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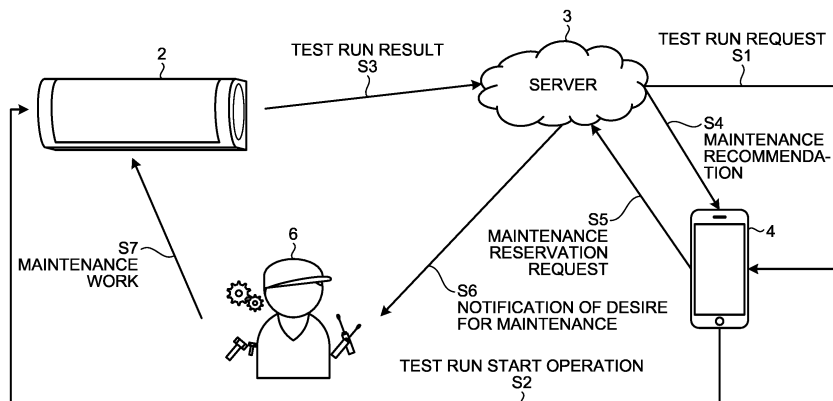
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(54) **AIR CONDITIONING SYSTEM**

(57) An air conditioning system includes a plurality of air conditioners; a server that is connected to each of the air conditioners via a communication network and that stores device information on each of the air conditioners; and a terminal that is connected to each of the air conditioners via the server. The server includes a classification unit that classifies the plurality of air conditioners into a plurality of groups based on the device information,

and a notification unit that notifies the terminals of information related to a test run of each of the air conditioners that are classified into the groups. As a result, it is possible to reduce a work load of a maintenance worker in a distributed manner in an intermediate period by performing the test run of each of the air conditioners in a distributed manner.

FIG.10



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Description

Field

[0001] The present invention relates an air conditioning system.

Background

[0002] For example, there is a proposed air conditioning system that predicts or senses abnormality of an air conditioner by performing a test run on the air conditioner in the time of year (hereinafter, referred to as an intermediate period), such as in spring or autumn, in which an operation of the air conditioner is not frequently performed. In this air conditioning system, it is possible to perform a maintenance work in advance by predicting or sensing abnormality of the air conditioner in the intermediate period, so that it is possible to avoid a situation in which an air conditioning operation is not able to be performed due to the maintenance work in an operating season in which the air conditioning operation is frequently performed.

Citation List

Patent Literature

[0003] Patent Literature 1: Japanese Laid-open Patent Publication No. 2011-89751

Summary

Technical Problem

[0004] However, in the conventional air conditioning system, if a test run is performed all at once on all of the air conditioners that are installed in an area handled by a maintenance worker in a certain period included in the intermediate period, such as in the same period in, for example, May, it is conceivable that the maintenance works may be concentrated in a certain period in the case where abnormality of some air conditioners has been sensed. As a result, a work load applied on the maintenance worker side is increased.

[0005] Accordingly, the present invention has been conceived in light of the circumstances described above and an object thereof is to provide an air conditioning system that is able to distribute and reduce the work load applied to the maintenance worker exerted in the intermediate period by performing the test run of each of the air conditioners in a distributed manner.

Solution to Problem

[0006] According to an aspect of an embodiment, an air conditioning system includes a plurality of air conditioners, a server and a terminal. The server is connected

to each of the air conditioners via a communication network and stores device information on each of the air conditioners. The terminal is connected to each of the air conditioners via the server. The server includes a classification unit and a notification unit. The classification unit classifies the plurality of air conditioners into a plurality of groups based on the device information. The notification unit notifies the terminals of information related to a test run of each of the air conditioners that are classified into the groups. Advantageous Effects of Invention

[0007] As an aspect of an embodiment, it is possible to reduce the work load applied to the maintenance worker exerted in, for example, an intermediate period by performing a test run in a distributed manner.

Brief Description of Drawings

[0008]

FIG. 1 is a diagram illustrating one example of an air conditioning system according to a present embodiment.

FIG. 2 is a block diagram illustrating one example of a configuration of an air conditioner.

FIG. 3 is a block diagram illustrating one example of a configuration of a server.

FIG. 4 is a diagram illustrating one example of a table configuration of a device management table.

FIG. 5 is a diagram illustrating one example of a table configuration of a test run management table.

FIG. 6 is a diagram illustrating one example of a table configuration of a maintenance management table.

FIG. 7 is a block diagram illustrating one example of a configuration of a smartphone terminal.

FIG. 8 is a diagram illustrating one example of a test run request screen of the smartphone terminal.

FIG. 9 is a diagram illustrating one example of a switching screen from a maintenance recommendation screen to a maintenance reservation screen of the smartphone terminal.

FIG. 10 is a diagram illustrating one example of a processing operation between a test run request and maintenance work completion performed in the air conditioning system.

FIG. 11 is a flowchart illustrating one example of a processing operation performed in a control unit included in the smartphone terminal related to a test run request reception process.

FIG. 12 is a flowchart illustrating one example of the processing operation performed in the control unit included in the smartphone terminal related to a maintenance reservation process.

FIG. 13 is a flowchart illustrating one example of the processing operation performed in the control unit included in a server related to a test run request process.

FIG. 14 is a flowchart illustrating one example of the processing operation performed in the control unit

included in the server related to a test run result notification process.

FIG. 15 is a flowchart illustrating one example of the processing operation performed in the control unit included in the server related to a reservation registration process.

FIG. 16 is a flowchart illustrating one example of the processing operation performed in the control unit included in the server related to a first test run request process.

FIG. 17 is a flowchart illustrating one example of the processing operation performed in the control unit included in the server related to a second test run request process.

FIG. 18 is a flowchart illustrating one example of the processing operation performed in the control unit included in the server related to a third test run request process.

Description of Embodiments

[0009] Preferred embodiments of an air conditioning system disclosed in the present invention will be explained in detail with reference to accompanying drawings. Furthermore, the disclosed technology is not limited to the embodiments. Furthermore, the embodiments described below may also be appropriately modified as long as the embodiments do not conflict with each other.

Embodiment

[0010] FIG. 1 is a diagram illustrating one example of an air conditioning system 1 according to the present embodiment. The air conditioning system 1 illustrated in FIG. 1 includes air conditioners 2, a server 3, smartphone terminals 4, and a communication network 5. The air conditioners 2 are air conditioners that is arranged at each place. The server 3 is a server that manages device information on the plurality of air conditioners 2 that are included in the air conditioning system. The smartphone terminals 4 correspond to terminals according to the present invention and are those that are able to communicate with the server 3 by being carried by users of the air conditioners 2. The communication network 5 is a communication network using, for example, the Internet, or the like.

[0011] FIG. 2 is a block diagram illustrating one example of a configuration of the air conditioner 2. The air conditioner 2 illustrated in FIG. 2 includes an outdoor unit 11, an indoor unit 12, an adapter 13, and a remote controller 14. The outdoor unit 11 includes a main body 11A. The main body 11A is provided with, for example, an outdoor fan, a compressor, an outdoor heat exchanger, an expansion valve, and the like. The indoor unit 12 includes a main body 12A, a light receiving unit 12B, and a control unit 12C. The indoor unit 12 is arranged in, for example, a room and is a part of the air conditioner that heats or cools air in the room. The remote controller 14

is able to perform a remote operation on the indoor unit 12 in accordance with an operation performed by a user of the indoor unit 12. The main body 12A is provided with, for example, an indoor fan and an indoor heat exchanger, and the room air that has been subjected to heat exchange by the indoor heat exchanger is blown out from the main body 12A, whereby heating, cooling, dehumidification, or the like of the room is performed.

[0012] The adapter 13 includes a first communication unit 13A, a second communication unit 13B, a storage unit 13C, and a control unit 13D. The first communication unit 13A is a communication interface (IF), such as a universal asynchronous receiver transmitter (UART), that performs a communication connection between the adapter 13 and the control unit 12C included in the indoor unit 12. The second communication unit 13B is an interface (IF) for connecting the adapter 13 and the communication network 5 in communication. The control unit 13D controls the indoor unit 12 by using Artificial Intelligence (AI). The adapter 13 is arranged in each of the indoor units 12. The storage unit 13C includes an operation history memory 131C, a failure estimation model 132C, and a refrigerant estimation model 133C.

[0013] The operation history memory 131C periodically collects various kinds of operation state data that are collected from the main body 11A included in the outdoor unit 11 and the main body 12A included in the indoor unit 12 by using the first communication unit 13A, and stores the collected operation state data. The second communication unit 13B sends operation state data that is being stored in the operation history memory 131C to the server 3. Furthermore, as will be described later, the server 3 uses the operation state data on the air conditioner 2 as teacher data, and generates a refrigerant estimation model and a failure estimation model on the basis of the teacher data. In addition, the server 3 sends the generated refrigerant estimation model and the failure estimation model to the adapter 13 via the communication network 5. The adapter 13 receives the refrigerant estimation model 133C and the failure estimation model 132C from the server 3 by using the second communication unit 13B, and stores the received refrigerant estimation model 133C and the failure estimation model 132C in the storage unit 13C.

[0014] The failure estimation model 132C predicts or senses, that is, estimates a failure occurred in each of the main body 11A included in the outdoor unit 11 and the main body 12A included in the indoor unit 12 by inputting some of the operation state data collected from the main body 11A included in the outdoor unit 11 and the main body 12A included in the indoor unit 12. The failure estimation model 132C estimates a failure of the air conditioner 2 including, for example, a stain of the outdoor heat exchanger, a lock of the expansion valve, abnormality related to degradation of the compressor, or the like.

[0015] The refrigerant estimation model 133C estimates an amount of refrigerant that is currently remaining

in a refrigerant circuit that is not illustrated and that is provided in each of the main body 11A included in the outdoor unit 11 and the main body 12A included in the indoor unit 12 by inputting some of the operation state data collected from the main body 11A included in the outdoor unit 11 and the main body 12A included in the indoor unit 12. For example, the refrigerant estimation model 133C estimates the amount of refrigerant that is currently remaining in the refrigerant circuit by using at least a rotation rate of the compressor, temperature of the refrigerant discharged from the compressor, temperature of the heat exchanger, the degree of opening of the expansion valve, and temperature of outside air included in the operation state data that indicates the operation state at the time of operation. As a result, the refrigerant estimation model 133C estimates abnormality caused by an insufficient amount of refrigerant.

[0016] FIG. 3 is a block diagram illustrating one example of a configuration of the server 3. The server 3 illustrated in FIG. 3 includes a communication unit 31, an operating unit 32, a display unit 33, a storage unit 34, and a control unit 35. The storage unit 34 includes a device management table 341, a test run management table 342, and a maintenance management table 343. The communication unit 31 is an interface for communicating with the communication network 5. The operating unit 32 is an interface for inputting various kinds of information, such as an operation command. The display unit 33 is an interface for displaying various kinds of information. The storage unit 34 is an area for storing therein various kinds of information. The control unit 35 performs overall control of the server 3.

[0017] FIG. 4 is a diagram illustrating one example of a table configuration of the device management table 341. The device management table 341 illustrated in FIG. 4 is a table that is used to manage the information on an air conditioner ID for identifying the air conditioner 2 as the device information. The device management table 341 manages, in an associated manner with each of air conditioner IDs 341A, a device model 341B, a customer name 341C, a postal code 341D, an address 341E, and a terminal ID 341F. The device model 341B is information for identifying a device model of the air conditioner 2. The customer name 341C is information for identifying a user of the air conditioner 2. The postal code 341D is information for specifying a region of an arrangement location of the air conditioner 2. The address 341E is information for specifying the arrangement location of the air conditioner 2. The terminal ID 341F is a telephone number of the smartphone terminal 4 corresponding to a contact detail of the user of the air conditioner 2.

[0018] FIG. 5 is a diagram illustrating one example of the table configuration of the test run management table 342. The test run management table 342 illustrated in FIG. 5 is a table that is used to manage whether or not a test run request has been output to the user of the air conditioner 2. The test run management table 342 manages, in an associated manner with each of terminal IDs

342A that are the telephone numbers of the respective smartphone terminals 4 corresponding to the contact details of the users of the respective air conditioners 2, an air conditioner ID 342B and a test run request completion flag 342C. The test run request completion flag 342C is an identifier for identifying whether or not the test run of the air conditioner 2 has been requested to the smartphone terminal 4. In the case where the test run request has already been output, the test run request completion flag 342C is set to "1", whereas, in the case where the test run request has not been output, the test run request completion flag 342C is set to "0".

[0019] FIG. 6 is a diagram illustrating one example of the table configuration of the maintenance management table 343. The maintenance management table 343 illustrated in FIG. 6 is the table that is used to manage the maintenance information in an associated manner with each of maintenance IDs 343A for identifying maintenance of the air conditioners 2. The maintenance management table 343 manages, in an associated manner with each of the maintenance IDs 343A, maintenance work date and time 343B, maintenance content 343C, customer information 343D, a terminal ID 343E, an air conditioner ID 343F, and a maintenance work executed flag 343G. The maintenance work date and time 343B is reservation date and time of the maintenance work. The maintenance content is information for identifying the maintenance content of the air conditioner 2 indicating, for example, the content of a failure, a maintenance worker who is in charge of the maintenance, and the like. The customer information 343D is information for identifying the user of the air conditioner 2 targeted for the maintenance indicating, for example, a customer name, an email address, an address, a postal code, and the like. The terminal ID 343E is information for identifying the smartphone terminal 4 corresponding to the contact detail of the user of the air conditioner 2 targeted for the maintenance, indicating a telephone number or the like. The air conditioner ID 343F is information for identifying the air conditioner 2 targeted for the maintenance. The maintenance work executed flag 343G is an identifier for identifying whether or not a maintenance work has been executed. In the case where the maintenance work has been executed, the maintenance work executed flag 343G is set to "1", whereas, in the case where the maintenance work has not been executed, the maintenance work executed flag 343G is set to "0".

[0020] The control unit 35 includes a generation unit 35A, a classification unit 35B, a notification unit 35C, and a management unit 35D. The generation unit 35A generates a failure estimation model and a refrigerant estimation model by using the operation state data received from each of the air conditioners 2 as teacher data. The classification unit 35B classifies, on the basis of the device information included in the device management table 341, the plurality of air conditioners 2 that are managed by the server 3 into a plurality of groups in accordance with a predetermined rule that will be described

later. The notification unit 35C attempts to request a test run by shifting a period of the test run in an intermediate period for each group and notifies the smartphone terminals 4 carried by the users of the air conditioners 2 included in the associated groups of information that is related to the test run to be performed on each of the air conditioners 2 included in the associated groups and that corresponds to a test run request. Furthermore, the test run request is a notification that requests each of the air conditioners 2 to perform the test run. The management unit 35D manages the device management table 341, the test run management table 342, and the maintenance management table 343.

[0021] FIG. 7 is a block diagram illustrating one example of a configuration of the smartphone terminal 4. The smartphone terminal 4 illustrated in FIG. 7 includes a communication unit 41, an operating unit 42, a display unit 43, a storage unit 44, and a control unit 45. The communication unit 41 is an interface for communicating with the communication network 5. The operating unit 42 is an interface for inputting various kinds of information, such as an operation command, or the like. The display unit 43 is an interface for displaying various kinds of information. The storage unit 44 is an area for storing therein various kinds of information. The control unit 45 performs overall control of the smartphone terminal 4.

[0022] FIG. 8 is a diagram illustrating one example of a test run request screen 43A of the smartphone terminal 4. The smartphone terminal 4 displays the test run request screen 43A on the display unit 43 in accordance with the test run request received from the server 3. The test run request screen 43A illustrated in FIG. 8 is a screen used to request a customer to perform a test run of the air conditioner 2. The test run request screen 43A includes a message 431A indicating that "We recommend you to perform a test run during a low season. Do you start the test run?", a button 432A corresponding to "yes" indicating a test run needs to be performed, and a button 433A corresponding to "no" indicating a test run is not needed. The message 431A is a message that urges the user of the smartphone terminal 4 to start the test run of the air conditioner 2. If the smartphone terminal 4 detects a button operation of the button 432A displayed on the test run request screen 43A, the smartphone terminal 4 sends information indicating a start of the test run to the air conditioner 2, and deletes the test run request screen 43A. Furthermore, if the smartphone terminal 4 detects a button operation of the button 433A displayed on the test run request screen 43A, the smartphone terminal 4 deletes the test run request screen 43A.

[0023] FIG. 9 is a diagram illustrating one example of a switching screen from a maintenance recommendation screen 43B to a maintenance reservation screen 43C of the smartphone terminal 4. The smartphone terminal 4 displays the maintenance recommendation screen 43B on the display unit 43 in accordance with the maintenance recommendation received from the server 3. The maintenance recommendation screen 43B illustrated in FIG.

9 is a screen that requests a customer to reserve the maintenance work of the air conditioner 2. The maintenance recommendation screen 43B includes a message 431B indicating that "a failure may have occurred. Would you like to request a repair?", a device model name 432B, an error code 433B, a button 434B corresponding to "yes" indicating a start of a repair request, and a button 435B corresponding to "no" indicating that there is no need to request a repair. The message 431B is a message that urges the user of the air conditioner 2 to reserve the maintenance work. The device model name 432B is information for identifying a device model of the air conditioner 2. The error code 433B is a code for identifying the content of an error. If the smartphone terminal 4 detects the button operation of the button 434B displayed on the maintenance recommendation screen 43B, the smartphone terminal 4 changes the screen from the maintenance recommendation screen 43B to the maintenance reservation screen 43C that is the reservation screen for the maintenance work. If the smartphone terminal 4 detects a button operation of the button 435B displayed on the maintenance recommendation screen 43B, the smartphone terminal 4 deletes the maintenance recommendation screen 43B.

[0024] The maintenance reservation screen 43C is a screen that is used for the customer to input the maintenance reservation content of the air conditioner 2. The maintenance reservation screen 43C includes a name entry field 431C, a postal code entry field 432C, an address entry field 433C, an email address entry field 434C, a telephone number entry field 435C, and a desired date and time entry field 436C. Furthermore, the maintenance reservation screen 43C includes a check button 437C, a cancel button 438C, and a device model name 439C. The name entry field 431C is a field for inputting a user name of the air conditioner 2 that is targeted for the maintenance. The postal code entry field 432C is a field for inputting a postal code used for identifying the region of the arrangement place of the air conditioner 2 targeted for the maintenance. The address entry field 433C is a field for inputting the address of the arrangement place of the air conditioner 2 targeted for the maintenance. The email address entry field 434C is a field for inputting the email address that is the contact details of the user of the air conditioner 2 targeted for the maintenance. The telephone number entry field 435C is a field for inputting the telephone number that is the contact detail of the user of the air conditioner 2 targeted for the maintenance. The desired date and time entry field 436C is a field for inputting the desired date and time of the maintenance work to be performed on the air conditioner 2 targeted for the maintenance. The device model name 439C is information for identifying the device model of the air conditioner 2 targeted for the maintenance. If the smartphone terminal 4 detects the check button 437C displayed on the maintenance reservation screen 43C, the smartphone terminal 4 sends the maintenance content to the server 3 and deletes the maintenance reservation screen 43C.

If the smartphone terminal 4 detects a cancel button 438C displayed on the maintenance reservation screen 43C, the smartphone terminal 4 deletes the maintenance reservation screen 43C.

[0025] In the following, an operation of the air conditioning system 1 according to the present embodiment will be described. FIG. 10 is a diagram illustrating one example of a processing operation between the test run request and the maintenance work completion performed in the air conditioning system 1. The server 3 notifies the smartphone terminal 4 carried by the user of the air conditioner 2 of the test run request in accordance with the predetermined rule at a predetermined timing (Step S1). The predetermined timing is a timing at which the test run request is issued and is a timing of, for example, once a day. Furthermore, the predetermined timing is not limited to once a day but may appropriately be changed to, for example, once every other day, or once every three days. The predetermined rule is a condition in which the air conditioners 2 handled by a maintenance worker 6 are finally grouped within a predetermined period of time, for example, a condition for assigning the air conditioners 2 that are included in the associated groups in accordance with installation region information that indicates an installation region and that is used to identify an arrangement place of the air conditioner 2 or in accordance with air conditioner count information that indicates the number of the air conditioners 2.

[0026] In the case where the smartphone terminal 4 receives the test run request, the smartphone terminal 4 displays the test run request screen 43A illustrated in FIG. 8 on the display unit 43. The user of the smartphone terminal 4 is able to recognize the test run request for the air conditioner 2 by looking at the test run request screen 43A. Then, the smartphone terminal 4 requests the air conditioner 2 to start the test run in accordance with a test run start operation displayed on the test run request screen 43A (Step S2). The air conditioner 2 consequently performs the test run in accordance with the request to start the test run. In the case where the air conditioner 2 performs the test run, the air conditioner 2 notifies the server 3 of a test run result of the test run performed on the air conditioner 2 (Step S3). Furthermore, in the case where the air conditioner 2 performs the test run and estimates abnormality of the air conditioner 2 by using, for example, the refrigerant estimation model 133C or the failure estimation model 132C, the air conditioner 2 obtains the content of the abnormality as the test run result.

[0027] In the case where the server 3 receives the test run result from the air conditioner 2 and the received content indicates an estimation of abnormality of the air conditioner 2, the server 3 notifies the smartphone terminal 4 of a maintenance recommendation (Step S4). In the case where the smartphone terminal 4 receives the maintenance recommendation from the server 3, the smartphone terminal 4 displays the maintenance recommendation screen 43B illustrated in FIG. 9. The user of the

smartphone terminal 4 is able to recognize the maintenance recommendation for the air conditioner 2 by looking at the maintenance recommendation screen 43B. The smartphone terminal 4 displays the maintenance reservation screen 43C illustrated in FIG. 9 in accordance with a maintenance recommendation operation displayed on the maintenance recommendation screen 43B. The user of the smartphone terminal 4 is able to input the reservation content about the maintenance work by looking at the maintenance reservation screen 43C.

[0028] The smartphone terminal 4 sends the maintenance reservation request to the server 3 in accordance with the maintenance reservation operation displayed on the maintenance reservation screen 43C (Step S5). In the case where the server 3 receives the maintenance reservation request from the smartphone terminal 4, the server 3 notifies the maintenance worker 6 of a desire for the maintenance in accordance with the maintenance reservation content (Step S6). Furthermore, the desire for the maintenance is generated as a result of a request for the test run only on the smartphone terminals 4 associated with the air conditioners 2 that have been grouped in accordance with the predetermined rule at the predetermined timing as described above, so that it is possible to distribute concentration of the maintenance recommendations received in the same period included in the intermediate period, that is, it is possible to distribute the desires for the maintenance received on the basis of the test run results by distributing the period in which the test run is performed on each of the air conditioners 2. Then, the maintenance worker 6 performs the maintenance work on the air conditioner 2 that is targeted for the maintenance (Step S7).

[0029] When a test run is requested to each of the air conditioners 2, for example, the test run of the 30000 air conditioners 2 in the region handled by a certain service base location is started all at once, the test run result indicating that maintenance of the 200 air conditioner 2 is needed is obtained, and it is assumed that the number of the air conditioners 2 that are able to receive a maintenance service from the maintenance worker 6 per day is 100. In this case, the maintenance worker 6 needs two days in this region because the number of air conditioners 2 subjected to the maintenance work performed by the maintenance worker 6 is 200.

[0030] In the air conditioning system 1 according to the present embodiment, on the basis of the assumption result described above, the predetermined timing included in the intermediate period is set to five times a day, and the predetermined rule is set such that the 6000 air conditioners 2 are grouped as a single group from among the 30000 air conditioners 2 included in the same region. In this case, the server 3 sends a test run request to the smartphone terminals 4 carried by the users of the 6000 air conditioners 2 per day in the same region, and sends a request for the test run to the smartphone terminals 4 of the users of all of the air conditioners 2 included in the

same region in five days. As a result, the number of maintenance recommendations obtained as a result of the test run results per day is reduced, in other words, the number of maintenance recommendations is accordingly distributed to five days. Then, by distributing the period of the test run of the air conditioners 2 included in the region, the number of desires for the maintenance (maintenance reservations) obtained as a result of the test run result is distributed. As a result of the number of desires for the maintenance (maintenance reservations) being distributed, the work performed by the maintenance worker 6 is distributed and it is thus possible to reduce the work load applied to the maintenance worker 6.

[0031] FIG. 11 is a flowchart illustrating one example of the processing operation performed in the control unit 45 included in the smartphone terminal 4 according to a test run request reception process. In FIG. 11, the control unit 45 included in the smartphone terminal 4 determines whether or not the control unit 45 has received the test run request from the server 3 (Step S11). If the control unit 45 has received the test run request (Yes at Step S11), the control unit 45 causes the display unit 43 to display the test run request screen 43A illustrated in FIG. 8 (Step S12). As a result, the user of the smartphone terminal 4 is able to recognize that the test run of the air conditioner 2 is needed by looking at the test run request screen 43A.

[0032] The control unit 45 determines whether or not the control unit 45 has detected the test run start operation (button operation of the button 432A) on the test run request screen 43A (Step S13). If the control unit 45 has detected the test run start operation (Yes at Step S13), the control unit 45 performs the test run of the air conditioner 2 and ends the processing operation illustrated in FIG. 11. After the end of the processing operation related to the test run request reception process, the user of the smartphone terminal 4 is able to perform the test run of the air conditioner 2 by using the button operation on the button displayed on the test run request screen 43A.

[0033] If the control unit 45 has not detected the test run start operation (No at Step S13), the control unit 45 determines whether or not the control unit 45 has detected a test run unnecessary operation (button operation of the button 433A) (Step S14). If the control unit 45 has detected the test run unnecessary operation (Yes at Step S14), the control unit 45 ends the processing operation illustrated in FIG. 11 without performing the test run.

[0034] If the control unit 45 has not received the test run request (No at Step S11), the control unit 45 ends the processing operation illustrated in FIG. 11. If the control unit 45 has not detected the test run unnecessary operation (No at Step S14), the control unit 45 proceeds to Step S13 in order to determine whether or not the control unit 45 has detected the test run start operation.

[0035] FIG. 12 is a flowchart illustrating one example of the processing operation that is performed in the control unit 45 included in the smartphone terminal 4 and that is related to the maintenance reservation process.

The control unit 45 included in the smartphone terminal 4 illustrated in FIG. 12 determines whether or not the control unit 45 has received the maintenance recommendation from the server 3 (Step S21). If the control unit 45 has received the maintenance recommendation (Yes at Step S21), the control unit 45 causes the display unit 43 to display the maintenance recommendation screen 43B illustrated in FIG. 9 (Step S22). As a result, the user of the smartphone terminal 4 is able to recognize the test run result of the air conditioner 2 by looking at the maintenance recommendation screen 43B.

[0036] The control unit 45 determines whether or not the control unit 45 has detected a maintenance recommendation start operation (button operation of the button 434B) displayed on the maintenance recommendation screen 43B (Step S23). If the control unit 45 has detected the maintenance recommendation start operation (Yes at Step S23), the control unit 45 causes the display unit 43 to display the maintenance reservation screen 43C (Step S24). As a result, the user of the smartphone terminal 4 is able to recognize the input content of the maintenance reservation for the air conditioner 2 by looking at the maintenance reservation screen 43C. The control unit 45 determines whether or not the control unit 45 has detected a maintenance reservation start operation (button operation of the check button 437C) displayed on the maintenance reservation screen 43C (Step S25).

[0037] If the control unit 45 has detected the maintenance reservation start operation displayed on the maintenance reservation screen 43C (Yes at Step S25), the control unit 45 sends the maintenance reservation request to the server 3 (Step S26), and ends the processing operation illustrated in FIG. 12. As a result, the user of the smartphone terminal 4 is able to input the maintenance reservation from the maintenance reservation screen 43C. The user is able to input, by using the smartphone terminal 4, reservation information including a customer name, a postal code, an address, an email address, a telephone number, maintenance desired date and time, the device model name 439C of the air conditioner, and the like related to the air conditioner 2 targeted for the maintenance. If the control unit 45 has not received the maintenance recommendation (No at Step S21), the control unit 45 ends the processing operation illustrated in FIG. 12.

[0038] If the control unit 45 has not detected the maintenance recommendation start operation (No at Step S23), the control unit 45 determines whether or not the control unit 45 has detected a maintenance recommendation unnecessary operation (button operation of the button 435B) (Step S27). If the control unit 45 has detected the maintenance recommendation unnecessary operation (Yes at Step S27), the control unit 45 deletes the maintenance recommendation screen 43B (Step S28), and ends the processing operation illustrated in FIG. 12.

[0039] If the control unit 45 has not detected the maintenance recommendation unnecessary operation (No at

Step S27), the control unit 45 proceeds to Step S23 in order to determine whether or not the control unit 45 has detected the maintenance recommendation start operation.

[0040] Furthermore, if the control unit 45 has not detected the maintenance reservation start operation (No at Step S25), the control unit 45 determines whether or not the control unit 45 has detected a maintenance reservation unnecessary operation (button operation of the cancel button 438C) (Step S29). If the control unit 45 has detected the maintenance reservation unnecessary operation (Yes at Step S29), the control unit 45 deletes the maintenance reservation screen 43C (Step S30), and ends the processing operation illustrated in FIG. 12. In addition, if the control unit 45 has not detected the maintenance reservation unnecessary operation (No at Step S29), the control unit 45 proceeds to Step S25 in order to determine whether or not the control unit 45 has detected the maintenance reservation start operation.

[0041] FIG. 13 is a flowchart illustrating one example of the processing operation that is performed in the control unit 35 included in the server 3 and that is related to the test run request process. In FIG. 13, the control unit 35 included in the server 3 determines whether or not the control unit 35 has detected the predetermined timing (Step S31). If the control unit 35 has detected the predetermined timing (Yes at Step S31), the control unit 35 refers to the device management table 341, and assigns unassigned air conditioner IDs included in the group in accordance with the predetermined rule (Step S32).

[0042] The control unit 35 refers to the device management table 341, and specifies the terminal IDs that are associated with the assigned air conditioner IDs (Step S33). The control unit 35 sends the test run request to each of the smartphone terminals 4 based on the specified terminal IDs (Step S34). As a result, the server 3 sends a request for the test run only to the smartphone terminals 4 that are included in the air conditioner 2 and that are associated with the air conditioner IDs assigned on the basis of the predetermined rule at the predetermined timing. The control unit 35 sets the test run request completion flag 342C associated with each of the terminal IDs of the smartphone terminals 4, to which the test run request has already been sent, to "1", and updates the content of the test run management table 342 (Step S35). The server 3 is able to recognize the air conditioner ID in which the test run request has been made and the terminal ID by referring to the test run request completion flag 342C included in the test run management table 342.

[0043] In addition, after the control unit 35 has updated the test run request completion flag 342C to "1", the control unit 35 determines whether or not an unassigned air conditioner ID is present (Step S36). If an unassigned air conditioner ID is present (Yes Step S36), the control unit 35 proceeds to Step S31 in order to determine whether or not the control unit 35 has detected the predetermined timing. In other words, the server 3 is able to assign the unassigned air conditioner ID suitable for the predeter-

mined rule at each predetermined timing. If an unassigned air conditioner ID is not present (No at Step S36), the control unit 35 ends the processing operation illustrated in FIG. 13. If the control unit 35 has not detected the predetermined timing (No at Step S31), the control unit 35 proceeds to Step S31 in order to determine whether or not the control unit 35 has detected the predetermined timing. In other words, the server 3 does not request the test run until the control unit 35 detects the predetermined timing.

[0044] FIG. 14 is a flowchart illustrating one example of the processing operation that is performed in the control unit 35 included in the server 3 and that is related to the test run result notification process. In FIG. 14, the control unit 35 included in the server 3 determines whether or not the control unit 35 has received the test run result from the air conditioner 2 (Step S41). Furthermore, if the air conditioner 2 has detected abnormality of the air conditioner 2 by using the failure estimation model 132C and the refrigerant estimation model 133C, the air conditioner 2 sends the test run result of the air conditioner 2 to the server 3. If the control unit 35 has received the test run result (Yes at Step S41), the control unit 35 extracts the air conditioner ID and the maintenance content from the test run result (Step S42).

[0045] The control unit 35 refers to the test run management table 342, specifies the terminal ID associated with the extracted air conditioner ID (Step S43), sends the maintenance recommendation to the smartphone terminal 4 on the basis of the specified terminal ID (Step S44), and ends the processing operation illustrated in FIG. 14. As a result, the server 3 is able to send the maintenance recommendation to the smartphone terminal 4 carried by the user of the air conditioner 2 in accordance with the test run result received from each of the air conditioners 2. If the control unit 35 has not received the test run result (No at Step S41), the control unit 35 ends the processing operation illustrated in FIG. 14.

[0046] FIG. 15 is a flowchart illustrating one example of the processing operation that is performed in the control unit 35 included in the server 3 and that is related to the reservation registration process. In FIG. 15, the control unit 35 included in the server 3 determines whether or not the control unit 35 has received a maintenance reservation request from the smartphone terminal 4 (Step S51). If the control unit 35 has received the maintenance reservation request (Yes at Step S51), the control unit 35 extracts the reservation information from the maintenance reservation request (Step S52) Furthermore, the reservation information mentioned here is information including a customer name, a postal code, an address, an email address, a telephone number, maintenance desired date and time, the device model name 439C of the air conditioner, and the like related to the air conditioner 2 targeted for the maintenance.

[0047] The control unit 35 registers, in the maintenance management table 343, the maintenance work date and

time, the maintenance content, the customer information, the terminal ID, and the air conditioner ID that are included in the reservation information (Step S53). The server 3 is able to check the reservation information on each of the maintenance IDs by referring to the maintenance management table 343. The control unit 35 selects the maintenance worker 6 that is associated with the maintenance content (Step S54), notifies the maintenance worker 6 of the maintenance content (Step S55), and ends the processing operation illustrated in FIG. 15. If the control unit 35 has not received the maintenance reservation request (No at Step S51), the control unit 35 ends the processing operation illustrated in FIG. 15.

[0048] As described above, the server 3 according to the present embodiment divides the plurality of air conditioners 2 into the groups in accordance with the predetermined rule, and notifies the smartphone terminals 4 carried by the users of the air conditioners 2 included in the associated groups of the test run request to be performed on the air conditioners 2 included in the associated groups in order to request the test run by shifting, for each group, the period of the test run included in the intermediate period. As a result, it is possible to distribute the period in which the test run is to be performed on each of the air conditioners 2, so that it is possible to suppress concentration of the maintenance work in a certain period included in the intermediate period, and it is thus possible to reduce the work load applied to the maintenance worker 6. In addition, it is possible to avoid a situation in which the air conditioner 2 is not able to be operated caused by the maintenance work that is performed in an operation period of the air conditioner 2 as a result of the maintenance work being performed in the intermediate period.

[0049] If the smartphone terminal 4 has received the test run request, the smartphone terminal 4 requests the air conditioner 2 associated with the user of the smartphone terminal 4 to start the test run in accordance with a predetermined operation. Furthermore, the air conditioner 2 performs the test run in accordance with the request for a start of the test run, and, if the air conditioner 2 has detected the result of the test run indicating that maintenance of the air conditioner 2 is needed, the air conditioner 2 notifies the server 3 of the result of the test run. Then, if the server 3 receives the result of the test run from the air conditioner 2, the server 3 notifies the smartphone terminal 4 carried by the user of the air conditioner 2 of a recommendation for the maintenance of the air conditioner 2. As a result, the user of each of the smartphone terminals 4 is able to promptly receive the maintenance work as a result of obtaining the recommendation for the maintenance on the basis of the test run result of the test run of the air conditioner 2 performed by shifting the period of the test run, and is able to avoid the situation in which the air conditioner 2 is not able to be operated caused by the maintenance work that is performed in an operation period of the air conditioner 2.

[0050] If the smartphone terminal 4 has received the

recommendation for the maintenance from the server 3, the smartphone terminal 4 notifies the server 3 of the information on a reservation for the maintenance work to be performed on the air conditioner 2 in accordance with a predetermined reservation operation. As a result, a customer is able to easily reserve the maintenance work.

[0051] In the case where air conditioner 2 estimates a failure of the air conditioner 2 by using the failure estimation model 132C in accordance with a start of the test run, the air conditioner 2 notifies the server 3 of the obtained estimation as the result of the test run. As a result, each of the air conditioners 2 is able to notify the server 3 of the result of the test run by using the failure estimation model 132C.

[0052] In the case where the air conditioner 2 uses the refrigerant estimation model 133C and estimates, in accordance with a start of the test run of the air conditioner 2, an insufficient amount of currently remaining refrigerant flowing inside the air conditioner, the air conditioner 2 notifies the server 3 of the obtained estimation as the result of the test run. As a result, each of the air conditioners 2 is able to notify the server 3 of the result of the test run by using the refrigerant estimation model 133C.

[0053] As the test run request process according to the present embodiment, a case has been described as an example in which an unassigned air conditioner ID is assigned in accordance with the predetermined rule illustrated in FIG. 13. In the following, more detailed examples of the predetermined rule will be described on the basis of FIG. 16 to FIG. 18.

[0054] FIG. 16 is a flowchart illustrating one example of the processing operation that is performed in the control unit 35 included in the server 3 and that is related to a first test run request process. In FIG. 16, the control unit 35 included in the server 3 determines whether or not the control unit 35 has detected the predetermined timing (Step S61). If the control unit 35 has detected the predetermined timing (Yes at Step S61), the control unit 35 refers to the device management table 341 and assigns a region on the basis of the postal code that is used to identify a group as the predetermined rule (Step S62). Furthermore, the predetermined rule is used to group the arrangement places of the air conditioners 2 on the basis of the postal codes registered by the users and associate the air conditioner IDs of the air conditioners 2 associated with the postal codes, respectively, with the groups that are classified by the postal codes. Alternatively, instead of the postal codes, grouping may be performed in units of municipalities in each of which the air conditioners 2 are installed.

[0055] The control unit 35 refers to the device management table 341, assigns unassigned air conditioner IDs included in the assigned region (Step S63). The control unit 35 refers to the device management table 341, and specifies the terminal IDs associated with the assigned air conditioner IDs (Step S64). The control unit 35 sends the test run request to each of the smartphone

terminals 4 on the basis of the specified terminal IDs (Step S65). The control unit 35 sets the test run request completion flag 342C associated with each of the terminal IDs of the smartphone terminals 4, to which the test run request has already been sent, to "1", and updates the content of the test run management table 342 (Step S66).

[0056] Furthermore, after having set the test run request completion flag 342C to "1", the control unit 35 determines whether or not an unassigned region is present (Step S67). If the unassigned region is present (Yes at Step S67), the control unit 35 proceeds to Step S61 in order to determine whether or not the predetermined timing has been detected. If the unassigned region is not present (No at Step S67), the control unit 35 ends the processing operation illustrated in FIG. 16. If the control unit 35 has not detected the predetermined timing (No at Step S61), the control unit 35 proceeds to Step S61 in order to determine whether or not the control unit 35 has detected the predetermined timing.

[0057] The control unit 35 that performs the first test run request process assigns the region associated with the unassigned postal code from the plurality of postal codes as the predetermined rule for identifying the arrangement places of the air conditioners 2 at each predetermined timing, and assigns the unassigned air conditioner IDs included in the assigned region. Furthermore, the control unit 35 requests the smartphone terminals 4 carried by the users of the assigned air conditioners 2 to perform the test run on the basis of the terminal IDs of the assigned air conditioners 2. As a result, it is possible to distribute a maintenance reservation period as a result of distributing an acquisition period of the test run results by distributing the test run requests to be sent to the smartphone terminals 4 carried by the users of the air conditioners 2 in each of the assigned regions. As a result of the maintenance reservation period being distributed, the work of the maintenance worker 6 is accordingly distributed, and it is thus possible to reduce the work load applied to the maintenance worker 6. In addition, the test run requests have been distributed in units of regions, so that it is possible to reduce the work load applied to the maintenance worker 6 by decreasing a moving distance of the maintenance worker 6 at the time of maintenance work performed by the maintenance worker 6.

[0058] FIG. 17 is a flowchart illustrating one example of the processing operation that is performed in the control unit 35 included in the server 3 and that is related to a second test run request process. In FIG. 17, the control unit 35 included in the server 3 determines whether or not the control unit 35 has detected the predetermined timing (Step S71). If the control unit 35 has detected the predetermined timing (Yes at Step S71), the control unit 35 refers to the device management table 341, and assigns, as the predetermined rule, the same number of air conditioner IDs as the predetermined number of air conditioners from among the plurality of air conditioner IDs

(Step S72).

[0059] The control unit 35 refers to the device management table 341, and specifies the terminal IDs associated with the assigned air conditioner IDs (Step S73).

5 The control unit 35 sends the test run requests to the smartphone terminals 4 based on the specified terminal IDs (Step S74). The control unit 35 sets the test run request completion flag 342C associated with each of the terminal IDs of the smartphone terminals 4, to which the test run request has been sent, to "1", and updates the content of the test run management table 342 (Step S75).

[0060] Furthermore, after the control unit 35 has set the test run request completion flag 342C to "1", the control unit 35 determines whether or not an unassigned air conditioner ID is present (Step S76). If an unassigned air conditioner ID is present (Yes at Step S76), the control unit 35 proceeds to Step S71 in order to determine whether or not the control unit 35 has detected the predetermined timing. If an unassigned air conditioner ID is not present (No at Step S76), the control unit 35 ends the processing operation illustrated in FIG. 17. If the control unit 35 has not detected the predetermined timing (No at Step S71), the control unit 35 proceeds to Step S71 in order to determine whether or not the control unit 35 has detected the predetermined timing.

[0061] The control unit 35 that performs the second test run request process assigns, as the predetermined rule, the same number of air conditioner IDs as the predetermined number of unassigned air conditioners from among the plurality of air conditioner IDs at each of the predetermined timings, and sends a request to each of the smartphone terminals 4 carried by the users of the assigned air conditioners 2 to perform the test run on the basis of the terminal IDs of the assigned air conditioners 2. As a result, a collection period of the test run results is distributed by distributing the test run requests to be sent to the smartphone terminals 4 carried by the users of the air conditioners 2 on the basis of the predetermined number of air conditioners, so that it is also possible to distribute a period of maintenance reservation. As a result of the period of maintenance reservation being distributed, an amount of work of the maintenance worker 6 is also distributed, and it is thus possible to distribute a work load applied to the maintenance worker 6. For example, it is possible to reduce the work load applied to the maintenance worker 6 by decreasing the number of maintenance work tasks by levelling the number of test runs of the air conditioners 2.

[0062] In addition, a case has been described as an example in which, as the predetermined rule, the same number of air conditioner IDs as the predetermined number of unassigned air conditioners are assigned from among the plurality of air conditioner IDs at each of the predetermined timings. However, as a predetermined rule that is different from the above described predetermined rule, it may be possible to assign a region, such as municipalities, that is used to identify the arrangement places of the air conditioners 2 at each predetermined

timing, and assign the same number of air conditioner IDs as the predetermined number of unassigned air conditioners included in the assigned region.

[0063] FIG. 18 is a flowchart illustrating one example of the processing operation performed in the control unit 35 included in the server 3 according to a third test run request process. In FIG. 18, the control unit 35 included in the server 3 determines whether or not the control unit 35 has detected the predetermined timing (Step S81). If the control unit 35 has detected the predetermined timing (Yes at Step S81), the control unit 35 refers to the device management table 341, and assigns unassigned device models as the predetermined rule (Step S82).

[0064] The control unit 25 assigns the number of air conditioners associated with the unassigned device models (Step S83). The control unit 35 refers to the device management table 341, and assigns the same number of unassigned air conditioner IDs as the assigned number of air conditioners from among the air conditioner IDs associated with the unassigned device models (Step S84).

[0065] The control unit 35 refers to the device management table 341, and specifies the terminal IDs associated with the assigned air conditioner IDs (Step S85). The control unit 35 sends a test run request to each of the smartphone terminals 4 based on the specified terminal IDs (Step S86). The control unit 35 sets the test run request completion flag 342C associated with each of the terminal IDs of the smartphone terminals 4, to which the test run request has already been sent, to "1", and updates the content of the test run management table 342 (Step S87).

[0066] Furthermore, after the control unit 35 has set the test run request completion flag 342C to "1", the control unit 35 determines whether or not an unassigned air conditioner ID is present from among the unassigned air conditioner IDs associated with the assigned device models (Step S88). If an unassigned air conditioner ID is present (Yes at Step S88), the control unit 35 determines whether or not the control unit 35 has detected the predetermined timing (Step S89).

[0067] If the control unit 35 has detected the predetermined timing (Yes at Step S89), the control unit 35 proceeds to Step S83 in order to assign the number of assigned air conditioners associated with the assigned device model. Furthermore, if the control unit 35 has not detected the predetermined timing (No at Step S89), the control unit 35 proceeds to Step S89 in order to determine whether or not the control unit 35 has detected the predetermined timing.

[0068] If an unassigned air conditioner ID is not present from among the unassigned air conditioner IDs associated with the assigned device model (No at Step S88), the control unit 35 determines whether or not an unassigned device model is present (Step S90). If the unassigned device model is present (Yes at Step S90), the control unit 35 proceeds to Step S82 in order to assign the unassigned device model. Furthermore, if an un-

signed device model is not present (No at Step S90), the control unit 35 ends the processing operation illustrated in FIG. 18.

[0069] In addition, if the control unit 35 has not detected the predetermined timing (No at Step S81), the control unit 35 ends the processing operation illustrated in FIG. 18.

[0070] The control unit 35 that performs the third test run request process assigns an unassigned device model from among the plurality of device models as the predetermined rule at each predetermined timing, and assigns the same number of unassigned air conditioner IDs as the predetermined number of air conditioners from among the unassigned air conditioner IDs associated with the assigned device model. Furthermore, the control unit 35 sends a request to the smartphone terminals 4 carried by the users of the assigned air conditioners 2 for the test run on the basis of the terminals ID of the assigned air conditioners 2. As a result, an acquisition period of the test run results is distributed by distributing the test run requests to be sent to the smartphone terminals 4 carried by the users of the air conditioners 2 for each of the predetermined number of air conditioners associated with the assigned device models, so that it is possible to distribute a period of the maintenance reservation. As a result of the period of the maintenance reservation being distributed, the work of the maintenance worker 6 is distributed and it is thus possible to reduce the work load applied to the maintenance worker 6. For example, by reducing the number of air conditioners that is targeted for the test run per day and that is associated with the device model in which a failure rate is high, it is possible to reduce the work load applied to the maintenance worker 6.

[0071] In addition, for convenience of description, a case has been described as an example in which the server 3 sends a request to the smartphone terminals 4 carried by the users of the air conditioners 2 for the test run, and generates the refrigerant estimation model or the failure estimation model for each of the air conditioners 2 on the basis of the operation state data collected by the air conditioner 2. However, it may be possible to perform the function for generating the refrigerant estimation model or the failure estimation model by using another server, and modifications are possible as needed.

[0072] Furthermore, a case has been described as an example in which the server 3 notifies the smartphone terminal 4 of a recommendation for maintenance of the air conditioner 2 in the case where the server 3 estimates a failure of the air conditioner 2. However, the example is not limited to the case where the server 3 estimates the failure of the air conditioner 2. The server 3 may also notify the smartphone terminal 4 of the recommendation of the maintenance air conditioner 2 even in a case in which, for example, the failure rate of the air conditioner 2 is equal to or larger than a predetermined threshold, a frequency of the maintenance work of the air conditioner

2 is equal to or larger than a predetermined number of times, or accumulated operation time of the air conditioner 2 is equal to or larger than a predetermined period of time. In addition, the server 3 may also notify the smartphone terminal 4 of the recommendation of the maintenance air conditioner 2 even in a case in which the commodity product release date of the air conditioner 2 is after an elapse of a predetermined period of time, or a commodity product guarantee period of the air conditioner 2 is after an elapse of a predetermined period of time.

[0073] In addition, a case has been described as an example in which the air conditioner 2 estimates a failure of the air conditioner 2 by using the failure estimation model 132C and the refrigerant estimation model 133C. However, the control unit 13D included in the air conditioner 2 may detect a failure of, for example, a bad power supply of the air conditioner 2, a malfunction of the remote controller, unavailability of a cooling operation, unavailability of a heating operation, a malfunction of a vent deflector, abnormality of discharge temperature, or the like in accordance with a start of the test run by way of various sensors included in the air conditioner 2.

[0074] A case has been described as an example in which the air conditioner 2 performs a test run in the case where the air conditioner 2 has detected the test run start operation that is output from the smartphone terminal 4. Instead of this, in the case where the air conditioner 2 detects a person in an air-conditioned space by a human detection sensor (not illustrated) included in the indoor unit 12 when the air conditioner 2 has detected the test run start operation, the air conditioner 2 may hold the operation of the test run and perform the test run after the person is not detected in the air-conditioned space. In addition, after having obtained an approval in advance from the user of the air conditioner 2, the air conditioner 2 may perform the test run in the case where an operation of the test run is requested from the server 3 to the air conditioner 2 even if the air conditioner 2 does not detect the test run operation that is output from the smartphone terminal 4.

[0075] In addition, a case has been described as an example in which the air conditioner 2 performs the test run in the case where the air conditioner 2 has detected the test run start operation that is output from the smartphone terminal 4. However, the example is not limited to the test run start operation that is output from the smartphone terminal 4. The user may perform the test run start operation by using the remote controller 14 or the like of the air conditioner 2 by looking at the display screen indicating the information related to the test run with respect to the smartphone terminal 4, and modifications are possible as needed.

[0076] Furthermore, the components of each unit illustrated in the drawings are not always physically configured as illustrated in the drawings. In other words, the specific shape of a separate or integrated device is not limited to the drawings. Specifically, all or part of the device can be configured by functionally or physically sep-

arating or integrating any of the units depending on various loads or use conditions.

[0077] Furthermore, all or any part of various processing functions performed by each unit may also be executed by a central processing unit (CPU) (or a microcomputer, such as a micro processing unit (MPU), a micro controller unit (MCU), or the like). Furthermore, all or any part of various processing functions may also be, of course, executed by programs analyzed and executed by the CPU (or the microcomputer, such as the MPU or the MCU), or executed by hardware by wired logic.

Reference Signs List

[0078]

- | | |
|------|------------------------------|
| 1 | air conditioning system |
| 2 | air conditioner |
| 3 | server |
| 4 | smartphone terminal |
| 35 | control unit |
| 35A | generation unit |
| 35B | classification unit |
| 35C | notification unit |
| 132C | failure estimation model |
| 133C | refrigerant estimation model |

Claims

1. An air conditioning system comprising:

a plurality of air conditioners;
 a server that is connected to each of the air conditioners via a communication network and that stores device information on each of the air conditioners; and
 a terminal that is connected to each of the air conditioners via the server, wherein
 the server includes

a classification unit that classifies the plurality of air conditioners into a plurality of groups based on the device information, and
 a notification unit that notifies the terminals of information related to a test run of each of the air conditioners that are classified into the groups.

2. The air conditioning system according to claim 1, wherein the information related to the test run is information for requesting the terminals to perform the test run on each of the air conditioners.

3. The air conditioning system according to claim 1 or 2, wherein

the device information includes installation region information for identifying regions in each of which the air conditioners have been installed, and
 the classification unit classifies, based on the device information, the plurality of air conditioners into the groups for each of an installation region.

- 4. The air conditioning system according to claim 1 or 2, wherein

the device information includes air conditioner count information for identifying a number of air conditioners that have been installed, and the classification unit classifies, based on the device information, the plurality of air conditioners into the groups for each of a predetermined number of air conditioners.

- 5. The air conditioning system according to claim 1 or 2, wherein

the device information includes device model information for identifying a device model of each of the air conditioners, and the classification unit classifies, based on the device information, the plurality of air conditioners into the groups for each of the device models of the air conditioners.

- 6. The air conditioning system according to claim 1 or 2, wherein

the terminal requests, via the communication network when the terminal has received the information related to the test run, the air conditioner associated with the terminal to perform the test run in response to a predetermined operation, the air conditioner

performs the test run in response to the request for a start of the test run, and notifies, when the air conditioner has detected a result of the test run indicating that maintenance of the air conditioner is needed, the server of the result of the test run, and

the server notifies, when the server has received the result of the test run from the air conditioner, the terminal of a recommendation for the maintenance of the air conditioner.

- 7. The air conditioning system according to claim 6, wherein, when the terminal has received the recommendation for the maintenance from the server, the

terminal notifies the server of information related to a reservation for maintenance work on the air conditioner in response to a predetermined reservation operation.

- 8. The air conditioning system according to claim 1 or 2, wherein

the terminal displays, when the terminal has received the information related to the test run, the information related to the test run, the air conditioner

requests the air conditioner to start the test run in response to a predetermined operation, performs the test run in response to the request for a start of the test run, and notifies, when the air conditioner has detected a result of the test run indicating that maintenance of the air conditioner is needed, the server of the result of the test run, and

the server notifies, when the server has received the result of the test run from the air conditioner, the terminal of a recommendation for the maintenance of the air conditioner.

- 9. The air conditioning system according to claim 1 or 2, wherein the air conditioner

includes a failure estimation model for estimating presence or absence of a failure by using operation state data on the air conditioner, and notifies the server of the result of the test run when the air conditioner estimates a failure of the air conditioner by using the failure estimation model at the time of the test run of the air conditioner.

- 10. The air conditioning system according to claim 1 or 2, wherein the air conditioner

includes a refrigerant estimation model for estimating an amount of refrigerant by using operation state data on the air conditioner, and notifies the server of the result of the test run when the air conditioner estimates the amount of refrigerant in the air conditioner by using the refrigerant estimation model at the time of the test run of the air conditioner.

FIG.1

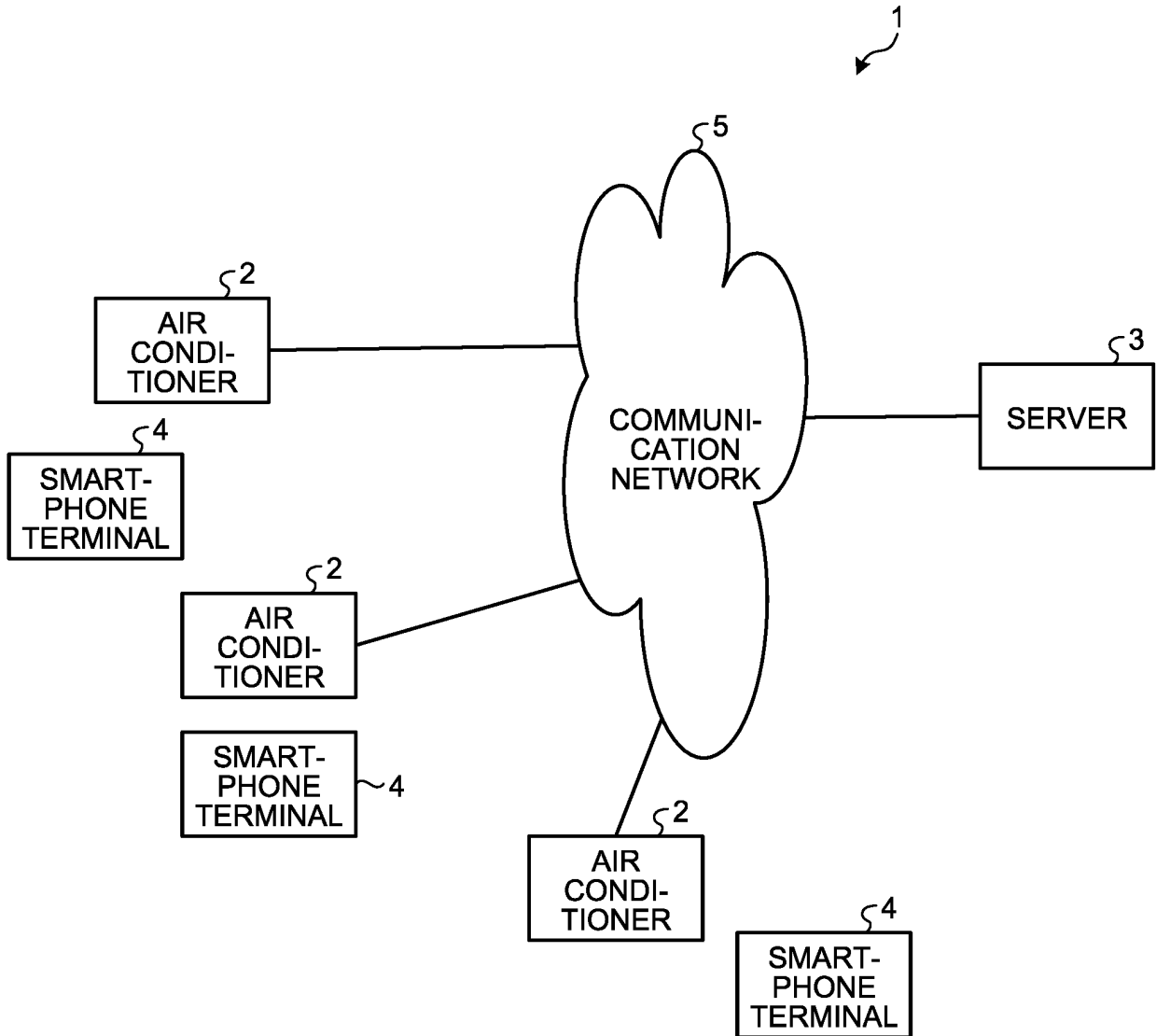


FIG.2

2

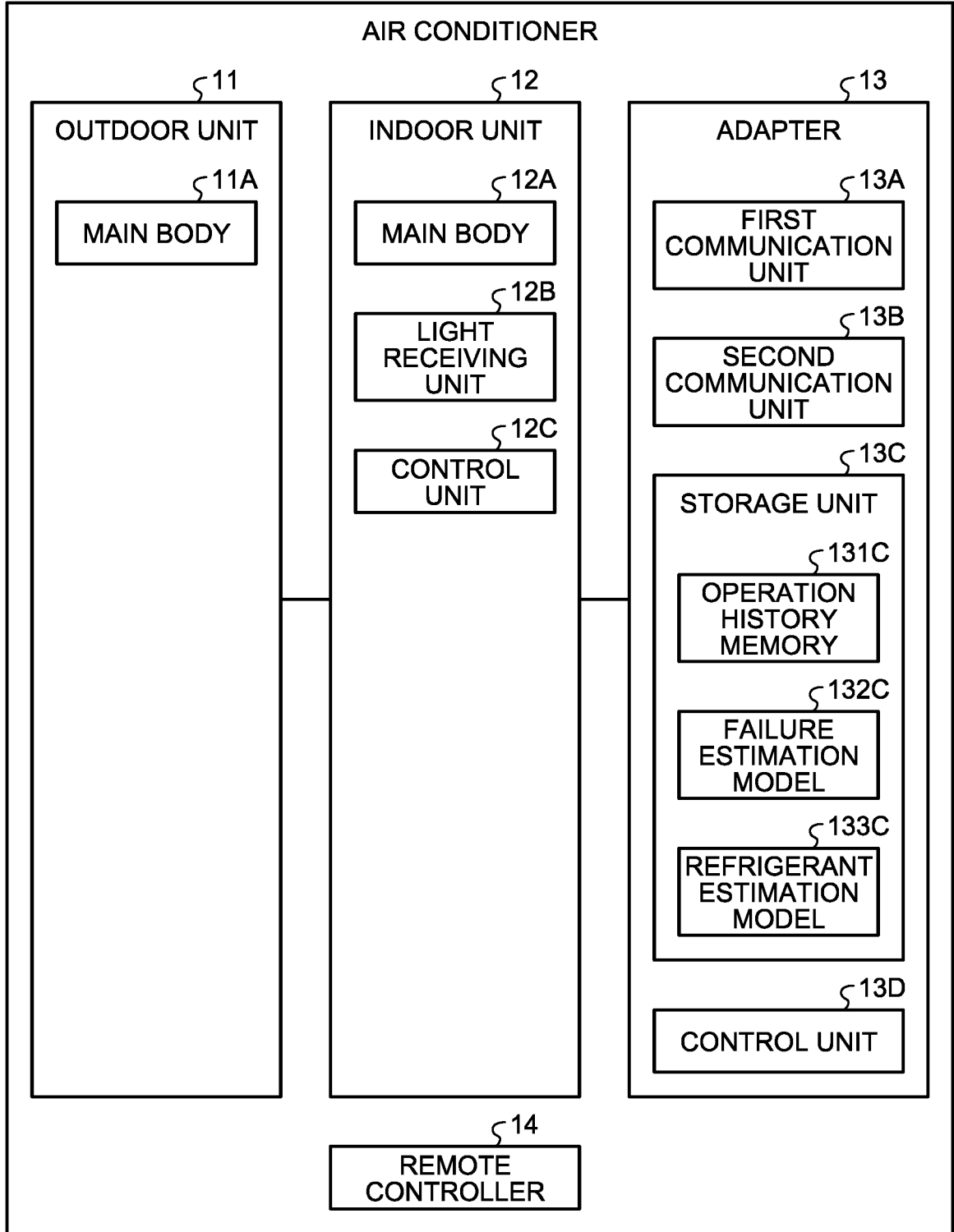


FIG.3

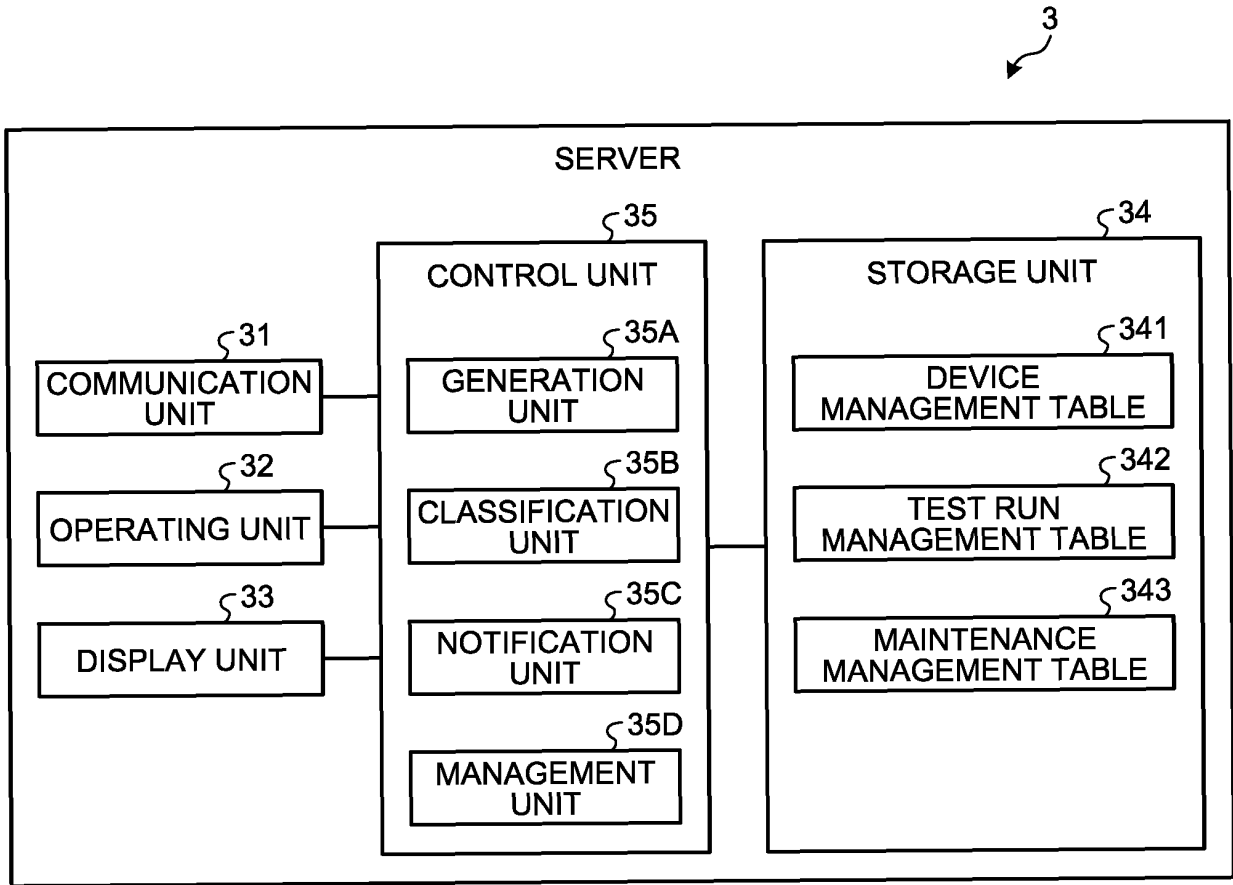


FIG.4

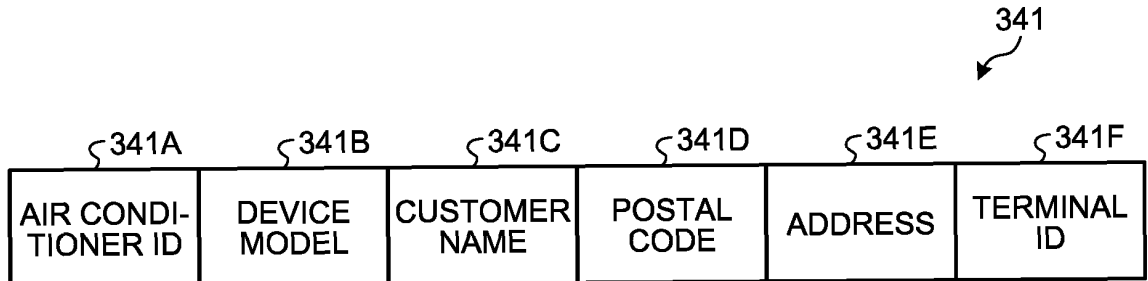


FIG.5

342

§ 342A	§ 342B	§ 342C
TERMINAL ID	AIR CONDITIONER ID	TEST RUN REQUEST COMPLETION FLAG

FIG.6

343

§ 343A	§ 343B	§ 343C	§ 343D	§ 343E	§ 343F	§ 343G
MAINTENANCE ID	MAINTENANCE WORK DATE AND TIME	MAINTENANCE CONTENT	CUSTOMER INFORMATION (EMAIL ADDRESS)	TERMINAL ID	AIR CONDITIONER ID	MAINTENANCE WORK EXECUTED FLAG

FIG.7

4

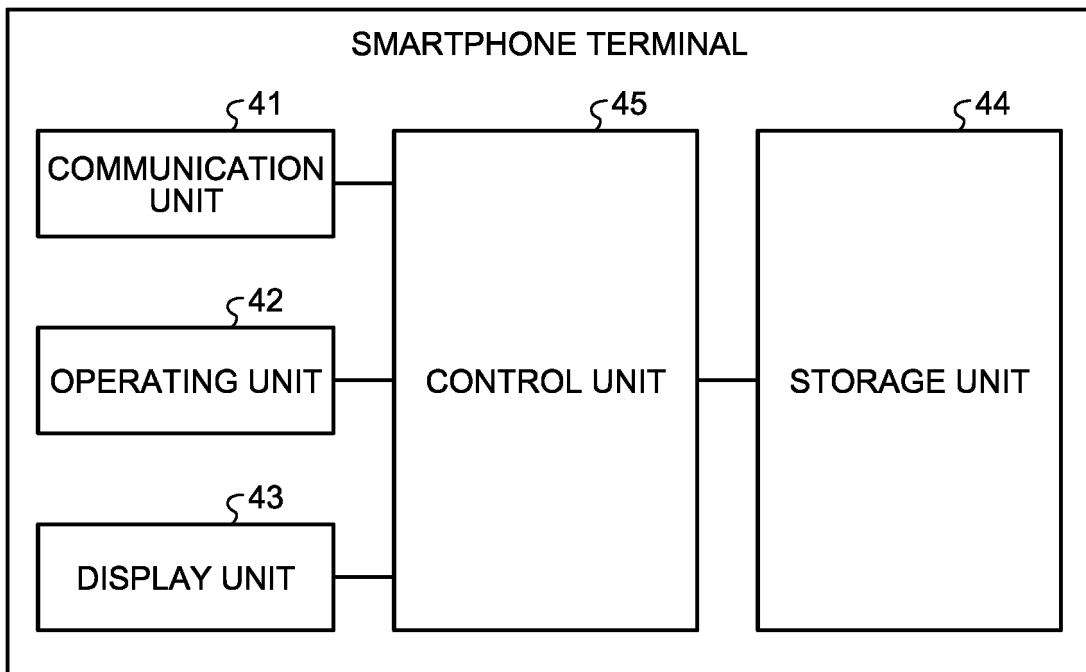


FIG.8

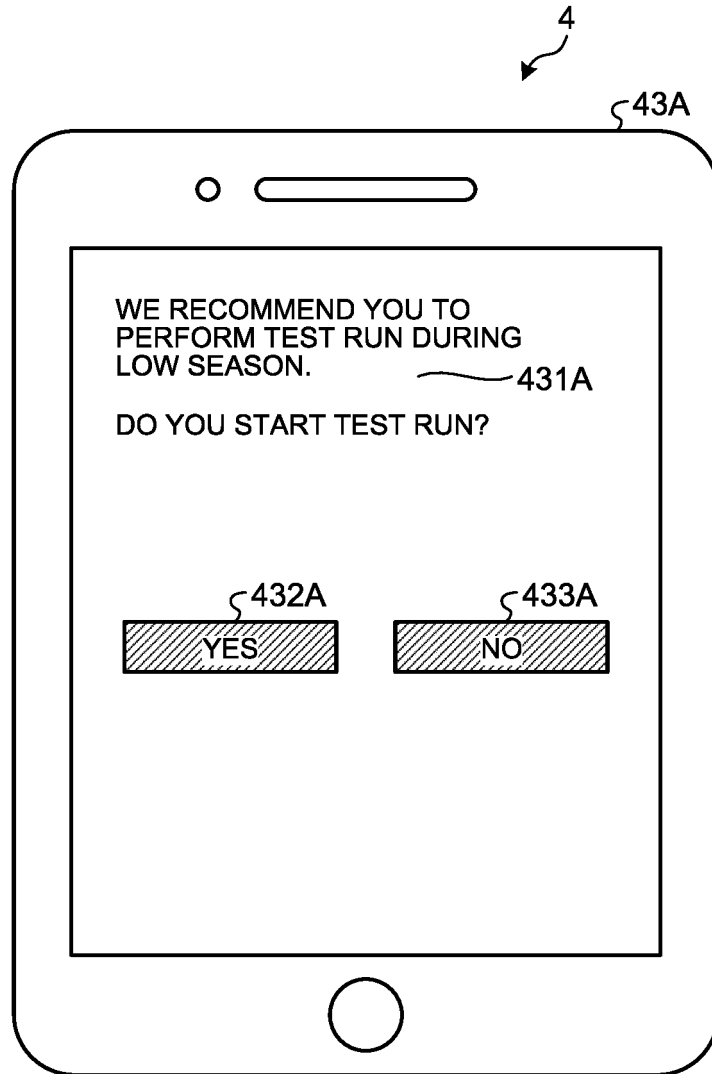


FIG.9

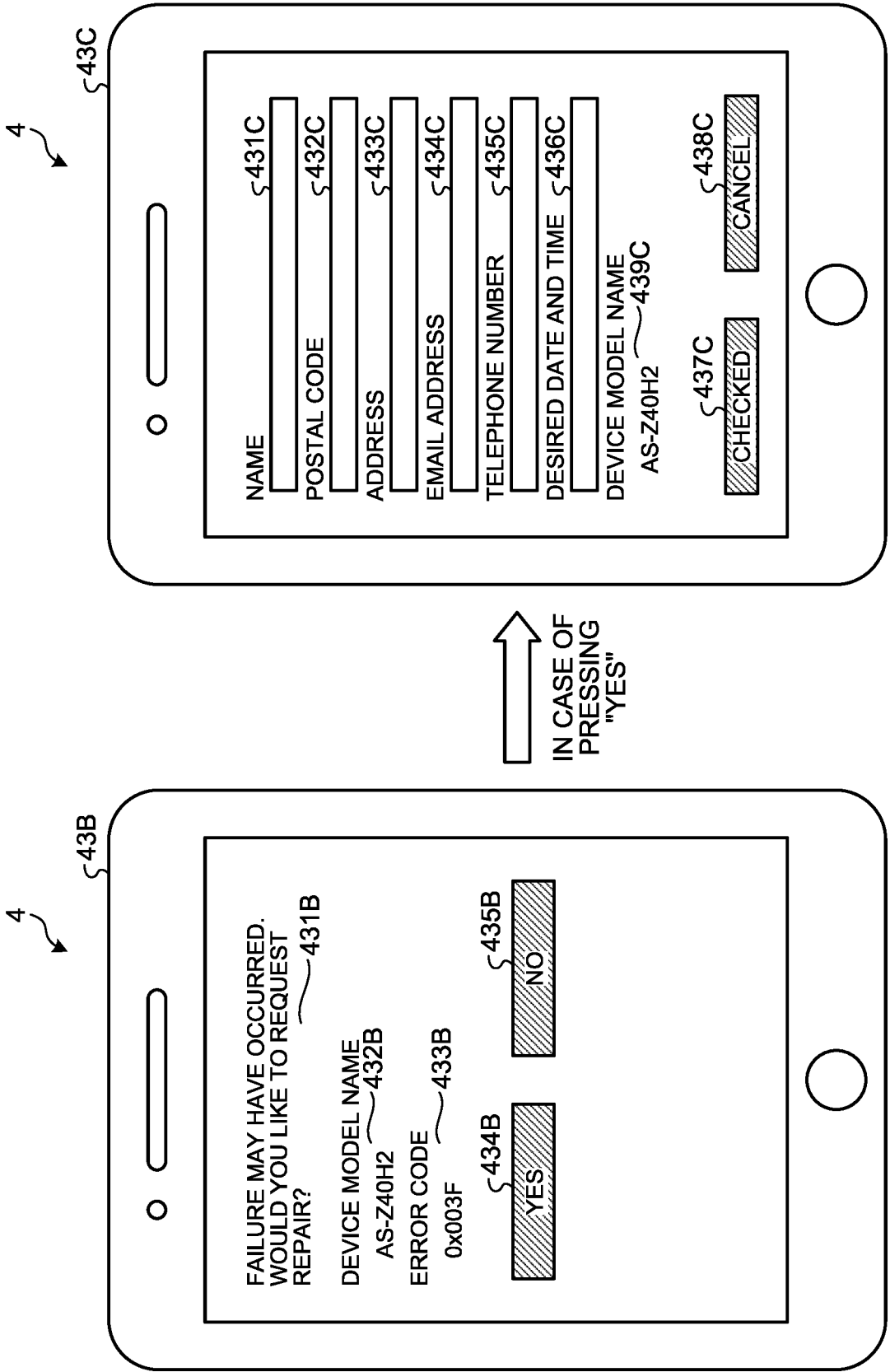


FIG.10

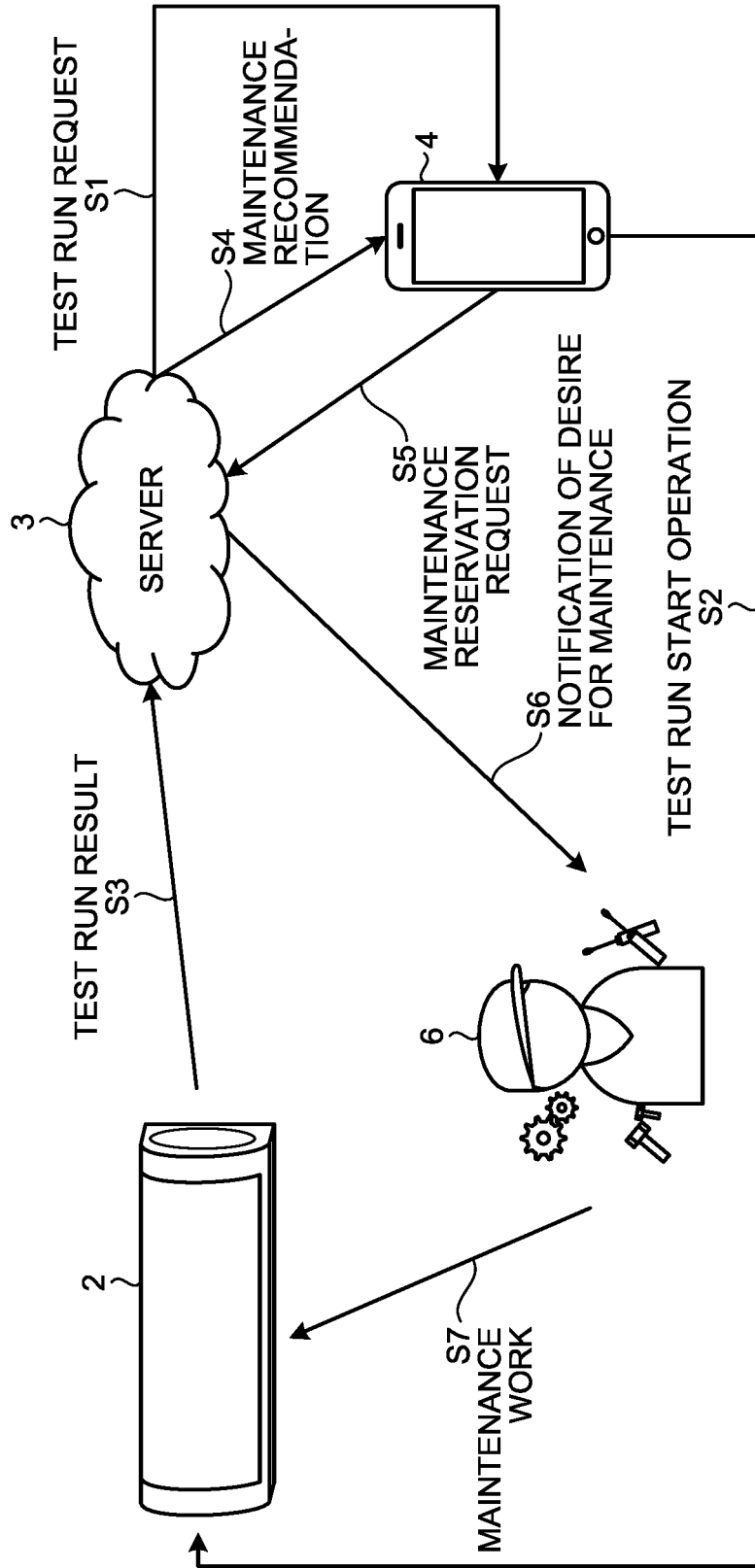


FIG.11

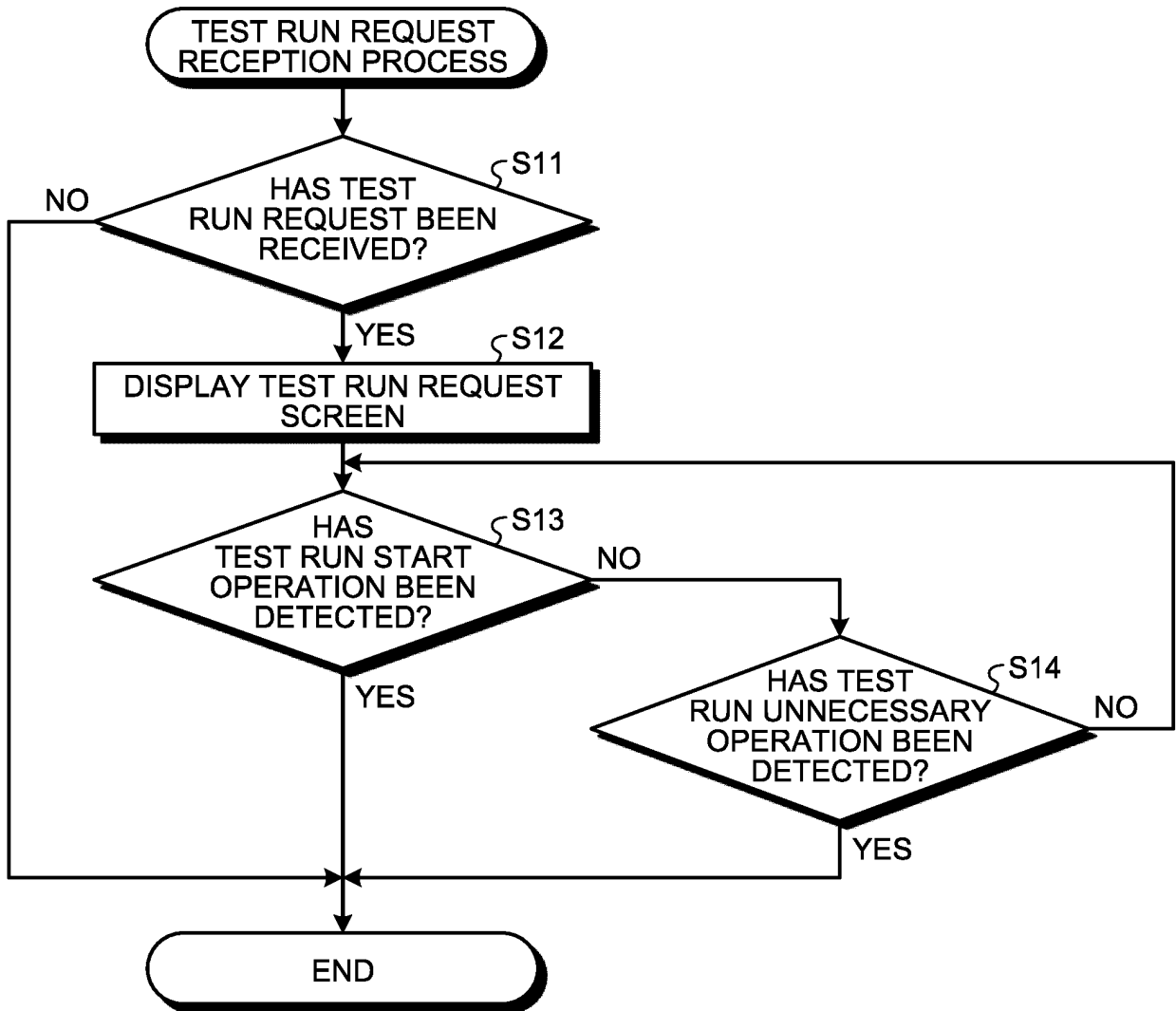


FIG.12

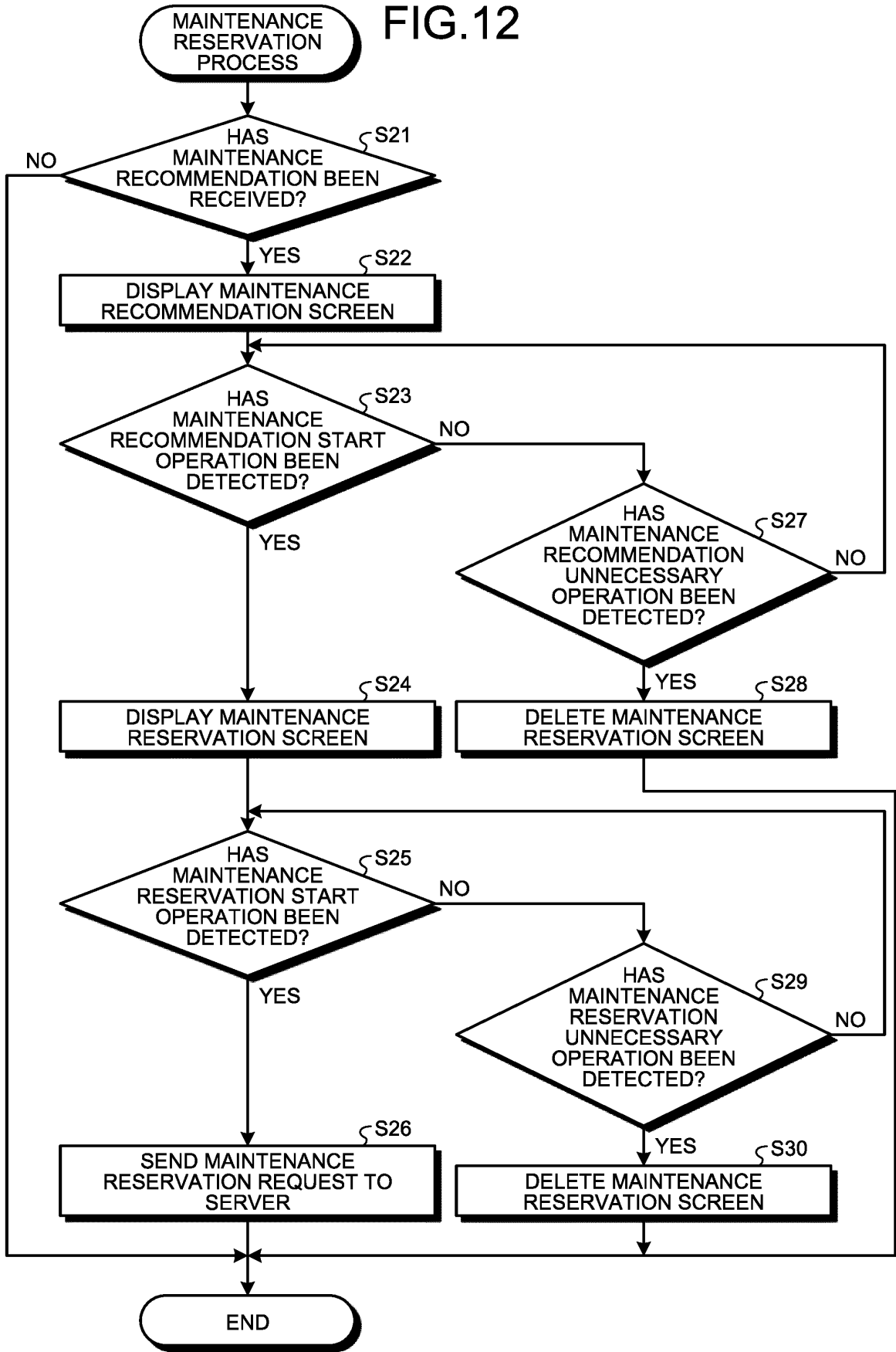


FIG.13

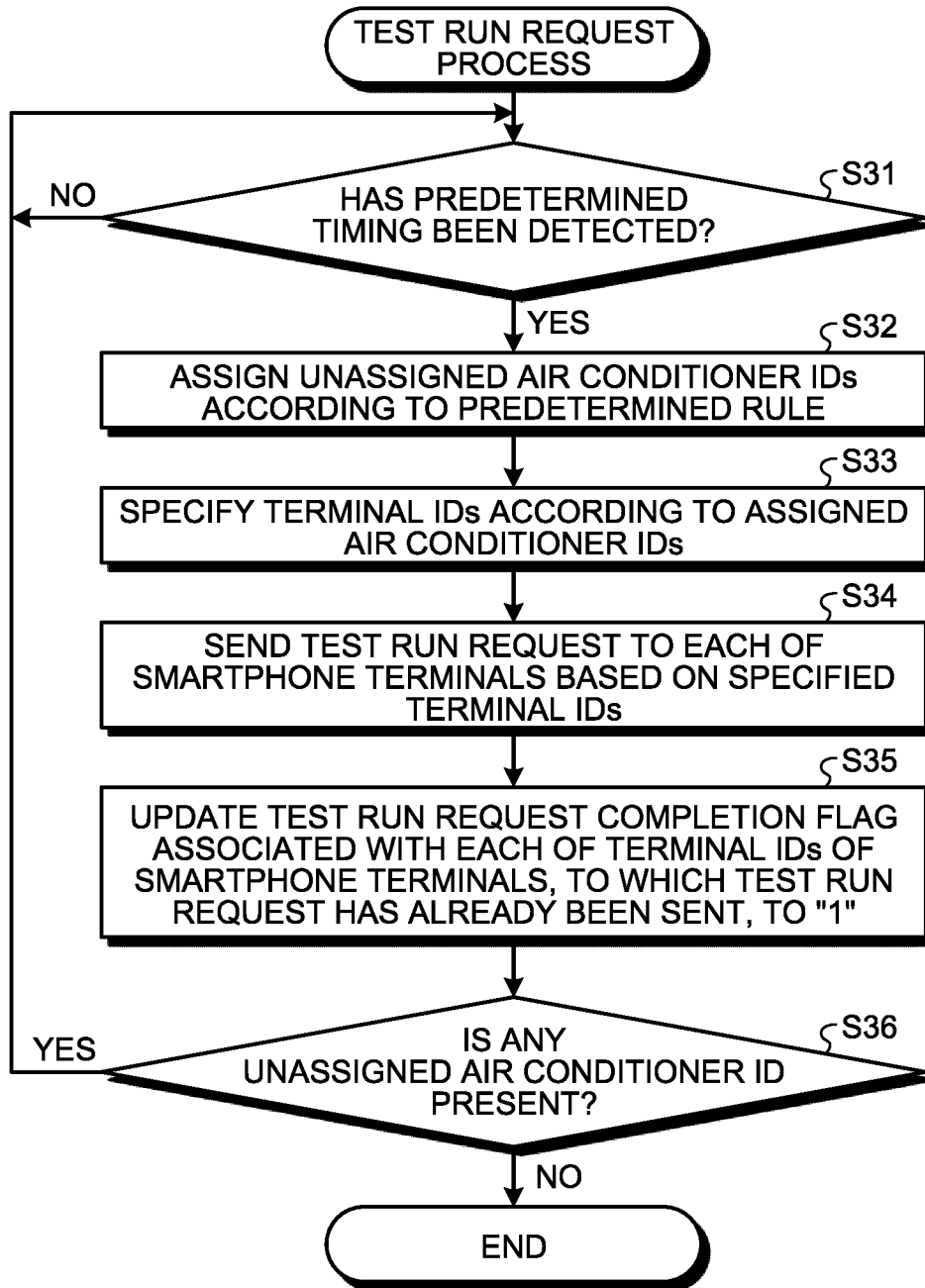


FIG.14

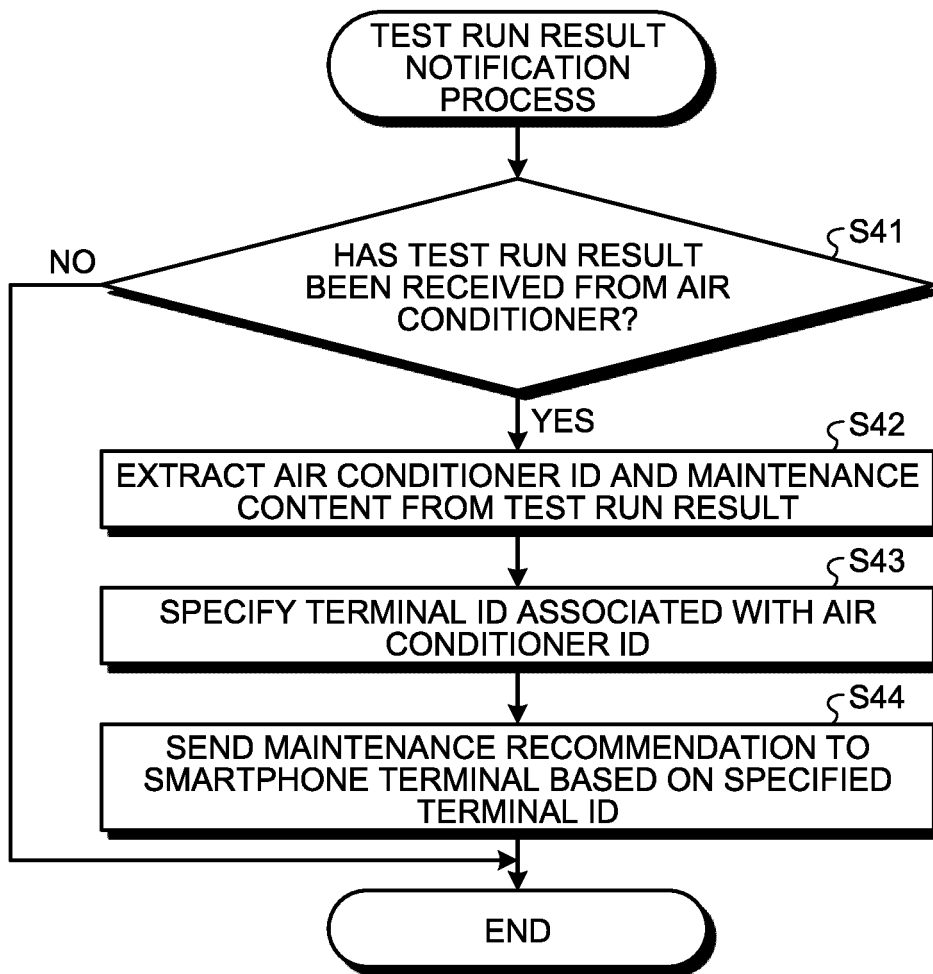


FIG.15

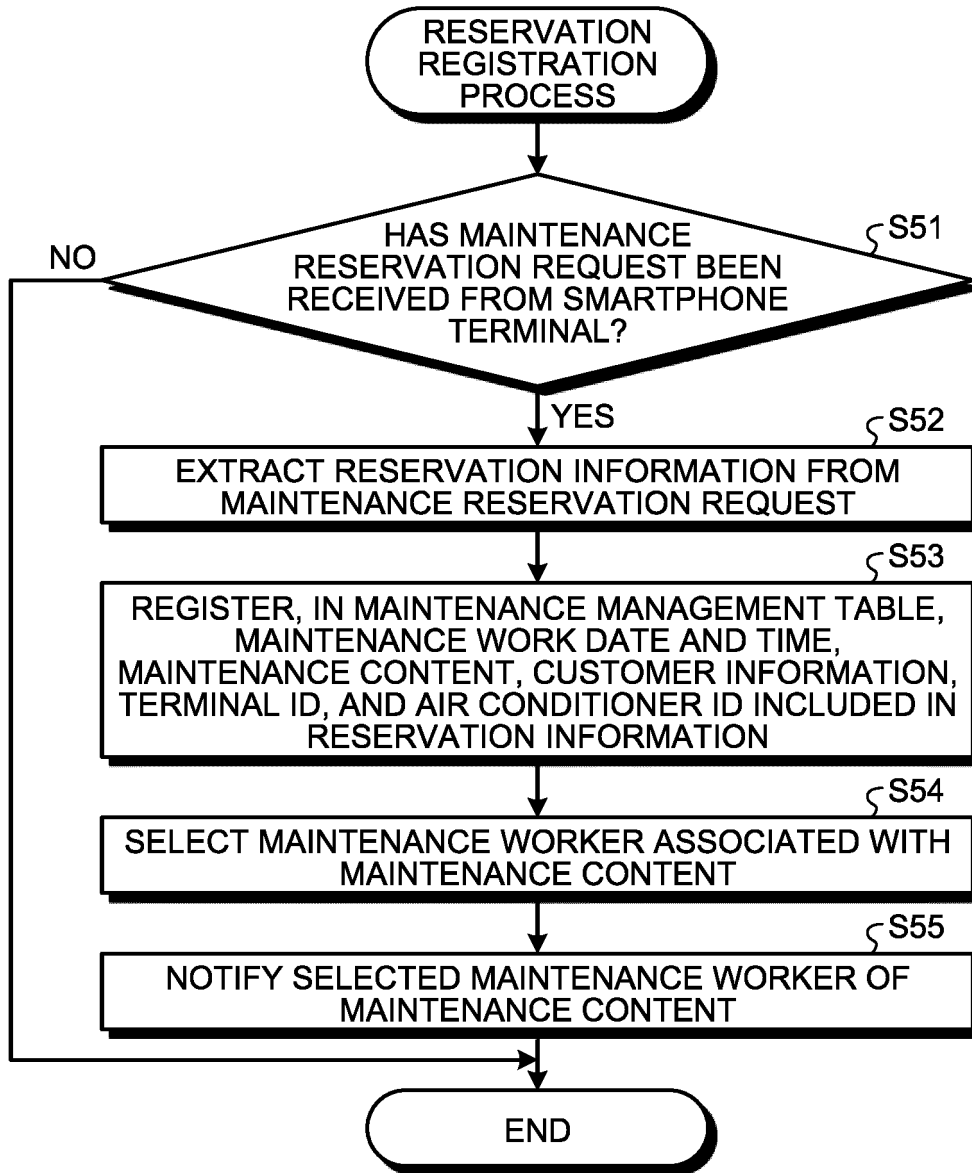


FIG.16

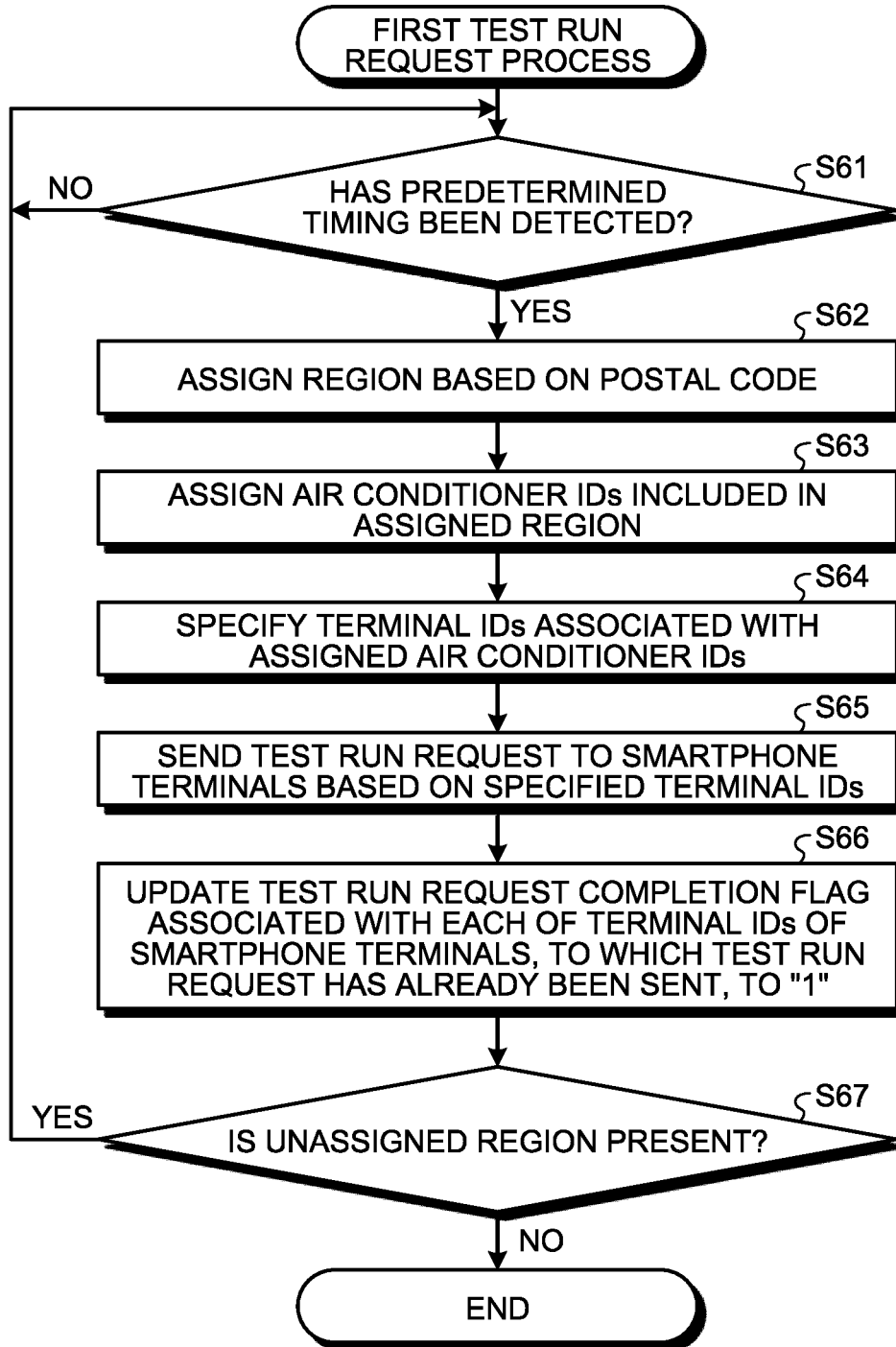


FIG.17

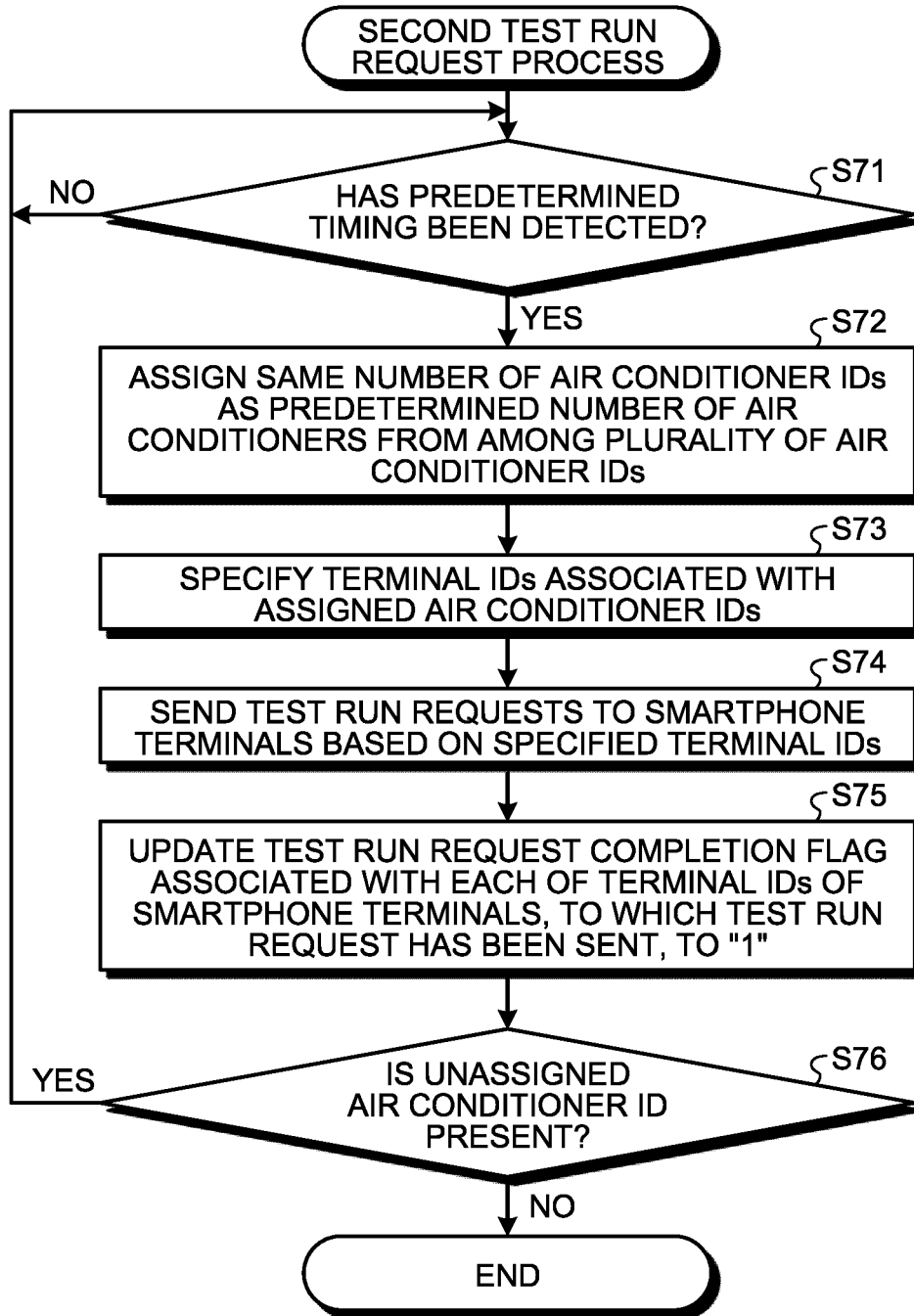
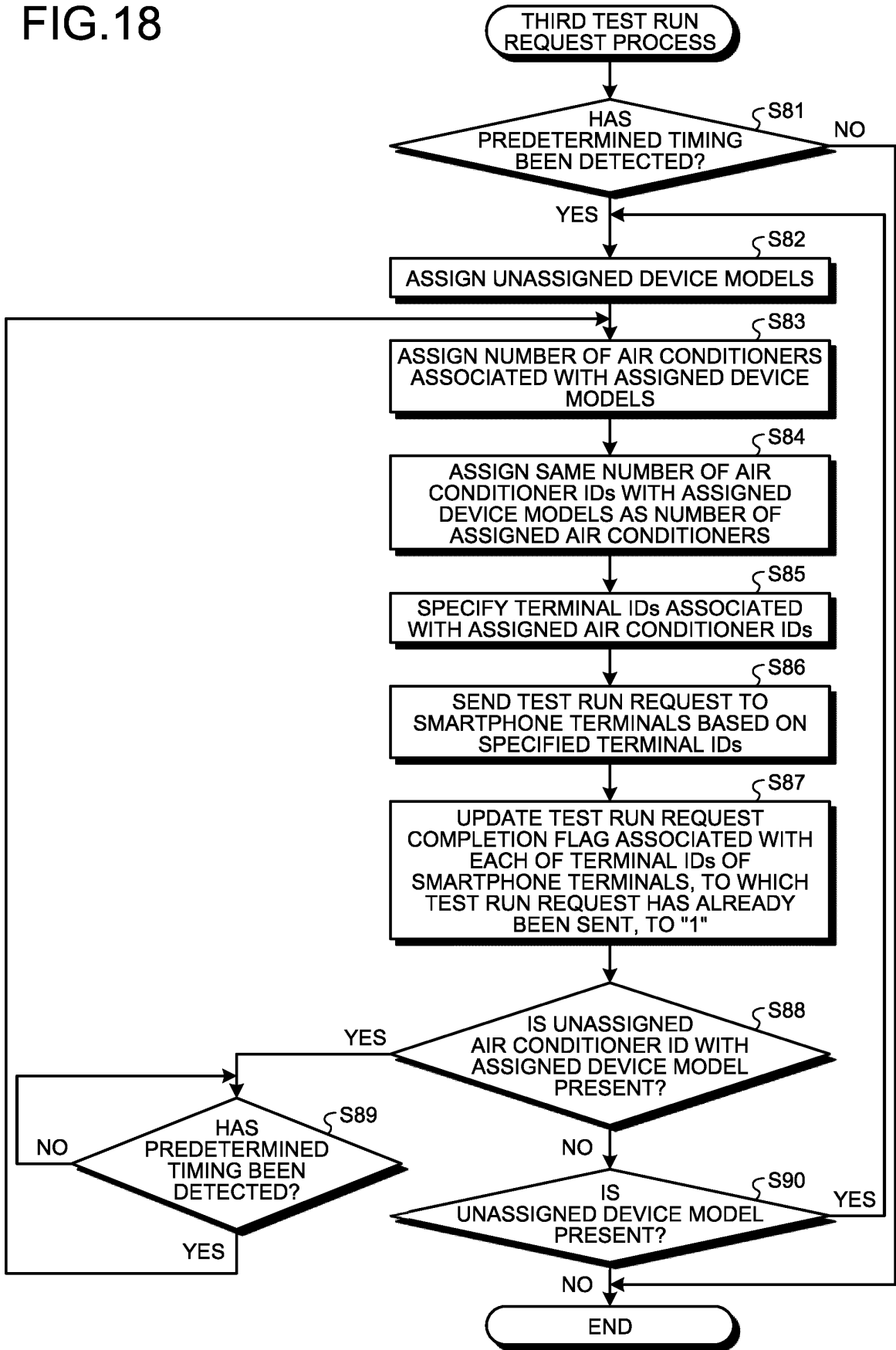


FIG.18



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2021/038643

5	A. CLASSIFICATION OF SUBJECT MATTER		
	<p>F24F 11/49(2018.01); F24F 11/52(2018.01); F24F 11/58(2018.01); F24F 11/64(2018.01) FI: F24F11/49; F24F11/52; F24F11/58; F24F11/64</p> <p>According to International Patent Classification (IPC) or to both national classification and IPC</p>		
10	B. FIELDS SEARCHED		
	<p>Minimum documentation searched (classification system followed by classification symbols) F24F11/49; F24F11/52; F24F11/58; F24F11/64</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p> <p>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</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)</p>		
15			
20	C. DOCUMENTS CONSIDERED TO BE RELEVANT		
	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
25	X	WO 2015/111203 A1 (JOHNSON CONTROLS HITACHI AIR CONDITIONING TECHNOLOGY (HONGKONG) LTD) 30 July 2015 (2015-07-30) paragraphs [0010]-[0117], fig. 1-17	1-5
	Y		6-10
	Y	WO 2020/175409 A1 (DAIKIN IND LTD) 03 September 2020 (2020-09-03) paragraphs [0111]-[0114]	6-8
	Y	JP 2008-249234 A (MITSUBISHI ELECTRIC CORP) 16 October 2008 (2008-10-16) paragraphs [0019]-[0137], fig. 1-16	9-10
30	A	JP 2018-204867 A (MITSUBISHI ELECTRIC CORP) 27 December 2018 (2018-12-27) entire text, all drawings	1-10
	A	JP 2020-86910 A (MITSUBISHI ELECTRIC CORP) 04 June 2020 (2020-06-04) entire text, all drawings	1-10
35	A	JP 2020-139674 A (DAIKIN IND LTD) 03 September 2020 (2020-09-03) entire text, all drawings	1-10
	<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
40	<p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"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</p> <p>"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</p> <p>"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</p> <p>"&" document member of the same patent family</p>		
45			
	Date of the actual completion of the international search	Date of mailing of the international search report	
	29 November 2021	07 December 2021	
50	Name and mailing address of the ISA/JP		Authorized officer
	<p>Japan Patent Office (ISA/JP) 3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915 Japan</p>		
55			Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No. PCT/JP2021/038643

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Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
WO 2015/111203 A1	30 July 2015	US 2017/0010014 A1 paragraphs [0027]-[0142], fig. 1-17 CN 106104163 A	
WO 2020/175409 A1	03 September 2020	(Family: none)	
JP 2008-249234 A	16 October 2008	(Family: none)	
JP 2018-204867 A	27 December 2018	(Family: none)	
JP 2020-86910 A	04 June 2020	(Family: none)	
JP 2020-139674 A	03 September 2020	(Family: none)	

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REFERENCES CITED IN THE DESCRIPTION

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