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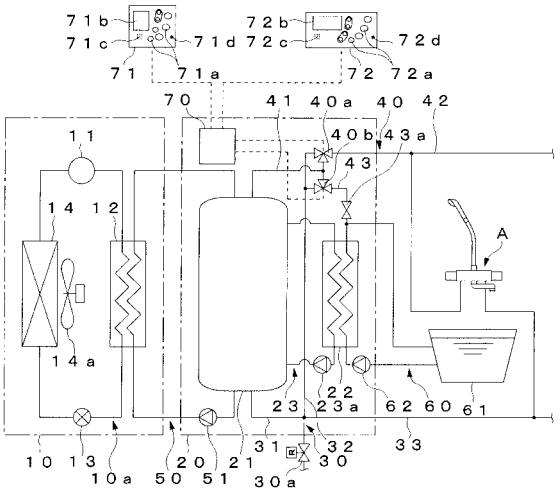
(54) HOT WATER SUPPLY DEVICE

(57) An object of this invention is to provide a hot water supply apparatus capable of surely detecting human bodies in the bathroom. When a setting of a remote controller for kitchen is prior to a setting of a remote controller for bathroom, when a predetermined time for assigning the priority to the setting of the remote controller for bathroom comes, and when a loudness which is larger than a predetermined loudness is detected by a microphone of the remote controller for bathroom, the setting of the remote controller for bathroom becomes prior to the setting of the remote controller for kitchen. By this, the use of the bathroom is surely detected without a human body detector, such as infrared human body detector, provided in the bathroom. It is possible to avoid incorrect detections of the use of the bathroom.

FIG. 1



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Description

TECHNICAL FIELD

[0001] The present invention relates to a hot water supply apparatus capable of supplying hot water of a temperature that is set up by a remote controller.

BACKGROUND ART

[0002] Generally, A hot water supply apparatus having a remote controller for kitchen located in a kitchen, and a remote controller for bathroom located in a bathroom is known. Said hot water supply apparatus normally complies with the remote controller for kitchen prior to the remote controller for bathroom, and complies with the remote controller for bathroom prior to the remote controller for kitchen when the bathroom is used (see the patent document 1).

Patent Document 1: Japanese Patent publication No. 2002-195649

DISCLOSURE OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0003] Said conventional hot water supply apparatus is provided, for automatically changing the said priority from the remote controller for kitchen to the remote controller for bathroom, with a human body detector, such as infrared human body detector, in the bathroom, and the human body detector detects a human body and change the said priority. However, in bathrooms, the environmental variation in temperature, humidity, and the like is large. Therefore, there is a possibility that said priority is not changed or unnecessarily changed to the remote controller for bathroom due to an incorrect detection.

[0004] An object of the present invention is to provide a hot water supply apparatus capable of surely detecting human bodies in the bathroom.

MEANS FOR SOLVING THE PROBLEM

[0005] To achieve the above object, in the present invention, a hot water supply apparatus comprises a remote controller for kitchen placed in a kitchen room, a remote controller for bathroom placed in a bathroom, a plurality of condition detectors for detecting in the bathroom a plurality of conditions which are different from each other, and a controller composed to, in a case in which a setting of the remote controller for kitchen is used prior to a setting of the remote controller for bathroom, use the setting of the controller for bathroom prior to the setting of the controller for kitchen when each of the condition detectors detects a predetermined condition in the bathroom respectively.

[0006] By this, when each of the condition detectors detects the predetermined condition in the bathroom respectively, the setting of the remote controller for bathroom is used prior to the setting of the remote controller for kitchen. Therefore, the use of the bathroom is surely detected without a human body detector, such as infrared human body detector, provided in the bathroom.

[0007] Also, to achieve the above object, in the present invention, a hot water supply apparatus comprises a remote controller for kitchen placed in a kitchen room, a remote controller for bathroom placed in a bathroom, a condition detector for detecting a condition in the bathroom, a memory for memorizing a passed data of a period in which a setting of the remote controller for bathroom is used prior to a setting of the remote controller for kitchen, and a controller composed to, in a case in which the setting of the remote controller for kitchen is used prior to the setting of the remote controller for bathroom, use the setting of the controller for bathroom prior to the setting of the controller for kitchen when the condition detector detects a predetermined condition in the bathroom and the time is within a period which is set up based on the data memorized in the memory to take priority on an operation of the remote controller.

[0008] By this, when the condition detector detects the predetermined condition in the bathroom and the time is within the period which is set up base on the data memorized in the memory to take priority on the operation of the remote controller, the setting of the remote controller for bathroom is used prior to the setting of the remote controller for kitchen. Therefore, the use of the bathroom is surely detected without a human body detector, such as infrared human body detector, provided in the bathroom.

[0009] Also, to achieve the above object, in the present invention, a hot water supply apparatus comprises a remote controller for kitchen placed in a kitchen room, a remote controller for bathroom placed in a bathroom, and a controller composed to use a setting of the remote controller for bathroom prior to a setting of the remote controller for kitchen when an operation of the remote controller for bathroom is detected.

[0010] By this, when the operation of the remote controller for bathroom is detected, the setting of the remote controller for bathroom is used prior to the setting of the remote controller for kitchen. Therefore, the use of the bathroom is surely detected without a human body detector, such as infrared human body detector, provided in the bathroom.

EFFECT OF THE INVENTION

[0011] According to this invention, the use of the bathroom is surely detected without a human body detector, such as infrared human body detector, provided in the bathroom. Therefore, it is possible to avoid incorrect detections of the use of the bathroom.

[0012] The above and other objects, features, and advantages of the present invention will become more ap-

parent from the following description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

FIG. 1 is a schematic configuration view of a hot water supply apparatus showing a first embodiment of the present invention;
FIG. 2 is a flow chart showing an operation of a controller referring to a control of priority changing of a remote controller;
FIG. 3 is a flow chart showing an operation of a controller referring to a control of priority changing of a remote controller for a hot water supply apparatus of a second embodiment of the present invention.

DESCRIPTION OF SYMBOLS

[0014] 70 ... controller, 71 ... remote controller for kitchen, 72 ... remote controller for bathroom, 72a ... switch, 72d ... microphone

BEST MODE FOR CARRYING OUT THE INVENTION

[0015] FIGS. 1 and 2 show a first embodiment of the present invention.
FIG. 1 is a schematic configuration view of a hot water supply apparatus, FIG. 2 is a flow chart showing an operation of a controller as to a control of priority changing of a remote controller.

[0016] The hot water supply apparatus comprises a heat pump unit 10 for heating water, a tank unit 20 for storing hot water heated by the heat pump unit 10, a water supply pipe 30 for supplying water to the tank unit 20, to a bathroom, and to a kitchen, a hot water supply pipe 40 for supplying hot water stored in the tank unit 20 to the bathroom and the kitchen, a first circulation circuit 50 for circulating water between the heat pump unit 10 and tank unit 20, and a second circulation circuit 60 for circulating water in a bath tub 61 between the tank unit 20 and the bath tub 61 in the bathroom. This hot water supply apparatus is to store hot water heated by the heat pump unit 10 in the tank unit 20 so that hot water stored in the tank unit 20 is supplied for washing dishes in the kitchen, for bathing in the bathroom, and etc., and also hot water stored in the tank unit 20 is supplied as a heat source for reheating stored hot water in the bath tub 61.

[0017] The heat pump unit 10 comprises an electrically-powered compressor 11, a gas cooler 12, an expansion valve 13, and an evaporator 14, which are connected in series by pipes made by copper or stainless steel so as to configure a refrigerant circuit 10a. Also, the refrigerant circuit 10a is filled with carbon dioxide as a refrigerant of which high-pressure side becomes in a supercritical state. The gas cooler 12 is a refrigerant-water heat exchanger in which a flow passage on a water side form a part of the first circulation circuit 50. The evaporator 14 is a refrigerant-air heat exchanger, and a fan 14a is provided in vicinity of the evaporator 14 so that air which conducts heat exchange with the refrigerant in the evaporator 14 can flow through the evaporator.

[0018] The tank unit 20 comprises a hot water storage tank 21, a reheating heat exchanger 22 for conducting heat exchange between water in the bath tub 61, which flows through the second circulation circuit 60, and hot water in the hot water storage tank 21, and a third circulation circuit 23 for circulating hot water between the hot water storage tank 21 and the reheating heat exchanger 22.

[0019] The hot water storage tank 21 is made of stainless steel or fiber reinforced plastic (FRB), etc., and is covered with a heat insulating material such as glasswool, foamed urethane, or etc. so as to prevent heat radiation of a stored hot water.

[0020] The reheating heat exchanger 22 is a water-water heat exchanger, and one side of its flow passages of the reheating heat exchanger 22 is a part of the second circulation circuit 60, and the other side of the flow passages of the reheating heat exchanger 22 is a part of the third circulation circuit 23.

[0021] The third circulation circuit 23 is configured by connecting in series an upper part of the hot water storage tank 21, the reheating heat exchanger 22, a circulation pump 23a, and a lower part of the hot water storage tank 21 by copper pipes or stainless steel pipes. Hot water in the upper part of the hot water storage tank 21 returns to the lower part of the hot water storage tank 21 via the reheating heat exchanger 22 by the circulation pump 23a.

[0022] The water supply pipe 30 comprises a first water supply pipe 31 connected to the lower part of the hot water storage tank 21, a second water supply pipe 32 connected to the hot water supply pipe 40, and a third water supply pipe 33 connected to faucets A in the bathroom or the kitchen. A pressure reducing valve 30a is provided on the water supply pipe 30 which is located at an upper stream side relative to the second water supply pipe 32 and the third water supply pipe 33 so as to reduce pressure of water supplied from waterworks to make the water pressure be at a predetermined pressure and make the water flow.

[0023] The hot water supply pipe 40 comprises a first hot water supply pipe 41, one side of which is connected to the upper part of the hot water storage tank 21 and the other side of which is connected to a first mixing valve 40a and a second mixing valve 40b for mixing hot water in the hot water storage tank 21 with water which flows through the second water supply pipe 32, a second hot water supply pipe 42, one side of which is connected to the first mixing valve 40a and the other side of which is connected to the faucet A in the bathroom or the kitchen, and a third hot water supply pipe 43, one side of which is connected to the second mixing valve 40b and the other side of which is connected to the second circulation

circuit 60. Hot water in the upper part of the hot water storage tank 21 flows through the hot water supply pipe 40 in accordance with pressure of water flows into the hot water storage tank 21 from the first water supply pipe 31. Also, on the third hot water supply pipe 43, a solenoid valve 43a for opening and closing the flow passage of the third hot water supply pipe 43 is provided.

[0024] The first circulation circuit 50 is configured by connecting in series the lower part of the hot water storage tank 21, a circulation pump 51, the gas cooler 12, and the upper part of the hot water storage tank 21 by copper pipes, stainless steel pipes, vulcanized polyethylene pipes, or etc., water in the lower part of the hot water storage tank 21 flows into the upper part of the hot water storage tank 21 via the gas cooler 12 by the circulation pump 51.

[0025] The second circulation circuit 60 is configured by connecting in series the bath tub 61, the circulation pump 62, the reheating heat exchanger 22, and the bath tub 61 by copper pipes, stainless steel pipes, vulcanized polyethylene pipes, or etc., water in the bath tub 61 returns to the bath tub 61 via the reheating heat exchanger 22 by the circulation pump 62.

[0026] Also, the hot water supply apparatus is provided in the tank unit 20, the hot water supply apparatus comprises a controller 70 for controlling operations, a remote controller for kitchen 71, and a remote controller for bathroom 72 provided respectively in a kitchen and a bathroom so as to control and set up the operations.

[0027] The controller 70 is composed by a microcomputer, a memory of the microcomputer memorizes operations such as an operation for heating water and etc., settings for operation modes, a program for changing priority between the remote controller for kitchen 71 and the remoter controller for bathroom 72, a passed data of a used amount of hot water, a passed data of a period in which a setting of the remote controller for bathroom was used prior to a setting of the remote controller for kitchen, and etc. Also, the controller 70 is connected to the first mixing valve 40a, the second mixing valve 40b, the remote controller for kitchen 71, and the remote controller for bathroom 72. The controller 70 transmits to the first mixing valve 40a and the second mixing valve 40b an output signal based on set-up temperature of hot water set up by the remote controller for kitchen 71 or the remote controller for bathroom 72. Moreover, the controller 70 sets up a period in which the setting of the remote controller for bathroom 72 becomes prior to the setting of the remote controller for kitchen 71 as a criterion based on the passed data of period in which the setting of the remote controller for bathroom 72 was prior to the setting of the remote controller for kitchen 71. In this embodiment, a criterion for deciding periods in which the setting of the remote controller for bathroom 72 is prior to the setting of the remote controller for kitchen 71 is a group of periods calculated by adding a predetermined time amount to before and after the each periods in which the setting of the remote controller for bathroom 72 was prior to the setting of the remote controller for kitchen 71.

[0028] The remote controller for kitchen 71 and the remote controller for bathroom 72 are connected to the controller 70 by communication cables respectively, the remote controller for kitchen 71 and the remote controller for bathroom 72 respectively comprises a switch for operations relating to, for example, supplying hot water to the bath tub 61 or reheating the hot water, a switch for setting temperature which is used to set up temperature of hot water to be supplied, a priority switch for changing a priority relating to the remote controllers for kitchen and bathroom, a plurality of switches 71a and 72a such as a communication switch for having conversations between a person in the kitchen and a person in the bathroom, and a display 71b and 72b for displaying operation status and set-up temperature, etc. Also, speakers 71c and 72c and microphones 71d and 72d as condition detectors are provided to the remote controller for kitchen 71 and to the remote controller for bathroom 72 respectively so that a person in the kitchen and a person in the bathroom can communicate with each other.

[0029] As for the hot water supply apparatus configured as above, for example, when a predetermined time period such as night time comes, or when operation for heating water is operated by the remote controller for kitchen 71 or by the remote controller for bathroom 72, the compressor 11, the fan 14a, and the circulation pump 51 are operated so as to heat water. By this, a refrigerant discharged from the compressor 11 absorbs heat by flowing into the evaporator 14 via the expansion valve 13 after radiating heat by passing through the gas cooler 12, and is suck up by the compressor 11. Also, water in the lower part of the hot water storage tank 21 passes through the first circulation circuit 50 by the circulation pump 51, the water is heated in the gas cooler 12 by exchanging heat with the refrigerant, and is stored in the upper part of the hot water storage tank 21. When a predetermined amount of hot water at the predetermined temperature is stored in the hot water storage tank 21, the operations of the compressor 11, the fan 14a, and the circulation pump 51 are stopped.

[0030] Also, hot water in the upper part of the hot water storage tank 21 passes through the first hot water supply pipe 41, then, by the first mixing valve 40a, the hot water is mixed with water which passes through the second water supply pipe 32 and temperature of the mixed hot water becomes the set-up temperature set up by the remote controller for kitchen 71 or the remote controller for bathroom 72, the hot water flows through the second hot water supply pipe 42, and the hot water is supplied from the faucet A in the kitchen or in the bathroom.

[0031] Also, hot water in the upper part of the hot water storage tank 21 passes through the first hot water supply pipe 41, then, by the second mixing valve 40b, the hot water is mixed with water passes through the second water supply pipe 32 and temperature of the mixed hot water becomes the set-up temperature set up by the remote controller for kitchen 71 or the remoter controller

for bathroom 72, the hot water flows through the third hot water supply pipe 43 and the second circulation circuit 60, and the hot water is supplied to the bath tub 61 when the bath tub 61 is to be filled with hot water.

[0032] Also, as reheating operation, by operating the circulation pumps 23a and 62, hot water in the bath tub 61 is circulated by the second circulation circuit 60, and hot water in the hot water storage tank 21 is circulated by the third circulation circuit 23. By this, hot water in the bath tub 61 is heated at the reheating heat exchanger 21 by exchanging heat with hot water in the upper part of the hot water storage tank 21 and flows back to the bath tub 61.

[0033] Normally, when the controller 70 is configured so that the setting of the controller for kitchen 71 is prior to the setting of the controller for bathroom 72, and hot water at temperature set up by the remote controller for kitchen 71 is supplied from each of the faucets A. In order to assign the setting of the controller for bathroom 72 the priority over the setting of the controller for kitchen 71, when a switch 72a of the remote controller for bathroom 72 for changing the priority is operated, the setting of the remote controller for bathroom 72 becomes prior. Also, in order to assign the priority to the setting of the controller for kitchen 71 when the setting of the controller for bathroom 72 has the priority, when a switch 71a of the remote controller for kitchen 71 for changing the priority is operated, the setting of the remote controller for kitchen 71 becomes prior.

[0034] The controller 70 comprises an automatic priority switching means for assigning the priority to the setting of the controller for bathroom 72 by judging the use of the bathroom, when the setting of the remote controller for kitchen 71 is prior to the setting of the remote controller for bathroom 72. Also, the automatic priority switching means assigns the priority to the setting of the controller for kitchen 72, by judging that the bathroom is not used, when the setting of the remote controller for bathroom 72 is prior to the setting of the remote controller for kitchen 71. The operation of the controller 70 of this priority change is explained by the flow chart in FIG. 2.

[0035] Firstly, at an usual situation, when the setting of the remote controller for kitchen 71 is set up to be prior to the setting of the remote controller for bathroom 72 (step S1), and a set-up time t1 for assigning the priority to the setting of the remote controller for bathroom 72 comes (step S2), further, when a loudness D detected by the microphone 72d of the remote controller for bathroom 72 is louder than a predetermined loudness D2 (step S3), the setting of the remote controller for bathroom 72 becomes prior to the setting of the remote controller for kitchen 71 (step S4). Also, when the priority is changed from the setting of the remote controller for kitchen 71 to the setting of the remote controller for bathroom 72, if a set-up temperature T for hot water is detected as higher than a predetermined temperature Th (step S5), the set-up temperature T is changed to a standard set-up temperature Ts (Th $\geqq$ Ts) (step S6). Secondly, when the setting of the remote controller for bathroom 72 is prior to the setting of the remote controller for kitchen 71, when a predetermined time t2 for canceling the priority of the setting of the remote controller for bathroom 72 and assigning the priority to the setting of the remote controller for kitchen 71 comes (step S7), when the loudness D detected by the microphone 72d of the remote controller for bathroom 72 is smaller than the predetermined loudness D2 (D1 > D2) (step S8), the setting of the remote controller for kitchen 71 becomes prior to the setting of the remote controller for bathroom 72 (step S1).

[0036] By the hot water supply apparatus of this embodiment, when the setting of the remote controller for kitchen 71 is prior to the setting of the remote controller for bathroom 72, if the set-up time t1 for assigning the priority to the setting of the remote controller for bathroom 72, and if the loudness larger than the predetermined loudness is detected by the microphone 72d of the remote controller for bathroom 72, the setting of the remote controller for bathroom 72 becomes prior to the setting of the remote controller for kitchen 71. By this, the use of the bathroom is surely detected without a human body detector, such as infrared human body detector, provided in the bathroom. Therefore, it is possible to avoid incorrect detections of the use of the bathroom.

[0037] Also, when the setting of the remote controller for bathroom 72 is prior to the setting of the remote controller for kitchen 71, when a predetermined time t2 for canceling the priority of the setting of the remote controller for bathroom 72 and assigning the priority to the setting of the remote controller for kitchen 71 comes, when the loudness detected by the microphone 72d of the remote controller for bathroom 72 is smaller than the predetermined loudness, the setting of the remote controller for kitchen 71 becomes prior to the setting of the remote controller for bathroom 72. By this, it becomes possible to assign the priority to the setting of the remote controller for kitchen 71 without changing the priority manually. Therefore, it is possible to improve the operability.

[0038] Also, when the priority is changed from the setting of the remote controller for kitchen 71 to the setting of the remote controller for bathroom 72, if the set-up temperature T of the hot water is set up to be higher than the predetermined temperature Th, the set-up temperature T of the hot water is changed to the standard set-up temperature Ts. By this, it becomes possible to prevent hot water at a high temperature from being supplied unexpectedly from the faucet A and shower in the bathroom. Therefore, it becomes possible to improve safety.

[0039] Also, in this embodiment, deciding whether the bathroom is being used or not being used is performed using two criterias, which are the period in which the setting of the remote controller for bathroom 72 should be prior to the setting of the remote controller for kitchen 71 determined from the passed data of periods in which the setting of the remote controller for bathroom 72 was prior to the setting of the remote controller for kitchen 71, and the detected loudness detected by the microphone 72d

of the remote controller for bathroom 72. However, the criterias are not restricted to the period in which the setting of the remote controller for bathroom 72 is prior to the setting of the remote controller for kitchen 71 determined from the passed data of periods in which the setting of the remote controller for bathroom 72 was prior to the remote controller for kitchen 71, and the detected loudness detected by the microphone 72d of the remote controller for bathroom 72.

[0040] The criteria for deciding the bathroom is being used or not being used can not only be the period in which the setting of the remote controller for bathroom 72 is prior to the setting of the remote controller for kitchen 71 determined from the passed data of periods in which the setting of the remote controller for bathroom 72 was prior to the setting of the remote controller for kitchen 71, and the loudness in the bathroom, but also temperature in the bathroom, humidity in the bathroom, or brightness in the bathroom. In this case, by using at least two criterias from the period in which the setting of the remote controller for bathroom 72 is prior to the remote controller for kitchen 71 determined from the passed data of periods in which the setting of the remote controller for bathroom 72 was prior to the setting of the remote controller for kitchen 71, the loudness in the bathroom, the temperature in the bathroom, the humidity in the bathroom, and the brightness in the bathroom, the use of the bathroom is surely detected as well as the said embodiment.

[0041] If the temperature of the bathroom is chosen as the criterion for changing the priority, when a temperature detected by a temperature sensor provided in the bathroom is higher than a first predetermined temperature, the setting of the remote controller for bathroom 72 is decided to be prior, and when a temperature detected by the temperature sensor provided in the bathroom is lower than a second predetermined temperature (the first predetermined temperature $\geqq$ the second predetermined temperature), the priority assigned to the setting of the remote controller for bathroom 72 is decided to be cancelled.

[0042] If the humidity of the bathroom is chosen as the criterion for changing the priority, when humidity detected by a humidity sensor is higher than a first predetermined humidity, the setting of the remote controller for bathroom 72 is decided to be prior, and when humidity detected by the humidity detector is lower than a second predetermined humidity (the first predetermined humidity $\geqq$ the second predetermined humidity), the priority assigned to the setting of the remote controller for bathroom 72 is decided to be cancelled.

[0043] If the brightness of the bathroom is chosen as the criterion for changing the priority, when illuminance detected by an illuminance sensor is brighter than a first predetermined illuminance, the setting of the remote controller for bathroom 72 is decided to be prior, and when illuminance detected by the illuminance sensor is darker than a second predetermined illuminance (the first predetermined illuminance $\geqq$ the second predetermined illuminance), the priority assigned to the setting of the remote controller for bathroom 72 is decided to be cancelled.

[0044] Also, this embodiment shows the criterion for deciding the period in which the setting of the remote controller for bathroom 72 is prior to the setting of the remote controller for kitchen 71 is a group of periods calculated by adding a predetermined time amount to before and after the each periods in which the setting of the remote controller for bathroom 72 was prior to the remote controller for kitchen 71. However, in the passed periods in which the remote controller for bathroom 72 was prior to the remote controller for the kitchen 71, for example, a period, which starts from a time that the remote controller for bathroom 72 was frequently prior to the other one to a time that the priority assigned to the remote controller for bathroom was frequently canceled, can be used as the criterion.

[0045] FIG.3 shows the second embodiment of this invention, which is a flow chart of an operation of the controller for changing priority of the remote controller. Also, the compositions which are the same with the ones in the previously explained first embodiment are assigned the same symbols

[0046] The controller 70 of this hot water supply apparatus comprises an automatic priority switching means for changing the priority to the setting of the controller for bathroom 72 by judging the bathroom is used when the setting of the remote controller for kitchen 71 is prior to the setting of the remote controller for bathroom 72. And the automatic priority switching means changes the priority to the setting of the controller for kitchen 71 by judging that the bathroom is not being used when the setting of the remote controller for bathroom 72 is prior to the setting of the remote controller for kitchen 71. The operation of the controller 70 of this priority change is explained by the flow chart in FIG. 3.

[0047] Firstly, at an usual situation, when the setting of the remote controller for kitchen 71 is set up to be prior to the setting of the remote controller for bathroom 72 (step S11), if a switch 72a of the remote controller for bathroom 72 is operated (step S12), the setting of the remote controller for bathroom 72 becomes prior to the setting of the remote controller for kitchen 71 (step S13). Also, when the priority is changed from the setting of the remote controller for kitchen 71 to the setting of the remote controller for bathroom 72, when a set-up temperature T of the hot water is detected to be higher than a predetermined temperature Th (step S14), the set-up temperature T of the hot water is changed to a standard set-up temperature Ts (Th $\geqq$ Ts) (step S15). Secondly, when the setting of the remote controller for bathroom 72 is prior to the setting of the remote controller for kitchen 71, if it is detected that the switch 72a of the remote controller for bathroom 72 is not operated for longer than a predetermined period t3 (step S16), the setting of the remote controller for kitchen 71 becomes prior to the setting of the remote controller for bathroom 72 (step S11).

[0048] As described above, according to the hot water supply apparatus of this embodiment, when the setting for the remote controller for kitchen 71 is prior to the setting of the remote controller for bathroom 72, if the operation of the remote controller for bathroom 72 is detected, the setting of the remote controller for bathroom 72 becomes prior to the setting of the remote controller for kitchen 71. By this, the use of the bathroom is surely detected without a human body detector, such as infrared human body detector, provided in the bathroom. Therefore, it is possible to avoid incorrect detections of the use of the bathroom.

[0049] Also, when the setting of the remote controller for bathroom 72 is prior to the setting of the remote controller for kitchen 71, if the operation of the remote controller for bathroom 72 is not detected for a predetermined period, the setting of the remote controller for kitchen 71 becomes prior to the setting of the remote controller for bathroom 72. By this, it becomes possible that the setting of the remote controller for kitchen 71 becomes prior to the other one without changing the priority manually. Therefore, it is possible to improve the operability.

[0050] The preferred embodiments described in this specification are illustrative and not restrictive. The scope of invention is given by the appended claims, and all changes and modifications included in the meaning of claims are embraced in the present invention.

Claims

1. A hot water supply apparatus comprising:

a remote controller for kitchen placed in a kitchen room (71);
a remote controller for bathroom placed in a bathroom (72);
a plurality of condition detectors (72d) for detecting in the bathroom a plurality of conditions which are different from each other; and
a controller (70) composed to, in a case in which a setting of the remote controller for kitchen (71) is used prior to a setting of the remote controller for bathroom (72), use the setting of the controller for bathroom (72) prior to the setting of the controller for kitchen (71) when each of the condition detectors (72d) detects a predetermined condition in the bathroom respectively.

2. The hot water supply apparatus according to claim 1, further comprising:

a controller (70) composed to, in a case in which the setting of the remote controller for bathroom (72) is used prior to the setting of the remote controller for kitchen (71), use the setting of the controller for kitchen (71) prior to the setting of the controller for bathroom (72) when each of the condition detectors (72d) detects another predetermined condition other than the said predetermined condition in the bathroom respectively.

3. A hot water supply apparatus comprising:

a remote controller for kitchen placed in a kitchen room (71);
a remote controller for bathroom placed in a bathroom (72);
a condition detector (72d) for detecting a condition in the bathroom;
a memory (70) for memorizing a passed data of a period in which a setting of the remote controller for bathroom (72) was used prior to a setting of the remote controller for kitchen (71); and
a controller (70) composed to, in a case in which the setting of the remote controller for kitchen (71) is used prior to the setting of the remote controller for bathroom (72), use the setting of the controller for bathroom (72) prior to the setting of the controller for kitchen (71) when the condition detector (72d) detects a predetermined condition in the bathroom and the time is within a period which is set up based on the data memorized in the memory (70) to take priority on an operation of the remote controller (72).

4. The hot water supply apparatus according to claim 3, further comprising:

a controller (70) composed to, in the case in which a setting of the remote controller for bathroom (72) is used prior to the setting of the remote controller for kitchen (71), cancel the setting in which the setting of the controller for bathroom (72) is used prior to the setting of the controller for kitchen (71) when the condition detector (72d) detects another predetermined condition in the bathroom other than the said predetermined condition and the time is within a period which is set up based on the data memorized in the memory (70) to take priority on the remote controller for kitchen (71).

5. A hot water supply apparatus comprising:

a remote controller for kitchen placed in a kitchen room (71);
a remote controller for bathroom placed in a bathroom (72);
and
a controller (70) composed to use a setting of the remote controller for bathroom (72) prior to a setting of the remote controller for kitchen (71) when an operation of the remote controller for bathroom (72) is detected.

6. The hot water supply apparatus according to claim 5, further comprising:

a controller (70) composed to, in a case in which the setting of the remote controller for bathroom (72) is used prior to the setting of the remote controller for kitchen (71), use the setting of the controller for kitchen (71) prior to the setting of the controller for bathroom (72) when the operation of the remote controller of bathroom (72) is undetected.

7. The hot water supply apparatus according to any one of claims 1-6, further comprising:

a controller (70) composed to, in a case in which the setting of the remote controller for bathroom (72) is used prior to the setting of the remote controller for kitchen (71) and a set-up temperature of the hot water to be supplied is set up at a temperature equal to or more than first predetermined temperature, change the set-up temperature to a temperature equal to or less than second predetermined temperature.

FIG. 1

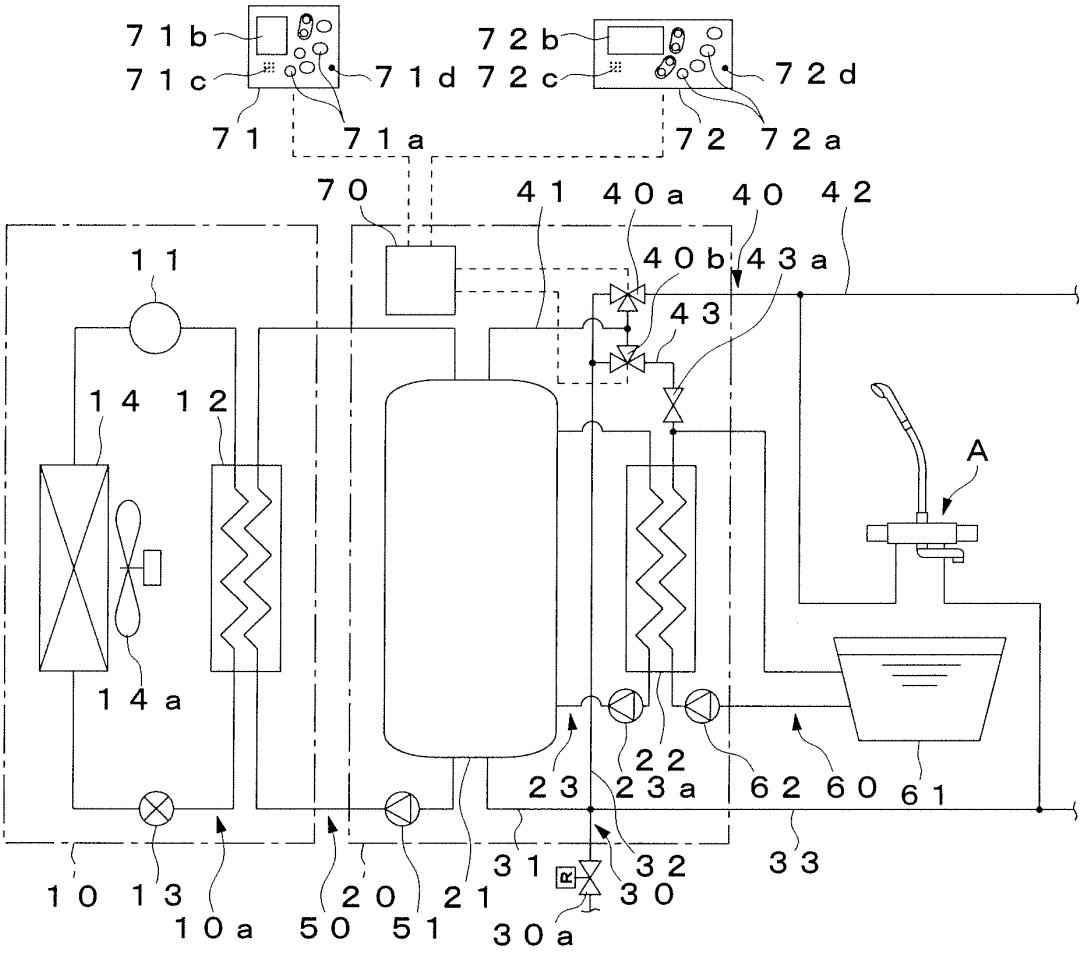

71b
71c
71d
72b
72c
72d
71
71a
72
72a
70
41
40a
40
42
40b
43a
43
11
14
12
14a
A
22
23
23a
62
60
61
10
13
10a
50
20
51
21
31
32
30
30a
33

FIG. 2

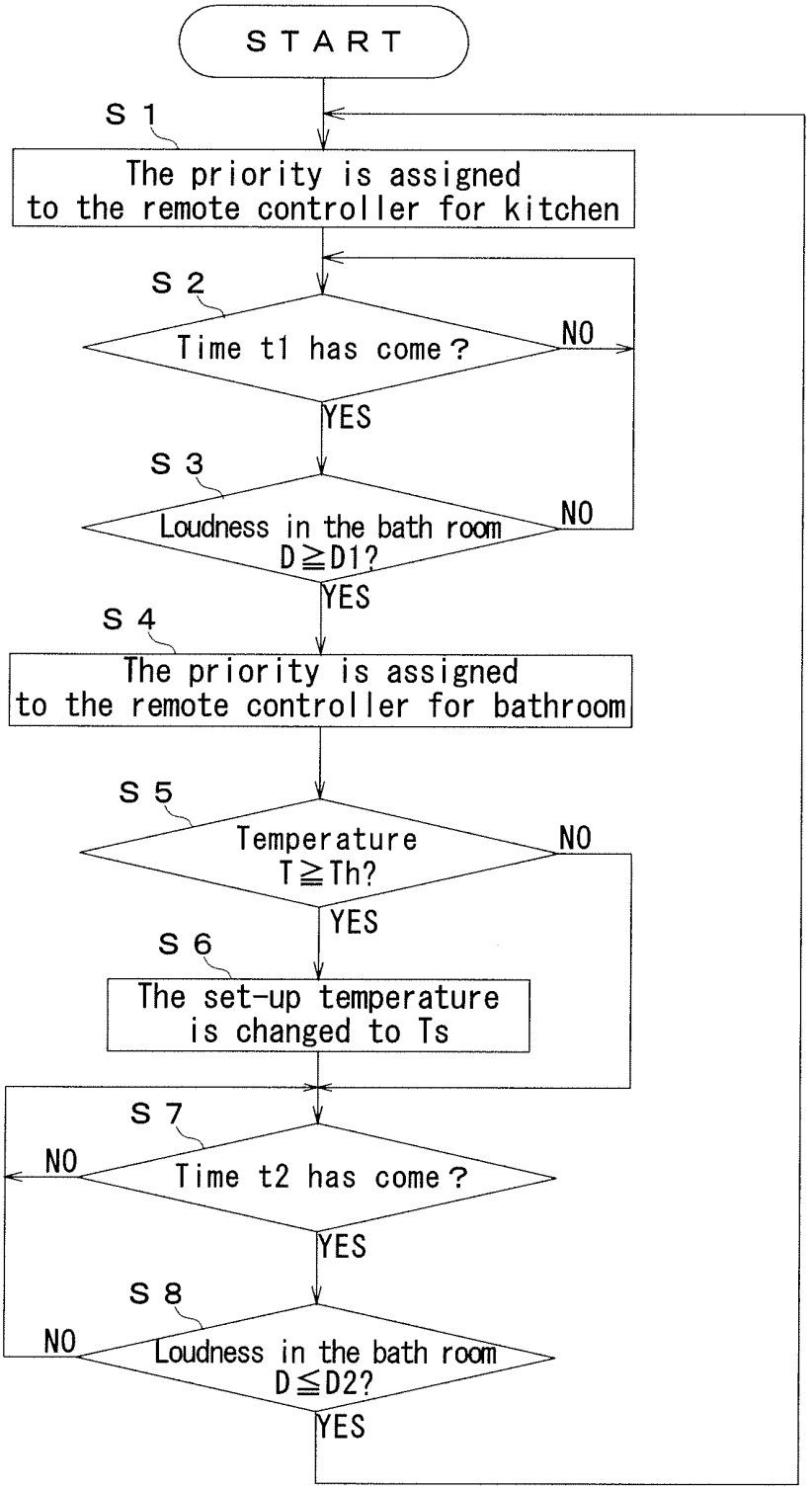
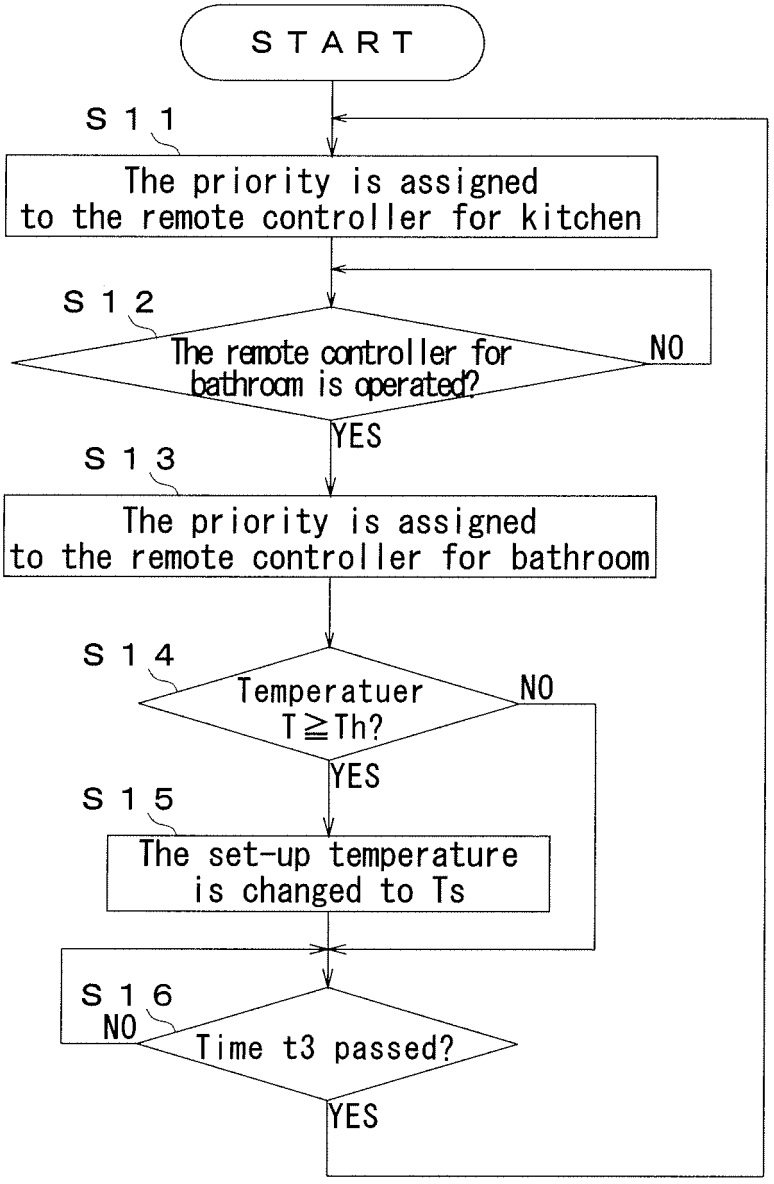

START
S 1
The priority is assigned to the remote controller for kitchen
S 2
Time t1 has come?
NO
YES
S 3
Loudness in the bath room D≧D1?
NO
YES
S 4
The priority is assigned to the remote controller for bathroom
S 5
Temperature T≧Th?
NO
YES
S 6
The set-up temperature is changed to Ts
S 7
NO
Time t2 has come?
YES
S 8
NO
Loudness in the bath room D≦D2?
YES

FIG. 3


START
S11
The priority is assigned to the remote controller for kitchen
S12
The remote controller for bathroom is operated?
NO
YES
S13
The priority is assigned to the remote controller for bathroom
S14
Temperatuer T≧Th?
NO
YES
S15
The set-up temperature is changed to Ts
S16
NO
Time t3 passed?
YES

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2008/069128

A. CLASSIFICATION OF SUBJECT MATTER
F24H1/00(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)
F24H1/00

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 1996-2009
Kokai Jitsuyo Shinan Koho 1971-2009 Toroku Jitsuyo Shinan Koho 1994-2009

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	JP 2002-195649 A (Tokyo Gas Co., Ltd.), 10 July, 2002 (10.07.02), Par. Nos. [0013] to [0019], [0025]; Figs. 1 to 5 (Family: none)	1,2,5,6 7 3,4
Y	JP 62-69058 A (Sanyo Electric Co., Ltd., Tokyo Sanyo Electric Co., Ltd.), 30 March, 1987 (30.03.87), Full text; Figs. 1 to 4 (Family: none)	7
A	JP 4-203834 A (Matsushita Electric Industrial Co., Ltd.), 24 July, 1992 (24.07.92), Full text; Figs. 1 to 10 (Family: none)	1-7

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

* Special categories of cited documents:
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 January, 2009 (13.01.09)	20 January, 2009 (20.01.09)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (April 2007)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2002195649 A **[0002]**