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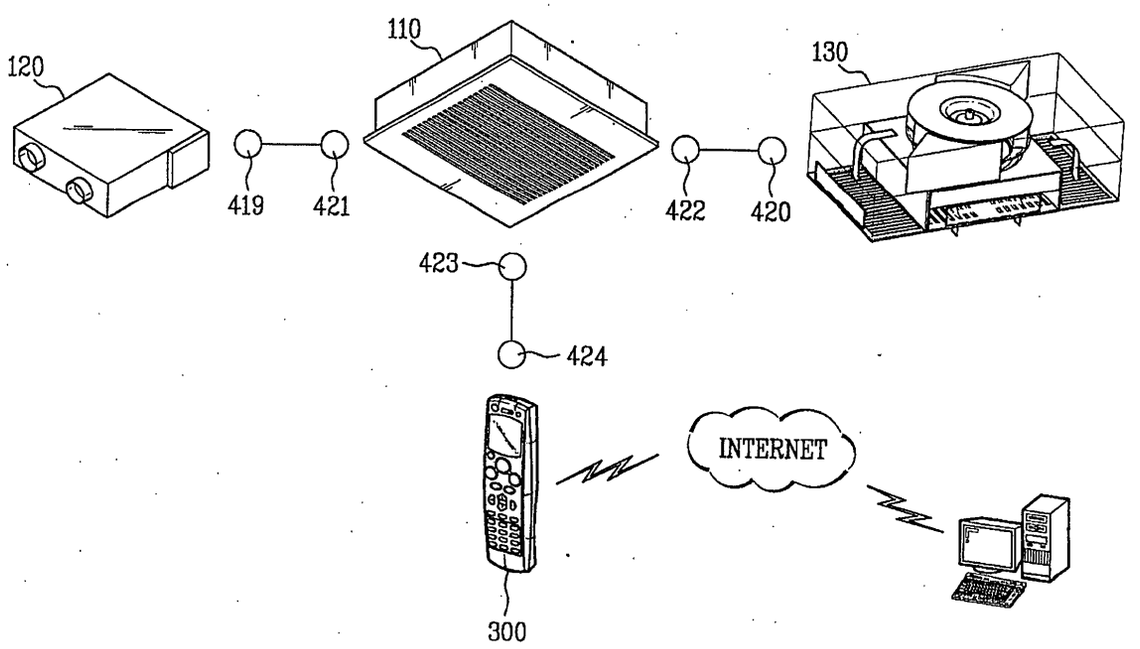
(54) Air conditioning system and method for controlling the same

(57) Air conditioning system including at least one room cooling/heating unit (110) for cooling/heating a room selectively, at least one ventilating unit (120) for ventilating a room selectively, at least one air purifying unit (130) for purifying contaminated room air selectively, and a controller (300) provided so as to be able to communicate with the room cooling/heating unit (110) , the ventilating unit (120), and the air purifying unit (130), for controlling above units interlocked with one another, thereby providing an air conditioning system in which a room cooling/heating function, a ventilating function, and an air purifying system are controlled, collectively.

FIG. 8



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Description

[0001] The present invention relates to air conditioning systems, and more particularly, to an air conditioning system which can control various kinds of air conditioning devices collectively, and a method for controlling the same.

[0002] Recently, owing to increase of large sized multistory buildings, there have been many developments of air conditioning system for controlling an environment of an inside of the building.

[0003] FIG. 1 illustrates a related art air conditioning system.

[0004] Referring to FIG. 1, the air conditioning system is provided with a cooling/heating unit for cooling or heating a room, and a ventilating unit for ventilating the room.

[0005] The cooling/heating unit is an air conditioner having an outdoor unit and an indoor unit. The indoor unit of the air conditioner is installed in the room, for cooling/heating the room.

[0006] The air conditioner is connected to a remote controller 30 with an electrical signal for controlling operation of the indoor unit.

[0007] In the meantime, the ventilating unit 20 is provided with ventilating ducts led to respective rooms, and fans each mounted on an inside of the duct.

[0008] The fan in the ventilating unit 20 is connected to a separate manual handling part 40, so that the fan is operated by manual handling of a manager.

[0009] Since the cooling/heating unit and the ventilating unit in the related art air conditioning system is controlled individually thus, not only management thereof is inconvenient, but also air conditioning effect is poor.

[0010] Moreover, the air conditioning system only performs cooling/heating and ventilation of the room, but not room air purification. Therefore, a person in the room is required to control an air purifier in the room, manually.

[0011] The manual control of the air purifier causes to fail interlocking with the room cooling/heating function and the ventilating function of the air conditioning system, to drop an overall energy efficiency for air conditioning of the room.

[0012] Accordingly, the present invention is directed to an air conditioning system and a method for controlling the same that substantially obviates one or more problems due to limitations and disadvantages of the related art.

[0013] An object of the present invention is to provide an air conditioning system and a method for controlling the same, which can control room cooling/heating, ventilation and air purification, collectively.

[0014] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[0015] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, an air conditioning system includes at least one room cooling/heating unit for cooling/heating a room selectively, at least one ventilating unit for ventilating a room selectively, at least one air purifying unit for purifying contaminated room air selectively, and a controller provided so as to be able to communicate with the room cooling/heating unit, the ventilating unit, and the air purifying unit, for controlling above units interlocked with one another.

[0016] The controller includes a temperature sensor for measuring a room temperature, and a microcomputer for generating a control signal for controlling operation of the units. The controller puts the room cooling/heating unit into operation, if the temperature measured at the temperature sensor is outside of a range preset at the microcomputer.

[0017] The controller further includes a timer for measuring an operation time period of the room cooling/heating unit. The controller stops operation of the room cooling/heating unit if the operation time period measured at the timer reaches to a time period preset at the microcomputer. The controller puts the ventilating unit into operation if the operation time period measured at the timer reaches to a time period preset at the microcomputer. The controller puts the air purifying unit into operation at the same time with putting the ventilating unit into operation.

[0018] A plurality of room cooling/heating units are provided so as to be able to communicate with the controller. The controller controls the units, remotely. The controller is controlled from a distant place by using a computer connected to the Internet.

[0019] The controller includes a room cooling/heating controller connected to the room cooling/heating unit so as to be able to communicate therewith for controlling the room cooling/heating unit, a ventilating controller connected to the ventilating unit so as to be able to communicate therewith, for controlling the ventilating unit, and making the room cooling/heating unit and the ventilating unit to operate interlocked with each other by data transmission/reception to/from the room cooling/heating unit, and an air purifying controller connected to the air purifying unit so as to be able to communicate therewith for controlling the air purifying unit, and making the units to operate interlocked with each other by data transmission/reception to/from the ventilating unit.

[0020] The controller includes a room cooling/heating controller connected to the room cooling/heating unit so as be able to communicate therewith, for remote control of the room cooling/heating unit, and a ventilating and air purifying controller connected to the ventilating unit and the air purifying unit so as to be able to communicate therewith for controlling the ventilating unit and the air

purifying unit remotely, and making the room cooling/heating units to operate interlocked with one another by transmission/reception of data to/from the room cooling/heating controller.

[0021] The controller includes a unitized controller connected to the room cooling/heating unit, the ventilating unit, and the air purifying unit so as to be able to communicate therewith for controlling the units remotely, and making the units to operate interlocked with one another.

[0022] In the meantime, in another aspect of the present invention, an air conditioning system includes at least one room cooling/heating unit for cooling/heating a room selectively, at least one ventilating unit for ventilating a room selectively, at least one air purifying unit for purifying contaminated room air selectively, and a unitized controller connected to one of the room cooling/heating unit, the ventilating unit, and the air purifying unit so as to be able to communicate therewith, for making the room cooling/heating unit, the ventilating unit, and the air purifying unit to operate interlocked with one another.

[0023] The room cooling/heating unit, the ventilating unit, and the air purifying unit are connected so as to be able to transmit/receive data to/from one another. The unitized controller puts the room cooling/heating unit into operation when the room temperature is outside of a preset temperature. The unitized controller puts the ventilating unit and the air purifying unit into operation when an operation time period of the room cooling/heating unit reaches to a preset time period.

[0024] In another aspect of the present invention, a method for controlling an air conditioning system includes at least one room cooling/heating unit for cooling/heating a room selectively, at least one ventilating unit for ventilating a room selectively, at least one air purifying unit for purifying contaminated room air selectively, and a controller provided so as to be able to communicate with the room cooling/heating unit, the ventilating unit, and the air purifying unit, for controlling above units interlocked with one another, the method includes a first step for measuring a room temperature, a second step for the controller to put the room cooling/heating unit into operation if the measured temperature is outside of a preset range, and a third step for the controller to put the ventilating unit into operation if an operation time period of the room cooling/heating unit reaches to a preset time period.

[0025] The third step includes the step of putting the air purifying unit into operation at the same time with the ventilating unit. The third step includes the step of stopping operation of the room cooling/heating unit.

[0026] It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

[0027] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings;

FIG. 1 illustrates a diagram of a related art air conditioning system in a building;

FIG. 2 illustrates a diagram of an air conditioning system in accordance with a first preferred embodiment of the present invention;

FIG. 3 illustrates a diagram showing connection of the air conditioning system in accordance with a first preferred embodiment of the present invention and the Internet;

FIG. 4 illustrates a diagram of an air conditioning system in accordance with a second preferred embodiment of the present invention;

FIG. 5 illustrates a diagram showing connection of the air conditioning system in accordance with a second preferred embodiment of the present invention and the Internet;

FIG. 6 illustrates a diagram of an air conditioning system in accordance with a third preferred embodiment of the present invention;

FIGS. 7A and 7B illustrate diagrams showing variations of the air conditioning system in accordance with a third preferred embodiment of the present invention and the Internet; and

FIG. 8 illustrates a diagram showing connection of the air conditioning system in accordance with a third preferred embodiment of the present invention and the Internet.

[0028] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[0029] Air conditioning systems and methods for controlling the same in accordance with embodiments of the present invention will be described in detail with reference to FIGS. 2 to 8.

[0030] FIGS. 2 and 3 illustrate air conditioning systems in accordance with a first preferred embodiment of the present invention.

[0031] Referring to FIG. 2, the air conditioning system includes at least one room cooling/heating unit 110, a ventilating unit 120, an air purifying unit 130, and a controller for controlling the units. The controller is able to communicate with the room cooling/heating unit, the ventilating unit, and the air purifying unit, such that the units are operated interlocked with one another.

[0032] For an interlocked operation of the units, the controller includes temperature sensors (not shown), and a microcomputer (not shown). The temperature sensor measures a room temperature, and the micro-

computer produces control data for controlling operation of the units. If the temperature measured at the temperature sensor is outside of a range preset at the microcomputer, the controller puts the room cooling/heating unit 110 into operation.

[0033] Moreover, the controller includes a timer for measuring an operation time period of the room cooling/heating unit 110. When the operation time period measured at the timer reaches to a time period preset at the microcomputer, the controller puts the ventilating unit 120 into operation. Then, outdoor air is introduced into the room by the ventilating unit 120. At this time, it is preferable that the air purifying unit 130 is operated at the same time for purifying air introduced into the room.

[0034] Since the outdoor air having an outdoor temperature is introduced into the room during the ventilation, the room is in an unstable state in which the room temperature varies. In this instance, it is difficult for the room cooling/heating unit to determine which one of the cooling and heating is to be performed. Therefore, it is preferable that the room cooling/heating unit is not operated during the ventilation.

[0035] That is, it is preferable that, if the operation time period of the room cooling/heating unit 110 measured at the timer reaches to a time period preset at the microcomputer, the controller puts the ventilating unit 120 and the air purifying unit 130 into operation, and operation of the room cooling/heating unit 110 is stopped. According to this, an energy consumption efficiency of the air conditioning system can be improved.

[0036] In the meantime, the controller in accordance with the embodiment of the present invention includes a room cooling/heating controller 111, a ventilating controller 121, and an air purifying controller 131. The room cooling/heating controller 111 is able to communicate with the room cooling/heating unit 110, for controlling the room cooling/heating unit 110. The ventilating controller 121 is able to communicate with the ventilating unit 120, for controlling the ventilating unit 120, and is able to exchange data with the room cooling/heating controller 111, for making an interlocked operation of the room cooling/heating unit 110, and the ventilating unit 120. Also, the air purifying controller 131 is able to communicate with the air purifying unit 130, for controlling the air purifying unit, and is able to exchange data with the ventilating controller 121, for making an interlocked operation of above units.

[0037] In the meantime, it is preferable that the room cooling/heating unit 110 is an indoor unit of an air conditioner. The air conditioner includes an outdoor unit and an indoor unit, for making heat exchange between refrigerant flowing in the units, and air, to cool or heat the air selectively. In order to make selective cooling/heating of a plurality of rooms, it is preferable that the rooms are provided with the indoor units, respectively.

[0038] In order to individual control of the plurality of room cooling/heating units provided to the rooms, though a plurality of room cooling/heating units may be provided, the room cooling/heating units may be controlled collectively by one room cooling/heating controller.

[0039] For communication between the room cooling/heating unit 110 and the room cooling/heating controller 111, data transceiver parts 401, and 402 are provided to the room cooling/heating unit 110 and the room cooling/heating controller 111 respectively, for data transmission/reception therebetween. The data transceiver part 402 in the room cooling /heating controller 111 receives data from the data transceiver part 401 in the room cooling /heating unit 110.

[0040] In the meantime, the ventilating unit 120 ventilates the room, selectively. For this, the ventilating unit 120 includes a duct making the room and outdoor in communication, and a fan provided inside of the duct. The duct is in communication with the rooms, and provided with fans as many as a number determined taking a total capacity of rooms into account.

[0041] The ventilating controller 121 is able to communicate with the ventilating unit 120, for remote control of the ventilating unit 120. The ventilating controller 121 and the ventilating unit 120 exchange data through data transceiver parts 403, and 404, respectively.

[0042] Data exchange between the ventilating controller 121 and the room cooling /heating controller 111 is made through data transceiver parts 406, and 405. According to this, the room cooling/heating and ventilation by above units are operated interlocked with each other.

[0043] In the meantime, the air purifying unit 130 purifies contaminated room air. The air purifying unit 130 draws room air, removes odor and dust from the room air, and discharges to the room, again.

[0044] The air purifying controller 131 is connected so as to be able to communicate with the air purifying unit 130, for controlling the air purifying unit 130. That is, the air purifying controller 131 and the air purifying unit 130 are connected such that data is exchanged through data transceiver parts 407, and 408.

[0045] Moreover, the air purifying controller 131 and the ventilating controller 121 are provided with data transceiver parts 410, and 409, additionally. The ventilating controller 121 and the air purifying controller 131 are connected such that communication can be made through the transceiver parts 410, and 409. According to this, the air purifying unit 130 and the ventilating unit 120 are operated interlocked with each other.

[0046] In this instance, the ventilating unit 120 is operated in response to a control data from the ventilating controller 121. In this instance, since the ventilating controller 121 -provides a control data to the air purifying controller 131, the air purifying unit 130 can be operated interlocked with operation of the room cooling/heating unit 110 and the ventilating unit 120. According to this, the units 110, 120, and 130 are operated according to operation of other units.

[0047] Of course, the air purifying controller 131 is

connected to the room cooling/heating controller 111 so as to be able to transmit/receive data, and the air purifying unit 130 and the room cooling/heating unit 110 can be operated interlocked with each other.

[0048] In the meantime, it is preferable that one of the room cooling/heating unit 111, the ventilating controller 121, and the air purifying controller 131 controls a corresponding unit, remotely. That is, it is preferable that at least any one of the controllers is a remote controller.

[0049] FIG. 3 illustrates a diagram showing the controllers controlled by apparatus connected to the Internet.

[0050] Referring to FIG. 3, it is preferable that at least one of the room cooling /heating controller 111, the ventilating controller 120, and the air purifying controller 130 is controlled with a computer connected to the Internet. That is, one of the controllers is provided to be able to communicate with the computer connected to the Internet, so that the user can control operation of the air conditioning system with the computer, on an outside of the building far from the building. Moreover, error signals from the controllers 111, 121, and 131 can be known through the computer connected to the Internet. Moreover, since the control through the Internet can be carried out by an automated program, the units can be managed without attendance of a man.

[0051] A method for controlling an air conditioning system in accordance with a first preferred embodiment of the present invention will be described.

[0052] First, in order to maintain a room temperature at a predetermined level, if the room temperature is outside of a preset range, the room cooling/heating controller 111 puts the room cooling/heating unit 110 into operation. In this instance, the room cooling/heating controller 111 puts the room cooling/heating unit 110 into operation, or stops operation thereof repeatedly according to the room temperature, to maintain the room temperature at an appropriate temperature.

[0053] For this, the room cooling/heating controller 111 or the room cooling/heating unit 110 is provided with a temperature sensor for measuring the room temperature and a microcomputer at one side thereof. If the temperature measured at the temperature sensor is outside of a range preset at the computer, the microcomputer issues an order for the room cooling/heating unit 110 to start operation. Then, the room cooling/heating unit 110 cools or heats the room for a preset time period.

[0054] A control data performed through the room cooling/heating controller 111 is transmitted from the data transceiver part 405 of the room cooling/heating controller 111 to the data transceiver part 406 of the ventilating controller 121.

[0055] In the meantime, if the room cooling or heating is continued for a long time, the room air may be polluted, or short of oxygen. Opposite to this, if the room air is kept ventilated, the energy consumption efficiency of the air conditioning system becomes poor. Therefore, the air conditioning system has the room ventilated after the room cooling/heating unit 110 is operated for a preset time period. The room cooling/heating controller 111 or the room cooling/heating unit 110 is provided with a timer therein for measuring a time period starting from starting of operation of the room cooling/heating unit 110. When a time period measured at the timer reaches to the time period preset at the microcomputer, a control data is provided from the room cooling/heating controller 111 to the ventilating controller 121.

[0056] Upon receiving the signal, the ventilating controller 121 puts the ventilating unit 120 into operation. That is, an operation staring point of the ventilating unit 120 is dependent on the operation time period of the room cooling/heating unit 110. During the ventilating unit 120 is operated, the room temperature is unstable due to introduction of the outdoor air into the room. Therefore, when ventilation of the room is required, it is preferable that operation of the room cooling/heating unit is stopped, and the ventilating unit 120 is put into operation. By doing so, the energy consumption efficiency of the air conditioning system can be improved.

[0057] When the ventilating unit 120 comes into operation, outdoor air is introduced into the room. In order to remove dust from the air, the air purifying controller 131 puts the air purifying unit 130 into operation. That is, a control data informing that the ventilating unit 120 is started is provided from the ventilating controller 121 to the air purifying controller 131, the air purifying controller 131 puts the air purifying unit 130 into operation.

[0058] Therefore, the air purifying controller 131 puts the air purifying unit 130 into operation at the same time with the operation of the ventilating unit 120. Then, the air purifying unit 130 removes dust and odor from the outdoor air introduced into the room.

[0059] In the meantime, the air purifying unit 130 is operated at the same time with the ventilating unit 120, not necessarily. That is, if room air is contaminated heavily, only the air purifying unit may be operated.

[0060] After the ventilating and air purifying are performed for the preset time period, the units are stopped. Then, a control data informing that the units are stopped is provided to the room cooling/heating controller 111, and the controller puts the room cooling/heating unit 110 into operation selectively depending on the room temperature.

[0061] FIG. 4 illustrates a diagram of an air conditioning system in accordance with a second preferred embodiment of the present invention.

[0062] Referring to FIG. 4, in the air conditioning system, units, particularly, the room cooling/heating units 110 are grouped, and the grouped units are controlled by one controller. Therefore, the air conditioning system is provided with a ventilating and air purifying controller 221 having a combined function of the ventilating controller and the air purifying controller.

[0063] In this instance, the room cooling/heating controller 211 is connected to the plurality of room cooling/heating units 110 so as to be able to communicate. At

least one room cooling/heating unit is provided to each of the rooms, all of which are controlled by one room cooling/heating unit. Of course, the room cooling/heating units 110 may be connected to the room cooling/heating controllers so as to be able to communicate respectively, and the room cooling/heating controllers can be controlled by a separate unitized room cooling/heating remote controller.

[0064] The room cooling/heating units 110 and the room cooling/heating controller 211 have data transceiver parts 411, and 412 respectively for transmission/reception of data therebetween. The data transceiver part 412 in the room cooling/heating controller 211 receives data from the data transceiver parts 411 of the room cooling/heating units 110, collectively.

[0065] The ventilating unit 130 and the air purifying unit 120 are connected with data transceiver parts 423, and 414 so as to be able to communicate to each other, and the units are interlocked. Therefore, when the ventilating unit 120 is started, a control data is provided to the air purifying unit 130 connected to the ventilating unit 120, and by the control data provided thereto, the air purifying unit 130 is also operated.

[0066] The ventilating and air purifying controller 221 is connected such that it can communicate with one of the ventilating unit 120 and the air purifying unit 130. Therefore, the ventilating unit 120 and the air purifying unit 130 are interlocked. In this instance, it is preferable that the ventilating and air purifying controller 221 is connected to the air purifying unit 130 so as to be able to communicate with each other. This is because there are cases occurred frequently, in which operation of only the air purifying unit 130 is required.

[0067] Accordingly, since the control data is provided from the ventilating and air purifying controller 221 to the air purifying unit 130 directly, a response speed of the air purifying unit 130 with respect to the control data is improved.

[0068] In this instance, the ventilating and air purifying controller 221 and the air purifying unit 130 are provided with separate data transceiver parts 415, and 416 respectively for transmission/reception of data therebetween.

[0069] Of course, though not shown, the ventilating and air purifying controller 221 may be connected both to the ventilating unit 120 and the air purifying unit 130 so as to be able to communicate with each other.

[0070] Moreover, the ventilating and air purifying controller 221 and the room cooling/heating unit 211 are provided with separate data transceiver parts 418, and 417 respectively for data transmission/reception of data therebetween.

[0071] In the meantime, it is preferable that the room cooling/heating controller 211 or the ventilating and air purifying controller 221 controls the room cooling/heating unit 110, the ventilating unit 120, and the air purifying unit 130, remotely. Moreover, as shown in FIG. 5, it is preferable that the at least one of the room cooling/heating controller 211 and the ventilating and air purifying controller 221 is controllable from a distant place through the Internet. The control though the Internet can be embodied according to a method the same with the first embodiment.

[0072] A method for controlling an air conditioning system in accordance with a second preferred embodiment of the present invention will be described.

[0073] At first, room temperatures of rooms are measured, and the room cooling/heating units in rooms of which room temperatures are outside of a preset temperature range are put into operation by using the room cooling/heating controller 211. For this, the room cooling/heating controller 211 is provided with a temperature sensor for measuring a room temperature.

[0074] In this instance, a control data is provided to the data transceiver part 418 in the ventilating and air purifying controller 221 through the data transceiver part 417 in the room cooling/heating controller 211.

[0075] According to this, the ventilating and air purifying controller 221 knows starting and stopping time points of the room cooling/heating unit 110, and calculates or sets starting times of the ventilating unit 120, and the air purifying unit 130.

[0076] Therefore, if a time comes, when ventilation of the room is required in the middle of operation of the room cooling/heating unit 110, the room cooling/heating controller 211 stops operation of the room cooling/heating unit 110. Also, the ventilating and air purifying controller 221 puts both the ventilating unit 120 and the air purifying unit 130 into operation, to remove dust and odor from the outdoor air introduced into the room.

[0077] In this instance, a control data is provided to the ventilating unit 130 through the air purifying unit 120. Upon completion of ventilation of the room, the ventilating and air purifying controller 221 stops the ventilating unit 120 and the air purifying unit 130. At the same time with this, the control data is provided to the room cooling/heating controller 211, to put the room cooling/heating unit again according to the room temperature.

[0078] The ventilating unit 120 and the air purifying unit 130 in accordance with the second preferred embodiment of the present invention are operated after the room cooling/heating unit 110 is operated for a predetermined time period. That is, it is preferable that starting time control of the ventilating unit and the air purifying unit is performed identical to the first embodiment.

[0079] FIG. 6 illustrates a diagram of an air conditioning system in accordance with a third preferred embodiment of the present invention.

[0080] Referring to FIG. 6, in the air conditioning system of this embodiment, the room cooling/heating unit 110, the ventilating unit 120, and the air purifying unit 130 are controlled by single unitized controller 300. The unitized controller 300 has a display screen for displaying individual operation states of above units. According to this, after knowing operation states of the units through the display screen, the controller 300 is operat-

ed, to control the units 110, 120, and 130, collectively.

[0081] The unitized controller 300 can be connected to one of the room cooling/heating unit 110, the ventilating unit 120, and the air purifying unit 130 so as to be able to communicate with each other. For interlocking of the room cooling/heating unit 110, the ventilating unit 120, and the air purifying unit 130, data transceiver parts 419, 420, 421, and 422 are provided thereto respectively, for transmission/reception of control data.

[0082] Referring to FIG. 6, the unitized controller 300 may be connected to the room cooling/heating unit 110. In this case, the ventilating unit 120, and the air purifying unit 130 are connected to the room cooling/heating unit 110 through the data transceiver parts 419, 421, 420, and 422.

[0083] FIGS. 7A and 7B illustrate a diagram of changed connection between the unitized controller 300 and the units.

[0084] Referring to FIG. 7A, the air purifying unit 130 is provided with two data transceiver parts 425, and 426 for data transmission/reception to/from the room cooling/heating unit 110 and the ventilating unit 120, and the room cooling/heating unit 110 and the ventilating unit 120 are respectively provided with data transceiver parts for data transmission/reception to/from the air purifying unit 130.

[0085] Therefore, a control data is transmitted to the ventilating unit 120 from the unitized controller 300 through the room cooling/heating unit 110 and the ventilating unit 120.

[0086] In the meantime, referring to FIG. 7B, the ventilating unit 120 is provided with two data transceiver parts 429, and 430 for data transmission/reception to/from the room cooling/heating unit 110 and the ventilating unit 120, and the room cooling/heating unit 110 and the air purifying unit 130 may only be provided with data transceiver parts 431, and 432 for data transmission/reception to/from the ventilating unit 120, respectively.

[0087] The room cooling/heating unit 110 is further provided with a separate data transceiver part 423 for communication with the unitized controller 300, and the unitized controller 300 is also provided with a separate data transceiver part 424.

[0088] It is preferable that the unitized controller 300 controls the room cooling/heating unit, remotely. Moreover, as shown in FIG. 8, alike the first embodiment, the unitized controller 300 can be operated from a distant place by using a computer connected to the Internet.

[0089] A method for controlling an air conditioning system in accordance with a third preferred embodiment of the present invention will be described in detail.

[0090] When the room temperature is outside of a preset range, the unitized controller 300 controls the room cooling/heating unit 110. After the room cooling/heating process is progressed for a preset time period, the unitized controller 300 stops operation of the room cooling/heating unit 110, and puts the ventilating unit 120 and the air purifying unit 130 into operation at the same time.

[0091] For this, the unitized controller 300 includes a temperature sensor for measuring a room temperature, and a timer for measuring an operation time period of the room cooling/heating unit. The unitized controller 300 includes a microcomputer for generating the control data based on data measured at the temperature sensor and the timer.

[0092] In this instance, the data for controlling the ventilating unit 120, and the air purifying unit 130 is provided to the data transceiver part 419 of the ventilating unit 120 and the data transceiver part 420 of the air purifying unit 130 from the unitized controller 300 through the data transceivers 421, and 422 of the room cooling/heating unit 110.

[0093] According to this, the ventilating unit 120 ventilates the room, and the air purifying unit 130 filters dust and odor from outdoor air introduced in the room.

[0094] Upon completion of the ventilation and air purification, the unitized controller 300 stops operation of the ventilating unit 120 and the air purifying unit 130, and puts the room cooling/heating unit 110 into operation again depending on the room temperature. Thus, since operation of the ventilating unit 120 and the air purifying unit 130 are controlled according to the operation time period of the room cooling/heating unit 110, and the units are operated interlocked with one another, energy consumption efficiency of the air conditioning system can be improved.

[0095] As has been described, the air conditioning system of the present invention has the following advantages.

[0096] First, the interlocked operation of the units in the air conditioning system permits to improve energy consumption efficiency of the air conditioning system.

[0097] Second, since the air conditioning system includes the air purifying unit operated interlocked with the room cooling/heating unit and the ventilating unit, the air conditioning system of the present invention can perform more various functions than the related art.

[0098] Third, since the units can be controlled interlocked with one another by using one unitized controller, separate controllers can be dispensed with.

[0099] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the inventions. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

[0100] Summarized, the invention provides an air conditioning system including at least one room cooling/heating unit for cooling/heating a room selectively, at least one ventilating unit for ventilating a room selectively, at least one air purifying unit for purifying contaminated room air selectively, and a controller provided so as to be able to communicate with the room cooling/heating unit, the ventilating unit, and the air purifying unit, for controlling above units interlocked with one another,

thereby providing an air conditioning system in which a room cooling/heating function, a ventilating function, and an air purifying system are controlled, collectively.

Claims

1. An air conditioning system comprising:

at least one room cooling/heating unit (110) for cooling/heating a room selectively;

at least one ventilating unit (120) for ventilating a room selectively;

at least one air purifying unit (130) for purifying contaminated room air selectively; and

a controller provided so as to be able to communicate with the room cooling/heating unit (110), the ventilating unit (120), and the air purifying unit (130), for controlling above units interlocked with one another.

2. An air conditioning system comprising:

at least one room cooling/heating unit (110) for cooling/heating a room selectively;

at least one ventilating unit (120) for ventilating a room selectively;

at least one air purifying unit (130) for purifying contaminated room air selectively; and

a unitized controller (300) connected to one of the room cooling/heating unit (110), the ventilating unit (120), and the air purifying unit (130) so as to be able to communicate therewith, for making the room cooling/heating unit (110), the ventilating unit (120), and the air purifying unit (130) to operate interlocked with one another.

3. The air conditioning system as claimed in claim 2, wherein the room cooling/heating unit (110), the ventilating unit (120), and the air purifying unit (130) are connected so as to be able to transmit/receive data to/from one another.

4. The air conditioning system as claimed in claim 1, wherein the controller includes;

a room cooling/heating controller (111) connected to the room cooling/heating unit (110) so as to be able to communicate therewith for controlling the room cooling/heating unit (110),

a ventilating controller (121) connected to the ventilating unit (120) so as to be able to communicate therewith, for controlling the ventilating unit (120), and making the room cooling/heating unit (110) and the ventilating unit (120) to operate interlocked with each other by data transmission/reception to/from the room cooling/heating unit (110), and

an air purifying controller (131) connected to the air purifying unit (130) so as to be able to communicate therewith for controlling the air purifying unit (130), and making the units to operate interlocked with each other by data transmission/reception to/from the ventilating unit (120).

5. The air conditioning system as claimed in claim 1, wherein the controller includes;

a room cooling/heating controller (211) connected to the room cooling/heating unit (110) so as to be able to communicate therewith, for remote control of the room cooling/heating unit (110), and

a ventilating and air purifying controller (221) connected to the ventilating unit (120) and the air purifying unit (130) so as to be able to communicate therewith for controlling the ventilating unit (120) and the air purifying unit (130) remotely, and making the room cooling/heating units (110) to operate interlocked with one another by transmission/reception of data to/from the room cooling/heating controller (111).

6. The air conditioning system as claimed in claim 1, wherein the controller includes a unitized controller (300) connected to the room cooling/heating unit (110), the ventilating unit (120), and the air purifying unit (130) so as to be able to communicate therewith for controlling the units remotely, and making the units to operate interlocked with one another.

7. The air conditioning system as claimed in one of claims 1 to 6, wherein the controller includes;

a temperature sensor for measuring a room temperature, and

a microcomputer for generating a control signal for controlling operation of the units.

8. The air conditioning system as claimed in one of claims 1 to 6, wherein the controller puts the room cooling/heating unit (110) into operation, if the temperature measured at the temperature sensor is outside of a range preset at the microcomputer.

9. The air conditioning system as claimed in one of claims 1 to 8, wherein the controller further includes a timer for measuring an operation time period of the room cooling/heating unit (110).

10. The air conditioning system as claimed in claim 9, wherein the controller stops operation of the room cooling/heating unit (110) if the operation time period measured at the timer reaches to a time period preset at the microcomputer.

11. The air conditioning system as claimed in one of claims 9 to 10, wherein the controller puts the ventilating unit (120) into operation if the operation time period measured at the timer reaches to a time period preset at the microcomputer.

12. The air conditioning system as claimed in claim 11, wherein the controller puts the air purifying unit (130) into operation at the same time with putting the ventilating unit (120) into operation.

13. The air conditioning system as claimed in one of claims 1 to 12, wherein a plurality of room cooling/heating units (110) are provided so as to be able to communicate with the controller.

14. The air conditioning system as claimed in one of claims 1 to 13, wherein the controller controls the units, remotely.

15. The air conditioning system as claimed in one of claims 1 to 14, wherein the controller is controlled from a distant place by using a computer connected to the Internet.

16. A method for controlling an air conditioning system comprising:

at least one room cooling/heating unit (110) for cooling/heating a room selectively;

at least one ventilating unit (120) for ventilating a room selectively;

at least one air purifying unit (130) for purifying contaminated room air selectively; and

a controller (300) provided so as to be able to communicate with the room cooling/heating unit (110), the ventilating unit (120), and the air purifying unit (130), for controlling above units interlocked with one another, the method comprising:

a first step for measuring a room temperature;

a second step for the controller to put the room cooling/heating unit (110) into operation if the measured temperature is outside of a preset range; and

a third step for the controller to put the ventilating unit (120) into operation if an operation time period of the room cooling/heating unit reaches to a preset time period.

17. The method as claimed in claim 16, wherein the third step includes the step of putting the air purifying unit (130) into operation at the same time with the ventilating unit (120).

18. The method as claimed in one of claims 16 to 17, wherein the third step includes the step of stopping operation of the room cooling/heating unit (110).

FIG. 1

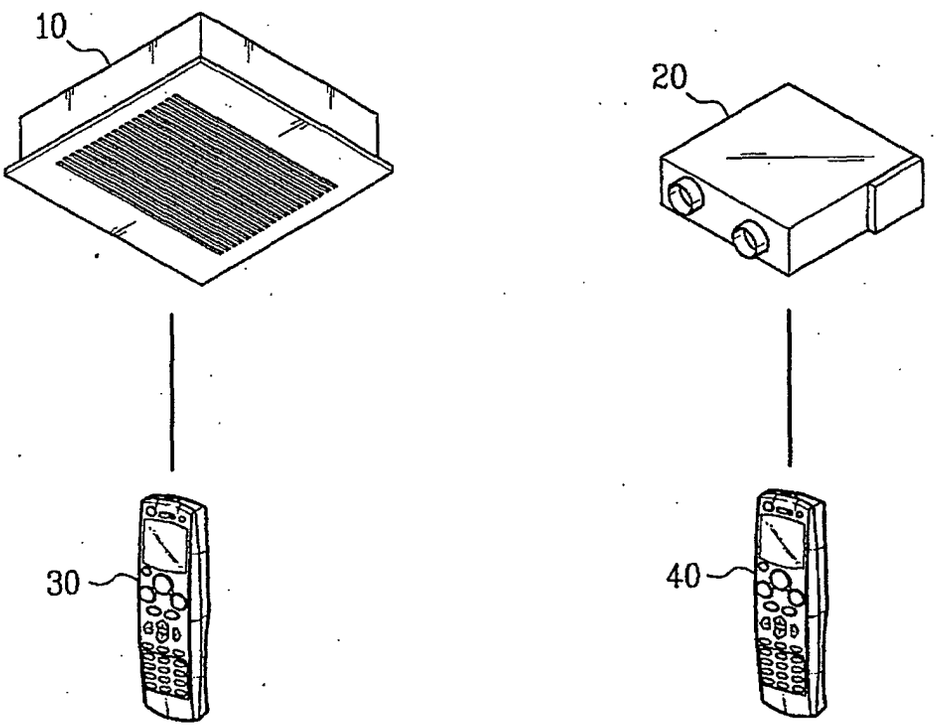
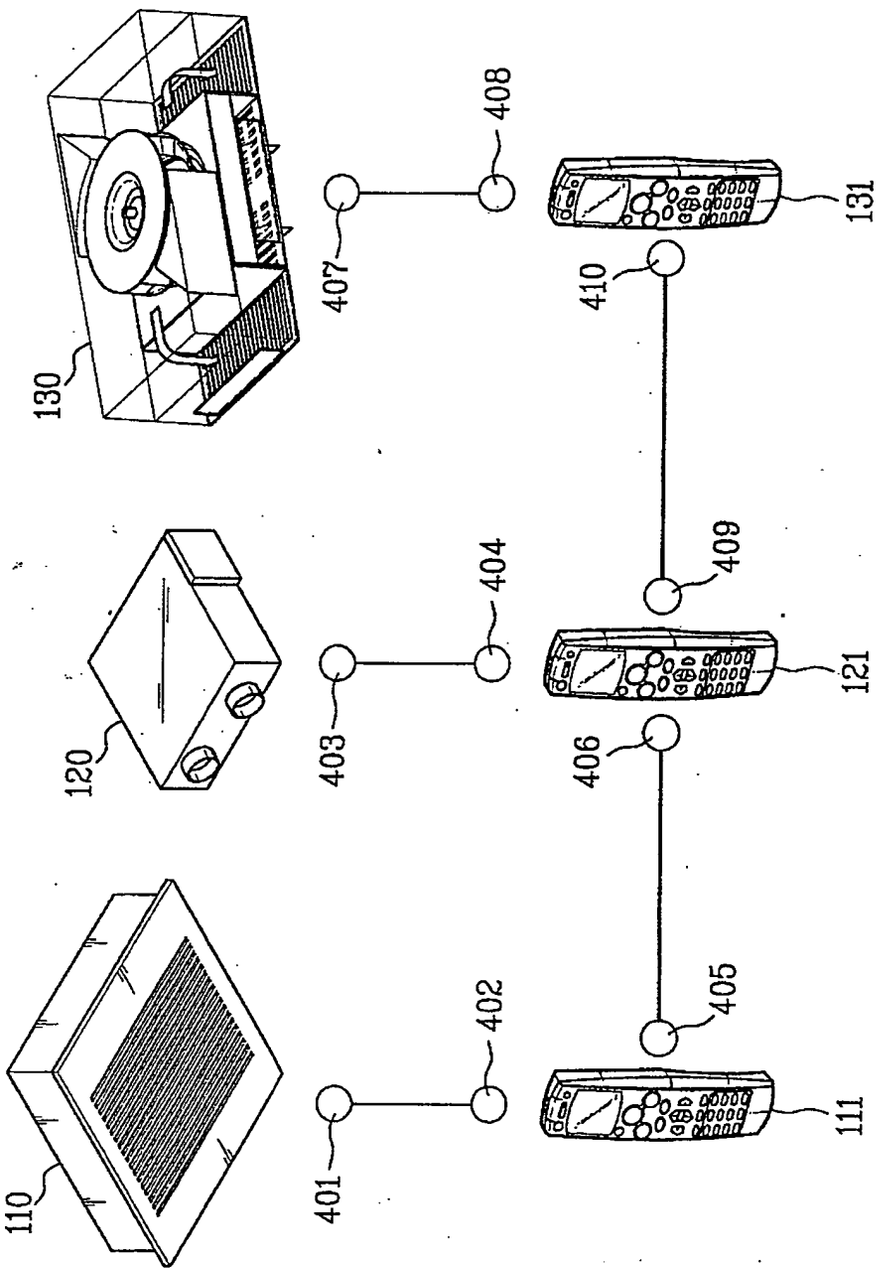


FIG. 2



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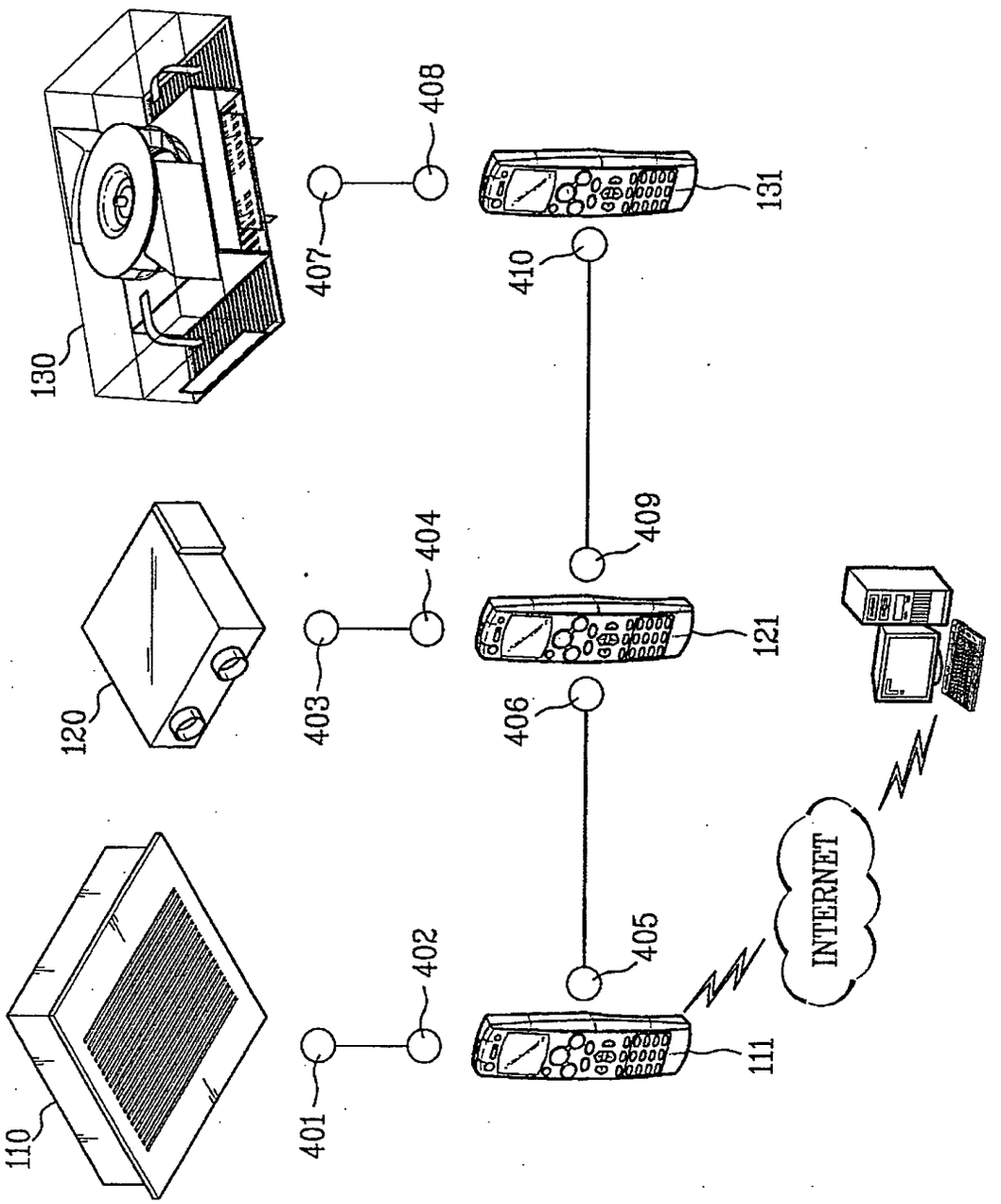
130
120
110
401
402
403
404
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407
408
409
410
111
121
131
INTERNET

FIG. 4

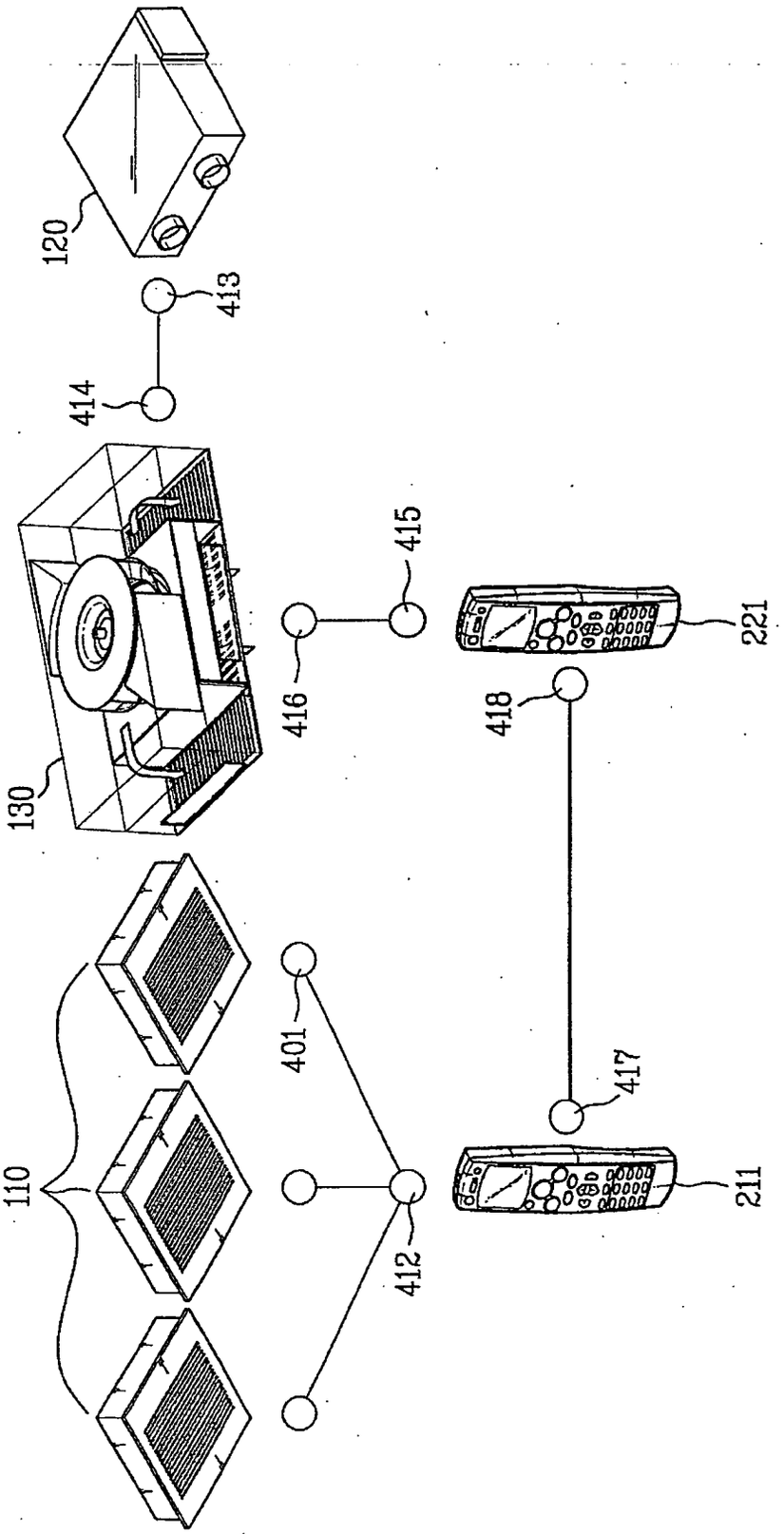


FIG. 5

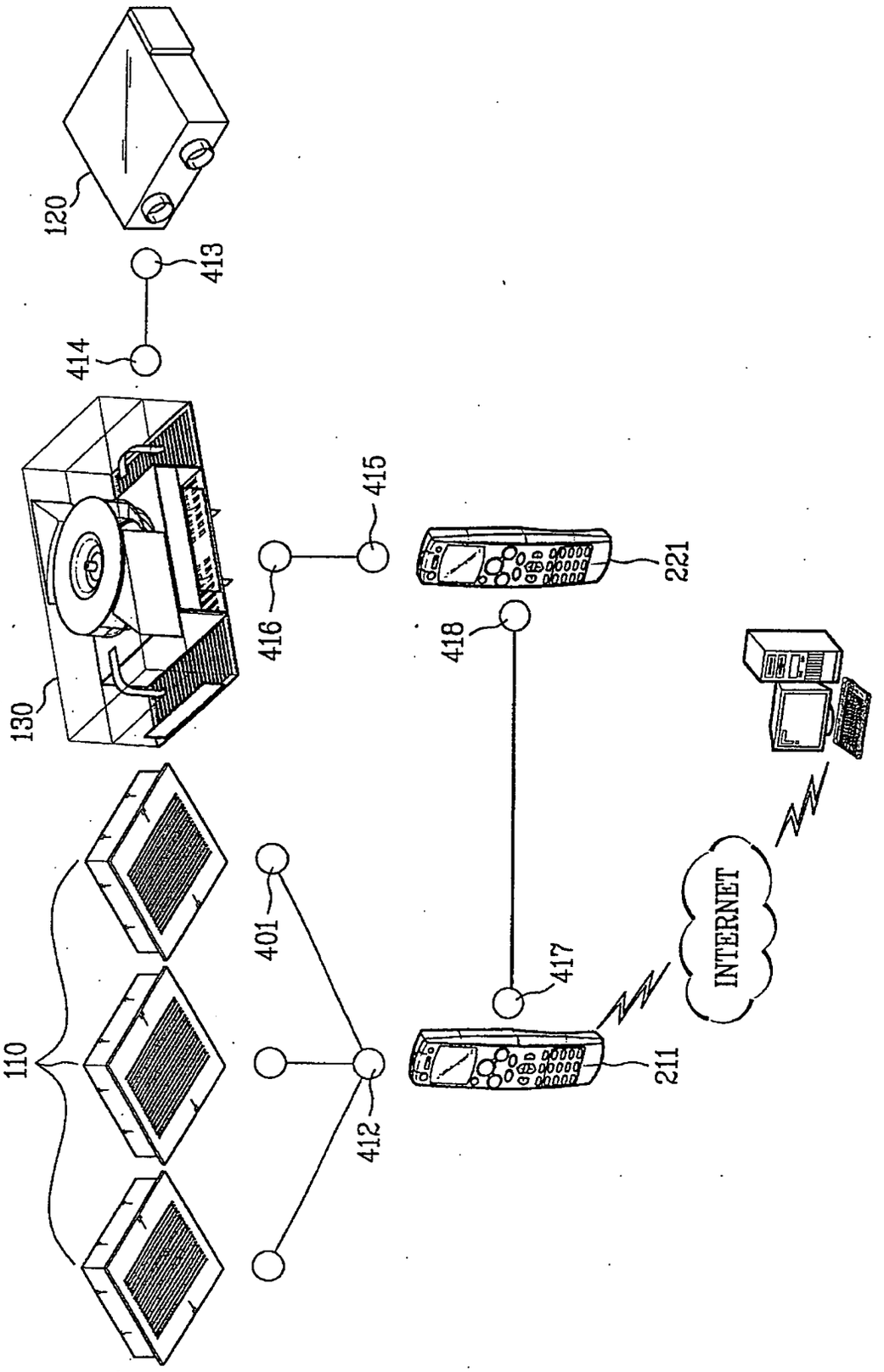


FIG. 6

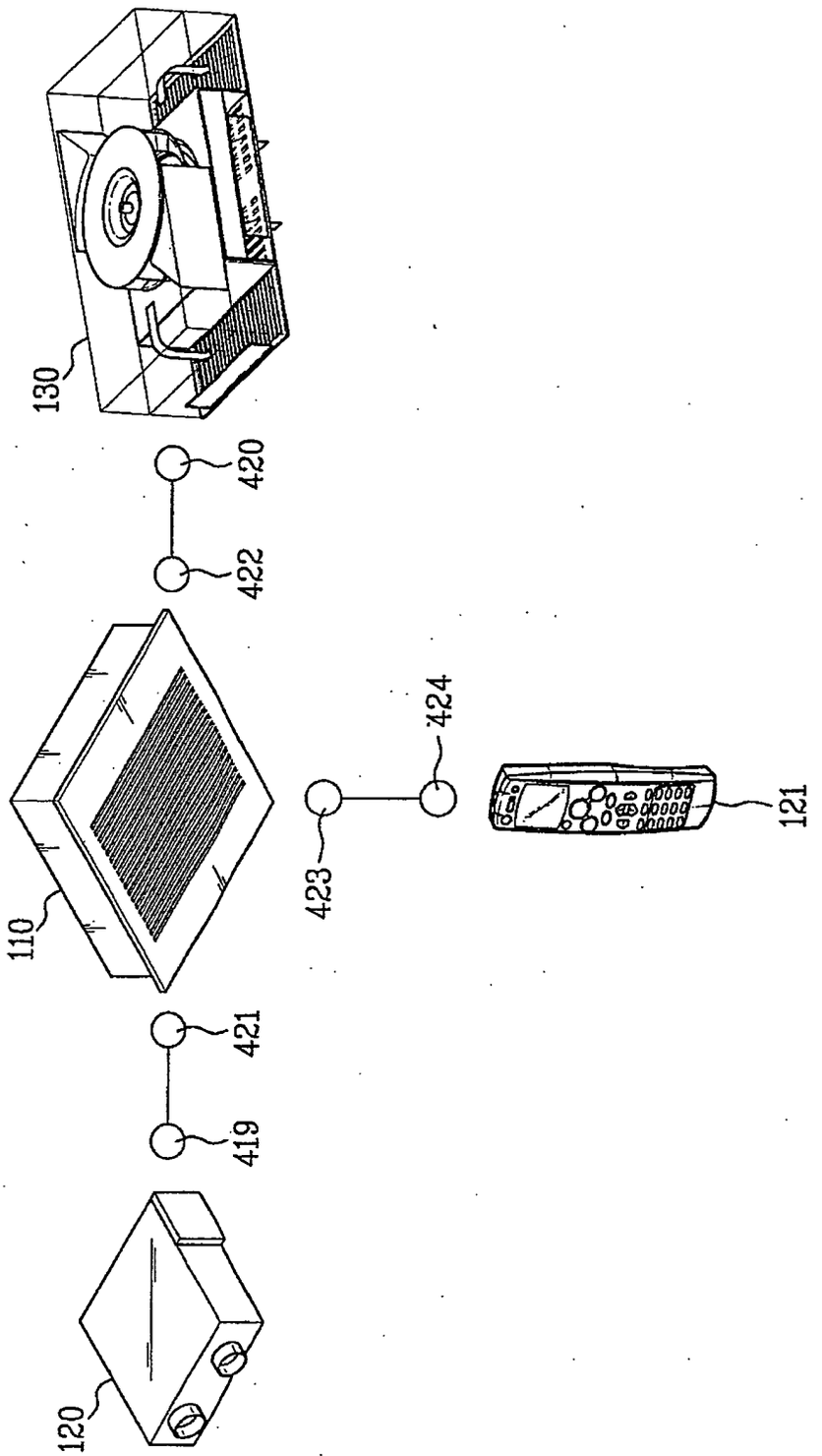


FIG. 7A

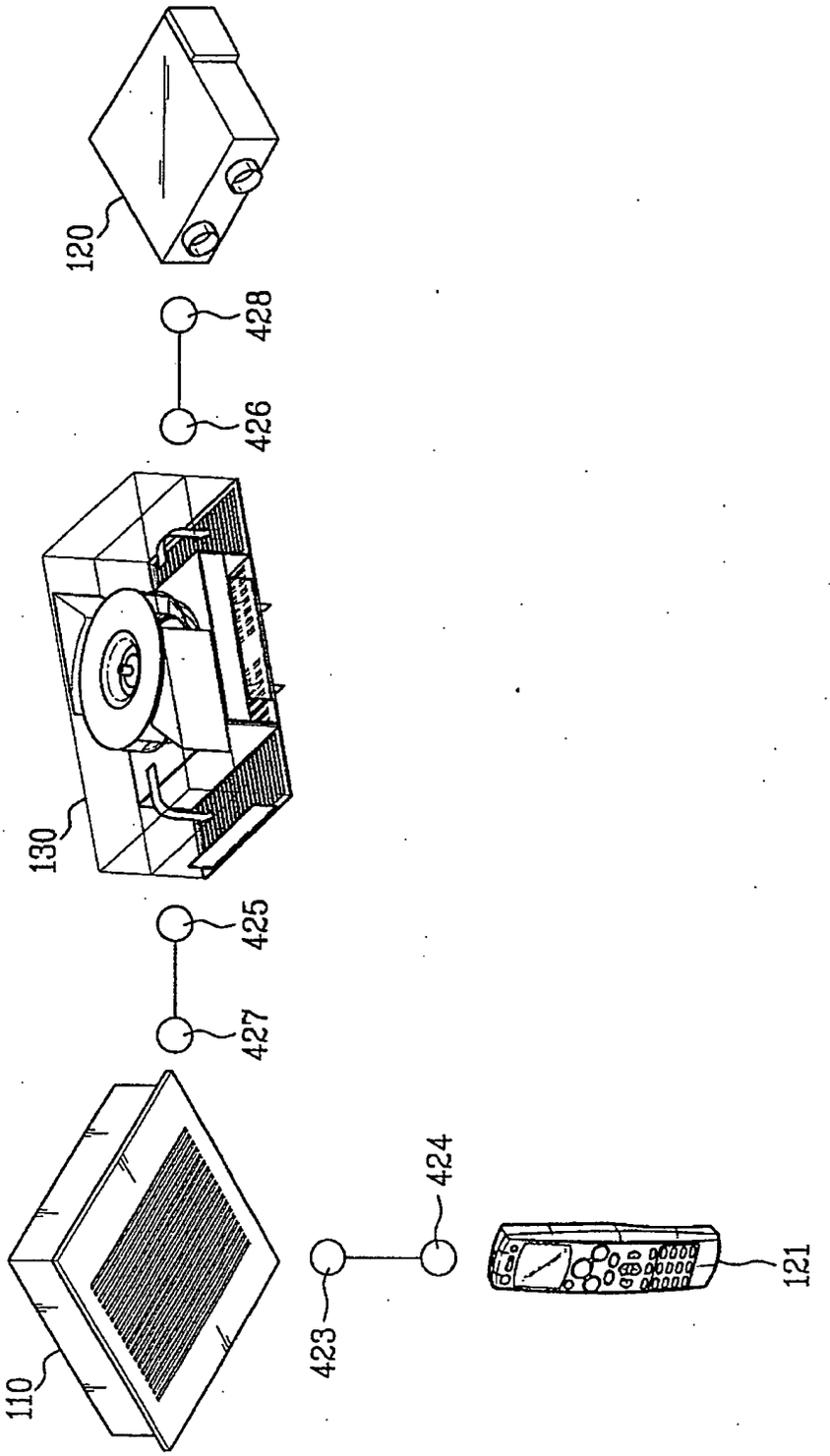


FIG. 7B

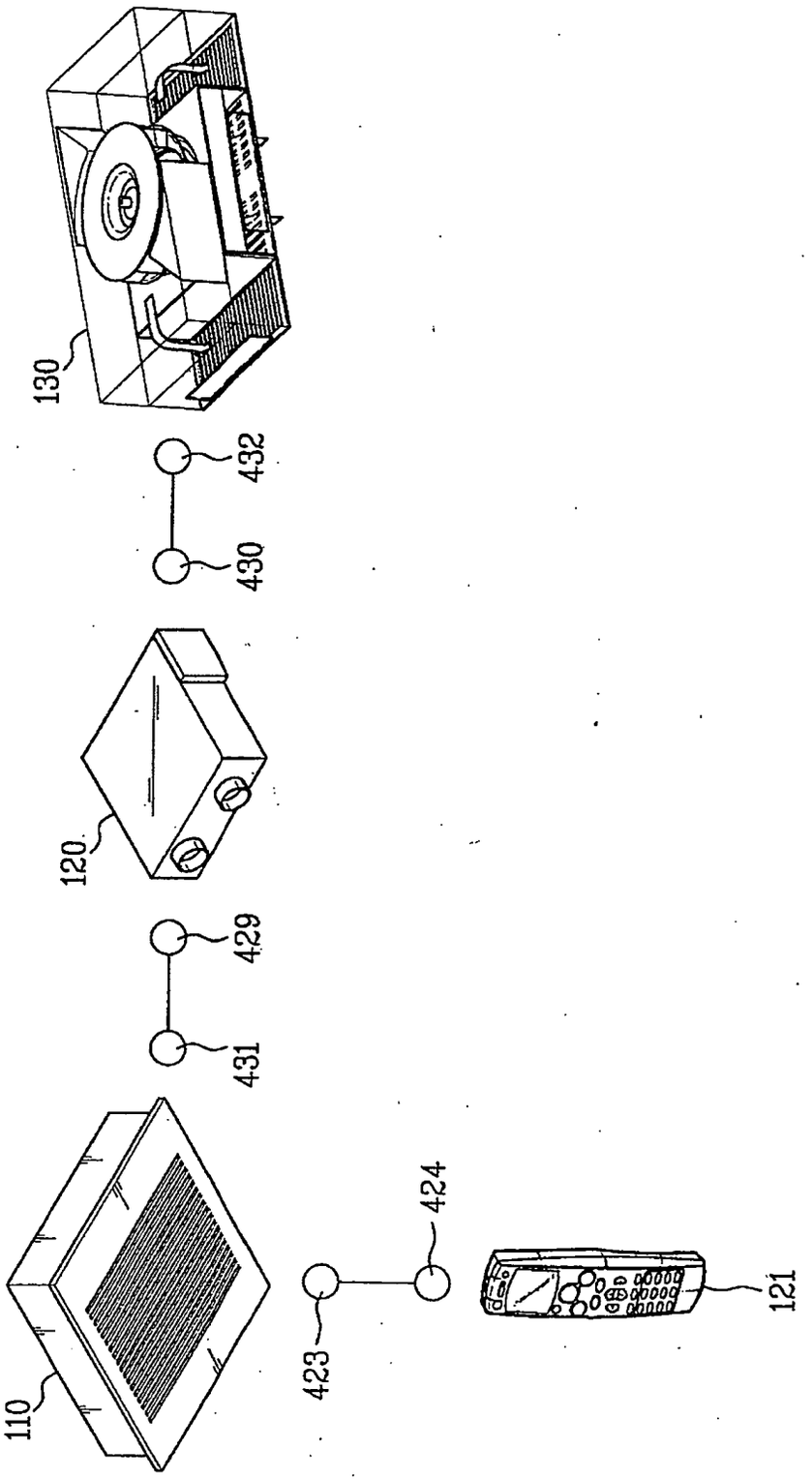
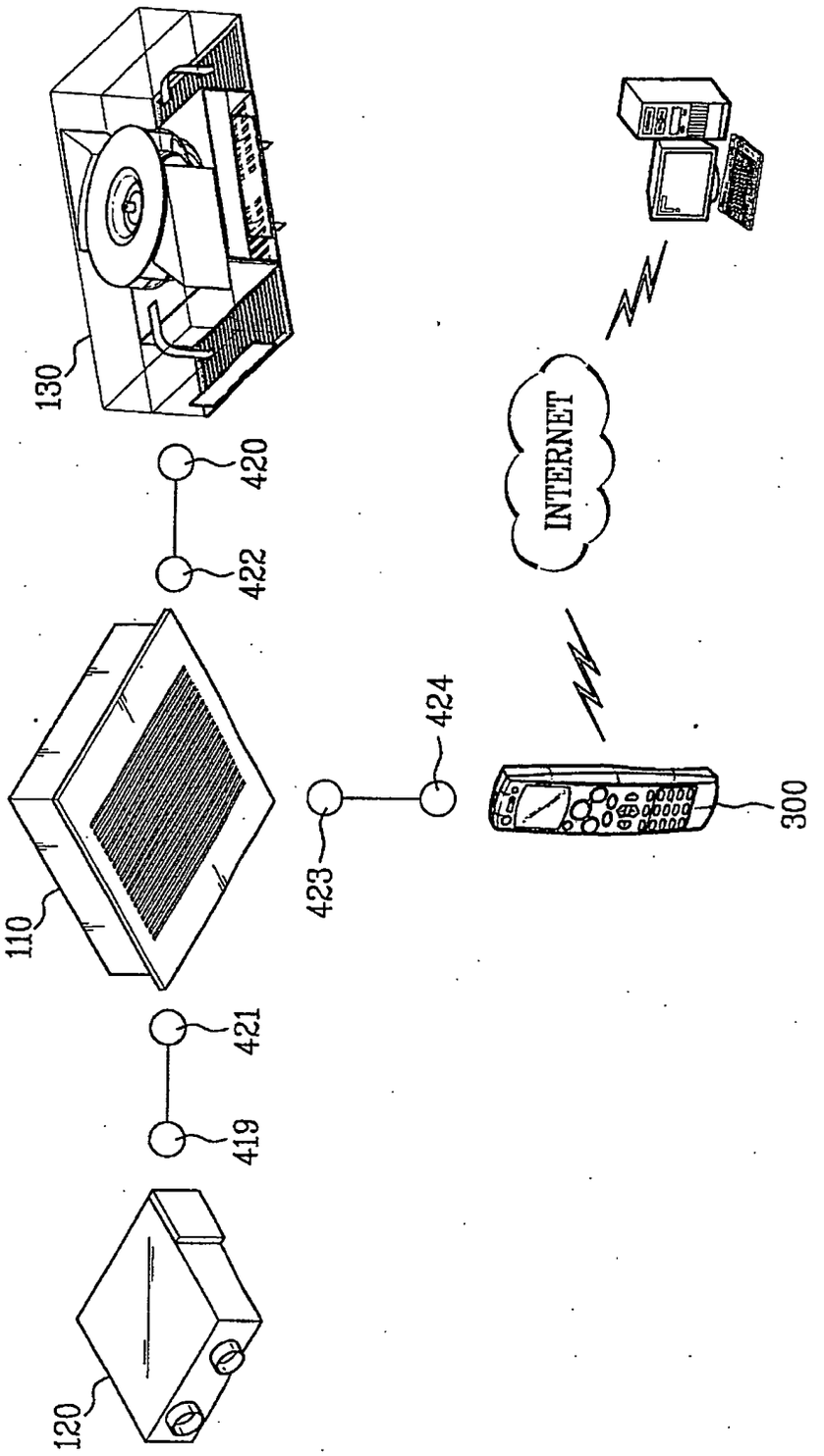


FIG. 8



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 00 7408

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	EP 1 182 407 A (LAMPE & MARTENS GEBAEUDETECHNIK GMBH & CO. KG) 27 February 2002 (2002-02-27) * abstract *	1	F24F11/00
A	US 5 042 997 A (RHODES ET AL) 27 August 1991 (1991-08-27) * abstract *	1	
A	US 6 717 513 B1 (SANDELMAN DAVID ET AL) 6 April 2004 (2004-04-06) * abstract *	1	
A	PATENT ABSTRACTS OF JAPAN vol. 1995, no. 11, 26 December 1995 (1995-12-26) & JP 07 217956 A (SANREIKI:KK), 18 August 1995 (1995-08-18) * abstract *	1	
A	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 07, 29 September 2000 (2000-09-29) & JP 2000 111128 A (SANYO ELECTRIC CO LTD), 18 April 2000 (2000-04-18) * abstract *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.7) F24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 August 2005	Valenza, D

CATEGORY OF CITED DOCUMENTS

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19-08-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1182407 A	27-02-2002	DE 10040650 A1	07-03-2002
		DE 20019373 U1	23-05-2001
		EP 1182407 A2	27-02-2002
US 5042997 A	27-08-1991	AU 635155 B2	11-03-1993
		AU 8402591 A	02-03-1992
		BR 9105851 A	29-09-1992
		CA 2067116 A1	28-01-1992
		EG 19287 A	30-11-1994
		EP 0494302 A1	15-07-1992
		JP 5500926 T	25-02-1993
		MX 9100397 A1	05-06-1992
		WO 9202304 A1	20-02-1992
		AR 246600 A1	31-08-1994
US 6717513 B1	06-04-2004	US 6437691 B1	20-08-2002
		US 6147601 A	14-11-2000
		US 6160477 A	12-12-2000
		US 6211782 B1	03-04-2001
		US 2004095237 A1	20-05-2004
		AU 5289100 A	12-12-2000
		WO 0072285 A1	30-11-2000
		US 2002097150 A1	25-07-2002
		US 6462654 B1	08-10-2002
		AU 2961500 A	01-08-2000
		BR 0007425 A	04-12-2001
		CA 2358536 A1	20-07-2000
		EP 1151427 A1	07-11-2001
		JP 2003526230 T	02-09-2003
		MX PA01006961 A	04-06-2003
		WO 0042587 A1	20-07-2000
JP 07217956 A	18-08-1995	JP 2586878 B2	05-03-1997
JP 2000111128 A	18-04-2000	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82