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HEATING APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to a manipulation of a heating apparatus such as a microwave oven or the like and, particularly, to an arrangement in which input sections required for operation are concentrated to a single location to improve manipulatability.

The manipulatability of a conventional microwave oven will be described with reference to Fig. 12 of the attached drawings. Fig. 12 shows an external appearance of a manipulating section of a microwave oven. In these years, the microwave oven is capable of automatically measuring weight and detecting steam from a foodstuff by providing of sensors such as a weight sensor, a vapor sensor and the like. In keeping therewith, the number of cooking menus which can be cooked by the microwave oven also increases. Accordingly, the number of input keys corresponding to the cooking menus also increases. In view of this, in a case where a plenty of keys must be arranged within a limited narrow space, characters on the keys should be decreased in their sizes. Thus, there has been presented a disadvantage such that it is difficult to read the characters.

In a case where "high range" (HIGH POWER) that

is for manual cooking using microwaves which are usually used, is set, a "range high" key 14 is first pushed. It is noted that the term "range" used throughout the specification gives a meaning of microwave power for heating foodstuffs, that is, if the term "high-range" is used, it gives a meaning of high microwave power. Subsequently, a selection setting means such as an encoder 8 (hereinafter will be simply referred to as "encoder") is rotated to perform time setting.

10 Subsequently, a "start" key 10-1 is pushed. Further, also in oven cooking due to an electric heater or the like, an "oven" key 15 is first pushed. A "temperature setting" key 13 (temperature changing key) is continuously pushed so as to set a required temperature.

15 Subsequently, the encoder 8 is rotated to thereby set a time. Then, the "start" key 10-1 is pushed. In this case, if the keys are spaced away from each other, or if the encoder is spaced from these keys, it is difficult to manipulate these keys.

20 On the other hand, in a case of "warming" (AUTO SENSOR REHEAT) in an automatic cooking mode using microwaves, a "warming" key 10-2 is pushed. Subsequently, the "start" key 10-1 should be pushed. Depending upon a selected one of various menus, operating methods are

25 different from each other.

However, the fact that the manipulating methods are different from each other depending upon selected one

of the various menus is extremely troublesome and, particularly, raises a great problem since the fact that manipulating methods are different from each other depending upon a selected one of the various menus, resulting in that the microwave oven is difficult to be used for the aged. Further, since no manipulating procedure with which a cooking manipulation should be made on the oven is exhibited, the problem becomes further serious. Moreover, these years, the manipulating section has raised the following problems. That is, the number of keys increases, and a large number of keys are displayed on a display section having a limited narrow area. As a result, many small characters are displayed therein. With glance of products by the user makes or gives such an impression as to be difficult to use for the user. This raises a serious problem.

SUMMARY OF THE INVENTION

In view of the above-discussed problems, it is an object of the invention to provide a heating apparatus which reduces the number of input keys as far as possible.

According to the invention, there is provided a

heating apparatus control which is arranged to perform menus selected from:

5 a first group of cooking menus, said group being a group of manual cooking menus, in which an additional operation other than a heating start operation is necessary after selection of a cooking menu and before the start of a cooking operation,

10 a second group of cooking menus, said group being a group of automatic cooking menus, in which the additional operation other than the heating start operation is not necessary after selection of the cooking menu and before the start of the cooking operation; and

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said heating apparatus comprising:

a display section for the first group of cooking menus, for displaying said first group of cooking menus;

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a display section for the second group of cooking menus, for displaying said second group of cooking menus; and

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a rotatable selective setting means for selecting a group of cooking menus and for selecting a cooking menu

within said group of cooking menus, and

the arrangement being such that said first or second
5 group of cooking menus is selected depending upon a
rotational direction of movement of said selective
setting means, one of the menus within the group of
cooking menus is selected in accordance with a
predetermined degree of rotation of said selective
10 setting means, and the display section for the first
group of cooking menus or the display section for the
second group of cooking menus is displayed in accordance
with the group of menus selected.

15 Further, a cooking start means, being a start key
section or the like, for inputting a manipulation start
is arranged integrally with the selective setting means.
When the cooking start means is pushed the cooking
operation will start.

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Moreover, if the selective setting means is not
performed, but the cooking start means is directly
pushed, "warming" (AUTO MICROWAVE COOK) that is a third
cooking menu, is selected, and cooking operation starts.
25 The "warming" menu is used with a highest frequency and,
therefore, should be able to be easily selected.

In this manner, an object of the invention is as follows. That is, selection and operation start of the various kinds of cooking menus are substantially completed not by the input keys which are distributed
5 widely on an instruction panel, but only by operation of the selective setting means and cooking start means which are concentrated to a single location, whereby the manipulation can be simplified.

A further object of the invention is as
10 follows. That is, the arrangement is such that only rotation of the selective setting means can select a cooking menu which is then displayed. Then a cooking start means is pushed whereby cooking operation of the selected cooking menu starts. The manipulation methods
15 can be integrated with respect to all the cooking menus.

Further, another object of the invention is as follows. That is, a setting key section for setting a temperature and a time, a display section therefor, a temperature and time setting display section, a finish
20 adjustment key section, a display section therefor are provided. A manipulating procedure is displayed whereby the manipulation is simplified.

Moreover, the other objects of the invention are as follows. That is, the order of the menus within
25 the display section for the first group of cooking menus (the display section for the group of manual cooking menus, or the like) and the display section for the

second group of cooking menus (the display section for the group of automatic cooking menus, or the like) is such that the display sections are arranged in the order of the frequency of use so that the cooking menu switch a highest frequency of use can be selected by a minimum rotating degree of the selective setting means, thereby it is possible to improve the manipulatabiliy of an heating apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram illustrating a manipulating section of a microwave oven in an embodiment of the invention;

Figs. 2, 6 and 11 are views illustrating external appearances of the manipulating section of the microwave oven in the embodiment shown in Fig. 1;

Figs. 3A, 3B and 3C are views illustrating an encoder;

Fig. 4 is a cross-sectional view illustrating the manipulating section of the microwave oven in the embodiment shown in Fig. 1;

Fig. 5 is a flow chart for explaining the manipulation of the microwave oven in the embodiment shown in Fig. 1;

Figs. 7, 8, 9 and 10 are views for explaining the manipulation of the microwave oven in the embodiment of the invention; and

Fig. 12 is a view illustrating an external appearance of a manipulating section of a conventional electronic range.

DESCRIPTION OF THE EMBODIMENTS

5 First, referring to Figs. 1 and 2, a group of cooking menus is divided into a first group of cooking menus (a group of manual cooking menus), a second group of cooking menus (a group of automatic cooking menus) and
10 a third group of cooking menus, which are different in genre or style from each other.

Each of the group of manual cooking menus is performed in such a way that a user sets a cooking time and a cooking temperature.

On the contrary, each of the group of automatic
15 cooking menus is carried out in accordance with signals from a weight sensor, a steam sensor and the like and does not require for the user to set a cooking time and a cooking temperature, and if the user selects a cooking menu, cooking can automatically be performed. Further
20 each of the third cooking menus is performed in accordance with signals from sensors similar to those of the group of automatic cooking menus, and is for "warming" (AUTO MICROWAVE COOK) which is most frequently used.

It is a display section for the first group of
25 cooking menus 1 (hereinafter referred to as "display section for manual cooking menus") to display the first

group of cooking menus (hereinafter referred to as "group of manual cooking menus"). It is a display section for the second group of cooking menus 2 (hereinafter referred to as "display section for the group of automatic cooking menus") to display the second group of cooking menus (hereinafter referred to as "group of automatic cooking menus").

A control section 9 (hereinafter referred to as "microcomputer") controls a display section 1 for the group of manual cooking menus and a setting display section 24 for the group of manual cooking menus, the display section 2 for the group of automatic cooking menus and a setting display section 25 for the group of automatic cooking menus, a temperature and time setting display section 5, and a setting key display section 7 under manipulation of a selective setting means 8 (hereinafter referred to as "an encoder"), cooking start means 10 (hereinafter referred to as "start key section"), a setting key section 3 and a finish adjustment key section 6.

Referring to Fig. 2, there is shown a knob 18 which projects from a surface 19 (hereinafter referred to as "a base") of the manipulating section. There is a start button 17 within the knob 18. The knob 18 is so arranged as to be interlocked with rotational operation of the encoder 8. The start button 17 is so arranged as to be interlocked with the start key section 10.

Accordingly, the encoder 8 is rotatable. Depending upon a rotational direction of the encoder 8, the group of manual cooking menus or the group of automatic cooking menus is selected. Depending upon the degree of rotation of the encoder 8, the cooking menu is selected from the selected group of cooking menus. Further, regarding setting of a time and a temperature which are required for the manual cooking menu, the time and the temperature are inputted from the encoder 8.

Referring to Figs. 3(A), 3(B) and 3(C), the encoder 8 is provided with a rotating portion 20 which can be rotated in either of left- and right-hand directions. The degree of rotation is outputted from terminals 26 as electric signals. The electric signals are processed by the microcomputer so as to control the entire operating section. Moreover, as shown in Fig. 3(C), the arrangement is as follows. That is, the start key section 10 is arranged at a lower portion of the encoder 8, whereby, if a switch mechanism portion 21 of the encoder 8 is pushed, the start key section 10 is pushed so that the encoder 8 is turned on.

Furthermore, a lamp 16 is mounted within the encoder 8.

Referring to Fig. 4, the encoder 8, the start key section 10 and the lamp 16 are mounted on a printed circuit board 22. Further, a rotating portion 20 of the encoder 8 is interlocked with the knob 18. The start

button 17 is interlocked with the switch mechanism portion 21 of the encoder 8. Moreover, the start button 17 is arranged within the knob 18. These elements project from a surface 19 (hereinafter referred to as "a base") of the manipulating section. Accordingly, this is easy to use for the user.

The user rotates the knob 18, and thereby the rotating portion 20 of the encoder 8 is rotated. Further, the user pushes the start button 17 so that the start key section 10 is pushed.

Moreover, the setting key section display portion 4 is arranged such that a lamp 23 is mounted on the printed circuit board, and is turned on and off in association with the turn-on or -off operation of the lamp 23. The other display portions are similarly turned on and off.

Referring to Fig. 5, a method of manipulation will be described. First, under a condition such that the electronic range is connected to a power source, that is, under a plug-in condition, the manipulating section is brought into a condition shown in Fig. 6. Displayed are extremely limited sections. This is because the manipulating section of the invention is arranged such that only display sections in a portion corresponding to an object of operation are turned on and displayed.

If the start button 17 is pushed, that is, the start key section 10 is pushed. The third cooking menu

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"warming" (AUTO MICROWAVE COOK) is selected so that cooking operation starts.

The cooking menu "warming" is most frequently used so that setting and cooking start can be performed by a simplest operation. Thus, the manipulation thereof

5 can be improved.

Then, the knob 18 is rotated whereby the encoder 8 is rotated in order to select the group of cooking menus and one of them. In a case where the knob

10 18 is rotated in a right-hand direction, the group of manual cooking menus and one of the group are selected. In a case where the knob 18 is rotated in a left-hand direction, the group of automatic cooking menus and one of the group are selected.

15 Now, in a case where the knob 18 (that is, the encoder 8) is rotated to the right through one click, the group of manual cooking menus is selected, and the display section 1 for the group of manual cooking menus is turned on as shown in Fig. 7. A position of "range high"

20 which is located at the lowermost position of the setting display section 24 for the group of manual cooking menus, for indicating which menu or what menu is selected at the present is illuminated for indication of the selected menu "range high". Then, the setting key section display

25 portion 4 which lights up (displays) the setting key section 3 which switches input signals indicating (a time, a temperature and the like) required for the manual

cooking menu is flushed to urge the user to manipulate.

When the knob 18 (that is, the encoder 8) is rotated to the right further by one click, the position of "range low" which is located at the second position from the below of the setting display section 24 for the group of manual cooking menus is turned on so that "range low" is selected. If the knob 18 is further rotated, "an oven toaster", "a grill" and "an oven" are subsequently selected.

Accordingly, since the higher the menu positioned on the setting display section for the group of manual cooking menus, the larger the knob 18 (that is, the encoder 8) must be turned, the higher the frequency of a menu, the lower the menu is positioned, and accordingly, the higher the frequency of use of a menu, the smaller the degree of rotation of the knob 18 (that is, the encoder 8) becomes. Thus, the manipulation can be improved.

Now, in a case where "range high" is selected, if the setting key section 3 is next pushed, the cooking menu is fixed to "range high" as shown in Fig. 8. The time setting display section 5 for the menu of "range high" is illuminated so as to urge the user to input a cooking time through the knob 18 (that is, the encoder 8). When the knob 18 (that is, the encoder 8) is rotated, a time is set in accordance with a degree of rotation of the knob 18. As shown in Fig. 9, it is

brought into a condition so as to start the cooking. The start button 17 is flashed to urge start. When the start button 17 is pushed, the start key section 10 is pushed so that cooking operation starts.

5 Next, in a case where the knob 18 (that is, the encoder 8) is rotated from the plug-in condition to the left through one click, the group of automatic cooking menus is selected. As shown in Fig. 10, the display section 2 for the group of automatic cooking menus is illuminated. A location of "uncooked food defrost" (DEFROST) which is located at the highest position of the setting display section 25 for the group of automatic cooking menus, for indicating what menu is selected at the present is illuminated to indicate that "uncooked food defrost" is selected at present. These automatic cooking menus has a function of finish adjustment in which the user can adjust the finishing of cooking in three stages. Accordingly, since there is possibility of adjustment of finish, the finish adjusting key portion display section 7 is illuminated on so that the user can readily manipulate it. If the key of "high" of the finish adjustment key section is pushed, the finish adjustment is strengthened. Furthermore, when a key of "low" of the finish adjustment key section is pushed, the finish adjustment is weakened. If no keys are pushed, the finish adjustment is standard.

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Next, when the knob 18 (that is, the encoder 8)

is rotated further to the left by one click, a position of "toast" located at the second position from the above of the setting display section 25 for the group of automatic cooking menus is illuminated so that "toast" is selected. If the knob 18 is rotated further to the left, "milk", "warming of sake" and "leaf and flower side dish" are subsequently selected in order.

Accordingly, the larger the rotation of the knob 18 (that is, the encoder 8), the lower the menu on the display section 2 for the group of automatic cooking menus is selected. That is, the higher the frequency of use of a menu, the higher the menu is positioned, Accordingly, the high the frequency of a menu, the smaller the rotation of the knob 18 for selecting the menu becomes, thereby it is possible to improve the manipulation of the microwave oven.

Now, in a case where "uncooked food defrost" is selected, it is brought into a condition in which the cooking can be started, regardless of whether or not the finish adjustment key section 6 is manipulated. The start button 17 is flashed to urge start. When the start button 17 is pushed, the start key section 10 is operated so that cooking operation is started.

As mentioned above, the manipulation is concentrated to the knob 18 (that is, the encoder 8), thereby it is possible to simplify the manipulation with the use the cooking menus. Moreover, the setting key

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portion display section 4, the temperature and time
setting display section 5, the finish adjustment key
portion display section 6 and the start key section 16
are provided, and display is made by illuminating them
5 one by one only when they are required. thereby the
manipulation is further improved. Further, regarding the
display, the illumination indicates that the associated
key can be manipulated while flashing indicates urging
the associated key to be pushed, thereby it is possible
10 to use the display for distinguish a necessary manipula-
tion from others.

Furthermore, as described previously, judgment
whether the group of manual cooking menus or the group of
automatic cooking menus is selected, can be made depend-
15 ing upon a rotational direction of the knob 18 (that is,
the encoder 8). Referring to Fig. 10, in a case where the
knob 18 (that is, the encoder 8) is rotated to the right,
the group of manual cooking menus is selected, and the
display section 1 for the group of manual cooking menus
20 is displayed.

Further, in a case where the knob 18 (that is,
the encoder 8) is rotated to the left, the group of
automatic cooking menus is selected so that the display
section 2 for the group of automatic cooking menus is
25 displayed. Accordingly, the positional relationship
between the display section 1 for the group of manual
cooking menus and the display section 2 for the group of

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automatic cooking menus is such that, in a case where the display sections exist on the left and the right, the display section for the group of manual cooling menus is arranged to the right, and the display section for the group of automatic cooking menus is arranged to the left, thereby the display section for the group of cooking menus exists at a position corresponding to the rotational direction of the encoder so that it is very easy to see the display section. Thus, the manipulatability is further improved.

Further, in a case where these groups of cooking menus exist vertically, the display section 1 for the group of manual cooking menus is arranged at an upper side, while the display section 2 for the group of automatic cooking menus is arranged at a lower side, thereby the display sections for the groups of cooking menus exist in the rotational direction of the knob 18 (that is, the encoder 8). Thus, manipulatability is further improved.

As described above, according to the invention, there can be produced the following advantages:

(1) Selection of all the cooking menus and the start of operation are substantially completed only by a manipulation in the manipulating section (only one knob 18 (that is, the encoder 8)) is manipulated but the input keys which are widely distributed on the manipulation panel are not used, thereby it is possible to simplify

the manipulation. Thus, the manipulating section can be used easily.

(2) The position of the display section 1 for the group of manual cooking menus and the position of the display section 2 for the group of automatic cooking menus are arranged vertically and horizontally, thereby the manipulatability can be improved.

(3) The display section for the group of manual cooking menus and the display section for the group of automatic cooking menus are arranged from an upper location or from a lower location in order that, the higher the using frequency of a menu, the higher or the lower the menu is positioned in the manipulating section, thereby the manipulatability can be improved. Moreover, only by pushing the start button, a menu having a highest using frequency can be set and is started in cooking. Thus, the manipulation can be greatly improved.



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CLAIMS

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1. A heating apparatus which is arranged to perform menus selected from:

10 a first group of cooking menus, said group being a group of manual cooking menus, in which an additional operation other than a heating start operation is necessary after selection of a cooking menu and before the start of a cooking operation,

15 a second group of cooking menus, said group being a group of automatic cooking menus, in which the additional operation other than the heating start operation is not necessary after selection of the cooking menu and before the start of the cooking operation; and

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said heating apparatus comprising:

a display section for the first group of cooking menus, for displaying said first group of cooking menus;

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a display section for the second group of cooking menus, for displaying said second group of cooking menus;

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a rotatable selective setting means for selecting a group of cooking menus and for selecting a cooking menu within said group of cooking menus, and

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the arrangement being such that said first or second group of cooking menus is selected depending upon a rotational direction of movement of said selective setting means, one of the menus within the group of cooking menus is selected in accordance with a predetermined degree of rotation of said selective setting means, and the display section for the first group of cooking menus or the display section for the second group of cooking menus is displayed in accordance with the group of menus selected.

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2. A heating apparatus according to claim 1, comprising cooking start means, wherein said cooking start means is so arranged as to be integral with said selective setting means, and wherein, under a cooking-start waiting condition, said cooking start means operates so as to

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start cooking operation.

3. A heating apparatus according to claim 2, wherein
said cooking start means has such a function that in a
5 case where a manipulation to be performed is made prior
to a manipulation with the use of said selective setting
means, a third cooking menu, said menu being a warming:
AUTO MICROWAVE COOK menu and being different from the
cooking menus among said first group of cooking menus and
10 said second group of cooking menus, is selected so as to
start cooking operation.

4. An operation setting method in a heating apparatus
which is arranged to perform menus selected from:

15 a first group of cooking menus, said group being group
of manual cooking menus, in which an additional operation
other than a heating start operation is required after
selection of a cooking menu and before the start of a
20 cooking operation;

a second group of cooking menus, said group being a group
of automatic cooking menus, in which the additional
operation other than the heating start operation is not
25 required after selection of a cooking menu and before the
start of the cooking operation; and



said heating apparatus comprising:

a display section for the first group of cooking menus,
for displaying said first group of cooking menus;

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a display section for the second group of cooking menus,
for displaying said second group of cooking menus;

a rotatable selective setting means for selecting a group
10 of cooking menus and for selecting a cooking menu within
said group of cooking menus; and

a heating start means so arranged as to be integral with
said selective setting means, and

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said method comprising the steps of:

turning said selective setting means in a rotational
direction by a desired degree;

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displaying and selecting a group of cooking menus
in accordance with said rotational direction of said
selective setting means;

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selecting a specific cooking menu within the group
of cooking menus selected in accordance with said desired



degree of rotation of said selective setting means, and

manipulating said heating start means so as to start a heating or cooking operation.

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5. A manipulation setting method comprising the following step prior to the first step of the setting method according to claim 4, further comprising the step of selecting a third cooking menu, said menu being a
10 warming: AUTO MICROWAVE COOK menu and being different from the cooking menus within said first group of cooking menus and said second group of cooking menus, in association with the operation of the heating start means.

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6. A heating apparatus substantially as hereinbefore described with reference to and as shown in figures 1 to 11 of the accompanying drawings.

20 7. An operation setting method for a heating apparatus substantially as hereinbefore described.

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