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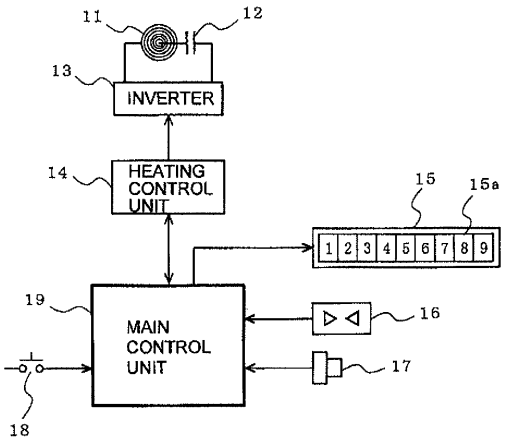
(54) INDUCTION COOKER

(57) A main control unit displays a low heat range, a moderate heat range, and a high heat range of a plurality of display windows 15a of a heating power display unit 15 in different display colors, determines that an input mode is for coarse adjustment of heating power when a heating level is inputted from a key switch, determines a display window 15a for the set heating level, and makes brighter the display windows 15a up to the determined display window 15a. When switching of the heating level to a heating level for fine adjustment of heating power is detected, the main control unit determines that the input mode is for fine adjustment of heating power, switches the display windows 15a to the display color belonging to the region that had been lastly brightened up, determines heating levels for fine adjustment defined in the range, determines a display window 15a for one of the heating levels for fine adjustment that is the same as or approximate to the set heating level, and makes brighter the display windows 15a up to the determined display window 15a.

FIG. 1



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Description

Technical Field

[0001] The present invention relates to a heating power display unit included in an induction cooking system, and more specifically to an induction cooking system capable of displaying and setting heating power, which has been set on the heating power display unit, to a further finer degree.

Background Art

[0002] Conventional induction cooking systems generally set the heating power to be controlled from minimum heating power (100 W) to maximum heating power (2500 W) in which each setting value is set in a rough manner. When performing fine adjustment of heating power, inputting means for fine adjustment of heating power enables fine adjustment of heating power within the range of 100 W to 2500 W (see Patent Literature 1, for example).

Citation List

Patent Literature

[0003] Patent Literature 1: Japanese Unexamined Patent Application Publication No. 2003-297541 (p. 5 and Figs. 1 and 2)

Summary of Invention

Technical Problem

[0004] In such a conventional induction cooking system, however, it is difficult to visually recognize to what extent the heating level has been switched. Moreover, for visual recognition, for example, a numerical display unit needs to be provided, leading to an increase in the required cost.

[0005] The present invention is directed to solve the above problem and to provide an induction cooking system in which the degree of fine adjustment of heating power is visually recognizable without increase in cost.

Solution to Problem

[0006] An induction cooking system according to the present invention includes heat-inputting means setting a heat level from among rough heating levels that can be set to a heating coil configured to heat a heating load by induction; switching means switching the heating level that is set by the heat-inputting means to a corresponding one of heating levels for fine adjustment; heat-displaying means including a plurality of display windows that are provided for each of a low heat range, a moderate heat range, and a high heat range, the ranges being defined on the basis of the rough heating levels that can be set to the heating coil; first display-controlling means displaying the low heat range, the moderate heat range, and the high heat range each having the plurality of display windows in the heat-displaying means in different display colors, determining that an input mode is for coarse adjustment of heating power when a heating level is inputted from the heat-inputting means, determining a display window for the set heating level, and making display windows in the input mode for coarse adjustment of heating power up to the determined display window for the set heating level brighter; and second display-controlling means determining that the input mode is for fine adjustment of heating power when detecting the switching of the heating level to the corresponding one of the heating levels for fine adjustment performed by the switching means, changing color of all the display windows to a display color of the range in which the display window that had been lastly brightened up by the first display-controlling means belongs, determining heating levels of the fine adjustment in the range, determining a display window for the determined heating level for the fine adjustment that is the same as or approximate to the set heating level, and making display windows from a display window in a lowest heating level for fine adjustment in the input mode for fine adjustment of heating power up to the determined display window brighter.

Advantageous Effects of Invention

[0007] According to the present invention, the low heat range, the moderate heat range, and the high heat range each having the plurality of display windows in the heat-displaying means are displayed in different display colors. When a heating level is inputted from the heat-inputting means, it is determined that the input mode is for coarse adjustment of heating power. Furthermore, a display window for the set heating level is determined, and display windows in the input mode for coarse adjustment of heating power up to the determined display window for the set heating level are made brighter. When the switching of the heating level to heating levels for fine adjustment performed by the switching means is detected, it is determined that the input mode is for fine adjustment of heating power, and all of the display windows are switched to the display color of the range in which the range that had been lastly brightened up by the first display-controlling means belongs. Furthermore, heating levels for fine adjustment defined for the range are determined, a display window for one of the heating levels for fine adjustment that is the same as or approximate to the set heating level is determined, and display windows from a display window in a lowest heating level for fine adjustment in the input mode for fine adjustment of heating power up to the determined display window are made brighter. Thus, in fine adjustment of heating power, the degree of fine adjustment of heating power is visually recognizable without a significant increase in cost,

whereby an induction cooking system with high user usability is provided.

Brief Description of Drawings

[0008]

[Fig. 1] Fig. 1 is a block diagram illustrating an outline configuration of an induction cooking system according to Embodiment 1 of the present invention.
[Fig. 2] Fig. 2 is a diagram illustrating exemplary displays indicated on a heating power display unit of the induction cooking system according to Embodiment 1.
[Fig. 3] Fig. 3 is a diagram illustrating exemplary displays indicated on a heating power display unit of an induction cooking system according to Embodiment 2 of the present invention.
[Fig. 4] Fig. 4 is a diagram illustrating exemplary displays indicated on a heating power display unit of an induction cooking system according to Embodiment 3 of the present invention.
[Fig. 5] Fig. 5 includes a diagram illustrating an exemplary display indicated on a heating power display unit of an induction cooking system according to Embodiment 4 of the present invention and a diagram illustrating an exemplary operation when switching from an input mode for coarse adjustment of heating power to an input mode for fine adjustment of heating power.
[Fig. 6] Fig. 6 includes a diagram illustrating an exemplary display indicated on the heating power display unit of the induction cooking system according to Embodiment 4 and a diagram illustrating an exemplary operation when switching from the input mode for fine adjustment of heating power to the input mode for coarse adjustment of heating power.
[Fig. 7] Fig. 7 is a flowchart illustrating the operation of the induction cooking system according to Embodiment 4.
[Fig. 8] Fig. 8 is a flowchart continued from Fig. 7.
[Fig. 9] Fig. 9 includes a diagram illustrating an exemplary display indicated on a heating power display unit of an induction cooking system according to Embodiment 5 of the present invention and a diagram illustrating an exemplary operation when switching from the input mode for fine adjustment of heating power to the input mode for coarse adjustment of heating power.
[Fig. 10] Fig. 10 is a flowchart illustrating the operation of the induction cooking system according to Embodiment 5.
[Fig. 11] Fig. 11 is a flowchart illustrating the operation of the induction cooking system according to Embodiment 6 of the present invention. Description of Embodiments

Embodiment 1

[0009] Fig. 1 is a block diagram illustrating an outline configuration of an induction cooking system according to Embodiment 1 of the present invention.

[0010] Referring to the drawing, a heating coil 11 of the induction cooking system is provided below a top plate (not illustrated) and is connected in series with a resonant capacitor 12. An inverter 13 converts direct-current voltage into high-frequency voltage on the basis of a driving signal from a heating control unit 14 and supplies the high-frequency current to a load circuit of the heating coil 11 and the resonant capacitor 12. The heating control unit 14 generates the driving signal on the basis of a heating power command from a main control unit 19 and drives the inverter 13.

[0011] A heating power display unit 15 is provided at, for example, the front edge of the top plate and has, for example, nine display windows 15a on the top face thereof. The display windows 15a are given different heating level numbers from, for example, "1" to "9". A set of, for example, a green LED, an orange LED, and a red LED is provided at the back of each of the display windows 15a. As an exemplary heating power distribution, heating level 1 represents 100 W, heating level 2 represents 300 W, heating level 3 represents 500 W, heating level 4 represents 750 W, heating level 5 represents 1000 W, heating level 6 represents 1500 W, heating level 7 represents 2000 W, heating level 8 represents 2500 W, and heating level 9 represents 3000 W. The display windows 15a for heating levels 1 to 3, heating levels 4 to 6, and heating levels 7 to 9 are classified as belonging to a low heat range, a moderate heat range, and a high heat range, respectively. When the heating power display unit 15 is in a standby state, the display windows 15a for heating levels 1 to 3 belonging to the low heat range are lit in green, the display windows 15a for heating levels 4 to 6 belonging to the moderate heat range are lit in orange, and the display windows 15a for heating levels 7 to 9 belonging to the high heat range are lit in red.

[0012] A key switch 16 functioning as heat-inputting means is provided on, for example, a frame body provided on a front edge side of the top plate. An encoder knob 17 (heat-adjusting dial) also functioning as heat-inputting means is provided on, for example, the front face of the induction cooking system. The key switch 16 includes a heating power UP key for increasing the heating power and a heating power DN key for decreasing the heating power. The encoder knob 17 is configured to increase/decrease the heating power when rotated in a certain direction. A mode switching switch 18 functioning as switching means is provided adjacent to the key switch 16, for example, and switches the heating power settings represented by the above heating level numbers (a mode for coarse adjustment of heating power) to detailed heating power settings (a mode for fine adjustment of heating power). The mode switching switch 18 is also responsible for the switching from the mode for fine adjustment of

heating power to the mode for coarse adjustment of heating power.

[0013] The main control unit 19, which will be detailed below in describing the operation, has functions as first and second display-controlling means. When controlling of the key switch 16 or the encoder knob 17 is detected, the main control unit 19 determines that the input mode is to be the input mode for coarse adjustment of heating power. Then, the main control unit 19 controls the heating control unit 14 such that a heating load is heated by induction with the heating level that has been set by the above control, and also controls the heating power display unit 15 such that display windows 15a up to the one having the heating level number corresponding to the set heating level become brighter still. The main control unit 19 has data on the low heat range, the moderate heat range, and the high heat range associated with the heating power settings; heating powers for fine adjustment that are defined for each of the ranges; and heating level numbers associated with the heating powers for fine adjustment defined for each range.

[0014] When turning ON of the mode switching switch 18 is detected while the heating power display unit 15 is performing display of the input mode for coarse adjustment of heating power, the main control unit 19 determines the range to which the set heating level belongs and determines the heating level of the fine adjustment in that range, and determines the number of the determined heating level of the fine adjustment that is the same as or approximate to the set heating level. Subsequently, the main control unit 19 controls the heating power display unit 15 such that all the display windows 15a come to have a color corresponding to the determined range and such that display windows 15a up to the one having the determined heating level number become brighter still. Thus, the mode is switched to the input mode for fine adjustment of heating power.

[0015] Next, switching of heating power display according to Embodiment 1 will be described with reference to Fig. 2.

[0016] Fig. 2 is a diagram illustrating exemplary displays indicated on the heating power display unit of the induction cooking system according to Embodiment 1.

[0017] When the power is turned ON, the main control unit 19 controls the heating power display unit 15 to be in the standby state with, for example, the display windows 15a for heating levels 1 to 3 belonging to the low heat range being green, the display windows 15a for heating levels 4 to 6 belonging to the moderate heat range being orange, and the display windows 15a for heating levels 7 to 9 belonging to the high heat range being red as illustrated in (a) of Fig. 2. In this state, when heating level 2 is set with the key switch 16 or the encoder knob 17, the main control unit 19 controls the display windows 15a for heating levels 1 and 2 belonging to the low heat range to become brighter still as illustrated in (b). When heating level 4 is set, the main control unit 19 controls all the display windows 15a belonging to the low heat range (green) to become brighter still and also controls the display window 15a for heating level 4 belonging to the moderate heat range (orange) to become brighter still as illustrated in (c). When heating level 8 is set, the main control unit 19 controls each of the display windows 15a up to the one for heating level 8 belonging to the high heat range (green, orange, and red) to become brighter as illustrated in (d). These are states of the input mode for coarse adjustment of heating power resulting from settings set by the key switch 16 or the encoder knob 17.

[0018] When the mode switching switch 18 is detected to be turned ON when the heating power display in the input mode for coarse adjustment of heating power is in the state illustrated in (b), the main control unit 19 determines that the mode has been switched to the input mode for fine adjustment of heating power and switches the display to a display for fine adjustment of heating power. In this case, the main control unit 19 determines heating level 2 as belonging to the low heat range, determines heating levels for fine adjustment that are defined for that range, and determines the number of the determined heating level of the fine adjustment that is the same as or approximate to the set heating level 2 to be "5". Subsequently, the main control unit 19 controls the heating power display unit 15 such that all the display windows 15a turn green and the display windows 15a up to the one for the determined heating level 5 become brighter still. Subsequently, when, for example, heating level 6 is set with the key switch 16, the main control unit 19 controls the heating control unit 14 such that the heating load is heated by induction with a heating power (electric power) corresponding to heating level 6, and makes the display window 15a for heating level 6 brighter also.

[0019] When the mode switching switch 18 is detected to be turned ON when the heating power display in the input mode for coarse adjustment of heating power is in the state illustrated in (c), the main control unit 19 determines that the mode has been switched to the input mode for fine adjustment of heating power and switches the display to a display for fine adjustment of heating power. In this case, the main control unit 19 determines heating level 4 as belonging to the moderate heat range, determines heating levels for fine adjustment that are defined for that range, and determines the number of the determined heating level of the fine adjustment that is the same as or approximate to the set heating level 4 to be "3". Subsequently, the main control unit 19 controls the heating power display unit 15 such that all the display windows 15a turn orange and the display windows 15a up to the one for the determined heating level 3 become brighter still. Subsequently, when, for example, heating level 2 is set with the key switch 16, the main control unit 19 controls the heating control unit 14 such that the heating load is heated by induction with a heating power (electric power) corresponding to heating level 2, and makes the display windows 15a for heating levels 1 and 2 brighter.

[0020] When the mode switching switch 18 is detected to be turned ON when the heating power display in the

input mode for coarse adjustment of heating power is in the state illustrated in (d), the main control unit 19 determines that the mode has been switched to the input mode for fine adjustment of heating power, as in the above case, and switches the display to a display for fine adjustment of heating power. In this case, the main control unit 19 determines heating level 8 as belonging to the high heat range, determines heating levels for fine adjustment that are defined for that range, and determines the number of the determined heating level of the fine adjustment that is the same as or approximate to the set heating level 8 to be "6". Subsequently, the main control unit 19 controls the heating power display unit 15 such that all the display windows 15a turn red and the display windows 15a up to the one having the determined heating level number "6" become brighter still. Subsequently, when, for example, heating level 7 is set with the encoder knob 17, the main control unit 19 controls the heating control unit 14 such that the heating load is heated by induction with a heating power (electric power) corresponding to heating level 7, and makes the display window 15a for heating level 7 brighter also.

[0021] As described above, when the input mode for coarse adjustment of heating power is switched to the input mode for fine adjustment of heating power in Embodiment 1, the range to which the set heating level belongs is determined, the heating levels for fine adjustment that are defined for that range are determined, and the number of the determined heating level of the fine adjustment that is the same as or approximate to the set heating level is determined. Furthermore, the heating power display unit 15 is controlled such that all the display windows 15a come to have a color corresponding to the range to which the set heating level belongs and such that the display windows 15a up to the one having the determined heating level number become brighter still. Thus, in fine adjustment of heating power, the degree of fine adjustment of heating power is visually recognizable without a significant increase in cost, whereby an induction cooking system with high user usability is provided.

Embodiment 2

[0022] In Embodiment 1, when the mode is switched to the input mode for fine adjustment of heating power in a state where a heating level is set, all the display windows 15a are made to have a color of the range corresponding to the set heating level and the display windows 15a up to the one having the heating level number corresponding to the set heating level are made brighter still. In Embodiment 2, in the input mode for coarse adjustment of heating power and in the input mode for fine adjustment of heating power, heating powers (electric powers) are displayed near all the respective display windows 15a.

[0023] A heating power display unit 15 according to Embodiment 2 includes nine display windows 15a as in the above case. In the standby state, display windows 15a for heating levels 1 to 3 belonging to the low heat range are lit in green, display windows 15a for heating levels 4 to 6 belonging to the moderate heat range are lit in orange, and display windows 15a for heating levels 7 to 9 belonging to the high heat range are lit in red. Furthermore, heating powers (electric powers) that are defined in correspondence with the heating level numbers are displayed under the respective display windows 15a.

[0024] Switching of heating power display according to Embodiment 2 will now be described with reference to Fig. 3. The configuration of the induction cooking system is the same as that in Embodiment 1 illustrated in Fig. 1.

[0025] Fig. 3 is a diagram illustrating exemplary displays indicated on the heating power display unit of the induction cooking system according to Embodiment 2.

[0026] When the power is turned ON, the main control unit 19 controls the heating power display unit 15 to be in the standby state with, as illustrated in (a) of Fig. 3, the display windows 15a for the low heat range being green, the display windows 15a for the moderate heat range being orange, and the display windows 15a for the high heat range being red. In this state, the main control unit 19 displays heating powers (electric powers) that are defined in correspondence with the heating level numbers under the respective display windows 15a. In this case, as an exemplary heating power distribution, 100 W is displayed under the display window 15a for heating level 1, 300 W is displayed under the display window 15a for heating level 2, 500 W is displayed under the display window 15a for heating level 3, 750 W is displayed under the display window 15a for heating level 4, 1000 W is displayed under the display window 15a for heating level 5, 1500 W is displayed under the display window 15a for heating level 6, 2000 W is displayed under the display window 15a for heating level 7, 2500 W is displayed under the display window 15a for heating level 8, and 3000 W is displayed under the display window 15a for heating level 9.

[0027] When the mode switching switch 18 is detected to be turned ON when the heating power display in the input mode for coarse adjustment of heating power is in the state illustrated in (b), the main control unit 19 determines that the mode has been switched to the input mode for fine adjustment of heating power and switches the display to a display for fine adjustment of heating power. In this case, the main control unit 19 determines heating level 2 as belonging to the low heat range, determines heating levels for fine adjustment (as an exemplary distribution, 100 W, 150 W, 200 W, 250 W, 300 W, 350 W, 400 W, 450 W, and 500 W) that are defined for the respective heating level numbers (1 to 9) given in that range, and determines the number of the determined heating level of the fine adjustment that is the same as or approximate to the set heating level (300 W) to be "5". Subsequently, the main control unit 19 controls the heating power display unit 15 such that all the display windows 15a turn green, with the determined heating levels for

fine adjustment corresponding to the heating level numbers being displayed under all the respective display windows 15a, and such that the display windows 15a up to the one for the determined heating level 5 become brighter still. Subsequently, when, for example, heating level 6 is set with the key switch 16, the main control unit 19 controls the heating control unit 14 such that the heating load is heated by induction with the heating power corresponding to heating level 6 (350 W), and makes the display window 15a for heating level 6 brighter also.

[0028] When the mode switching switch 18 is detected to be turned ON when the heating power display in the input mode for coarse adjustment of heating power is in the state illustrated in (c), the main control unit 19 determines that the mode has been switched to the input mode for fine adjustment of heating power and switches the display to a display for fine adjustment of heating power. In this case, the main control unit 19 determines heating level 4 as belonging to the moderate heat range, determines heating levels for fine adjustment (as an exemplary distribution, 600 W, 700 W, 800 W, 900 W, 1000 W, 1100 W, 1300 W, 1500 W, and 1700 W) that are defined for the respective heating level numbers (1 to 9) given in that range, and determines the number of the determined heating level of the fine adjustment that is the same as or approximate to the set heating level (750 W) to be "3". Subsequently, the main control unit 19 controls the heating power display unit 15 such that all the display windows 15a turn orange, with the determined heating levels for fine adjustment corresponding to the heating level numbers being displayed under all the respective display windows 15a, and such that the display windows 15a up to the one for the determined heating level of 3 become brighter still. Subsequently, when, for example, heating level 2 is set with the key switch 16, the main control unit 19 controls the heating control unit 14 such that the heating load is heated by induction with the heating power corresponding to heating level 2 (700 W), and makes the display windows 15a for heating levels 1 and 2 brighter.

[0029] When the mode switching switch 18 is detected to be turned ON when the heating power display in the input mode for coarse adjustment of heating power is in the state illustrated in (d), the main control unit 19 determines that the mode has been switched to the input mode for fine adjustment of heating power, as in the above case, and switches the display to a display for fine adjustment of heating power. In this case, the main control unit 19 determines heating level 8 as belonging to the high heat range, determines heating levels for fine adjustment (as an exemplary distribution, 1800 W, 1900 W, 2000 W, 2200 W, 2400 W, 2600 W, 2800 W, 2900 W, and 3000 W) that are defined for the respective heating level numbers (1 to 9) given in that range, and determines the number of the determined heating level of the fine adjustment that is the same as or approximate to the set heating level (2500 W) to be "6". Subsequently, the main control unit 19 controls the heating power display unit 15 such that all the display windows 15a turn red, with the determined heating levels for fine adjustment corresponding to the heating level numbers being displayed under all the respective display windows 15a, and such that the display windows 15a up to the one for the determined heating level of 6 become brighter still. Subsequently, when, for example, heating level 7 is set with the encoder knob 17, the main control unit 19 controls the heating control unit 14 such that the heating load is heated by induction with the heating power corresponding to heating level 7 (2800 W), and makes the display window 15a for heating level 7 brighter also.

[0030] As described above, when the input mode for coarse adjustment of heating power is switched to the input mode for fine adjustment of heating power in Embodiment 2, the range to which the set heating level belongs is determined, the heating levels for fine adjustment that are defined for the respective heating level numbers given in that range are determined, and the number of the determined heating level of the fine adjustment that is the same as or approximate to the set heating level is determined. Furthermore, the heating power display unit 15 is controlled such that all the display windows 15a come to have a color of the range to which the set heating level belongs, with the determined heating levels for fine adjustment corresponding to the heating level numbers being displayed under all the respective display windows 15a, and such that the display windows 15a up to the one having the determined heating level number become brighter still. Thus, in fine adjustment of heating power, the degree of fine adjustment of heating power is visually recognizable without a significant increase in cost, and the numerical values of the respective heating levels for fine adjustment are also recognizable, whereby an induction cooking system with higher user usability is provided.

[0031] In Embodiment 2, when the mode is switched to the input mode for fine adjustment of heating power, a heating level for fine adjustment that is higher than the set heating level is selected as being approximate to the set heating level. Alternatively, a heating level for fine adjustment that is lower than the set heating level may be selected as being approximate to the set heating level. In the latter case, safety is further increased.

[0032] In addition, displaying of the determined heating level of the fine adjustment that is the same as or approximate to the set heating level on the heating power display unit 15 may be displayed in the display window 15a for heating level 5. In such a case, the heating level that has been set in the input mode for coarse adjustment of heating power is displayed in the middle of the heating power display unit 15. Therefore, ease of visual recognition by the user increases.

Embodiment 3

[0033] Fig. 4 is a diagram illustrating exemplary displays indicated on a heating power display unit of an induction cooking system according to Embodiment 3 of

the present invention. The configuration of the induction cooking system is the same as that in Embodiment 1 illustrated in Fig. 1.

[0034] A heating power display unit 15 according to Embodiment 3 includes nine display windows 15a as in the above case. In the standby state, all the display windows 15a are lit in, for example, blue. Furthermore, as in Embodiment 2, heating powers (electric powers) are displayed under the respective display windows 15a.

[0035] The main control unit 19, which will be detailed below in describing the operation, has functions as first and second display-controlling means. When controlling of the key switch 16 or the encoder knob 17 is detected, the main control unit 19 determines that the input mode is to be the input mode for coarse adjustment of heating power. Then, the main control unit 19 controls the heating control unit 14 such that the heating level is set on the basis of the control performed, and also controls the heating power display unit 15 such that the color of the display windows 15a up to the one having the heating level number corresponding to the set heating level is switched from blue to, for example, red. The main control unit 19 has data on the low heat range, the moderate heat range, and the high heat range associated with the heating power settings; heating powers for fine adjustment that are defined for each of the ranges; and heating level numbers associated with the heating powers for fine adjustment defined for each range.

[0036] When the mode switching switch 18 is detected to be turned ON, the main control unit 19 determines that the input mode for coarse adjustment of heating power has been switched to the input mode for fine adjustment of heating power, determines the range to which the set heating level belongs, determines the heating levels for fine adjustment that are defined for that range, and determines the number of the determined heating level of the fine adjustment that is the same as or approximate to the set heating level. Subsequently, the main control unit 19 controls the heating power display unit 15 such the color of the display windows 15a up to the one for the determined heating level number is switched from blue to red.

[0037] Next, switching of heating power display according to Embodiment 3 will be described with reference to Fig. 4.

[0038] Fig. 4 is a diagram illustrating exemplary displays indicated on the heating power display unit of the induction cooking system according to Embodiment 3.

[0039] When the power is turned ON, the main control unit 19 controls the heating power display unit 15 to be in the standby state with, as illustrated in (a) of Fig. 4, all the display windows 15a being blue. In this state, the main control unit 19 displays heating powers (electric powers) that are defined in correspondence with the heating level numbers under the respective display windows 15a. The correspondence between the heating level numbers and the heating powers is the same as that in Embodiment 2.

[0040] When the mode switching switch 18 is detected to be turned ON when the heating power display in the input mode for coarse adjustment of heating power is in the state illustrated in (b), the main control unit 19 determines that the mode has been switched to the input mode for fine adjustment of heating power and switches the display to a display for fine adjustment of heating power. In this case, the main control unit 19 determines heating level 2 as belonging to the low heat range, determines heating levels for fine adjustment (as an exemplary distribution, 100 W, 150 W, 200 W, 250 W, 300 W, 350 W, 400 W, 450 W, and 500 W) that are defined for the respective heating level numbers (1 to 9) given in that range, and determines the number of the determined heating level of the fine adjustment that is the same as or approximate to the set heating level (300 W) to be "5". Subsequently, the main control unit 19 controls the display windows 15a up to the one for the determined heating level of 5 to turn red, with the determined heating levels for fine adjustment corresponding to the heating level numbers being displayed under all the respective display windows 15a. Subsequently, when, for example, heating level 6 is set with the key switch 16, the main control unit 19 controls the heating control unit 14 such that the heating load is heated by induction with the heating power corresponding to heating level 6 (350 W), and makes the display window 15a for heating level 6 be switched to red also.

[0041] When the mode switching switch 18 is detected to be turned ON when the heating power display in the input mode for coarse adjustment of heating power is in the state illustrated in (c), the main control unit 19 determines that the mode has been switched to the input mode for fine adjustment of heating power and switches the display to a display for fine adjustment of heating power. In this case, the main control unit 19 determines heating level 4 as belonging to the moderate heat range, determines heating levels for fine adjustment (as an exemplary distribution, 600 W, 700 W, 800 W, 900 W, 1000 W, 1100 W, 1300 W, 1500 W, and 1700 W) that are defined for the respective heating level numbers (1 to 9) given in that range, and determines the number of the determined heating level of the fine adjustment that is the same as or approximate to the set heating level (750 W) to be "3". Subsequently, the main control unit 19 controls the display windows 15a up to the one for the determined heating level of 3 to turn red, with the determined heating levels for fine adjustment corresponding to the heating level numbers being displayed under all the respective display windows 15a. Subsequently, when, for example, heating level 2 is set with the key switch 16, the main control unit 19 controls the heating control unit 14 such that induction heating is performed with the heating power corresponding to heating level 2 (700 W), and makes only the display windows 15a for heating levels 1 and 2 be lighted in red.

[0042] When the mode switching switch 18 is detected to be turned ON when the heating power display in the

input mode for coarse adjustment of heating power is in the state illustrated in (d), the main control unit 19 determines that the mode has been switched to the input mode for fine adjustment of heating power, as in the above case, and switches the display to a display for fine adjustment of heating power. In this case, the main control unit 19 determines heating level 8 as belonging to the high heat range, determines heating levels for fine adjustment (as an exemplary distribution, 1800 W, 1900 W, 2000 W, 2200 W, 2400 W, 2600 W, 2800 W, 2900 W, and 3000 W) that are defined for the respective heating level numbers (1 to 9) given in that range, and determines the number of the determined heating level of the fine adjustment that is the same as or approximate to the set heating level (2500 W) to be "6". Subsequently, the main control unit 19 controls the display windows 15a up to the one for the determined heating level of 6 to turn red, with the determined heating levels for fine adjustment corresponding to the heating level numbers being displayed under all the respective display windows 15a. Subsequently, when, for example, heating level 7 is set with the encoder knob 17, the main control unit 19 controls the heating control unit 14 such that the heating load is heated by induction with the heating power corresponding to heating level 7 (2800 W), and makes the display window 15a for heating level 7 be switched to red also.

[0043] As described above, when the input mode for coarse adjustment of heating power is switched to the input mode for fine adjustment of heating power in Embodiment 3, the range to which the set heating level belongs is determined, the heating levels for fine adjustment that are defined for the respective heating level numbers given in that range are determined, and the number of the determined heating level of the fine adjustment that is the same as or approximate to the set heating level is determined. Subsequently, the display windows 15a up to the one having the determined heating level number are made to light in red and the other display windows are made to light in blue, with the determined heating levels for fine adjustment corresponding to the heating level numbers being displayed under all the respective display windows 15a. Thus, in fine adjustment of heating power, the degree of fine adjustment of heating power is visually recognizable without a significant increase in cost, and the numerical values of the respective heating levels for fine adjustment are also recognizable, whereby an induction cooking system with higher user usability is provided.

[0044] In Embodiment 3, the display windows 15a up to the one having the determined heating level number turn red in the input mode for fine adjustment of heating power. The present invention is not limited to such a case. For example, as illustrated in (c) of Fig. 4, when the mode is switched to the input mode for fine adjustment of heating power from a state where heating level 4 is set in the input mode for coarse adjustment of heating power, the display windows 15a up to the one having a heating level number of "5" that is not the same as or approximate to heating level 4 (the set heating level) but is in the middle may turn red. When the input mode for fine adjustment of heating power is returned to the input mode for coarse adjustment of heating power, the display windows 15a up to the one in the middle in the relevant range may turn red. In such a configuration, the user can easily recognize the positional change in display, whereby user usability is increased.

Embodiment 4

[0045] In Embodiments 1, 2, and 3, the mode is switched with the mode switching switch 18 from the input mode for coarse adjustment of heating power to the input mode for fine adjustment of heating power and the other way round. In Embodiment 4, the mode is switched with the key switch 16 or the encoder knob 17.

[0046] Fig. 5 includes a diagram illustrating an exemplary display indicated on a heating power display unit of an induction cooking system according to Embodiment 4 of the present invention and a diagram illustrating an exemplary operation of switching the mode from the input mode for coarse adjustment of heating power to the input mode for fine adjustment of heating power. Fig. 6 includes a diagram illustrating an exemplary display indicated on the heating power display unit of the induction cooking system according to Embodiment 4 and a diagram illustrating an exemplary operation of switching the mode from the input mode for fine adjustment of heating power to the input mode for coarse adjustment of heating power. The configuration of the induction cooking system is the same as that in Embodiment 1 illustrated in Fig. 1.

[0047] In Embodiment 4, when the key switch 16 or the encoder knob 17 is operated in any of the low heat range, the moderate heat range, and the high heat range and switching between a certain heating level numbers is made a certain number of times N (for example, six times in total) within a certain period of time T, the main control unit 19 switches the state of display on the heating power display unit 15. Specifically, as illustrated in (a) of Fig. 5, in a state where the heating power display unit 15 displays the moderate heat range in the input mode for coarse adjustment of heating power, when switching between heating levels 4 and 5 is made six times in total within the certain period of time T (see (b) of Fig. 5), the mode is switched to the input mode for fine adjustment of heating power for the moderate heat range. In this case, all the display windows 15a turn orange, and the display windows 15a up to the one for heating level 5, which is the middle level in the moderate heat range, are made brighter. The reason for brightening up to heating level 5 in the middle of the heating power display unit 15 is that the user can easily recognize the positional change in display.

[0048] For another example, in a state where the heating power display unit 15 displays the high heat range in the input mode for fine adjustment of heating power as

illustrated in (a) of Fig. 6, when switching between heating levels 8 and 9 is made six times in total within the certain period of time T, the mode is switched to the input mode for coarse adjustment of heating power. In this case, the display windows 15a up to the one for heating level 8 (2500 W), which is, in the input mode for coarse adjustment of heating power, lower than heating level 8 (2900 W) in the input mode for fine adjustment of heating power, are made brighter. In this state, the display windows 15a for the low heat range are green, the display windows 15a for the moderate heat range are orange, and the display windows 15a for the high heat range are red. The reason for the lowering of the heating level when switching the mode to the input mode for coarse adjustment of heating power is performed is out of safety consideration.

[0049] Next, switching of heating power display according to Embodiment 4 will be described with reference to flowcharts. Fig. 7 is a flowchart illustrating the operation of the induction cooking system according to Embodiment 4. Fig. 8 is a flowchart continued from Fig. 7.

[0050] When the power is turned ON (S1) and the key switch 16 or the encoder knob 17 is detected to be operated (S2), the main control unit 19 controls the heating control unit 14 such that the heating load is heated by induction with the default heating level of 5 (1000 W). Subsequently, the main control unit 19 controls the heating power display unit 15 such that the display windows 15a up to the one for heating level 5 become brighter (S3). In this case, the display windows 15a for heating levels 1 to 3 belonging to the low heat range (green) and the display windows 15a for heating levels 4 and 5 belonging to the moderate heat range (green) are made brighter.

[0051] In this state, after a desired heating level is set with the key switch 16 or the encoder knob 17 (S4), the main control unit 19 checks if switching between adjacent heating levels has been made N times or more in total within the certain period of time T (S5). When the main control unit 19 determines that switching between adjacent heating levels has not been made, the main control unit 19 continually heats the heating load with the desired set heating level (S9). When the main control unit 19 determines that switching between adjacent heating levels has been made N times or more in total within the certain period of time T, the main control unit 19 switches the mode to the input mode for fine adjustment of heating power for the range in which the switches have been made with the key switch 16 or the encoder knob 17 (S6).

[0052] For example, in (b) of Fig. 3, when switching between heating levels 1 and 2 has been made N times or more in total within the certain period of time T, the main control unit 19 switches the mode to the input mode for fine adjustment of heating power for the low heat range. For another example, in (d) of Fig. 3, when switching between heating levels 7 and 8 has been made N times or more in total within the certain period of time T, the main control unit 19 switches the mode to the input mode for fine adjustment of heating power for the high heat range. In addition, in (c) of Fig. 3, when switching between heating levels 4 and 5 has been made N times or more in total within the certain period of time T, the main control unit 19 switches the mode to the input mode for fine adjustment of heating power for the moderate heat range.

[0053] Subsequently, the main control unit 19 controls the heating control unit 14 such that the heating load is heated by induction with the heating level of 5, for example, with 5 set as the default heating level during switching to the input mode for fine adjustment of heating power (S7), and, in this case, controls the heating power display unit 15 such that the display windows 15a up to the one for heating level 5 become brighter. Heating level 5 is set to, as illustrated in Figs. 3 and 4, for example 300 W in the input mode for fine adjustment of heating power for the low heat range, for example 1000 W in the input mode for fine adjustment of heating power for the moderate heat range, and for example 2400 W in the input mode for fine adjustment of heating power for the high heat range. Subsequently, after a desired heating level is set with the key switch 16 or the encoder knob 17 (S8), the main control unit 19 switches the heating level from the default heating level of 5 to the set heating level and controls the heating control unit 14 such that the heating load is heated by induction (S9).

[0054] Next, a sequence of switching from the input mode for fine adjustment of heating power to the input mode for coarse adjustment of heating power will be described. While heating is in progress in the input mode for fine adjustment of heating power (Fig. 8: S11), after a desired heating level is set with the key switch 16 or the encoder knob 17 (S12), the main control unit 19 checks if switching between adjacent heating levels has been made N times or more in total within the certain period of time T (S13). When the main control unit 19 determines that switching between adjacent heating levels has not been made, the main control unit 19 continually heats the heating load with the desired set heating level (S17). When the main control unit 19 determines that switching between adjacent heating levels has been made N times or more in total within the certain period of time T, the main control unit 19 switches the mode to the input mode for coarse adjustment of heating power (S14).

[0055] For example, in (b) of Fig. 3, when switching between heating levels 2 and 3 has been made N times or more in total within the certain period of time T, the main control unit 19 switches the mode to the input mode for coarse adjustment of heating power and makes the display windows 15a up to the heating level of, for example, 2 brighter, with 2 set as the default heating level during the switching. For another example, in (c) of Fig. 3, when switching between heating levels 5 and 6 has been made N times or more in total within the certain period of time T, the main control unit 19 switches the mode to the input mode for coarse adjustment of heating power and makes the display windows 15a up to the heat-

ing level of, for example, 5 brighter, with 5 set as the default heating level during the switching. For yet another example, in (d) of Fig. 3, when switching between heating levels 8 and 9 has been made N times or more in total within the certain period of time T, the main control unit 19 switches the mode to the input mode for coarse adjustment of heating power and makes the display windows 15a up to the heating level of, for example, 8 brighter, with 8 set as the default heating level during the switching.

[0056] Subsequently, when the switching of mode to the input mode for coarse adjustment of heating power is made in the low heat range, the main control unit 19 controls the heating control unit 14 such that the heating load is heated by induction with the heating level of 2, for example, with 2 set as the default heating level during switching (S15). When the switching of mode to the input mode for coarse adjustment of heating power is made in the moderate heat range, the heating load is heated by induction with the heating level of 5, for example, with 5 set as the default heating level during switching (S15). When the switching of mode to the input mode for coarse adjustment of heating power is made in the high heat range, the main control unit 19 controls the heating control unit 14 such that the heating load is heated by induction with the heating level of 8, for example, with 8 set as the default heating level during switching (S15). Subsequently, when a desired heating level is set with the key switch 16 or the encoder knob 17 (S16), the main control unit 19 switches the heating level from the default heating level (any of heating levels 2, 5, and 8) to the desired set heating level and controls the heating control unit 14 such that the heating load is heated by induction (S17).

[0057] As described above, in Embodiment 4, the mode is switched from the input mode for coarse adjustment of heating power to the input mode for fine adjustment of heating power or the other way round by a certain operation performed on one of the key switch 16 or the encoder knob 17, which are existing parts. Thus, in fine adjustment of heating power, the degree of fine adjustment of heating power is visually recognizable without an increase in cost, whereby an induction cooking system with high user usability is provided.

Embodiment 5

[0058] Fig. 9 includes a diagram illustrating an exemplary display indicated on a heating power display unit of an induction cooking system according to Embodiment 5 of the present invention and a diagram illustrating an exemplary operation of switching the mode from the input mode for fine adjustment of heating power to the input mode for coarse adjustment of heating power. A case illustrated in (c) and (d) of the drawing will be described below in Embodiment 6. The configuration of the induction cooking system is the same as that in Embodiment 1 illustrated in Fig. 1.

[0059] In Embodiment 5, when heating level 9 in any of the low heat range, the moderate heat range, and the high heat range is selected a certain S number of times (for example, three times) or more within a certain period of time T with the key switch 16 or the encoder knob 17, the main control unit 19 switches the input mode for fine adjustment of heating power to the input mode for coarse adjustment of heating power. Specifically, as illustrated in (a) and (b) of Fig. 9, in the input mode for fine adjustment of heating power for the low heat range, when heating level 9 is selected S times or more within the certain period of time T with the heating power UP key of the key switch 16, the main control unit 19 switches the mode to the input mode for coarse adjustment of heating power. Alternatively, when heating level 9 is selected by turning the encoder knob 17 in a certain direction and when the encoder knob 17 is kept turning for the certain period of time T, the main control unit 19 switches the mode to the input mode for coarse adjustment of heating power. In this case, heating level 3 of the input mode for coarse adjustment of heating power is selected. Further, the main control unit 19 controls the heating power display unit 15 such that the display windows 15a belonging to the individual ranges turn green, orange, and red, respectively, and such that the display windows 15a for heating levels up to 3 belonging to the low heat range become brighter.

[0060] The switching to the input mode for coarse adjustment of heating power in the moderate heat range and the high heat range is performed in the same manner. In case of the moderate heat range, heating power 6 is selected and in case of the high heat range, heating power 9 is selected.

[0061] Next, switching of heating power display according to Embodiment 5 will be described with reference to flowcharts.

[0062] Fig. 10 is a flowchart illustrating the operation of the induction cooking system according to Embodiment 5.

[0063] While heating is in progress in the input mode for fine adjustment of heating power in S21, after a desired heating level is set with the key switch 16 or the encoder knob 17 (S22), the main control unit 19 checks if heating level 9 has been selected S times or more within the certain period of time T (S23). When the main control unit 19 determines that heating level 9 has not been selected S times or more, the main control unit 19 continuously heats the heating load with the desired set heating level (S27). When the main control unit 19 determines that heating level 9 has been selected S times or more within the certain period of time T, the main control unit 19 switches the mode to the input mode for coarse adjustment of heating power (S24).

[0064] For example, during operation in the low heat range in (a) of Fig. 9, when heating level 9 has been selected S times or more within the certain period of time T, the main control unit 19 switches the mode to the input mode for coarse adjustment of heating power and makes the display windows 15a up to the heating level of 3 bright-

er. For another example, during operation in the moderate heat range, when heating level 9 has been selected S times or more within the certain period of time T, the main control unit 19 switches the mode to the input mode for coarse adjustment of heating power and makes the display windows 15a up to the heating level of 6 brighter. For yet another example, during operation in the high heat range in (c) of Fig. 9, when heating level 9 has been selected S times or more within the certain period of time T, the main control unit 19 switches the mode to the input mode for coarse adjustment of heating power and makes the display windows 15a up to the heating level of 9 brighter.

[0065] Subsequently, when the input mode for fine adjustment of heating power for the low heat range has been switched to the input mode for coarse adjustment of heating power, the main control unit 19 controls the heating control unit 14 such that the heating load is heated by induction with the heating level of 3 (S25). When the input mode for fine adjustment of heating power for the moderate heat range has been switched to the input mode for coarse adjustment of heating power, the heating load is heated by induction with the heating level of 6 (S25). When the input mode for fine adjustment of heating power for the high heat range has been switched to the input mode for coarse adjustment of heating power, the main control unit 19 controls the heating control unit 14 such that the heating load is heated by induction with the heating level of 9 (S25). Subsequently, when a desired heating level is set with the key switch 16 or the encoder knob 17 (S26), the main control unit 19 switches each heating level (any of heating levels 3, 6, and 9) to the set heating level and controls the heating control unit 14 such that the heating load is heated by induction (S27).

[0066] As described above, in Embodiment 5, the mode is switched from the input mode for fine adjustment of heating power to the input mode for coarse adjustment of heating power by selecting heating power 9 with one of the key switch 16 or the encoder knob 17, which are existing parts, S times or more within the certain period of time T. Thus, the operation of switching the mode is facilitated, and the degree of fine adjustment of heating power is visually recognizable, and an induction cooking system with high user usability is provided.

Embodiment 6

[0067] In Embodiment 5, the input mode for fine adjustment of heating power is switched to the input mode for coarse adjustment of heating power when heating level 9 is selected S times within the certain period of time T with the key switch 16 or the encoder knob 17. In Embodiment 6, the input mode for fine adjustment of heating power is switched to the input mode for coarse adjustment of heating power when heating level 1 is selected S times within the certain period of time T with the key switch 16 or the encoder knob 17.

[0068] In Embodiment 6, when heating level 1 in any of the low heat range, the moderate heat range, and the high heat range is selected S times or more within the certain period of time T with the key switch 16 or the encoder knob 17, the main control unit 19 switches the input mode for fine adjustment of heating power to the input mode for coarse adjustment of heating power. Specifically, as illustrated in (c) and (d) of Fig. 9, in the input mode for fine adjustment of heating power for the high heat range, when heating level 1 is selected S times or more within the certain period of time T with the heating power DN key of the key switch 16, the main control unit 19 switches the mode to the input mode for coarse adjustment of heating power. Alternatively, when heating level 1 is selected by turning the encoder knob 17 in a certain direction and when the encoder knob 17 is kept turning for the certain period of time T, the main control unit 19 switches the mode to the input mode for coarse adjustment of heating power. Further, the main control unit 19 controls the heating power display unit 15 such that the display windows 15a belonging to the individual ranges turn green, orange, and red, respectively, and such that the display windows 15a up to the one for heating level 7 belonging to the high heat range become brighter.

[0069] That is, when the input mode for fine adjustment of heating power for the high heat range is switched to the input mode for coarse adjustment of heating power, the heating power of 7 is set. Although not illustrated, when the input mode for fine adjustment of heating power for the moderate heat range is switched to the input mode for coarse adjustment of heating power, the heating power of 4 is set. When the input mode for fine adjustment of heating power for the low heat range is switched to the input mode for coarse adjustment of heating power, the heating power of 1 is set.

[0070] Next, switching of heating power display according to Embodiment 6 will be described with reference to flowcharts. The configuration of the induction cooking system is the same as that in Embodiment 1 illustrated in Fig. 1.

[0071] Fig. 11 is a flowchart illustrating the operation of the induction cooking system according to Embodiment 6.

[0072] While heating is in progress in the input mode for fine adjustment of heating power in S31, after a desired heating level is set with the key switch 16 or the encoder knob 17 (S32), the main control unit 19 checks if heating level 1 has been selected S times or more within the certain period of time T (S33). When the main control unit 19 determines that heating level 1 has not been selected S times or more, the main control unit 19 continually heats the heating load with the desired set heating level (S37). When the main control unit 19 determines that heating level 1 has been selected S times or more within the certain period of time T, the main control unit 19 switches the mode to the input mode for coarse adjustment of heating power (S34).

[0073] For example, during operation in the high heat

range in (c) of Fig. 9, if heating level 1 has been selected S times or more within the certain period of time T, the main control unit 19 switches the mode to the input mode for coarse adjustment of heating power and makes the display windows 15a up to the heating level of 7 brighter. For another example, during operation in the moderate heat range, when heating level 1 has been selected S times or more within the certain period of time T, the main control unit 19 switches the mode to the input mode for coarse adjustment of heating power and makes the display windows 15a up to the heating level of 4 brighter. During operation in the low heat range, when heating level 1 has been selected S times or more within the certain period of time T, the main control unit 19 switches the mode to the input mode for coarse adjustment of heating power and makes the display windows 15a up to the heating level of 1 brighter.

[0074] Subsequently, when the input mode for fine adjustment of heating power for the high heat range has been switched to the input mode for coarse adjustment of heating power as illustrated in (c) and (d) of Fig. 9, the main control unit 19 controls the heating control unit 14 such that the heating load is heated by induction with the heating level of 7 (S35). When the input mode for fine adjustment of heating power for the moderate heat range has been switched to the input mode for coarse adjustment of heating power, the main control unit 19 controls the heating control unit 14 such that the heating load is heated by induction with the heating level of 4 (S35). When the input mode for fine adjustment of heating power for the low heat range has been switched to the input mode for coarse adjustment of heating power, the main control unit 19 controls the heating control unit 14 such that the heating load is heated by induction with the heating level of 1 (S35). Subsequently, when a desired heating level is set with the key switch 16 or the encoder knob 17 (S36), the main control unit 19 switches each heating level (any of heating levels 1, 4, and 7) to the set heating level and controls the heating control unit 14 such that the heating load is heated by induction (S37).

[0075] As described above, in Embodiment 6, the mode is switched from the input mode for fine adjustment of heating power to the input mode for coarse adjustment of heating power by selecting heating power 1 with one of the key switch 16 or the encoder knob 17, which are existing parts, S times or more within the certain period of time T. Thus, the operation of switching the mode is facilitated, and the degree of fine adjustment of heating power is visually recognizable, whereby an induction cooking system with high user usability is provided.

[0076] In Embodiments 5 and 6 described above, when the input mode for fine adjustment of heating power in any of the low heat range, the moderate heat range, and the high heat range is switched to the input mode for coarse adjustment of heating power, the heating levels are selected as 3, 6, 9, respectively, or 1, 4, and 7, respectively. Alternatively, the heating levels in the middle heating levels 2, 5, 8 in the respective ranges may be selected. Reference Signs List

[0077] 11. heating coil; 12. resonant capacitor; 13. inverter; 14. heating control unit; 15. heating power display unit; 15a. display window; 16. key switch; 17. encoder knob; 18. mode switching switch; 19. main control unit.

[0078] The present subject-matter includes, inter alia, the following aspects:

1. An induction cooking system, comprising:

heat-inputting means setting a heat level from among rough heating levels that can be set to a heating coil configured to heat a heating load by induction;

switching means switching the heating level that is set by the heat-inputting means to a corresponding one of heating levels for fine adjustment;

heat-displaying means including a plurality of display windows that are provided for each of a low heat range, a moderate heat range, and a high heat range, the ranges being defined on the basis of the rough heating levels that can be set to the heating coil;

first display-controlling means displaying the low heat range, the moderate heat range, and the high heat range each having the plurality of display windows in the heat-displaying means in different display colors, determining that an input mode is for coarse adjustment of heating power when a heating level is inputted from the heat-inputting means, determining a display window for the set heating level, and making display windows in the input mode for coarse adjustment of heating power up to the determined display window for the set heating level brighter; and

second display-controlling means determining that the input mode is for fine adjustment of heating power when detecting the switching of the heating level to the corresponding one of the heating levels for fine adjustment performed by the switching means, changing color of all the display windows to a display color of the range in which the display window that had been lastly brightened up by the first display-controlling means belongs, determining heating levels of the fine adjustment in the range, determining a display window for the determined heating level for the fine adjustment that is the same as or approximate to the set heating level, and making display windows from a display window in a lowest heating level for fine adjustment in the input mode for fine adjustment of heating power up to the determined display window brighter.

2. The induction cooking system of aspect 1, wherein the first display-controlling means displays numeri-

cal values defined for the respective rough heating levels, which are settable to the heating coil, in the vicinity of the respective display windows when the low heat range, the moderate heat range, and the high heat range each having the plurality of display windows in the heat-displaying means are displayed in different display colors, and

the second display-controlling means displays numerical values defined for the respective determined heating levels for fine adjustment in the vicinity of the respective display windows when making brighter the display windows up to the determined heating level that is the same as or approximate to the set heating level.

Claims

1. An induction cooking system, comprising:

heat-inputting means setting a heat level from among rough heating levels that can be set to a heating coil (11) configured to heat a heating load by induction;

switching means switching the heating level that is set by the heat-inputting means to a corresponding one of heating levels for fine adjustment;

heat-displaying means (15) including a plurality of display windows (15a) that are provided for each of a low heat range, a moderate heat range, and a high heat range, the ranges being defined on the basis of the rough heating levels that can be set to the heating coil (11);

first display-controlling means displaying the plurality of display windows (15a) in the heat-displaying means (15) in a predetermined display color, determining that an input mode is for coarse adjustment of heating power when a heating level is inputted from the heat-inputting means, determining a display window (15a) for the set heating level, and making display windows (15a) from a display window (15a) in a lowest heating level in the input mode for coarse adjustment of heating power up to the display window (15a) for the set heating level change color; and

second display-controlling means determining that the input mode is for fine adjustment of heating power when detecting the switching of the heating level to the corresponding one of the heating levels for fine adjustment performed by the switching means, determining heating level of the fine adjustment in the range in which a display window (15a) that had been lastly brightened up by the first display-controlling means, determining a display window (15a) for the determined heating level for the fine adjustment that is the same as or approximate to the set heating level, and making display windows (15a) from a display window (15a) in a lowest heating level for fine adjustment in the input mode for fine adjustment of heating power up to the determined display window (15a) change color.

2. The induction cooking system of Claim 1, wherein the first display-controlling means displays numerical values defined for the respective rough heating levels, which are settable to the heating coil (11), in the vicinity of the respective display windows (15a) when displaying each of the plurality of display windows (15a) in the predetermined display color, and the second display-controlling means displays numerical values defined for the determined heating levels for fine adjustment in the vicinity of the respective display windows (15a) when changing the display colors of the display windows (15a) up to the display window (15a) for the heating level that is the same as or approximate to the set heating level.

3. The induction cooking system of Claim 2, wherein, when certain two heating levels in one of the rough heating levels are alternately selected a plurality of times within a certain period of time by operation of the heat-inputting means rather than by the switching means, the second display-controlling means determines that the input mode is for fine adjustment of heating power.

4. The induction cooking system of Claim 2, wherein, when certain two heating levels in one of the rough heating levels are alternately selected a plurality of times within a certain period of time by operation of the heat-inputting means rather than by the switching means, the first display-controlling means determines that the input mode is for coarse adjustment of heating power.

5. The induction cooking system of Claim 2, wherein, when a lowest heating level or a highest heating level in one of the rough heating levels is selected a plurality of times within a predetermined period of time by operation of the heat-inputting means rather than by the switching means, the first display-controlling means determines that the input mode is for coarse adjustment of heating power.

6. The induction cooking system of Claim 2, further comprising heating-controlling means configured to, when the second display-controlling means has determined heating levels for fine adjustment, start heating with one of the determined heating levels for fine adjustment that is preset.

7. The induction cooking system of Claim 6, wherein the heating-controlling means starts heating with a

preset heating level when the input mode for coarse adjustment of heating power has been switched to the input mode for fine adjustment of heating power.

FIG. 1

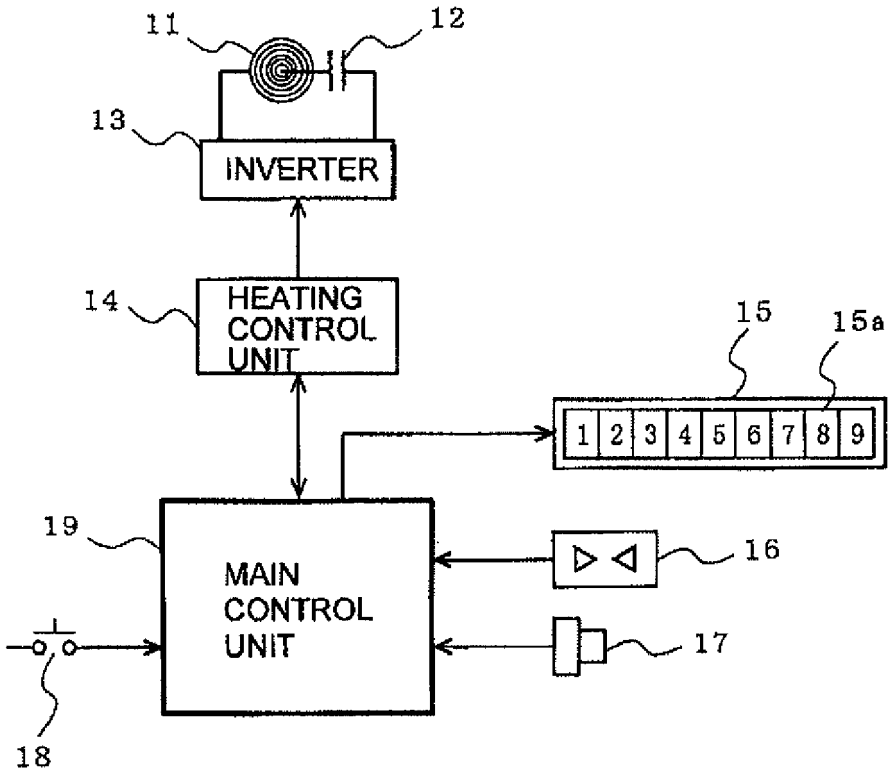

11
12
13
INVERTER
14
HEATING CONTROL UNIT
15
15a
1 2 3 4 5 6 7 8 9
19
MAIN CONTROL UNIT
16
17
18

FIG. 2

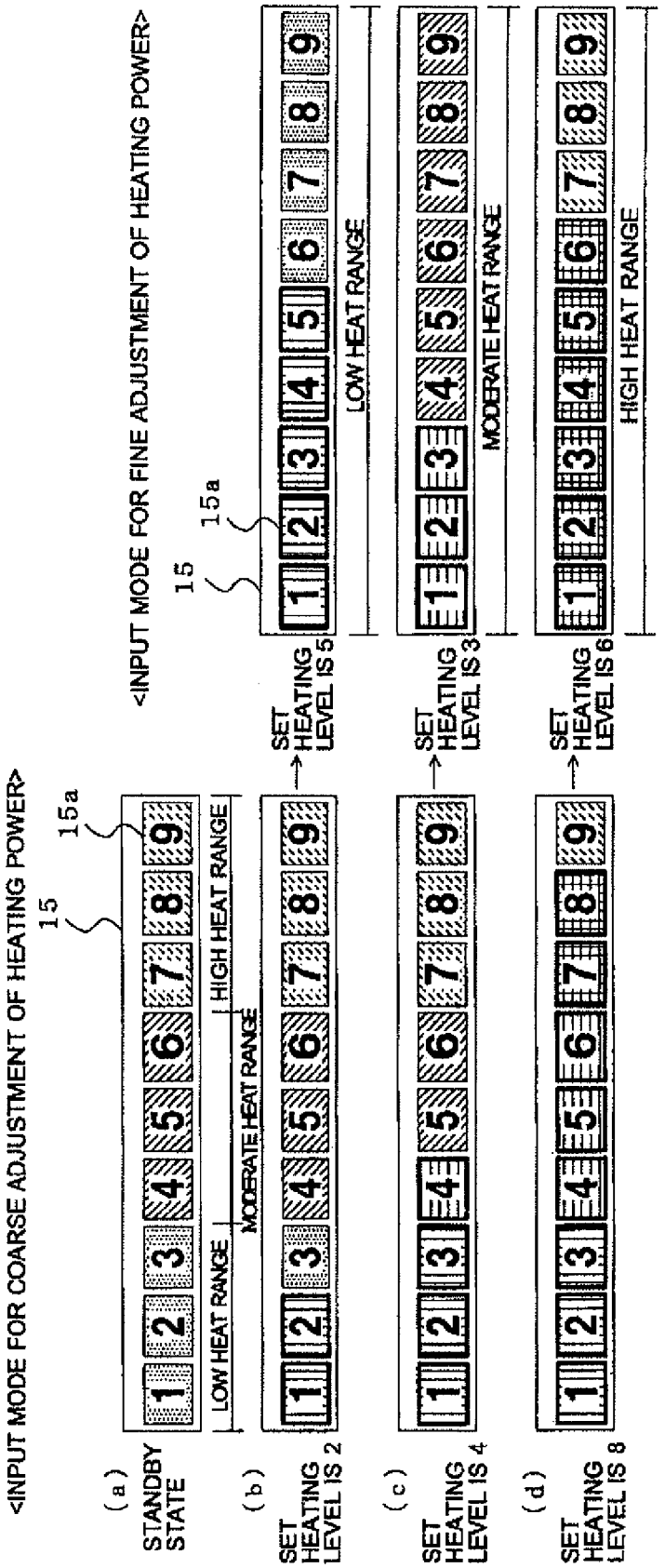

<INPUT MODE FOR COARSE ADJUSTMENT OF HEATING POWER>
15
15a
(a) STANDBY STATE
LOW HEAT RANGE
MODERATE HEAT RANGE
HIGH HEAT RANGE
(b) SET HEATING LEVEL IS 2
(c) SET HEATING LEVEL IS 4
(d) SET HEATING LEVEL IS 8
<INPUT MODE FOR FINE ADJUSTMENT OF HEATING POWER>
15
15a
SET HEATING LEVEL IS 5
SET HEATING LEVEL IS 3
SET HEATING LEVEL IS 6
LOW HEAT RANGE
MODERATE HEAT RANGE
HIGH HEAT RANGE

FIG. 3

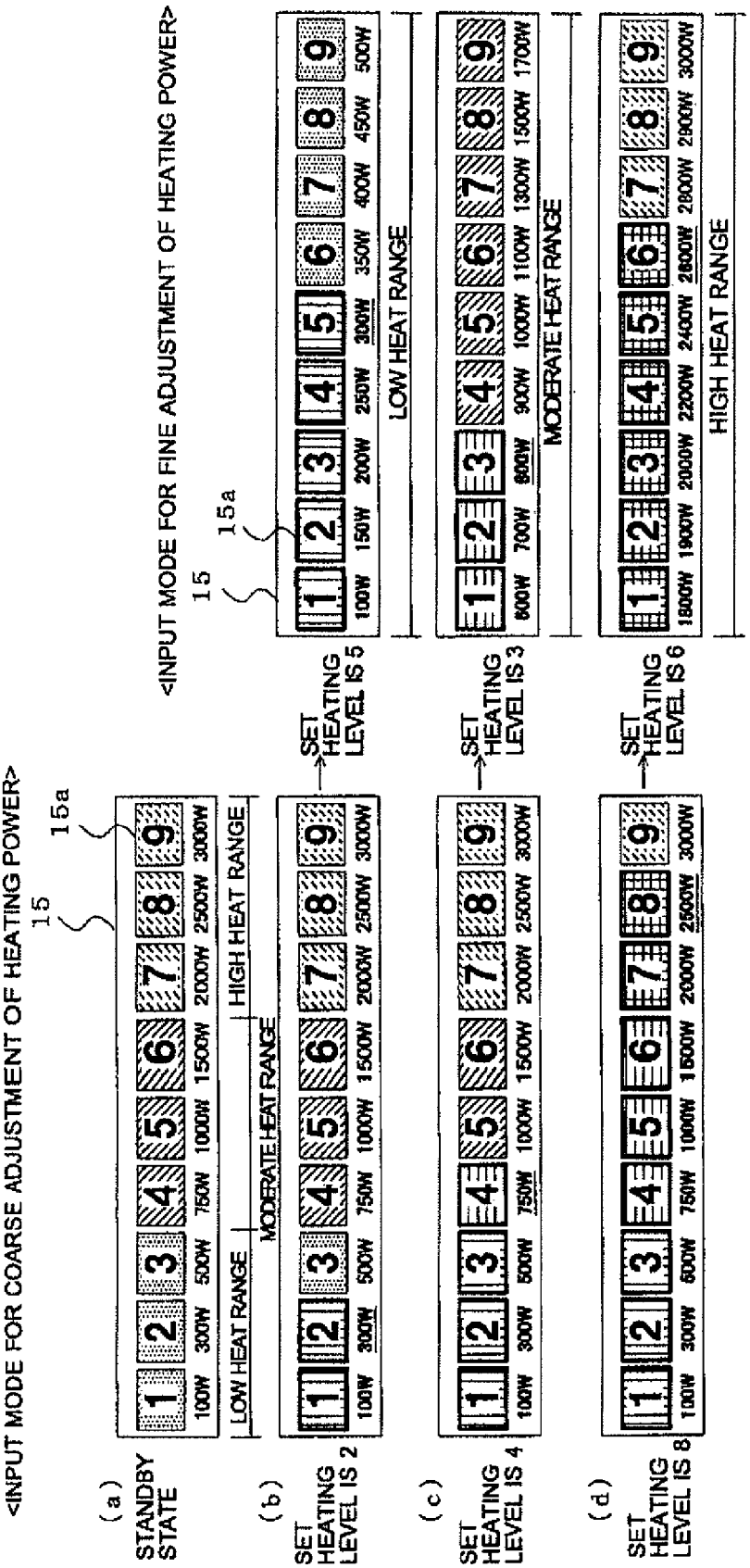

<INPUT MODE FOR COARSE ADJUSTMENT OF HEATING POWER>
<INPUT MODE FOR FINE ADJUSTMENT OF HEATING POWER>
15
15a
(a)
STANDBY STATE
(b)
SET HEATING LEVEL IS 2
(c)
SET HEATING LEVEL IS 4
(d)
SET HEATING LEVEL IS 8
SET HEATING LEVEL IS 5
SET HEATING LEVEL IS 3
SET HEATING LEVEL IS 6
LOW HEAT RANGE
MODERATE HEAT RANGE
HIGH HEAT RANGE
1 2 3 4 5 6 7 8 9
100W 300W 500W 750W 1000W 1500W 2000W 2500W 3000W
100W 150W 200W 250W 300W 350W 400W 450W 500W
600W 700W 800W 900W 1000W 1100W 1300W 1500W 1700W
1800W 1900W 2000W 2200W 2400W 2600W 2800W 2900W 3000W

FIG. 4

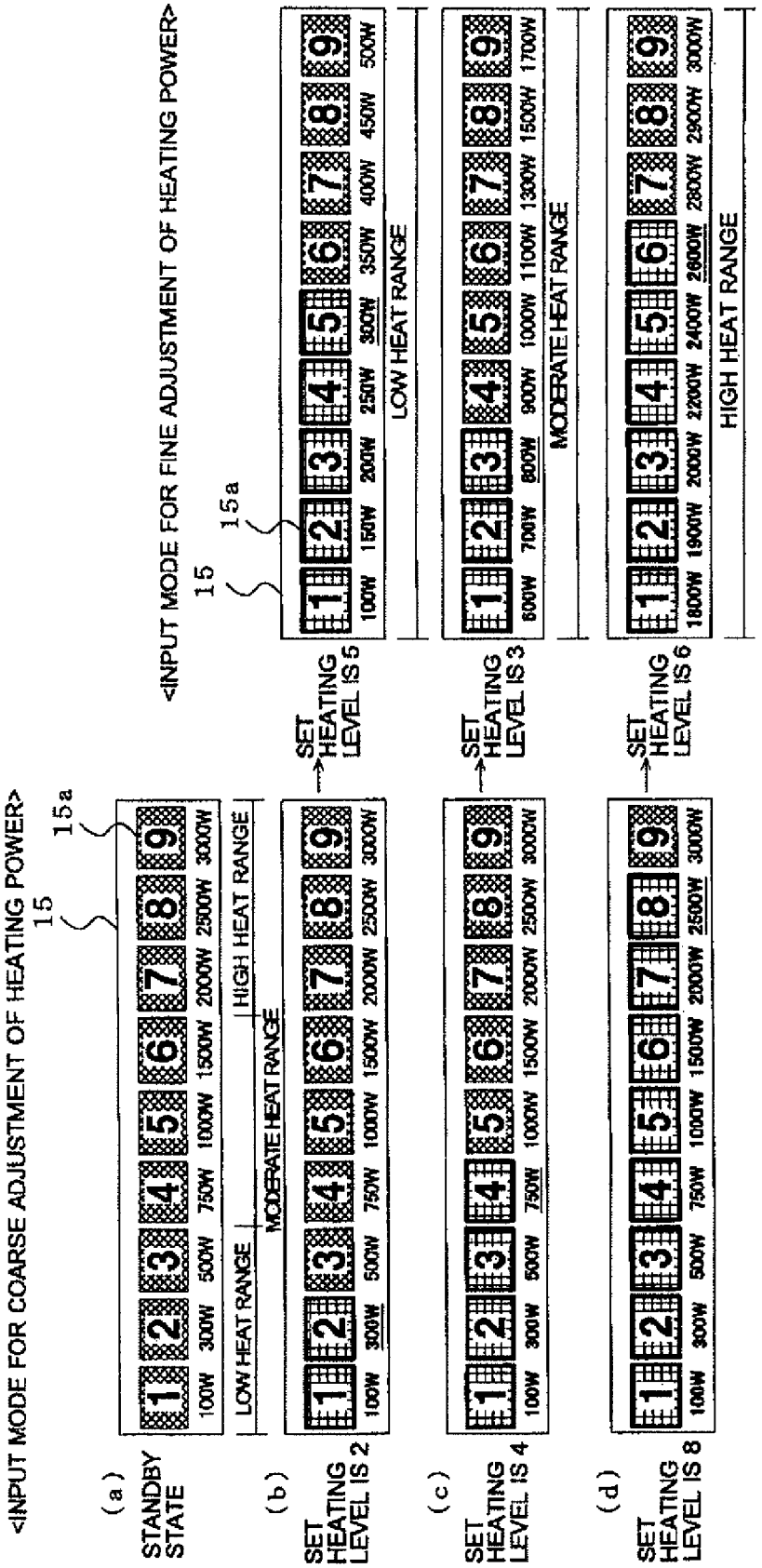

<INPUT MODE FOR COARSE ADJUSTMENT OF HEATING POWER>
15
15a
(a)
STANDBY STATE
1 2 3 4 5 6 7 8 9
100W 300W 500W 750W 1000W 1500W 2000W 2500W 3000W
LOW HEAT RANGE
HIGH HEAT RANGE
MODERATE HEAT RANGE
(b)
SET HEATING LEVEL IS 2
(c)
SET HEATING LEVEL IS 4
(d)
SET HEATING LEVEL IS 8
<INPUT MODE FOR FINE ADJUSTMENT OF HEATING POWER>
15
15a
SET HEATING LEVEL IS 5
1 2 3 4 5 6 7 8 9
100W 150W 200W 250W 300W 350W 400W 450W 500W
LOW HEAT RANGE
SET HEATING LEVEL IS 3
600W 700W 800W 900W 1000W 1100W 1300W 1500W 1700W
MODERATE HEAT RANGE
SET HEATING LEVEL IS 6
1800W 1900W 2000W 2200W 2400W 2600W 2800W 2900W 3000W
HIGH HEAT RANGE

FIG. 5

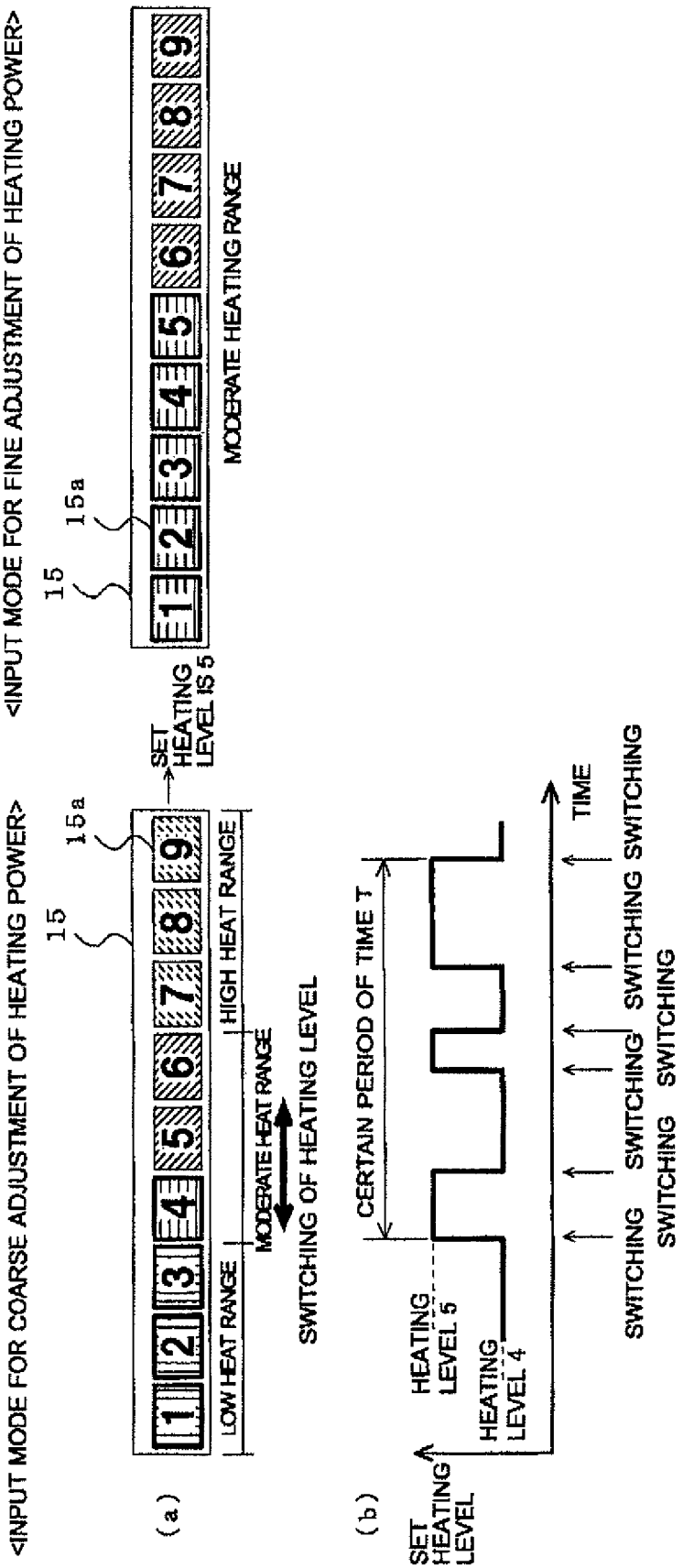

<INPUT MODE FOR COARSE ADJUSTMENT OF HEATING POWER>
15
15a
1 2 3 4 5 6 7 8 9
SET HEATING LEVEL IS 5
LOW HEAT RANGE
HIGH HEAT RANGE
MODERATE HEAT RANGE
SWITCHING OF HEATING LEVEL
(a)
<INPUT MODE FOR FINE ADJUSTMENT OF HEATING POWER>
15
15a
1 2 3 4 5 6 7 8 9
MODERATE HEATING RANGE
(b)
SET HEATING LEVEL
HEATING LEVEL 5
HEATING LEVEL 4
CERTAIN PERIOD OF TIME T
TIME
SWITCHING
SWITCHING
SWITCHING
SWITCHING
SWITCHING

FIG. 6

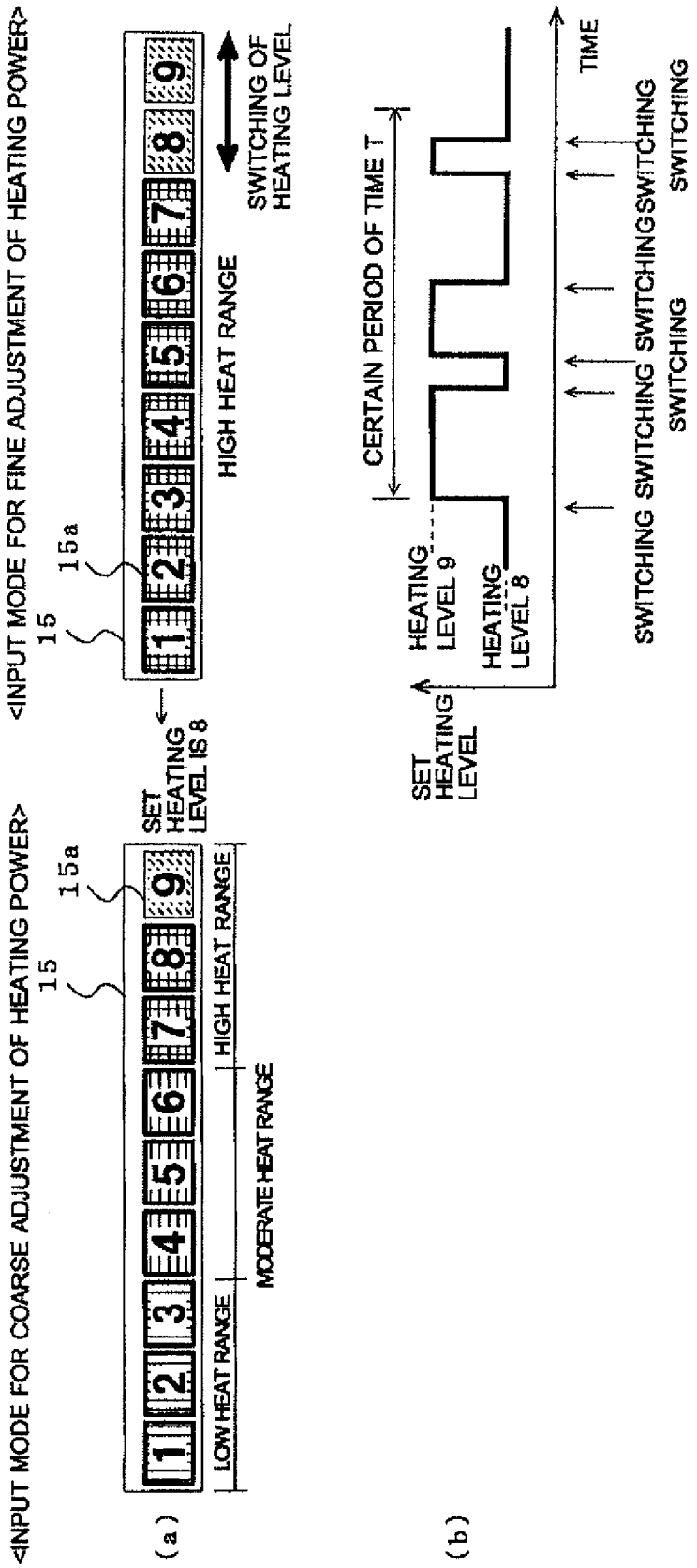

<INPUT MODE FOR COARSE ADJUSTMENT OF HEATING POWER>
15
15a
1 2 3 4 5 6 7 8 9
LOW HEAT RANGE
MODERATE HEAT RANGE
HIGH HEAT RANGE
SET HEATING LEVEL IS 8
(a)
<INPUT MODE FOR FINE ADJUSTMENT OF HEATING POWER>
15
15a
1 2 3 4 5 6 7 8 9
HIGH HEAT RANGE
SWITCHING OF HEATING LEVEL
(b)
CERTAIN PERIOD OF TIME T
SET HEATING LEVEL
HEATING LEVEL 9
HEATING LEVEL 8
SWITCHING
SWITCHING
SWITCHING
SWITCHING
TIME

FIG. 7

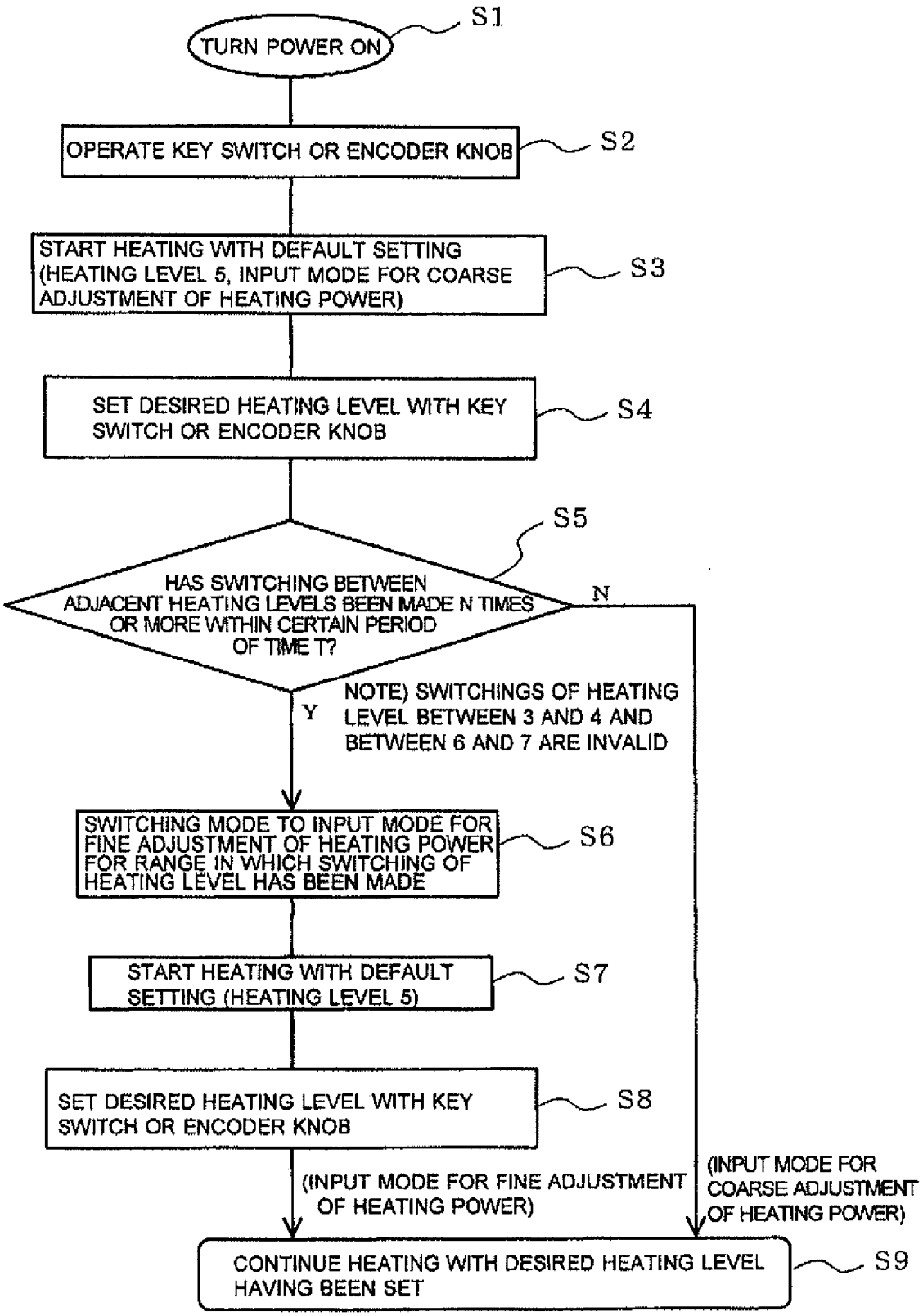

S1
TURN POWER ON
OPERATE KEY SWITCH OR ENCODER KNOB
S2
START HEATING WITH DEFAULT SETTING (HEATING LEVEL 5, INPUT MODE FOR COARSE ADJUSTMENT OF HEATING POWER)
S3
SET DESIRED HEATING LEVEL WITH KEY SWITCH OR ENCODER KNOB
S4
S5
HAS SWITCHING BETWEEN ADJACENT HEATING LEVELS BEEN MADE N TIMES OR MORE WITHIN CERTAIN PERIOD OF TIME T?
N
Y
NOTE) SWITCHINGS OF HEATING LEVEL BETWEEN 3 AND 4 AND BETWEEN 6 AND 7 ARE INVALID
SWITCHING MODE TO INPUT MODE FOR FINE ADJUSTMENT OF HEATING POWER FOR RANGE IN WHICH SWITCHING OF HEATING LEVEL HAS BEEN MADE
S6
START HEATING WITH DEFAULT SETTING (HEATING LEVEL 5)
S7
SET DESIRED HEATING LEVEL WITH KEY SWITCH OR ENCODER KNOB
S8
(INPUT MODE FOR FINE ADJUSTMENT OF HEATING POWER)
(INPUT MODE FOR COARSE ADJUSTMENT OF HEATING POWER)
CONTINUE HEATING WITH DESIRED HEATING LEVEL HAVING BEEN SET
S9

FIG. 8

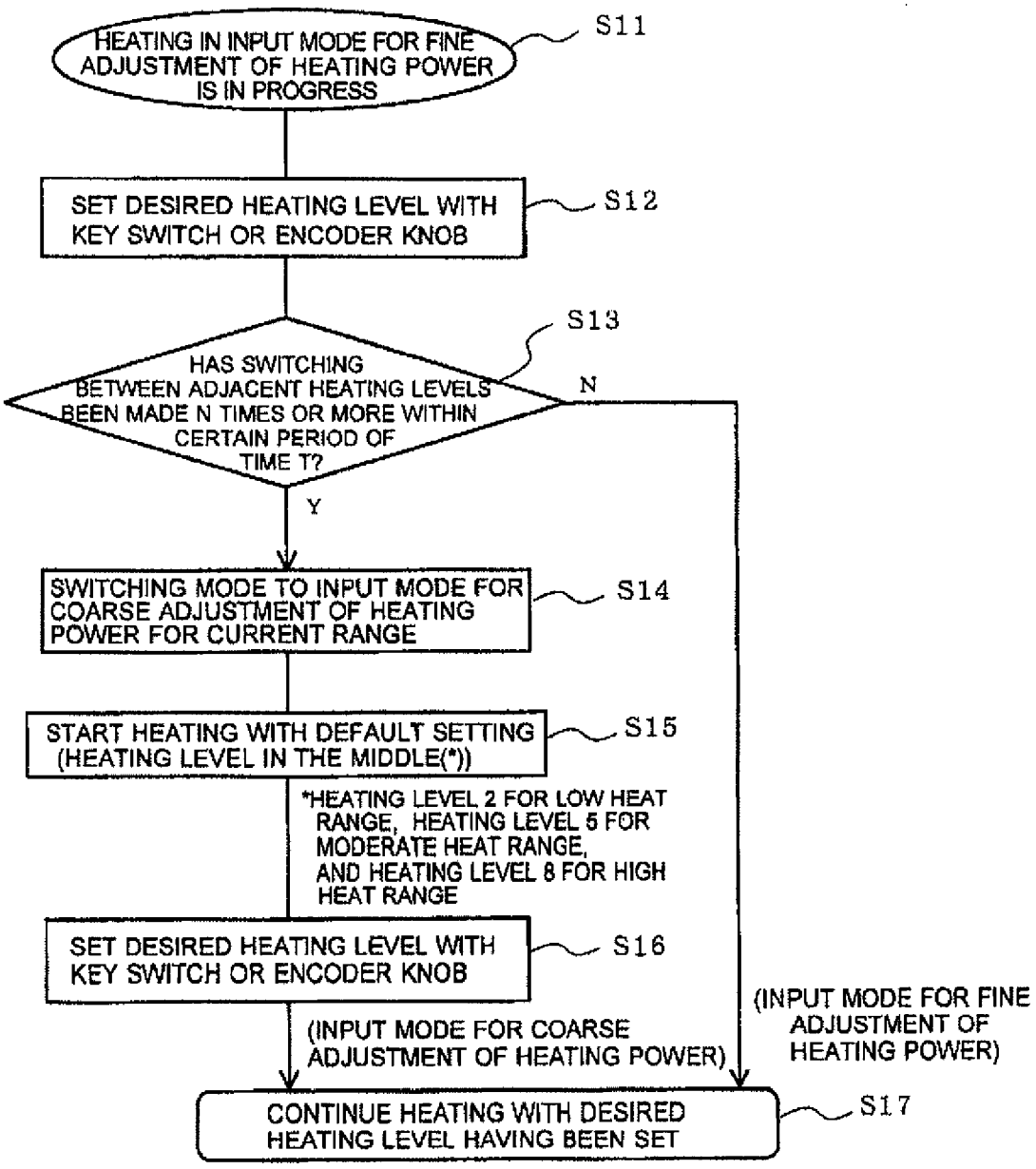

HEATING IN INPUT MODE FOR FINE ADJUSTMENT OF HEATING POWER IS IN PROGRESS
S11
SET DESIRED HEATING LEVEL WITH KEY SWITCH OR ENCODER KNOB
S12
HAS SWITCHING BETWEEN ADJACENT HEATING LEVELS BEEN MADE N TIMES OR MORE WITHIN CERTAIN PERIOD OF TIME T?
S13
N
Y
SWITCHING MODE TO INPUT MODE FOR COARSE ADJUSTMENT OF HEATING POWER FOR CURRENT RANGE
S14
START HEATING WITH DEFAULT SETTING (HEATING LEVEL IN THE MIDDLE(*))
S15
*HEATING LEVEL 2 FOR LOW HEAT RANGE, HEATING LEVEL 5 FOR MODERATE HEAT RANGE, AND HEATING LEVEL 8 FOR HIGH HEAT RANGE
SET DESIRED HEATING LEVEL WITH KEY SWITCH OR ENCODER KNOB
S16
(INPUT MODE FOR COARSE ADJUSTMENT OF HEATING POWER)
(INPUT MODE FOR FINE ADJUSTMENT OF HEATING POWER)
CONTINUE HEATING WITH DESIRED HEATING LEVEL HAVING BEEN SET
S17

FIG. 9

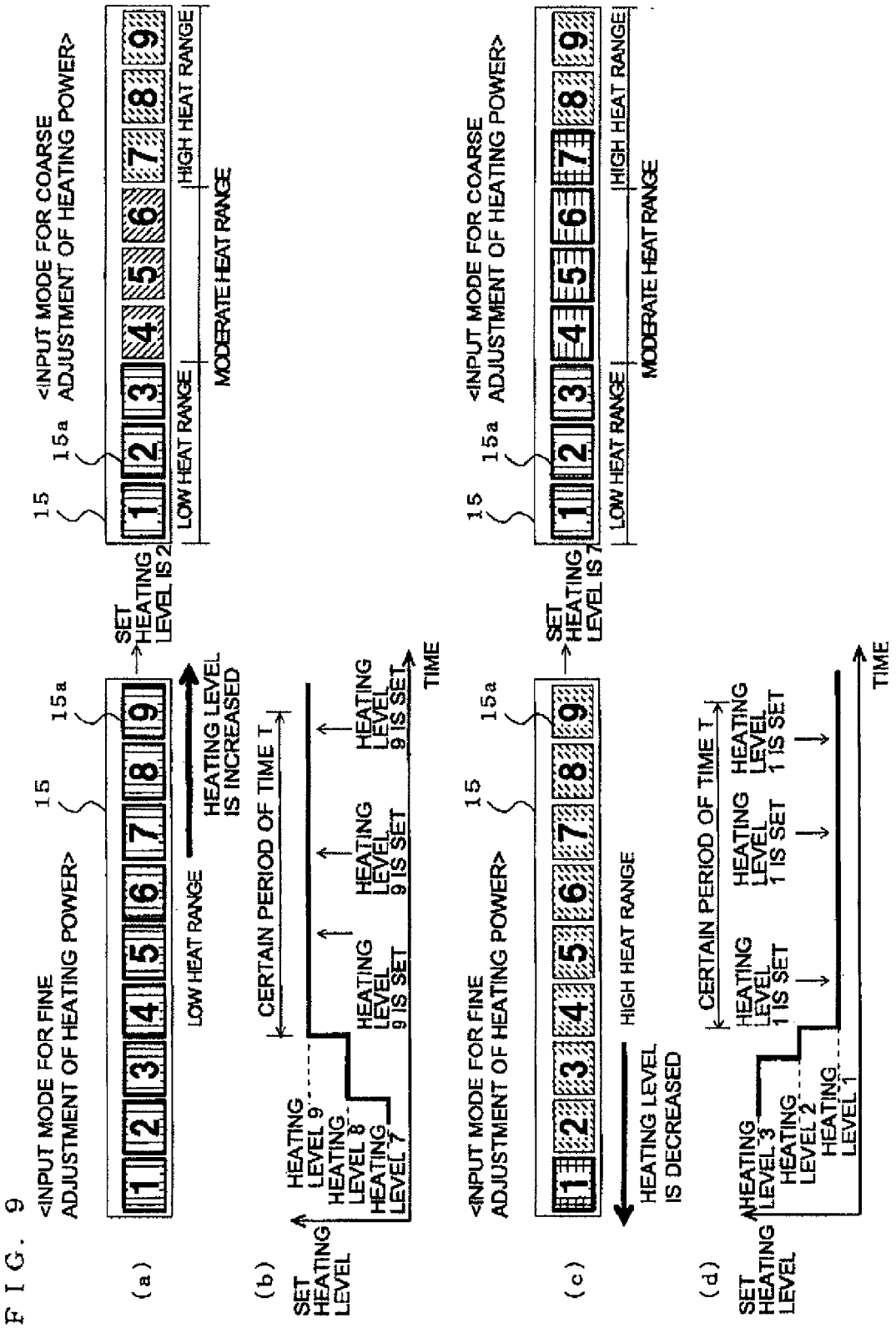

(a)
<INPUT MODE FOR FINE ADJUSTMENT OF HEATING POWER>
15
15a
1 2 3 4 5 6 7 8 9
LOW HEAT RANGE
HEATING LEVEL IS INCREASED
SET HEATING LEVEL IS 2
<INPUT MODE FOR COARSE ADJUSTMENT OF HEATING POWER>
1 2 3 4 5 6 7 8 9
LOW HEAT RANGE
HIGH HEAT RANGE
MODERATE HEAT RANGE
(b)
SET HEATING LEVEL
HEATING LEVEL 9
HEATING LEVEL 8
HEATING LEVEL 7
CERTAIN PERIOD OF TIME T
HEATING LEVEL 9 IS SET
HEATING LEVEL 9 IS SET
TIME
(c)
<INPUT MODE FOR FINE ADJUSTMENT OF HEATING POWER>
1 2 3 4 5 6 7 8 9
HIGH HEAT RANGE
HEATING LEVEL IS DECREASED
SET HEATING LEVEL IS 7
<INPUT MODE FOR COARSE ADJUSTMENT OF HEATING POWER>
1 2 3 4 5 6 7 8 9
LOW HEAT RANGE
HIGH HEAT RANGE
MODERATE HEAT RANGE
(d)
SET HEATING LEVEL
HEATING LEVEL 3
HEATING LEVEL 2
HEATING LEVEL 1
CERTAIN PERIOD OF TIME T
HEATING LEVEL 1 IS SET
HEATING LEVEL 1 IS SET
TIME

FIG. 10

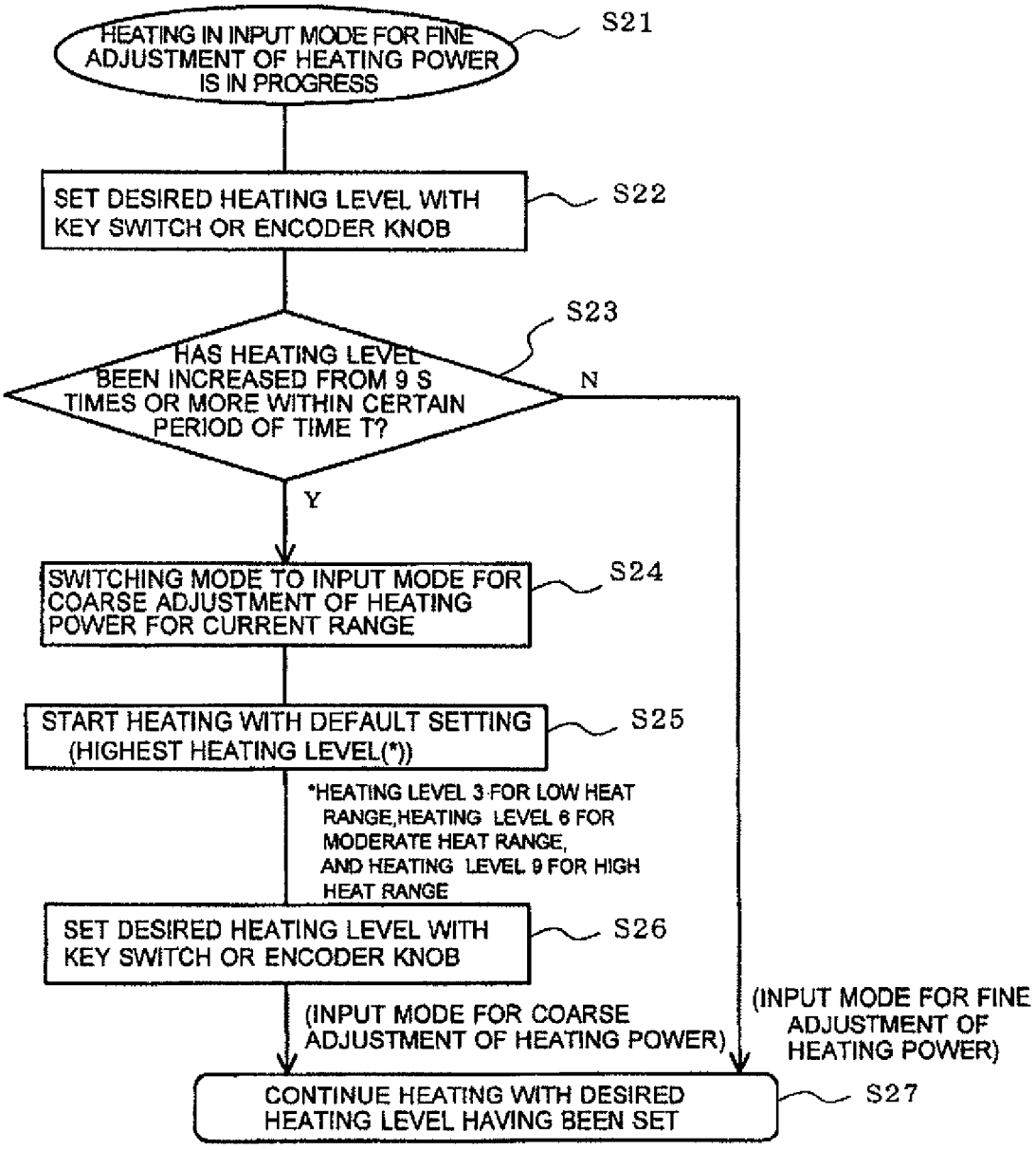
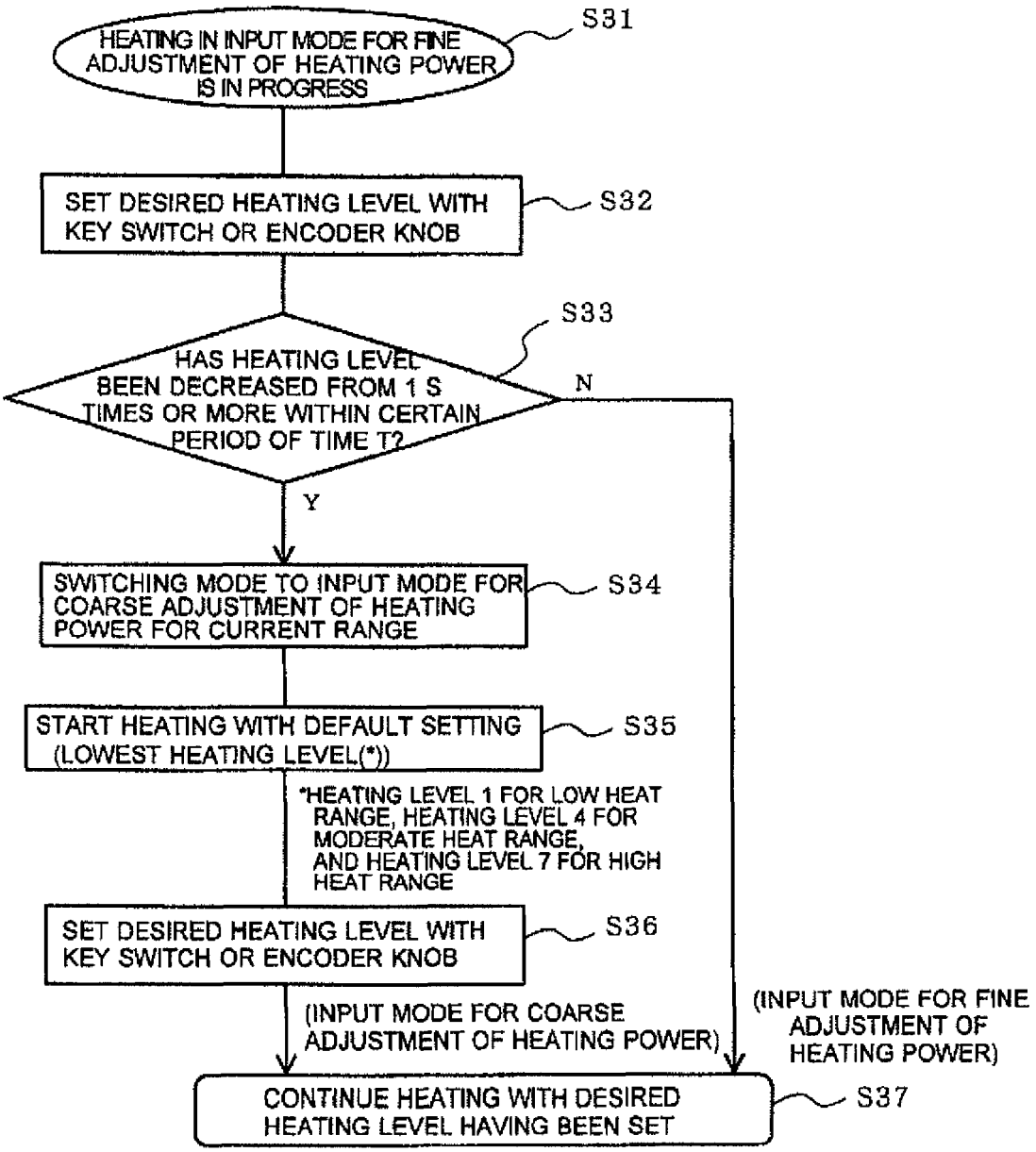

HEATING IN INPUT MODE FOR FINE ADJUSTMENT OF HEATING POWER IS IN PROGRESS
S21
SET DESIRED HEATING LEVEL WITH KEY SWITCH OR ENCODER KNOB
S22
S23
HAS HEATING LEVEL BEEN INCREASED FROM 9 S TIMES OR MORE WITHIN CERTAIN PERIOD OF TIME T?
N
Y
SWITCHING MODE TO INPUT MODE FOR COARSE ADJUSTMENT OF HEATING POWER FOR CURRENT RANGE
S24
START HEATING WITH DEFAULT SETTING (HIGHEST HEATING LEVEL(*))
S25
*HEATING LEVEL 3 FOR LOW HEAT RANGE, HEATING LEVEL 6 FOR MODERATE HEAT RANGE, AND HEATING LEVEL 9 FOR HIGH HEAT RANGE
SET DESIRED HEATING LEVEL WITH KEY SWITCH OR ENCODER KNOB
S26
(INPUT MODE FOR COARSE ADJUSTMENT OF HEATING POWER)
(INPUT MODE FOR FINE ADJUSTMENT OF HEATING POWER)
CONTINUE HEATING WITH DESIRED HEATING LEVEL HAVING BEEN SET
S27

FIG. 11


HEATING IN INPUT MODE FOR FINE ADJUSTMENT OF HEATING POWER IS IN PROGRESS
S31
SET DESIRED HEATING LEVEL WITH KEY SWITCH OR ENCODER KNOB
S32
HAS HEATING LEVEL BEEN DECREASED FROM 1 S TIMES OR MORE WITHIN CERTAIN PERIOD OF TIME T?
S33
N
Y
SWITCHING MODE TO INPUT MODE FOR COARSE ADJUSTMENT OF HEATING POWER FOR CURRENT RANGE
S34
START HEATING WITH DEFAULT SETTING (LOWEST HEATING LEVEL(*))
S35
*HEATING LEVEL 1 FOR LOW HEAT RANGE, HEATING LEVEL 4 FOR MODERATE HEAT RANGE, AND HEATING LEVEL 7 FOR HIGH HEAT RANGE
SET DESIRED HEATING LEVEL WITH KEY SWITCH OR ENCODER KNOB
S36
(INPUT MODE FOR COARSE ADJUSTMENT OF HEATING POWER)
(INPUT MODE FOR FINE ADJUSTMENT OF HEATING POWER)
CONTINUE HEATING WITH DESIRED HEATING LEVEL HAVING BEEN SET
S37

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EUROPEAN SEARCH REPORT

Application Number
EP 15 18 2798

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	JP 2003 297541 A (MITSUBISHI ELECTRIC CORP; MITSUBISHI ELECTRIC HOME APPL) 17 October 2003 (2003-10-17) * the whole document *	1-7	INV. H05B6/12 F24C15/00 F24C7/08
A	EP 2 066 148 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 3 June 2009 (2009-06-03) * abstract; figures 1-7 *	1	
A	EP 1 272 007 A2 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 2 January 2003 (2003-01-02) * abstract; figures 1-3 *	1	

TECHNICAL FIELDS SEARCHED (IPC)
F24C
H05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 December 2015	Garcia, Jesus

CATEGORY OF CITED DOCUMENTS

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02-12-2015

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- JP 2003297541 A **[0003]**