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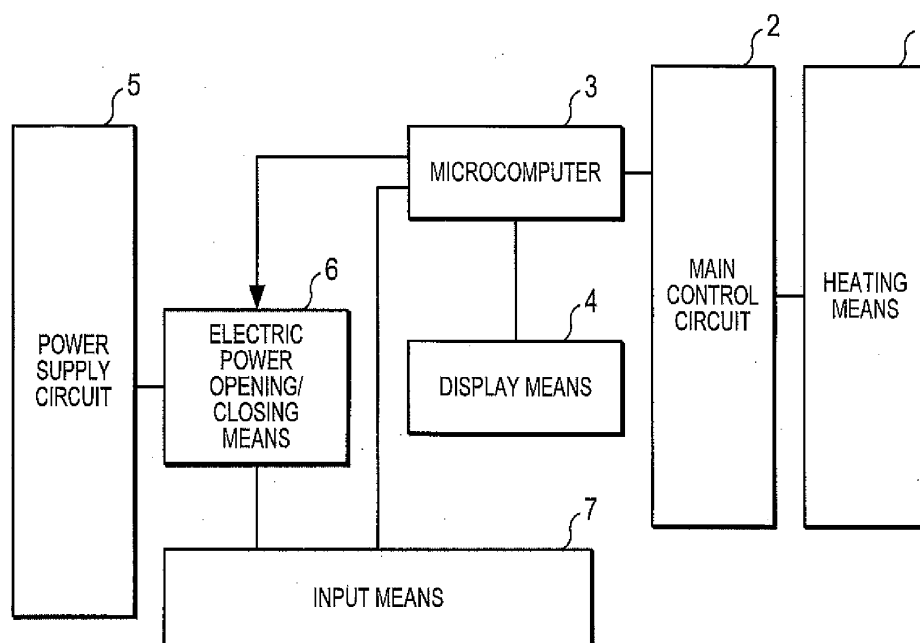
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(54) **HEATING COOKING DEVICE**

(57) A heating cooking device includes a heating means 1, a main control circuit 2, input means 7 including a rotary knob, a microcomputer 3, display means 4, a power supply circuit 5 and electric power opening/closing means 6. During a period that the microcomputer 3 does not fetch data from the input means 7, the microcomputer 3 set the electric power opening/closing means 6 to an

OFF operation. Consequently, consumed electric power of the input means 7 can be reduced, and when a malfunction of a signal processing circuit of the input means 7 occurs due to radio wave noise or electrostatic noise, an operation of the signal processing circuit can be restored by a reset operation.

FIG. 1



Description**Technical Field**

[0001] The present invention relates to a heating cooking device using a microcomputer.

Background Art

[0002] As input means used in a high-frequency heating device which is controlled by a control circuit provided with a microcomputer, there is known a rotary knob which outputs data of positional information in accordance with a rotating position of an operating knob.

[0003] In a method for using this kind of rotary knob, a menu which is set by the rotating position is allocated to the rotary knob. For example, the rotating positions obtained by dividing the menu into nine are allocated thereto. "8" positions are allocated such that a position of "0" is set to an OFF state, a position of "1" is set to a state of a user setting, a position of "2" is set to a range setting state and a position of "3" is set to an oven setting state.

[0004] In such a way, since a setting operation is more easily carried out than a setting operation by keys and the number of keys can be reduced, a complication can be eliminated and a neat design can be obtained. Since the menu such as a range is set by the rotary knob and a watt value or time is set by the key (or another rotary encoder), an operating method can be easily understood..

[0005] As a rotary switch device of this kind, there is known a rotary switch device which includes print resistors formed by printing on a common circuit board such that a movable contact which rotates in association with a rotary knob sliding-contacts the print resistors (for example, see Patent Document 1).

Related Art Documents**Patent Documents**

[0006] Patent Document 1: JP-A-11-273505

Summary of the Invention**Problem to be Solved by the Invention**

[0007] However, in the above-described related-art structure, since a signal process of the rotary knob uses an IC, a power needs to be constantly supplied, whereby there is a problem of large consumed electric power. Further, there is another problem of a malfunction of the IC of the rotary knob due to radio wave noise or electrostatic noise.

[0008] The present invention is made to solve the above-described related-art problems, and an object therefore is to provide a heating cooking device which can reduce consumed electric power and which can re-

store a signal processing circuit of input means including a rotary knob from a malfunction due to electrostatic noise.

Means for Solving the Problem

[0009] In order to solve the related-art problem, the present invention provides a heating cooking device of including: a heating chamber for accommodating an object to be heated; heating means for heating the object to be heated in the heating chamber; a main control circuit for controlling the heating means; input means for executing an input containing a cooking setting; a microcomputer for fetching data from the input means; a power supply circuit for supplying electric power to the input means; and electric power opening/closing means provided between the power supply circuit and the input means, for controlling an ON/OFF operation of supply of the electric power to the input means, wherein during a period that the microcomputer does not fetch the data from the input means, the microcomputer sets the electric power opening/closing means to an OFF operation.

[0010] Since the consumed electric power is reduced by the amount of electric power consumed during the period that data are not fetched. Further, since the signal processing circuit of the input means having the rotary knob is reset by turning OFF of the power, even if the malfunction of the signal processing circuit occurs, an operation of the signal processing circuit can be restored.

Advantages of the Invention

[0011] In the heating cooking device of the present invention, to solve the problems of large consumed electric power and the malfunction of signal processing circuit of the input means having the rotary knob due to the electrostatic noise, the power of the input means is turned OFF during the period that the data are not fetched, whereby the consumed electric power is reduced by the amount of electric power consumed during the period that the data are not fetched, and the signal processing circuit of the input means is reset by turning OFF of the power, whereby the operation can be restored, and usability is improved.

Brief Description of the Drawings**[0012]**

Fig. 1 is a control block diagram of a heating cooking device of a first embodiment of the present invention. Fig. 2 is a flowchart of the heating cooking device of the first embodiment of the present invention.

Mode for Carrying Out the invention

[0013] In a first aspect of the invention, there is provided a heating cooking device including: a heating chamber

for accommodating an object to be heated; heating means for heating the object to be heated in the heating chamber; a main control circuit for controlling the heating means; input means for executing an input containing a cooking setting; a microcomputer for fetching data from the input means; a power supply circuit for supplying electric power to the input means; and electric power opening/closing means provided between the power supply circuit and the input means, for controlling an ON/OFF operation of supply of the electric power to the input means, wherein during a period that the microcomputer does not fetch the data from the input means, the microcomputer sets the electric power opening/closing means to an OFF operation.

[0014] Thus, during the period that the data for setting cooking operations are not fetched, the power of the input means having a rotary knob is turned OFF, whereby the consumed electric power (a watt value) is reduced by the amount thereof consumed during the period, and a signal processing circuit (an IC) of the input means is reset by turning OFF the power. Thus, an operation of the signal processing circuit can be restored. Accordingly, the consumed electric power can be reduced and the signal processing circuit of the input means due to electrostatic noise can be restored from the malfunction thereof.

[0015] Now, an embodiment of the present invention will be described below by referring to the drawings. The present invention is not limited to the embodiment.

(First Embodiment)

[0016] Fig. 1 is a control block diagram of a heating cooking device of a first embodiment of the present invention.

[0017] In Fig. 1, a microcomputer 3 controls heating means 1 by using a main control circuit 2. Further, the microcomputer 3 displays information such as cooking information or setting information in display means 4. input means 7 includes a rotary knob as one example of an input device and an IC (Integrated Circuit) as a signal processing circuit which processes a signal of the rotary knob. The microcomputer 3 controls electric power opening/closing means 6 for controlling an ON/OFF operation of supply of electric power to the input means. Thus, power source electric power supplied to the input means 7 from a power supply circuit 5 is turned ON/OFF.

[0018] Operations and effects of the heating cooking device having a configuration as described above will be described below.

[0019] Initially, the microcomputer 3 controls the electric power opening/closing means 6 to turn ON the power of the input means 7. For example, during 20 ms, HIGH (high level) and LOW (low level) CLOCK signals are supplied to the signal processing IC of the input means 7, so that data of 9 bits of present positional information can be fetched.

[0020] Since the data are changed one bit by one bit by a leading edge of the CLOCK signal, the data are

fetched just before a fall thereof. For example, the data of the 9 bits of the necessary positional information of all data of 21 bits are fetched to determine a position of "0" to a position "8" from the data. After the microcomputer 3 fetches the data of the 9 bits of the positional information, the microcomputer 3 immediately controls the electric power opening/closing means 6 to turn OFF the power of the input means 7.

[0021] After 100 ms, the microcomputer 3 controls again the electric power opening/closing means 6 to turn ON the power of the input means 7 and repeats the above-described operation.

[0022] As described above, in the present embodiment, during a period that the data are not fetched, since the power of the input means 7 is turned OFF, whereby a consumed electric power (watt value) can be reduced by the amount of electric power consumed during the period. Further, since the power is turned off to reset the signal processing IC of the input means 7, an operation of the IC can be restored to the normal operation.

[0023] Fig. 2 is a flowchart showing an operation of the heating cooking device of the first embodiment of the present invention.

[0024] In Fig. 2, the microcomputer 3 transmits a signal for turning ON a power of the rotary knob of the input means 7 in step S1. Then, in step S2, the microcomputer 3 waits until start-up of the power becomes stable (for example, about 7ms). Then, in step S3, the microcomputer 3 transmits the HIGH signal to a CLOCK terminal of the signal processing IC of the rotary knob.

[0025] In step S4, the microcomputer 3 transmits the LOW to the CLOCK terminal of the signal processing IC of the rotary knob. After the microcomputer 3 waits for 20 μ sec, the microcomputer 3 transmits the HIGH to the CLOCK terminal. Thus, the data transmitted by the signal processing IC is shifted by one bit. Only the last 9 bits of all the 21 bits are the necessary positional information, and the rest of 12 bits are unnecessary data. Thus, in step S5, the microcomputer 3 determines whether repetitions are carried out 12 times. If the repetitions have not yet been carried out 12 times, the process returns to the step S4. If the repetitions are carried out 12 times, since subsequent data are necessary data, the process proceeds to step S6.

[0026] In the step S6, the microcomputer 3 reads the data of 1 bit sent from the signal processing IC of the rotary knob and stores the data. Then, in step S7, the microcomputer 3 determines whether the repetitions of 9 times are carried out, and the process proceeds to step S8 if the repetitions of the 9 times have not been carried out. If the microcomputer 3 has not yet carried out the repetitions of the 9 times, the process proceeds to step S9.

[0027] In the step S8, the microcomputer 3 transmits the LOW to the CLOCK terminal of the signal processing IC of the rotary knob. After the microcomputer 3 waits for 20 μ sec, the microcomputer transmits the HIGH to the CLOCK terminal. Thus, the data transmitted by the signal

processing IC is shifted by one bit. Then, the process returns to the step S6.

[0028] In the step S9, the microcomputer 3 converts the fetched data of the 9 bits into the positional information. For example, when the data indicate 90, the microcomputer 3 recognizes the position of "0", namely, an OFF state. In step S10, the microcomputer 3 transmits a signal for turning OFF the power of the rotary knob of the input means 7. Then, in step S11, the microcomputer 3 waits for 100 ms. After that, the microcomputer 3 repeats the operations from the step S1.

[0029] As described above, the heating cooking device of the present embodiment includes: a heating chamber for accommodating an object to be heated, the heating means 1 for heating the object to be heated in the heating chamber; the main control circuit 2 for controlling the heating means 1; the input means 7 for executing a cooking setting, etc.; the microcomputer 3 for fetching the data from the input means 7; the display means 4 for displaying the cooking setting, etc.; the power supply circuit 5 for supplying the electric power to the input means 7; and the electric power opening/closing means 6 provided between the power supply circuit 5 and the input means 7, for controlling an ON/OFF operation of supply of the electric power to the input means 7, and during the period that the microcomputer 3 does not fetch the data from the input means 7, the microcomputer 3 turns OFF the electric power opening/closing means 6.

[0030] Consequently, the consumed electric power can be reduced by the amount of the electric power consumed during the period that the data are not fetched. Further, since the signal processing IC of the input means 7 is reset by turning OFF the power, even when the signal processing IC malfunctions, the signal processing IC can be restored to a normal operation.

[0031] The present invention is scheduled to be susceptible to alterations or modifications contrived by the skilled in the art in accordance with the descriptions of the specification and the well-known techniques, and the alterations and modifications shall fall within a range where protection of the present invention is sought. Further, component elements in the above-described embodiment may be arbitrarily combined together.

[0032] This application is based on Japanese Patent Application (Application No. 2011-271891) filed on December 13, 2011, and the contents thereof are incorporated herein by reference.

Industrial Applicability

[0033] As described above, in the heating cooking device of the present invention, during the period that the data are not fetched, the power of the input means is turned OFF, whereby the consumed electric power is reduced by the amount thereof consumed during the period. Further, since the signal processing circuit of the input means is reset by turning OFF the power, the signal processing circuit can be restored from the malfunction

due to the noise. Thus, the present invention can be easily applied not only to the heating cooking device, but also to a use of a domestic electric apparatus.

Description of Reference Signs

[0034]

- 1: Heating Means
- 2: Main Control Circuit
- 3: Microcomputer
- 4: Display Means
- 5: Power Supply Circuit
- 6: Electric Power Opening/Closing Means
- 7: Input Means

Claims

1. A heating cooking device comprising:

- a heating chamber for accommodating an object to be heated;
- heating means for heating the object to be heated in the heating chamber;
- a main control circuit for controlling the heating means;
- input means for executing an input containing a cooking setting;
- a microcomputer for fetching data from the input means;
- a power supply circuit for supplying electric power to the input means; and
- electric power opening/closing means provided between the power supply circuit and the input means, for controlling an ON/OFF operation of supply of the electric power to the input means, wherein during a period that the microcomputer does not fetch the data from the input means, the microcomputer sets the electric power opening/closing means to an OFF operation.

FIG. 1

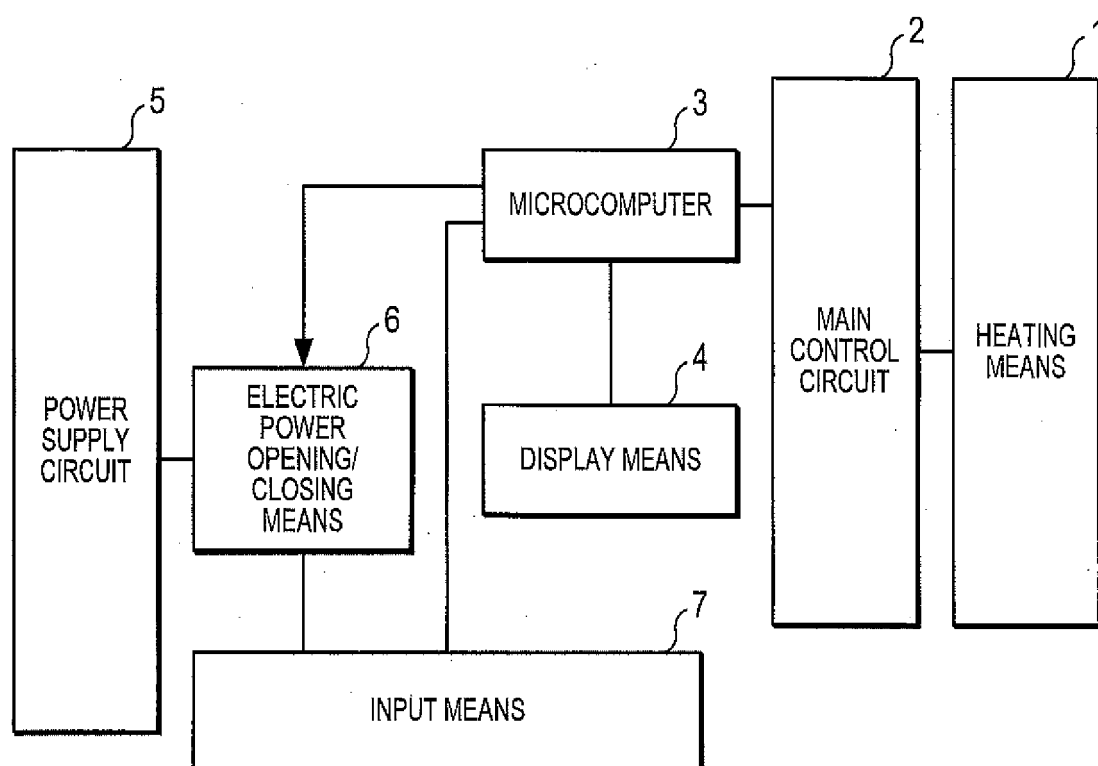
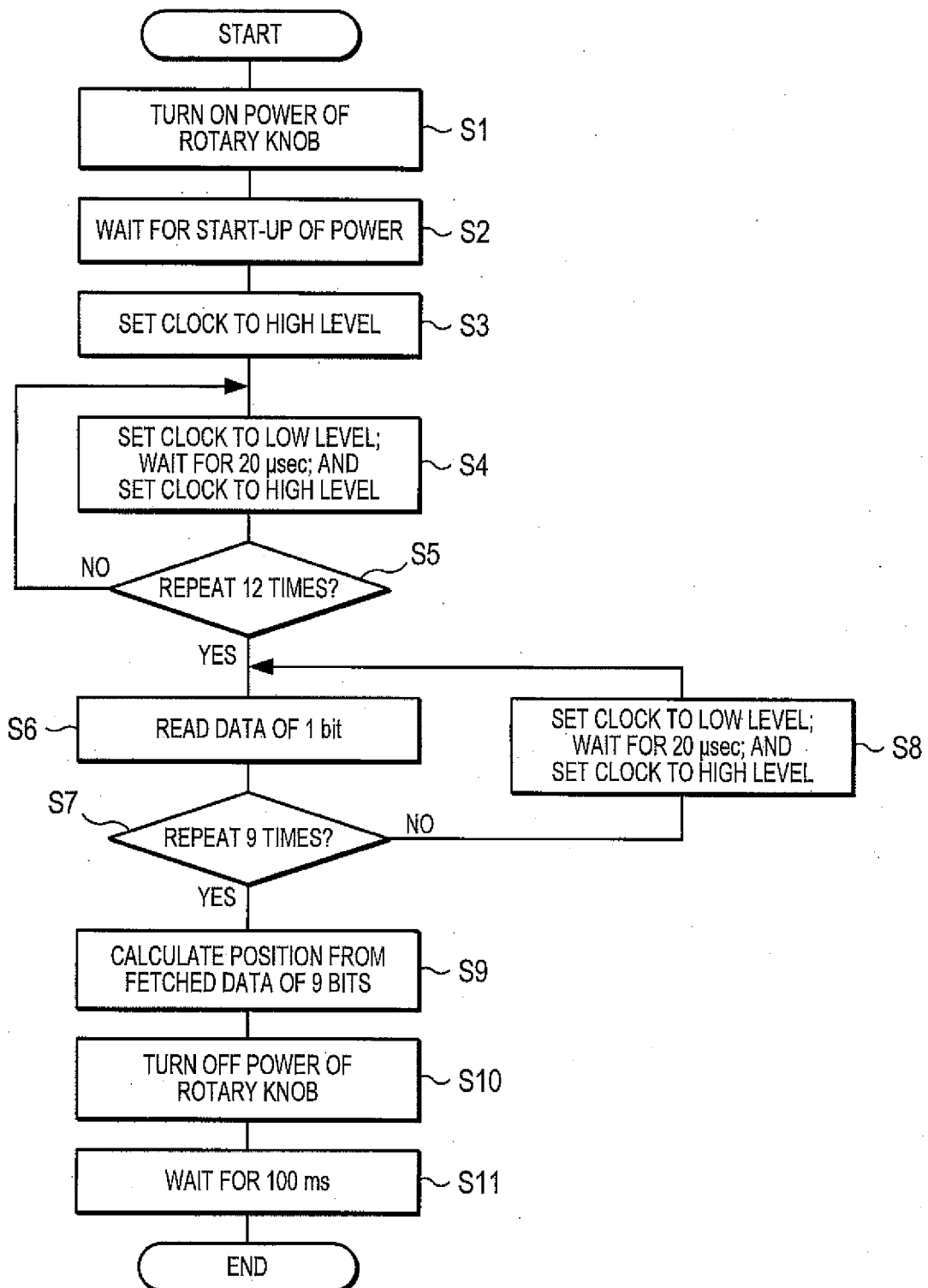


FIG. 2



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/007911

A. CLASSIFICATION OF SUBJECT MATTER

F24C15/00 (2006.01) i, F24C7/02 (2006.01) i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F24C15/00, F24C7/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2012
Kokai Jitsuyo Shinan Koho	1971-2012	Toroku Jitsuyo Shinan Koho	1994-2012

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2010-286226 A (Sharp Corp.), 24 December 2010 (24.12.2010), entire text (Family: none)	1
Y	JP 2007-287400 A (SMK Corp.), 01 November 2007 (01.11.2007), entire text (Family: none)	1

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

* Special categories of cited documents:

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"&" document member of the same patent family

Date of the actual completion of the international search
28 December, 2012 (28.12.12)Date of mailing of the international search report
15 January, 2013 (15.01.13)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 11273505 A [0006]
- JP 2011271891 A [0032]