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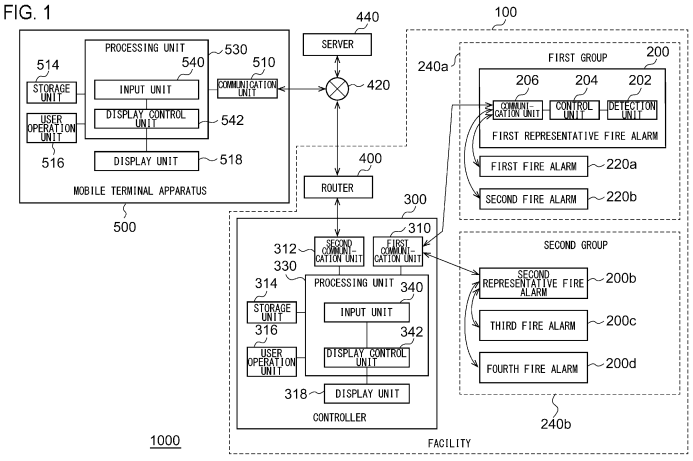
(54) DISPLAY DEVICE AND PROGRAM

(57) A first representative fire alarm 200, a second representative fire alarm 200b, a first fire alarm 220a, a second fire alarm 220b, a third fire alarm 220c, and a fourth fire alarm 220d are provided in a facility. An input unit 540 is adapted to receive information related to each of the first representative fire alarm 200, the second representative fire alarm 200b, the first fire alarm 220a, the second fire alarm 220b, the third fire alarm 220c, and the fourth fire alarm 220d. A display control unit 542 causes, when the input unit 540 receives a plurality of items of information, a display unit 518 to display a notice for communicating that information with a higher degree of priority is available.

FIG. 1



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Description

[TECHNICAL FIELD]

[0001] The present disclosure relates to display technology and, more particularly, to a display apparatus and a program for displaying information.

[BACKGROUND ART]

[0002] Fire alarms are provided in a facility such as building. When the fire alarm detects a fire, the fire alarm transmits a fire signal to a server. A mobile terminal apparatus communicates with the server and displays support information regarding the fire (see, for example, patent literature 1).

[0003] [Patent literature 1] JP Patent 6240744

[SUMMARY OF INVENTION]

[TECHNICAL PROBLEM]

[0004] When a plurality of sensors like fire alarms are provided in a facility and information related to the plurality of sensors is displayed collectively, the larger the number of items of information, the more difficult it may become to recognize the information.

[0005] The present disclosure addresses the above-described issue, and a purpose thereof is to provide a technology of making it possible to recognize information easily when there are plurality of items of information.

[SOLUTION TO PROBLEM]

[0006] A display apparatus according to an embodiment of the present disclosure includes: an input unit adapted to a facility in which a plurality of sensors are provided, the input unit being capable of receiving information related to each of the plurality of sensors; a display control unit that causes, when the input unit receives a plurality of items of information, a display unit to display a notice for communicating that information with a higher degree of priority is available.

[0007] Optional combinations of the aforementioned constituting elements, and implementations of the present disclosure in the form of devices, systems, computer programs, recording mediums recording computer programs, etc. may also be practiced as additional modes of the present invention.

[ADVANTAGEOUS EFFECTS OF INVENTION]

[0008] According to the present disclosure, it is possible to recognize information easily when there are plurality of items of information.

[BRIEF DESCRIPTION OF DRAWINGS]

[0009]

Fig. 1 shows a configuration of a control system according to the embodiment;
Fig. 2 shows a data structure of a status table stored in the storage unit of Fig. 1;
Fig. 3 shows a data structure of the table stored in the storage unit of Fig. 1;
Figs. 4A-4C show screens displayed on the display unit of Fig. 1;
Fig. 5 shows another screen displayed on the display unit of Fig. 1;
Figs. 6A-6C show screens displayed on the display unit of Fig. 1;
Fig. 7 is a sequence chart showing a display procedure executed by the control system of Fig. 1;
Fig. 8 is a sequence chart showing another display procedure executed by the control system of Fig. 1; and
Fig. 9 is a flowchart showing a display procedure executed by the control system 1000.

[0010] A summary will be given before describing the invention in specific details. The embodiment relates to a control system for displaying information related to each of a plurality of sensors provided in a facility such as a house. The plurality of sensors are exemplified by fire alarms. The plurality of fire alarms are connected to a controller provided in the facility and transmit alarm information to the controller when a fire is detected and transmit failure information to the controller when a failure is detected. Further, the plurality of fire alarms are driven by batteries and transmit a battery level to the controller. The controller is connected to a server outside the facility via a network and transmits the alarm information, failure information, and battery level (hereinafter, generically referred to as "information") to the server. The server can be accessed from an information terminal device such as a smartphone.

[0011] The information terminal device or the controller is a display apparatus and can display each of the plurality of items of information. For example, a notice for communicating alarm information or failure information is displayed. When the number of fire alarms increases or when alarm information and failure information are transmitted from one fire alarm, the number of notices displayed increases. This makes it difficult for a user to recognize the information.

[0012] For easy recognition of the information related to each of the plurality of fire alarms, the display apparatus according to the embodiment organizes the plurality of fire alarms into one or more groups. Further, the display apparatus displays an area in which information representative of each group is shown (hereinafter, "first area") and an area in which information related to two or more fire alarms included in each group is displayed (herein-

after, "second area") in separate screens. Upon receiving alarm information and failure information from two or more fire alarms included in a group, the display apparatus selects one of the information based on the priority assigned to the information and displays a notice for communicating that the selected information is available (hereinafter, "first notice") in the first area. The display apparatus also displays a notice for individually communicating that the alarm information and the failure information are received (hereinafter, "second notice") in the second area.

[0013] When the user finds the first notice in the screen including the first area, the user recognizes that, of the plurality of items of information, information with a high priority is available. At this stage, the user does not recognize from which fire alarm the information is received or whether information other than that information is received. Thus, when the user finds the second notice in the screen including the second area for the group, the user recognizes the fire alarm that transmitted the prioritized information and the fire alarm that transmitted the information other than the prioritized information.

[0014] Fig. 1 shows a configuration of a control system 1000. The control system 1000 includes a first representative fire alarm 200a and a second representative fire alarm 200b, which are generically referred to as representative fire alarms 200, a first fire alarm 220a, a second fire alarm 220b, a third fire alarm 220c, and a fourth fire alarm 220d, which are generically referred to as fire alarms 220, a controller 300, a router 400, a network 420, a server 440, and a mobile terminal apparatus 500. The number of representative fire alarms 200 is assumed to be but not limited to "2", and the number of fire alarms 220 is assumed to be but not limited to "4".

[0015] The representative fire alarm 200 includes a detection unit 202, a control unit 204, and a communication unit 206. The controller 300 includes a first communication unit 310, a second communication unit 312, a storage unit 314, a user operation unit 316, a display unit 318, and a processing unit 330. The processing unit 330 includes an input unit 340, a display control unit 342. The mobile terminal apparatus 500 includes a communication unit 510, a storage unit 514, a user operation unit 516, a display unit 518, and a processing unit 530, and the processing unit 330 includes an input unit 540 and a display control unit 542.

[0016] The representative fire alarm 200, the fire alarm 220, the controller 300, and the router 400 are provided in the facility 100. The network 420 and the server 440 are provided outside the facility 100. The facility 100 is a building subject to control by the control system 1000 and is exemplified by an independent housing. The facility 100 is not limited to an independent housing and may be a housing in a multi-unit apartment building, an office building, a commercial facility, etc. The representative fire alarm 200 and the fire alarm 220 are provided as a sensor for detecting an outbreak of fire in each of a plurality of rooms in the facility 100. The representative fire alarm 200 and the fire alarm 220 communicate wirelessly with the controller 300. For example, specified low power radio is used for wireless communication, but the embodiment is not limited to this. The fire alarms may communicate by wire.

[0017] Wireless communication between the representative fire alarm 200/the fire alarm 220 and the controller 300 will be described in further detail. The representative fire alarms 200 and the fire alarms 220 are organized into a first group 240a and a second group 240b, which are generically referred to as groups 240. The first group 240a includes the first representative fire alarm 200a, the first fire alarm 220a, and the second fire alarm 220b. The second group 240b includes the second representative fire alarm 200b, the third fire alarm 220c, and the fourth fire alarm 220d. In other words, one group includes one representative fire alarm 200 and one or more fire alarm 220.

[0018] The representative fire alarm 200 communicates wirelessly with the controller 300 by using the first frequency band such as the 926 MHz band and also communicates wirelessly with the fire alarm 220 by using the second frequency band such as the 426 MHz band. Meanwhile, the fire alarm 220 communicates wirelessly with the representative fire alarm 200 by using the second frequency band such as the 426 MHz band but does not directly communicate wirelessly with the controller 300. The fire alarm 220 communicates wirelessly with the controller 300 via the representative fire alarm 200. Therefore, the representative fire alarm 200 also has the function of relaying wireless communication between the controller 300 and the fire alarm 220 in addition to the function of communicating wirelessly with the controller 300.

[0019] The representative fire alarm 200 and the fire alarm 220 differ in the availability of the relaying function and are otherwise identical in the function of detecting a fire, etc. Therefore, the representative fire alarm 200 may be referred to as the fire alarm 220 when a description is given of a feature other than wireless communication.

[0020] The representative fire alarm 200 is a sensor capable of detecting an outbreak of fire in a room, etc. of the facility 100. The detection unit 202 of the representative fire alarm 200 detects an outbreak of fire by detecting the smoke or detecting the heat. In the case of smoke-based detection for detecting the smoke, an outbreak of fire is detected as the smoke enters the representative fire alarm 200, and the light of the light emitting diode is reflected by particles of the smoke and reaches the light receiving unit. In the case of heat-based detection for detecting the heat, an outbreak of fire is detected as the heat sensitive element reaches a certain temperature. When the detection unit 202 detects an outbreak of fire, the control unit 204 outputs a sound for communicating a fire incident from a speaker (not shown) and generates alarm information for communicating a fire incident. The alarm information includes at least one of fire incident and operation test. Fire incident indicates an outbreak of fire, and operation test indicates a forced sound-

ing of an alarm by an operation test. The communication unit 206 transmits the alarm information to the controller 300 in the first frequency band. In that process, the communication unit 206 may transmit the alarm information to the fire alarm 220 in the second frequency band.

[0021] The control unit 204 detects a failure or a speaker disconnection in the representative fire alarm 200. A publicly known technology may be used for the detection, and a description thereof is omitted. The control unit 204 further includes a timekeeping function and measures the period of time since the manufacturing or since the previous maintenance. When a failure or speaker disconnection is detected, the control unit 204 generates failure information including failure/disconnection, which indicates a failure or speaker disconnection, and generates failure information including elapse of 10 years, indicating that 10 years have elapsed, when it is detected that 10 years have elapsed. The failure information may include failure/disconnection and elapse of 10 years. The communication unit 206 transmits the failure information to the controller 300 in the first frequency band.

[0022] Further, the detection unit 202 detects the level of the battery that drives the representative fire alarm 200. A publicly known technology may be used for the detection of a battery level, and a description thereof is omitted. The battery levels of, for example, 80%, 50%, etc. are shown. When the battery level detected by the detection unit 202 changes, the control unit 204 cause the communication unit 206 to transmit the battery level to the controller 300 in the first frequency band. The battery level may be transmitted only when it changes by a predetermined amount (e.g., 5%) instead of ever time the battery level changes.

[0023] The configuration of the fire alarm 220 is similar to the configuration of the representative fire alarm 200, but the communication unit 206 (not shown) of the fire alarm 220 transmits the alarm information, failure information, and battery level in the second frequency band. The destination of the alarm information and failure information is the representative fire alarm 200 but may include other fire alarms 220. The destination of the battery level is the representative fire alarm 200.

[0024] When the communication unit 206 of the representative fire alarm 200 receives the alarm information, failure information, and battery level in the second frequency band from the fire alarm 220 in the relaying process, the communication unit 206 transmits the alarm information, failure information, and battery level to the controller 300 in the first frequency band. Further, the representative fire alarm 200 or the fire alarm 220 may output a sound for communicating the outbreak of fire from a speaker (not shown) upon receiving the alarm information including fire incident.

[0025] As described above, the first communication unit 310 of the controller 300 is compatible with, for example, specified low power radio and receives the alarm information and failure information from the representative fire alarm 200. The alarm information includes identification information (hereinafter, "sensor identification information") for identifying the representative fire alarm 200 or the fire alarm 220 transmitting the information. The first communication unit 310 outputs the alarm information and failure information to the processing unit 330. The first communication unit 310 receives the battery level from the representative fire alarm 200. The battery level also includes the sensor identification information. The first communication unit 310 outputs the battery level of the processing unit 330.

[0026] The processing unit 330 stores the alarm information, failure information, and battery level received in the storage unit 314. The storage unit 314 stores the alarm information, failure information, and battery level for each sensor identification information. This is equivalent to storing the alarm information, failure information, and battery level for each sensor. Fig. 2 shows a data structure of a status table stored in the storage unit 314. The table already registers that the first representative fire alarm 200a, the first fire alarm 220a, and the second fire alarm 220b are included in the first group 240a and that the second representative fire alarm 200b, the third fire alarm 220c, and the fourth fire alarm 220d are included in the second group 240b. The values of battery level of the representative fire alarms 200 and the fire alarms 220 are indicated. When the alarm information including fire incident is received, "1" is entered in "fire incident". When alarm information including fire incident is not received, "0" is entered in "fire incident". The same is true of operation test in the alarm information, failure/disconnection and elapse of 10 years in the failure information. Date and time information indicates the date and time when an alarm is originated. Date and time information is generated by the representative fire alarm 200 or the fire alarm 220 and is included in the alarm information. Reference is made back to Fig. 1.

[0027] The processing unit 330 causes the first communication unit 310 to periodically transmit a check signal for checking connection to each of the representative fire alarms 200 and the fire alarms 220. Upon receiving the check signal, the representative fire alarm 200 and the fire alarm 220 transmit a reply signal for indicating a reply to the check signal to the controller 300. The reply signal also includes the sensor identification information. Transmission of a check signal to and reception of a reply signal from the fire alarm 220 are performed via the representative fire alarm 200.

[0028] Upon receiving a reply signal, the first communication unit 310 of the controller 300 outputs the reply signal to the processing unit 330. Through these steps, the processing unit 330 determines that it is possible to communicate with the representative fire alarm 200 or the fire alarm 220 receiving the reply signal in response to the check signal. Meanwhile, the processing unit 330 determines that it is not possible to communicate with the representative fire alarm 200 or the fire alarm 220 for which a reply signal in response to a check signal is not received for a predetermined period of time. The process-

ing unit 330 stores, for each sensor identification information, communication status information indicating whether communication is enabled or disabled. In the status table shown in Fig. 2, "1" in the "acquisition failure" field of the "communication status information" means communication is disabled, and "0" in the "acquisition failure" field of the "communication status information" means communication is enabled.

[0029] Hereinafter, the screens for displaying information related to the representative fire alarm 200 and the fire alarm 220 will be described in the order of (1) the screen displayed on the mobile terminal apparatus 500, and (2) the screen displayed on the controller 300. In this embodiment, at least one of these screens may be displayed.

(1) Screen displayed on the mobile terminal apparatus 500

[0030] The second communication unit 312 performs, for example, wireless communication or communication by wire and is connected to the server 440 via the router 400 and the network 420. For example, wireless local area network (LAN) is used for wireless communication, but the embodiment is not limited thereto. When any of the alarm information, failure information, communication status information, and battery level stored in the storage unit 314 is changed, the second communication unit 312 transmits the changed information to the server 440. The information transmitted from the second communication unit 312 includes facility identification information for identifying the facility 100 in addition to the sensor identification information. Upon receiving the information, the server 440 stores one of the alarm information, failure information, communication status information, and battery level for each facility identification information and sensor identification information. Through these steps, the status table in the server 440 is synchronized with the status table of the storage unit 314 with a delay of a predetermined period of time.

[0031] The mobile terminal apparatus 500 is, for example, a smartphone, a tablet terminal device, and a mobile terminal apparatus and is used by the user residing in the facility 100. The communication unit 510 of the mobile terminal apparatus 500 is connected to the server 440 via the network 420 by performing wireless communication. For example, a mobile phone system such as long term evolution (LTE) or wireless LAN is used for wireless communication, but the embodiment is not limited thereto. The storage unit 514 stores a program executable in the mobile terminal apparatus 500. For example, the storage unit 514 stores an application program. In this embodiment, an application program capable of executing the process in the control system 1000 (hereinafter, "control system application") is highlighted.

[0032] The user operation unit 516 is exemplified by a touch panel and can receive a user operation input from a user. When the user operation unit 516 receives a user operation input of a user, the user operation unit 516 outputs a user operation signal determined by the user operation input to the processing unit 530. The display unit 518 displays a screen generated by the display control unit 542. The display unit 518 may be integrated with the user operation unit 516. The display unit 518 displays a screen including a button, and the user operation unit 516 receives a user operation input provided by a touch of the user on the button.

[0033] The processing unit 530 is comprised of, for example, a microcomputer including a processor and a memory. The functions of the processing unit 530 are realized by the computer system as the processor executes the program stored in the storage unit 514. The processing unit 530 according to the embodiment executes the control system application. The processing unit 530 transmits a signal for requesting connection (hereinafter, "connection request signal") to the server 440 via the communication unit 510 and the network 420. The connection request signal includes identification information for identifying the mobile terminal apparatus 500 (hereinafter, "terminal identification information").

[0034] Upon receiving the connection request signal, the server 440 extracts an authentication process based on the terminal identification information included in the connection request signal. When the authentication process is successful, the server 440 approves connection with the mobile terminal apparatus 500 and transmits an approval signal to the mobile terminal apparatus 500 via the network 420. When the authentication process fails, on the other hand, the server 440 rejects connection with the mobile terminal apparatus 500 and transmits a rejection signal to the mobile terminal apparatus 500 via the network 420. When connection is approved, the server 440 transmits the status table to the mobile terminal apparatus 500 via the network 420. When the information included in the status table is updated after transmitting the status table, the server 440 transmits the updated information sequentially to the mobile terminal apparatus 500 via the network 420.

[0035] The communication unit 510 of the mobile terminal apparatus 500 receives the approval signal or the rejection signal from the server 440 via the network 420. When the approval signal is received, the communication unit 510 receives the status table from the server 440 and sequentially receives the information updated after the status table. When the communication unit 510 receives the rejection signal, the processing unit 530 terminates the process. When the communication unit 510 receives the approval signal, the processing unit 530 continues the process. When the process is continued, the processing unit 530 causes the storage unit 514 to store the status table received by the communication unit 510. Subsequently, the processing unit 530 updates the status table in the storage unit 514 with the information sequentially received by the communication unit 510.

[0036] The input unit 540 of the processing unit 530 receives the information on each of the representative

fire alarms 200 and the fire alarms 220 from the storage unit 514. The information is comprised of, for example, alarm information, failure information, communication status information, and battery level, and the alarm information includes information indicating the date and time of the alarm. Reception of the information in the input unit 540 is sequentially made at a point of time when the information stored in the storage unit 514 is updated.

[0037] Fig. 3 shows a data structure of the table stored in the storage unit 514. By way of one example, a degree of priority "1" is assigned to fire incident, a degree of priority "2" is assigned to operation test, and a degree of priority "3" is assigned to failure/disconnection. Further, a degree of priority "4" is assigned to elapse of 10 years, and a degree of priority "1" is assigned to acquisition failure. It should be noted that the degree of priority "1" is highest, and the degree of priority "5" is lowest. Reference is made back to Fig. 2.

[0038] The display control unit 542 generates a screen for displaying the information received by the input unit 540 on the display unit 518. Figs. 4A-4C will be used to explain the screens generated by the display control unit 542. Figs. 4A-4C show screens displayed on the display unit 518. Fig. 4A shows a screen showing representative information representative of each of the groups, Fig. 4B shows a screen showing detailed information on one group, and Fig. 4C shows a screen for timeline showing a history of information. Denoting the area for showing detailed information on one group as a "first area 628", the area for showing the representative information representative of each of the groups is referred to as a "second area 626", and the area for showing a timeline is referred to as a "second area 630". Therefore, Fig. 4A corresponds to a screen including the first area 628, Fig. 4B corresponds to a screen including the second area 626, and Fig. 4C corresponds to a screen including the second area 630.

[0039] As shown in Fig. 4A, the display control unit 542 generates a screen so that a first portion 620 and a second portion 622 are included in the first area 628 in the same screen. More specifically, the display control unit 542 generates a screen in which the first portion 620 and the second portion 622 are arranged vertically. The first portion 620 is a portion for showing the information related to the first group 240a, and the second portion 622 is a portion for showing the information related to the second group 240b. The display control unit 542 provides a first group display field 710 in the first portion 620 and shows the name "fire alarm 1" of the first representative fire alarm 200a, a first message notice 642, and a first dead battery notice 662 in the first group display field 710. Further, the display control unit 542 provides a second group display field 712 in the second portion 622 and shows the name "fire alarm 2" of the second representative fire alarm 200b, a first message notice 642, and a first dead battery notice 662 in the second group display field 712. The detail of the representative information on the first group 240a such as the first message notice 642 and the first dead battery notice 662 and the representative information on the second group 240b will be described later.

[0040] A touch on the display portion of the "first alarm 1" in the first portion 620 by the user causes the user operation unit 516 to receive an instruction for transition to the screen showing the detailed information on the first group 240a. In response to this, the display control unit 542 generates a screen as shown in Fig. 4B so that the first portion 620 is included in the second area 626. The display control unit 542 provides a first representative fire alarm display field 700, a first fire alarm display field 702, and a second fire alarm display field 704 in the first portion 620. The name "fire alarm 1" of the first representative fire alarm 200a is shown in the first representative fire alarm display field 700, and the name "living/fire alarm" of the first fire alarm 220a is shown in the first fire alarm display field 702. Further, the name "dining/fire alarm" of the second fire alarm 220b is shown in the second fire alarm display field 704.

[0041] When at least one of the alarm information, failure information, and communication status information related to the first representative fire alarm 200a of the first group 240a is received, the display control unit 542 causes the second message notice 640 to be displayed in the first representative fire alarm display field 700 in the first portion 620. When at least one of the alarm information, failure information, and communication status information related to the first fire alarm 220a of the first group 240a is received, the display control unit 542 causes the second message notice 640 to be displayed in the first fire alarm display field 702 in the first portion 620. When at least one of the alarm information, failure information, and communication status information related to the second fire alarm 220b of the first group 240a is received, the display control unit 542 causes the second message notice 640 to be displayed in the second fire alarm display field 704 in the first portion 620. When none of the alarm information, failure information, and communication status information is received, on the other hand, the display control unit 542 does not cause the second message notice 640 to be displayed.

[0042] The second message notice 640 is a notice to communicate the alarm information, failure information, and communication status information related to the corresponding representative fire alarm 200, the fire alarm 220 is received. The content of the second message notice 640 is shown in "message" of Fig. 3. When fire incident in the alarm information is received, for example, the second message notice 640 indicates "fire incident". Referring to Fig. 4B, the second message notice 640 in the first representative fire alarm display field 700 indicates "fire incident", showing that fire incident in the alarm information related to the first representative fire alarm 200a is received. The second message notice 640 in the first fire alarm display field 702 indicates "failure/speaker disconnection", showing that failure/disconnection in the failure information related to the first fire alarm 220a is

received. Further, the second message notice 640 in the second fire alarm display field 704 indicates "10-year-elapse notice", showing that elapse of 10 years in the failure information related to the second fire alarm 220b is received.

[0043] The display control unit 542 maintains a threshold value that should be compared with the battery level. For example, the display control unit 542 maintains a first threshold value and a second threshold value (first threshold value>second threshold value). By way of example, the first threshold value is "20%", and the second threshold value is "10%". When the battery level is lower than the first threshold value and equal to or higher than the second threshold value, the display control unit 542 determines that battery is consumed. When the battery level is lower than the second threshold value, the display control unit 542 determines that the battery is dead. The display control unit 542 causes a second battery consumption notice (not shown) to be displayed in the first portion 620 in association with the representative fire alarm 200, the fire alarm 220 for which it is determined that the battery is consumed and causes a second dead battery notice 660 to be displayed in the first portion 620 in association with the representative fire alarm 200, the fire alarm 220 for which it is determined that the battery is dead. The second battery consumption notice is a notice for indicating that the battery is consumed, and the second dead battery notice 660 is a notice for indicating that the battery is dead.

[0044] In this case, the battery level of the first representative fire alarm 200a and the second fire alarm 220b is lower than the second threshold value so that the second dead battery notice 660 is shown in the first representative fire alarm display field 700 and the second fire alarm display field 704. Meanwhile, the battery level of the first fire alarm 220a is equal to or higher than the first threshold value so that the second battery consumption notice or the second dead battery notice 660 is not shown in the first fire alarm display field 702. The second battery consumption notice and the second dead battery notice 660 are generically referred to as "second battery level notice", and it can be said that the second battery level notice is a notice for indicating that the battery level is lower than a threshold value.

[0045] A user's touch on the display portion for the "fire alarm 2" in the second portion 622 of Fig. 4A causes the user operation unit 516 to receive an instruction for transition to the screen showing the detailed information on the second group 240b. Illustration of this screen will be omitted, but the display control unit 542 generates a screen similar to that of Fig. 4B. In that screen, the second portion 622 is included in the second area 626. The display control unit 542 provides a second representative fire alarm display field, a third fire alarm display field, and a fourth fire alarm display field in the second portion 622. The name "fire alarm 2" of the second representative fire alarm 200b is shown in the second representative fire alarm display field, the name of the third fire alarm 220c is shown in the third fire alarm display field, and the name of the fourth fire alarm 220d is shown in the fourth fire alarm display field. Further, the second message notice 640, the second dead battery notice 660, etc. are shown as already described.

[0046] Thus, the first portion 620 of the second area 626, the second portion 622 of the second area 626, and the first area 628 are included in mutually different screens. Further, it is possible to make a transition from the screen including the first area 628 to the screen including the first portion 620 of the second area 626, and it is also possible to make a transition to the screen including the second portion 622 of the second area 626.

[0047] Referring back to Fig. 4A, the detail of the representative information on the first group 240a will be described. When the display control unit 542 shows at least one second message notice 640 in the first portion 620 of the second area 626 shown in Fig. 4B, the display control unit 542 causes the first message notice 642 to be displayed in the first group display field 710. When the display control unit 542 does not show the second message notice 640 in the first portion 620 of the second area 626 shown in Fig. 4B, on the other hand, the display control unit 542 does not cause the first message notice 642 to be displayed in the first group display field 710. In this case, the second message notice 640 is shown in the first representative fire alarm display field 700, the first fire alarm display field 702, and the second fire alarm display field 704 in the first portion 620 of the second area 626. Therefore, the first message notice 642 is shown in the first group display field 710.

[0048] However, the first representative fire alarm display field 700, the first fire alarm display field 702, and the second fire alarm display field 704 in the first portion 620 of the second area 626 differ in the content of the second message notice 640. This is equivalent to the reception of fire incident, failure/disconnection, and elapse of 10 years in association with the first representative fire alarm 200a and the fire alarms 220 included in the first group 240a. When the input unit 540 receives a plurality of items of information, the display control unit 542 refers to the degree of priority shown in the table of Fig. 3 and selects the information with the highest degree of priority. In this case, fire incident has a degree of priority "1", failure/disconnection has a degree of priority "3", and elapse of 10 years has a degree of priority "4" so that fire incident is selected. The display control unit 542 causes "fire incident" thus selected to be displayed as the first message notice 642 in the first group display field 710 in the first portion 620 of the first area 628 of Fig. 4A. In other words, the first message notice 642 is a notice to indicate the presence of information with a higher degree of priority when a plurality of items of information are received.

[0049] When the display control unit 542 shows at least one second battery level notice in the first portion 620 of the second area 626 shown in Fig. 4B, the display control unit 542 causes the first battery level notice for indicating

the presence of at least one battery level notice to be displayed in the first group display field 710. When only the second battery consumption notice is shown in the first portion 620 of the second area 626, the first battery consumption notice is shown in the first group display field 710. When only the second dead battery notice 660 is shown in the first portion 620 of the second area 626, the first dead battery notice 662 is shown in the first group display field 710. In other words, the second battery level notice shown in the first portion 620 of the second area 626 is identical to the first battery level notice shown in the first group display field 710.

[0050] Assuming that the second battery consumption notice and the second dead battery notice 660 are shown in the first portion 620 of the second area 626, the first dead battery notice 662 is shown in the first group display field 710. When the display control unit 542 does not show one or more second battery level notices in the first portion 620 of the second area 626, on the other hand, the display control unit 542 does not cause the first battery level notice to be displayed in the first group display field 710. In this case, the second dead battery notice 660 is shown in the first representative fire alarm display field 700 and the second fire alarm display field 704 in the first portion 620 of the second area 626, and so the first dead battery notice 662 is shown in the first group display field 710. The first message notice 642 and the second battery level notice that can be displayed in the first group display field 710 are the representative information on the first group 240a. The representative information on the second group 240b is shown in the second group display field 712, and a description thereof is omitted since it is similar to the representative information on the first group 240a.

[0051] Fig. 4C shows s a screen for timeline generated by the display control unit 542. The screen for timeline is a screen that includes the first portion 620 in the second area 630 and is a screen that shows a history of information related to one of the representative fire alarm 200 and the fire alarms 220. In this example, a history of information related to the first representative fire alarm 200a is shown by way of example. A transition to the timeline screen like this can be made from the screen that shows the detailed information on one group, i.e., from the screen of Fig. 4B showing the second area 626. Alternatively, a transition to the timeline screen may be made from the screen showing the representative information on each group, i.e., from the screen of Fig. 4A showing the first area 628.

[0052] The first portion 620 of the second area 630 of Fig. 4C shows all second message notices 644 related to the first representative fire alarm 200a. In this example, two second message notices 644 are shown by way of example. The two second message notices 644 indicate "fire incident" and "10-year-elapse notice". This is as shown in Fig. 2. When two or more items of information are received in association with the first representative fire alarm 200a, the display control unit 542 refers to the degree of priority shown in the table of Fig. 3 and selects the information with the highest degree of priority. Further, the display control unit 542 displays a message corresponding to the selected information in the second message notice 640 in the first representative fire alarm display field 700 of Fig. 4B. Still further, when the display control unit 542 determines that the battery of the first representative fire alarm 200a is consumed or dead, the display control unit 542 shows a history of the first representative fire alarm 200a thus determined in the timeline screen.

[0053] The display control unit 542 equally generates a screen for timeline similar to that of Fig. 4C in association with the first fire alarm 220a and the second fire alarm 220b included in the first group 240a. Further, the display control unit 542 equally generates a screen for timeline in association with the second representative fire alarm 200b, the third fire alarm 220c and the fourth fire alarm 220d included in the second group 240b. The screen for timeline is a screen that includes the second portion 622 in the second area 630 and is a screen that shows a history of information related to one of the representative fire alarm 200 and the fire alarms 220. Reference is made back to Fig. 1.

[0054] As described above, the representative fire alarm 200 communicates directly with the controller 300, but the fire alarm 220 communicates with the controller 300 via the representative fire alarm 200. Therefore, when communication of the representative fire alarm 200 is disabled, communication of the fire alarm 220 connected to the representative fire alarm 200 is also disabled. When communication of the fire alarm 220 is disabled, on the other hand, the other fire alarms 220 and the representative fire alarm 200 are not affected. In other words, the impact from disabled communication of the representative fire alarm 200 is larger than the impact from disabled communication of the fire alarm 220. When communication of the representative fire alarm 200 is disabled, therefore, the display control unit 542 may display that communication with the representative fire alarm 200 is disabled on the display unit 518 in addition to or apart from the display of "acquisition failure" in the first message notice 642 and the second message notice 640.

[0055] Fig. 5 shows another screen displayed on the display unit 518. In this case, the display control unit 542 displays a message "the fire alarm 1 went offline" when communication with the first representative fire alarm 200a is disabled, i.e., when acquisition failure in association with the first representative fire alarm 200a is received. The user can recognize that communication with the first representative fire alarm 200a and the fire alarm 220 included in the first group 240a is disabled by seeing this message. Further, a similar message is displayed when communication with the second representative fire alarm 200b is disabled. Reference is made back to Fig. 1.

(2) Screen displayed on the controller 300

[0056] A description has been given of a case where screens for showing information from various sensors are displayed on the display unit 518 of the mobile terminal apparatus 500. These screens may be displayed on the display unit 318 of the controller 300. The screen displayed on the display unit 518 has been assumed to be a screen more elongated in the vertical direction than in the horizontal direction. In this case, however, a screen more elongated in the horizontal direction than in the vertical direction is assumed as the screen displayed on the display unit 318.

[0057] The input unit 340 executes a process similar to that of the input unit 540. The storage unit 314 stores the same table as that of Fig. 3. The display control unit 342 generates a screen for displaying the information received by the input unit 340 on the display unit 318. Figs. 6A-6C will be used to explain the screens generated by the display control unit 342. Figs. 6A-6C show screens displayed on the display unit 318. Fig. 6A shows a screen showing representative information representative of each of the groups, Fig. 6B shows a screen showing detailed information on one group, and Fig. 6C shows a screen for timeline showing a history of information. In other words, Figs. 6A-6C correspond to Figs. 4A-4C, respectively. Fig. 6A corresponds to a screen including the first area 628, Fig. 6B corresponds to a screen including the second area 626, and Fig. 6C corresponds to a screen including the second area 630.

[0058] As shown in Fig. 6A, the display control unit 342 generates a screen so that the first portion 620 and the second portion 622 are included in the first area 628 in the same screen. More specifically, the display control unit 342 generates a screen in which the first portion 620 and the second portion 622 are arranged horizontally. Provision of the first group display field 710 in the first portion 620 and the provision of the second group display field 712 in the second portion 622, and the content displayed in the first group display field 710 and the second group display field 712 are as shown in Fig. 4A so that a description thereof is omitted.

[0059] As shown in Fig. 6B, the display control unit 342 generates a screen in which the first portion 620 is included in the second area 626. Provision of the first representative fire alarm display field 700, the first fire alarm display field 702, and the second fire alarm display field 704 in the first portion 620 and the content displayed in the first representative fire alarm display field 700, the first fire alarm display field 702, and the second fire alarm display field 704 are as shown in Fig. 4B so that a description thereof is omitted. As shown in Fig. 6C, the display control unit 342 generates a screen for history in which the first portion 620 is included in the second area 630. A transition to the screen for history can be made from a screen showing the representative information on each group or a screen showing the detailed information on one group. The content displayed in the screen for history is similar to that of Fig. 4C so that a description thereof is omitted.

[0060] The device, the system, or the entity that executes the method according to the disclosure is provided with a computer. By causing the computer to run a program, the function of the device, the system, or the entity that executes the method according to the disclosure is realized. The computer is comprised of a processor that operates in accordance with the program as a main hardware feature. The disclosure is non-limiting as to the type of the processor so long as the function is realized by running the program. The processor is comprised of one or a plurality of electronic circuits including a semiconductor integrated circuit (IC) or a large-scale integration (LSI). The plurality of electronic circuits may be integrated in one chip or provided in a plurality of chips. The plurality of chips may be aggregated in one device or provided in a plurality of devices. The program is recorded in a non-transitory recording medium such as a computer-readable ROM, optical disk, and hard disk drive. The program may be stored in a recording medium in advance or supplied to a recording medium via wide area communication network including the Internet.

[0061] A description will be given of the operation of the control system 1000 having the configuration described above. Fig. 7 is a sequence chart showing a display procedure executed by the control system 1000. The controller 300 receives the information (S10). The controller 300 transmits the status table to the server 440 (S12). The server 440 stores the status table (S14). The mobile terminal apparatus 500 transmits a connection request signal to the server 440 (S16). The server 440 transmits the status table to the mobile terminal apparatus 500 (S18). The mobile terminal apparatus 500 receives the status table (S20). The mobile terminal apparatus 500 selects the information in accordance with the degree of priority (S22) and displays the selected information (S24).

[0062] Fig. 8 is a sequence chart showing another display procedure executed by the control system 1000. The controller 300 receives the information (S50). The controller 300 selects the information in accordance with the degree of priority (S52) and displays the selected information (S54). The controller 300 transmits the status table to the server 440 (S56). The server 440 stores the status table (S58).

[0063] Fig. 9 is a flowchart showing a display procedure executed by the control system 1000. The input unit 540 receives the information (S100). When the input unit 540 receives a plurality of items of information (Y in S102), the display control unit 542 selects the information in accordance with the degree of priority (S104) and displays the information on the display unit 518 (S106). When the input unit 540 does not receive a plurality of items of information (N in S102), the display control unit 542 displays the information on the display unit 518 (S106).

[0064] According to the embodiment, the first message

notice 642 for indicating the presence of information with a higher degree of priority is displayed when a plurality of items of information are received. This makes it possible to recognize the information easily when a plurality of items of information are available. Further, display of the first message notice 642 makes it possible to recognize easily that the information is received. Further, inclusion of alarm date and time information in the alarm information makes it easy to identify what caused the alarm. Further, the alarm information has a higher degree of priority than the failure information. It is therefore possible to let the user know the alarm information preferentially in the form of the first message notice 642, when the alarm information and the failure information are received. Further, the alarm information has a higher degree of priority than the communication status information. It is therefore possible to let the user know the alarm information preferentially in the form of the first message notice 642, when the alarm information and the communication status information are received.

[0065] Further, display of the second message notice 640 for indicating that a plurality of items of information are received makes it possible to easily recognize information on each of a plurality of sensors. Further, display of the second message notice 640 in the second area 626, the second area 630 in association with each of a plurality of items of information makes it possible to recognize easily that the information is received. Further, display of the second battery level notice in the second area 626, the second area 630 and display of the first battery level notice in the first area 628 in association with each of one or more battery levels makes it possible to recognize easily that the battery level is lower than a threshold value.

[0066] Further, organizing the fire alarms 220 and the representative fire alarms 200 into a plurality of groups 240 and display of the first message notice 642 associated with each group 240 make it possible to easily recognize the status of reception of information in each group 240. Further, inclusion of the first portion 620 of the first area 628 and the second portion 622 of the first area 628 in the same screen improves the viewability of a list of the representative information on the first group 240a and the representative information on the second group 240b.

[0067] Further, including of the first portion 620 of the second area 626, the second area 630 and the second portion 622 of the second area 626, the second area 630 in mutually different screens distinguishes the information from each other and makes it easily understandable. Further, capability to make a transition from the screen including the first area 628 to the screen including the first portion 620 of the second area 626, the second area 630 makes it possible to recognize the relevance between the information easily. Further, capability to make a transition from the screen including the first area 628 to the screen including the first portion 620 of the second area 626, the second area 630 makes it possible to recognize easily how the first representative fire alarm 200a and the other fire alarms 220 are connected.

[0068] Further, capability to make a transition from the screen including the first area 628 to the screen including the second portion 622 of the second area 626, the second area 630 makes it possible to recognize the relevance between the information easily. Further, capability to make a transition from the screen including the first area 628 to the screen including the second portion 622 of the second area 626, the second area 630 makes it possible to recognize easily how the second representative fire alarm 200b and the other fire alarms 220 are connected.

[0069] One embodiment of the present disclosure is summarized below. A display apparatus (300, 500) according to an embodiment of the present disclosure includes: an input unit (340, 540) adapted to a facility in which a plurality of sensors are provided, the input unit being capable of receiving information related to each of the plurality of sensors; a display control unit (342, 542) that causes, when the input unit (340, 540) receives a plurality of items of information, a display unit (318, 518) to display a notice for communicating that information with a higher degree of priority is available.

[0070] The information received by the input unit (340, 540) is comprised of at least one of alarm information and failure information in each of the plurality of sensors, and the alarm information has a higher degree of priority than the failure information.

[0071] The information received by the input unit (340, 540) is adapted to include communication status information, and the alarm information has a higher degree of priority than the communication status information.

[0072] The display control unit (342, 542) causes the notice to be displayed as a first notice in a first area of the display unit (318, 518), and the display control unit (342, 542) causes a second notice for communicating that the input unit receives a plurality of items of information in a second area of the display unit (318, 518) different from the first area.

[0073] Some of the plurality of sensors are included in a first group, and some other of the plurality of sensors are included in a second group, the display control unit (342, 542) causes the first notice associated with the first group to be displayed in a first portion of the first area and causes the second notice associated with the first group to be displayed in a first portion of the second area, and the display control unit (342, 542) causes the first notice associated with the second group to be displayed in a second portion of the first area and causes the second notice associated with the second group to be displayed in a second portion of the second area.

[0074] The first portion of the first area and the second portion of the first area are included in the same screen, the first portion of the second area, the second portion of the second area, and the first area are included in mutually different screens, a transition from a screen including the first area to a screen including the first portion

of the second area is enabled, and a transition from a screen including the first area to a screen including the second portion of the second area is enabled.

[0075] One of the sensors included in the first group is a first representative sensor, and the other sensors included in the first group communicate with the display apparatus (300, 500) via the first representative sensor, and one of the sensors included in the second group is a second representative sensor, and the other sensors included in the second group communicate with the display apparatus (300, 500) via the second representative sensor.

[0076] The display apparatus (300, 500) is mounted on a terminal device (500).

[0077] Described above is an explanation based on an exemplary embodiment. The embodiment is intended to be illustrative only and it will be understood by those skilled in the art that various modifications to constituting elements and processes could be developed and that such modifications are also within the scope of the present disclosure.

[0078] In the embodiment, the sensor is assumed to be the representative fire alarm 200 and the fire alarm 220. Alternatively, the sensor may be a gas alarm etc., or different types of alarms may coexist. According to this variation, the flexibility in configuration can be improved.

[INDUSTRIAL APPLICABILITY]

[0079] According to the present disclosure, it is possible to recognize information easily when there are plurality of items of information.

[REFERENCE SIGNS LIST]

[0080] 100 facility, 200 representative fire alarm, 202 detection unit, 204 control unit, 206 communication unit, 220 fire alarm, 240 group, 300 controller, 310 first communication unit, 312 second communication unit, 314 storage unit, 316 user operation unit, 318 display unit, 330 processing unit, 340 input unit, 342 display control unit, 400 router, 420 network, 440 server, 500 mobile terminal apparatus, 510 communication unit, 514 storage unit, 516 user operation unit, 518 display unit, 530 processing unit, 540 input unit, 542 display control unit, 1000 control system

Claims

1. A display apparatus comprising:

   an input unit adapted to a facility in which a plurality of sensors are provided, the input unit being capable of receiving information related to each of the plurality of sensors;
   a display control unit that causes, when the input unit receives a plurality of items of information, a display unit to display a notice for communicating that information with a higher degree of priority is available.

2. The display apparatus according to claim 1, wherein

   the information received by the input unit is comprised of at least one of alarm information and failure information in each of the plurality of sensors, and
   the alarm information has a higher degree of priority than the failure information.

3. The display apparatus according to claim 2, wherein

   the information received by the input unit is adapted to include communication status information, and
   the alarm information has a higher degree of priority than the communication status information.

4. The display apparatus according to any one of the claims 1 to 3, wherein

   the display control unit causes the notice to be displayed as a first notice in a first area of the display unit, and
   the display control unit causes a second notice for communicating that the input unit receives a plurality of items of information in a second area of the display unit different from the first area.

5. The display apparatus according to claim 4, wherein

   some of the plurality of sensors are included in a first group, and some other of the plurality of sensors are included in a second group,
   the display control unit causes the first notice associated with the first group to be displayed in a first portion of the first area and causes the second notice associated with the first group to be displayed in a first portion of the second area, and
   the display control unit causes the first notice associated with the second group to be displayed in a second portion of the first area and causes the second notice associated with the second group to be displayed in a second portion of the second area.

6. The display apparatus according to claim 5, wherein

   the first portion of the first area and the second portion of the first area are included in the same screen,
   the first portion of the second area, the second portion of the second area, and the first area are included in mutually different screens,

a transition from a screen including the first area to a screen including the first portion of the second area is enabled, and
a transition from a screen including the first area to a screen including the second portion of the second area is enabled.

7. The display apparatus according to claim 5 or 6, wherein

one of the sensors included in the first group is a first representative sensor, and the other sensors included in the first group communicate with the display apparatus via the first representative sensor, and
one of the sensors included in the second group is a second representative sensor, and the other sensors included in the second group communicate with the display apparatus via the second representative sensor.

8. The display apparatus according to any one of the claims 1 to 6, wherein
the display apparatus is mounted on a terminal device.

9. A program adapted for execution in the display apparatus according to any one of claims 1 to 8.

FIG. 1

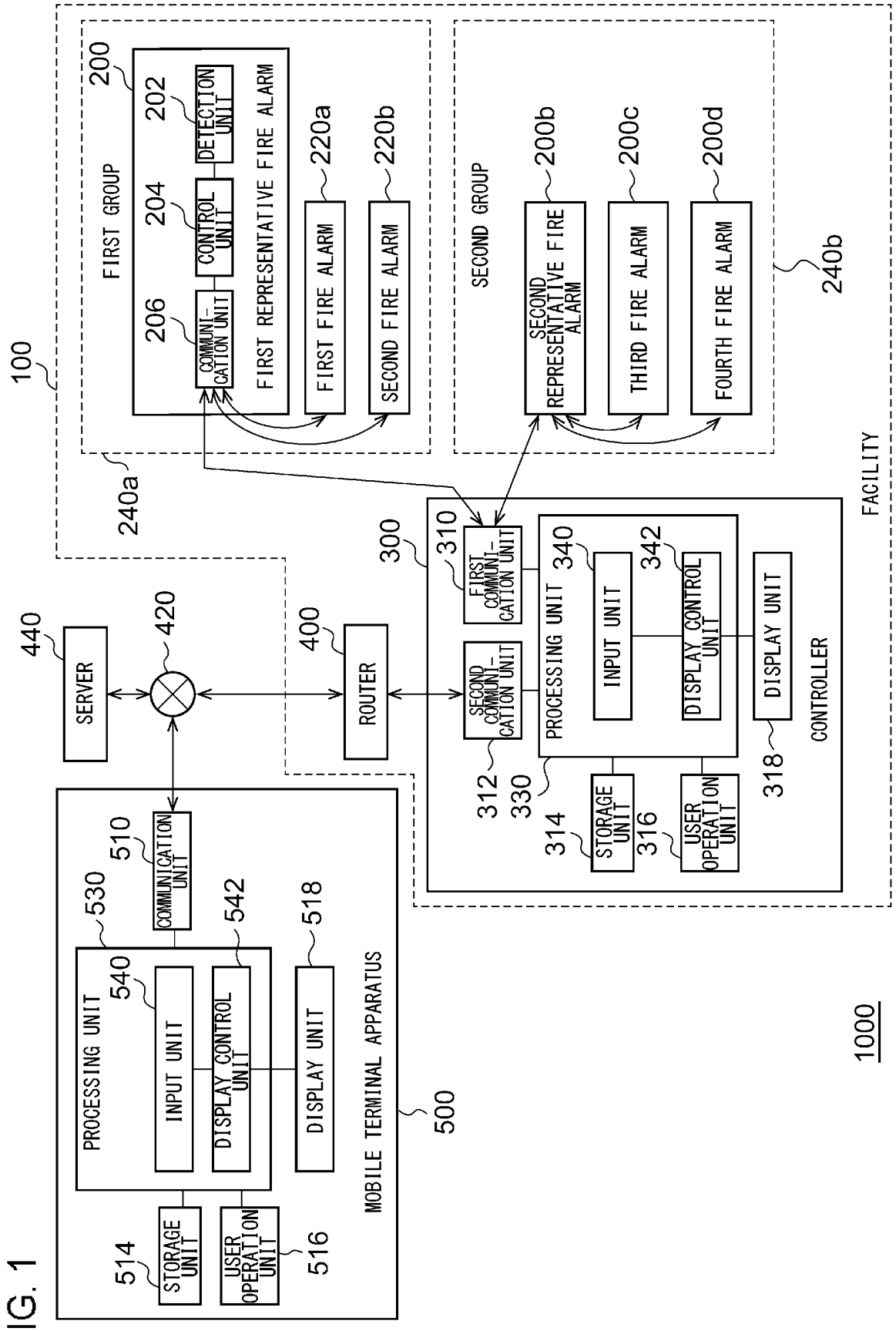
1000
FACILITY
100
240a
240b
FIRST GROUP
SECOND GROUP
200
202
DETECTION UNIT
204
CONTROL UNIT
206
COMMUNICATION UNIT
FIRST REPRESENTATIVE FIRE ALARM
220a
FIRST FIRE ALARM
220b
SECOND FIRE ALARM
200b
SECOND REPRESENTATIVE FIRE ALARM
200c
THIRD FIRE ALARM
200d
FOURTH FIRE ALARM
300
310
FIRST COMMUNICATION UNIT
SECOND COMMUNICATION UNIT
312
PROCESSING UNIT
330
340
INPUT UNIT
342
DISPLAY CONTROL UNIT
DISPLAY UNIT
318
CONTROLLER
314
STORAGE UNIT
316
USER OPERATION UNIT
400
ROUTER
420
440
SERVER
500
MOBILE TERMINAL APPARATUS
510
COMMUNICATION UNIT
530
PROCESSING UNIT
540
INPUT UNIT
542
DISPLAY CONTROL UNIT
518
DISPLAY UNIT
514
STORAGE UNIT
516
USER OPERATION UNIT

FIG. 2

GROUP	FIRE ALARM	BATTERY LEVEL	ALARM INFORMATION		FAILURE INFORMATION		COMMUNICATION STATUS INFORMATION	DATE AND TIME INFORMATION
			FIRE INCIDENT	OPERATION TEST	FAILURE/ DISCONNECTION	ELAPSE OF 10 YEARS	ACQUISITION FAILURE	
FIRST GROUP	FIRST REPRESENTATIVE FIRE ALARM	5%	1	0	0	1	0	A
	FIRST FIRE ALARM	90%	0	0	1	1	0	—
	SECOND FIRE ALARM	5%	0	0	0	1	0	—
SECOND GROUP	SECOND REPRESENTATIVE FIRE ALARM	85%	0	0	1	0	0	—
	THIRD FIRE ALARM	5%	0	0	0	1	1	—
	FOURTH FIRE ALARM	15%	0	0	0	1	1	—

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FIG. 3

DEGREE OF PRIORITY	TYPE	MESSAGE
1	FIRE INCIDENT	FIRE INCIDENT
2	OPERATION TEST	FORCE ALARM SOUNDING
3	FAILURE/ DISCONNECTION	FAILURE/ SPEAKER DISCONNECTION
4	ELAPSE OF 10 YEARS	10-YEAR-ELAPSE NOTICE
5	ACQUISITION FAILURE	ACQUISITION FAILURE

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FIG. 4A

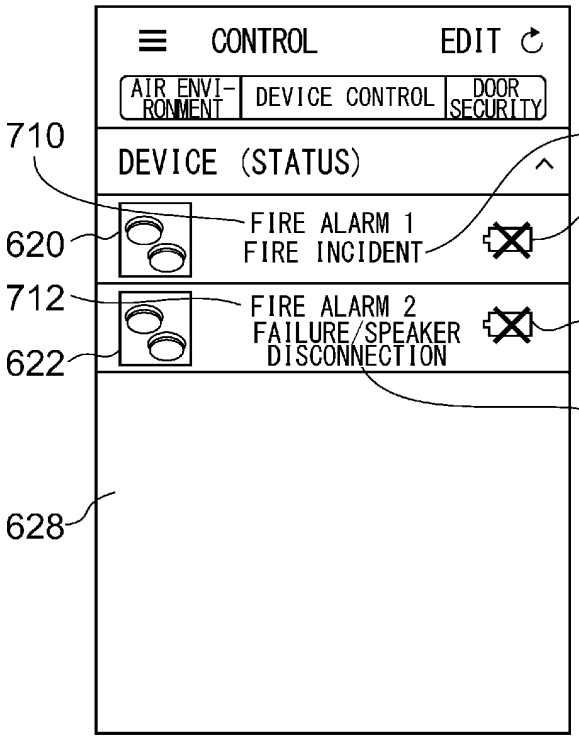

FIG. 4B

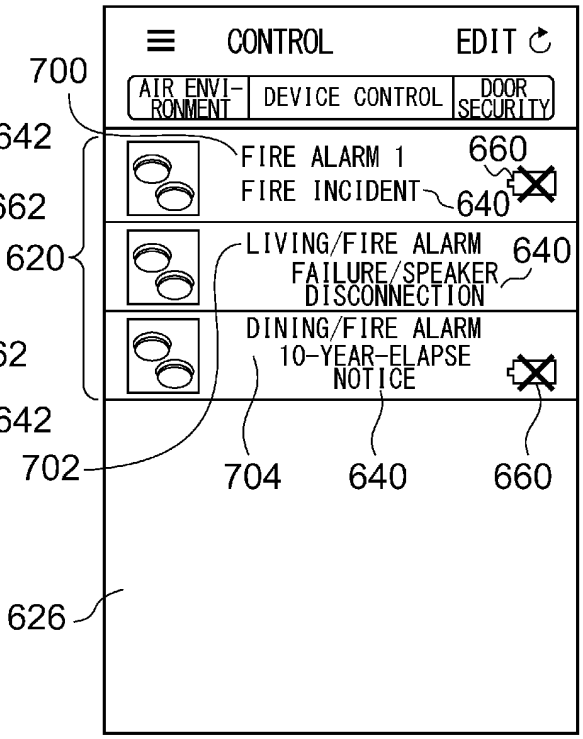

FIG. 4C

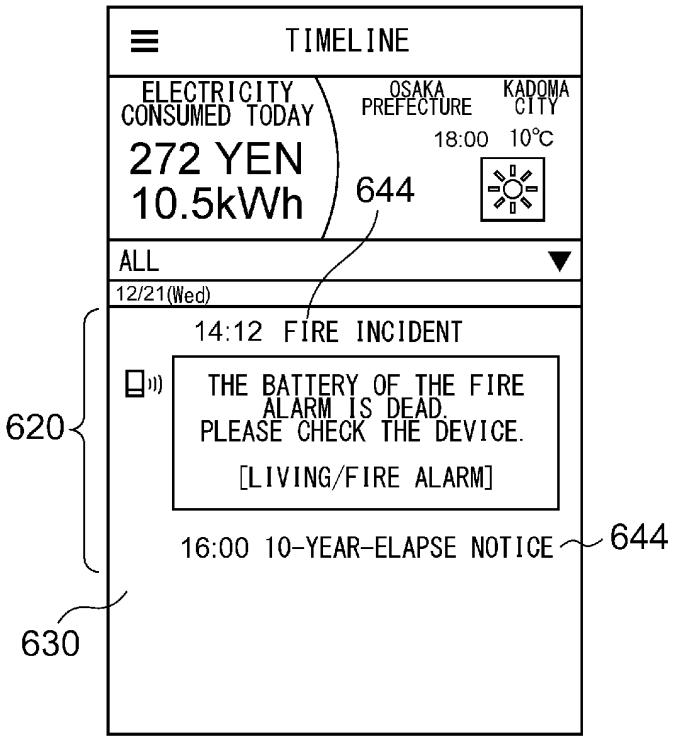

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FIG. 5

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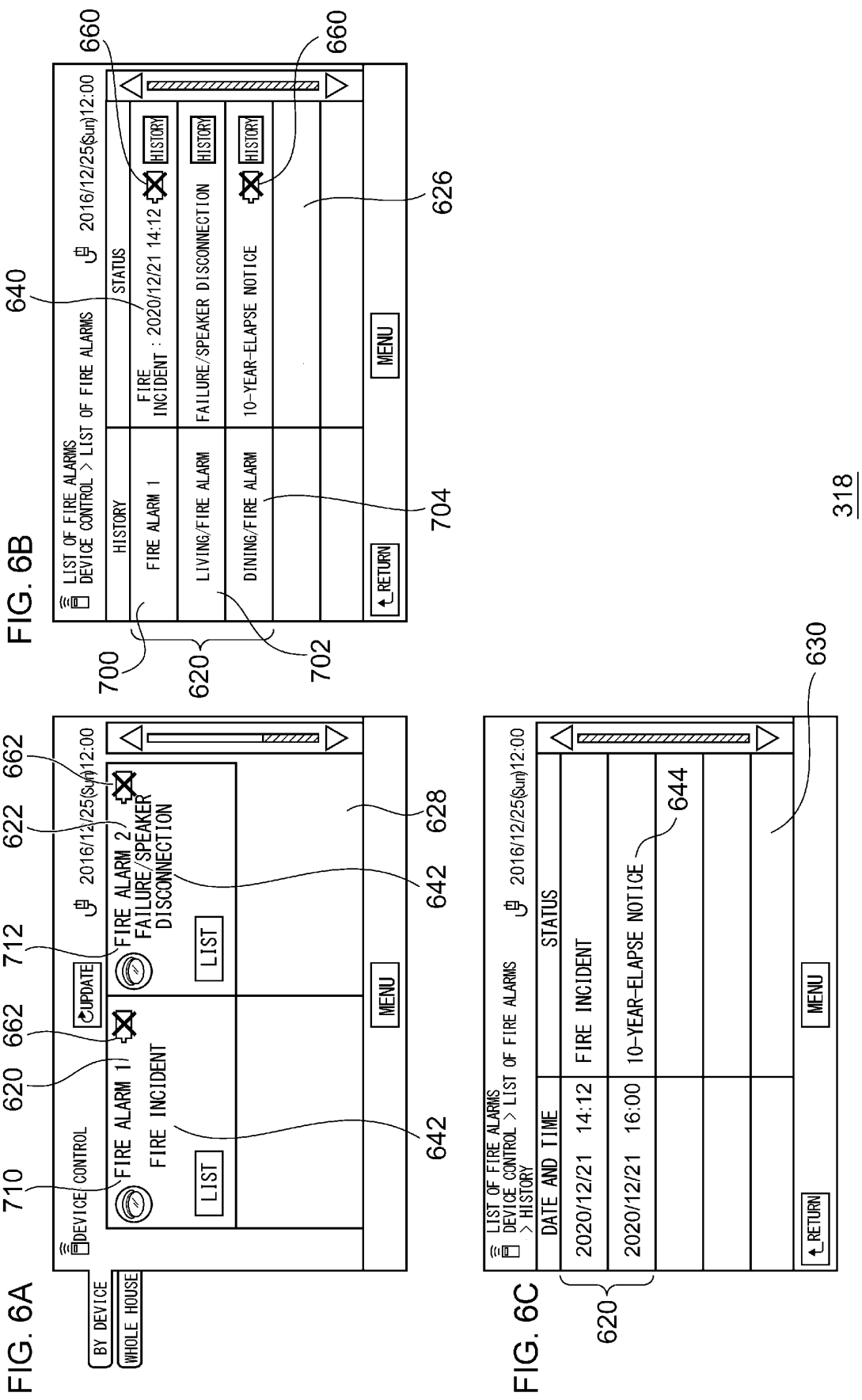


FIG. 6A
DEVICE CONTROL
BY DEVICE
WHOLE HOUSE
2016/12/25(Sun)12:00
UPDATE
FIRE ALARM 1
FIRE INCIDENT
LIST
FIRE ALARM 2
FAILURE/SPEAKER DISCONNECTION
LIST
MENU
710
620
662
712
622
662
642
628
FIG. 6B
LIST OF FIRE ALARMS
DEVICE CONTROL > LIST OF FIRE ALARMS
2016/12/25(Sun)12:00
HISTORY
STATUS
FIRE ALARM 1
FIRE INCIDENT : 2020/12/21 14:12
HISTORY
LIVING/FIRE ALARM
FAILURE/SPEAKER DISCONNECTION
HISTORY
DINING/FIRE ALARM
10-YEAR-ELAPSE NOTICE
HISTORY
RETURN
MENU
640
660
660
626
704
700
620
702
FIG. 6C
LIST OF FIRE ALARMS
DEVICE CONTROL > LIST OF FIRE ALARMS > HISTORY
2016/12/25(Sun)12:00
DATE AND TIME
STATUS
2020/12/21 14:12
FIRE INCIDENT
2020/12/21 16:00
10-YEAR-ELAPSE NOTICE
644
RETURN
MENU
630
620
318

FIG. 7

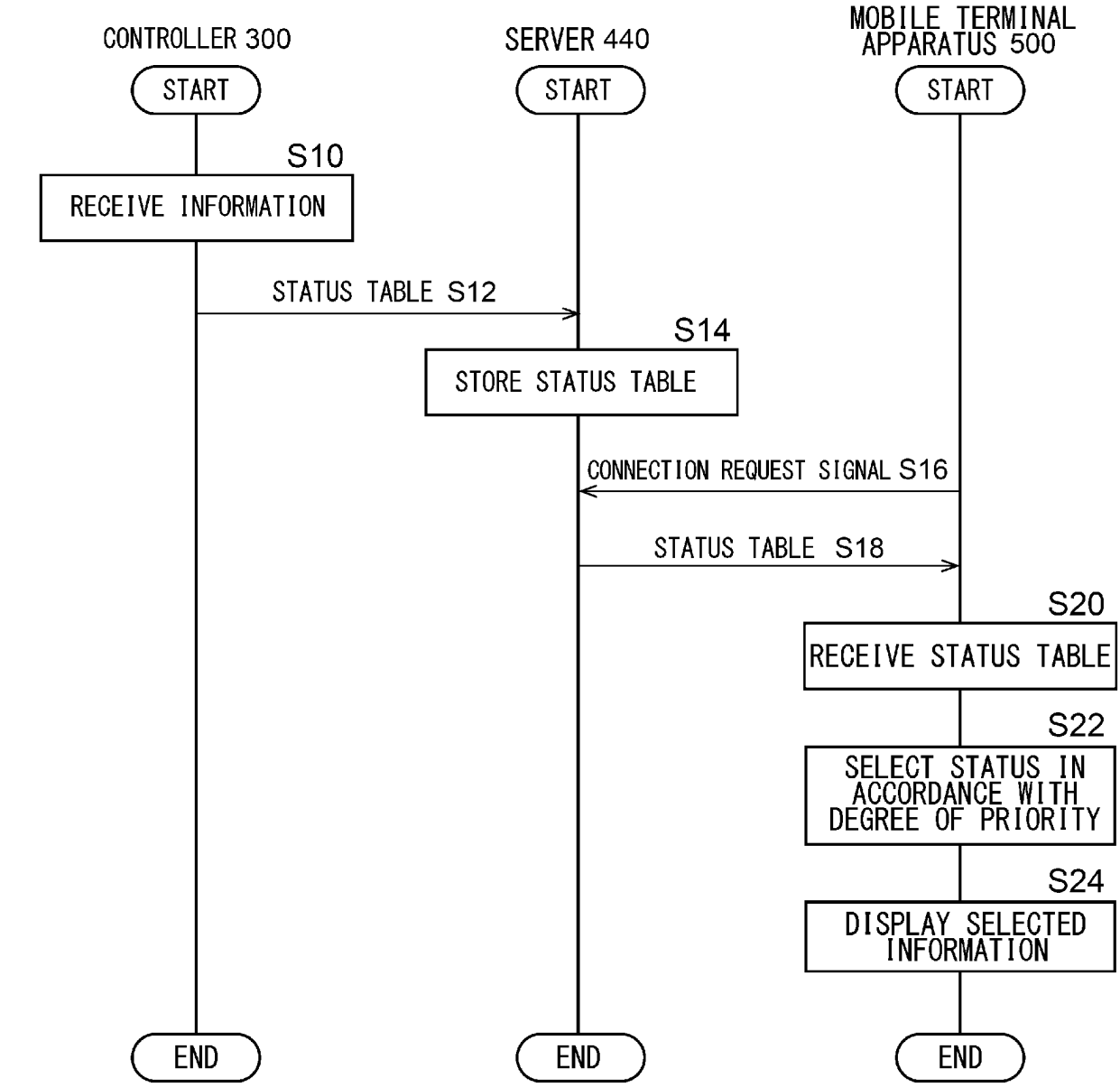

CONTROLLER 300
SERVER 440
MOBILE TERMINAL APPARATUS 500
START
START
START
S10
RECEIVE INFORMATION
STATUS TABLE S12
S14
STORE STATUS TABLE
CONNECTION REQUEST SIGNAL S16
STATUS TABLE S18
S20
RECEIVE STATUS TABLE
S22
SELECT STATUS IN ACCORDANCE WITH DEGREE OF PRIORITY
S24
DISPLAY SELECTED INFORMATION
END
END
END

FIG. 8

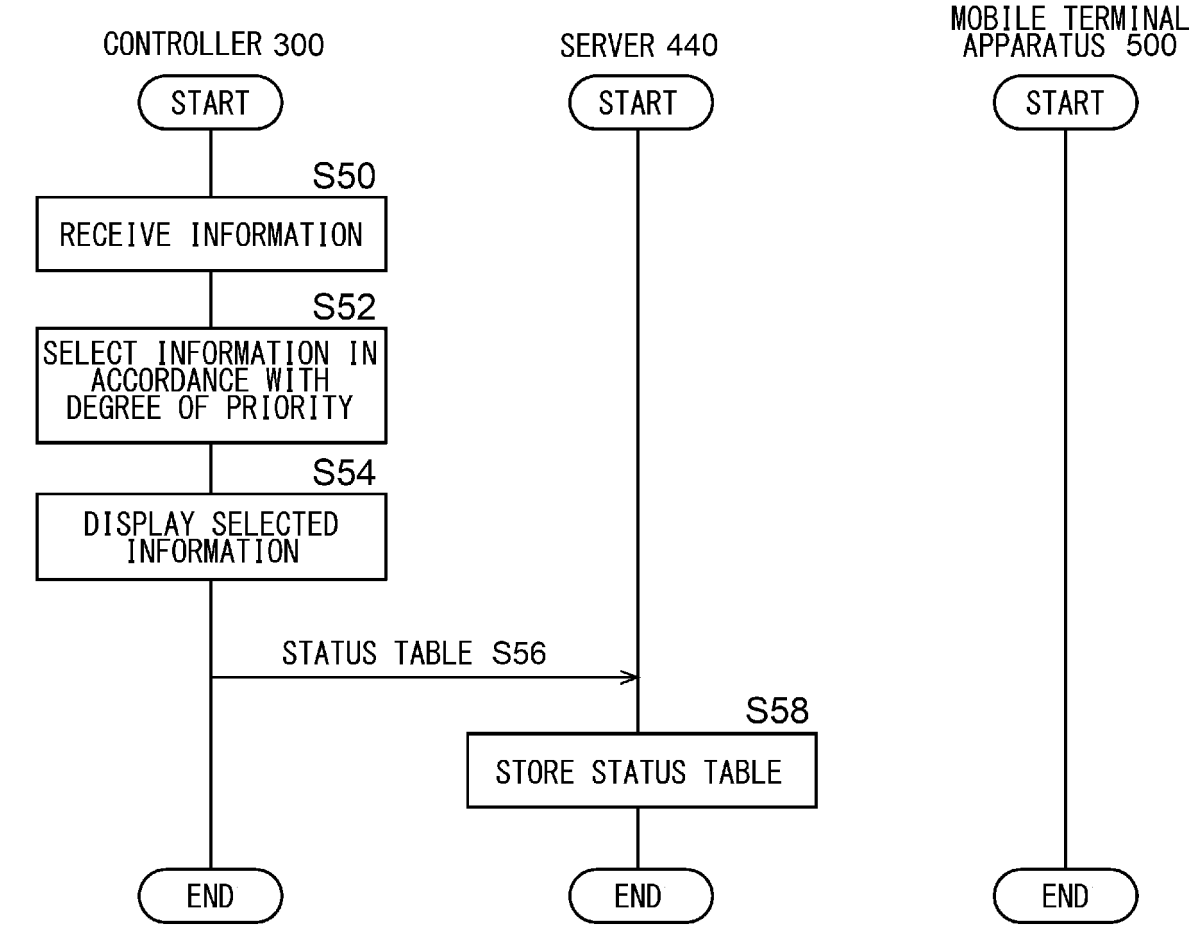
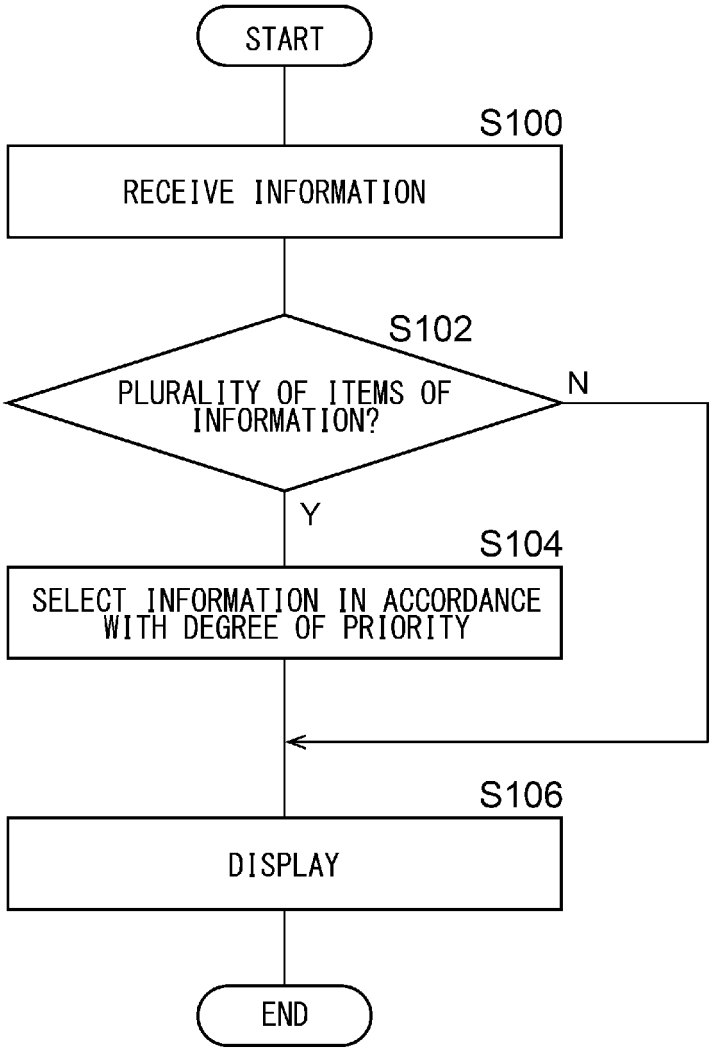

CONTROLLER 300
SERVER 440
MOBILE TERMINAL APPARATUS 500
START
START
START
S50
RECEIVE INFORMATION
S52
SELECT INFORMATION IN ACCORDANCE WITH DEGREE OF PRIORITY
S54
DISPLAY SELECTED INFORMATION
STATUS TABLE S56
S58
STORE STATUS TABLE
END
END
END

FIG. 9


START
S100
RECEIVE INFORMATION
S102
PLURALITY OF ITEMS OF INFORMATION?
N
Y
S104
SELECT INFORMATION IN ACCORDANCE WITH DEGREE OF PRIORITY
S106
DISPLAY
END

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2021/013786

A. CLASSIFICATION OF SUBJECT MATTER
G08B 17/00(2006.01)i; G08B 25/00(2006.01)i
FI: G08B 17/00 L; G08B 25/00 510E

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G08B 17/00; G08B 25/00

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

Published examined utility model applications of Japan	1922-1996
Published unexamined utility model applications of Japan	1971-2021
Registered utility model specifications of Japan	1996-2021
Published registered utility model applications of Japan	1994-2021

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2000-067338 A (NITTAN CO., LTD.) 03 March 2000 (2000-03-03) paragraphs [0016]-[0018], [0026], fig. 6-7	1, 8-9
Y	paragraphs [0019], [0024], [0026], [0039], fig. 3, 6-7	2-4
A	paragraphs [0016]-[0019], [0024], [0026], [0039], fig. 3, 6-7	5-7
Y	JP 64-029996 A (NITTAN CO., LTD.) 31 January 1989 (1989-01-31) page 5, line 16 to page 7, line 7, page 8, lines 13-18, page 10, lines 16-20	2-4
A	page 5, line 16 to page 7, line 7, page 8, lines 13-18, page 10, lines 16-20	1, 5-9

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 April 2021 (28.04.2021)	18 May 2021 (18.05.2021)

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

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2021/013786

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 95126/1983 (Laid-open No. 5588/1985) (HOCHIKI CORP.) 16 January 1985 (1985-01-16) page 5, lines 3-11, page 6, lines 4-11	3-4
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
JP 2000-067338 A	03 Mar. 2000	(Family: none)	
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REFERENCES CITED IN THE DESCRIPTION

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