aspect referring to the second aspect, the external apparatus 99 is configured to transmit the individual setting information 90 and a second identification code 97 identifying the at least

one second apparatus 80 to the first apparatus 70. The first apparatus 70 is configured to transmit, in accordance with the second identification code 97 received from the external apparatus 99, the individual setting information 90 to the at least one second apparatus 80 conforming to the second identification code 97. According to the third aspect, the external apparatus can cause the master device to recognize the slave device on which the master device performs the setting process.

[0161] In an alarm system 1, 2, 3, 4 of a fourth aspect referring to any one of the first to third aspects, the individual setting information 90 includes location information 91 indicating an installation location of the at least one second apparatus 20, 40, 60, 80. With the fourth aspect, the installation location of the at least one second apparatus 20, 40, 60, 80 can be set.

[0162] In an alarm system 1, 2, 3, 4 of a fifth aspect referring to any one of the first to fourth aspects, the individual setting information 90 includes a re-output time 92 representing an amount of time from when the at least one second apparatus 20, 40, 60, 80 stops outputting an alarm to when the at least one second apparatus 20, 40, 60, 80 restarts outputting the alarm. With the fifth aspect, the re-output time of the at least one second apparatus 20, 40, 60, 80 can be set.

[0163] In an alarm system 1, 2, 3, 4 of a sixth aspect referring to any one of the first to fifth aspects, the individual setting information 90 includes information (latch information 93) relating to whether or not a latch is provided to the at least one second apparatus 20, 40, 60, 80. With the sixth aspect, a setting relating to whether or not a latch is provided to the at least one second apparatus 20, 40, 60, 80 can be made.

[0164] In an alarm system 1, 2, 3, 4 of a seventh aspect referring to any one of the first to sixth aspects, the individual setting information 90 includes language information 94 on a voice message to be output from the at least one second apparatus 20, 40, 60, 80. With the seventh aspect, a setting of the language information on the voice message of the at least one second apparatus 20, 40, 60, 80 can be made.

[0165] In an alarm system 1, 2, 3, 4 of an eighth aspect referring to any one of the first to seventh aspects, the individual setting information 90 includes sound information 95 which is an output pattern of an alarm sound to be output from the at least one second apparatus 20, 40, 60, 80. With the eighth aspect, a setting of the output pattern of the alarm sound of the at least one second apparatus 20, 40, 60, 80 can be made.

[0166] In an alarm system 1, 2, 3, 4 of a ninth aspect referring to any one of the first to eighth aspects, the first apparatus 10, 30, 50, 70 is configured to transmit a first identification code 96 for identifying the first apparatus 10, 30, 50, 70 to the at least one second apparatus 20, 40, 60, 80. With the ninth aspect, when receiving the individual setting information 90, the at least one second apparatus 20, 40, 60, 80 can recognize the first apparatus 10, 30, 50, 70 from which the individual setting informa-

tion 90 has been transmitted.

[0167] In an alarm system 1, 2, 3, 4 of a tenth aspect referring to the ninth aspect, the first apparatus 10, 30, 50, 70 is configured to transmit the first identification code 96 to the at least one second apparatus 20, 40, 60, 80 before transmitting the individual setting information 90. With the tenth aspect, before receiving the individual setting information 90, the at least one second apparatus 20, 40, 60, 80 can recognize the first apparatus 10, 30, 50, 70 from which the individual setting information 90 has been transmitted.

[0168] In an alarm system 1, 2, 3, 4 of an eleventh aspect referring to the ninth or tenth aspect, the at least one second apparatus 20, 40, 60, 80 includes a plurality of second apparatuses 20, 40, 60, 80. The first apparatus 10, 30, 50, 70 is configured to transmit at least one of the first identification code 96 or the individual setting information 90 to the plurality of second apparatuses 20, 40, 60, 80 at timings shifted between the plurality of second apparatuses 20, 40, 60, 80. With the eleventh embodiment, the first apparatus 10, 30, 50, 70 can reliably transmit information without communications to the plurality of second apparatuses 20, 40, 60, 80 colliding with each other.

[0169] In an alarm system 1, 2, 3, 4 of a twelfth aspect referring to any one of the first to eleventh aspects, the at least one second apparatus 20, 40, 60, 80 includes a plurality of second apparatuses 20, 40, 60, 80. The first apparatus 10, 30, 50, 70 is configured to multicast the individual setting information 90 to the plurality of second apparatus 20, 40, 60, 80 which operates with the first apparatus 10, 30, 50, 70 in an interconnected manner in a reset process of modifying the individual setting information 90 set in the plurality of second apparatus 20, 40, 60, 80. With the twelfth embodiment, the reset process can be performed quickly.

[0170] In an alarm system 1, 2, 3, 4 of a thirteenth aspect referring to any one of the first to twelfth aspects, the first apparatus 10, 30, 50, 70 includes an operation input receiving unit 104, 304, 506, 705, and the at least one second apparatus 20, 40, 60, 80 includes an operation input receiving unit 204, 404, 604, 804. The first apparatus 10, 30, 50, 70 is configured to transmit the individual setting information 90 to the at least one second apparatus 20, 40, 60, 80 when an operation is given to at least one of the operation input receiving unit 104, 304, 506, 705 of the first apparatus 10, 30, 50, 70 or the operation input receiving unit 204, 404, 604, 804 of the at least one second apparatus 20, 40, 60, 80. With the thirteenth aspect, the setting process can be performed at an arbitrary timing.

[0171] An apparatus 10, 30, 50, 70 of a fourteenth aspect is a first apparatus 10, 30, 50, 70 used for an alarm system 1, 2, 3, 4. The first apparatus 10, 30, 50, 70 is configured to store individual setting information 90 required for a setting of the at least one second apparatus 20, 40, 60, 80. The fourteenth aspect provides an apparatus which enables work required for setting of the mas-

ter device and the slave device(s) to be simplified and enables a time required for registration to be reduced.

[0172] A setting method of a fifteenth aspect is a setting method of the alarm system 1, 2, 3, 4. The setting method includes: a transmission step of transmitting individual setting information 90 from a first controller 106, 306, 509, 706 of the alarm system 1, 2, 3, 4, to the at least one second apparatus 20, 40, 60, 80; and a setting step of, when the second controller 206, 406, 606, 806 receives the individual setting information 90, making, based on the individual setting information 90, a setting of the at least one second apparatus 20, 40, 60, 80. The fifteenth aspect provides a setting method which enables work required for setting of the master device and the slave device(s) to be simplified and enables a time required for registration to be reduced.

[0173] A setting program of a sixteenth aspect is a program configured to cause a computer system to execute the setting method of the fifteenth aspect. The sixteenth aspect provides a function which enables work required for setting of the master device and the slave device(s) to be simplified and enables a time required for registration to be reduced.

Reference Signs List

[0174]

1 Alarm System
2 Alarm System
3 Alarm System
4 Alarm System
10 First Apparatus (Master Device)
20 Second Apparatus (Slave Device)
30 First Apparatus (Master Device)
40 Second Apparatus (Slave Device)
50 First Apparatus (Master Device)
60 Second Apparatus (Slave Device)
70 First Apparatus (Master Device)
70A First relay device
70B Second relay device
80 Second Apparatus (Slave Device)
90 Individual Setting Information
91 Location information
92 Re-output time
93 Latch Information
94 Language information
95 Sound information
96 Master Device Identification Code
97 Slave Device Identification Code
98 Data Table
99 External Apparatus
101 Transceiver
102 Detection Unit
103 Notifier
104 Operation Input Receiving Unit
105 Power Source
106 First Controller (Controller)

107 Storage
108 Antenna
109 Switch
201 Transceiver
5 202 Detection Unit
203 Notifier
204 Operation Input Receiving Unit
205 Power Source
206 Second Controller (Controller)
10 207 Storage
208 Antenna
209 Switch
301 First Transceiver
302 Second Transceiver
15 303 Notifier
304 Operation Input Receiving Unit
305 Power Source
306 First Controller (Controller)
307 Storage
20 308 First Antenna
309 Second Antenna
310 Switch
401 Transceiver
402 Detection Unit
25 403 Notifier
404 Operation Input Receiving Unit
405 Power Source
406 Second Controller (Controller)
407 Storage
30 408 Antenna
409 Switch
501 Wireless Transceiver
502 Wired Transceiver
503 Operation Unit
35 504 Notifier
505 Display Section
506 Operation Input Receiving Unit
507 Power Source
508 Indicator Light
40 509 First Controller (Controller)
510 Storage
511 Antenna
512 Communication Line
513 Switch
45 601 Transceiver
602 Detection Unit
603 Notifier
604 Operation Input Receiving Unit
605 Power Source
50 606 Second Controller (Controller)
607 Storage
608 Antenna
609 Switch
701 First Transceiver
55 702 Second Transceiver
703 Wired Transceiver
704 Power Source
705 Operation Input Receiving Unit

706 First Controller (Controller)
 707 Storage
 708 First Antenna
 709 Second Antenna
 710 Communication Line
 711 Switch
 801 Transceiver
 802 Detection Unit
 803 Notifier
 804 Operation Input Receiving Unit
 805 Power Source
 806 Second Controller (Controller)
 807 Storage
 808 Antenna
 809 Switch

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the external apparatus (99) is configured to transmit the individual setting information and a second identification code identifying the at least one second apparatus (80) to the first apparatus (70), and the first apparatus (70) is configured to transmit, in accordance with the second identification code received from the external apparatus (99), the individual setting information to the at least one second apparatus (80) conforming to the second identification code.

4. The alarm system (1, 2, 3, 4) of any one of claims 1 to 3, wherein the individual setting information includes location information indicating an installation location of the at least one second apparatus (20, 40, 60, 80).

Claims

1. An alarm system (1,2,3,4) in which a plurality of apparatuses including a first apparatus (10, 30, 50, 70) and at least one second apparatus (20, 40, 60, 80) cooperate with each other to achieve alarming in an interconnected manner between the plurality of apparatuses, the first apparatus (10, 30, 50, 70) including a first controller (106, 306, 509, 706) configured to execute a setting process of making a setting for interconnected operation between the first apparatus (10, 30, 50, 70) and the at least one second apparatus (20, 40, 60, 80), the at least one second apparatus (20, 40, 60, 80) including a second controller (206, 406, 606, 806) configured to execute the setting process between the first apparatus (10, 30, 50, 70) and the at least one second apparatus (20, 40, 60, 80), the first controller (106, 306, 509, 706) being configured to transmit individual setting information which is information regarding a setting of the at least one second apparatus (20, 40, 60, 80) to the at least one second apparatus (20, 40, 60, 80) in the setting process, the second controller (206, 406, 606, 806) being configured to, when receiving the individual setting information, make, based on the individual setting information, a setting of the at least one second apparatus including the second controller in the setting process.

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2. The alarm system (4) of claim 1, further comprising:

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an external apparatus (99) configured to communicate with the first apparatus (70), wherein the external apparatus (99) is configured to transmit the individual setting information to the first apparatus (70).

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3. The alarm system (4) of claim 2, wherein

5. The alarm system (1, 2, 3, 4) of any one of claims 1 to 4, wherein the individual setting information includes a re-output time representing an amount of time from when the at least one second apparatus (20, 40, 60, 80) stops outputting an alarm to when the at least one second apparatus (20, 40, 60, 80) restarts outputting the alarm.

6. The alarm system (1, 2, 3, 4) of any one of claims 1 to 5, wherein the individual setting information includes information relating to whether or not a latch is provided to the at least one second apparatus (20, 40, 60, 80), the at least one second apparatus (20, 40, 60, 80) is configured to continue outputting an alarm regardless of operation or a communication state of a detection source of a fire in a case of the latch being provided, and the at least one second apparatus (20, 40, 60, 80) is configured to stop outputting the alarm in accordance with operation or a communication state of a detection source of a fire in a case of the latch not being provided.

7. The alarm system (1, 2, 3, 4) of any one of claims 1 to 6, wherein the individual setting information includes language information on a voice message to be output from the at least one second apparatus (20, 40, 60, 80).

8. The alarm system (1, 2, 3, 4) of any one of claims 1 to 7, wherein the individual setting information includes sound information which is an output pattern of an alarm sound to be output from the at least one second apparatus (20, 40, 60, 80).

9. The alarm system (1, 2, 3, 4) of any one of claims 1 to 8, wherein the first apparatus (10, 30, 50, 70) is configured to

transmit a first identification code for identifying the first apparatus (10, 30, 50, 70) to the at least one second apparatus (20, 40, 60, 80).

10. The alarm system (1, 2, 3, 4) of claim 9, wherein the first apparatus (10, 30, 50, 70) is configured to transmit the first identification code to the at least one second apparatus (20, 40, 60, 80) before transmitting the individual setting information.
11. The alarm system (1, 2, 3, 4) of claim 9 or 10, wherein the at least one second apparatus (20, 40, 60, 80) includes a plurality of second apparatuses (20, 40, 60, 80), and the first apparatus (10, 30, 50, 70) is configured to transmit at least one of the first identification code or the individual setting information to the plurality of second apparatuses (20, 40, 60, 80) at timings shifted between the plurality of second apparatuses (20, 40, 60, 80).
12. The alarm system (1, 2, 3, 4) of any one of claims 1 to 11, wherein the first apparatus (10, 30, 50, 70) further includes an operation input receiving unit (104, 304, 506, 705), the at least one second apparatus (20, 40, 60, 80) further includes an operation input receiving unit (204, 404, 604, 804), the first apparatus (10, 30, 50, 70) is configured to transmit the individual setting information to the at least one second apparatus (20, 40, 60, 80) when an operation is given to at least one of the operation input receiving unit (104, 304, 506, 705) of the first apparatus (10, 30, 50, 70) or the operation input receiving unit (204, 404, 604, 804) of the at least one second apparatus (20, 40, 60, 80).
13. An apparatus used as the first apparatus (10, 30, 50, 70) in the alarm system (1, 2, 3, 4) of any one of claims 1 to 12, the first apparatus (10, 30, 50, 70) being configured to store individual setting information required for a setting of the at least one second apparatus (20, 40, 60, 80).
14. A setting method of an alarm system (1,2,3,4) in which a plurality of apparatuses including a first apparatus (10, 30, 50, 70) and at least one second apparatus (20, 40, 60, 80) cooperate with each other to achieve alarming in an interconnected manner between the plurality of apparatuses, the first apparatus (10, 30, 50, 70) including a first controller (106, 306, 509, 706) configured to execute a setting process of making a setting for interconnected operation between the first apparatus (10, 30, 50, 70) and the at least one second apparatus (20, 40, 60, 80),

the at least one second apparatus (20, 40, 60, 80) including a second controller (206, 406, 606, 806) configured to execute the setting process between the first apparatus (10, 30, 50, 70) and the at least one second apparatus (20, 40, 60, 80), the setting method comprising:

a transmission step of transmitting individual setting information from a first controller (106, 306, 509, 706) of the alarm system (1, 2, 3, 4), to the at least one second apparatus (20, 40, 60, 80), the individual setting information being information regarding a setting of the at least one second apparatus (20, 40, 60, 80); and a setting step of, when the second controller (206, 406, 606, 806) receives the individual setting information, making, based on the individual setting information, a setting of the at least one second apparatus (20, 40, 60, 80).

15. A setting program configured to cause a computer to execute the setting method of claim 14.

FIG. 1

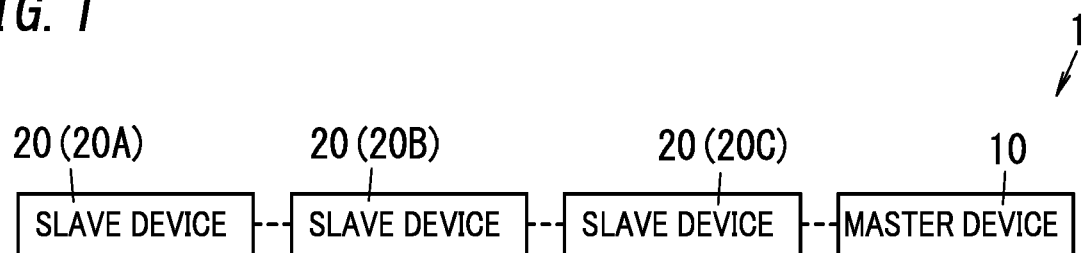


FIG. 2

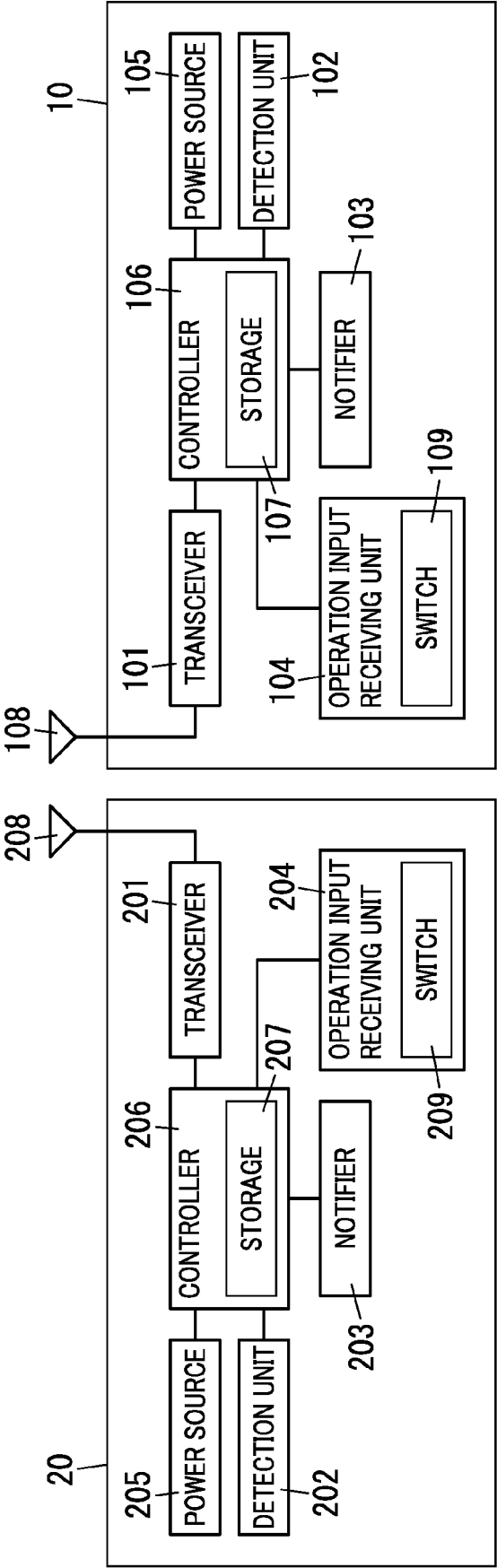


FIG. 3

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INDIVIDUAL SETTING INFORMATION 90	REGISTRATION ITEM WITH SLAVE DEVICE 20
LOCATION INFORMATION 91	FIRST FLOOR
RE-OUTPUT TIME 92	TWO MINUTES
LATCH INFORMATION 93	LATCH IS PROVIDED
LANGUAGE INFORMATION 94	JAPANESE
SOUND INFORMATION 95	ALARM SOUND COMPLIANT WITH ISO8201

FIG. 498
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DATA	INDIVIDUAL SETTING INFORMATION 90	REGISTRATION ITEM WITH SLAVE DEVICE 20
1	LOCATION INFORMATION 91	FIRST FLOOR
	RE-OUTPUT TIME 92	TWO MINUTES
	LATCH INFORMATION 93	LATCH IS PROVIDED
	LANGUAGE INFORMATION 94	ENGLISH
	SOUND INFORMATION 95	ALARM SOUND COMPLIANT WITH ISO8201
2	LOCATION INFORMATION 91	SECOND FLOOR
	RE-OUTPUT TIME 92	THREE MINUTES
	LATCH INFORMATION 93	LATCH IS NOT PROVIDED
	LANGUAGE INFORMATION 94	GERMAN
	SOUND INFORMATION 95	ALARM SOUND COMPLIANT WITH DIN33404-3

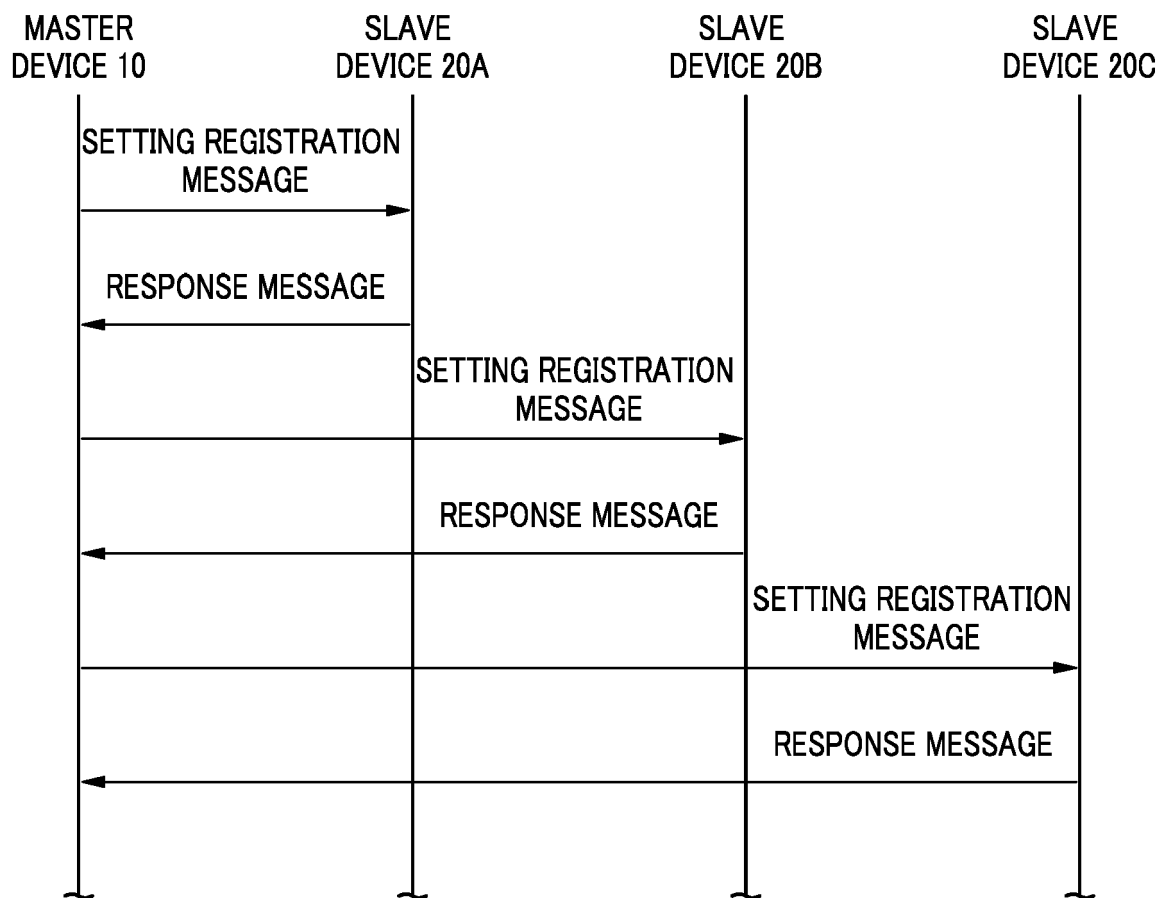
FIG. 5

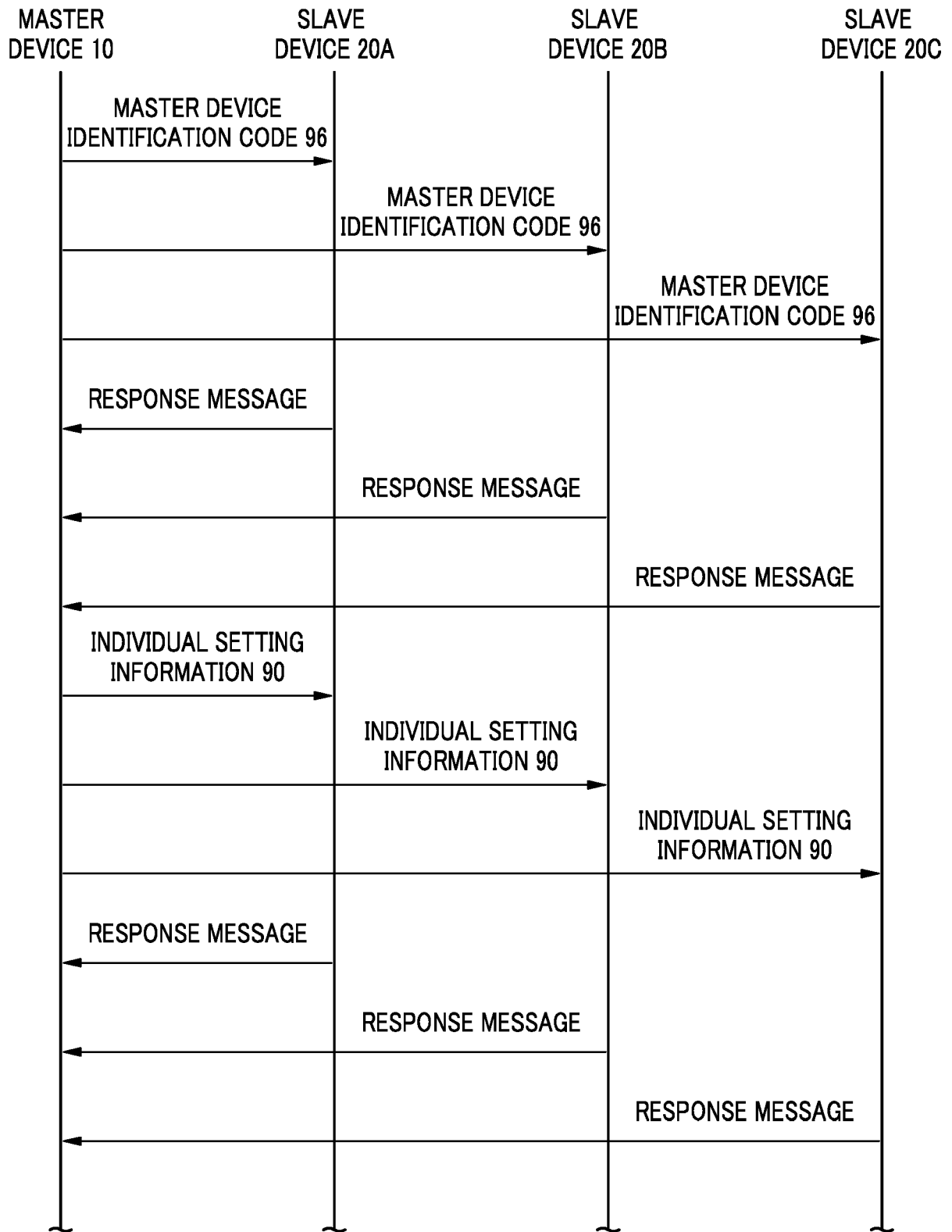
FIG. 6

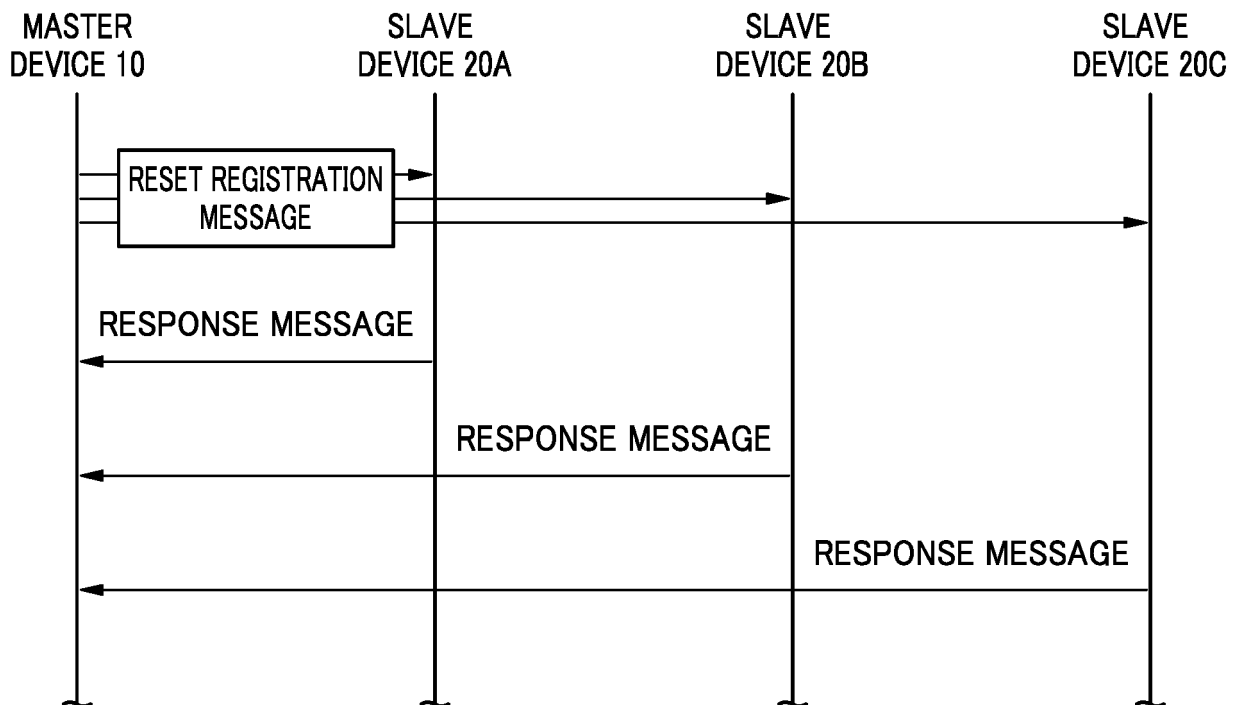
FIG. 7

FIG. 8

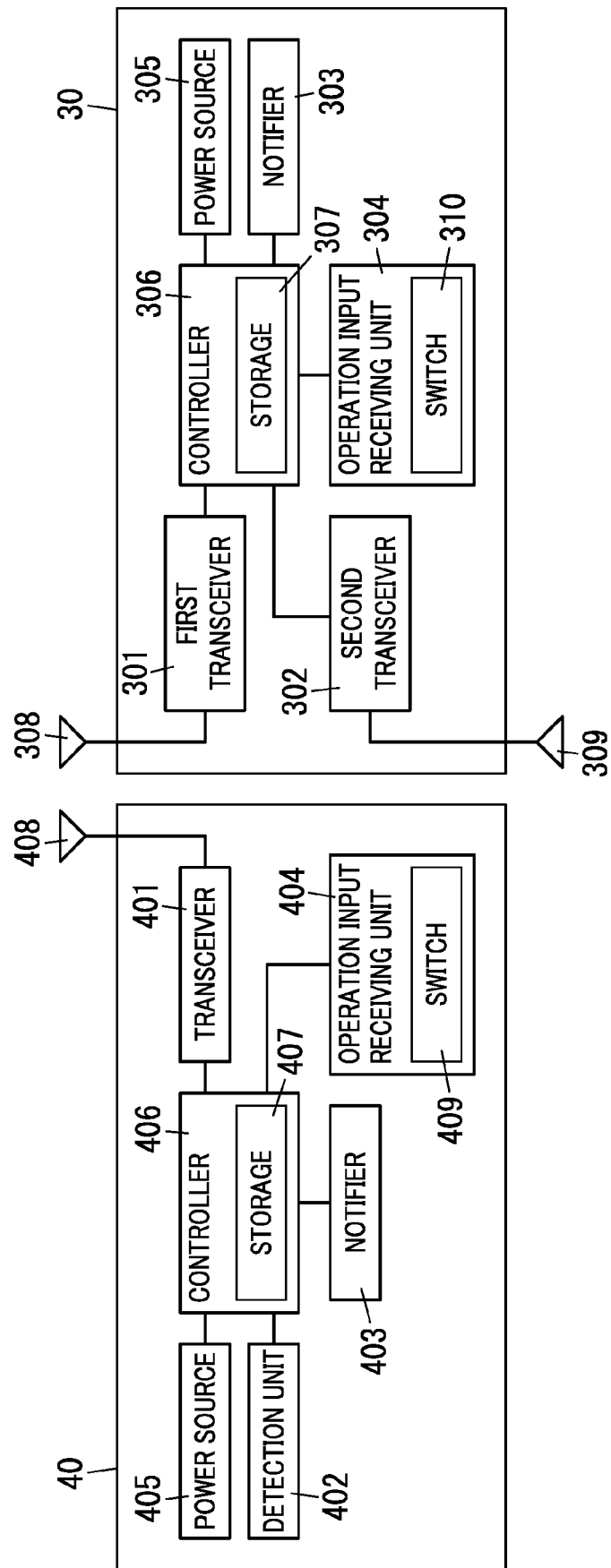


FIG. 9

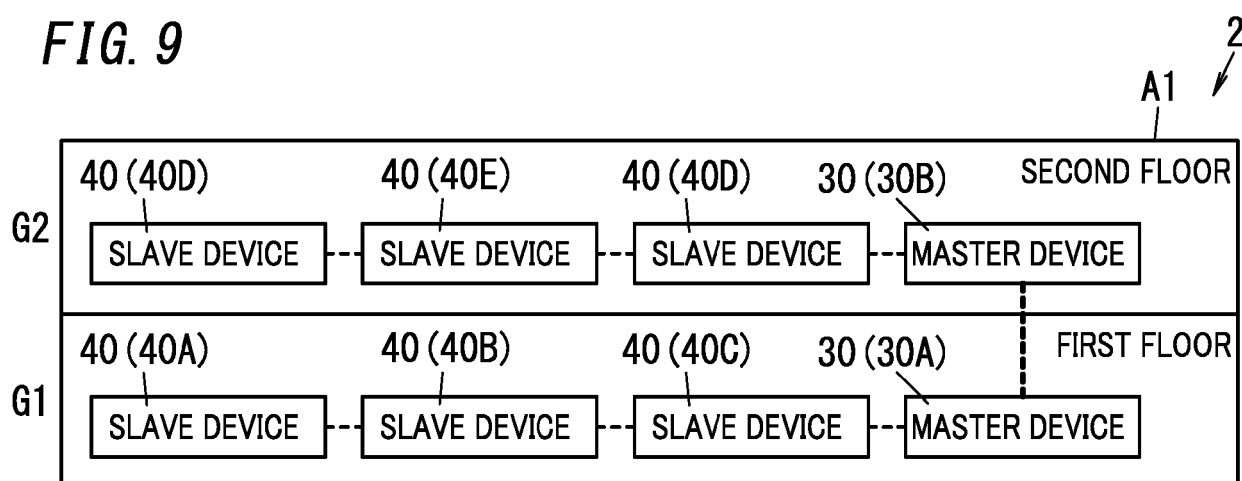


FIG. 10

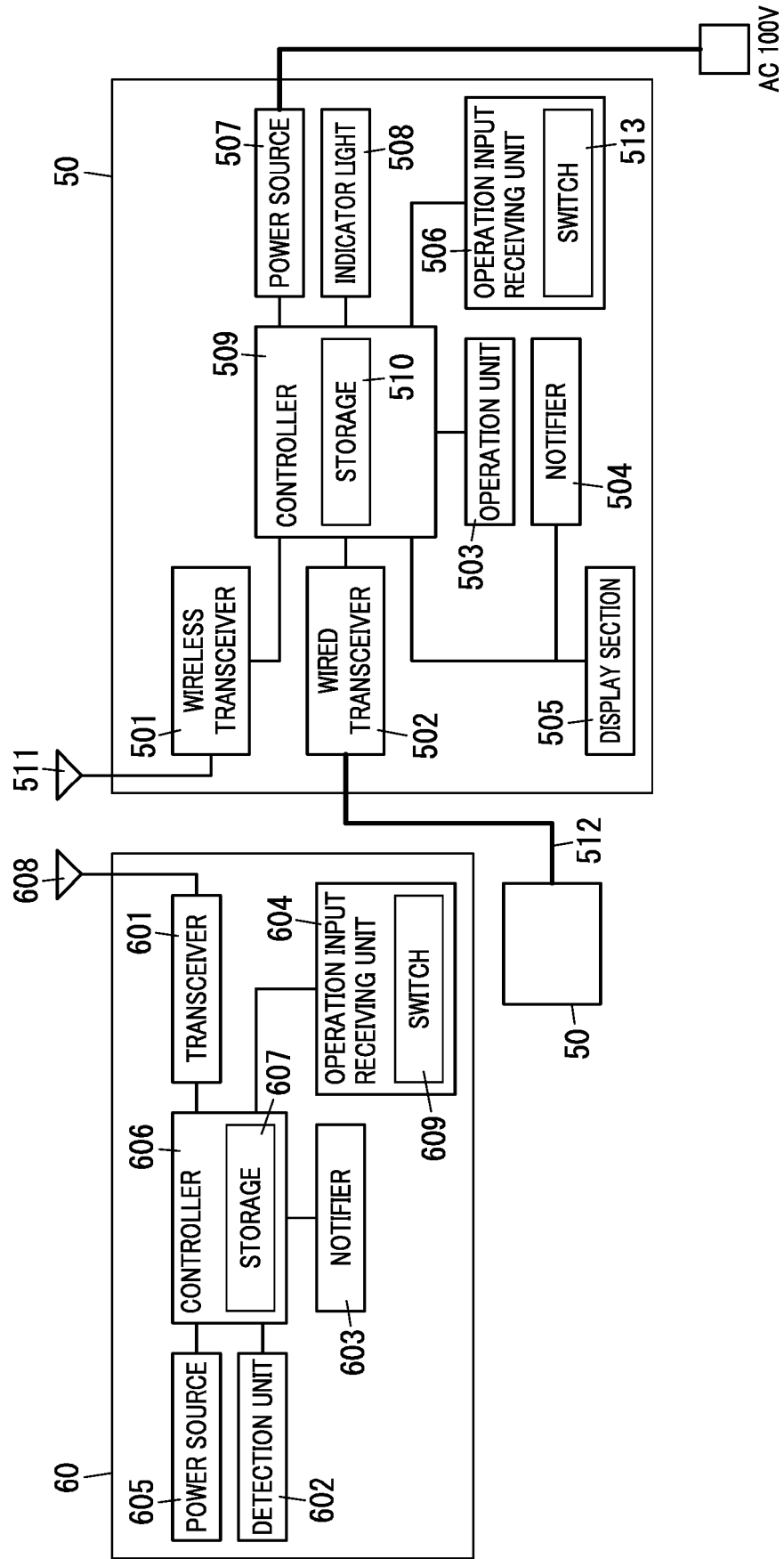


FIG. 11

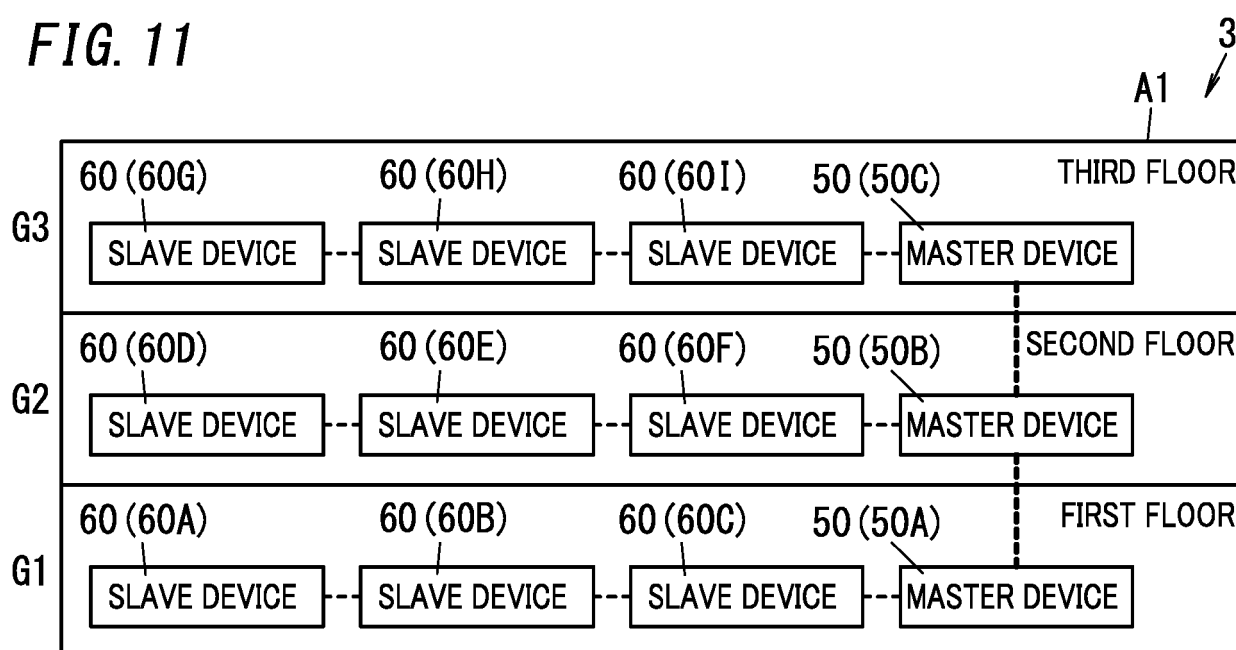


FIG. 12

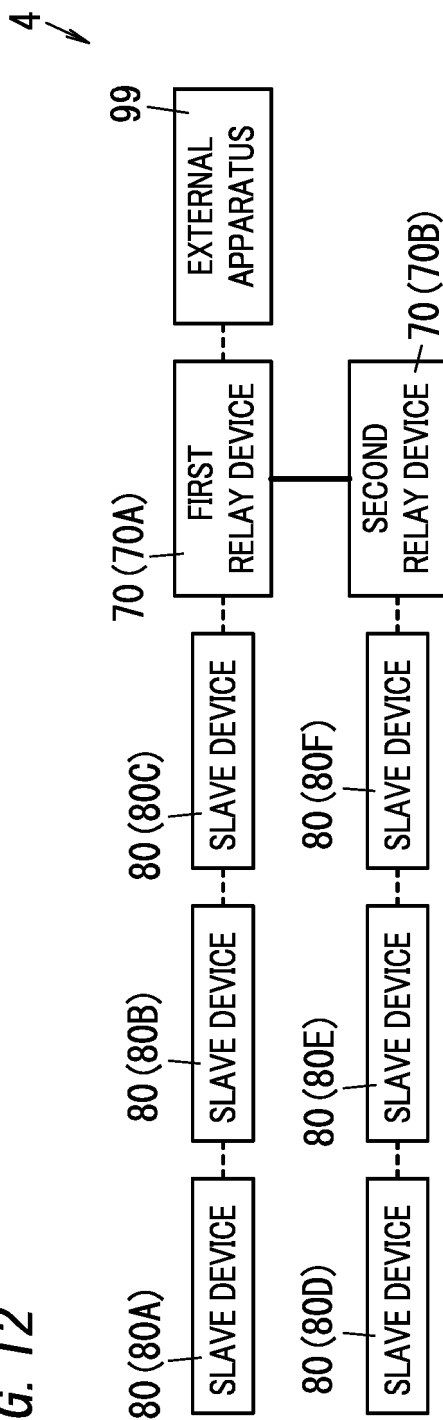
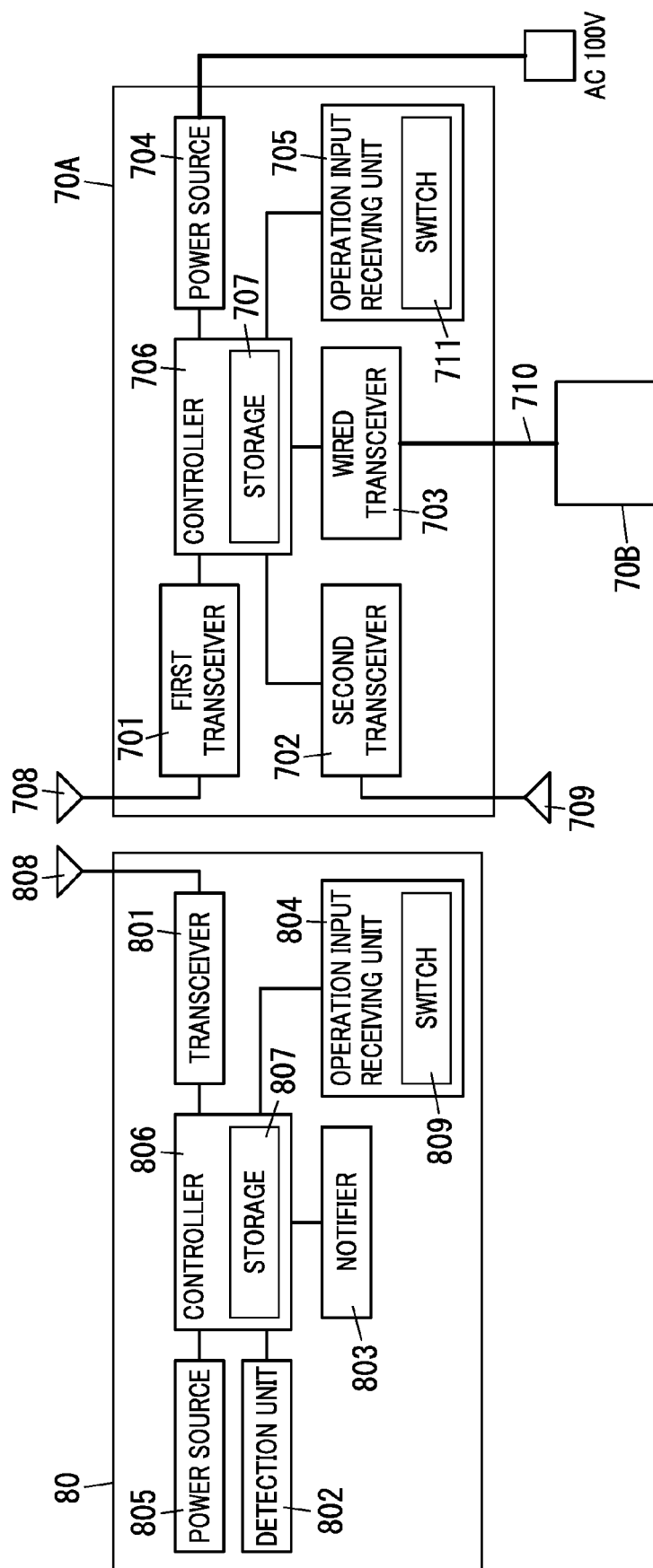


FIG. 13





EUROPEAN SEARCH REPORT

Application Number
EP 21 18 4224

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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	EP 2 897 396 A1 (PANASONIC IP MAN CO LTD [JP]) 22 July 2015 (2015-07-22) * abstract * * paragraph [0021] - paragraph [0043]; figures 1-3 *	1,4-15	INV. G08B25/10 ADD. G08B25/00
X	EP 2 897 395 A1 (PANASONIC IP MAN CO LTD [JP]) 22 July 2015 (2015-07-22) * abstract * * paragraph [0019] - paragraph [0041]; figures 1-3 *	1,4-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			G08B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 December 2021	Examiner Heß, Rüdiger
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05-12-2021

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