



(11) **EP 2 535 655 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
19.12.2012 Bulletin 2012/51

(51) Int Cl.:
F24F 11/02 (2006.01)

(21) Application number: **11742095.0**

(86) International application number:
PCT/JP2011/051103

(22) Date of filing: **21.01.2011**

(87) International publication number:
WO 2011/099346 (18.08.2011 Gazette 2011/33)

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

(30) Priority: **10.02.2010 JP 2010028007**

(71) Applicant: **Hitachi Appliances, Inc.**
Minato-ku
Tokyo 105-0022 (JP)

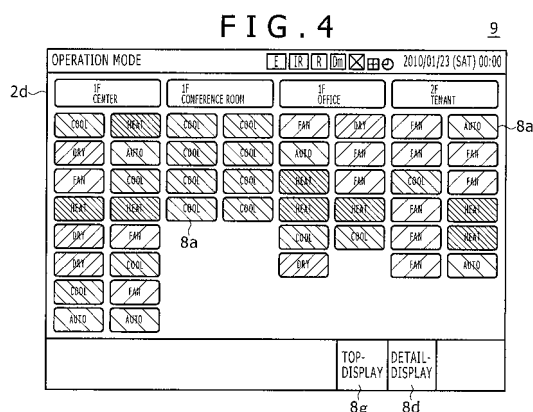
(72) Inventors:
• **KUDO Ena**
Shizuoka-shi
Shizuoka 424-0926 (JP)

• **YAMANASHI Yoshiyuki**
Shizuoka-shi
Shizuoka 424-0926 (JP)
• **SUGIYAMA Naoya**
Shizuoka-shi
Shizuoka 424-0926 (JP)

(74) Representative: **MERH-IP**
Matias Erny Reichl Hoffmann
Paul-Heyse-Straße 29
80336 München (DE)

(54) **AIR-CONDITIONING SYSTEM**

(57) An air-conditioning management system handles a plurality of air conditioners as a group on a room-by-room basis, on a floor-by-floor-basis, and so forth, the air-conditioning management system being provided with a centralized controller for monitoring and controlling of the plural air conditioner groups. The centralized controller is provided with a controller display subunit 2d, and group icons 8a corresponding to the plural air-conditioner groups, respectively, are displayed on one screen of the controller display subunit in a batch. There is adopted a configuration such that respective operation-information pieces of the plural air conditioner groups are displayed at respective sites of the group icons displayed on the one screen of the controller display subunit in a batch, and the controller display subunit is provided with a display-contents switching button for sequentially displaying the respective operation-information pieces of the plural air conditioner groups at the respective sites of the group icons displayed on the one screen of the controller display subunit in a batch. By so doing, the respective varieties of the detailed information pieces on the plural air-conditioner groups can be displayed on the display subunit of the centralized controller in such a way as to enable an operator to easily ascertain the information pieces by a simple operation.



Description

Technical Field

[0001] The invention relates to an air-conditioning management system for managing a plurality of air conditioners, and in particular, to an air-conditioning management system for displaying information on a plurality of air conditioner groups in a batch.

Background Art

[0002] An air-conditioning management system is provided with a centralized controller for managing a plurality of air conditioners, and the centralized controller executes display and setting of respective operation states of air-conditioner groups. More specifically, the plural air conditioners are handled as an air-conditioner group (hereinafter also referred to simply as "a group") on a room-by-room basis, on a floor-by-floor-basis, and so forth to be thereby controlled.

[0003] Air-conditioning management systems according to the related art include one described in Patent Document 1.

Citation List

Patent Literature

[0004]

Patent Document 1: Japanese Unexamined Patent Application Publication No. 2009-36392

Summary of Invention

Technical Problem

[0005] With the centralized controller of the air-conditioning management system according to the related art, an operation state, and operation data are displayed on a group-by-group basis to be thereby ascertained. However, this system is for displaying groups on a list, and displaying many information pieces, such as set-temperature, filter-cleaning required, and so forth, after integration on a group-by-group basis at a time. The system, therefore, has a problem in that it is not easy to ascertain information as needed. Further, it is necessary to execute several complex operations in order to cause the information as needed to be displayed.

[0006] It is therefore an object of the invention to obtain an air-conditioning management system capable of causing information on various types of operations with respect to plural air-conditioner groups to be displayed on a group-by-group basis on the display subunit of a centralized controller in such a way as to be easily ascertained by a simple operation.

Solution to Problem

[0007] To that end, in accordance with one aspect of the invention, there is provided an air-conditioning management system provided with a centralized controller for monitoring and controlling a plurality of air conditioner groups, the centralized controller comprising a controller display subunit, a group display means for displaying respective group display sites corresponding to the plural air conditioner groups on one screen of the controller display subunit in a batch, a group operation-information display means for displaying respective operation-information pieces of the plural air conditioner groups on the one screen of the controller display subunit, and a display-contents switching means for switching the contents of display, displayed on the controller display subunit.

[0008] Further, in accordance with one aspect of the invention, there is provided an air-conditioning management system provided with a centralized controller for monitoring and controlling a plurality of air conditioner groups by handling plural air conditioners as a group on a room-by-room basis, on a floor-by-floor-basis, and so forth, the centralized controller comprising a controller display subunit, wherein respective group icons corresponding to the plural air conditioner groups are displayed on one screen of the controller display subunit in a batch, and respective operation-information pieces of the plural air conditioner groups are displayed at respective sites of the group icons displayed on the one screen of the controller display subunit in a batch, the controller display subunit comprising a display-contents switching button for sequentially displaying the respective operation-information pieces of the plural air conditioner groups at the respective sites of the group icons displayed on the one screen of the controller display subunit in a batch.

Advantageous Effects of Invention

[0009] With the present invention, it is possible to obtain an air-conditioning management system capable of causing information pieces of plural air-conditioner groups to be displayed on a group-by-group basis on the display subunit of a centralized controller in such a way as to be easily ascertained by a simple operation.

Brief Description of Drawings

[0010]

Fig. 1 is a view showing an overall configuration of a first embodiment of an air-conditioning management system according to the invention;

Fig. 2 is a control block diagram of the air-conditioning management system according to the first embodiment;

Fig. 3 is a view showing an example of a top screen that is normally displayed on a display subunit of a

centralized controller;

Fig. 4 is a view showing an example of an operation-mode display screen;

Fig. 5 is a view showing an example of a set-temperature display screen;

Fig. 6 is a view showing an example of a fan speed display screen;

Fig. 7 is a view showing an example of a wind-direction display screen;

Fig. 8 is view for describing setting of wind-directions;

Fig. 9 is a view showing an operation-detail setting screen in a pop-up fashion;

Fig. 10 is a view showing an example of a maintenance-information display screen;

Fig. 11 is a view showing an example of a compressor operation-state display screen;

Fig. 12 is a view showing an example of an air-conditioner operation-time display screen;

Fig. 13 is a view showing an example of a screen for setting a recommendable cooling temperature and a recommendable heating temperature;

Fig. 14 is a view showing an example of a screen for setting detailed information displayed in units of display modes;

Fig. 15 is a flow chart for describing switching of detailed information display to a display subunit;

Fig. 16 is a flow chart for describing another example of switching of the detailed information display to the display subunit;

Fig. 17 is a flow chart for describing the respective displays of group icons on the set-temperature display screen shown in Fig. 5 in the case where a set-temperature set in a group differs from the recommendable cooling temperature or the recommendable heating temperature, preset by a centralized controller; and

Fig. 18 is a flow chart for describing setting of detailed information to be displayed in units of display modes.

Description of Embodiments

[0011] There are described hereinafter embodiments of the invention with reference to the accompanying drawings.

First Embodiment

[0012] A first embodiment of an air-conditioning management system according to the invention is described with reference to Figs. 1, and 2. Fig. 1 is a view showing an overall configuration of the air-conditioning management system, and the air-conditioning management system 1 is provided with a centralized controller 2 for managing a plurality of air conditioners. The centralized controller executes display and setting of respective operation states of air-conditioner groups A1, A2, ... (in Fig. 1, only A1, A2 are shown; however, the number of the groups may be not less than three). More specifically,

plural indoor units 4 (4,..., 4n) are handled as a group A1, A2,... on a room-by-room basis, on a floor-by-floor basis, and so forth to be thereby controlled. The respective air-conditioner groups are made up such that the plural indoor units 4 (4, ..., 4n) connected to, for example, one remote-control switch 5 are integrated with each other, and monitoring and controlling of the plural indoor units 4 can be executed in a batch.

[0013] Further, a plurality of the groups A1, A2,... integrated with each other, are handled as an air conditioner block (hereinafter referred to as a block). In Fig. 1, only the block A is shown, however, not less than two blocks (the blocks B, C, D,...) can be connected to one controller, that is, the centralized controller 2.

[0014] Plural outdoor units 3, the plural indoor units 4, a regeneration unit 7, the remote-control switch (hereinafter referred to simply as "remote control") 5, and so forth are connected to the centralized controller 2 via a control wiring 6.

[0015] Fig. 2 is a control block diagram of the air-conditioning management system according to the present embodiment. The centralized controller 2 includes a communication subunit 2a, a control subunit 2b, an input subunit 2c, a controller display subunit 2d, and a storage subunit 2e. The indoor unit 4 is provided with a control subunit 4b, and a communication subunit 4a for use in communication with the centralized controller 2, the outdoor unit 3, and the remote control 5, respectively. The outdoor unit 3 is provided with a communication subunit 3a for use in communication with the communication subunit 4a, and a control subunit 3b. The remote control 5 is provided with not only a communication subunit 5a for use in communication with the communication subunit 4a, but also a control subunit 5b, an input subunit 5c, a display subunit 5d, and a storage subunit 5e.

[0016] The control subunit 2b of the centralized controller 2 transmits an operation-instruction demand (change in operation mode, set temperature, and so forth) from the input subunit 2c to the indoor unit 4 via the control wiring 6 from the communication subunit 2a. The operation-instruction demand is received by the communication subunit 4a, whereupon the operation-instruction demand is executed by the control subunit 4b. After the execution, the control subunit 4b of the indoor unit transmits changed data to the centralized controller 2 via the communication subunit 4a, and the control wiring 6. The communication subunit 2a of the centralized controller 2 receives the changed data from the communication subunit 4a of the indoor unit, thereby displaying the contents of a change on the controller display subunit 2d. Further, the changed data is also transmitted from the communication subunit 4a of the indoor unit to the outdoor unit 3, and the remote control 5, respectively.

[0017] Transmission of an operation-instruction demand from the remote control 5 as well can be made to the indoor unit 4, and this operation-instruction demand from the remote control 5 is transmitted to the communication subunit 4a of the indoor unit 4 via the communi-

cation subunit 5a of the remote control, and the control wiring 6. In the case of the operation-instruction demand received from the remote control 5, changed data is also transmitted to the centralized controller 2, and the outdoor unit 3 via the communication subunit 4a of the indoor unit 4, and the control wiring 6.

[0018] Further, communication is performed between the indoor unit 4 and the centralized controller 2 every time operation data is changed, or at a given time interval, and the centralized controller 2 retains information on an operation between the outdoor unit 3 having received the operation data from the indoor unit 4, and the indoor unit 4, and so forth in the storage subunit 2e. By so doing, information (operation-information, group name, and so forth) on the respective air-conditioner groups A1, A2, ... can be displayed on the controller display subunit 2d to be thereby ascertained.

[0019] Next, there is described hereinafter an example of display at the controller display subunit 2d according to the present embodiment with reference to Figs. 3 - Figs. 18.

Fig. 3 shows a top screen that is normally displayed by the centralized controller 2. In the figure, 8a denotes a group icon corresponding to an individual air-conditioner group, and 8b denotes a block icon corresponding to individual air conditioner block categorized by the plural air-conditioner groups. The name of the individual air-conditioner group is displayed in the group icon, and the name of the individual air conditioner block is displayed in the block icon.

[0020] In the case of this example, four blocks including A block (1F Center), B block (1F Conference Room), C block (1 F Office) and D block (2 F Tenant) are displayed in the block icon 8b. The respective blocks include at least one group of the air-conditioner group, and the respective group icons 8a of the air-conditioner groups included in each of the blocks are displayed under each of the block icons. More specifically, the icons such as the group icons A1 (the air-conditioner group for air-conditioning of the general affairs dept.), A2 (the air-conditioner group for air-conditioning of the accounting business dept.), ... and so forth are disposed under the block icon A for the purpose of display.

[0021] Similarly, the group icons B1 (the air-conditioner group for air-conditioning of Conference Room 1), B2 (the air-conditioner group for air-conditioning of Conference Room 2), ..., and so forth are disposed under the block icon B, the group icons C1 (the air-conditioner group for air-conditioning of Office 1), C2 (the air-conditioner group for air-conditioning of Office 2), ..., and so forth are disposed under the block icon C, and the group icons D1 (the air-conditioner group for air-conditioning of Tenant 1A), D2 (the air-conditioner group for air-conditioning of Tenant 1B), ..., and so forth are disposed under the block icon D, respectively.

[0022] The respective group icons 8a are made up so as to be displayed in respective colors different from each other for every run/stop.

[0023] In the case where there exists not less than one group of the groups including at least one indoor unit 3 (4) where "regeneration operation," "inspection required," "operation under restriction," "filter cleaning required," "timer setting," and so forth are applicable, or at least one regeneration unit 7, or all the indoor units 4 connected to the centralized controller 2 are under setting of "remote control operation prohibited," a various-information icon 8c is displayed in the upper part of the controller display subunit 2d. Date and time are also displayed in the upper part of the controller display subunit 2d.

[0024] Further, a detail-display button 8d, a menu button 8j, a button 8k for all-groups setting in a batch, a button 8l for all-groups operation in a batch, and a button 8m for all the-groups stop in a batch are displayed in the lower part of the controller display subunit 2d.

[0025] With a push of the detail-display button 8d, the top screen 8 is switched to a detailed information 1 display screen 9. There are available two different methods for switching between detailed information display screens thereafter.

[0026] With one of the methods, after the information display screen is switched to the detailed information 1 display screen 9, the detail-display button 8d, a top button 8g, and the button 8k for all-groups setting in a batch are displayed in the lower part of the controller display subunit 2d, as shown in Fig. 4. As shown in a flow chart of Fig. 15, display is sequentially switched from [the detailed information 1 display screen 9 → a detailed information 2 display screen 10 → ... → a detailed information n display screen 20 → the top screen 8] at the time of every push of the detail-display button 8d. As the top button 8g is provided, it is possible to cause any detail-display screen to revert to the top screen 8.

[0027] With the present embodiment, the detailed information 1 display screen 9 is an operation-mode display screen shown in Fig. 4. With a push of the detail-display button 8d in this operation-mode display screen 9, an immediately following detailed information screen is displayed (if the immediately following screen is the top screen, the top screen is displayed). Further, with a push of the top button 8g, the operation-mode display screen 9 is caused to revert to the top screen. More specifically, as shown in the flow chart of Fig. 15, with the push of the top button 8d on the top screen 8 shown in Fig. 3, there occurs a transition to the detailed information 1 display screen 9 (the operation-mode display screen), and with a push of the detail-display button 8d again, the detailed information 1 display screen 9 is switched to an immediately successive detailed information 2 display screen 10 (in this example, to a set-temperature display screen shown in Fig. 5). Thereafter, at the time of every push of the detail-display button 8d, a detailed information display screen undergoes a transition to the next detailed information display screen, and with a push of the detail-display button 8d in the detailed information n display screen 20, the detailed information n display

screen 20 is caused to revert to the top screen 8. Further, with the push of the detail-display button 8d in any of the detailed information display screen, any detailed information display screen can be reverted to the top screen 8.

[0028] With another of the methods, after the information display screen is switched to the detailed information 1 display screen 9, a preceding information button 8e, a following information button 8f, the top button 8g, and the button 8k for all-groups setting in a batch are displayed in the lower part of the controller display subunit 2d, as shown in Fig. 6. By so doing, display is sequentially switched from [the detailed information 1 display screen 9 → the detailed information 2 display screen 10 → ... → the detailed information n display screen 20 → the top screen 8] at the time of every push of the following information button 8f, as shown in a flow chart of Fig. 16. Further, since the top button 8g is provided, it is possible to cause any detailed information display screen to revert to the top screen 8.

[0029] With this example as well, the detailed information 1 display screen 9 is similarly the operation-mode display screen shown in Fig. 4. With a push of the following information button 8f in this operation-mode display screen 9, the immediately following detailed information screen is displayed (if the immediately following screen is the top screen, the top screen is displayed) and a push of the preceding information button 8e, an immediately preceding detailed-information screen is displayed. Further, with the push of the top button 8g, the operation-mode display screen 9 is caused to revert to the top screen. More specifically, as shown in the flow chart of Fig. 16, with a push of the detail-display button 8d in the top screen 8 shown in Fig. 3, there occurs a transition to the detailed information 1 display screen 9 (the operation-mode display screen), and subsequently, with a push of the following information button 8f, the detailed information 1 display screen 9 is switched to an immediately following detailed information 2 display screen 10 (the set-temperature display screen shown in Fig. 5). Thereafter, at the time of every push of the following information button 8f, the detailed information 2 display screen 10 undergoes a transition to the next detailed information display screen, and with a push of the following information button 8f in the detailed information n display screen 20, the detailed information n display screen 20 is caused to revert to the top screen 8. Further, with a push of the preceding information button 8e, an immediately preceding detailed information screen can be displayed. Further, with the push of the preceding information button 8e in any of the detailed information display screen, any detailed information display screen can be reverted to the top screen 8.

[0030] Further, a configuration may be adopted such that if a button manipulation is not executed for a given time period after switching of the detailed information display screen, the screen is caused to automatically revert to the top screen 8.

[0031] With the present embodiment, with a push of

the detail-display button 8d or the following information button 8f in the detailed information 2 display screen 10 (the set-temperature display screen shown in Fig. 5), the detailed information display screen is shifted to a fan speed display screen 11 shown in Fig. 6, and further, at the time of every push of the detail-display button 8d or the following information button 8f, the fan speed display screen 11 is sequentially switched to a wind-direction display screen 12 shown in Fig. 7, a maintenance-information display screen 14 shown in Fig. 10, a compressor operation-state display screen 15 shown in Fig. 11, and an air-conditioner accumulated operation-time display screen 16 shown in Fig. 12. Thus, with the present embodiment, at the time of every push of the detail-display button 8d or the following information button 8f, the detailed information display screen can be sequentially shifted to the following screens to thereby cause operation-information on all the air-conditioner groups to be displayed on one screen, so that it is possible to keep displaying any number of operation-information pieces that need be displayed. Furthermore, the respective icons of all the groups are displayed in a batch (the respective icons of all the groups are displayed on one screen), and the icons of the respective groups are displayed at respective positions identical to each other, in the controller display subunit 2d, so that even if the screen is shifted to any of the detailed information screens, it is possible to instantly ascertain the operation-information on the air-conditioner group to be ascertained.

[0032] Next, there is described the contents of display on each of the detailed information display screens.

In the operation-mode display screen 9, the respective group icons 8a are displayed in colors differing from each other by the operation mode of each of the air-conditioner groups (with the present embodiment, the colors differing from each other are expressed by indicating the respective group icons 8a that are shown in differently textured half-tone dot meshing), as shown in Fig. 4. In the case of divergent operation modes (an operation mode as set from the centralized controller 2 differing from an operation mode actually in operation due to an operation cycle state of the outdoor unit 3), both the operation modes are displayed. As shown by a divergent operation modes group icon 9a, "heating" according to an operation mode (the divergent operation modes) set from the centralized controller 2 is displayed in upper steps, and "cooling" according to the operation mode (a real operation mode) of the outdoor unit 3 actually in operation is displayed in lower steps by flashing light.

[0033] The set-temperatures of the respective air-conditioner groups are displayed on the set-temperature display screen 10, as shown in Fig. 5. A recommendable temperature can be preset, and it can be ascertained on the set-temperature display screen 10 that a set-temperature for the duration of a cooling operation is set lower than a recommendable cooling temperature or a set-temperature for the duration of a heating operation is set higher than a recommendable heating temperature. The

recommendable cooling temperature and the recommendable heating temperature can be set on common screens as integrated after transition to a recommendable temperature setting screen 17 shown in Fig. 13 from the menu button 8j on the top screen 8 shown in Fig. 3.

[0034] In Fig. 5, if the set-temperature of an air-conditioner group for the duration of the cooling operation is set lower than a recommendable cooling temperature (28°C in this example), the group icon 8a of the air-conditioner group is displayed in a color different from a normal color. With a push of a recommendable cooling temperature setting button 8h on the screen of Fig. 5, the set-temperatures of an air-conditioner group, set lower than the recommendable cooling temperature, are forcefully changed to the recommendable cooling temperature (28°C) in a batch, whereupon the group icon 8a of the air-conditioner group whose set-temperature has been changed to the recommendable cooling temperature is displayed in the normal color.

[0035] Similarly, in Fig. 5, if the set-temperature of an air-conditioner group for the duration of the heating operation is higher than a recommendable heating temperature (20°C in this example), the group icon 8a of the air-conditioner group is displayed in a color other than the normal color, and the color in the case where the set-temperature is lower than the recommendable cooling temperature.

With a push of a recommendable heating temperature setting button 8i on the screen of Fig. 5, the set-temperatures of an air-conditioner group, set higher than the recommendable heating temperature, are forcefully changed to the recommendable heating temperature (20°C) in a batch, whereupon the group icon 8a of the air-conditioner group whose set-temperature has been changed to the recommendable heating temperature is displayed in the normal color.

[0036] With this example, if the set-temperature for the duration of the cooling operation is lower than the recommendable cooling temperature or the set-temperature for the duration of the heating operation is higher than the recommendable heating temperature, the group icon 8a is displayed in the color different from the normal color for the purpose of warning, however, the group icon 8a may be, for example, flashed instead of varying color for the purpose of warning to be thereby displayed.

[0037] Further, if the air-conditioner group that is forcefully changed in a batch by the recommendable cooling temperature setting button 8h or the recommendable heating temperature setting button 8i, and an air-conditioner group other than a target for a change in a batch are preset, this will enable flexible support matching the actual state of an area as a target for air-conditioning management.

[0038] A flow chart of a display method described in Fig. 5 is as shown in Fig. 17. More specifically, if the recommendable cooling temperature is set by the centralized controller 2 shown in Figs. 1, and 2, respectively, the set-temperature of a group is set lower than the rec-

ommendable cooling temperature, and the group icon 8a of the group as the target for the change in a batch is displayed in the color different from the normal color. Upon the recommendable cooling temperature setting button 8h shown in Fig. 5 being pushed in this state, the set-temperatures of all the groups as the targets for the change in a batch are forcefully changed to the recommendable cooling temperature, and the group icon 8a is displayed in the normal color, as shown in Fig. 17 (a). Similarly, if the recommendable heating temperature is set by the centralized controller 2 shown in Figs. 1, and 2, respectively, the set-temperature of a group is set higher than the recommendable heating temperature, and the group icon 8a of the group as the target for the change in a batch is displayed in the color other than the normal color, and the color in the case where the set-temperature is lower than the recommendable cooling temperature. Upon the recommendable heating temperature setting button 8i shown in Fig. 5 being pushed in this state, the set-temperatures of all the groups as the targets for the change in a batch are forcefully changed to the recommendable heating temperature, and the group icon 8a is displayed in the normal color, as shown in Fig. 17 (b). The set-temperature can be switched over in display between Celsius temperature and Fahrenheit temperature (not shown).

[0039] With the fan speed display screen 11, the respective group icons 8a are displayed in colors differing from each other by the fan speed of each of the air-conditioner groups, as shown in Fig. 6.

[0040] On the wind-direction display screen 12 shown in Fig. 7, there is displayed a wind-direction angle of a blow-off air blew off from the indoor unit 4. With the present embodiment, the wind-direction angle can be set in 8 stages, and displays in the controller display subunit 2d are provided according to respective wind-directions that are set, as shown in Fig. 8. More specifically, the wind-direction in a first stage corresponds to an angle at which air is blew off in a direction closest to the horizontal direction, the wind-directions in second and third stages, respectively, gradually point more downward, and the wind-direction in a seventh stage corresponds to an angle at which the air is blew off in the most downward direction. Further, there is provided an auto wind-direction mode, which is a mode for causing the wind-direction to be automatically varied from the horizontal direction to downward or from downward to the horizontal direction. As shown in Fig. 7, the respective group icons 8a of the air-conditioner groups with a fixed wind-direction angle are displayed in a color differing from a color in which the respective group icons 8a of the groups where the auto wind-direction mode is set.

[0041] There is also provided an outdoor unit operation cycle display screen (not shown) for displaying the operation cycle state of the outdoor unit 3, and the operation modes (a cooling-operation mode, a heating-operation mode, an auto cooling/heating operation mode, a dry operation mode, and so forth) of the outdoor unit 3 are dis-

played on the outdoor unit operation cycle display screen. As is the case with the operation-mode display screen 9 shown in Fig. 4, the respective group icons 8a are displayed in colors differing from each other by the operation mode.

[0042] Upon the group icon 8a of an air-conditioner group, the block icon 8b, or the button 8k for all-groups setting in a batch being pushed on the operation-mode display screen 9 (Fig. 4), the set-temperature display screen 10 (Fig. 5), the fan speed display screen 11 (Fig. 6), the wind-direction display screen 12 (Fig. 7), and the outdoor unit operation cycle display screen (not shown), respectively, an operation-condition setting screen 13 shown in Fig. 9 is displayed in a pop-up fashion. With respect to a relevant air-conditioner group, block, or all the air-conditioner groups, setting of run/stop, setting of an operation mode, setting of a set-temperature, setting of a fan speed, setting of wind-direction, setting of remote control operation (permitted/prohibition), and a change in the contents of setting can be executed from the operation-condition setting screen 13.

[0043] If the respective air-conditioner groups apply to at least any of "regeneration operation," "inspection required," "operation under restriction (demand setting)," "filter cleaning required," "timer setting," and "remote control operation prohibited" on the maintenance-information display screen 14 shown in Fig. 10, the various-information icons 8c applicable to those information, respectively, are displayed in the respective group icons 8a, as shown in the figure. In such a case, the respective group icons 8a are displayed in various colors different from the normal color.

[0044] Besides the display screens described as above, there are provided detailed information screens including an inlet-temperature display screen, an ambient-temperature display screen, a remote control thermometer display screen, a remote thermometer display screen, and so forth, and respective temperatures are displayed as is the case with the set-temperature display screen 10 shown in Fig. 5. Temperature in the periphery of a remote control switch is displayed on the remote control thermometer display screen, and a mean value between the inlet-temperature and the reading of a remote thermometer is displayed on the remote thermometer display screen.

[0045] In the case of the compressor operation-state display screen 15 shown in Fig. 11, if a compressor of the outdoor unit to which a relevant air-conditioner group is connected via piping is in operation, "thermo ON" is displayed, and if the compressor is in stop, "thermo OFF" is displayed. In the case of "thermo ON," relevant group icons 8a are displayed in a color different from the normal color.

[0046] In the case of the air-conditioner operation-time display screen 16 shown in Fig. 12, accumulated operation time of the indoor unit 4 of the relevant air-conditioner group, in, for example, a relevant month, is displayed as "such and such hours" or "such and such h"

or "such and such H". In Fig. 12, guidance operation hours (in this example, 600 hours) can be preset, and if accumulated the operation time exceeds the guidance operation hours, the group icon 8a of the relevant air-conditioner group is displayed in a color different from the normal color.

[0047] In the case of the outdoor unit compressor's thermo-ON time display screen (not shown), compressor operation hours of the air-conditioner group connected to the outdoor unit, in the relevant month, are displayed as is the case with the air-conditioner accumulated operation-time display screen 16 shown in Fig. 12.

[0048] Fig. 13 shows the screen 17 for setting the recommendable cooling temperature, and the recommendable heating temperature, and a transition from the menu button 8j shown in Fig. 3 to the screen 17 is possible, thereby enabling the recommendable cooling temperature, and the recommendable heating temperature for all the air-conditioner groups to be set in a batch.

[0049] Further, it is also possible to effect transition from the menu button 8j shown in Fig. 3 to a detailed information display setting screen 18 shown in Fig. 14. With respect to displays on the detailed information display setting screens 9 to 16, and so forth, respectively, a multitude of items of the displays can be set, so that if all the detailed information display setting screens are sequentially displayed at all times, it is expected to take much time before reaching target information. Accordingly, the present embodiment is configured such that display items can be preset as appropriate so as to enable only necessary information according to an operator (a supervisor, service man, and so forth), operating the centralized controller 2, to be displayed on the detailed information display setting screen 18. More specifically, setting can be executed whereby detailed information 1, and detailed information 2 are displayed in "display mode 1" while detailed information 3 is displayed in "display mode 2" on the detailed information display setting screen 18.

[0050] For example, with respect to the operation-mode display screen 9 (Fig. 4), and the set-temperature display screen 10 (Fig. 5) on the detailed information display setting screen 18 shown in Fig. 14, display in "display mode 1" is selected with a push of a display mode 1 button 18a, while with respect to the inlet-temperature display screen, and the remote control thermometer display screen, display in "display mode 2" is selected with a push of a display mode 2 button 18b. Thus, necessity/non-necessity of displaying respective detailed information pieces can be selected for every display mode. By so doing, the operation-mode display screen 9, and the set-temperature display screen 10 can be sequentially displayed in "display mode 1," and the inlet-temperature display screen, and the remote control thermometer display screen can be sequentially displayed in "display mode 2".

[0051] Accordingly, there is available an application method whereby the display mode 1 is used as a moni-

toring mode to display the operation-mode, and the set-temperature while the display mode 2 is used as an inspection mode to display the inlet-temperature, and the remote control thermometer.

[0052] A flow chart of this operation is as shown in Fig. 18. Display or non-display with respect to the respective detailed information pieces 1, 2, ... is decided upon, and setting is made on whether detailed information to be displayed is displayed in the display mode 1, in the display mode 2, or in both the display mode 1 and the display mode 2. If the setting is made as above, the detailed information screens that are set so as to be displayed in the display mode 1 are sequentially displayed in the display mode 1 while the detailed information screens that are set so as to be displayed in the display mode 2 are sequentially displayed in the display mode 2, so that only necessary items according to the operator operating the centralized controller 2 can be sequentially displayed, thereby enabling the operator to reach the target information in short time.

[0053] Further, as to selection of the display mode, setting can also be made such that, for example, if the detail-display button 8d is pushed once on the screen of Fig. 3, the display mode 1 will occur, and if the detail-display button 8d is pushed for awhile, the display mode 2 will occur.

[0054] As described in the foregoing, with the present embodiment, the respective group icons 8a showing information on the air-conditioner group in whole are displayed at a given layout on one screen instead of displaying a wide variety of the detailed information (ascertainment of the operation-information such as the operation mode by the air-conditioner group, the set-temperature, and so forth, ascertainment of maintenance-information such as necessity/non-necessity of inspection, necessity/non-necessity of filter-cleaning, and so forth) in one batch on the screen of the centralized controller 2 for managing the plural air conditioners, and the detailed information is switched to be displayed every time the button is pushed once while displaying the respective group icons 8a showing the operation-information on the air-conditioner group in whole at the given layout by one variety after another on one screen, so that different detailed information pieces can be sequentially displayed at respective positions identical to each other, thereby enabling an air-conditioning management system capable of easily ascertaining the respective varieties of the detailed information pieces on the air-conditioner group in whole to be implemented.

[0055] Further, after an operation state is displayed in the controller display subunit of the centralized controller, and the operation state is ascertained, it is possible to cause a setting-change screen to be displayed in the pop-up fashion as is the case with the operation-condition setting screen 13, so that the present embodiment has an effect that a setting-change can be instantly executed by a simple operation after ascertaining the operation state.

Further, since the respective varieties of the detailed information pieces are switched by one variety after another to be then displayed, the present embodiment has another effect that characters and figures, large in size, can be displayed.

[0056] Further, if an equipment requiring maintenance is included in even one of the air-conditioner groups on the top screen 8 shown in Fig. 3, a maintenance icon for "emergency stop," "inspection required," "filter cleaning required," and so forth, as the various-information icon 8c, is also displayed in the upper part of the controller display subunit 2d, so that it is possible to instantly find out which air-conditioner group requires maintenance if the top screen 8 is caused to undergo a transition to the maintenance-information display screen 14 shown in Fig. 10. Accordingly, the present embodiment has still another effect that remiss overlooking of maintenance-information can be prevented, and speedy maintenance can be performed.

[0057] Since respective temperatures set on an group-by-group basis can be instantly found out from the set-temperature display screen 10, the present embodiment has a further effect in that over-cooling and over-heating are prevented, and the centralized controller 2 can forcefully changes the set-temperature, thereby reducing energy consumption. Furthermore, not only general users such as a building supervisor and so forth can easily find out necessary operation-information but also a service worker responsible for maintenance of the air-conditioners can easily find out operation-information necessary at the time of an inspection.

[0058] Thus, with the present embodiment, it is possible to display the respective varieties of the detailed information pieces on the plural air-conditioner groups on the display subunit of the centralized controller in such a way as to enable an operator to easily ascertain the information pieces by a simple operation, so that it is possible to obtain an air-conditioning management system capable of easily getting hold of an air-conditioner group deviating from the setting of the air-conditioning management system, thereby instantly executing a setting-change.

List of Reference Signs

[0059]

- 1: air-conditioning management system
- 2: centralized controller (2a: communication subunit, 2b: control subunit 2b, 2c: input subunit, 2d: controller display subunit, 2e: storage subunit)
- 3: outdoor unit (3a: communication subunit, 3b: control subunit)
- 4 (4,... 4n): indoor unit (4a: communication subunit, 4b: control subunit)
- 5: remote-control switch (remote control) (5a: communication subunit, 5b: control subunit, 5c: input subunit, 5d: display subunit, 5e: storage subunit)

6: control wiring
 7: regeneration unit
 8: top screen (8a: group icon (group display site),
 8b: block icon, 8c: various-information icon, 8d: de-
 tail-display button (group operation-information display
 means), 8e: a preceding information button, 8f:
 a following information button, 8g: the top button:,
 8h: recommendable cooling temperature setting but-
 ton, 8i: recommendable heating temperature setting
 button, 8j: menu button, 8k: button for all-groups set-
 ting in a batch, 8l: button for all-groups operation in
 a batch, 8m: button for all the-groups stop in a batch)
 9: operation-mode (detailed information 1) display
 screen (9a: divergent operation modes group icon)
 10: set-temperature (detailed information 2) display
 screen
 11: fan speed display screen
 12: wind-direction display screen
 13: operation-condition setting screen
 14: maintenance-information display screen
 15: compressor operation-state display screen
 16: air-conditioner accumulated operation-time dis-
 play screen
 17: recommendable temperature setting screen
 18: detailed information display setting screen (18a:
 display mode 1 button, 18b: display mode 2 button)
 20: detailed information n display screen
 A, B, C, D: blocks
 A1, A2, B1, B2, C1, C2: air-conditioner group (group)

Claims

1. An air-conditioning management system provided
 with a centralized controller for monitoring and controlling a plurality of air conditioner groups, the centralized controller comprising:
 a controller display subunit;
 a group display means for displaying respective group display sites corresponding to the plural air conditioner groups on one screen of the controller display subunit in a batch;
 a group operation-information display means for displaying respective operation-information pieces of the plural air conditioner groups on the one screen of the controller display subunit, and
 a display-contents switching means for switching the contents of display, displayed on the controller display subunit.
2. The air-conditioning management system according to claim 1, wherein the respective group display sites corresponding to the plural air conditioner groups are displayed on the one screen of the controller display subunit in a batch on a top screen normally displayed on the controller display subunit, and when the respective operation-information pieces of the

plural air conditioner groups are displayed in a batch by the display-contents switching means, the respective operation-information pieces of the plural air conditioner groups, corresponding to the respective group display sites, are displayed at respective sites identical to each other.

3. An air-conditioning management system provided with a centralized controller for monitoring and controlling a plurality of air conditioner groups by handling plural air conditioners as a group on each room, on each floor, and so forth, the centralized controller comprising:

a controller display subunit, wherein respective group icons corresponding to the plural air conditioner groups are displayed on one screen of the controller display subunit in a batch, and respective operation-information pieces of the plural air conditioner groups are displayed at respective sites of the group icons displayed on the one screen of the controller display subunit in a batch, the controller display subunit comprising a display-contents switching button for sequentially displaying the respective operation-information pieces of the plural air conditioner groups at the respective sites of the group icons displayed on the one screen of the controller display subunit in a batch.

4. The air-conditioning management system according to claim 1, wherein a screen for displaying the respective operation-information pieces of the plural air conditioner groups on the one screen of the controller display subunit in a batch is provided with a top button for causing the screen to be reverted to a top screen, and a button for causing the following operation-information to be displayed, or the top button for causing the screen to be reverted to the top screen, a button for displaying the following operation-information, and a button for causing the screen to be reverted to an immediately preceding display screen.
5. The air-conditioning management system according to claim 1, wherein display items in operation-information display of the air conditioner group can display at least not less than one item among "operation-mode display," "set-temperature display," "fan speed display," "wind-direction display," "outdoor unit operation cycle display," "regeneration operation display," "display for necessity/non-necessity of filter-cleaning," "operation under restriction," "display for filter cleaning required," "timer setting display," "display for remote control operation prohibited," "inlet-temperature display," "ambient-temperature display," "remote control thermometer display," "remote-thermometer display," "compressor opera-

tion-state display," "air-conditioner accumulated operation-time display," and "thermo-ON time display" with respect to the respective air conditioner groups.

6. The air-conditioning management system according to claim 5, wherein at least not less than two items among the display items can be displayed, the centralized controller is provided with plural display modes, and not less than one item pre-selected from among the display items is displayed in the respective display modes. 5 10
7. The air-conditioning management system according to claim 5, wherein at least "operation-mode display" is enabled from among the display items, and in response to operation modes of the respective air conditioner groups, display icons of the respective air conditioner groups are displayed in respective colors preset so as to corresponding to the operation modes. 15 20
8. The air-conditioning management system according to claim 5, wherein the centralized controller is made up such that at least "set-temperature display" can be displayed from among the display items, and a recommendable cooling temperature as well as a recommendable heating temperature for the respective air conditioner groups can be set, and the air conditioner group as well is provided with a remote control, thereby causing the air conditioner group whose set-temperature is lower than the recommendable cooling temperature set by the centralized controller or the air conditioner group whose set-temperature is higher than the recommendable heating temperature to be in a alarm display differing from respective displays for other air conditioner groups on a screen for the set-temperature display. 25 30 35
9. The air-conditioning management system according to claim 8, wherein temperature display according to plural systems, such as Celsius temperature, Fahrenheit temperature, and so forth, is enabled in the case of "set-temperature display" in the centralized controller. 40 45
10. The air-conditioning management system according to claim 8, wherein the centralized controller is provided with a recommendable cooling temperature setting button, and a recommendable heating temperature setting button, and the set-temperature for all or a part of the air conditioner groups, in the state of the alarm display, can be forcefully changed by these recommendable temperature setting buttons. 50
11. The air-conditioning management system according to claim 10, wherein the air conditioner group exempted from targets for control of set-temperature, in a batch, by the recommendable cooling tempera-

ture setting button, or the recommendable heating temperature setting button, can be set.

12. The air-conditioning management system according to claim 1, wherein if the group display site or the group icon, corresponding to an air conditioner group displayed in the controller display subunit, is operated, an operation-condition setting screen of the air conditioner group is displayed in a pop-up fashion, and an operation-condition can be changed from the screen displayed in the pop-up fashion.
13. The air-conditioning management system according to claim 1, wherein the respective air-conditioner groups are made up such that plural indoor units connected to one remote-control switch are integrated with each other, thereby enabling monitoring and controlling of the plural indoor units to be executed in a batch.
14. The air-conditioning management system according to claim 1, wherein if a non-operation state lasts for a given time period while operation-information pieces on the respective air-conditioner groups are in display, a screen is caused to revert to a top screen where the respective group display sites corresponding to the plural air conditioner groups are displayed on one screen in a batch.

FIG. 1

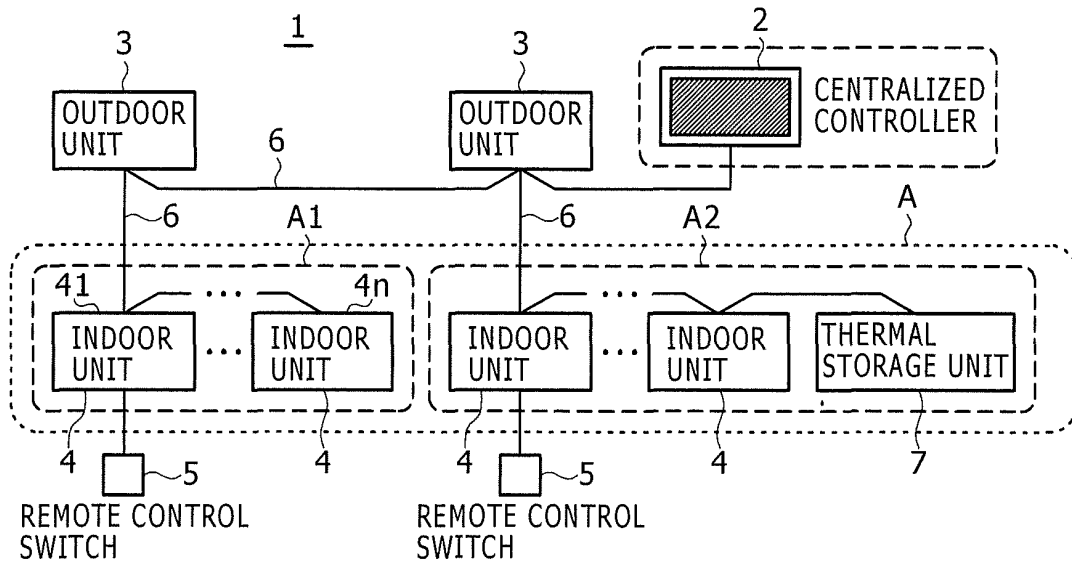


FIG. 2

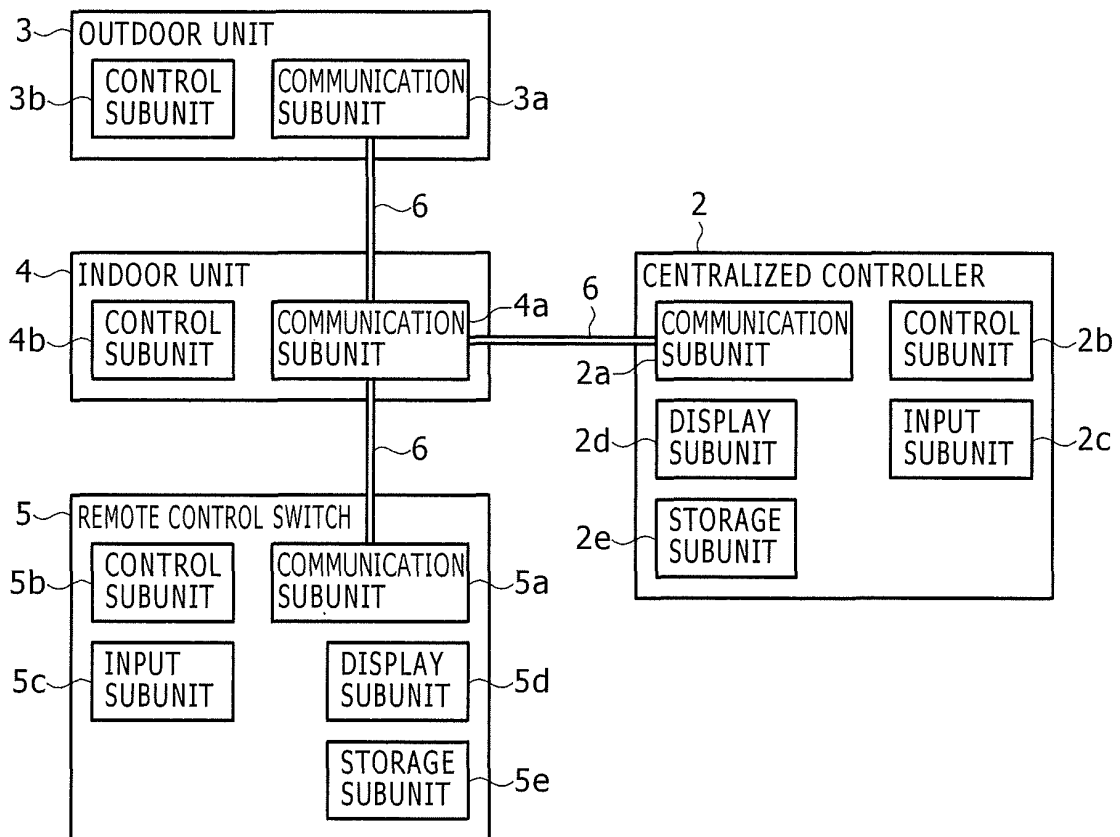
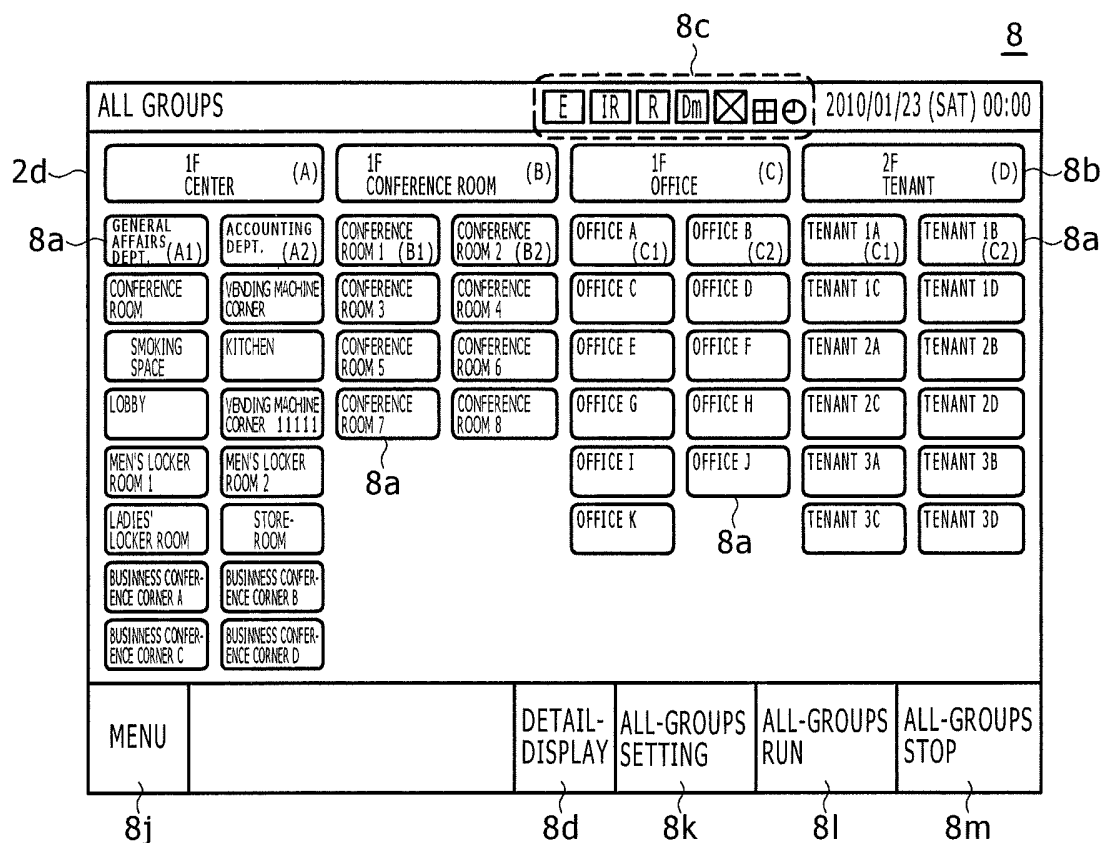


FIG. 3



- E : IN EMERGENCY STOP
- R : IN REGENERATION OPERATION
- IR : INSPECTION REQUIRED
- Dm : DEMAND SETTING
- ⊞ : FILTER-CLEANING REQUIRED
- ⊗ : REMOTE CONTROL MANIPULATION PROHIBITED
- ⌚ : TIMER SETTING

FIG. 4

9

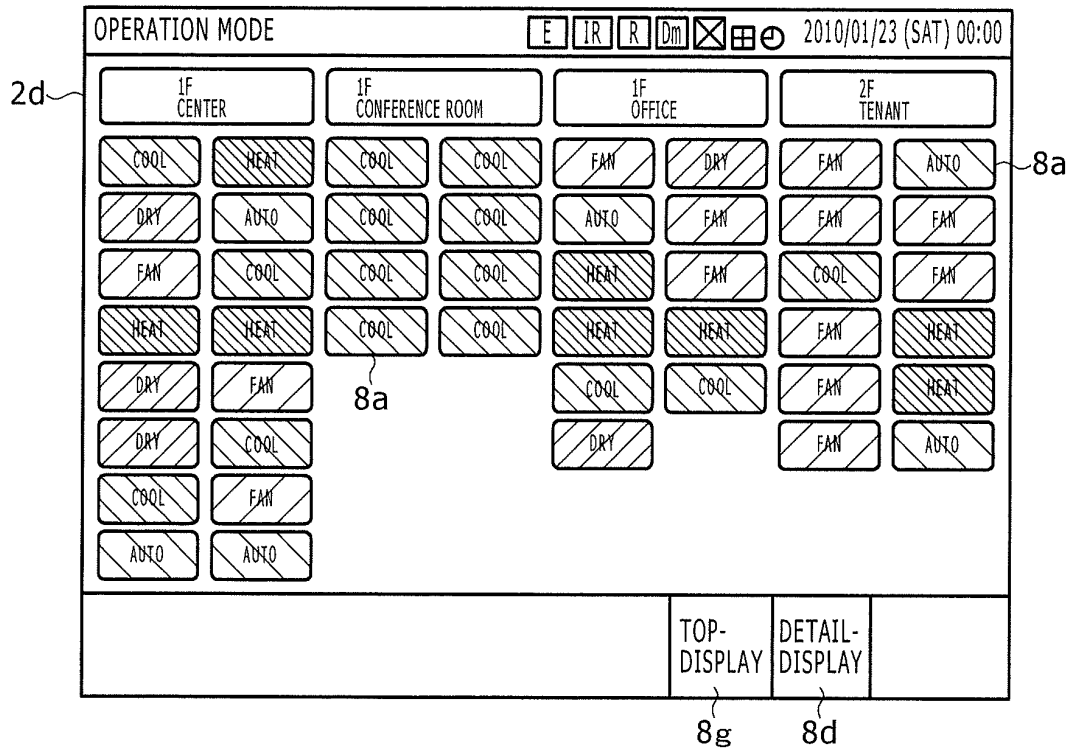


FIG. 5

10

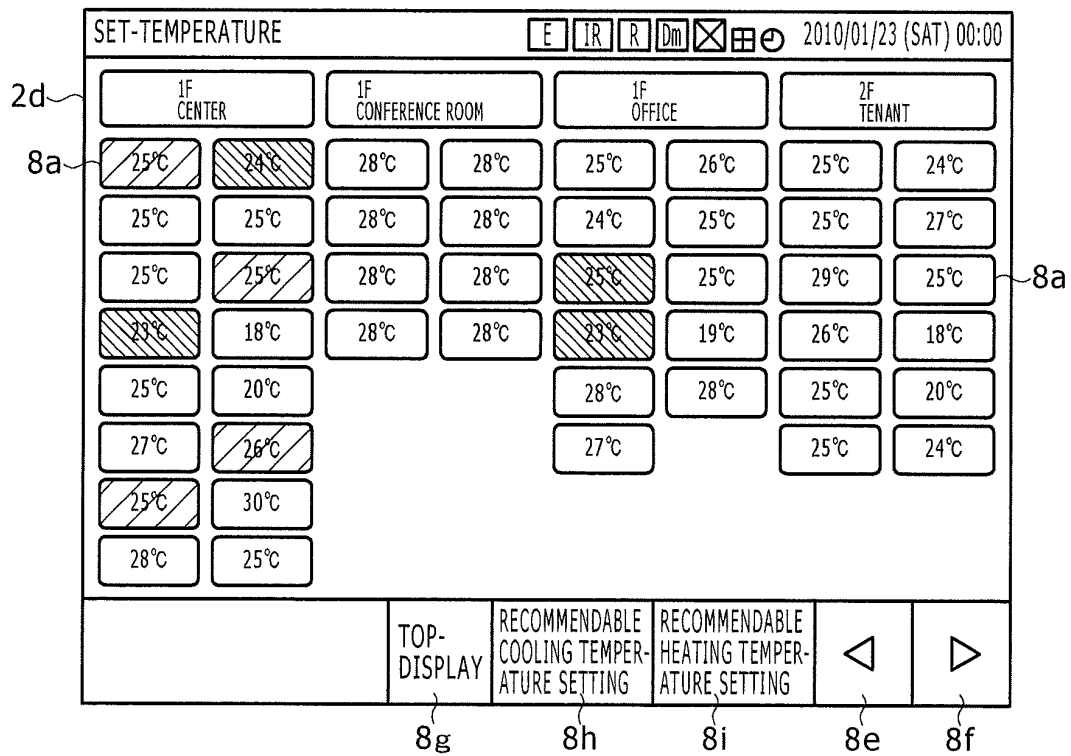


FIG. 6

11

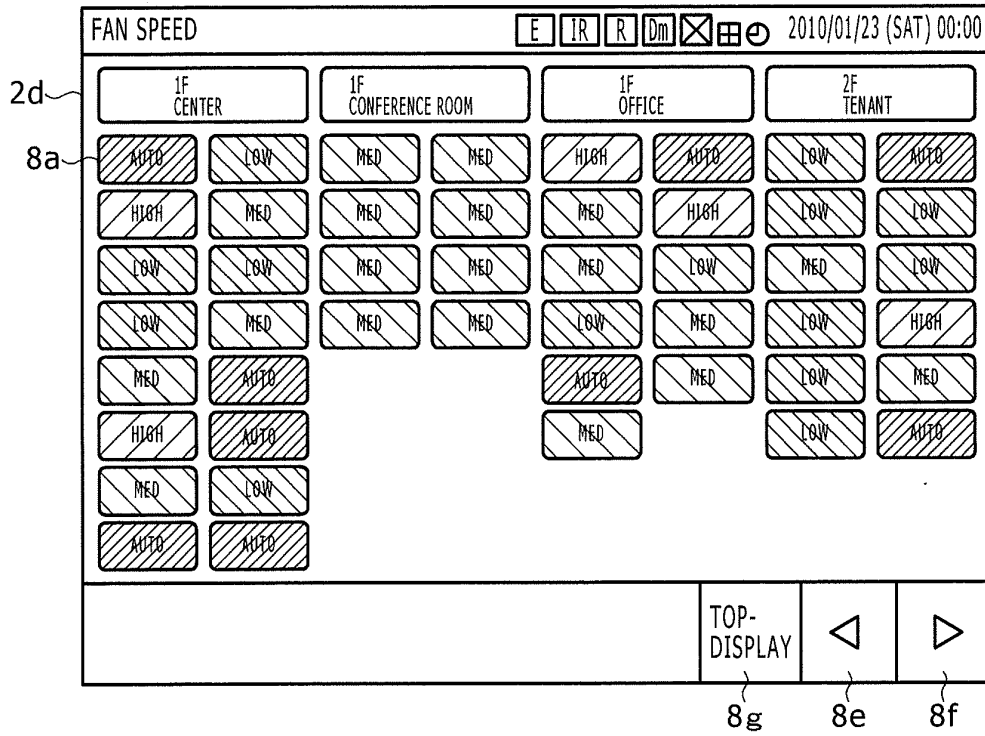


FIG. 7

12

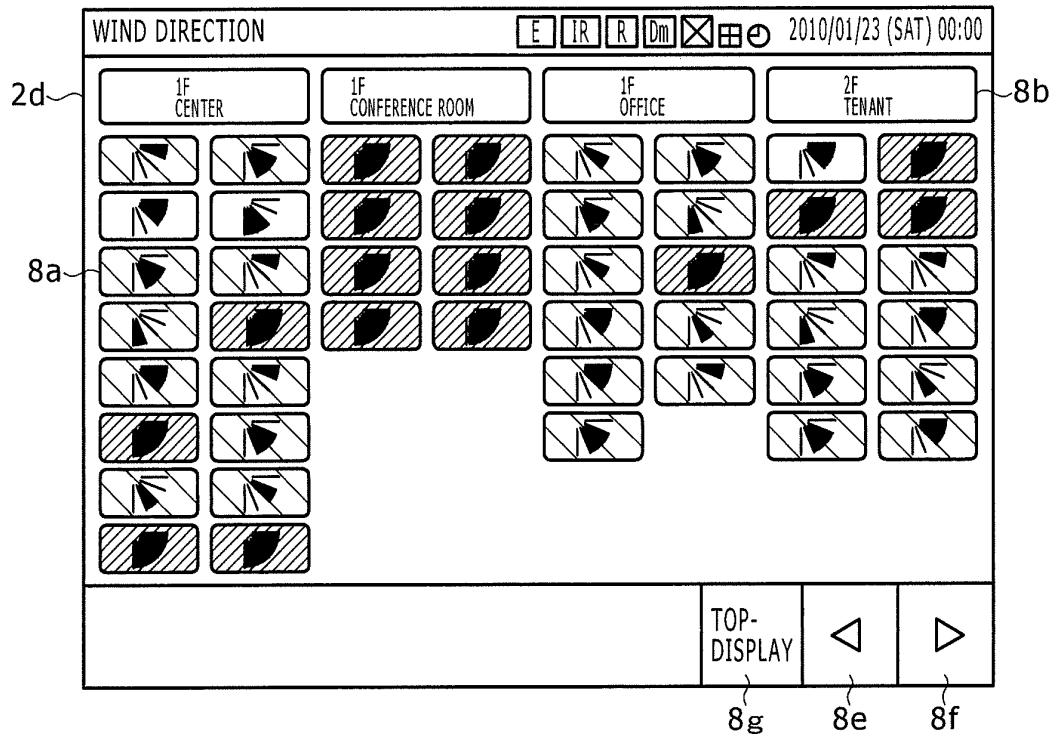


FIG. 8

FIRST STAGE	SECOND STAGE	THIRD STAGE	FOURTH STAGE	FIFTH STAGE	SIXTH STAGE	SEVENTH STAGE	AUTO
							

FIG. 9

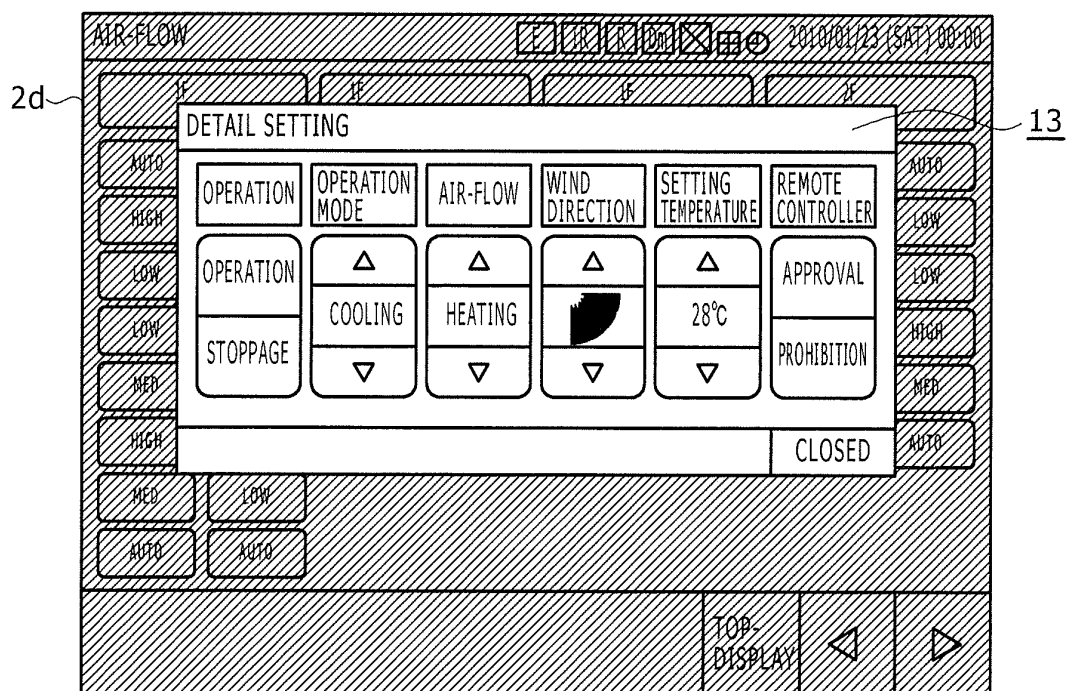


FIG. 10

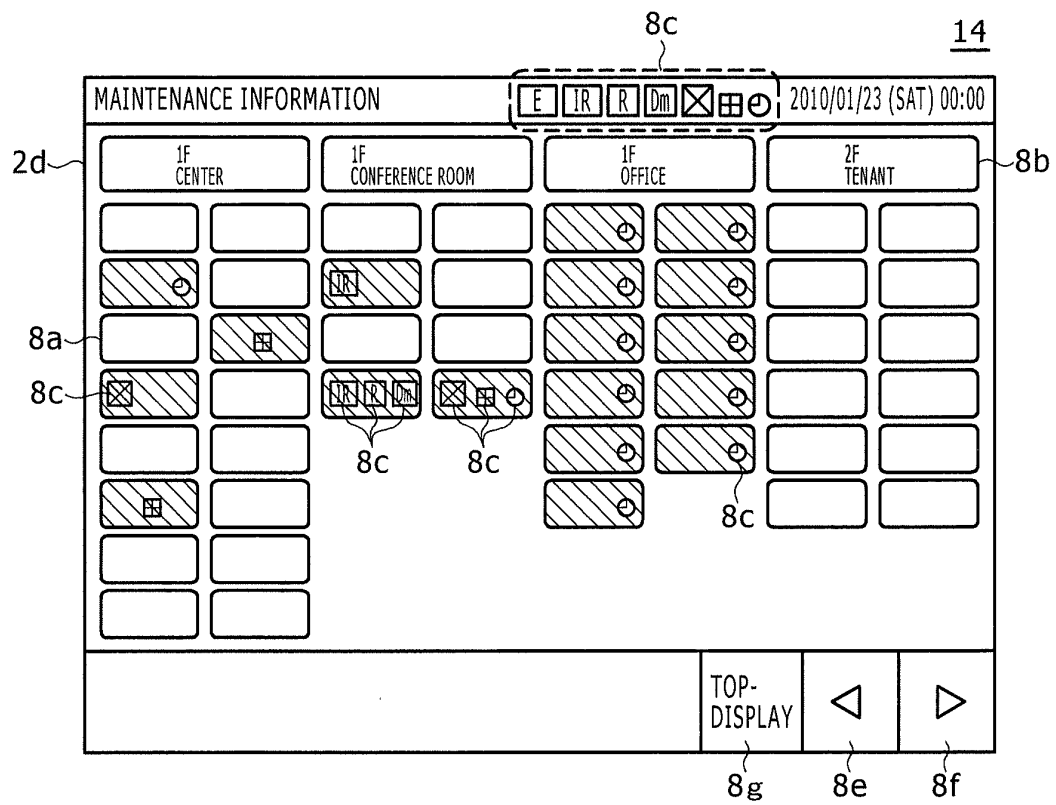


FIG. 11

15

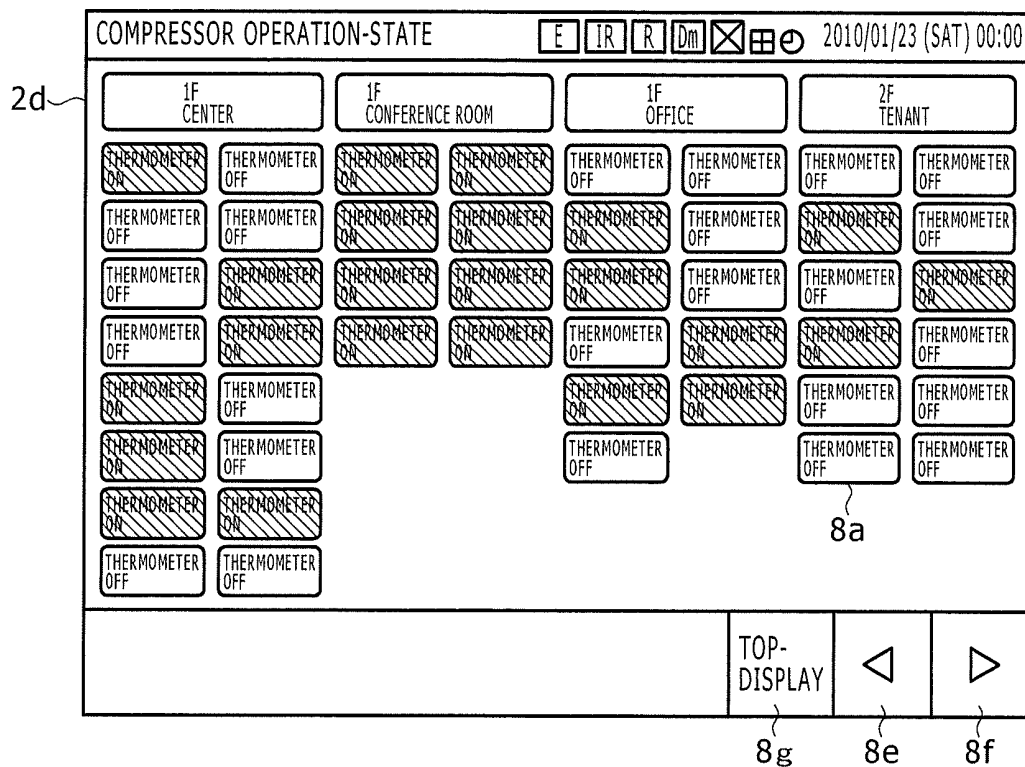


FIG. 12

16

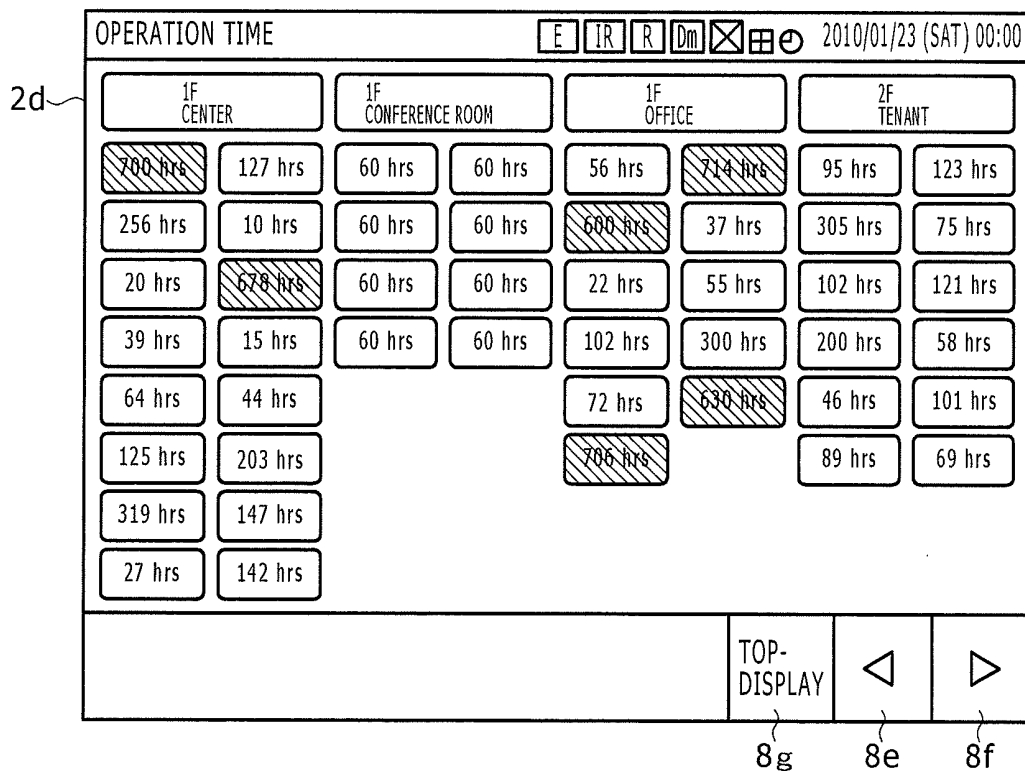


FIG. 13

17

2d

RECOMMENDABLE TEMPERATURE SETTING E TR R Dm ⊗ ⊞ ⊙ 2010/01/23 (SAT) 00:00

RECOMMENDABLE COOLING TEMPERATURE	RECOMMENDABLE HEATING TEMPERATURE
Δ	Δ
28°C	20°C
▽	▽

END

FIG. 14

18

2d

DETAILED INFORMATION DISPLAY SETTING E TR R Dm ⊗ ⊞ ⊙ 2010/01/23 (SAT) 00:00

OPERATION MODE	MODE 1	MODE 2	MAINTENANCE INFORMATION	MODE 1	MODE 2
SETTING TEMPERATURE	MODE 1	MODE 2	INLET TEMPERATURE	MODE 1	MODE 2
FAN SPEED	MODE 1	MODE 2	REMOTE CONTROL THERMOMETER	MODE 1	MODE 2
WIND DIRECTION	MODE 1	MODE 2	REMOTE-THERMOMETER	MODE 1	MODE 2
OUTDOOR UNIT CYCLE	MODE 1	MODE 2	COMPRESSOR OPERATION-STATE	MODE 1	MODE 2

18a 18b

END

FIG. 15

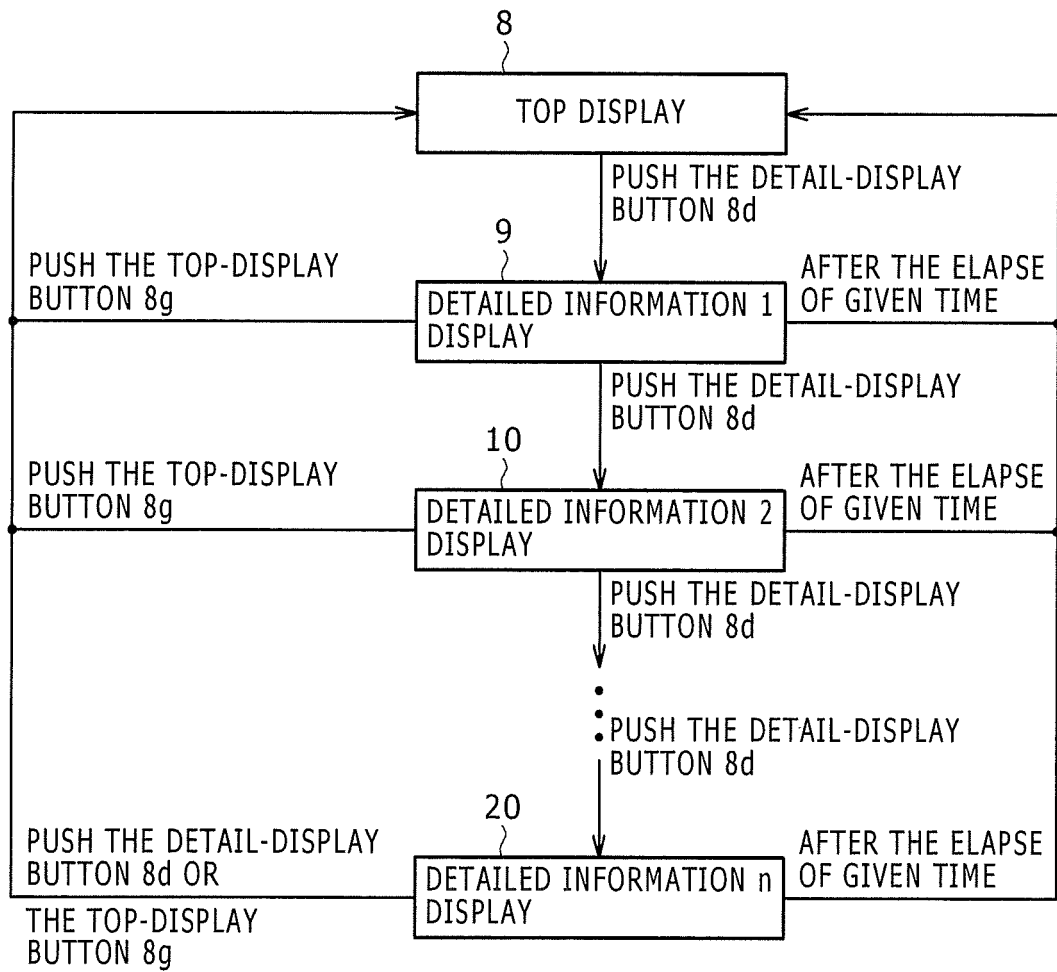


FIG. 16

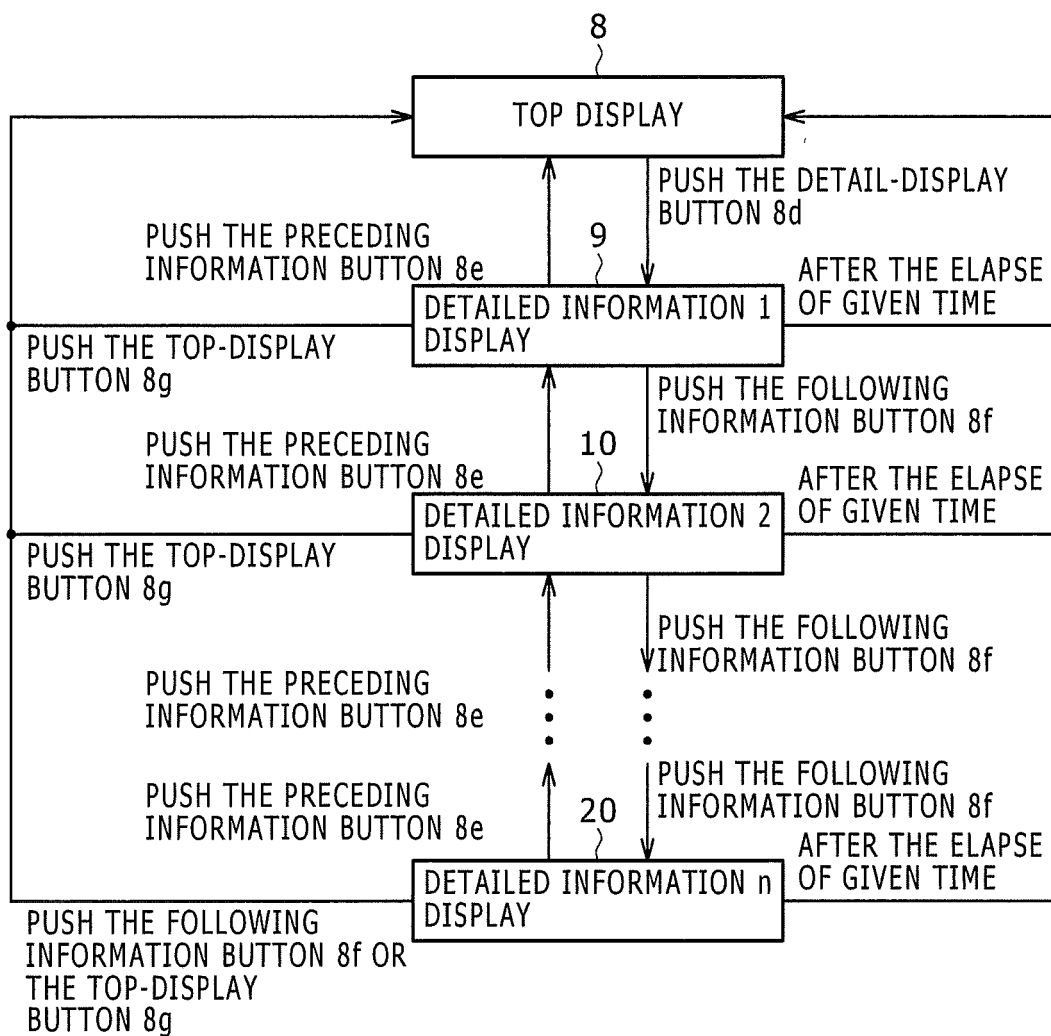


FIG. 17A

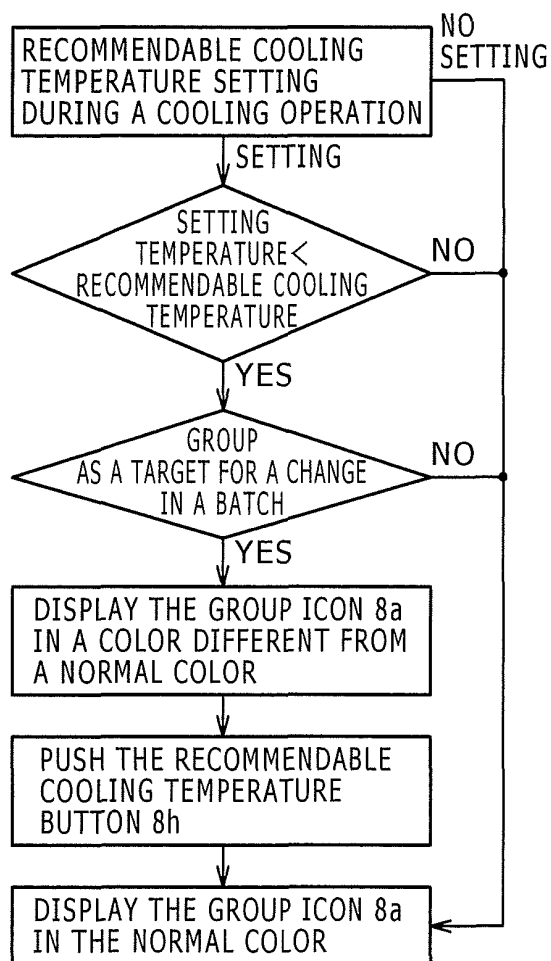


FIG. 17B

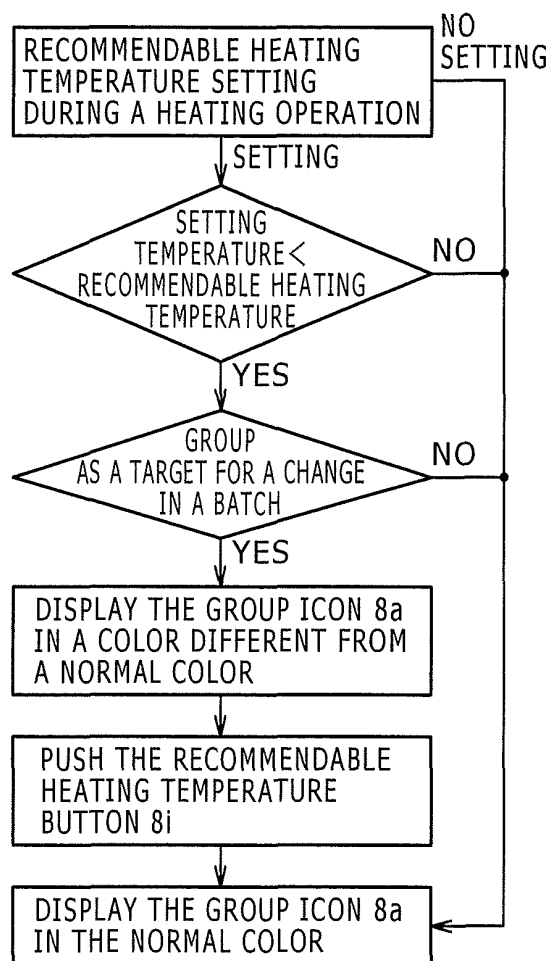
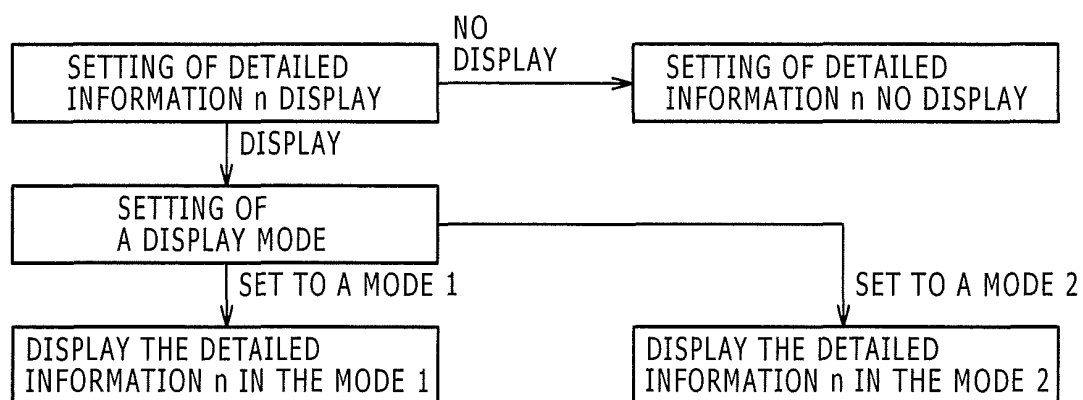


FIG. 18



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2011/051103

A. CLASSIFICATION OF SUBJECT MATTER

F24F11/02 (2006.01) i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F24F11/02

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

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2011
Kokai Jitsuyo Shinan Koho	1971-2011	Toroku Jitsuyo Shinan Koho	1994-2011

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	JP 2010-3292 A (Daikin Industries, Ltd.), 07 January 2010 (07.01.2010), paragraphs [0073], [0074]; fig. 11, 12 & WO 2009/141997 A1 & WO 2009/142024 A1	1-7, 13, 14 12 8-11
Y	JP 10-160229 A (Toshiba Corp.), 19 June 1998 (19.06.1998), paragraph [0022]; fig. 7 (Family: none)	12
A	JP 2008-157533 A (Daikin Industries, Ltd.), 10 July 2008 (10.07.2008), paragraphs [0071], [0072]; fig. 6, 7 & US 2008/0306632 A1 & EP 2096367 A1 & WO 2008/084635 A1 & KR 10-2008-0097423 A & CN 101389908 A & AU 2007342888 B	8-11

☒ Further documents are listed in the continuation of Box C.☐ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search
14 February, 2011 (14.02.11)Date of mailing of the international search report
01 March, 2011 (01.03.11)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2011/051103

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 9-257297 A (Toshiba Corp.), 30 September 1997 (30.09.1997), entire text; all drawings (Family: none)	1-14

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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