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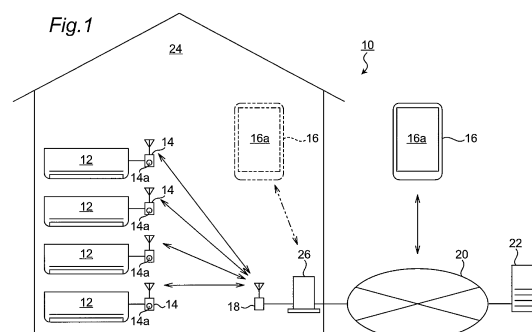
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(54) **OPERATION SYSTEM FOR HOME ELECTRIC APPLIANCES AND PROGRAM FOR OPERATING HOME ELECTRIC APPLIANCES**

(57) An control system for controlling a household electrical appliance 12 comprises a mobile terminal 16 sending a control signal for controlling the household electrical appliance 12; and a communication device 14 sending the control signal from the mobile terminal 16 to the household electrical appliance 12. The mobile terminal 16 sends a request signal to the communication device 14 by a user controls. The request signal is a signal for requesting the communication device 14 to send an information about an operational status of the household electrical appliance 12 after receiving the control signal to the mobile terminal 16. The communication device, after receiving the request signal from the mobile terminal 16, sends the information about the operational status of the household electrical appliance 12 after receiving the control signal. The mobile terminal 16 informs the user of the information about the operational status of the household electrical appliance 12 after receiving the control signal sent from the communication device 14. The mobile terminal 16 informs the user of a notice about a transmission completion of the control signal to the household electrical appliance 12 and simultaneously

suggest the user perform a controls for sending the request signal.



Description

Technical Field

[0001] The invention relates to a control system for controlling a household electrical appliance by the use of a mobile terminal and a program for controlling a household electrical appliance.

Background Art

[0002] Conventionally, a control of a household electrical appliance by the use of a mobile terminal such as mobile telephone is performed. For example, a control system for a household electrical appliance described in Patent document 1 is adapted to be controlled by the use of a mobile telephone through an internet. The control system for the a household electrical appliance of Patent document 1 is adapted, after the household electrical appliance is controlled by user through the mobile telephone, to inform through the mobile telephone the user that the household electrical appliance actually acts on the basis of the user controls. Consequently, the user can receive a notice that the household electrical appliance start to act in response to the controls of the mobile telephone.

Prior Art Document(s)

[0003] Patent Document 1: Japanese Patent No. 4621643

Summary of the Invention

Problems to be solved by the Invention

[0004] However, in the control system for the household electrical appliance described in Patent document 1, the user in a position with a view of the household electrical appliance unnecessarily receives the notice about an operational status of the household electrical appliance through the mobile telephone.

[0005] Accordingly, it is an object of the invention, in case that a household electrical appliance is controlled by the use of a mobile terminal such as mobile telephone, to inform the user of an operational status of the household electrical appliance controlled by the mobile terminal, as appropriate.

Means to Solve the Problems

[0006] In order to achieve the above object, the present invention has the following constitutions.

[0007] In one aspect of the invention, there is provided a control system for controlling a household electrical appliance, the control system for controlling the household electrical appliance comprising:

a mobile terminal sending a control signal for controlling the household electrical appliance; and
a communication device connected to the household electrical appliance, receiving the control signal from the mobile terminal, and sending the received the control signal to the household electrical appliance, wherein the mobile terminal is adapted to send a request signal to the communication device by a user controls,

the request signal is a signal for requesting the communication device to send an information about an operational status of the household electrical appliance after receiving the control signal to the mobile terminal,

the communication device is, after receiving the request signal from the mobile terminal, adapted to obtain and send the information about the operational status of the household electrical appliance after receiving the control signal,

the mobile terminal further is adapted to inform the user of the information about the operational status of the household electrical appliance after receiving the control signal sent from the communication device, and

the mobile terminal yet further is adapted to inform the user of a notice about a transmission completion of the control signal to the household electrical appliance and simultaneously suggest the user perform a controls for sending the request signal.

[0008] In another aspect of the invention, there is provided a program for controlling a household electrical appliance installed in a communicatable mobile terminal, the program for controlling the household electrical appliance making the mobile terminal function as,
a means for sending a control signal for controlling the household electrical appliance to a communication device which is connected to the household electrical appliance, which receives the control signal from the mobile terminal, and which sends the received the control signal to the household electrical appliance,
a means for sending a request signal to the communication device by a user controls, the request signal is a signal for requesting the communication device to send an information about an operational status of the household electrical appliance after receiving the control signal to the mobile terminal,
a means for informing the user of the information about the operational status of the household electrical appliance after receiving the control signal sent from the communication device, and
a means for informing the user of a notice about a transmission completion of the control signal to the household electrical appliance and simultaneously suggesting the user perform a controls for sending the request signal.

Effects of the Invention

[0009] According to the invention, in case that the household electrical appliance is controlled by the use of the mobile terminal, the user can be informed of an operational status of the household electrical appliance controlled by the mobile terminal, as appropriate.

Brief Description of the Drawings

[0010] The above aspects and features of the present invention will become more apparent from the following description of preferred embodiments thereof with reference to the accompanying drawings, and wherein:

Fig. 1 schematically shows a configuration of a control system for an air conditioner according to an embodiment of the invention,

Fig. 2 shows an example of a control screen for the air conditioner,

Fig. 3 is a flow diagram showing an anterior part of an exemplary sequence of actions of a mobile terminal and wireless communication adaptor,

Fig. 4 is a flow diagram showing a posterior part of the exemplary sequence of actions of the mobile terminal and wireless communication adaptor,

Fig. 5 shows an exemplary window for informing about transmission completion,

Fig. 6 shows an exemplary window for informing about a transmission failure,

Fig. 7 shows an exemplary windows for informing about an operational status,

Fig. 8 shows an exemplary windows for informing about a status acknowledgement failure,

Fig. 9 is a perspective view showing an appearance of the air conditioner connected to the wireless communication adaptor,

Fig. 10 is a perspective view showing an inside of the air conditioner,

Fig. 11 is a perspective view showing a configuration of the wireless communication adaptor,

Fig. 12 shows an attachment the wireless communication adaptor to the air conditioner,

Fig. 13 is a front view of a part of the air conditioner and shows an exemplary wiring layout of a lead wire of the wireless communication adaptor, and

Fig. 14 is a perspective view of a part of the air conditioner and show an exemplary wiring layout of a lead wire of the wireless communication adaptor.

Embodiments for Carrying out the Invention

[0011] A aspect of the invention is a control system for controlling a household electrical appliance, the control system for controlling the household electrical appliance comprising:

a mobile terminal sending a control signal for con-

trolling the household electrical appliance; and a communication device connected to the household electrical appliance, receiving the control signal from the mobile terminal, and sending the received the control signal to the household electrical appliance, wherein the mobile terminal is adapted to send a request signal to the communication device by a user controls,

the request signal is a signal for requesting the communication device to send an information about an operational status of the household electrical appliance after receiving the control signal to the mobile terminal,

the communication device is, after receiving the request signal from the mobile terminal, adapted to obtain and send the information about the operational status of the household electrical appliance after receiving the control signal,

the mobile terminal further is adapted to inform the user of the information about the operational status of the household electrical appliance after receiving the control signal sent from the communication device, and

the mobile terminal yet further is adapted to inform the user of a notice about a transmission completion of the control signal to the household electrical appliance and simultaneously suggest the user perform a controls for sending the request signal.

[0012] According to the aspect of the invention, the user can be informed of the operational status of the household electrical appliance controlled by the mobile terminal, as appropriate.

[0013] The control system for controlling the household electrical appliance may have a router device connected to an internet and a relay device relaying communication between the communication device and the mobile terminal. In this case, the mobile terminal and the relay device are adapted to be able to have a first communication between the mobile terminal and the relay device only through the router device and a second communication between the mobile terminal and the relay device through both the internet and the router device, and the mobile terminal is adapted such that the user can select the first or second communication by the use of the mobile terminal.

[0014] According to such configuration, through the internet, the household electrical appliance can be controlled by the mobile terminal outside of a house in which the household electrical appliance is placed. In the house, without the internet, the user can control the household electrical appliance by the use of the mobile terminal in a stress-free situation.

[0015] The household electrical appliance may be an air conditioner, and the communication device may be connected to an operation control part of the air conditioner for controlling an air-conditioning operation.

[0016] According to such configuration, the air condi-

tioner can be controlled by the mobile terminal.

[0017] In the case where the household electrical appliance is the air conditioner, the communication device may have a communication device body communicating with the relay device, a connector detachably connecting to a communication device connection terminal of the operation control part of the air conditioner, a lead wire connecting the communication device body and the connector, and an attachment for attaching the communication device body to the air conditioner or a room in which the air conditioner is placed.

[0018] According to such configuration, the communication device can be attached to the air conditioner or a house in which the air conditioner is placed on the basis of a communication condition between the communication device and the relay device. Consequently, the communication between the communication device and the relay device becomes stable and thus the user surely can control the air conditioner by the use of the mobile terminal.

[0019] The air conditioner may have a body and a front panel openably covering a front portion of the body, the communication device connection terminal of the operation control part of the air conditioner is disposed on the front portion of the body of the air conditioner, and the attachment of the communication device is adapted to hold a housing rim of the body of the air conditioner.

[0020] According to such configuration, the connector of the communication device can be connected to the communication device connection terminal disposed on the front portion of the body of the air conditioner shortly after the front panel is opened. Also, the communication device body of the communication device can be attached easily to the air conditioner since the attachment holds the housing rim of the body of the air conditioner. Consequently, communication device can be attached easily to the air conditioner in a short time.

[0021] The housing rim of the body of the air conditioner held by the attachment may be positioned at a position at which the communication device with the attachment holding the housing rim is not opened up to an air blown from an outtake opening of the air conditioner.

[0022] According to such configuration, it is suppressed that, during a cooling operation, a dew condensation (beading) occurs on a surface of the communication device body of the communication device opened up to a cold air. Therefore, it is suppressed that the dew condensation interrupts the communication between the communication device body and the relay device. Consequently, during the cooling operation of the air conditioner, a quality in the communication between the communication device body and the relay device is highly maintained, and thus a reliability of the communication is improved.

[0023] The operation control part of the air conditioner may be disposed on a front portion of a body of the air conditioner, and the communication device connection terminal may be mounted directly on the operation control

part.

[0024] According to such configuration, as compared with the case where the communication device connection terminal is mounted indirectly on the operational control part through a lead wire for example, workability in an assembly is improved and a cost is decreased.

[0025] It is preferable to provide a program for controlling a household electrical appliance installed in a communicatable mobile terminal, the program for controlling the household electrical appliance making the mobile terminal function as,

a means for sending a control signal for controlling the household electrical appliance to a communication device which is connected to the household electrical appliance, which receives the control signal from the mobile terminal, and which sends the received control signal to the household electrical appliance,

a means for sending a request signal to the communication device by a user controls, the request signal is a signal for requesting the communication device to send an information about an operational status of the household electrical appliance after receiving the control signal to the mobile terminal,

a means for informing the user of the information about the operational status of the household electrical appliance after receiving the control signal sent from the communication device, and

a means for informing the user of a notice about a transmission completion of the control signal to the household electrical appliance and simultaneously suggesting the user perform a controls for sending the request signal.

[0026] According to such program, the household electrical appliance can be controlled by a mobile terminal used widely such as smartphone.

[0027] Hereinbelow, embodiments of the present invention will be described with reference to the accompanying drawings. It is noted that the invention is not limited by the following embodiments.

[0028] Fig. 1 schematically shows a configuration of a control system for a household electrical appliance according to an embodiment of the invention.

Although the control system for the household electrical appliance explained below is a control system for an air conditioner as an example of the household electrical appliance, the household electrical appliance of the invention is not limited to the air conditioner.

[0029] The control system 10 for the air conditioner shown in Fig. 1 is a system for controlling at least one air conditioner by the use of a mobile terminal.

As shown in Fig. 1, the control system 10 for the air conditioner has at least one air conditioner 12, wireless communication adaptors (communication devices) 14 provided on the air conditioner 12 respectively, a mobile terminal 16 owned by a user, a gateway device (relay device) 18 for relaying communication between the wireless communication adaptors 14 and the mobile terminal 16, an internet 20, and a server device 22 connected to the internet 20.

[0030] The air conditioners 12 are placed in a house 24 owned by the user owning the mobile terminal 16. The wireless communication adaptors 14 are connected to the air conditioners 12 respectively.

[0031] The wireless communication adaptors 14 are connected to an operation control part (not shown) of the air conditioners 12. Details of the connection of the air conditioner 12 and the wireless communication adaptor are explained below. The wireless communication adaptors 14 are adapted to communicate with the gateway device 18. The wireless communication adaptor 14, as described below, receive a control signal for controlling the air conditioner sent from the mobile terminal 16 through the gateway device 18, and then send the received control signal to the operation control part of the air conditioners 12. The operation control part controls an air conditioning operation of the air conditioner 12 on the basis of the control signal.

[0032] The wireless communication adaptor 14 also, as described below, are adapted to obtain an information about an operational status of the air conditioner 12 from the operation control part of the air conditioner 12 and then send it to the gateway device 18.

[0033] The mobile terminal 16 is, for example, a portable terminal used widely such as smartphone, tablet PC (personal computer), and has, in the embodiment, functions to connect to the internet 20 and to communicate with the gateway device 18.

[0034] The mobile terminal 16, for example, a smartphone is adapted to connect to the internet 20 through a telephone network (for example, 3G network).

In addition to or alternatively, the mobile terminal 16, for example, is adapted to have a Wi-Fi communication function for communicating with the internet 20 through a public wireless network.

[0035] By connecting to the internet 20, the mobile terminal 16, for example can obtain a program for controlling the air conditioner 12 from a home page of a manufacturer manufacturing the air conditioner 12 through the internet 20. The obtained program is installed in the mobile terminal 16. By activating the installed program, the air conditioner 12 can be controlled by the mobile terminal 16. That is, the mobile terminal 16 becomes available to generate a control signal for controlling the air conditioner 12 and send it.

[0036] The mobile terminal 16 also is adapted to connect to a router device 26 by no use of the internet 20 through a communication technology used widely such as, for example, Wi-Fi communication, Bluetooth (trade-mark), infrared communication, and then to communicate with the gateway device 18 through the router device 26. The necessary device (such as Wi-Fi antenna) is incorporated in the mobile terminal 16.

[0037] The gateway device 18 is a device for relaying communication between the wireless communication adaptors 14 and the mobile terminal 16, and thus is configured to communicate with the wireless communication adaptor 14 and the mobile terminal 16. The gateway de-

vice 18 also is placed in the user's house 24 in which the air conditioners 12 are placed and is connected to the router device 26 connecting to the internet 20.

[0038] For example, the gateway device 18 is adapted to communicate with the wireless communication adaptor 14 by the use of a frequency of a signal within a specified low power radio-specified small band (924.0-928.0MHz). A frequency band of communication between the gateway device 18 and the wireless communication adaptor 14 preferably is a low frequency band within which a signal can far-reach.

[0039] The gateway device 18 also is adapted to connect to the mobile terminal 16 through the router device 26. That is, the gateway device 18 is adapted to have a communication (first communication) with the mobile terminal 16 only through the router device 26 without passing through the internet 20.

[0040] Further, the gateway device 18 is adapted to be able to connect to the internet 20 through the router device 26. Therefore, the gateway device 18 can have a communication (second communication) with the mobile terminal 16 and have a communication with the server device 22, through the internet 20 and the router device 26.

[0041] That is, the gateway device 18 is adapted to communicate with the mobile terminal 16 not by the use of the internet 20 (the first communication only through the router device 26) and by the use of the internet 20 (the second communication through the internet 20 and the router device 26). This reason is explained below.

[0042] The server device 22 is a server device arranged by the manufacturer of the air conditioner 12 and stores an information associated with the air conditioners 12, wireless communication adaptors 14, mobile terminal 16, and gateway device 18 so as to perform an authentication of the mobile terminal 16 accessing the gateway device 18 and like.

[0043] Hereinbelow, an example of control of the air conditioner 12 by the use of the mobile terminal 16 is explained. In this example, the mobile terminal 16 is a smartphone having a touch panel 16a and is with an installed control program for the air conditioner having already been started. In this example, the mobile terminal 16 is Wi-Fi communicated with the router device 26.

[0044] Fig. 2 shows an example of a control screen 30 for the air conditioner 12 displayed in the touch panel 16a of the mobile terminal 16. The mobile terminal 16 is adapted to display the control screen 30 in the touch panel 16a when the air conditioner is operated.

[0045] When there are a plurality of air conditioners 12, the mobile terminal 16 is adapted to display a selection screen for the air conditioners such that the user can select the air conditioner operated by the mobile terminal 16.

[0046] As shown in Fig. 2, the control screen 30 for controlling the air conditioner 12 includes a plurality of buttons 30a-30e for setting an operation of the air conditioner. The control screen 30 shown in Fig. 2 is a control

screen for operating the air conditioner 12 placed in a living room.

[0047] An "operation mode" button 30a is a button through which the user selects an operation mode. When the user touches the "operation mode" button 30a, the mobile terminal 16 displays, for example, an operation mode select window (not shown), through which the user selects one air-conditioning operation mode from a plurality of air-conditioning operation mode such as heating operation, cooling operation, and dehumidifying operation, in the touch panel 16a. The mobile terminal 16 displays the user-selected operation mode in a current settings indicating part 30f in the control screen 30 and stores it in a memory part (not shown).

[0048] A "temperature setting" button 30b is a button through which the user sets a temperature of an air blown from the air conditioner 12. When the user touches the "temperature setting" button 30b, the mobile terminal 16 displays, for example, a temperature entry window (not shown), through which the user enters a desired temperature, in the touch panel 16a. The mobile terminal 16 displays the user-entered temperature in the current settings indicating part 30f in the control screen 30 and stores it in the memory part.

[0049] An "airflow setting" button 30c is a button through which the user sets a flow of the air blown from the air conditioner 12. When the user touches the "airflow setting" button 30c, the mobile terminal 16 displays, for example, an airflow entry window (not shown), through which the user enters a desired flow, in the touch panel 16a. The mobile terminal 16 displays the user-entered flow in the current settings indicating part 30f in the control screen 30 and stores it in the memory part.

[0050] A "wind-direction setting" button 30d is a button through which the user sets a direction of the air blown from the air conditioner 12. When the user touches the "wind-direction setting" button 30d, the mobile terminal 16 displays, for example, a wind-direction entry window (not shown), through which the user enter a desired wind-direction, in the touch panel 16a. The mobile terminal 16 displays the user-entered wind-direction in the current settings indicating part 30f in the control screen 30 and stores it in the memory part.

[0051] A "settings send" button 30e is a button for sending an information including the operation mode, temperature, airflow, and wind-direction set by the user by the use of the mobile terminal 16 to the air conditioner 12.

[0052] The mobile terminal 16 is adapted to send the gateway device 18 a control signal for the air conditioner 12 including the information about the operation mode, temperature, airflow, and wind-direction set by the user and stored in the memory part, that is, indicated in the current settings indicating part 30f, when the user touches the "setting send" button 30e.

[0053] The control signal includes an identification information of the air conditioner 12 to be controlled. Therefore, the gateway device 18 can send the control signal to the wireless communication adaptor 14 connected to

the air conditioner 12 controlled by the mobile terminal 16.

[0054] Then, the mobile terminal 16 sends the control signal for the air conditioner 12 to the gateway device 18 only through the router device 26 without passing through the internet 20 or through both the internet 20 and the router device 26. Specifically, the mobile terminal 16 is adapted to send the control signal to the gateway device 18 on the basis of a transmission setting at the timing at which the user touches the "settings send" button 30e.

[0055] As shown in Fig. 2, the control screen 30 is provided with buttons 30g and 30h for the transmission setting, in particular, through which the user selects whether the communication between the mobile terminal 16 and the gateway device 18 is only through the router device 26 without passing through the internet 20 or through both the internet 20 and the router device 26.

[0056] The mobile terminal 16 is adapted to configure a "direct" communication for communicating only through the router device 26 as the communication between the mobile terminal 16 and the gateway device 18, when the user touches the "direct" button 30g.

[0057] In the "direct" communication configuration, the control signal for the air conditioner 12 is sent from the mobile terminal 16 to the gateway device 18 only through the router device 26, when the user touches the "settings send" button 30e.

[0058] On the other hand, the mobile terminal 16 is adapted to configure a "server" communication for communicating through both the internet 20 and the router device 26 as the communication between the mobile terminal 16 and the gateway device 18, when the user touches the "server" button 30h.

[0059] In the "server" configuration, the control signal for the air conditioner 12 is sent from the mobile terminal 16 to the server device 22 through the internet 20 and the router device 26. The server device 22 then sends the received control signal to the gateway device 18 through the internet 20 and the router device 26.

[0060] The control signal for the air conditioner may be sent from the mobile terminal 16 to the gateway device 18 through the internet 20 and the router device 26 without passing through the server device 22.

[0061] As noted above, the user selects methods of the communication between the mobile terminal 16 and the gateway device 18. This reason is that there are a case where the mobile terminal 16 is used outside of the user's house 24 (solid line) and a case where the mobile terminal 16 is used in the house 24 (two-dot chain line), as shown in Fig. 1.

[0062] As shown by the solid line in Fig. 1, In the case where the mobile terminal 16 is outside of the house 24, in the broad sense, in the case where the mobile terminal 16 is at a position at which the mobile terminal 16 cannot communicate with the router device 26 directly, the mobile terminal 16 can control the air conditioner 12 by communicating with the gateway device 18 through the internet 20 and the router device 26. That is, the user, which is outside of the house 24, touches the "server" button

30h so as to set to the "server" communication, and thereby enable the user to control the air conditioner 12 through the mobile terminal 16.

[0063] On the other hand, as shown by the two-dot chain line in Fig. 1, in the case where the mobile terminal 16 is in the house 24, in the broad sense, in the case where the mobile terminal 16 is at a position at which the mobile terminal 16 can communicate with the router device 26 directly, the mobile terminal 16 can communicate with the gateway device 18 only through the router device 26 or through the internet 20 and the router device 26. That is, the user can select one of the "direct" communication and the "server" communication.

[0064] However, if the user in the house 24 wishes to frequently control the air conditioner 12 by the use of the mobile terminal 16, the "server" communication through the use of the internet 20 and the router device 26 is unsuitable as the communication between the mobile terminal 16 and the gateway device 18. This reason is that it is possible to cause a delay of a response to the user controls from the air conditioner 12 to the mobile terminal 16 by the reason of a congestion of the internet 20 and like. Consequently, the user may not control the air conditioner 12 by the use of the mobile terminal 12 in a stress-free situation.

[0065] In order to overcome this problem, the control system of the air conditioner 12 is adapted to have a communication unaffected by the congestion of the internet 20 and like, that is, communication between the mobile terminal 16 and the gateway device 18 only through the router device 26 without passing through the internet 20. Since the mobile terminal 16 communicates with the gateway device 18 only through the router device 26, the user can control the air conditioner 12 in a stress-free situation by the use of the mobile terminal 16, as well as by the use of a remote controller of the air conditioner 12.

[0066] The user selects the communication methods between the mobile terminal 16 and the gateway device 18 because only the user knows a frequency of controls to the air conditioner 12 by the use of the mobile terminal 16.

[0067] As not shown in the figure, the control screen 30 of the mobile terminal 16 includes, besides the buttons described above, a button for on-off controlling the operation of the air conditioner 12 and a button for setting a timer by which an operation of the air conditioner 12 is automatically started at a given time.

[0068] Hereinbelow, actions of the mobile terminal 16 and the wireless communication adaptor 14 after the control signal is sent from the mobile terminal 16 are explained with reference to flow diagrams shown in Figs. 3 and 4. The flow on the left side in Figs. 3 and 4 shows an example of an action sequence of the mobile terminal 16. The flow on the right side in Figs. 3 and 4 shows an example of an action sequence of the wireless communication adaptor 14.

[0069] As shown in Fig. 3, In steps S100 and S110,

the mobile terminal 16 sends the control signal for the air conditioner to the wireless communication adaptor 14 (through the gateway device 18), as noted above.

[0070] On the other hand, in step S300, the wireless communication adaptor 14 receives (through the gateway device 18) the control signal from the mobile terminal 16 (acknowledges the control signal). Then, in step S310, the wireless communication adaptor 14 sends the received control signal to the operation control part of the air conditioner 12. Thus, the air conditioner 12 starts to perform the operation corresponding to the control signal.

[0071] The wireless communication adaptor 14, in the succeeding step S320, sends a transmission completion signal to the mobile terminal 16 (through the gateway device 18) so as to give to the mobile terminal 16 a notice that the control signal have been sent to the air conditioner 12.

[0072] The mobile terminal 16, in step S120, receives the transmission completion signal from the wireless communication adaptor 14. Then, the mobile terminal 16, in the succeeding step S130, informs the user of a notice about a transmission completion of the control signal to the air conditioner 12.

[0073] For example, as shown in Fig. 5, the mobile terminal 16 displays a transmission completion notice window 32 in the touch panel 16a. The transmission completion notice window 32 shows a message 32a for informing the user of the notice about the transmission completion of the control signal, and an information 32b about the operation mode, temperature, airflow, and wind-direction included in the control signal sent from the mobile terminal 16 to the air conditioner 12. Through the transmission completion notice window 32, the user can read the transmission completion of the control signal from the mobile terminal 16 to the air conditioner 12, that is, success of the transmission.

[0074] By contrast, if the transmission completion signal from the wireless communication adaptor 14 is not acknowledged at step S120, the mobile terminal 16, in step S150, determines whether an elapsed time after sending the control signal for the air conditioner at step S110 runs over a given time (for example, 30 seconds) or not, that is, checks time-out. If the elapsed time after sending the control signal for the air conditioner 12 runs over the given time (time-out), the action of step S160 is executed. If not, the process is returned to step S120.

[0075] In the case where the mobile terminal 16 cannot receive the transmission completion signal from the wireless communication adaptor 14 after a lapse of the given time since the control signal for the air conditioner 12 is sent, in step S160, the mobile terminal 16 informs the user of a notice that the transmission of the control signal from the mobile terminal 16 to the air conditioner 12 failed.

[0076] For example, as shown in Fig. 6, the mobile terminal 16 displays a transmission failure notice window 34 in the touch panel 16a. The transmission failure notice window 34 shows a message 34a for informing the user of a notice about a transmission failure of the control sig-

nal. Through the transmission failure notice window 34, the user can read the transmission failure of the control signal from the mobile terminal 16 to the air conditioner 12.

[0077] As shown in Fig. 6, the transmission failure notice window 34 includes a "retry" button 34b for re-sending the control signal for the air conditioner 12 from the mobile terminal 16 to the wireless communication adaptor 14. The mobile terminal 16 re-sends the control signal to the wireless communication adaptor 14, that is, the process is returned to step S110, when the user touches the "retry" button 34b.

[0078] After the mobile terminal 16 displays the transmission completion notice window 32 in the touch panel 16a at step S130, in step S140, the mobile terminal 16 displays a "operational status" button 32c for providing the user with an information about the operational status of the air conditioner 12 after receiving the control signal in the touch panel 16a. That is, the mobile terminal 16 is adapted to suggest the user check the operational status of the air conditioner 12 after receiving the control signal.

[0079] In this embodiment, the transmission completion notice window 32 and the "operational status" button 32c are displayed simultaneously. For example, as shown in Fig. 5, the "operational status" button 32c is displayed in the transmission completion notice window 32. Therefore, the mobile terminal 16 can inform the user of a notice about the transmission completion of the control signal to the air conditioner 12 while suggest the user have the control for checking the operational status of the air conditioner 12 after receiving the control signal. Consequently, the user can check whether the air conditioner 12 takes action corresponding to the user controls on the mobile terminal 16 or not, without forgetting, shortly after receiving from the mobile terminal 16 the notice about the transmission completion of the control signal to the air conditioner 12.

[0080] As shown in Fig. 4, after the user touches the "operational status" button 32c at step S170 (the mobile terminal 16 detects the controls on the "operational status" button 32c), the mobile terminal 16, in the succeeding step S180, sends an operational status request signal to the wireless communication adaptor 14.

[0081] The operational status request signal is a signal for requesting the wireless communication adaptor 14 to send the information about the operational status of the air conditioner 12 after receiving the control signal to the mobile terminal 16 so that the mobile terminal 16 obtains such information.

[0082] If the user controls on the "operational status" button 32c is not at step S170, the process is returned to step S100.

[0083] On the other hand, in step S330, the wireless communication adaptor 14 receives the operational status request signal (detects the operational status request signal). In the succeeding step S340, the wireless communication adaptor 14 obtains the information about a current operational status from the operation control part

of the air conditioner 12, that is, the information about the operational status of the air conditioner 12 being in the operation corresponding to the control signal from the mobile terminal 16. For example, the wireless communication adaptor 14 obtains an information about the operation mode, temperature, airflow, and wind-direction currently configured for the air conditioner 12. The wireless communication adaptor 14 may obtain an information about an indoor temperature, indoor humidity, and outdoor temperature, if the air conditioner 12 has sensors for detecting the indoor temperature, indoor humidity, and outdoor temperature.

[0084] The wireless communication adaptor 14, after obtaining the information about the operational status of the air conditioner 12 at step S340, in step S350, sends the obtained information of the operational status to the mobile terminal 16.

[0085] The mobile terminal 16, in step S190, receives from the wireless communication adaptor 14 the information about the operational status of the air conditioner 12 (detects the information of the operational status). In succeeding step S200, the mobile terminal 16 informs the user of the received information of the operational status.

[0086] For example, as shown in Fig. 7, the mobile terminal 16 displays an operational status information window 36 in the touch panel 16a. The operational status information window 36 shows an information 36a about the current operational status, that is, the operational status of the air conditioner 12 after receiving the control signal. For example, the information 32a about the operation mode, temperature, airflow, and wind-direction currently configured for air conditioner 12 is displayed. If the wireless communication adaptor 14 obtains from the air conditioner 12 the information about the indoor temperature, indoor humidity, and outdoor temperature and send it as the information of the operational status to the mobile terminal 16, the operational status information window 36 shows the information 36b about the indoor temperature, indoor humidity, and outdoor temperature. Through the operational status information window 36, the user can read the operational status of the air conditioner 12 after receiving the control signal from the mobile terminal 16. That is, the user can understand that the air conditioner 12 starts to perform the operation corresponding to the controls to the mobile terminal 16.

[0087] If the information of the operational status of the air conditioner 12 from the wireless communication adaptor 14 is not acknowledged at step S190, the mobile terminal 16, in step S210, determines whether an elapsed time after sending the operational status request signal at step S180 runs over a given time (for example, 30seconds) or not that is, checks time-out. If the elapsed time after sending the operational status request signal runs over the given time (time-out), the action of step S220 is executed. If not, the process is returned to step S190.

[0088] In the case where the mobile terminal 16 cannot

receive the information about the operational status of the air conditioner 12 from the wireless communication adaptor 14 after a lapse of the given time since the operational status request is sent, in step S220, the mobile terminal 16 informs the user of a notice that the mobile terminal 16 fails to acknowledge the information of the operational status from the wireless communication adaptor 14.

[0089] For example, as shown in Fig. 8, the mobile terminal 16 displays a status acknowledgement failure notice window 38 in the touch panel 16a. The status acknowledgement failure notice window 38 shows a message 38a for informing the user of a notice that the mobile terminal 16 fails to acknowledge the operational status of the air conditioner 12. Through the status acknowledgement failure notice window 38, the user can understand that the mobile terminal 16 fails to acknowledge the operational status of the air conditioner 12.

[0090] As shown in Fig. 8, the status acknowledgement failure notice window 38 includes a "retry" button 38b for re-sending the operation status request signal from the mobile terminal 16 to the wireless communication adaptor 14. The mobile terminal 16 re-sends the operational status request signal to the wireless communication adaptor 14, that is, the process is returned to step S180, when the user touches the "retry" button 38b.

[0091] According to the configuration of the operation system 10 for the air conditioner, the user receives the notice about the transmission completion or transmission failure to the air conditioner 12 of the control signal for controlling the air conditioner 12, and receives the information about the operational status of the air conditioner 12 after receiving the control signal. Therefore, the user can understand (guess) the reason that the air conditioner 12 does not operate after the user controls the mobile terminal 16.

[0092] Specifically, the notices, that the user receives from the mobile terminal, are of three types in after the user performs an input for controlling the air conditioner 12 to the mobile terminal 16.

[0093] The user receives a first notice, as the notice for giving the user understanding of the transmission failure of the control signal from the mobile terminal 16 to the air conditioner 12, from the mobile terminal 16 through, for example, the transmission failure notice window 34 shown in Fig. 6.

[0094] The user also receives a second notice, as the notice for giving the user understanding of the transmission completion of the control signal from the mobile terminal 16 to the air conditioner 12 and the mobile terminal's failure to obtain the information about the operational status of the air conditioner 12, from the mobile terminal 16 through, for example, the transmission completion notice window 34 shown in Fig. 5 and the status acknowledgement failure notice window 38 shown in Fig. 8.

[0095] The user further receives a third notice, as the notice for giving the user understanding of the transmis-

sion completion of the control signal from the mobile terminal 16 to the air conditioner 12 and the acknowledgement completion of the information about the operational status of the air conditioner 12, from the mobile terminal 16 through, for example, the transmission completion notice window 34 shown in Fig. 5 and the operational status information window 36 shown in Fig. 7.

[0096] The user has a knowledge about presences of the first to third notice.

Therefore, when the user receives the first notice from the mobile terminal 16, the user can guess that the communication between the mobile terminal 16 and the air conditioner 12 (wireless communication adaptor 14) cannot be performed temporarily or semipermanently by the reason of, for example, a congestion of the internet 20 or a disconnection of lines. Consequently, the user can retry to control the air conditioner 12 by the use of the mobile terminal 18 after a few moments.

[0097] When the user receives the second notice from the mobile terminal 16, the user can guess that the control signal from the mobile terminal 16 has reached to the air conditioner 12 (wireless communication adaptor 14) while the air conditioner 12 does not operate for some reason. The user can guess a breakdown of the air conditioner 12, disconnection of a main power supply, and like. Therefore, it is suppressed that the user mistakes that the control signal from the mobile terminal 16 has not reached to the air conditioner 12 by the reasons of the temporarily congestion of the internet 20 and thus makes a repeat control of the mobile terminal 16 for the air conditioner 12 without avail.

[0098] When the user receives the third notice from the mobile terminal 16, the user can guess that the air conditioner 12 operates so as to correspond to the controls of the mobile terminal 16.

[0099] As noted above, providing the user with the information about the operational status of the air conditioner 12 after receiving the control signal from the mobile terminal 16 is performed, when the user touches the "operational status" button 32c in the transmission completion notice window 32 for example, that is, when the user needs it. In other words, the information about the operational status of the air conditioner 12 after receiving the control signal is not provided automatically to the user. This reason is that the user could be in a position with a view of the air conditioner 12. That is, the user in the position with the view of the air conditioner 12 can check the operational status of the air conditioner 12 by looking it directly and thus does not need to be provided with the information of the operational status from the mobile terminal 16. Therefore, it is suppressed that the notice about the operational status of the air conditioner 12 is provided unnecessarily to the user in the position with the view of the air conditioner 12 through the mobile terminal 16.

[0100] Hereinbelow, the connection between the air conditioner 12 and the wireless communication adaptor 14 is explained in detail.

[0101] Fig. 9 is a perspective view showing an appear-

ance of the air conditioner 12. Fig. 10 is a perspective view showing an inside of the air conditioner 12.

[0102] As shown in Fig. 9, the air conditioner 12 has a body 12a made up mostly of an underframe and a front panel 12b openably covering a front portion of the body 12a (a portion on the face-side of the air conditioner 12). The body 12a and the front panel 12b are made mostly from synthetic resin.

[0103] As shown in Fig. 10 in which the front panel 12 is omitted, the air conditioner 12 has intake openings 12c which is formed on a top portion and the front portion of the air conditioner 12 and through which an air is introduced into the body 12a, and an outtake opening 12d which is formed on a bottom portion and through which the air in the body 12a is blown outside (in the house 24). When the air is introduced into the body 12a through the intake openings 12c, the front panel 12b is opened so as to expose the intake opening 12c formed on the front portion of the body 12a. Between the intake openings 12c and the outtake opening 12d, a fan 12e generating a flow of the air from the intake openings 12c to the outtake opening 12d and a heat exchanger (not shown) exchanging heat with the air introduced into the body 12a are disposed.

[0104] To a frame 12f positioned at a top-front portion of the body 12a of the air conditioner 12, a control box 12g for controlling the air conditioner 12 is attached. The operation control part 12h is accommodated in the control box 12g.

[0105] The operation control part 12h has a control substrate on which an adaptor connection terminal 12i for connecting the control substrate and the wireless communication adaptor 14 is mounted directly.

[0106] If the wireless connection adaptor 14 through which the air conditioner 12 is controlled by the use of the mobile terminal 16 is not connected with the adaptor connection terminal 12i of the operation control part 12h, the air conditioner 12 performs an air conditioning operation on the basis of a control sequence incorporated into the operation control part 12h.

[0107] The wireless communication adaptor 14 has, as shown in Fig. 11, a communication device body 14b communicating with the gateway device 18, a connector 14c detachable connecting to the adaptor connection terminal 12i of the operation control part 12h of the air conditioner 12, and a lead wire 14d connecting the communication device body 14b and the connector 14c.

[0108] The wireless communication adaptor 14 has an attachment 14e for attaching the communication device body 14b to the air conditioner 12 (the body 12a) or the room of the house 24 in which the air conditioner 12 is placed (for example, a wall surface on which the air conditioner 12 is mounted, a post of the indoor close to the air conditioner 12, and like).

[0109] Specifically, in the embodiment, the attachment 14e for the wireless communication adaptor 14, as shown in Fig. 11, is a clip-like member made by doubling up a piece of metal sheet in a U-shape. The attachment

14e also is fixed to a back surface of the communication device body 14b through a base part 14f thereof. In the embodiment, the base part 14f of the attachment 14e has a through hole 14g formed thereon. The communication device body 14b has a protrusion 14h engaging with the through hole 14g and formed on the back surface thereof. The communication device body 14b also has a pair of engaging parts 14i formed on the back surface thereof. The base part 14f of the attachment 14e is moved along the back surface of the communication device body 14b and then inserted between the pair of engaging parts 14i.

[0110] The attachment 14e of the wireless communication adaptor 14 has an opposed part 14j opposite to the base part 14f at intervals. As shown in Fig. 12, the communication device body 14b of the wireless communication adaptor 14 can be attached to the air conditioner 12 by sandwiching a housing rim 12j of the body 12a of the air conditioner 12 between the base part 14f and the opposed part 14j of the attachment 14e. The communication device body 14b of the wireless communication adaptor 14 may be attached to the body 12a of the air conditioner 12 without exposing to outside, instead of with the communication device body 14b exposed outside of the body 12a as shown in Fig. 12.

[0111] In the housing of the body 12a of the air conditioner 12, the rim 12j sandwiched by the attachment 14e of the wireless communication adaptor 14 preferably is positioned away from the outtake opening 12d. Specifically, in the housing of the body 12a of the air conditioner 12, the rim 12j sandwiched by the attachment 14e preferably is positioned such that the communication device body 14b with the attachment 14e thereof holding the rim 12j of the body 12a is not opened up directly to the air blown from the outtake opening 12d. Therefore, it is suppressed that, in the cooling operation of the air conditioner 12, the communication device body 14b of the wireless communication device 14 is opened up to a volume of cold air blown from the outtake opening 12d. Consequently, it is suppressed that a dew condensation (beading) occurs on a surface of the communication device body 14b of the wireless communication adaptor 14, and thereby avoids the dew condensation interrupting the communication between the communication device body 14b and the gateway device 18. That is, during the cooling operation of the air conditioner 12, a quality in the communication between the wireless communication adaptor 14 and the gateway device 18 is highly maintained, and thus a reliability of the communication is improved.

[0112] The attachment 14e of the wireless communication adaptor 14 further has a keyhole-like mounting hole 14k formed on the opposed part 14j and used when the communication device body 14b is mounted on the room of the house 24. The communication device body 14b of the wireless communication adaptor 14 can be mounted on the room by engaging the mounting hole 14k and a screw 14l mounted on a wall surface of the room.

[0113] By the use of the attachment 14e, the communication device body 14b of the wireless communication adaptor 14 can be attached to the air conditioner 12 or on the room of the house 24 in which the air conditioner 12 is placed. Thereby improves an arbitrary property in the position of the communication device body 14b of the wireless communication adaptor 14.

[0114] When the communication device body 14b of the wireless communication adaptor 14 is inside of the air conditioner 12, for example, when the housing rim 12j of the body 12a of the air conditioner 12 is held by the attachment 14e as shown in Fig. 12, it is suppressed that the communication device body 14b spoils a design of the appearance of the air conditioner 12. In this case, lead wire 14d of the wireless communication adaptor 14 is laid at any position inside of the air conditioner 12 and connected to the adaptor connection terminal 12i of the operation control part 12h. For example, as shown in Figs. 13 and 14, the lead wire 14d is connected to the adaptor connection terminal 12i of the operation control part 12 by passing through a lead wire guide groove 12k formed on the control box 12g accommodating the operation control part 12h and guiding lead wire 14d and a duct 12l disposed on the outer-side of the fan 12e.

[0115] It is possible that a stability in the communication between the communication device 14b and the gateway device 18 degrades, if the communication device body 14b of the wireless communication adaptor 14 is disposed inside the air conditioner 12 without exposing outside. For example, when the air conditioner 12 is mounted on the wall surface of the room in the house 24 through a metal mounting plate (not shown), it is possible that the communication between the communication device body 14b and the gateway device 18 is interrupted by the metal mounting plate. If there is such possibility, as shown in Fig. 12, the communication device body 14b of the wireless communication adaptor 14 is attached to the air conditioner 12 through the attachment 14e with it exposing outside of the air conditioner 12.

[0116] Although the communication device body 14b of the wireless communication adaptor 14 is attached to the air conditioner 12 with it exposing outside, it is possible to degrade the stability of in the communication between the communication device body 14b and the gateway device 18. In this case, the communication device body 14b is disposed away from the air conditioner 12. For example, the communication device body 14b is attached on the wall surface of the room by engaging the mounting hole 14k of the attachment 14e and the screw 14l mounted on a portion of the wall surface of the room in the house 24 positioned away from the air conditioner 12. In this case, a part of lead wire 14d is extended from inside of the air conditioner 12 and laid on the wall surface of the room, for example.

[0117] As noted above, since the arbitrary property in the position of the communication device body 14b of the wireless communication adaptor 14 is high, the communication device body 14 can be disposed at position such

that the communication between the communication device body 14b of the wireless adaptor 14 and the gateway device 18 can become stable.

[0118] Concerning the layout of the lead wire 14d of the wireless communication adaptor 14, as shown in Fig. 10, the adaptor connection terminal 12i of the operation control part 12h connected to the lead wire 14d (the connector 14c) preferably is disposed on the front portion of the body 12a of the air conditioner 12. For example, as shown in Fig. 10, the operation control part 12h is disposed on the front portion of the body 12a of the air conditioner 12 and the adaptor connection terminal 12i is mounted directly on the operation control part 12h. Therefore, the lead wire 14d can be connected easily to the adaptor connection terminal 12i of the operation control part 12h after the front panel 12b opened. Consequently, a working times for installing the wireless communication adaptor 14 including laying of the lead wire 14d can be compressed.

[0119] According to the embodiment, in case that the air conditioner 12 is controlled by the use of the mobile terminal 16, the user can be informed of an operational status of the air conditioner 12 controlled by the mobile terminal 16, as appropriate.

[0120] The invention has described with reference to the embodiment described above, however, the invention is not limited to the embodiment.

[0121] For example, in the above embodiment, the communication between the mobile terminal 16 and the wireless communication adaptor 14 is performed through the gateway device 18 which is a relay device. However, the invention is not limited to this. The control system 10 of the air conditioner may have a configuration with the gateway device 18 deleted from the configuration shown in Fig. 1. In this case, the wireless communication adaptor 14 is adapted to connect to the internet 20 and/or the wireless communication adaptor 14 and the mobile terminal 16 are adapted to communicate with each other.

[0122] Also, in the above embodiment, the user can be informed of the information about the operational status of the air conditioner 12 after the control signal have been sent from the mobile terminal 16 to the air conditioner 12. However, the invention is not limited to this. For example, the control system of the air conditioner may be adapted to inform the user of the information about the operational status of the air conditioner when the user wants it, that is, at any time.

[0123] Further, in the above embodiment, the mobile terminal for controlling the air conditioner is a mobile terminal used widely such as a smartphone. However, the invention is not limited to this. For example, a mobile terminal dedicating the controls of the air conditioner may be used.

[0124] Moreover, in the above embodiment, as shown in Fig. 3, the wireless communication adaptor 14 sends the control signal to the air conditioner 12 and then sends the transmission completion signal to the mobile terminal 16. The mobile terminal 16 receives the transmission

completion signal and informs the user of the notice about the transmission completion of the control signal. However, the invention is not limited to this. The mobile terminal 16 may be adapted to inform the user of the notice about transmission completion of the control signal after sending the control signal to the wireless communication adaptor 14.

[0125] Moreover, as shown in Fig. 13, the adaptor connection terminal 14i connected to the wireless communication adaptor 14 may be mounted indirectly on the operation control part 12h of the air conditioner 12 through a lead wire, instead of directly to the operation control part 12h. In this case, the adaptor connection terminal 14i can be disposed at any position in the air conditioner 12. For example, the adaptor connection terminal 14i may be disposed on an outer surface of the air conditioner 12. In this case, the adaptor connection terminal 14i is covered by a cap for example when the wireless communication adaptor 14 is not connected to the adaptor connection terminal 14i. Additionally, if the adaptor connection terminal 12i is mounted directly on the operation control part 12h as shown in Fig. 13, a lead wire and like becomes unnecessary and thereby improves a workability in an assembly and decreases a cost.

[0126] Moreover, the wireless communication adaptor 14 may be a part of the air conditioner 12 incorporated integrally into the air conditioner 12, instead of detachably into air conditioner 12, that is, instead of an optional part attachable to the air conditioner 12.

[0127] Although the present invention has been fully described in connection with the preferred embodiments thereof with reference to the accompanying drawings, it is to be noted that various changes and modifications are apparent to those skilled in the art. Such changes and modifications are to be understood as included within the scope of the present invention as defined by the appended claims unless they depart therefrom.

[0128] The entire disclosure of Japanese Patent Applications No. 2012-167971 filed on July 30, 2012 and No. 2012-172265 filed on August 2, 2012, including specification, claims, and drawings are incorporated herein by reference in its entirety.

Claims

1. A control system for controlling a household electrical appliance, the control system for controlling the household electrical appliance comprising:

a mobile terminal sending a control signal for controlling the household electrical appliance; and
a communication device connected to the household electrical appliance, receiving the control signal from the mobile terminal, and sending the received the control signal to the household electrical appliance,

wherein the mobile terminal is adapted to send a request signal to the communication device by a user controls,
the request signal is a signal for requesting the communication device to send an information about an operational status of the household electrical appliance after receiving the control signal to the mobile terminal,
the communication device is, after receiving the request signal from the mobile terminal, adapted to obtain and send the information about the operational status of the household electrical appliance after receiving the control signal,
the mobile terminal further is adapted to inform the user of the information about the operational status of the household electrical appliance after receiving the control signal sent from the communication device, and
the mobile terminal yet further is adapted to inform the user of a notice about a transmission completion of the control signal to the household electrical appliance and simultaneously suggest the user perform a controls for sending the request signal.

2. The control system for controlling the household electrical appliance according to claim 1, further comprising:

a router device connected to an internet; and
a relay device relaying communication between the communication device and the mobile terminal,
wherein the mobile terminal and the relay device are adapted to be able to have a first communication between the mobile terminal and the relay device only through the router device and a second communication between the mobile terminal and the relay device through both the internet and the router device, and
the mobile terminal is adapted such that the user can select the first or second communication by the use of the mobile terminal.

3. The control system for controlling the household electrical appliance according to claim 1 or 2, wherein the household electrical appliance is an air conditioner, and
the communication device is connected to an operation control part of the air conditioner for controlling an air-conditioning operation.

4. The control system for controlling the household electrical appliance according to claim 3, wherein the communication device has a communication device body communicating with the relay device, a connector detachably connecting to a communication device connection terminal of the oper-

ation control part of the air conditioner, a lead wire connecting the communication device body and the connector, and an attachment for attaching the communication device body to the air conditioner or a room in which the air conditioner is placed.

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5. The control system for controlling the household electrical appliance according to claim 4, wherein the air conditioner has a body and a front panel openably covering a front portion of the body, the communication device connection terminal of the operation control part of the air conditioner is disposed on the front portion of the body of the air conditioner, and the attachment of the communication device is adapted to hold a housing rim of the body of the air conditioner. 10
6. The control system for controlling the household electrical appliance according to claim 5, wherein the housing rim of the body of the air conditioner held by the attachment is positioned at a position at which the communication device with the attachment holding the housing rim is not opened up to an air blown from an outtake opening of the air conditioner. 15 20 25
7. The control system for controlling the household electrical appliance according to claim 4, wherein the operation control part of the air conditioner is disposed on a front portion of a body of the air conditioner, and the communication device connection terminal is mounted directly on the operation control part. 30 35
8. A program for controlling a household electrical appliance installed in a communicatable mobile terminal, the program for controlling the household electrical appliance making the mobile terminal function as, 40
a means for sending a control signal for controlling the household electrical appliance to a communication device which is connected to the household electrical appliance, which receives the control signal from the mobile terminal, and which sends the received the control signal to the household electrical appliance, 45
a means for sending a request signal to the communication device by a user controls, the request signal is a signal for requesting the communication device to send an information about an operational status of the household electrical appliance after receiving the control signal to the mobile terminal, 50
a means for informing the user of the information about the operational status of the household electrical appliance after receiving the control signal sent from the communication device, and 55
a means for informing the user of a notice about a

transmission completion of the control signal to the household electrical appliance and simultaneously suggesting the user perform a controls for sending the request signal.

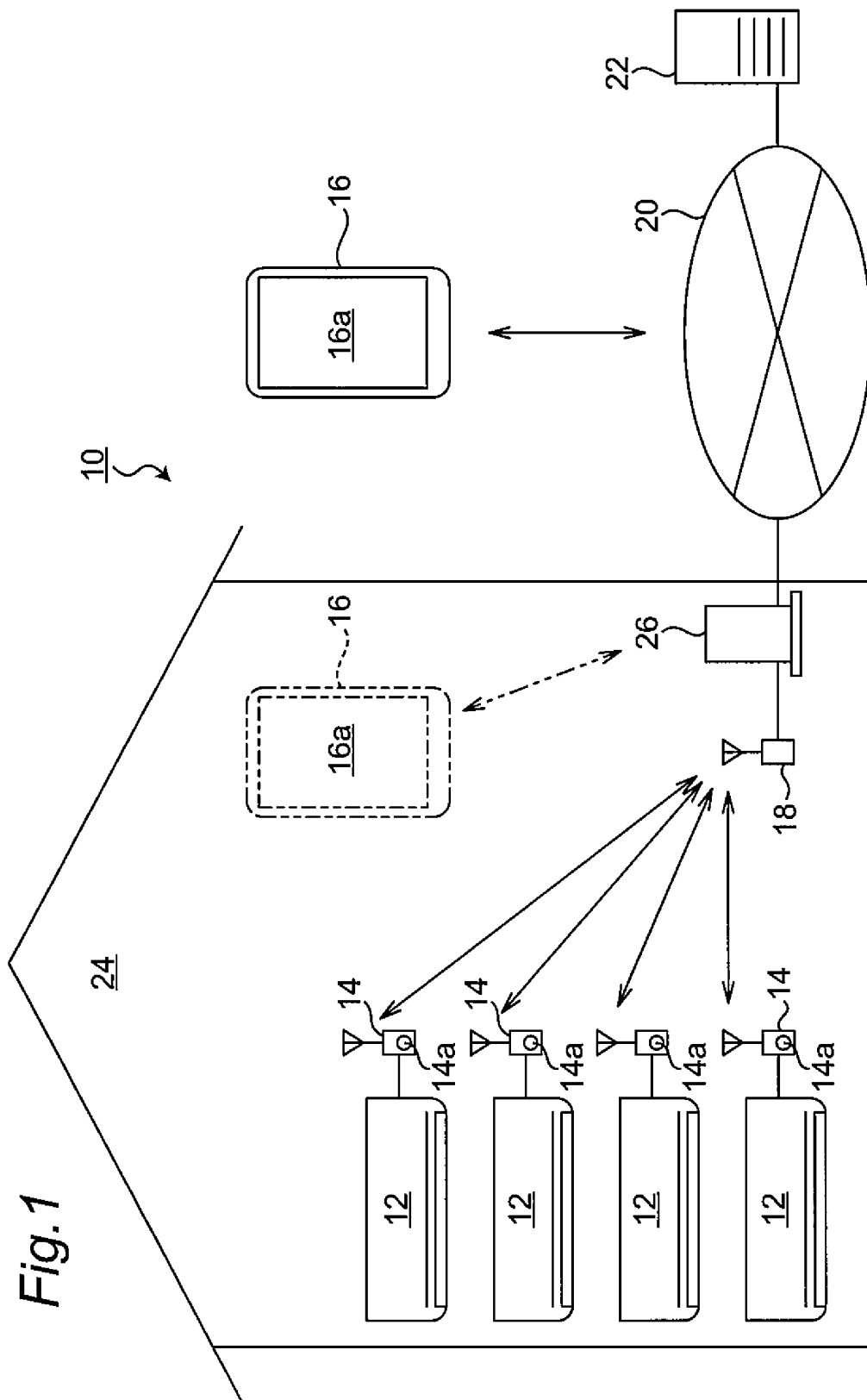
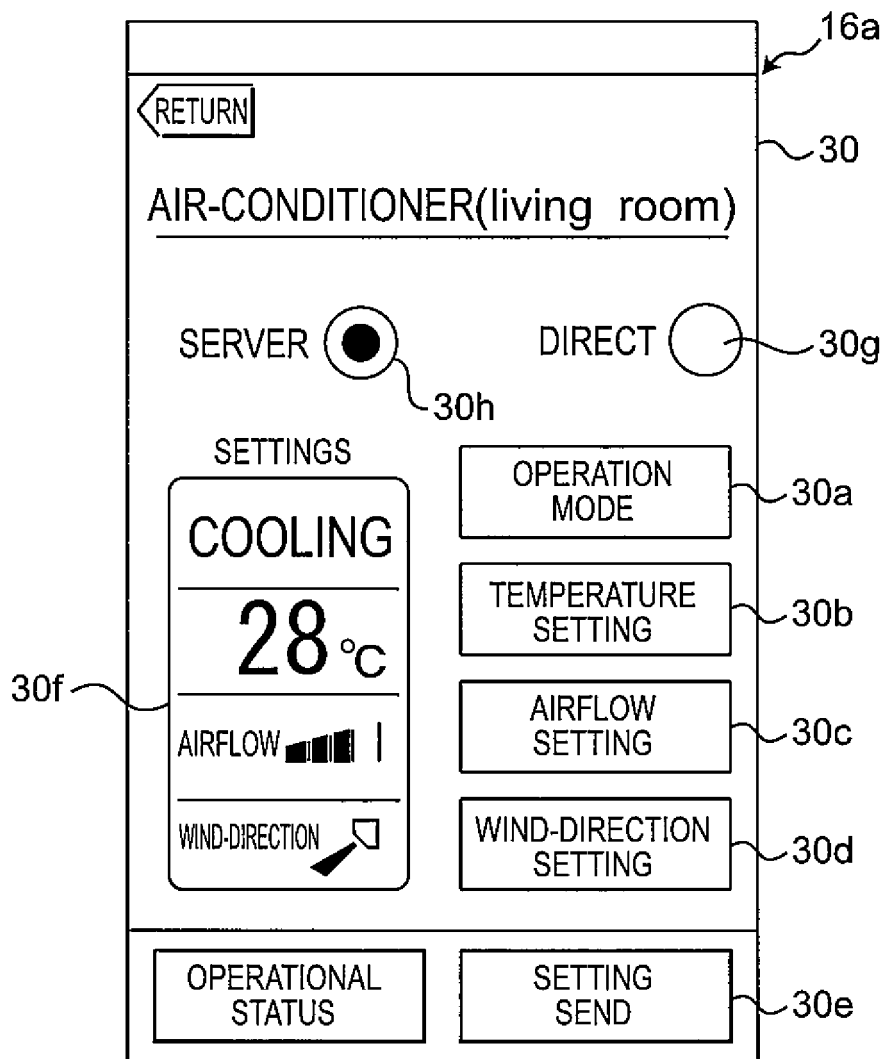
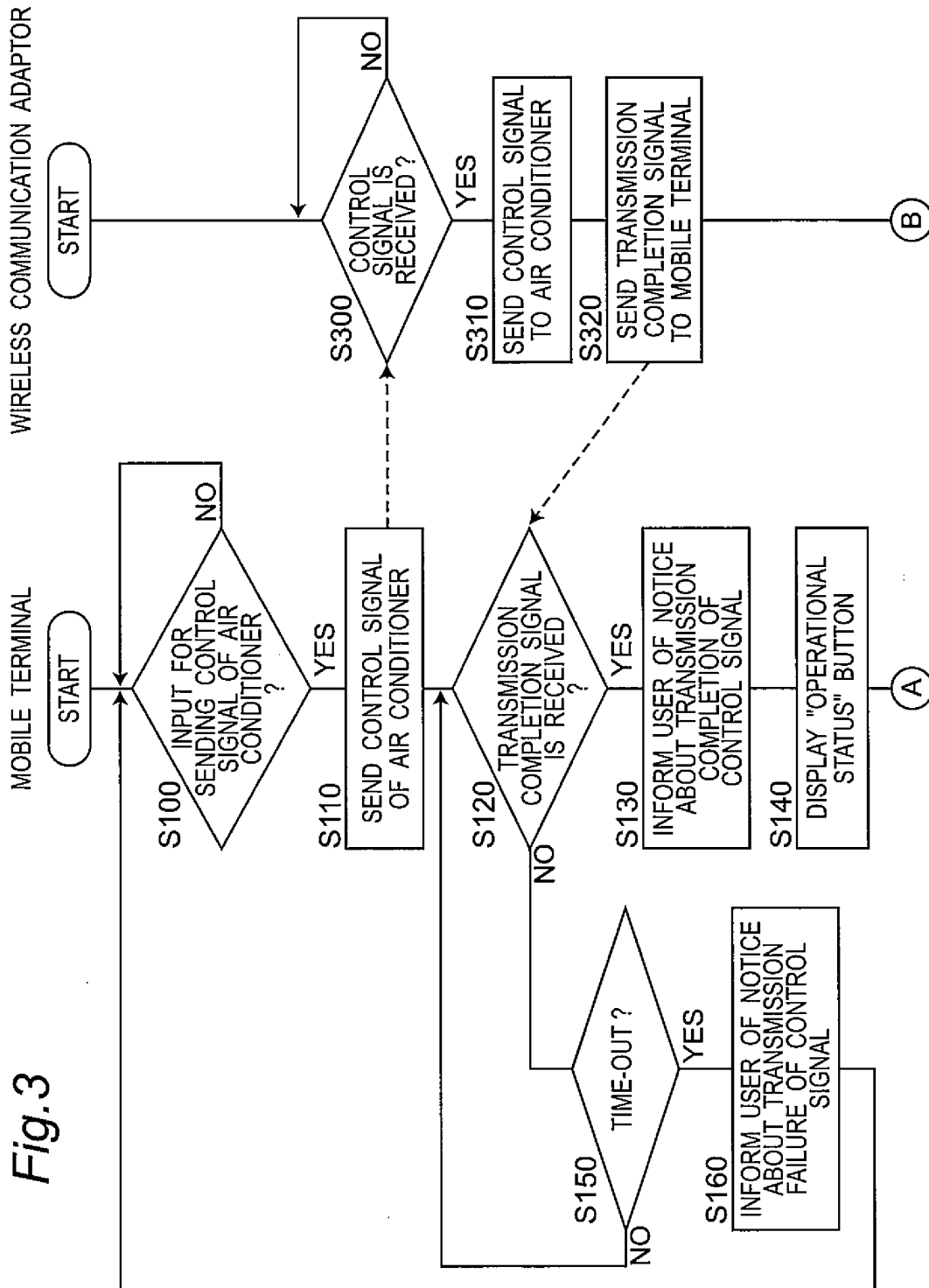


Fig.2





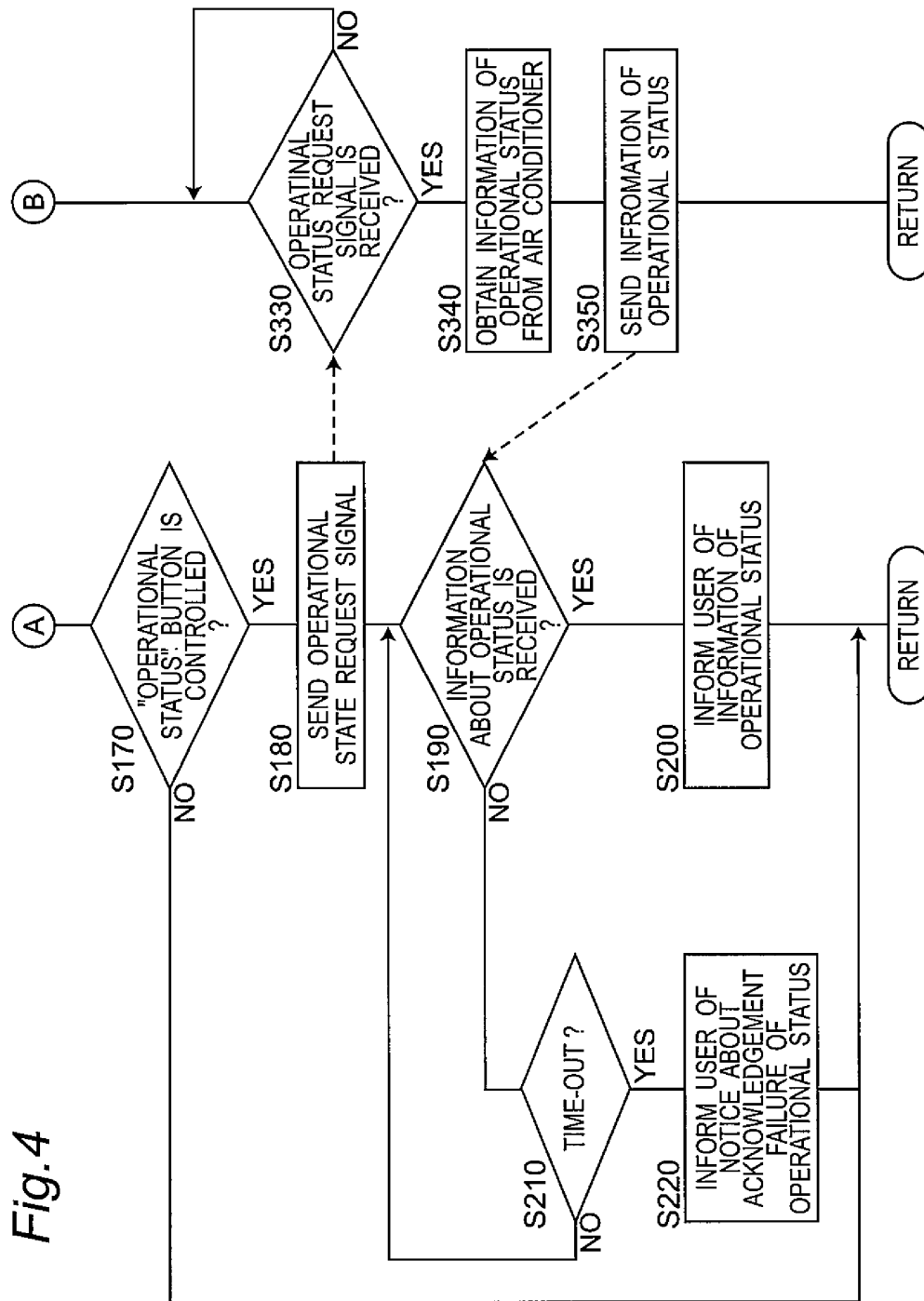


Fig.5

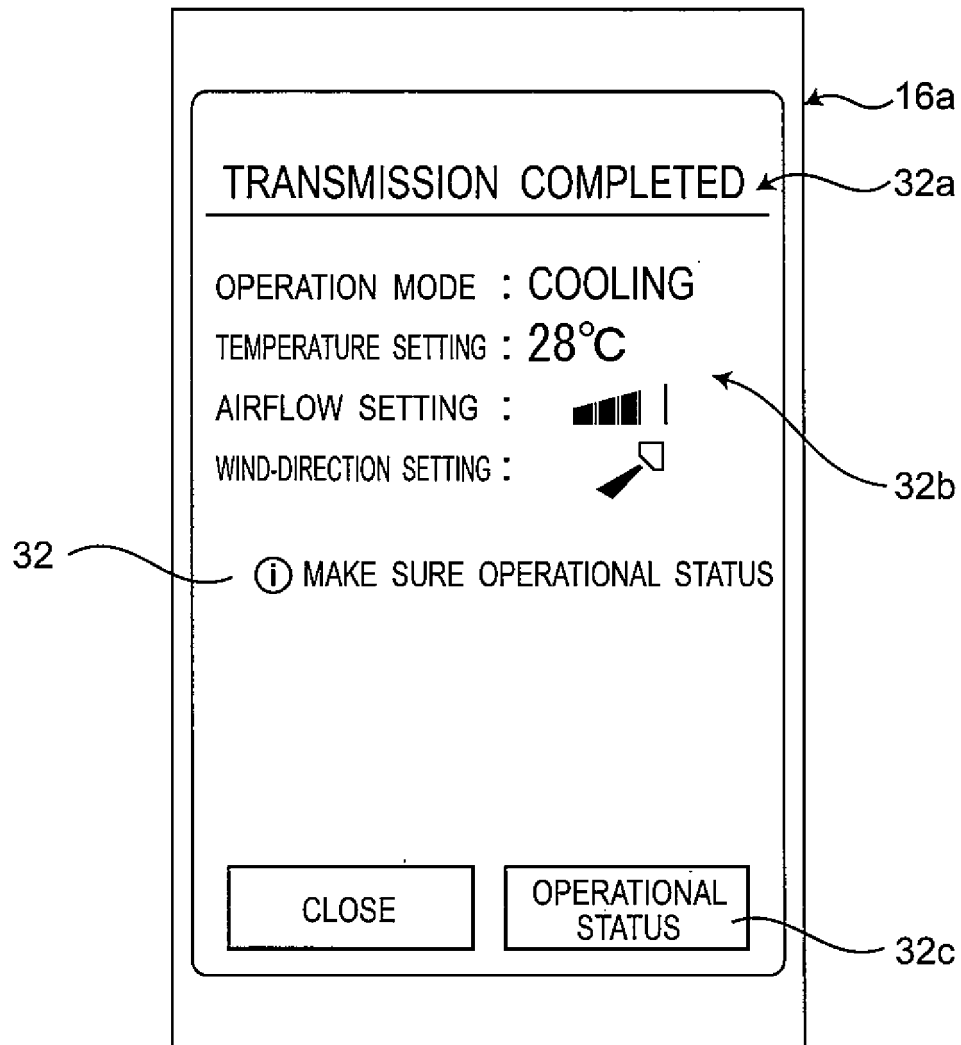


Fig.6

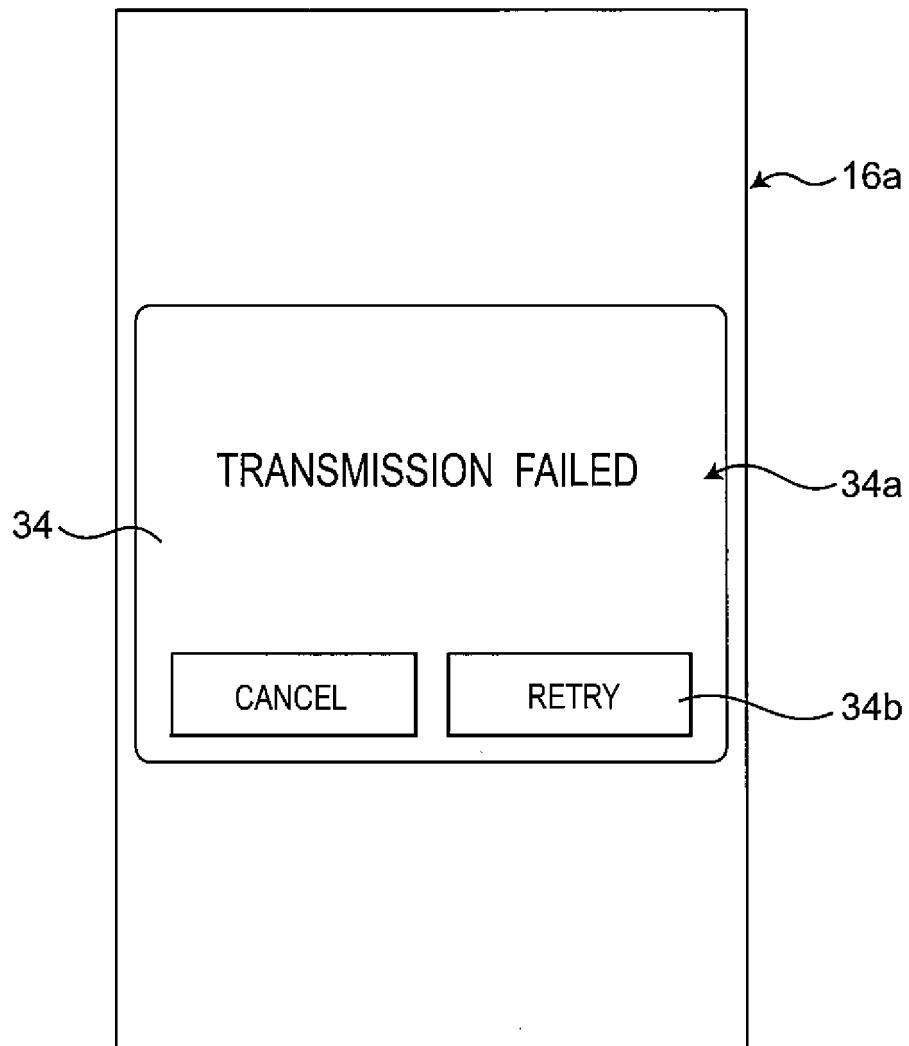


Fig.7

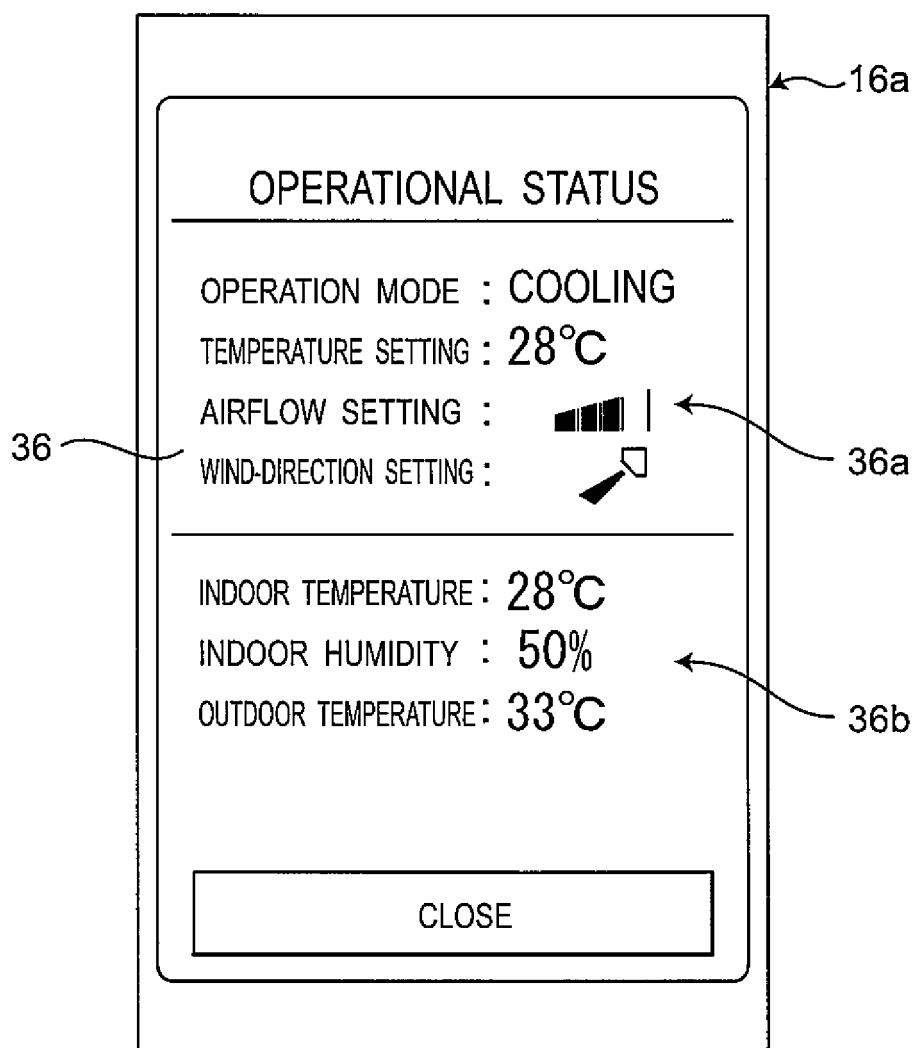


Fig.8

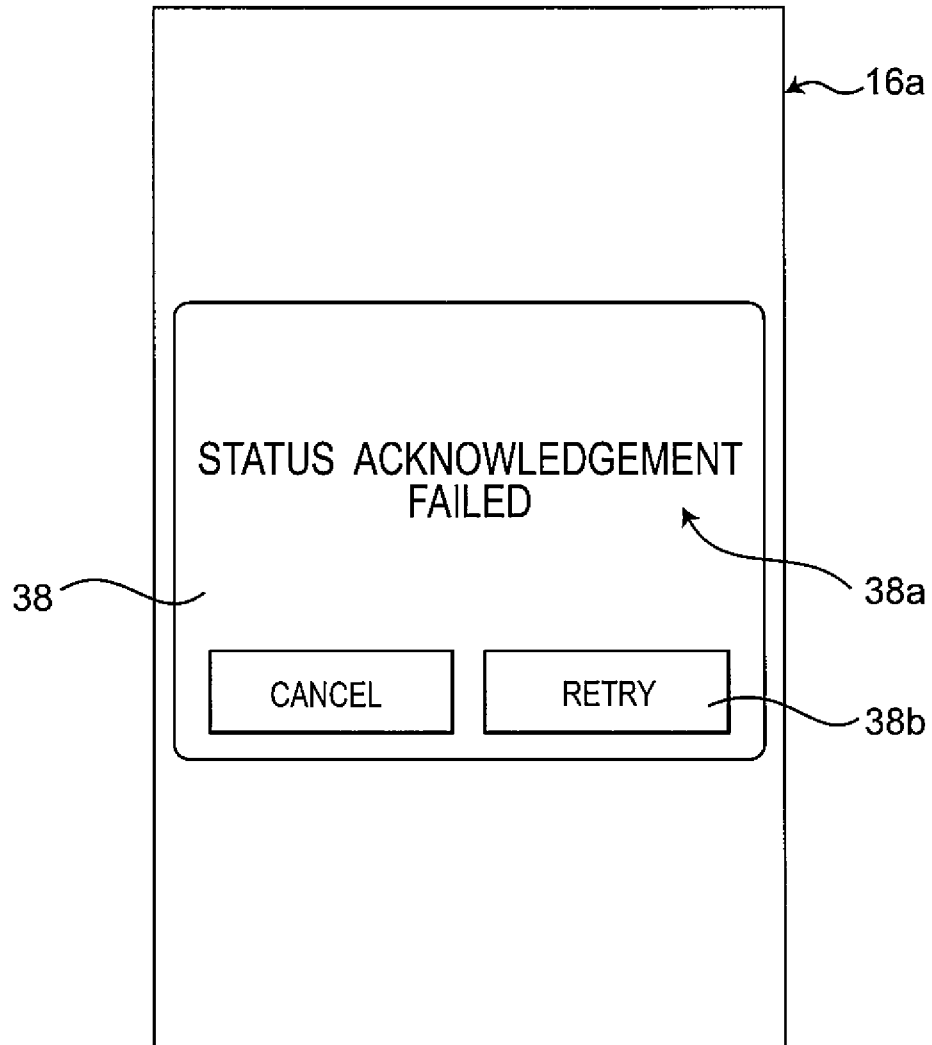


Fig.9

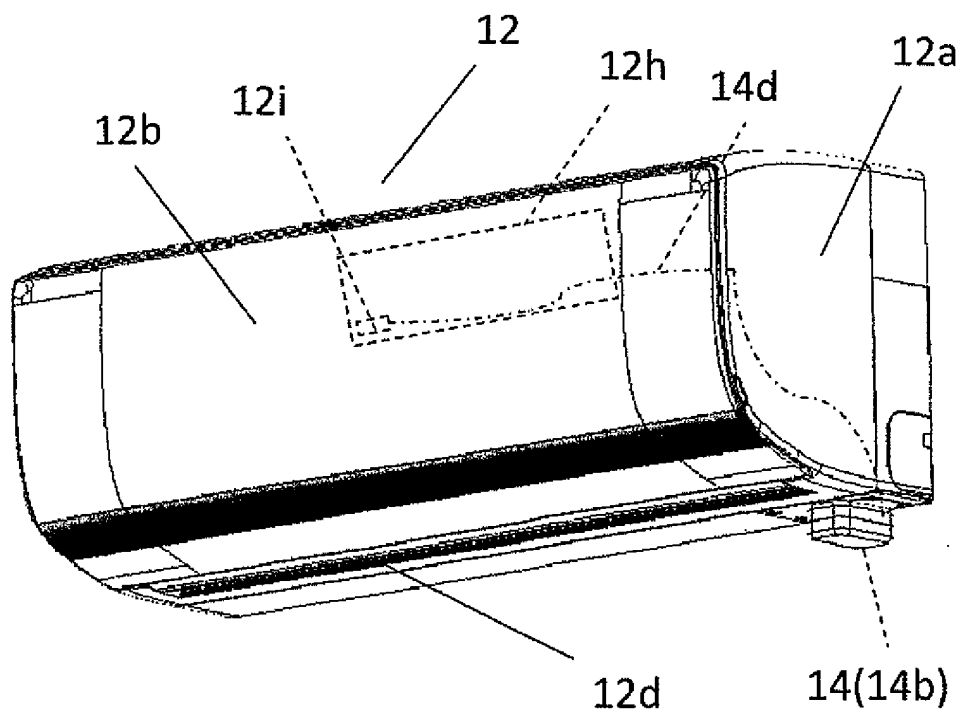
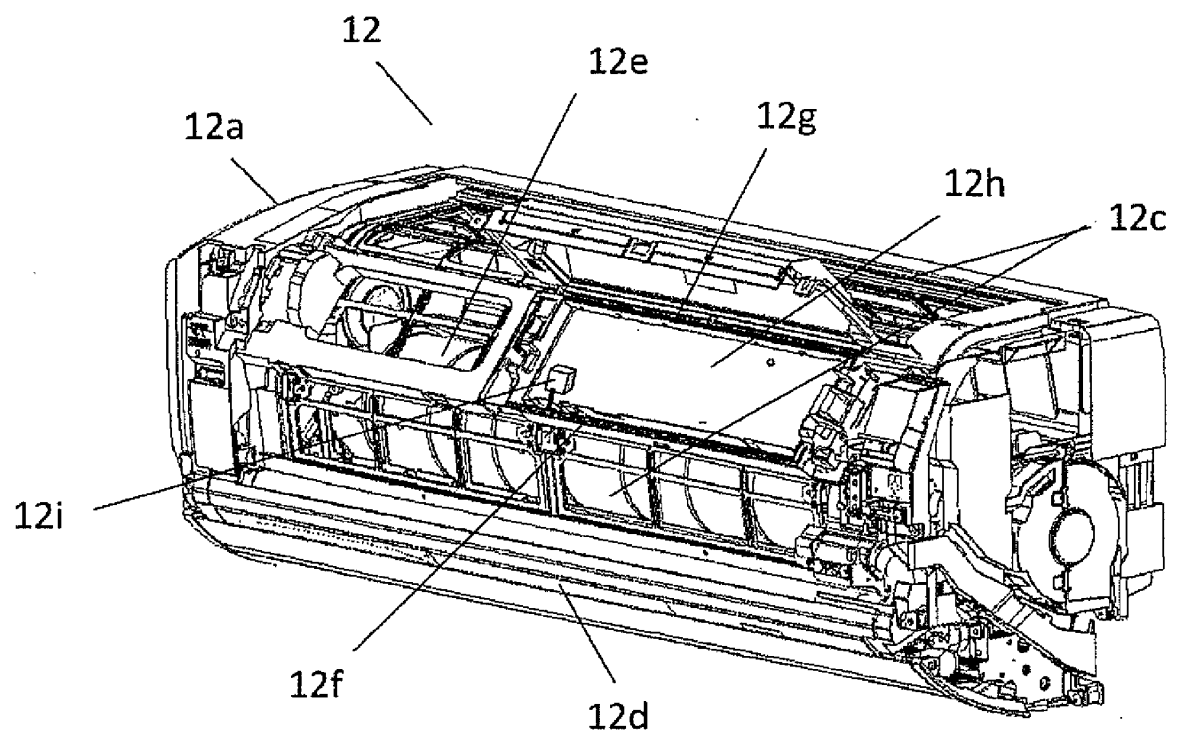


Fig.10



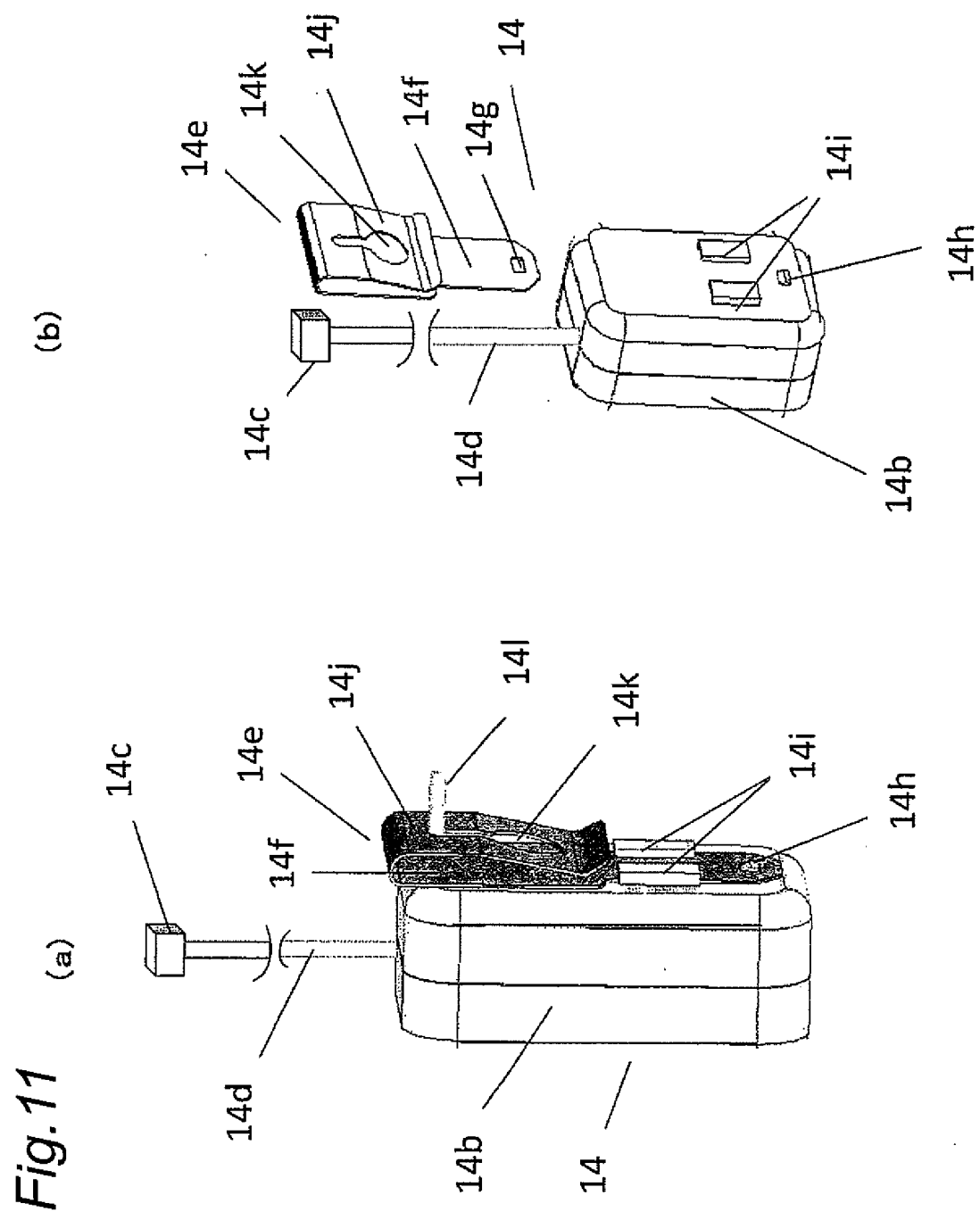


Fig.12

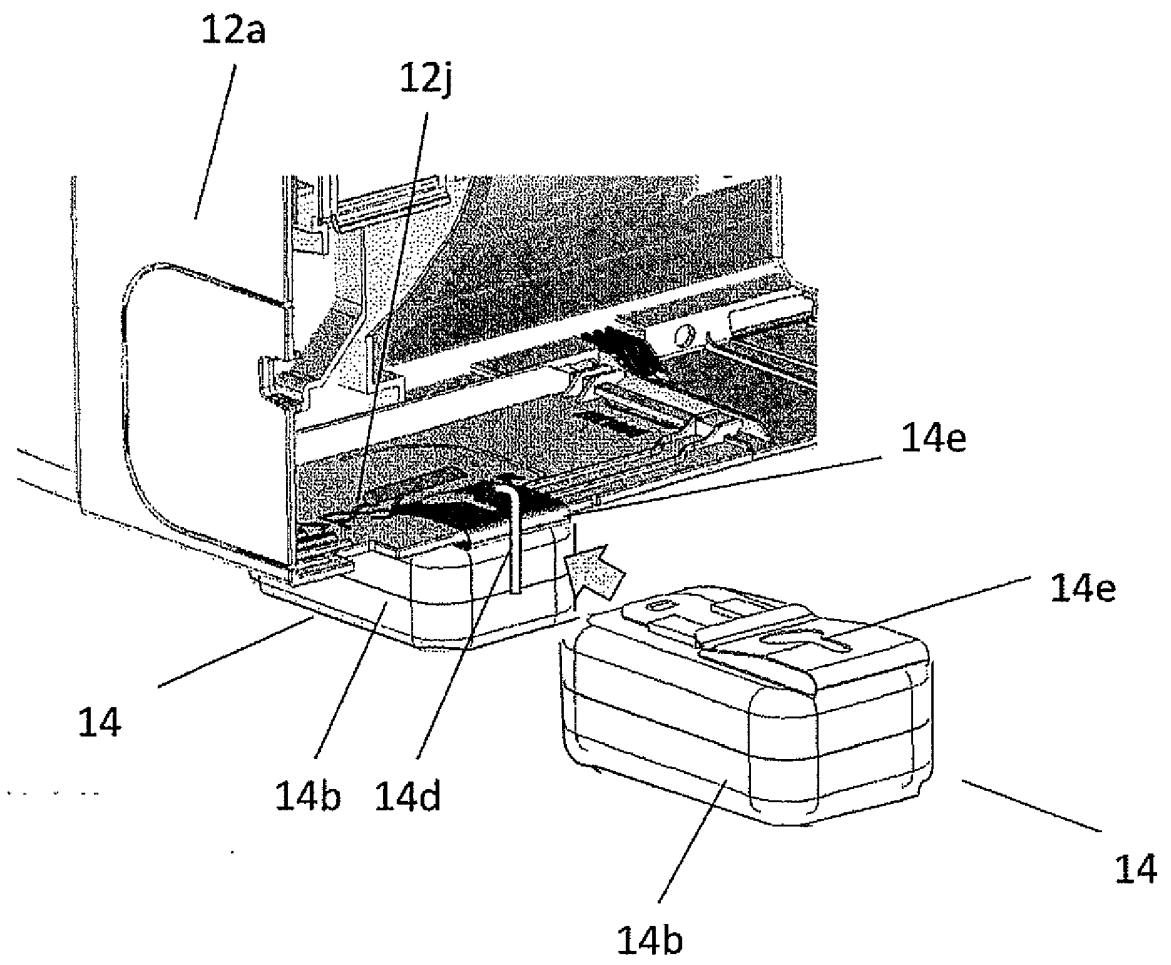
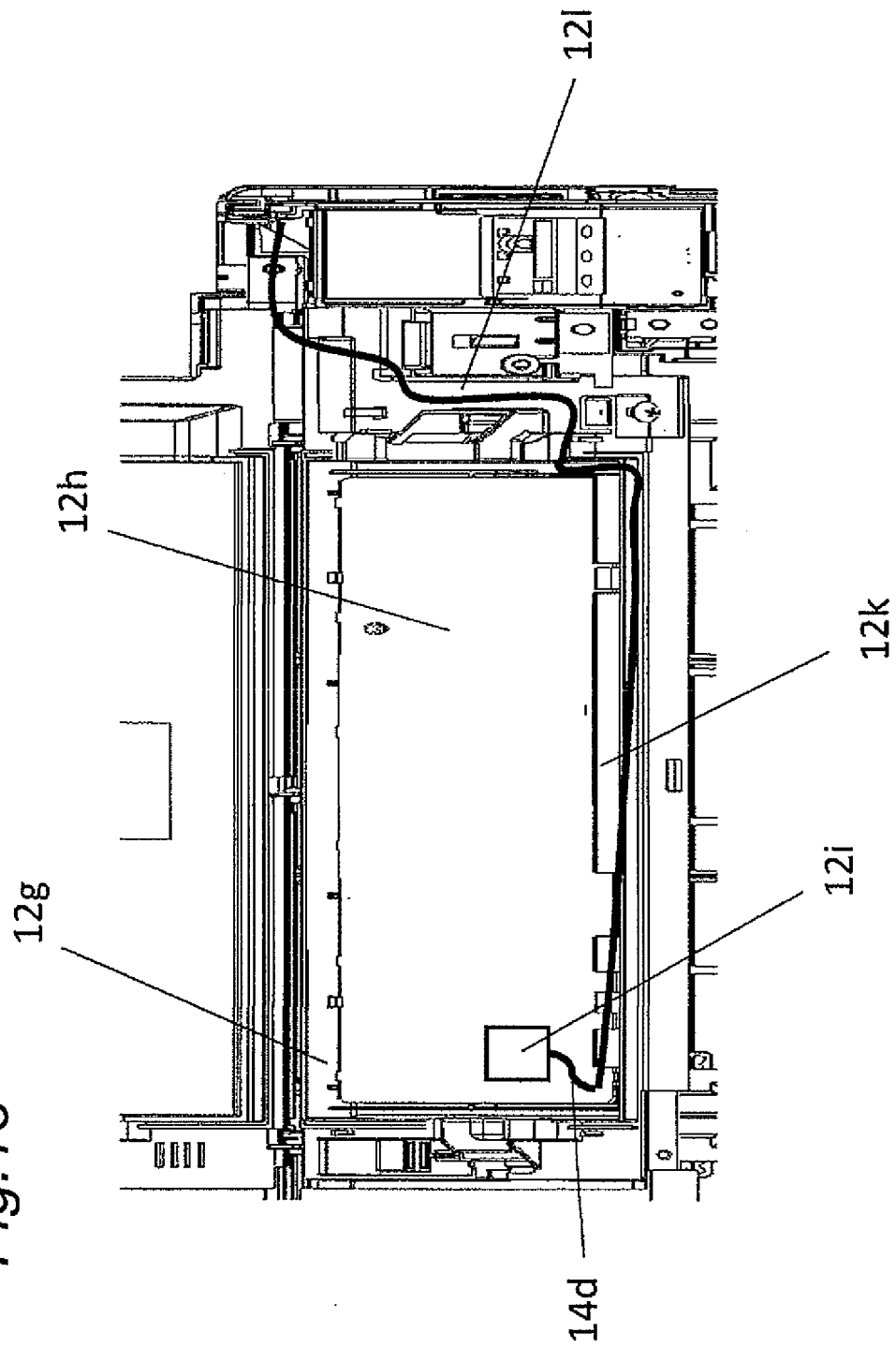
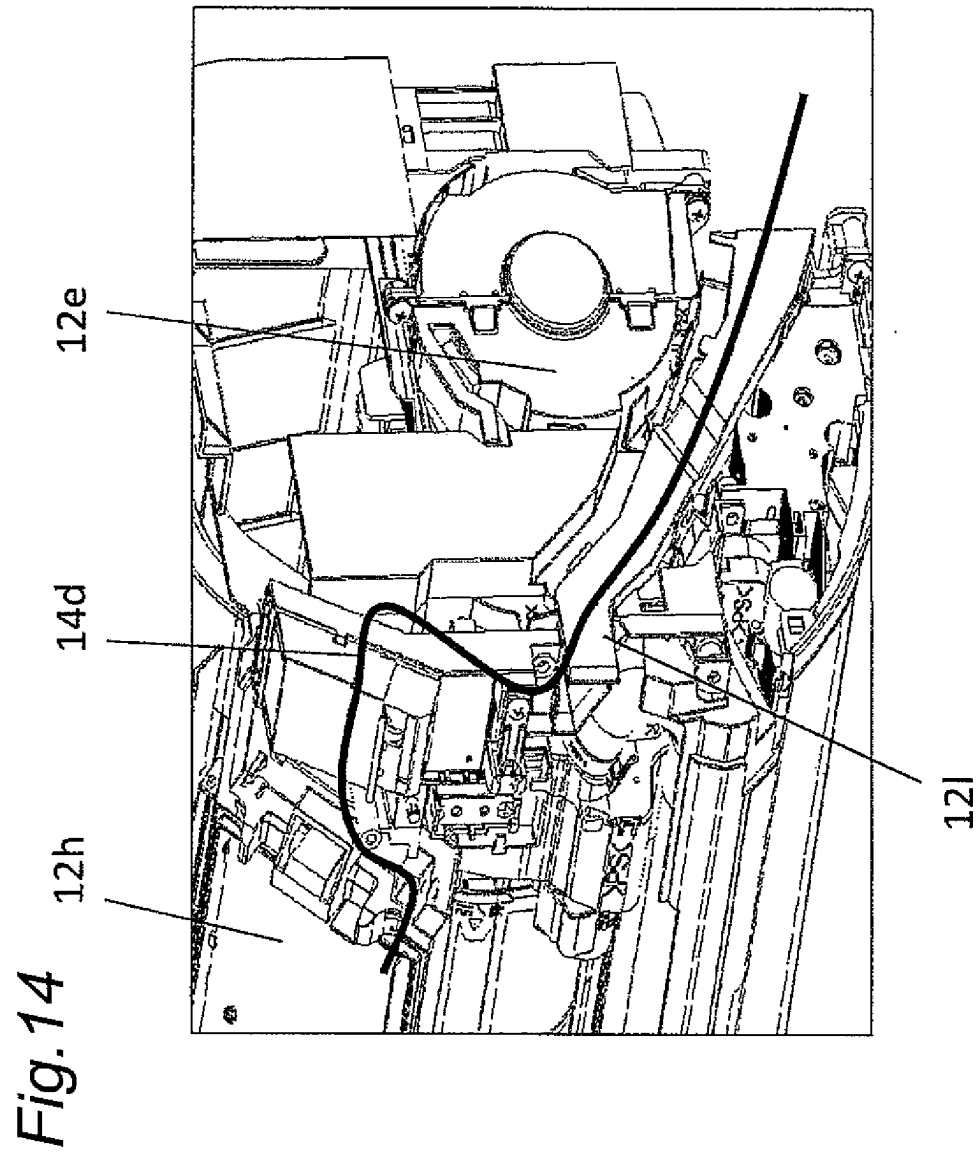


Fig.13





INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2013/004557

A. CLASSIFICATION OF SUBJECT MATTER

F24F11/02(2006.01)i, F24F13/20(2006.01)i, H04Q9/00(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F24F11/02, F24F13/20, H04Q9/00

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 1996-2013

Kokai Jitsuyo Shinan Koho 1971-2013 Toroku Jitsuyo Shinan Koho 1994-2013

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.
A	JP 2011-114519 A (Panasonic Corp.), 09 June 2011 (09.06.2011), entire text; all drawings (Family: none)	1-8
A	JP 2007-6329 A (Brother Industries, Ltd.), 11 January 2007 (11.01.2007), entire text; all drawings & US 2007/0071190 A1 & CN 1893508 A	1-8
A	JP 63-209393 A (Toshiba Corp.), 30 August 1988 (30.08.1988), entire text; all drawings (Family: none)	1-8

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

* Special categories of cited documents:

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Date of the actual completion of the international search
16 October, 2013 (16.10.13)Date of mailing of the international search report
29 October, 2013 (29.10.13)Name and mailing address of the ISA/
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REFERENCES CITED IN THE DESCRIPTION

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