PTO/SB/80 (11-08)
Approved for use through 11/30/2011. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

☑ Practitioners associated with the Customer Number: 07733

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

☑ The address associated with Customer Number: 07733

OR

☐ Firm or Individual Name			
Address			
City		State	Zip
Country			
Telephone		Email	

Assignee Name and Address:

Intirion Corporation
2 Annette Road, Suite 3
Foxboro, Massachusetts 02035

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	James J. Russo	Date	8/6/12
Name	James J. Russo	Telephone	
Title	General Manager		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET
First Named Inventor/Applicant Name:	Gregory Allan Thomas Hall
Filer:	Ralph E. Jocke/Janice Ruf
Attorney Docket Number:	INT-1001 CIP 2 C

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	70	70
UTILITY SEARCH FEE	2111	1	300	300
UTILITY EXAMINATION FEE	2311	1	360	360
Pages:				
Claims:				
Miscellaneous-Filing:				
LATE FILING FEE FOR OATH OR DECLARATION	2051	1	70	70
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**800**

Electronic Acknowledgement Receipt

EFS ID:	29260782
Application Number:	15600118
International Application Number:	
Confirmation Number:	4190
Title of Invention:	MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET
First Named Inventor/Applicant Name:	Gregory Allan Thomas Hall
Customer Number:	7733
Filer:	Ralph E. Jocke/Janice Ruf
Filer Authorized By:	Ralph E. Jocke
Attorney Docket Number:	INT-1001 CIP 2 C
Receipt Date:	19-MAY-2017
Filing Date:	
Time Stamp:	15:49:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$800
RAM confirmation Number	052217INTEFSW00002346100637
Deposit Account	100637
Authorized User	Janice Ruf

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.19 (Document supply fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		INT_1001_CIP_2_C_Specification.pdf	218752 50efc2e3b4484ae2c5395672d6867aa4578d9ba9	yes	51

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	36
Claims	37	50
Abstract	51	51

Warnings:

Information:

2	Drawings-only black and white line drawings	Figures.pdf	5738487 6a3037474ecb728ff8cb0467647177b346ad0ae5	no	25

Warnings:

The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing

Information:

3	Application Data Sheet	ADS.pdf	1823895 af4fe076ca48751543b3a6dffeb2e813c82db1f0	no	9

Warnings:

Information:

4	Power of Attorney	POA.pdf	227147 6a0b6f8d9c371b3297716f2352449dc1c8692159	no	2

Warnings:

Information:

5	Fee Worksheet (SB06)	fee-info.pdf	36998 7bc0ad69104a353f2ea77ec52591b5b4a98bfb47	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	8045279

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET

TECHNICAL FIELD

[0001] Exemplary embodiments relate to improvements to appliances. Specifically, exemplary embodiments relate to improvements to appliances that include compact refrigerator and microwave oven functionality.

BACKGROUND

[0002] Compact refrigerators are used for many different purposes. They are often found in dormitories, hotels, offices and other establishments. Compact refrigerators are also often used in housing units for storage of beverages in bar areas or entertainment areas. Compact refrigerators provide useful storage for refrigerated items without the requirement for the considerable floor space and power draw that is required for a full size refrigerator.

[0003] Compact refrigerators and associated appliances may benefit from improvements.

SUMMARY

[0004] In one exemplary embodiment, an apparatus is provided that includes a microwave oven. The microwave oven includes a radiation emitting microwave element and a microwave housing. The microwave housing bounds a cooking interior area. The radiation emitting microwave element is operative to irradiate the cooking interior area. The apparatus also includes a refrigerator. The refrigerator includes refrigerator housing. The refrigerator housing bounds a cooled refrigerator interior area. The refrigerator housing is in fixed operative connection with the microwave housing. The refrigerator includes a refrigerant compressor, or other refrigeration technology. The refrigerant compressor is operative to compress a refrigerant material. The refrigerant material is operative to cause cooling of the cooled refrigerator interior area. The apparatus includes at least one power control circuit. The at least one power control circuit is operative

to cause electrical power to be selectively delivered to the microwave element and the compressor. One of the microwave element and compressor does not operate when the other of the microwave element and the compressor operates. A charging pad is provided on the microwave oven. The charging pad is configured for receiving an item to be charged by the charging pad. The microwave oven further includes at least one smoke sensor. In exemplary embodiments different types of smoke sensors may be used. An exemplary sensor includes a sensor emitter and at least one sensor receiver configured to receive radiation from the at least one smoke sensor emitter, wherein air of at least a portion of the cooking interior area extends intermediate of the at least one sensor emitter and the at least one sensor receiver. The apparatus also includes at least one safety circuit. The at least one safety circuit is in operative connection with the at least one sensor emitter, the at least one sensor receiver, and the microwave element. The at least one safety circuit is operative to cause the at least one sensor emitter to emit sensor radiation and the at least one sensor receiver to sense sensor radiation from the at least one sensor emitter while the microwave element operates during a cooking session. A determination is made that a transmission amount of sensor radiation from the at least one sensor emitter that reaches the at least one sensor receiver has fallen by at least a threshold amount during the cooking session, due to smoke in the cooking interior area. Responsive at least in part to the determination, the microwave element is no longer supplied with electrical power. Other features may be included in exemplary embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The system of the application is explained in more detail below with reference to the accompanying drawings, in which:

[0006] Figure 1 is a front perspective view of an exemplary embodiment of an appliance system of this application.

[0007] Figure 2 is a rear perspective view of the embodiment of Figure 1 showing an alternative arrangement.

[0008] Figure 3 is a schematic block diagram of an embodiment of the exemplary system.

[0009] Figure 4 is an electrical schematic diagram corresponding to the embodiment of Figure 3.

[0010] Figure 5 is a schematic logic flow diagram of an exemplary embodiment.

[0011] Figure 6 is a schematic logic flow diagram of another exemplary embodiment.

[0012] Figure 7 is a schematic logic flow diagram of another embodiment.

[0013] Figure 8 is a graph illustrating the duty cycles of the appliances in the system of Figure 3.

[0014] Figure 9 is a block diagram of an alternate embodiment.

[0015] Figure 10 is an electrical schematic diagram of the embodiment of Figure 9.

[0016] Figure 11 is an illustration of a control panel of the embodiment of Figure 9.

[0017] Figure 12 is a front view of the microwave oven according to another embodiment.

[0018] Figure 13 is a side view of the microwave oven door of Figure 12.

[0019] Figure 14 is a top perspective view of a charging pad on the top portion of a microwave oven.

[0020] Figure 15 is an illustration of a control panel of an alternate embodiment.

[0021] Figure 16 is an electrical schematic diagram of the embodiment of Figure 15.

[0022] Figure 17 is a front view of the microwave oven according to another embodiment.

[0023] Figure 18 is an electrical schematic diagram of the embodiment of Figure 17.

[0024] Figure 19 is a front view of the microwave oven according to another exemplary embodiment.

[0025] Figure 20 is an electrical schematic diagram of the embodiment of Figure 19.

[0026] Figure 21 is a rear view of the microwave oven according the embodiments of Figures 12-19.

[0027] Figure 22 is a similar view as that of Figure 21 except that the AC cord is shown.

[0028] Figure 23 is a schematic logic flow diagram of an exemplary embodiment.

[0029] Figure 24 is a front view of the microwave oven according to another exemplary embodiment.

[0030] Figure 25 is a front view of the microwave oven according to another embodiment.

[0031] Figure 26 is a front view of the microwave oven according to another exemplary embodiment.

[0032] Figure 27 is an illustration of a control panel of an alternate embodiment.

[0033] Figure 28 is a schematic diagram corresponding to the embodiment of Figure 14 showing the charging pad and a device being charged.

DETAILED DESCRIPTION

[0034] A multiple linked appliance system 1, for example, a combination microwave oven 2 and refrigerator 3 incorporating features described in the present

application illustrated in the Figures. Although exemplary embodiments will be described with reference to the features shown in the drawings, it should be understood that other embodiments may have many alternate forms. In addition, any suitable size, shape or type of elements or materials could be used. The computer or controller devices described in this application may be constructed having one or several processors and one or several program product modules stored in one or several memory elements. For illustration, computer or controller components may be described as individual units by function. It should be understood, that in some instances, these functional components may be separated or combined in other components.

[0035] In the exemplary embodiments, the circuits described herein may comprise one or more circuits including processors which for purposes hereof corresponds to any electronic device that is configured via circuit executable instructions that can be implemented in either hardware circuits, software, firmware or applications that are operative to enable the circuits to process data and carry out the other actions described herein. For example, the circuits may include circuits that correspond to one or more or a combination of a CPU, FPGA, ASIC or any other integrated circuit or other type or circuit that is capable of processing data. The processors may be included in a computer, server or other type of electronic device. Further, the circuits described herein may include data stores that correspond to one or more of volatile or non-volatile memories such as random access memory, flash memory, magnetic memory, optical memory, solid state memory or other devices that are operative to store computer executable instructions and data. Computer executable instructions may include instructions in any of a plurality of programming languages and formats including, without limitation, routines, subroutines, programs, threads of execution, objects, methodologies and functions which carry out the actions such as those described herein. Structures for the circuits and processors may include, correspond to and utilize the principles described in the textbook entitled Microprocessor Architecture, Programming, and Applications with the 8085 by Ramesh S. Gaonker (Prentiss Hall, 2002), which is incorporated herein by reference in its entirety. Of course it should be understood that these circuit structures are exemplary and in other embodiments, other circuit

structures for storing, processing, resolving and outputting information may be used.

[0036] In exemplary embodiments the refrigerator may be connected to a power supply that provides a connection that enables the microwave oven to be connected to the same electrical supply. A single plug, therefore, may serve to connect both appliances and the current required for each appliance may be supplied by the same supply cord and circuit. In exemplary embodiments power may be supplied by the 110V AC current outlet.

[0037] To make this combination attractive for use in dorm rooms, hotel rooms, recreational vehicles, tractor trailer cabs, and other similar locations, it may be necessary to assure that the peak current draws of both appliances are not demanded from the supply at the same time. Many household circuits are protected from overload conditions by an automatic circuit breaker that is activated when current in the circuit exceeds the breaker rating. This is 15 amps in many circuits.

[0038] The duty cycle of an exemplary refrigerator used in these combined systems includes a current spike that occurs during the first few seconds of operation. This is the start up current for the refrigerator compressor. The current draw is considerably reduced as the compressor attains its full operational speed. In typical refrigerator appliances the peak current may be in the range of 7 to 9 amps, while the steady state current may level off at 1.4 amps or less. A microwave oven demands a relatively steady 8 to 13 amps of cooking power during operation of the cooking element. It is apparent that an overload condition may occur when both appliances are placed in operation absent suitable control circuitry.

[0039] In an exemplary embodiment, a combination microwave and refrigerator system is constructed having a single electrical plug input supply. The electrical supply in the exemplary embodiment is directly connected to the microwave oven. The microwave oven is adapted to provide power to the refrigerator through a power supply outlet, and to auxiliary receptacles adapted for connection to devices that operate at a low power operation draw. The microwave oven includes circuitry

including a processor based controller adapted to monitor operation of the refrigerator compressor and control the power to the microwave magnetron cooking element and other components. The current draws on the low power receptacles are separately monitored for control by the microwave controller. The microwave controller is adapted to balance the duty cycles of the connected appliances in operative connection therewith to avoid overload conditions. A control logic flow is implemented internally within the circuitry of the microwave controller. A receptacle or other power connecting power supply outlet for the refrigerator and the low power auxiliary receptacle may be implemented as part of the microwave control panel on the microwave oven.

[0040] In one embodiment, the auxiliary outlets are constructed to provide low power for the purpose of recharging batteries included in cellular mobile phones, personal media devices and digital cameras, in addition to operating lap top computers and other similar low power devices. The current to the auxiliary outlets is sensed by suitable circuitry in operative connection with the microwave controller.

[0041] In another embodiment, the power to the auxiliary outlets is disabled through operation of the microwave controller when the microwave magnetron is energized or whenever the current to the auxiliary outlets exceeds a preset value.

[0042] In one embodiment, a programmed control model for control logic flow is established and executed by the microwave controller. The model is dependent on the state of operation of the microwave cooking element or elements which are referred to herein as a magnetron. As part of the exemplary control model, the power draw of the compressor is monitored to sense operation of the compressor to compress refrigerant to provide cooling. When cooking power is demanded by the microwave the compressor is disabled by having electrical power thereto withdrawn by the control circuit for a preset minimum period. When power demand to the magnetron ceases, refrigerator compressor power is restored provided that the preset minimum period has expired.

[0043] In another exemplary embodiment of the control model, sensing circuits are operative to monitor current draw on the auxiliary outlets. The control model is

adapted to cause the controller to disable the power to the auxiliary receptacles, if the microwave magnetron is in operation. In addition the auxiliary receptacles are disabled if a predetermined maximum current draw is sensed. Another control model is based on operation of the refrigerator and operates to disable the auxiliary receptacles when the compressor is in the start up mode. Of course these approaches are exemplary and in other embodiments, other approaches may be used. Further while in the exemplary embodiment the controller is integrated with the microwave oven, in other embodiments the controller may be integrated with the refrigerator or other device, or may be configured as a separate component.

[0044] In one aspect of an exemplary embodiment, a non-transitory processor readable medium having processor executable program instructions embodied therein for operating at least one processor of a control circuit to control a system of multiple linked appliances having a microwave oven, a refrigerator, and an auxiliary power supply outlet is provided. The processor executable program code causes the control circuit to disable the refrigerator and the auxiliary power supply outlet, when the microwave demands high power such as magnetron cooking power, and enable the auxiliary power supply outlet when the microwave is not drawing cooking power.

[0045] One exemplary embodiment of a multi-appliance interconnected system 1 is illustrated in Figure 1. This embodiment consists of two appliances, a refrigerator 3 and a microwave oven 2. Refrigerator 3 is electrically connected to microwave oven 2 by power cord 7 to refrigerator receptacle 15, shown at the rear of the microwave 2 in Figure 2. Refrigerator 3 is generally subject to control by the microwave microprocessor controller which is alternatively referred to herein as power control circuit 4 of the microwave oven 2. The power control circuit may be operative to cause electrical power to be selectively delivered to and/or withheld from the microwave magnetron and the refrigerator compressor. A single cord 8 provides input electrical power to the system 1 from receptacle 5 through microwave 2. In the case where stand alone appliances are used, as shown in Figures 1 and 2, microwave oven 2 is connected directly to power source 5. The refrigerator 3, as the heaviest component, is used as the base with the microwave oven 2 stacked on top. In the selection of the refrigerator 3, it would be

advantageous in some embodiments for the height of the refrigerator to be no more than 48 inches above the floor. This provides a more ergonomic operation of the microwave oven 2 for the user. In addition, in the stacked position of the appliances in an exemplary embodiment, the doors 9 and 10 of the microwave 2 and refrigerator 3, respectively, are arranged in a common plane.

[0046] At least one power control circuit 4 serves as a controller for the operation of the microwave oven 2 and is also adapted to control the other components of system 1, as shown in Figure 3. Power is distributed throughout the system 1 under control of microwave controller 4 and digitally operated switches such as relays 19 and 20 represented in Figure 3. It should be understood that in some embodiments the relays may control power delivery via mechanical contacts while in other embodiments, solid state relays may be used. Power is distributed to each of the appliances 2 and 3, and to auxiliary low power receptacles 11 and 12. In use lamps 13 and 14 in the form of LEDs or the like may be positioned adjacent to the auxiliary receptacles to indicate power being available from the adjacent receptacle or power to the receptacle being disabled. The low power auxiliary receptacles 11 and 12 are provided to permit convenient access for plugging in a low power device, for example, devices including rechargeable batteries, such as cellular phones, PDAs, or other electronic devices that do not demand high power. As shown in the graph of Figure 8, there are instances during which, if more than one of the appliances is in use, the cumulative current would cause an overload condition.

[0047] An exemplary control panel 22 of microwave oven 2 may be adapted to provide a display of the particular status of the controlling relays. For example, LEDs 13 and 14 may indicate that power to the outlets 11 and 12 are disabled or available. In one embodiment the lamps will light when power is available at the outlet and flash when disabled. In another embodiment the lamps will light when power is not available at the outlet and not activate when power is available at the outlet as a means to reduce the standby power draw. A button operated touch panel is used in the exemplary embodiment to provide manual control.

[0048] As shown in Figure 4, in order to control the power to the microwave 2, refrigerator 3 and receptacles 11 and 12, sensing circuits, may be coupled to the control circuit to monitor current draw by the appliance components and the auxiliary receptacles. A relay 20 is connected in the power line to the refrigerator and may be actuated by signals from controller 4. In particular, according to an exemplary embodiment, sensing circuits 16, as shown in Figure 4, have sensors 17 and 18 coupled to the power line of the auxiliary outlets 11 and 12 to monitor the current being drawn by a connected device. Sensors 17 and 18 may include current sensing transformers of the type available from Triad Magnetics of Corona, Calif. The signals generated by sensors 17 and 18 may be used to activate switches or other control components, such as relays 19. Relays 19 may be actuated by control circuit 4 to enable and disable the delivery of power to the low power auxiliary outlets 11 and 12 in response to signals from sensors 17 and 18. A maximum current may be set through the program logic associated with the at least one power control circuit 4 to prevent overload of the outlets 11 and 12. In one embodiment of the system, the maximum current limit is set at 2 amps, and the control circuitry is operated to cease power delivery in situations where the power draw exceeds this amount. Of course this approach is exemplary.

[0049] In another embodiment, a clock function 21 included in the at least one control circuit 4 is used to provide timed delays during which, for example, refrigerator 3 would be prevented from undesirably rapid on/off cycles. When the compressor of the refrigerator 3 is disabled during microwave cooking operation, a time delay of 3 minutes is provided during which the compressor of the refrigerator 3 will remain disabled, even if microwave use is only for a short period. Control circuit 4 may be programmed to manage the power delivery to the components of the system to avoid overload conditions, while minimizing disruptions in the use of an individual appliance. A model of operative events and related control operations may be designed into the program instructions executed by at least one control circuit 4 to provide a control methodology as illustrated in Figures 5-7.

[0050] In one embodiment, as illustrated in the block diagram of Figure 3, at least one control circuit 4, constructed as part of the controller for microwave 2, is adapted to receive and process the sensor signals and identify particular events in the

system 1 related to a particular appliance or combination of appliance conditions. Circuit 4 controls the power to microwave 2 and refrigerator 3 and also low power receptacles 11 and 12 to avoid overload conditions. The circuit 4 is operative to execute the control methods illustrated and described below. In one exemplary embodiment, the circuit 4 is operative to control operations of microwave oven 2 and is adapted to execute the program instructions described below. The control circuit is coupled directly to refrigerator outlet 15 and low power outlets 11 and 12.

[0051] In one exemplary embodiment, shown in Figure 1, the outlets 11, and 12, are included as part of the front control panel of microwave oven 2. In Figure 2, in another embodiment, the auxiliary receptacles 11 and 12 and refrigerator receptacle 15 are accessible at the rear of the microwave oven 2. In these alternative embodiments, the microwave oven 2 is connected by supply cord 8 directly to power supply receptacle 5. Refrigerator 3 is connected by power cord 7 to receptacle 15 on microwave oven 2 as shown in Figure 2.

[0052] In one exemplary embodiment, control models for program logic flows are established as shown in Figures. 5-7 for execution by the at least one control circuit 4. These models can be in the form of processor executable instructions stored in a computer readable medium, such as software or firmware associated with the circuit 4. The models shown are, in the first instance, dependent on the state of operation of microwave oven 2. The current demands of the microwave 2 when drawing cooking power are generally the most significant contribution to overload, as shown in Figure 8. To avoid overload conditions, power to the low power receptacles 11 and 12 and refrigerator receptacle 15 is disabled during microwave magnetron operation. If the refrigerator 3 compressor is drawing power when the microwave 2 is turned on to commence cooking, the power to the refrigerator compressor is turned off and clock function 21 is used to determine a predetermined period during which the compressor of refrigerator 3 cannot be restarted. A time delay, for example, of 3 minutes, may be set through programming of the control circuit and when this delay period is expired, receptacle 15 may again be enabled, providing the control circuit determines in accordance with its programming and sensed parameters that microwave cooking

operation has ceased. This prevents a too rapid restart of the compressor that may otherwise result in damage.

[0053] In some exemplary arrangements, the control circuitry of the power controller may operate responsive to sensing the power draw of the refrigerator and the cooking element of the microwave oven so as to detect the power draw reaching a threshold which should not be exceeded to prevent an overload condition. In other exemplary arrangements, the control circuitry may operate to detect inputs that may be provided by input devices and which are operative to cause power drawing devices such as the magnetron of the microwave oven or the compressor of the refrigerator to operate. In such arrangements, the control circuitry may operate to detect the signal from a thermostat within the refrigerator which indicates that the thermostat is signaling that the refrigerant compressor should operate to cause the temperature to be lowered within the cooling area of the refrigerator. In such arrangements, the control circuitry may operate to detect the signal from the thermostat and prevent the delivery of power to the compressor in situations where the cooking element of the microwave oven is operating. In such embodiments the control circuitry may delay the supply of power to the compressor until the cooking element of the microwave oven has ceased operation. Likewise an exemplary embodiment of the control circuitry may be operative to detect inputs to the control panel of the microwave which are provided by a user to commence microwave operation. In response to the detection of such inputs, the exemplary control circuitry may be operative to first cause a determination to be made as to whether the refrigerator is drawing the level of power that indicates that the compressor thereof is operating. In response to a determination that the refrigerator is drawing a level of power that is incompatible with operation of the microwave cooking element, the exemplary control circuitry may be operative to cause power to the refrigerator compressor to be withdrawn. Thereafter the control circuitry may be operative to cause power to be supplied to the cooking element of the microwave. Further in exemplary embodiments, the control circuitry may also monitor the power draw of auxiliary outlets or other power delivery points to assure that the level of draw that is currently occurring will not be an impediment to an operation that is being requested by an input device of the apparatus before the apparatus begins to

operate in a manner that will cause increased power draw. Thus the exemplary apparatus enables the preventative action of discontinuing operation of a power drawing component before instituting operation of another component that draws a high level of power. Of course it should be understood that this approach is exemplary and in other embodiments, other approaches may be used.

[0054] In the embodiment shown in Figure 5, if low power is demanded at receptacle 11 or 12 and microwave oven 2 is not in use for cooking, power is supplied to the low power receptacles, provided further, that the current demand at an individual outlet does not exceed a preset limit, for example, 2 amps. Since the auxiliary outlets may be enabled during refrigerator compressor operation, there may be an overload generated at peak compressor operation. In one embodiment the control circuitry acts to disable the auxiliary outlets during compressor startup to prevent accidental overload of the system. Therefore as illustrated in the logic flow diagram of Figure 5, control circuitry may be adapted to check the operational status of the refrigerator, as well as the microwave oven, prior to enabling the auxiliary outlets.

[0055] Figures 9-11 illustrate another embodiment. In this embodiment the sensing components 117 and 118 are configured to reduce the risk of overload by the combined demands of the auxiliary outlets 111 and 112 and the refrigerator outlet 115. In the exemplary configuration as shown in Figure 10, current sensor 117 is configured to monitor the current draw through the refrigerator outlet 115 and the circuitry is operative to limit the refrigerator current draw at the outlet 115 so that it does not exceed 10 amps. Current sensor 118 is connected to monitor the combined current in the auxiliary outlets 111 and 112. Current sensor 118 and the circuitry is to limit the combined auxiliary outlet current draw to 4 amps. In this manner the risk of overload is minimized. As represented in the block diagram of Figure 9, the microwave 102 has at least one control circuit comprising controller 104 that is operatively connected to power supply 105. Clock function 121 which is shown schematically separately but may be part of the controller provides a timing device to determine a restart delay for power to refrigerator 103. Sensing circuit/sensor 117 is to monitor the current demanded by refrigerator 103 and sensing circuit/sensor 118 is connected to low power receptacles 111 and 112 is

operative to monitor the combined current in receptacle 111 and 112. In the exemplary embodiment the control circuitry is shown as operative to control the availability of electrical power to some devices as a whole. For example, if the control circuitry operates to cause power not to be available to the refrigerator, all components of the refrigerator, such as the internal lights, air circulation fan, etc., are not supplied with electrical power, in addition to the compressor, which is the component which is most likely to draw power at a level which may be excessive. However in other embodiments, the control circuitry may be configured to deliver and withhold power selectively to individual refrigerator components or groups of such components. Thus in such embodiments the power control circuitry may be operative to withdraw power to the high power draw components (s) such as the compressor, while still making power available to other low power draw components such as the internal fan and/or lights.

[0056] Likewise in exemplary embodiments, the power control circuitry is operative to selectively allow power to be available or withdrawn from components of the microwave. For example, exemplary embodiments control the availability of power to selected components of the microwave such as the magnetron and the auxiliary outlets. The power control circuitry of exemplary arrangements may operate to maintain electrical operation of certain components, even though electrical power to other components is not available. For example, an exemplary controller may operate to maintain power to the clock display output on the control panel at all times. Further some exemplary arrangements may assure that power is maintained to control circuitry with programmed settings so that programmed data is not lost. This may include for example programmed data concerning a future time to turn on the cooking function, the power level and/or how long to cook. This way if the memory of the microwave has been programmed to begin to cook a food item placed inside the microwave oven at a future time so it is cooked by the time a person returns (for example) the programmed instructions to carry out those instructions will not be lost. Alternatively, configuration data that enables the microwave oven controller to communicate in a wireless network or with other devices will be preserved even though the control circuitry operates to cause electrical power not to be available to certain components. Of course these are merely examples.

[0057] It should be understood that for purposes hereof when it is stated that power is withdrawn or not made available to a microwave, refrigerator or other assembly of components, the terminology refers to not making such power available to the entire assembly or to only certain selected components that draw high power such as the refrigerant compressor or magnetron. Likewise herein references to the microwave or the refrigerator operating or running refers to operation of the respective high power draw components such as the magnetron or the compressor, for example.

[0058] In the exemplary embodiment, as shown in Figure 11, a control panel 122 is arranged with a keypad 123 for manual control and a display 124. Auxiliary outlet 111 is shown as accessible from the front and is associated with a status LED indicator and reset button 113 that may be caused to be operative during use and switch to a flashing mode when the microwave is drawing cooking power. Refrigerator outlet 115 is also accessible on the front panel and is associated with an LED indicator and reset button 114. Similarly LED indicator 114 is controlled to be on by being illuminated during use of the refrigerator and to switch to a flashing mode when the microwave is drawing cooking power. In another exemplary embodiment, the status LED indicator and reset button 113 may be caused to be off during use and switched on or to a flashing mode when the microwave magnetron is drawing cooking power. Similarly, in this embodiment, the LED indicator 114 is controlled to be off during operation of the refrigerator compressor and switched on or to a flashing mode when the microwave radiation cooking element is operating.

[0059] A further embodiment of the logic flow operational model is shown in Figure 6. In this model, the refrigerator compressor draws or demands power. This may be triggered by a temperature rise of the refrigerator interior area within the housing of the refrigerator and involve start up of the refrigerator compressor with an associated peak power demand. If the microwave cooking element is sensed by the control circuitry as currently drawing cooking power, the programming of the control circuitry causes power not to be available the refrigerator so that operation of the refrigerator compressor will be delayed. If the microwave cooking element

was on and subsequently cycled off, the clock function 21 must be checked by the controller to determine if power availability to the refrigerator to restart can occur. Under some circumstances, it may be necessary to give the refrigerator compressor priority to prevent an undesirable rise in temperature. In the latter instance, the control circuit can be coupled to the refrigerator temperature sensor to execute a programmed sequence during which the microwave cooking element will be disabled by not having power supplied thereto to allow the refrigerator to operate long enough to return to proper operating temperatures.

[0060] In the embodiment of Figure 7, the exemplary control circuitry operates to give priority to the power demands of the microwave oven, as indicated above. Use of the receptacles 11, 12, and 15 are, therefore, caused to be disabled during microwave cooking operation. The operational models which carry out the logic represented in Figures. 5-7, may be established by logic flows implemented by instructions that are programmed or imbedded in the control circuitry of controller 4.

[0061] In this manner a system of linked appliances, including a microwave oven, refrigerator, and at least one low power draw device or appliance may all be connected through a common supply cord to a receptacle providing house current or other electrical power level without the risk of inconvenient interruptions or damage during use caused by overloads.

[0062] It is also advantageous to provide such a combination microwave/refrigerator system that also provides auxiliary outlets for low power applications, such as for the purpose of recharging batteries in cellular phones, operating lap top computers and other low power devices, while controlling the operation of the appliances to avoid overload conditions.

[0063] In another exemplary embodiment as illustrated in Figures 12 and 13, the auxiliary outlets or electrical power receptacles 211, 212 may be included as part of the front control panel 222 of the microwave oven 202 and located on the upper portion 270 of the front control panel 222. The auxiliary outlets 211, 212, front control panel 222 and microwave oven 202 are similar to auxiliary outlets 11, 12,

front control panel 22, and microwave oven 2 except as discussed below. In this exemplary embodiment, the auxiliary outlets 211, 212 are positioned side by side with respect to each other with each of the auxiliary outlets 211, 212 being at the same height as the other. The auxiliary outlet 211 of Figure 12 may be associated with a status LED indicator and reset button 213, which is located on the lower portion 272 of the front control panel and in vertical alignment with the auxiliary outlet 211. The status LED indicator and reset button 213 may be caused by the control circuitry of the controller to be on during use and switched to a flashing mode to indicate that power is not available therefrom when the microwave oven 202 is drawing cooking power. The auxiliary outlet 212 of Figure 12 may be associated with status LED and reset button 214, which is located on the lower portion of the front control panel and in vertical alignment with the auxiliary outlet 212. The status LED indicator and reset button 214 may be caused by the controller to be on during use and switched to a flashing mode to indicate that power is not available therefrom when the microwave oven 202 is drawing cooking power thereto is withdrawn. In another exemplary embodiment, the status LED indicator and reset button 213 may be caused to be off during the time power is available for use and switched on or to a flashing mode when the microwave oven is running and power thereto is withdrawn. Similarly, in another embodiment, the status LED indicator and reset button 214 may be caused to be off during power availability and switched on or to a flashing mode when the microwave oven is running or the refrigerator is running and the controller causes power not to be available. Other elements and operational features may be similar in structure and function as that of the embodiments shown in Figures 1-11. Thus, the same reference numbers will be used in this exemplary embodiment to indicate elements that are similar in the embodiments shown in Figures 1-11.

[0064] Smart technology may be integrated in some of the exemplary embodiments. For example, a user may be able to monitor and/or control the refrigerator 3 such as by turning it on and off remotely by a remote device 217. The remote device 217 may include a hand held device such as a cellular phone. The cell phone may also be a smart phone. In some exemplary embodiments, the refrigerator, the microwave and/or the controller may include circuitry suitable for communication in a wireless network. Such a wireless network may be established in the facility,

residence, office or other location where the combined refrigerator and microwave appliance is operated. Such devices may include circuitry that enables transmission of wireless signals to and from such components. Such communications may include communications of operational properties such as operating status, temperature, programmed values or other information that is pertinent to the operational condition of the particular device. In further exemplary arrangements, circuitry may be operative to enable received wireless messages to modify the operational condition and/or the programming of the particular device.

[0065] For example in some exemplary arrangements, the user may be able to communicate from a wireless phone via cellular or WiFi connection to determine that the refrigerator is operating, the temperature therein, the operational status of the compressor or other items. Alternatively and/or in addition, the user may be able to remotely control components of the refrigerator. These may include, for example, the ability to remotely turn on the internal light within the refrigerator and to view the food items currently housed within the refrigerator via one or more electronic cameras positioned therein. This may enable a user, for example, to determine that they need to purchase additional groceries or other items for purposes of an upcoming meal or other activities. Alternatively and/or in addition, in some exemplary embodiments, instructions may be utilized to change the temperature within the refrigerator. This may be done, for example, to chill certain grocery items that may need to be cooled or frozen for certain purposes. Of course these approaches are exemplary.

[0066] Likewise the microwave may include interface circuitry which enables the remote monitoring of the condition of the microwave components via a remote wireless device. This may include, for example, determining the periods of past operation and current status of the microwave such as whether it is currently being used to cook items. Alternatively and/or in addition, the remote monitoring capabilities may include determining the programmed status of the controller of the microwave such as the controller being programmed to cook an item housed in the microwave at a set future time or for a particular duration at a particular power level. Alternatively and/or in addition, the remote operational capabilities

associated with the microwave circuitry may include the ability to turn on an internal light within the cooking chamber of the microwave and to view via a camera whether an item is contained therein. Further such remote capabilities may also include the ability to remotely change the program parameters so as to initiate cooking at a different time or at a different power level. Likewise exemplary arrangements may include having the wireless interface in operative with the power control circuit to provide the ability to monitor the current status of power draw on auxiliary outlets, the occurrence of alarm conditions, or the current status of other connected devices. It should be understood that such capabilities may be implemented in the controller circuitry or in separate circuitry of the microwave and/or the refrigerator. Further the exemplary arrangements may utilize communications interface capabilities included in circuitry of the controller to facilitate monitoring and operational control of the appliance. Of course these capabilities are exemplary and in other embodiments, other approaches may be used.

[0067] In an exemplary embodiment a charging pad 219 (Fig. 14) may be provided on the microwave oven 2 or other suitable location to receive a smart phone or other chargeable device for purposes of charging the device. For example, a wireless charging pad 219 may be positioned on top 225 of the microwave oven 2 for recharging the smart phone or other device. The charging pad 219 may be built into the top 225 of the microwave oven 2 or may be a separate component that is mounted to the top 225 of the microwave oven 2 or other location. The exemplary charging pad 219 includes an inductive charging pad and includes a recessed area 220 for receiving an item to be charged such as the smart phone. The control circuitry may include or be in operative connection with a wireless interface 221 configured for communicating with the remote control device 217 for controlling the microwave or refrigerator and work in conjunction with the control circuitry to perform functions such as removing the supply of electrical power to the microwave oven 2 and/or refrigerator 3. In an exemplary arrangement, USB ports 223, 224 may be provided in the area of the charging pad 219. Alternatively, or in addition, power outlets may be provided in proximity to the charging pad 219. Alternatively, the charging pad 219 may be provided on the front, side, rear or

bottom of the microwave oven 2, or at another suitable location in connection with the combined appliance structure.

[0068] The exemplary charging pad 219 may utilize inductive or wireless charging, which uses an electromagnetic field to transfer energy between the charging pad 219 and the device being charged. In general, the charging pad 219 may include a primary inductive coil 402 (Figure 28) in connection with circuitry that is operative to create an alternating electromagnetic field that is received by a secondary inductive coil 404 (Figure 28) connected to the circuitry of the device being charged such as device 217. Power from the electromagnetic field is converted back into electric current to charge a battery 406 (Figure 28) in the device. Figure 28 shows an exemplary arrangement in which the charging pad 219 utilizes inductive charging to charge the device 217. In this arrangement, the charging pad 219 includes an inductive charging station 408 and the primary inductive coil 402. The power source 5 provides electrical power to the inductive charging station 408 and the other components of the charging pad 219.

[0069] The inductive charging station 408 is provided for inductively charging the device 217 and may be built into or otherwise attached to the charging pad 219. The inductive charging station 408 may include the primary inductive coil 402 that is connected to the power source 5 for the microwave oven 2. The recessed area 220 may define a cover of the charging pad 219 that covers the primary inductive coil 402 and provide a surface on which the remote device 217 may be placed for charging. The inductive charging station 408 may also include one or more capacitors coupled in series and/or parallel with the primary inductive coil 402 to form an LC circuit. The inductance value of the primary inductive coil 402 and the capacitance value of the capacitor or capacitors may be selected to achieve a desired resonant frequency which corresponds to a frequency of a coil and circuitry in the device being charged, but it should be noted that this exemplary arrangement is not limited to any particular inductance and/or capacitance values and/or any particular power source ratings.

[0070] The device 217 or other device to be charged may include the battery 406 that provides electrical power to the components and circuitry of the device. The

battery 406 may comprise a rechargeable battery or batteries including lead acid, nickel cadmium (NiCad), nickel metal hydride (NiMHi), lithium ion (Li-ion) or lithium ion polymer (Li-ion polymer) batteries. The device may include any number of batteries, the size and rating of which may vary. The battery 406 may also comprise power conduits, connectors, receptacles, battery connectors, or power cables coupled with batteries.

[0071] The device 217 or other device to be charged may include an inductive charger 410 for charging the battery 406 when the device 217 is placed on or in the vicinity of the inductive charging station 408 of the charging pad 219. The inductive charger 410 may be built into or otherwise attached to the device to be charged. As schematically represented in Figure 28, the inductive charger 410 may include the secondary inductive coil 404 and a charging circuit 412 that is connected to the battery 406. The inductance value of the secondary inductive coil 404 may be selected to correspond or complement the inductance value of the primary inductive coil 402, but it should be noted that in exemplary arrangements the secondary inductive coil is not limited to any particular inductance value. Likewise, the power rating of the charging circuit 412 may be selected to match or complement the rating of the battery 406. The two inductive coils 402, 404 in proximity combine to operate in a manner similar to the principles employed in an electrical transformer. Further in some embodiments greater distances between primary and secondary inductive coils and/or more effective charging can be achieved when the inductive charging system uses resonant inductive coupling. Of course the described approaches are exemplary and in other embodiments other approaches may be used. In some exemplary embodiments the charging pad may be in operative connection with the control circuitry that controls power availability to components of the device. For example, the control circuitry may operate in accordance with its programmed instructions to cause power to not be available to the charging pad when the microwave draws cooking power. Alternatively or in addition the control circuitry may be operative to cause power not to be available to the charging pad responsive to power draw by the refrigerator compressor, the auxiliary outlets or other items, and/or cumulative power draw of multiple items.

[0072] As seen in Figures 16, 18, and 20, a safety sensor which is alternatively referred to herein as a safety circuit 226 such as a smoke or gas sensor may be provided in connection with the microwave oven 2. The smoke sensor 226 operates in connection with exemplary control circuitry to turn off the microwave oven upon sensing smoke or polluted air indicative of a potentially dangerous condition such as excessive smoke generated from overcooked food. The exemplary safety sensor 226 may be powered on or otherwise operational when the microwave oven is in operation. The sensor circuitry may operate responsive to processor executable instructions to determine the optimal activation point. The exemplary smoke sensor may be battery-powered or powered by the house current that powers the combined appliance with an optional battery backup when the power from the house current is out. The smoke sensor may include an ionization smoke sensor that uses a radioisotope, typically Americium-241, to ionize air. The ionization smoke sensor circuitry operates to turn off power to the magnetron cooking element of the microwave oven upon sensing a difference due to smoke indicative of a potentially dangerous condition. The smoke sensor alternatively may include a radiation type smoke detector that may contain a source emitter of infrared, visible, or ultraviolet light (typically an incandescent light bulb or light-emitting diode), a lens, and a photoelectric or other type of radiation sensing receiver (typically a photodiode) and suitable control circuitry.

[0073] An exemplary sensor 226 may include an alcohol sensor that is coupled with a thermistor 228. An exemplary alcohol sensor 226 may operate in a set temperature range, such as from 32 to 104 degrees Fahrenheit. When a set level of heating is sensed by the thermistor 228, the thermistor 228 through suitable control circuitry causes the alcohol sensor 226 to turn on and become operational and check for properties of the gas within the interior area of the microwave.

[0074] If the exemplary alcohol sensor 226 is operational due to the sensing of the set level of heating and senses polluted air that is indicative of a dangerous condition, a shutdown signal is outputted by the alcohol sensor to the controller 104. Upon receiving the shutdown signal, the controller 104 determines that the radiation cooking emitting element of the microwave oven 2 should be shut down and causes the magnetron of the microwave to shut down through the withdrawal of

electrical power. If (after the alcohol sensor is caused to be turned on by the thermistor) the alcohol sensor 226 senses air that is not indicative of a dangerous condition such as the air produced by normal cooking of food in the microwave oven 2, the alcohol sensor circuitry will not send a shutdown signal to the controller 104 and the controller allows the microwave cooking activity to continue.

[0075] Alternatively or in addition, a fault indicator 230 may be coupled to the control circuitry of the controller 104 or other circuitry to indicate that there is a dangerous condition upon detection by the alcohol sensor 226. For example, the fault indicator 230 may be a buzzer that is activated in response to the alcohol sensor 226 sensing polluted air indicative of a dangerous condition. In another example, fault indicator 230 may include the display 124 displaying a fault message such as "E-1" in response to the alcohol sensor 226 detecting polluted air indicative of a dangerous condition. Alternatively the fault indicator may output one or more signals, such as wireless alarm signals that can be detected by a receiver of an alarm system or through a remove device such as a smart phone.

[0076] An exemplary embodiment may include a combination of fault indicators. For example, upon the alcohol sensor 226 sensing air that is indicative of a dangerous condition, a shutdown signal is outputted by the alcohol sensor 226 to the controller 104. Upon receiving the shutdown signal, the controller 104 determines that the microwave oven 2 should be shut down and causes the radiation emitting cooking element of microwave oven 2 to be shut down. In addition in an exemplary embodiment, a buzzer is activated and the display 124 displays a fault message such as "E-1" in response to the alcohol sensor 226 sensing polluted air indicative of a dangerous condition.

[0077] The alcohol sensor 226 may be reset automatically responsive to the alcohol sensor 226 no longer detecting gas indicative of the dangerous condition. Alternatively or in addition, the alcohol sensor 226 may be reset upon sensing by a suitable switch, opening of the microwave door 9 of the microwave oven 2. The display may display a "bar" or other suitable icon to indicate that the alcohol sensor 226 is turned on. Other types of suitable safety sensors may also be used

instead of the alcohol sensor to detect a dangerous condition within the cooking area of the microwave.

[0078] In addition to one or more sensors which detect the gases generated from cooked food, the sensor 226 may include a temperature sensing capability such as, for example, using the thermistor 228 and related elements mentioned above.

[0079] Referring to Figure 24, in another exemplary embodiment, the safety sensor which is alternatively referred to as a safety circuit may comprise an infrared sensor 326. The infrared sensor 326 may include two oppositely positioned infra-red disposed infrared sensor elements in the form of a sensor emitter 328 and sensor receiver 330 (schematically shown in Figure 24) provided on the microwave oven and located in the microwave's cavity 332. The exemplary infrared sensor 326 operates as follows. The sensor emitter 328 emits radiation and the sensor receiver 330 senses sensor radiation from the sensor emitter 328 while the microwave element operates during a cooking session. When smoke that is indicative of a dangerous condition passes in between the infrared sensor elements 328, 330, a determination is made by the safety circuit that a transmission amount of sensor radiation from the sensor emitter reaching the sensor receiver has fallen by at least a programmed threshold amount during the cooking session, due to smoke in the cooking interior area. Responsive to the determination, the cooking element of the microwave oven is caused by the safety circuit to be no longer supplied with electrical power. The exemplary safety circuit may use the smoke point of oil or similar food products as the basis for its threshold amount, so that normal smoke emitted during the cooking or heating of food or beverages will not cause the infrared sensor 326 to deactivate cooking operation. The exemplary infrared sensor 326 would not require interaction from the microwave user. The exemplary safety sensor may be operative to cause an initial transmissivity level of sensor radiation that reaches the sensor receiver from the sensor emitter early in the cooking session to be stored in a data store or other memory associated with the safety circuit. The determination of a level of smoke corresponding to a dangerous condition is made in this embodiment responsive to circuitry operating in accordance with programmed instructions to detect that the transmission

amount of sensor radiation reaching the sensor receiver has dropped by the threshold amount from the initial transmissivity level during the cooking session.

[0080] Referring to Figure 25, in another exemplary embodiment, the safety sensor or safety circuit may comprise a light sensor 334, which detects the increase smoke density within the microwave's cooking area which is alternatively referred to as a cavity. The light sensor 334 may also include a sensor emitter and sensor receiver. The light sensor 334 may be provided in the microwave cavity 332 and may operate as follows. At the beginning of a cooking cycle, the light generated travels through the clean air to the light sensor 334. As smoke increases in density, the amount of light that reaches the sensor receiver is reduced. The circuitry of light sensor 334 includes a programmed trip point or threshold that corresponds to the reduced amount of light sensed caused by the amount of smoke, that is indicative of a dangerous condition. When the trip point is reached, the safety circuit causes the electrical power to the radiation emitting cooking element to be withdrawn. A circuit determination would be made based on the amount of smoke that corresponds to the trip point and its corresponding light sensor reading.

[0081] Referring to Figure 26, in another exemplary embodiment, the safety sensor may include an optical motion sensor 336. The optical motion sensor 336 may also include a sensor emitter and sensor receiver. The optical motion sensor 336 may be positioned in the microwave cavity 332 adjacent air exhaust vents 338, 340 of the microwave, which comprises an air passage that connects an area where food is cooked in the microwave oven to the air outside the housing of the microwave oven. The optical motion sensor 336 detects motion which is sensed due to the presence of smoke blown by an exhaust fan 342 of the microwave oven 2 through the air passage. The exhaust fan 342 is operative to cause air to move in the air passage connected to the microwave cavity. In an exemplary arrangement, the sensor emitter and sensor receiver are positioned to be operative to sense the transmission of radiation between the emitter and the receiver in the air passage. The optical motion sensor 336 has a trip point or threshold that corresponds to the presence of smoke of a predetermined density that corresponds to a reduced level of transmission that is indicative of a dangerous condition. When the trip point is

reached, the optical motion sensor causes the cooking element of the microwave oven to be turned off. It should be noted that the exemplary optical motion sensor is not be positioned within the microwave cavity and directed toward a turntable therein, since the turntable itself may result in false alarms in some configurations. Of course it should be understood that other types of smoke sensors may be positioned in air passages in other alternative embodiments.

[0082] Alternative embodiments may include other types of smoke sensors. For example, some embodiments may include sensors that are operative to detect smoke by determining the level of volatile organic compounds (VOCs) in the air in the microwave oven cooking area. In some exemplary embodiments such VOC sensors may be positioned to sense air in at least a portion of the microwave cooking area. In some cases such VOC sensors may be positioned in an air passage that extends between the microwave cooking area and the air in the atmosphere outside the microwave. Such an arrangement may have an advantage in that positioning the sensor in the air passage may minimize the amount of cooking splatter and other contamination from the food cooked in the microwave oven that reaches the sensor.

[0083] Some exemplary arrangements may include a VOC sensor that comprises a tin dioxide semiconductor gas sensor. In some arrangements the semiconductor is formed on an alumina substrate with a thick film heater of ruthenium oxide on the reverse side. Of course this configuration is exemplary and in other embodiments other arrangements and VOC sensor types may be used.

[0084] In exemplary microwave oven arrangements VOC sensors may be operated in conjunction with suitable control circuitry to detect conditions which correspond to a dangerous smoke condition. Such a dangerous smoke condition is determined responsive to the level of VOCs, such as carbon dioxide and/or carbon monoxide in the air in the cooking area of the microwave oven. Such compounds may generally indicate the presence of combustion which is corresponds to a potentially dangerous condition. Responsive to detecting a threshold VOC concentration in the air of the cooking area, the control circuitry in operative connection with the sensor is operative to cause power to be withdrawn from the

magnetron of the microwave oven so as to prematurely end a current cooking session before the set and time thereof. In exemplary arrangements, the sensitivity of the VOC sensors is sufficient to detect a developing potentially dangerous condition and cause power to be withdrawn from the microwave cooking element before a fire or other condition causes damage to the microwave oven. This enables the sensor circuitry to reset when the dangerous smoke condition is no longer detected and enable the microwave oven to operate in a subsequent cooking session.

[0085] In some exemplary arrangements multiple sensors in operative connection with detection circuitry is utilized to determine the activation point for an alarm condition based on detection of parameters such as humidity, temperature, temperature rate of change, and gas constituents generated during cooking phases. Combinations of absolute and relative values and rates of change thereof may be detected for purposes of evaluating possible alarm conditions. Other types of sensors that may be used in exemplary embodiments include flame sensors. Flame sensors are operative, detect and provide signals indicative of the presence of a flame or fire. Upon the flame sensor detecting the presence of a flame, the flame sensor causes the controller to discontinue electrical power to the microwave oven cooking element. In some arrangements the flame sensor may take the form of an optical flame sensor. The flame sensor may be of the type that utilizes ionization current flame detection. Alternatively, the flame sensor may be of the type that utilizes thermocouple flame detection.

[0086] Alternatively or in addition, the fault indicator 230 may be coupled to the controller 104 or other circuitry to indicate that there is a dangerous condition upon detection of a potentially dangerous condition by any of the infrared sensor 326, light sensor 334, optical motion sensor 336, or flame or fire sensor in the embodiments described above. For example, the fault indicator 230 may be a buzzer that is activated in response to the safety sensor 226 sensing polluted air indicative of a dangerous condition. In another example, fault indicator 230 may include the display 124 displaying a fault message such as "E-1" in response to the safety sensor 226 detecting polluted air indicative of a dangerous condition.

[0087] Exemplary embodiments may include a combination of fault indicators. For example, upon the trip point or threshold value being reached by any of the detection circuitry of the infrared sensor 326, light sensor 334, or optical motion sensor 336, a shutdown signal is outputted by the sensor 226 to the controller circuitry 104. Upon receiving the shutdown signal, the controller 104 determines that the microwave oven 2 should be shut down and causes electricity to be withdrawn from the cooking element. In addition, a buzzer is activated and the display 124 displays a fault message such as "E-1" in response to the sensor 226 sensing polluted air indicative of a dangerous condition. In other exemplary embodiments, the controller or other circuitry may be operative to output signals that can be communicated to a remote location, indicative of an alarm condition that is detected through one or more detection circuits of the microwave oven or other connected devices. This may include, for example, the circuitry dispatching messages to a remote device such as a smart phone of a user. The messages caused to be dispatched responsive to operation of the control circuitry may be indicative of an alarm condition that can be output on the display of the user's device to advise that a potentially dangerous condition exists. Alternatively and/or in addition, the control circuitry may be operative to communicate messages to a central controller or alarm panel located in the facility or institution in which the microwave is operated. For example the circuitry may be operative to provide wireless communication to an alarm panel or central monitoring station which receives the information that there is a potentially dangerous condition at the microwave device located in a particular location, dormitory room or other identified area of the building or facility. In still other exemplary arrangements, messages corresponding to alarm conditions that are cause to be sent by the control circuitry of exemplary arrangements may be dispatched to devices or alarm monitoring stations of a security force for an oversight authority within the area in which the microwave is operated. Of course it should be understood that these approaches are exemplary and in other embodiments, other approaches may be used.

[0088] The exemplary detection circuitry of the smoke sensor, infrared sensor 326, light sensor 334, or optical motion sensor 336, may be reset automatically upon the sensor not detecting gas or other conditions that are no longer indicative of the

dangerous condition. Alternatively or in addition, the sensor may be reset upon circuitry sensing opening of the microwave door 9 of the microwave oven 2. The display may display a "bar" or other suitable icon to indicate that the sensor is turned on. Other types of suitable safety sensors and circuitry may also be used to detect dangerous conditions. Further in other exemplary embodiments, other circuitry may be in operative connection with the combined appliance or separate components so as to address dangerous conditions. Such items may include, for example, a suitable fire extinguishing system that may be automatically triggered in response to detecting conditions corresponding to fire or smoke within the cooking chamber of the microwave oven. For example in some exemplary arrangements, a compressed supply of carbon dioxide may be included with or be positioned adjacent to the combined appliance. A suitable gas conduit and control valve may be positioned to deliver the carbon dioxide into the cooking chamber of the microwave oven responsive to the detection of flame, excessive temperature or smoke within the microwave cooking chamber. Suitable circuitry in operative connection with the controller or circuitry of the temperature, smoke or flame detection devices may operate to cause the control valve for the delivery of the carbon dioxide or other fire extinguishing material to be opened to cause the delivery thereof responsive to the detection of one or more of the alarm conditions. Further as can be appreciated, in some exemplary arrangements, the control circuitry may operate in accordance with its programmed instructions to require that the alarm condition be detected as existing for a programmed period of time before the control circuitry operates to cause the fire extinguishing material to be delivered into the cooking chamber. Further although exemplary arrangements may include carbon dioxide as the fire extinguishing material, in other embodiments other types of fire extinguishing or fire suppressing materials may be utilized. These may include, for example, chemical fire extinguishing or retarding materials in the form of powders or foams. Alternatively, and/or in addition, fire suppressing materials may include the delivery of nonflammable gaseous material. Of course these approaches are exemplary and in other embodiments, other approaches may be used.

[0089] As shown in Figures 15, 16 and 27, the exemplary front control panel 22 of the microwave oven 2 may include Universal Serial Bus (USB) ports 232, 234 for

connection, communication, and power supply between the front control panel 22 and electronic devices such as a personal computer, cell phone, Smart Phone, Ipod®, Ipad®, or other suitable device to allow communication and/or charging of the electronic device plugged into the USB ports. In one exemplary embodiment, a first USB port 232 may be provided on the upper portion 236 of the front control panel 22, and a second USB port 234 may be provided on the lower portion 238 of the front control panel 22 above the auxiliary outlets 111, 112 and between the reset buttons 113, 114 as seen in Figure 15. The first USB port 232 may be operatively connected to a three ampere fuse and a linear time-variant system (LVT) of 100 mA, 120 volts, and 12 watts. The second USB port 234 may be operatively connected to a linear time-variant system (LVT) of 200 mA, 120 volts, and 24 watts. The second USB port 234 may also be reset. The current sensor 118 may be constructed to limit the second USB port and the two auxiliary outlets to 12 amps. The USB ports 232, 234 may be in operative connection with respective printed circuit boards. Alternatively, as represented in Figure 27, instead of auxiliary outlet 111, another USB port 237 may be provided on the front panel 22 at the location of the auxiliary outlet 111. Alternatively or in addition, one or more USB ports may be provided on the rear of the microwave oven, the sides of the microwave oven, and/or the top or bottom of the microwave oven. Alternatively or in addition, one or more auxiliary outlets may be provided on the rear of the microwave oven, the sides of the microwave oven, and/or the top or bottom of the microwave oven. Alternatively, the refrigerator outlet may be provided on the top, bottom, or one of the sides of the microwave oven.

[0090] Figures 17 and 18 show another exemplary arrangement of a control panel and control circuitry that includes USB ports 232, 234. In this arrangement, the first and second USB ports 232, 234 are located side by side on the lower portion 238 of the front control panel 22 above the auxiliary outlets 111, 112. The USB ports 232, 234 are also located rightwardly (as viewed in Figure 17) adjacent a status LED indicator and reset button 240. In this exemplary arrangement, current sensor 218 is configured to monitor the combined current in the USB ports 232, 234 and the auxiliary outlets 111 and 112. The current sensor 218 is constructed to limit the combined current in the USB ports and auxiliary outlets 111 and 112, to 12 amperes. The LED indicator and reset button 240 may be controlled to

illuminate when power to the auxiliary outlets 111, 112 and the USB ports 232, 234 is available and flash when disabled. In another embodiment, the LED indicator and reset button 240 may be controlled to be off when power to the auxiliary outlets 111, 112 and the USB ports 232, 234 is available and light on illuminate or flash when disabled. In an exemplary arrangement, depressing the LED indicator and reset button 240 enables power delivery from the auxiliary outlets 111, 112 and the USB ports 232, 234 so that power may be again supplied from them after a power interruption due to excessive power draw, when the combined current draw falls from above to below the limit. Of course it should also be understood that in exemplary arrangements, the controller or other control circuitry that operates to avoid excessive power draw may also operate to discontinue delivery of power from the receptacles and the USB ports in circumstances where the power draw of the microwave cooking element and/or the refrigerator compressor requires the power delivery from the auxiliary outlets and USB ports be discontinued. In such exemplary arrangements, the control circuitry may operate to automatically resume the delivery of power to such receptacles and ports or in other embodiments, or a manual input may be required to cause the delivery of power to be reinstituted. Of course it should be understood that these approaches are exemplary and in other embodiments other approaches may be used.

[0091] Figures 19 and 20 show an alternative arrangement in which one USB port 234 is located above the auxiliary outlets 111, 112 and rightwardly adjacent the status LED indicator and reset button 240. In this exemplary arrangement, the current sensor 218 is configured to monitor the combined current draw from the USB port 234 and auxiliary outlets 111 and 112. The current sensor 218 is configured to limit the combined current draw from the USB port 234 and auxiliary outlets 111 and 112, to 12 amperes. Alternatively, the current sensor 218 may be configured to limit the combined current in the USB port 234 and the auxiliary outlets 111 and 112 to 13 amperes. The LED indicator and reset button 240 may be controlled to illuminate when power to the auxiliary outlets 111, 112 and the USB port 234 is available, and flash when the control circuitry causes the outlets and ports to be disabled. In another exemplary embodiment, the LED indicator and reset button 240 may be off when power to the auxiliary outlets 111, 112 and the USB port

234 is available, and illuminate or flash when disabled. In an exemplary arrangement, depressing the LED indicator and reset button 240 enables operation of the auxiliary outlets 111, 112 and the USB port 234 so that power may be again supplied from them after the controller discontinues the supply of power thereto when the combined current draw falls from above to below the limit. Of course as is the case with the previously described embodiment, the controller and other circuitry may be operative to also discontinue the supply of electrical power to the auxiliary receptacles and/or USB ports when power draw is required for the magnetron of the microwave or the refrigerator compressor is sensed that power delivery to other devices needs to be discontinued to limit excessive power draw. In such circumstances, the discontinuance of power to the auxiliary receptacles and USB ports may be automatically reinstated responsive to operation of the controller. Alternatively, in other arrangements, manual inputs may be required from a user to reinstitute the electrical delivery therefrom. Further in some exemplary arrangements, the controller may be configured so as to require manual inputs to reinstate electrical delivery only under circumstances where excessive power draw above the limits from the one or more auxiliary outlets or USB ports has occurred, thus requiring a manual input to reinstitute the electrical power delivery therefrom. Of course these approaches are exemplary and in other embodiments other approaches may be used. Other elements of the embodiments of Figures 17-20 may be similar in structure and function as the embodiments shown in Figures 1-11. Thus, the same reference numbers are used in describing these exemplary embodiments to indicate elements that are similar to elements or components in the embodiments shown in Figures 1-11.

[0092] Figure 21 shows the rear portion 244 of the exemplary microwave oven of the embodiments shown in Figures 12-20. Refrigerator outlet 15 is shown on and accessible from the rear portion 244 of the microwave oven and is associated with the LED indicator and reset button 214, which is also provided on the rear portion 244 of the microwave oven. Figure 22 is a similar view as Figure 21 except that an AC electrical cord 8 for the microwave oven is shown.

[0093] In the embodiments shown in Figures 12-22, control models for control logic may be established for execution of executable instructions by the controller or

microprocessor which is also referred to herein as at least one control circuit 4. These models can be in the form of processor executable instructions stored in a computer readable medium, such as software or firmware within the control circuit 104. The exemplary models and logic flow are, in the first instance, dependent on the state of operation of the microwave oven 2. The current demands of the microwave oven 2 are generally the most significant contribution to overload. To avoid overload conditions, in exemplary arrangements power to the low power receptacles or auxiliary outlets, refrigerator receptacle, and/or USB ports is disabled during microwave operation.

[0094] Figure 23 shows a flow chart illustrating several control models for operational scenarios. The control circuit 104 begins by determining whether the microwave oven is turned on or operating (e.g. cooking) in step 246. When the microwave oven is turned on and operating to perform cooking, the rear refrigerator outlet 15, the two auxiliary outlets 111, 112 on the front control panel 22, and the two USB ports 232, 234 on the front control panel are all turned off or disabled, so that the total draw of current for the combination microwave and refrigerator is not over 15 amperes as indicated in step 248.

[0095] When the microwave oven is not drawing cooking power and items are plugged into the two USB ports 232, 234, two auxiliary outlets 111, 112, and rear refrigerator outlet 15, then the exemplary control circuit 104 determines whether the refrigerator outlet 15 is drawing less than 2 amperes (approximately the average amperes when the refrigerator compressor is running) in step 250. If the refrigerator outlet 15 is drawing less than 2 amperes, then all the outlets 15, 111, 112 and USB ports 232, 234 are caused to be enabled, so that power may be supplied through them as indicated in step 252. If the refrigerator outlet 15 not drawing less than 2 amperes, the control circuit 104 determines whether the refrigerator outlet 15 is drawing less than 14 amperes in step 254. If the refrigerator outlet 15 is drawing less than 14 amperes but not less than or greater than or equal to 2 amperes, then the auxiliary outlets 111, 112 and USB ports 232, 234 are disabled or turned off so that no power may be supplied from them as indicated in step 256. The refrigerator outlet 15 remains enabled. If the refrigerator outlet 15 is not drawing less than 14 amperes or drawing greater than

or equal to 14 amperes, then the refrigerator outlet 15 is disabled in step 258. This may be accomplished by tripping the relay 20 of the reset circuit off. In addition, the red LED light on the LED indicator and reset button 214 is turned on to identify the disabled condition of the refrigerator. Then, in step 260, the auxiliary outlets 111, 112 and USB ports 232, 234 are enabled so that power may be supplied through them.

[0096] Then, the exemplary control circuit determines whether the refrigerator outlet 15 is drawing less than 14 amperes in step 262. If the refrigerator outlet 15 is not drawing less than 14 amperes or drawing greater than or equal to 14 amperes, then the refrigerator outlet 15 remains disabled and the red LED light on the LED indicator and reset button 214 remains turned on to identify the disabled condition of the refrigerator 3. This condition may occur, for example, if an electrical heater is plugged into what is normally used as the refrigerator electrical supply outlet 15. When the refrigerator outlet 15 draws less than 14 amperes resulting from the overload condition being eliminated, the refrigerator outlet 15 will be enabled by the control circuit so that power may supplied to the refrigerator outlet 15 upon the LED indicator and reset button 214 being depressed as indicated in step 264. Depression of the LED indicator and reset button 214 in this condition will also turn off the red LED light. The process then ends. It should be noted that the at least one control circuit 104 can make the determination in steps at the same time or in a different order.

[0097] It should be understood that in exemplary embodiments, determination as to the power draw from receptacles that have been disabled, may be determined through a process of again supplying power output through the receptacle. The power draw from the receptacle is monitored continuously after the power is restored and if it is detected that the power draw exceeds a threshold or other determined amount, power is discontinued to the receptacle. In some exemplary arrangements, the power sensing circuitry may operate in conjunction with the controller to calculate the current power draw level. The control circuitry may also operate in accordance with its programming to determine that other connected devices are consuming power which may necessitate not providing power to the receptacle so as to avoid an overload condition. Alternatively or in addition, the control circuitry may be operative to monitor other conditions that

may be indicative of a problem when the power is restored to a receptacle, port or other control outlet. For example, responsive to a manual input to reinstitute the supply of power thereto, the control circuitry may operate to recognize conditions that correspond to an electrical short or other malfunction which necessitates an immediate withdrawal of electrical power thereto. This may include, for example, monitoring the rate at which power is drawn and the current flow increases to detect a short or other fault condition. Numerous different types of detection circuitry and control approaches may be implemented in order to help assure that if power output has been discontinued, that excessive power draw or undesirable conditions are not a problem when power is reinstated.

[0098] Although exemplary embodiments are described herein as used in conjunction with vapor compression refrigerators, embodiments employing the principles described herein may also be used with other types of refrigerators. Such refrigerators may include refrigerators that use thermoelectric cooling, such as Peltier elements to provide cooling. Other embodiments may include absorption refrigerators to provide cooling. In such embodiments the components of the refrigerator apparatus which draw electrical power, are controlled through operation of at least one control circuit, to prevent, suspend or defer the operation thereof at times when the microwave radiation emitting cooking element of other components that draw electrical power are to be operated, so as to avoid exceeding a maximum threshold for current draw for the combined appliance that is permitted by the at least one control circuit.

[0099] It should be understood that the above description is only illustrative of the exemplary embodiments. Various alternatives and modifications can be devised by those skilled in the art without departing from the teachings of exemplary embodiments. Accordingly, the present application is intended to embrace all such alternatives, modifications and variances which fall with the scope of the appended claims.

[0100] Thus the exemplary systems, arrangements, and methods of operation that have been described herein achieve desirable capabilities, eliminate difficulties

encountered in the use of prior devices and systems and attain the useful results described herein.

[0101] In the foregoing description, certain terms have been used in describing exemplary embodiments for purposes of brevity, clarity and understanding. However, no unnecessary limitations are to be implied therefrom because such terms are used for descriptive purposes and are intended to be broadly construed. Moreover, the descriptions and illustrations herein are by way of examples and the inventive features are not limited to the particular features shown and described.

[0102] Further it should be understood that elements, features, relationships, devices and other aspects described in connection with one exemplary embodiment may be utilized in connection with other exemplary embodiments such that numerous different arrangements, functions and capabilities may be carried out. Numerous different aspects of described embodiments may be used together or in different combinations to achieve useful results.

[0103] Having described the features, discoveries and principles of the exemplary embodiments, the manner in which they are constructed and operated, and the advantages and useful results attained, the new and useful structures, devices, elements, arrangements, parts, combinations, systems, equipment, operations, methods, processes and relationships are set forth in the appended claims.

CLAIMS

We claim:

1. Apparatus comprising:

a microwave oven,

wherein the microwave oven includes:

a radiation emitting microwave element,

a microwave housing, wherein the microwave housing bounds a cooking interior area, wherein the radiation emitting microwave element is operative to irradiate the cooking interior area,

wherein an air passage extends between the cooking interior area and an exterior of the housing,

at least one power control circuit, wherein the at least one power control circuit is operative to cause

electrical power to be selectively delivered to the microwave element,

wherein the microwave oven further includes at least one sensor emitter and at least one sensor receiver configured to receive radiation from the at least one

sensor emitter, wherein the at least one sensor emitter and the at least one sensor receiver extends in the air passage such that air from at least a portion of the cooking interior area extends intermediate of the at least one sensor emitter and the at least one sensor receiver,

at least one safety circuit, wherein the at least one safety circuit is in operative connection with the at least one sensor emitter, the at least one sensor receiver, and the microwave element,

wherein the at least one safety circuit is operative to cause

the at least one sensor emitter to emit sensor radiation and the at least one sensor receiver to sense sensor radiation from the at least one sensor emitter while the microwave element operates during a current cooking session,

data to be stored in a memory associated with the at least one sensor circuit corresponding to an initial transmissivity level of transmitted radiation from the at least one sensor emitter that reaches the at least one sensor receiver early in the current cooking session,

comparison of a current level of transmitted radiation during the current cooking session that reaches the at least one sensor receiver, and the initial transmissivity level,

a determination based on the stored data that the current level of transmitted radiation from the at least one sensor emitter

that reaches the at least one sensor receiver has fallen by at least a threshold amount from the initial transmissivity level during the current cooking session, due to smoke in the cooking interior area,

responsive at least in part to the determination, the microwave element to no longer be supplied with electrical power to prematurely end the current cooking session,

wherein the at least one safety circuit is configured to reset after the premature end of the current cooking session responsive to the at least one sensor circuit, so that the at least one sensor circuit is operative to cause the radiation emitting microwave element to be allowed to be supplied with electrical power during a next subsequent cooking session.

2. The apparatus according to claim 1

wherein the microwave oven housing includes a fan, wherein the fan is operative to cause air from the cooking interior area to move through the air passage.

3. The apparatus according to claim 1 and further including

a power supply outlet, wherein the power supply outlet is provided on the microwave oven,

wherein the power supply outlet is configured to receive an electrical connection to an appliance having lower power requirements than power requirements of the microwave oven,

wherein the at least one power control circuit is operative to cause

electrical power to be selectively delivered to the microwave element and the power supply outlet, wherein the power supply outlet does not operate to supply power therefrom when the microwave element draws cooking power.

4. The apparatus according to claim 1 and further comprising:

a power supply outlet provided on the microwave oven wherein the power supply outlet is in operative connection with the at least one power control circuit,

a refrigerator configured to be connected to the power supply outlet,

wherein the refrigerator includes a refrigerator housing, wherein the refrigerator housing bounds a cooled refrigerator interior area, wherein the refrigerator housing is in a fixed operative connection with the microwave housing, wherein the refrigerator includes a refrigerant compressor, wherein the refrigerant compressor is operative to compress refrigerant material, wherein the refrigerant is operative to cause cooling of the cooled refrigerator interior area,

wherein the at least one power control circuit is configured to:

disable refrigerator operation by not supplying electrical power to the compressor when the microwave element draws cooking power;

enable refrigeration operation by supplying electrical power to the compressor when the microwave element does not draw cooking power.

5. The apparatus according to claim 4

wherein the microwave oven includes a USB port, wherein the USB port is in operative connection with the at least one power control circuit,

wherein the USB port is not operative when the microwave element draws cooking power.

6. The apparatus according to claim 4

wherein the microwave oven includes an inductance charging pad, wherein the inductance charging pad is in operative connection with the at least one power control circuit,

wherein the inductance charging pad is not operative when the microwave element draws cooking power.

7. The apparatus according to claim 4 and further including

a wireless interface, wherein the wireless interface is in operative connection with the at least one control circuit,

wherein the wireless interface is operative to transmit signals indicative of a condition of at least one of the microwave oven and the refrigerator, to a wireless mobile device.

8. The apparatus according to claim 4 and further including

a temperature sensor, wherein the temperature sensor is operative to sense a temperature corresponding to temperature in the cooking interior area,

wherein the temperature sensor is in operative connection with the at least one sensor circuit,

wherein the at least one power control circuit is operative to cause the microwave element to no longer be supplied with cooking power to prematurely end the current cooking session responsive at least in part to

the determination, and

the temperature being sensed above a temperature level during the current cooking session.

9. Apparatus comprising:

a microwave oven configured to be connected to a source of electrical power and having a control circuit, wherein the control circuit is configured to control operation of the microwave oven;

a smoke sensor, wherein the smoke sensor is positioned in an air passage that extends between a cooking area inside the microwave oven and air outside the microwave oven, wherein the smoke sensor is in operative connection with the control circuit, wherein the smoke sensor is configured to cause cooking power to the microwave oven to be withdrawn prior to a set end time of a current cooking session upon the smoke sensor sensing smoke indicative of a dangerous condition; and

wherein the smoke sensor is configured to be reset after ending the current cooking session prior to the set end time based on sensing the smoke indicative of the dangerous condition, to enable the microwave oven to receive cooking power in a next subsequent cooking session responsive at least in part to the smoke sensor no longer sensing the smoke indicative of the dangerous condition.

10. The apparatus according to claim 9 and further comprising:

a power supply outlet on the microwave oven,

wherein the power supply outlet is in operative connection with the control circuit,

a refrigerator,

wherein the refrigerator is electrically connected with the power supply outlet,

wherein the control circuit is operative to

withdraw electrical power from the refrigerator when the microwave oven draws cooking power,

deliver electrical power to the refrigerator when the microwave oven does not draw cooking power.

11. The apparatus according to claim 10, wherein the smoke sensor includes at least one of

a photosensor,

a motion sensor,

an ionization sensor,

a VOC sensor,

a sensor including a radiation emitter and a radiation receiver.

12. The apparatus according to claim 10

wherein the microwave oven includes a USB port, wherein the USB port is in operative connection with the control circuit,

wherein the control circuit causes the USB port not to be operative when the microwave oven draws cooking power.

13. The apparatus according to claim 10

wherein the microwave oven includes an inductance charging pad,

wherein the inductance charging pad is in operative connection with the control circuit,

wherein the control circuit causes the inductance charging pad not to be operative when the microwave oven draws cooking power.

14. The apparatus according to claim 10

and further including a wireless interface, wherein the wireless interface is in operative connection with the control circuit,

wherein the wireless interface is operative to transmit signals indicative of a condition of at least one of the microwave oven and the refrigerator to a wireless mobile device.

15. The apparatus according to claim 10 and further including

a temperature sensor, wherein the temperature sensor is operative to sense a temperature corresponding to temperature in the cooking area,

wherein the temperature sensor is in operative connection with the smoke sensor,

wherein the control circuit is operative to cause cooking power to the microwave oven to be withdrawn prior to the set end time of the current cooking session, responsive to the smoke sensor sensing smoke indicative of the dangerous condition and the temperature being sensed above a temperature level during the cooking session.

16. The apparatus according to claim 10

wherein the smoke sensor includes a sensor emitter and a sensor receiver, wherein the sensor receiver is configured to receive radiation output from the sensor emitter,

a sensor circuit, wherein the sensor circuit is in operative connection with the sensor emitter, the sensor receiver and the control circuit,

wherein the sensor circuit is operative to cause

the sensor emitter to emit radiation and the receiver to sense radiation from the emitter while the microwave oven operates during a current cooking session,

data to be stored in a memory associated with the sensor circuit corresponding to an initial transmissivity level of transmitted radiation from the sensor emitter that reaches the sensor receiver early in the current cooking session,

comparison of a current level of transmitted radiation that reaches the sensor receiver during the current cooking session, and the initial transmissivity level,

a determination based on the stored data, that the current level of transmitted radiation from the sensor emitter that reaches the sensor receiver has fallen by at least a threshold amount from the initial transmissivity level during the current cooking session, wherein the determination corresponds to smoke indicative of the dangerous condition,

wherein cooking power to the microwave oven is withdrawn prior to the set end time of the current cooking session responsive at least in part to the determination.

17. Apparatus comprising:

a microwave oven configured to be connected to a source of electrical power and having a control circuit to control operation of the microwave oven, wherein the microwave oven includes an interior cooking area, wherein the microwave oven includes an air passage that extends between the cooking area and outside the microwave oven,

a smoker sensor, wherein the smoke sensor is positioned in the air passage, wherein the smoke sensor is configured to cause cooking power to be withdrawn from the microwave oven prior to a set end time of a current cooking session responsive at least in part to the smoke sensor sensing at least one change in an amount of smoke sensed by the smoke sensor which at least one change corresponds to a dangerous condition, and

wherein in the control circuit is configured to reset after ending the current cooking session prior to the set end time due to sensing the dangerous condition, to enable cooking power to again be available to the microwave oven in a next subsequent cooking session responsive at least in part to the smoke sensor no longer sensing the dangerous condition.

18. The apparatus according to claim 17 and further comprising:

a power supply outlet on the microwave oven,

a refrigerator configured to be connected to the source of electrical power by connection to the power supply outlet, wherein the refrigerator includes a compressor,

wherein the control circuit is operative to cause

electrical power to be unavailable to the compressor, when the microwave oven demands cooking power,

electrical power to be available to the compressor when the microwave oven does not demand cooking power.

19. The apparatus according to claim 18, wherein the smoke sensor includes at least one of

a radiation emitter and radiation receiver,

a photosensor,

a motion sensor,

an ionization sensor,

a VOC sensor.

20. The apparatus according claim 18, wherein the microwave oven further includes at least one output device including at least one of

a USB port,

an inductance charging pad,

an auxiliary electrical outlet,

wherein the at least one output device is in operative connection with control circuit, and wherein the control circuit is operative to cause the at least one output device to be inoperative when the microwave oven demands cooking power.

Petitioner Ex 1003, Page 57 of 210

ABSTRACT

A combination microwave and refrigerator system is provided. The microwave oven is connected to a source of power and has a control circuit for controlling the operation of the microwave oven. A first power supply outlet is provided on the microwave oven. A refrigerator is connected to the source of power by connection to the first power supply outlet. The control circuit is configured to disable the cooking operation of the refrigerator, when the microwave oven demands cooking power, and enable the cooling operation of the refrigerator when the microwave oven is not drawing cooking power. A safety sensor is provided in the microwave oven, and is configured to cause cooking power to the microwave oven to be turned off upon the safety sensor sensing a dangerous condition.

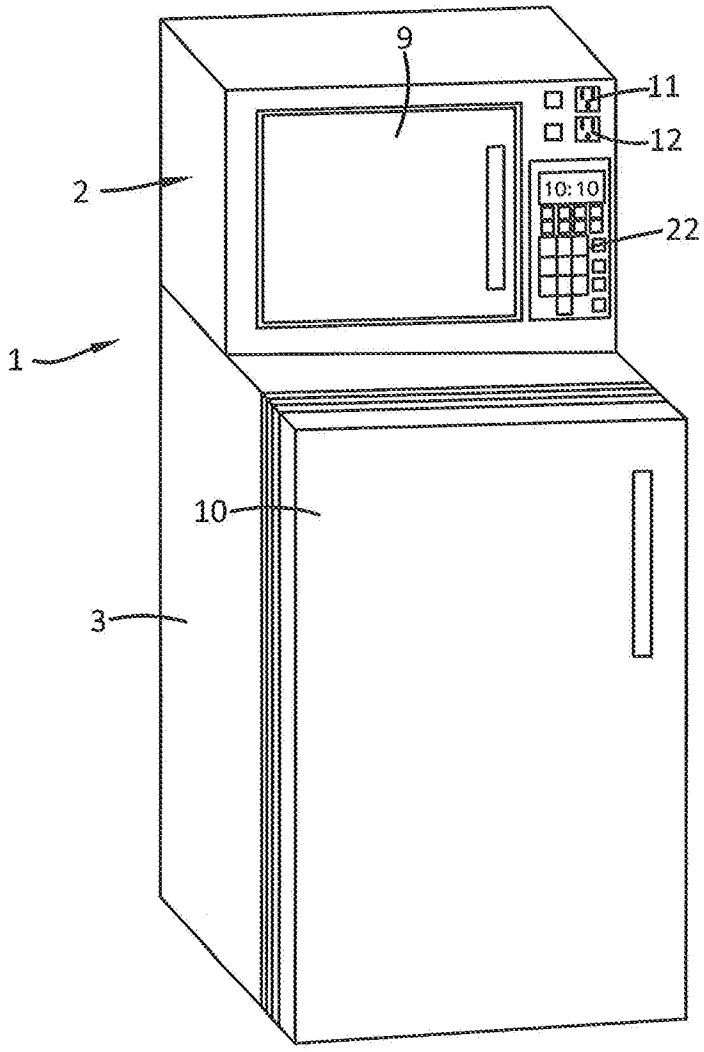


FIGURE 1

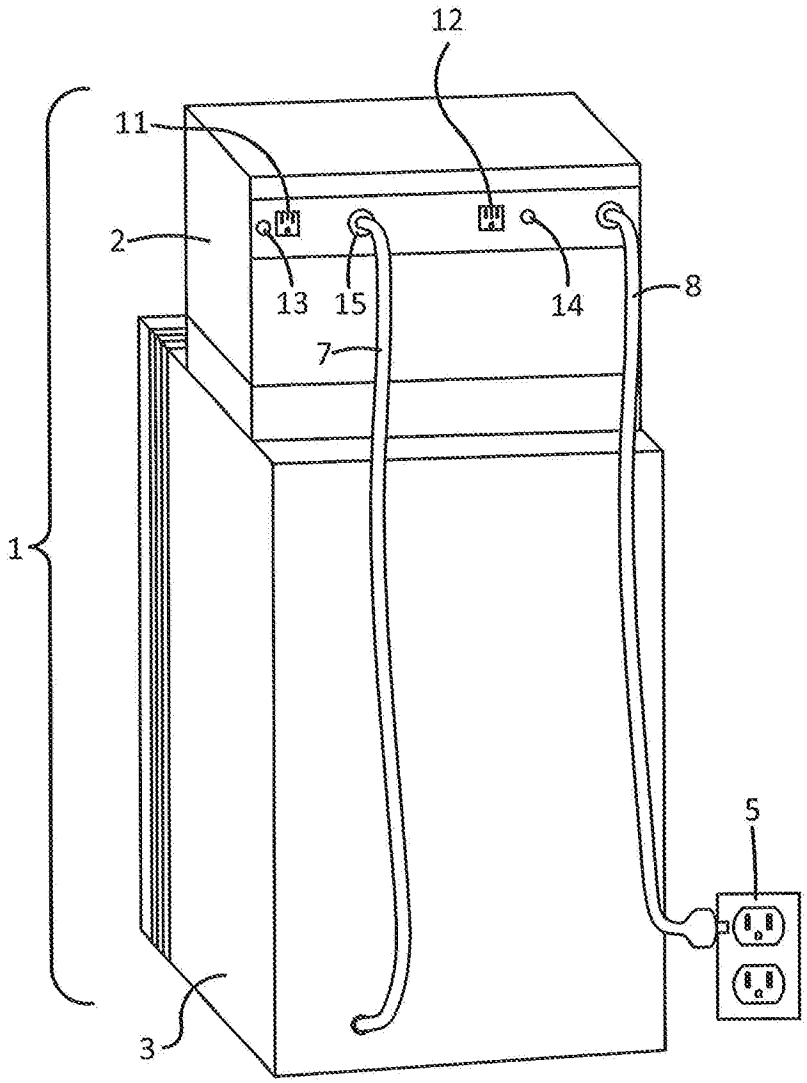


FIGURE 2

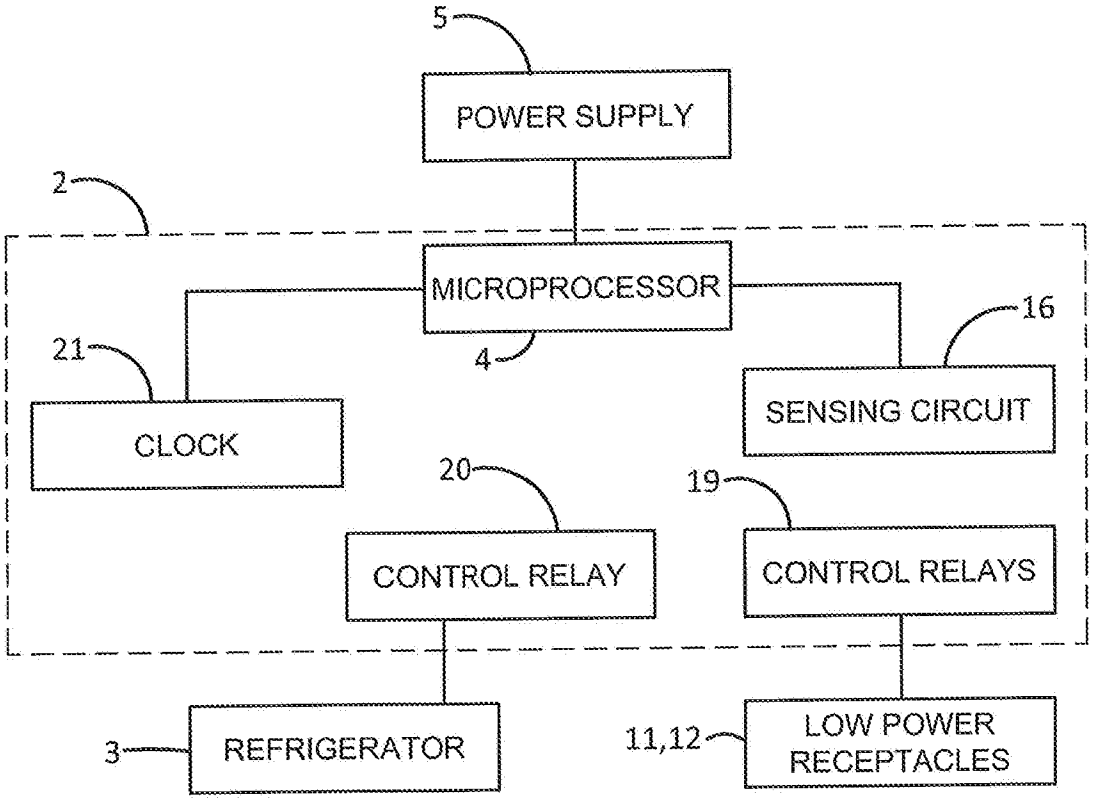

5
POWER SUPPLY
2
MICROPROCESSOR
16
21
4
SENSING CIRCUIT
CLOCK
20
19
CONTROL RELAY
CONTROL RELAYS
3
REFRIGERATOR
11,12
LOW POWER
RECEPTACLES

FIGURE 3

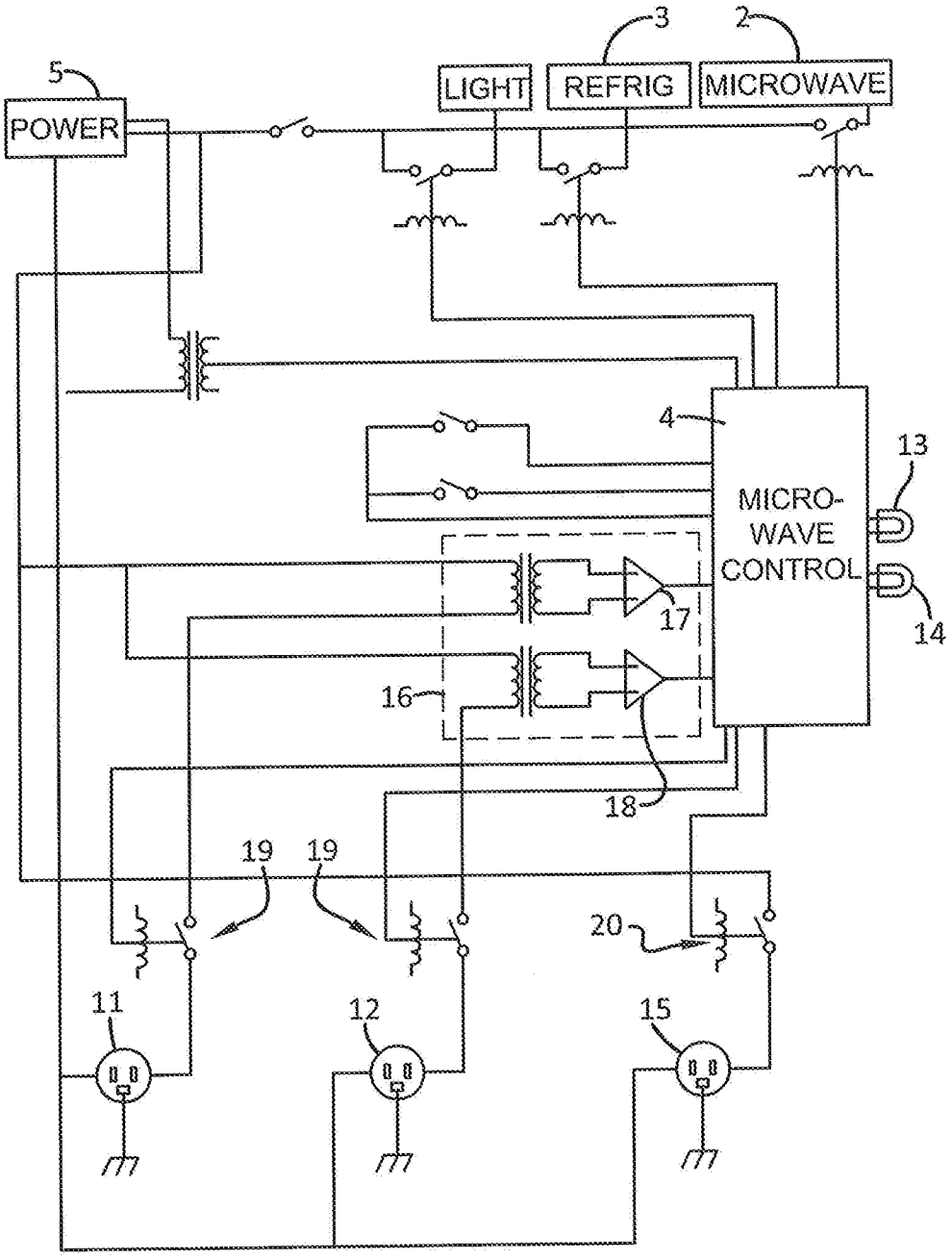

3
2
5
LIGHT
REFRIG
MICROWAVE
POWER
4
13
MICRO-
WAVE
CONTROL
17
14
16
18
19
19
20
11
12
15

FIGURE 4

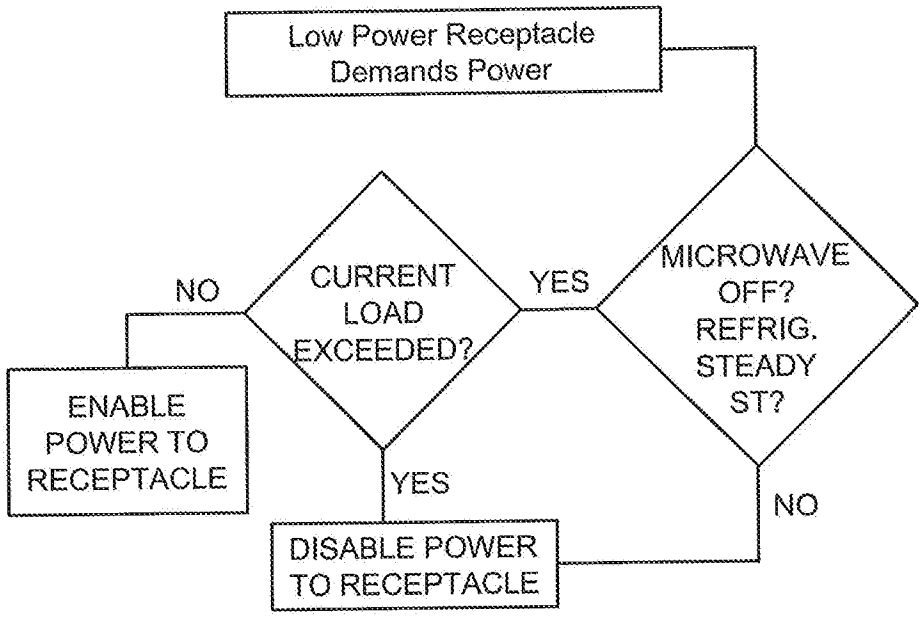


FIGURE 5

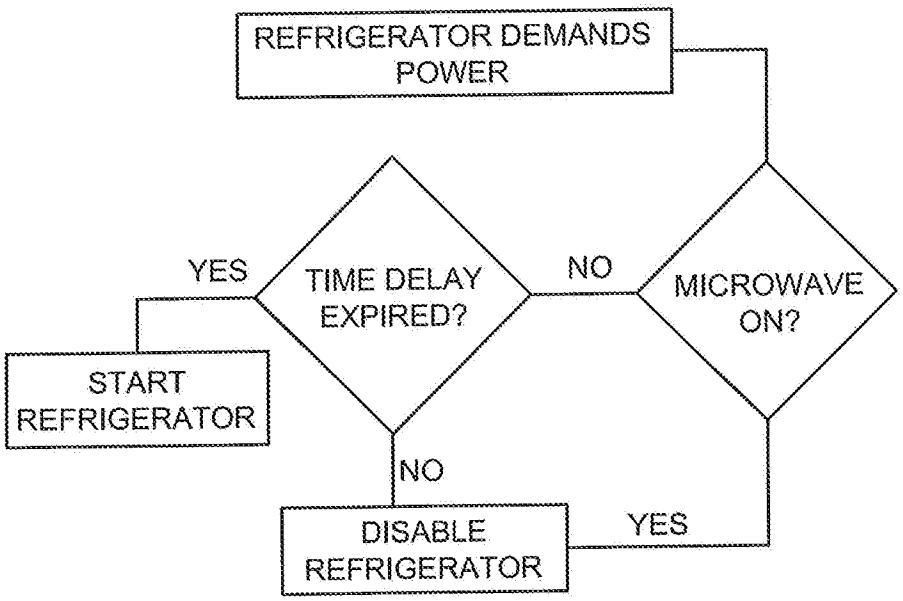


FIGURE 6

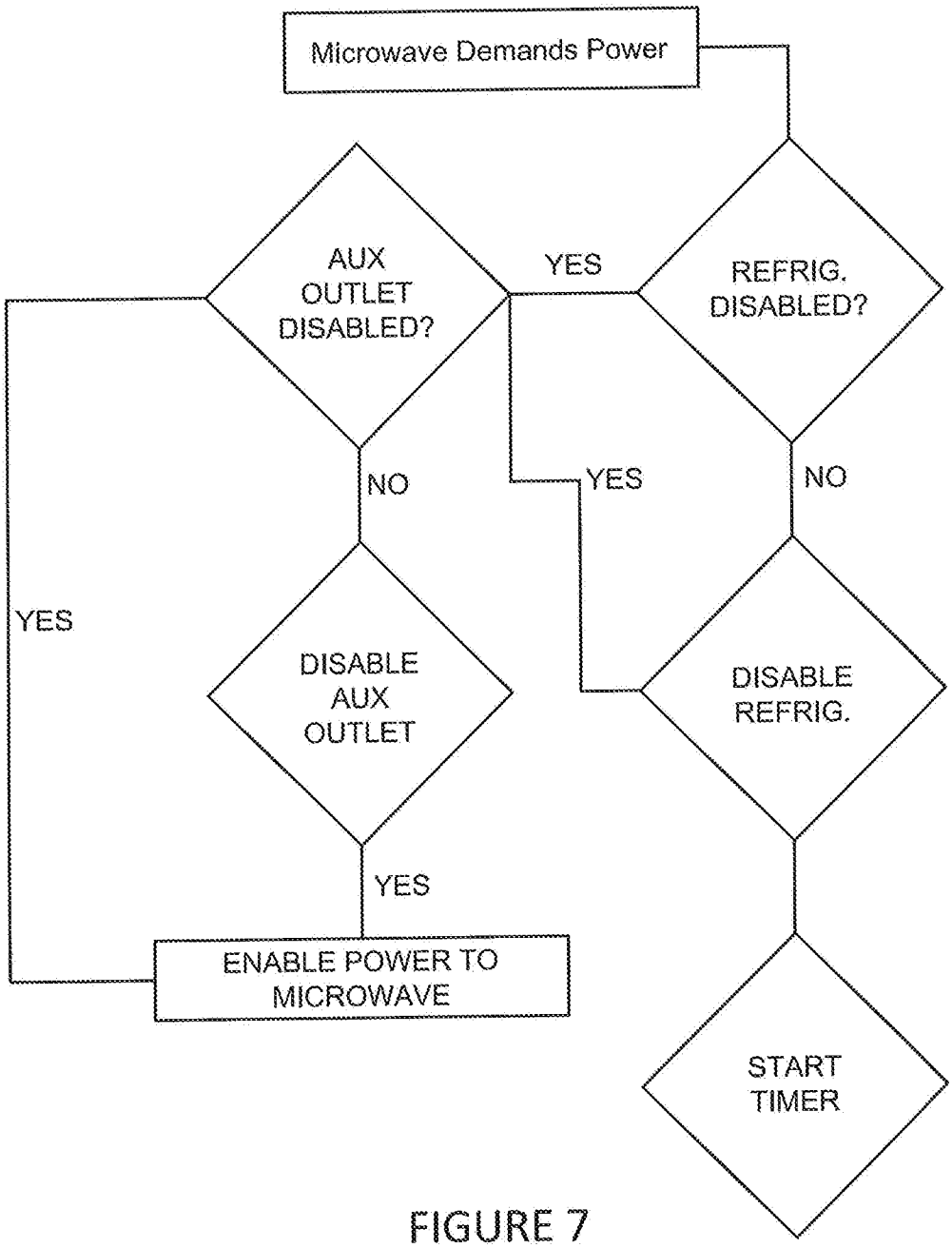

Microwave Demands Power
AUX OUTLET DISABLED?
YES
REFRIG. DISABLED?
NO
YES
NO
YES
DISABLE AUX OUTLET
DISABLE REFRIG.
YES
ENABLE POWER TO MICROWAVE
START TIMER

FIGURE 7

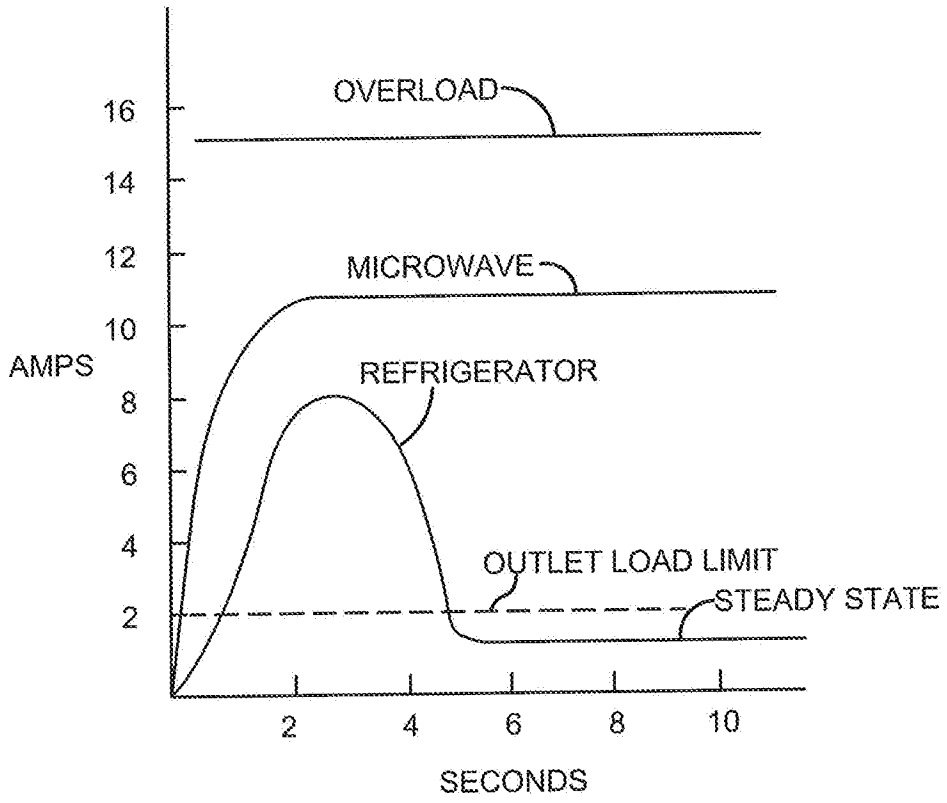

OVERLOAD
MICROWAVE
REFRIGERATOR
OUTLET LOAD LIMIT
STEADY STATE
AMPS
16
14
12
10
8
6
4
2
2
4
6
8
10
SECONDS

FIGURE 8

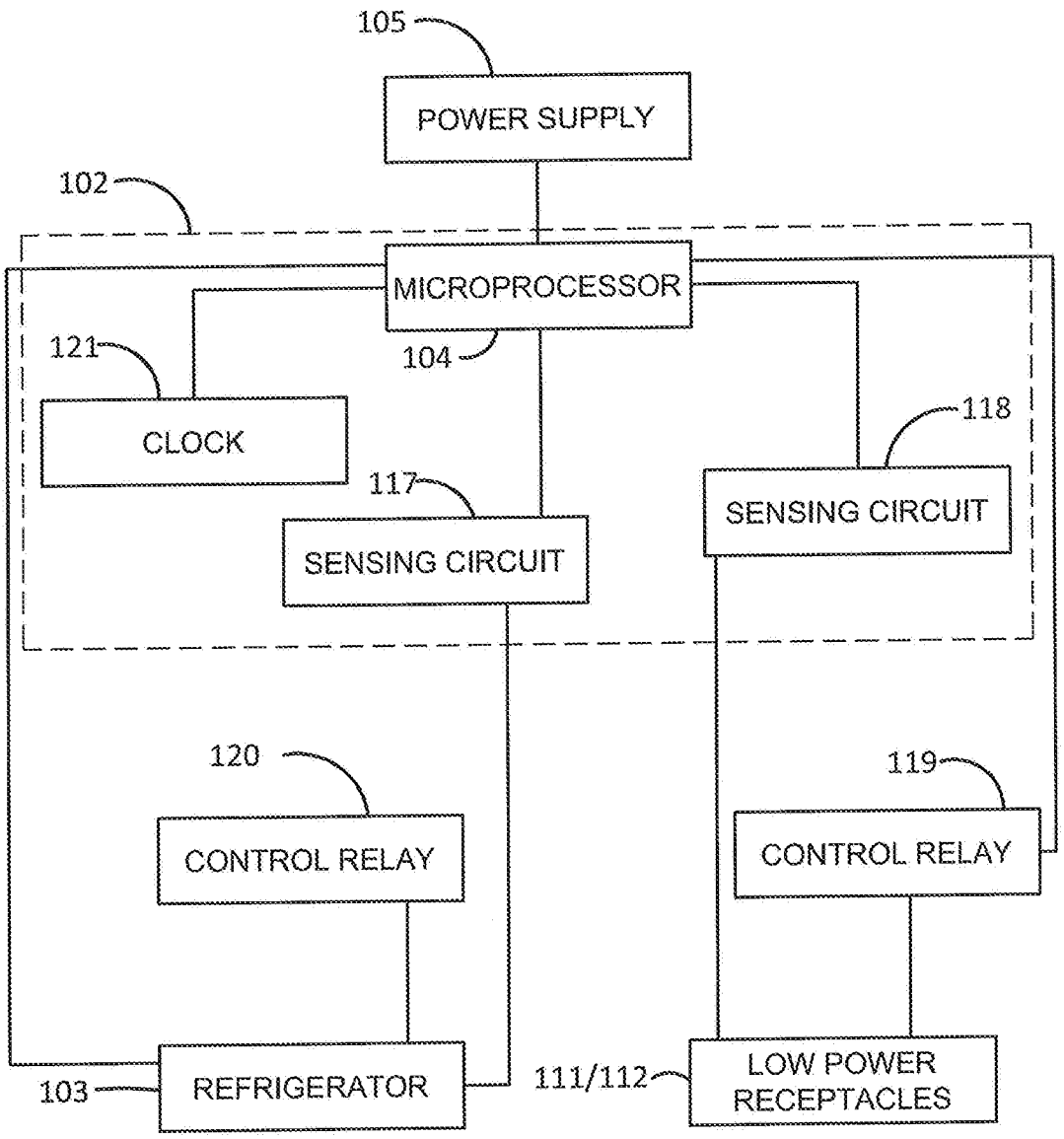

105
POWER SUPPLY
102
MICROPROCESSOR
104
121
CLOCK
117
SENSING CIRCUIT
118
SENSING CIRCUIT
120
CONTROL RELAY
119
CONTROL RELAY
103
REFRIGERATOR
111/112
LOW POWER RECEPTACLES

FIGURE 9

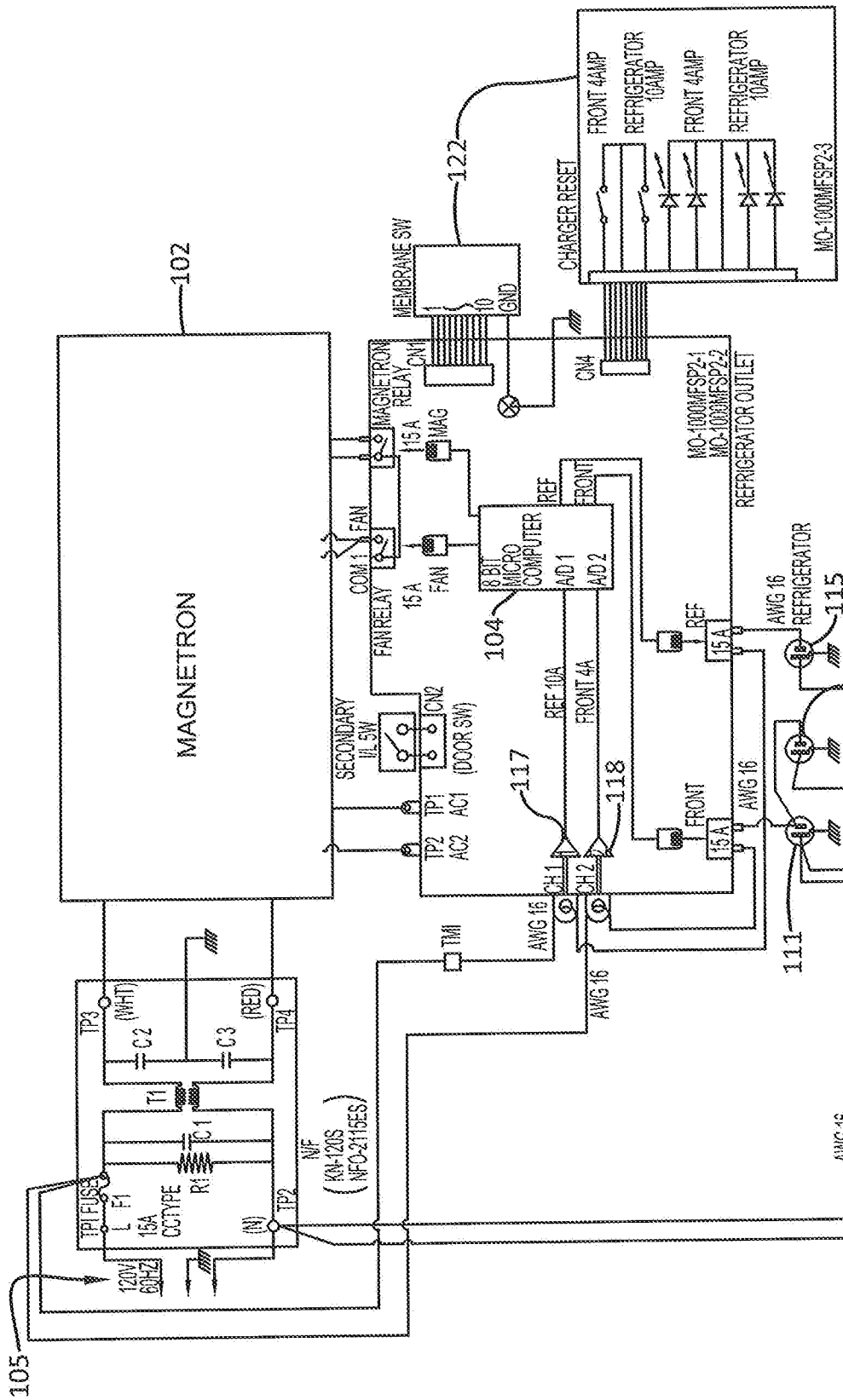

102
MAGNETRON
105
120V 60HZ
TP1 FUSE
F1
15A
CCTYPE
L
(N)
TP2
R1
C1
T1
C2
C3
TP3
(WHT)
(RED)
TP4
N/F
(KN-120S
NFO-2116ES)
MEMBRANE SW
1
10
GND
122
CN1
MAGNETRON
RELAY
15A
MAG
FAN
COM 1
FAN RELAY
15A
FAN
8 BIT
MICRO
COMPUTER
104
A/D 1
A/D 2
REF
FRONT
SECONDARY
I/L SW
CN2
(DOOR SW)
TP1
AC1
TP2
AC2
117
118
REF 10A
FRONT 4A
CH 1
CH 2
AWG 16
TIMI
CHARGER RESET
CN4
FRONT 4AMP
REFRIGERATOR
10AMP
FRONT 4AMP
REFRIGERATOR
10AMP
MO-1000MFSP2-3
MO-1000MFSP2-1
MO-1003MFSP2-2
REFRIGERATOR OUTLET
REF
15A
FRONT
15A
AWG 16
REFRIGERATOR
115
112
111
CHARGER 2 OUTLET
CHARGER 1 OUTLET
AWG 16
AWG 16

FIGURE 10

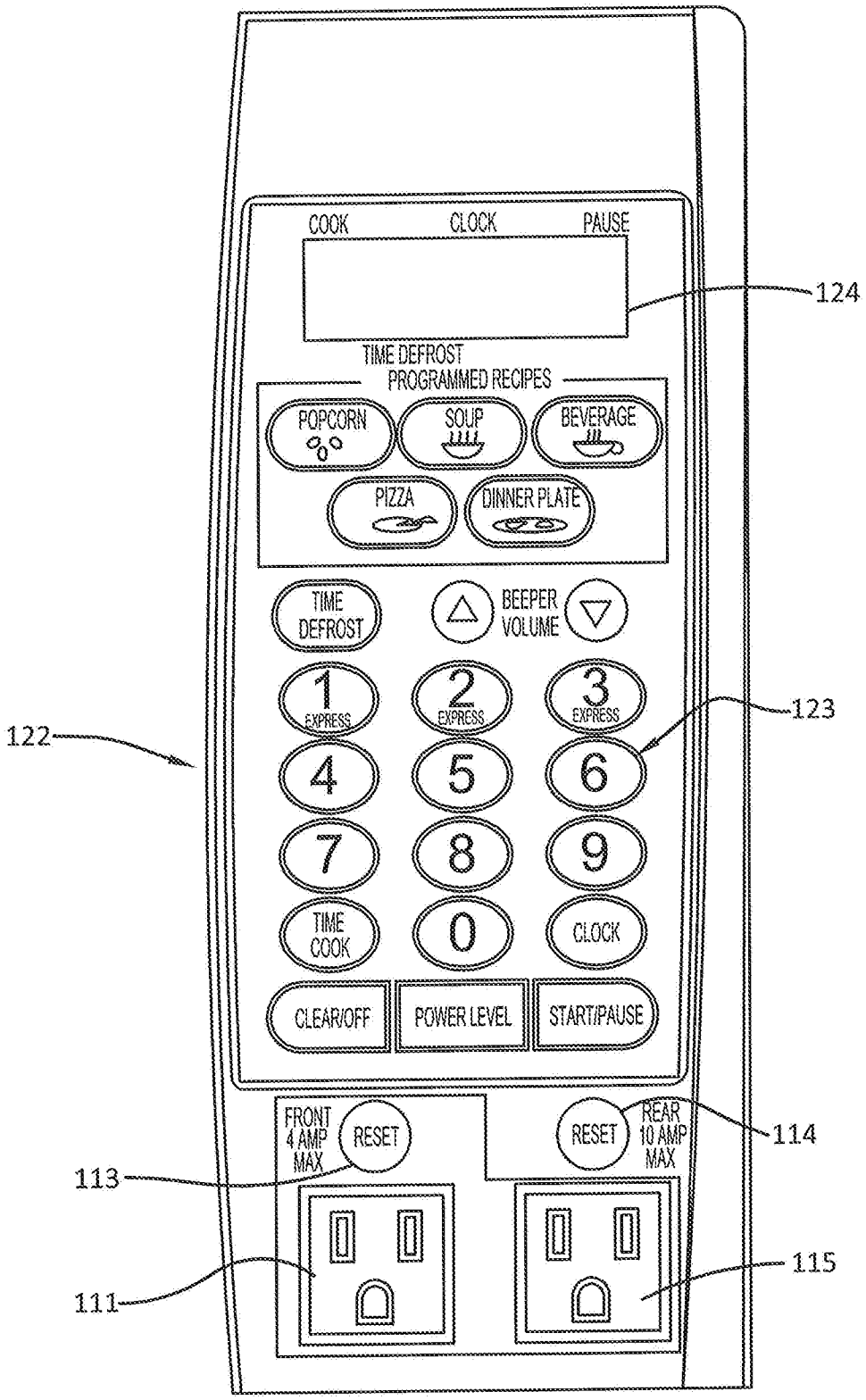

COOK
CLOCK
PAUSE
124
TIME DEFROST
PROGRAMMED RECIPES
POPCORN
SOUP
BEVERAGE
PIZZA
DINNER PLATE
TIME DEFROST
BEEPER VOLUME
1 EXPRESS
2 EXPRESS
3 EXPRESS
123
122
4
5
6
7
8
9
TIME COOK
0
CLOCK
CLEAR/OFF
POWER LEVEL
START/PAUSE
FRONT 4 AMP MAX
RESET
RESET
REAR 10 AMP MAX
114
113
111
115

FIGURE 11

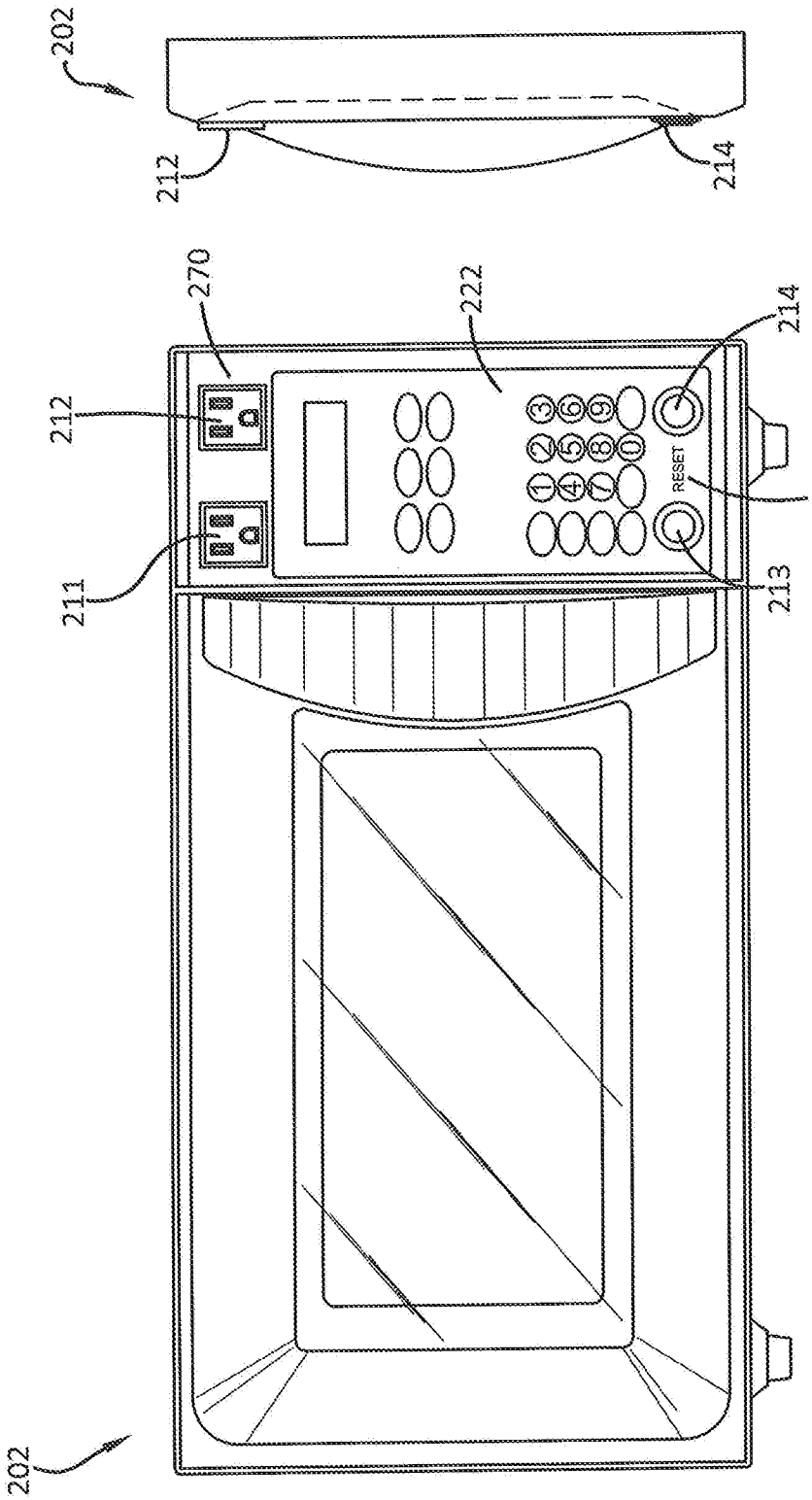


FIGURE 13

FIGURE 12

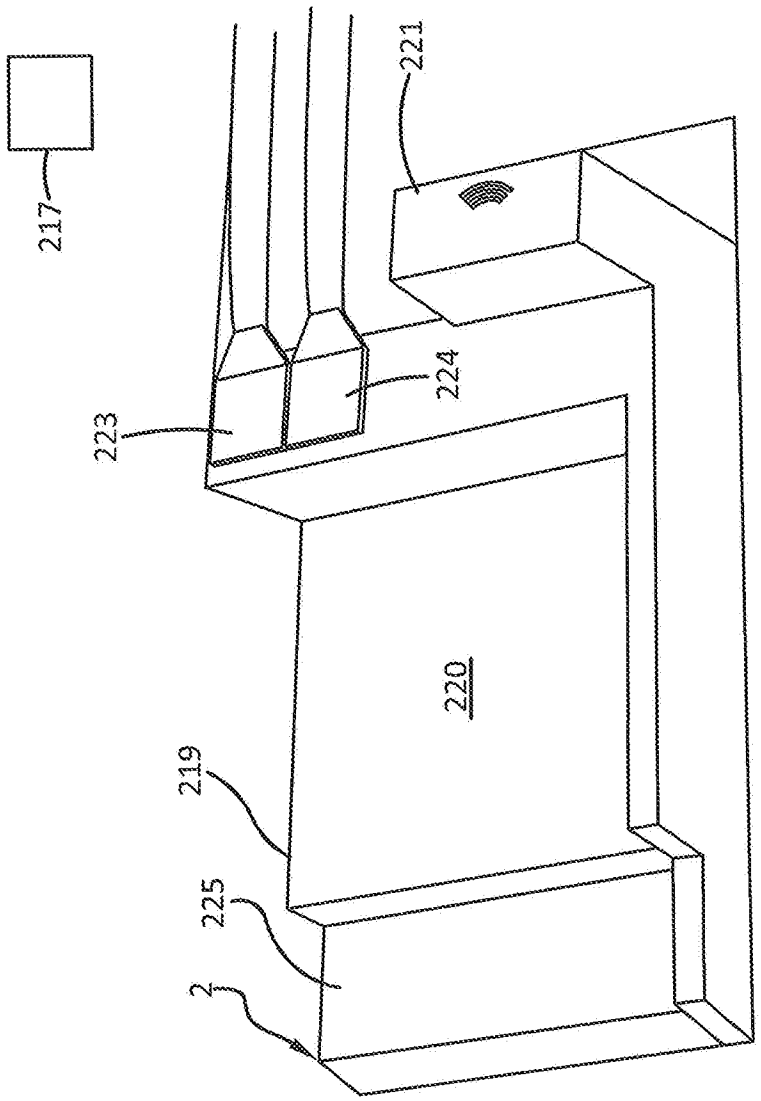


FIGURE 14

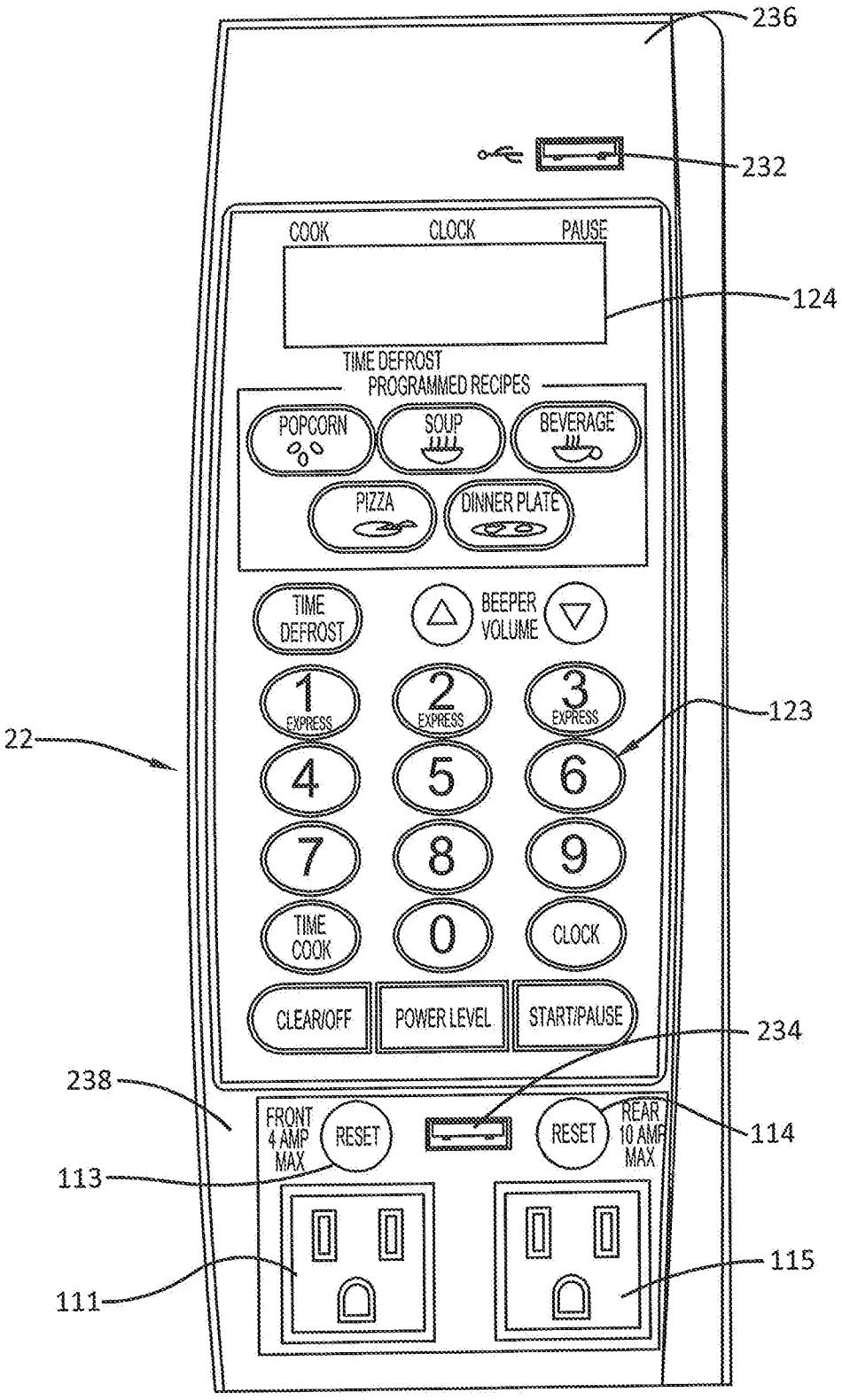

236
232
COOK
CLOCK
PAUSE
124
TIME DEFROST
PROGRAMMED RECIPES
POPCORN
SOUP
BEVERAGE
PIZZA
DINNER PLATE
TIME DEFROST
BEEPER VOLUME
1 EXPRESS
2 EXPRESS
3 EXPRESS
123
22
4
5
6
7
8
9
TIME COOK
0
CLOCK
CLEAR/OFF
POWER LEVEL
START/PAUSE
234
238
FRONT 4 AMP MAX
RESET
RESET
REAR 10 AMP MAX
114
113
111
115

FIGURE 15

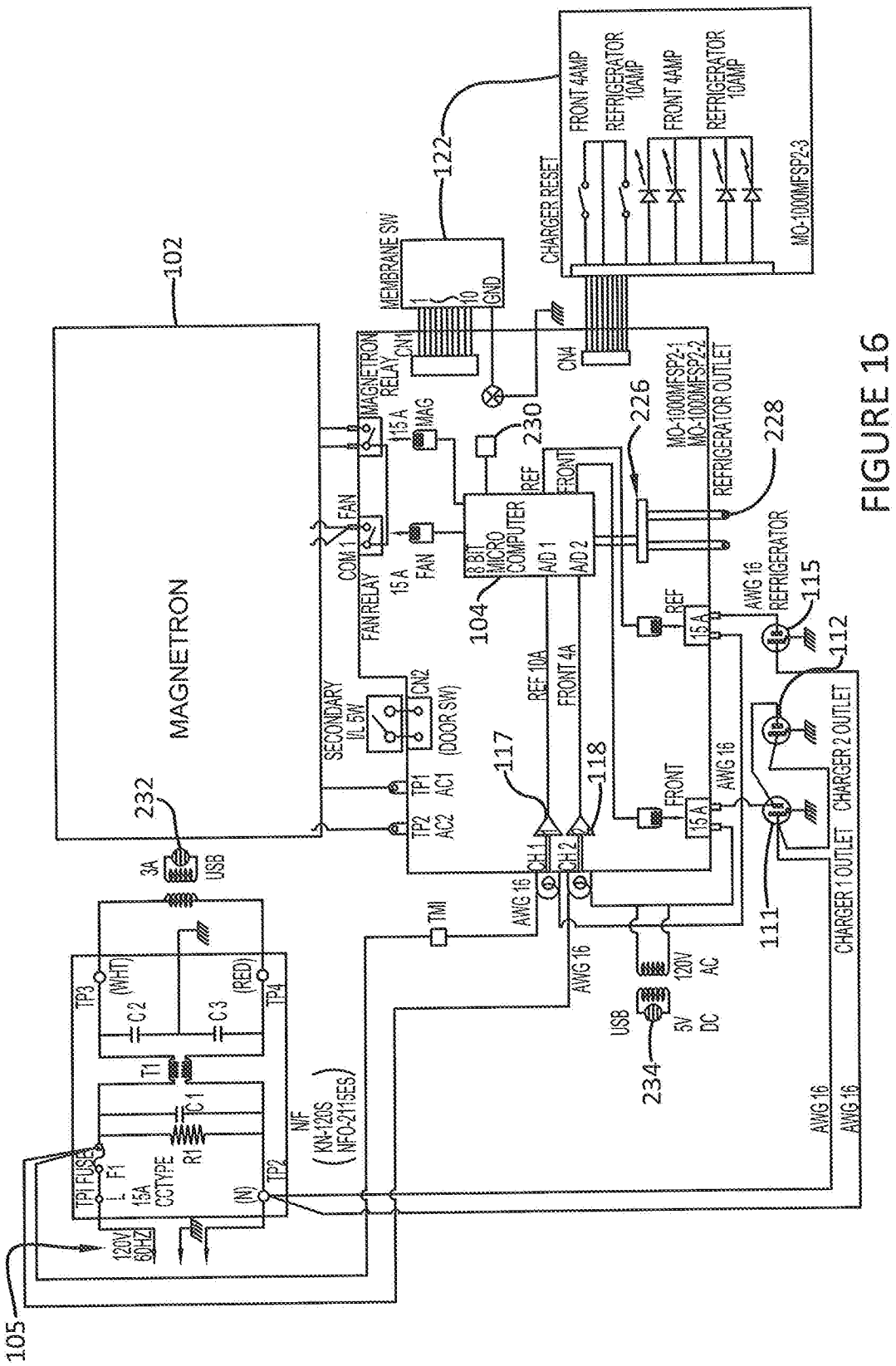

MAGNETRON
102
105
120V 60HZ
TP1 FUSE
F1
15A
CCITYPE
R1
TC1
T1
C2
C3
TP3
(WHT)
TP4
(RED)
TP2
(N)
NF
(KN-128S
NFO-211ES)
3A
USB
232
234
TM1
AWG 16
CH 1
CH 2
117
118
SECONDARY
IL 5W
CN2
(DOOR SW)
TP1
AC1
TP2
AC2
FAN RELAY
COM 1
FAN
15 A
MAGNETRON
RELAY
CN1
115 A
MAG
8 BIT
MICRO
COMPUTER
104
A/D 1
A/D 2
REF
FRONT
230
226
228
REFRIGERATOR OUTLET
MO-1000MFSP2-1
MO-1000MFSP2-2
REF 10A
FRONT 4A
REF
15 A
FRONT
15 A
AWG 16
REFRIGERATOR
115
112
111
CHARGER 1 OUTLET
CHARGER 2 OUTLET
120V
AC
5V
DC
USB
MEMBRANE SW
1
10
GND
122
CN4
CHARGER RESET
FRONT 4AMP
REFRIGERATOR
10AMP
FRONT 4AMP
REFRIGERATOR
10AMP
MO-1000MFSP2-3

FIGURE 16

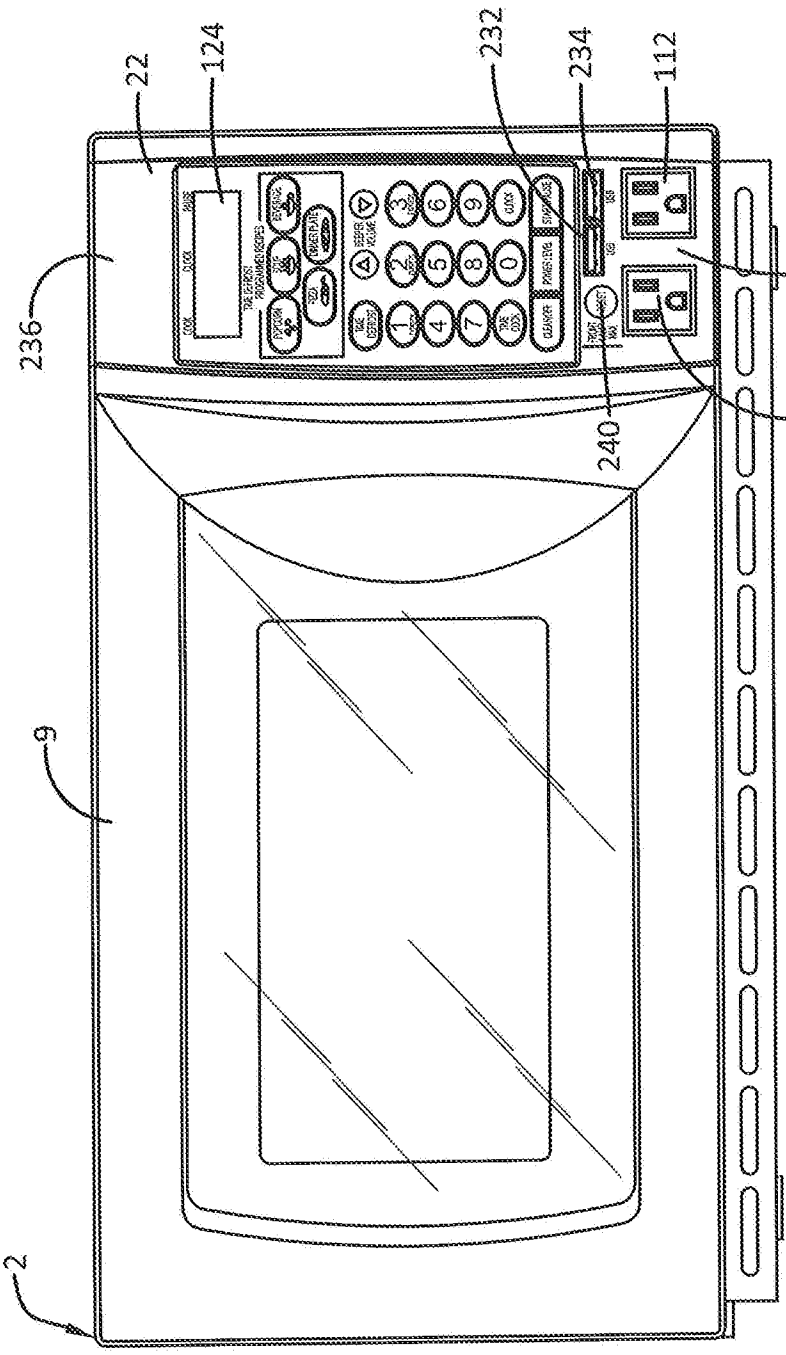


FIGURE 17

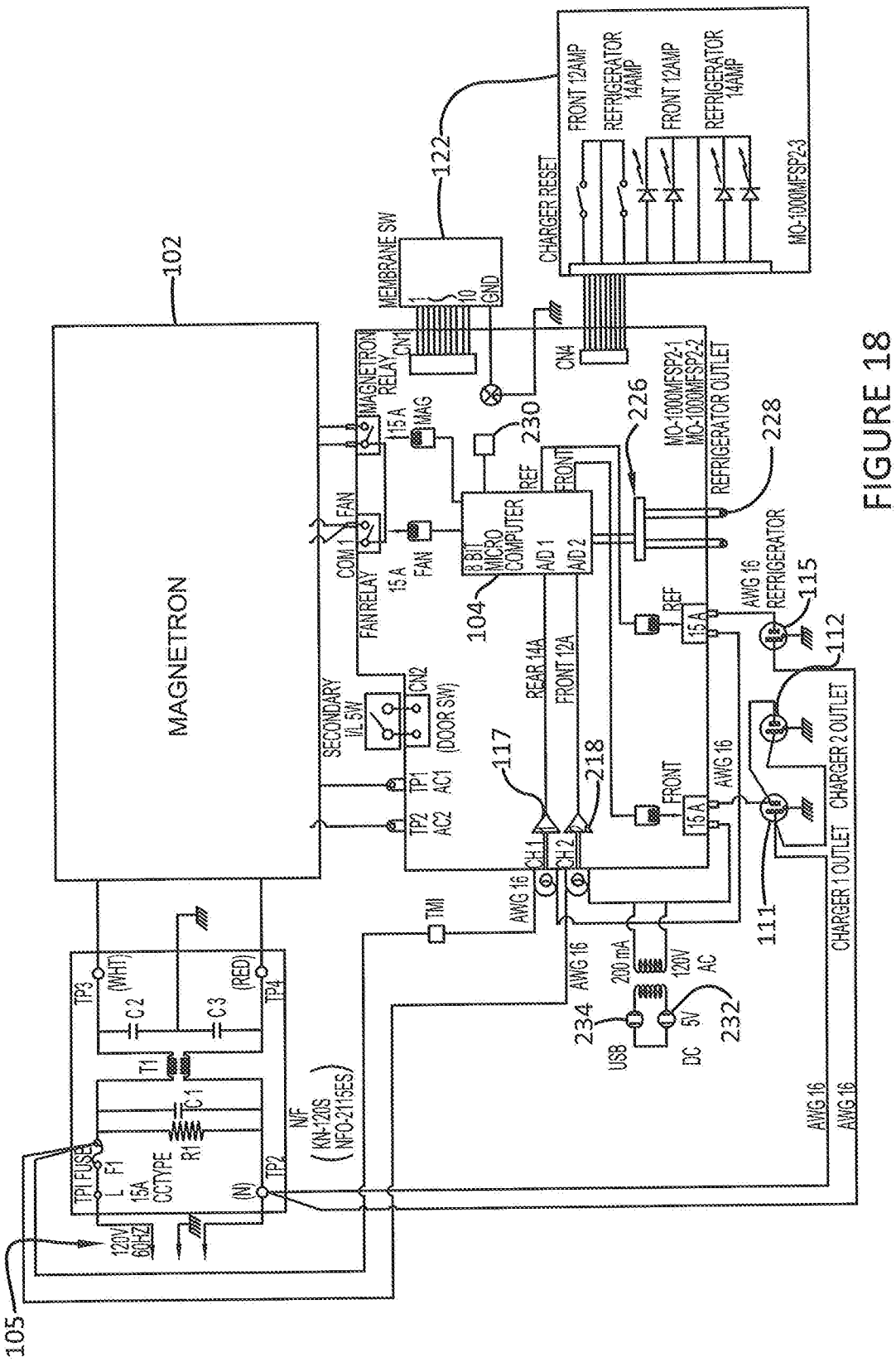

105
120V 60HZ
TP1 FUSE
L F1 15A CCTYPE
R1
TC1
T1
TP3
(WHT)
C2
C3
(RED)
TP4
TP2
(N)
N/F (KN-120S NFO-2115ES)
102
MAGNETRON
SECONDARY
IIL 5W
CN2 (DOOR SW)
TP1 AC1
TP2 AC2
MAGNETRON RELAY
CN1
15 A
MAG
FAN
COM 1
FAN RELAY
15 A
FAN
TM1
AWG 16
CH 1
CH 2
8 BIT MICRO COMPUTER
A/D 1
A/D 2
REF
FRONT
230
104
117
218
REAR 14A
FRONT 12A
226
MEMBRANE SW
1
10
GND
122
CN4
CHARGER RESET
FRONT 12AMP
REFRIGERATOR 14AMP
FRONT 12AMP
REFRIGERATOR 14AMP
MO-1000MFSP2-3
MO-1000MFSP2-1
MO-1000MFSP2-2
REFRIGERATOR OUTLET
228
REF
15 A
AWG 16
REFRIGERATOR
115
112
FRONT
15 A
AWG 16
CHARGER 2 OUTLET
111
CHARGER 1 OUTLET
AWG 16
AWG 16
AWG 16
200 mA
120V AC
234
USB
DC 5V
232

FIGURE 18

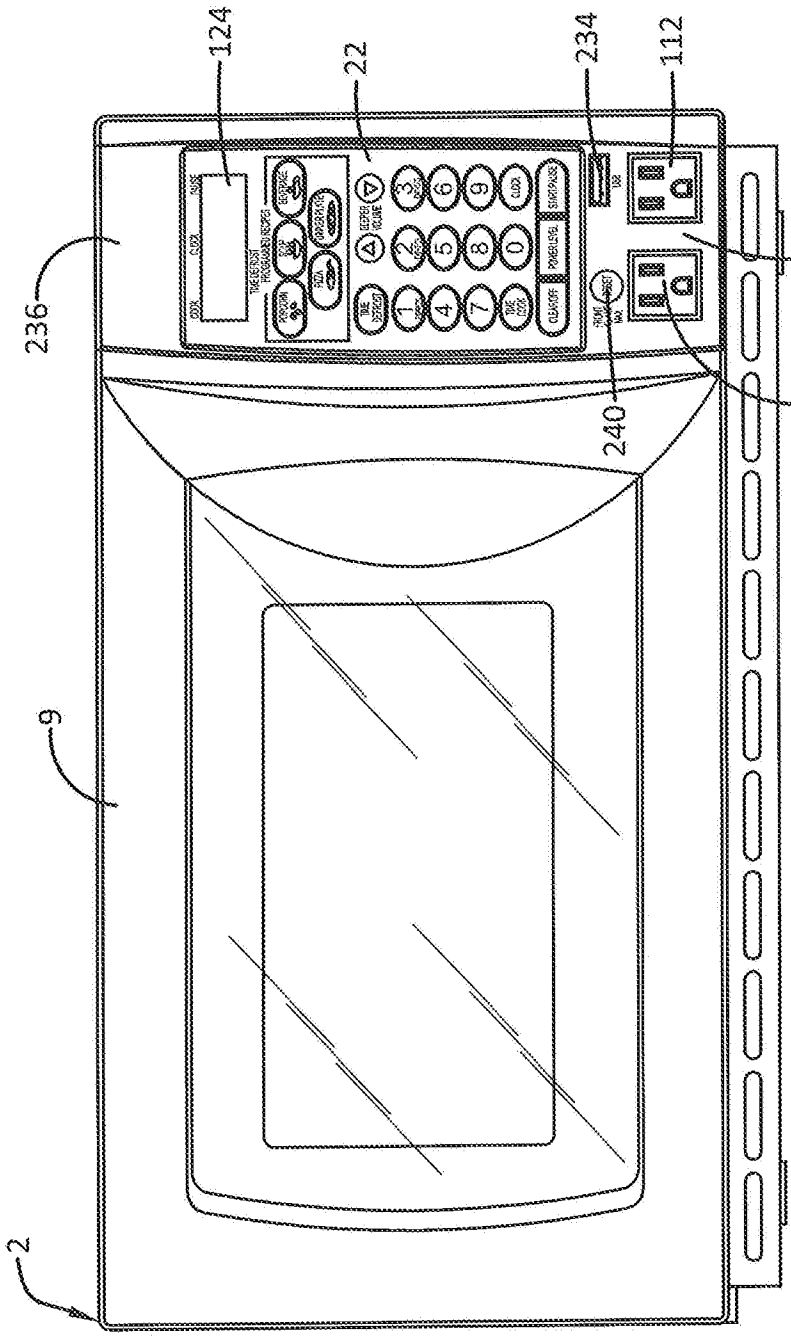


FIGURE 19

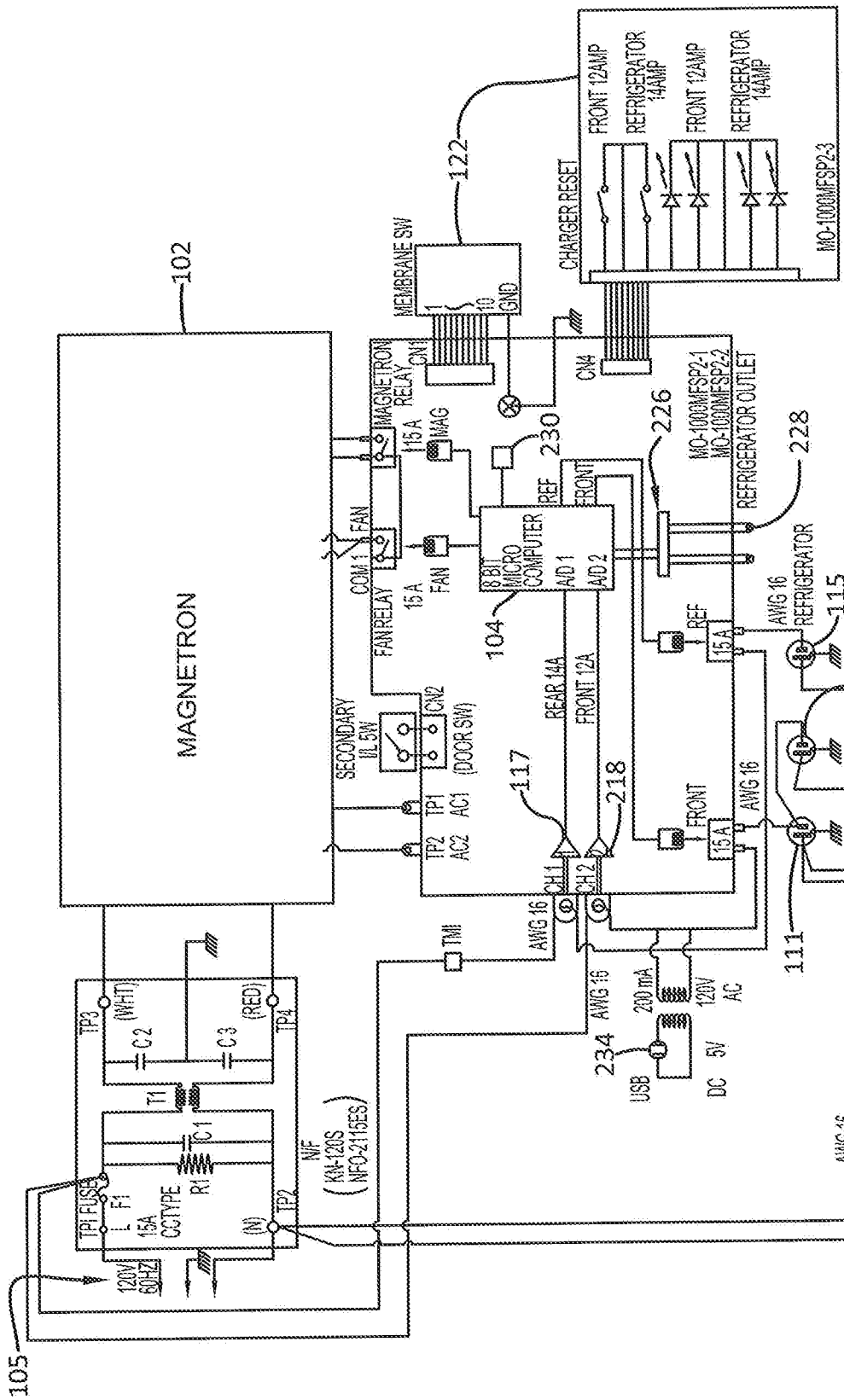

MAGNETRON
102
105
120V 60HZ
TP1 FUSE
F1 15A
CCTYPE
R1
C1
T1
C2
C3
TP3 (WHT)
TP4 (RED)
TP2 (N)
NF
(KN-120S NFD-2116ES)
SECONDARY IL 5W
CN2 (DOOR SW)
TP1 AC1
TP2 AC2
TM1
AWG 16
CH1
CH2
117
218
REAR 14A
FRONT 12A
FAN RELAY
COM 1
FAN
15A FAN
MAGNETRON RELAY
15A MAG
8 BIT MICRO COMPUTER
A/D 1
A/D 2
REF
FRONT
104
230
226
228
MO-1000MFSP2-1
MO-1000MFSP2-2
REFRIGERATOR OUTLET
REF
15A
AWG 16
REFRIGERATOR
115
112
FRONT
16A
AWG 16
CHARGER 2 OUTLET
CHARGER 1 OUTLET
111
234
USB
DC 5V
200 mA
120V AC
AWG 16
AWG 16
MEMBRANE SW
1
10
GND
CN1
122
CHARGER RESET
CN4
FRONT 12AMP
REFRIGERATOR 14AMP
FRONT 12AMP
REFRIGERATOR 14AMP
MO-1000MFSP2-3

FIGURE 20

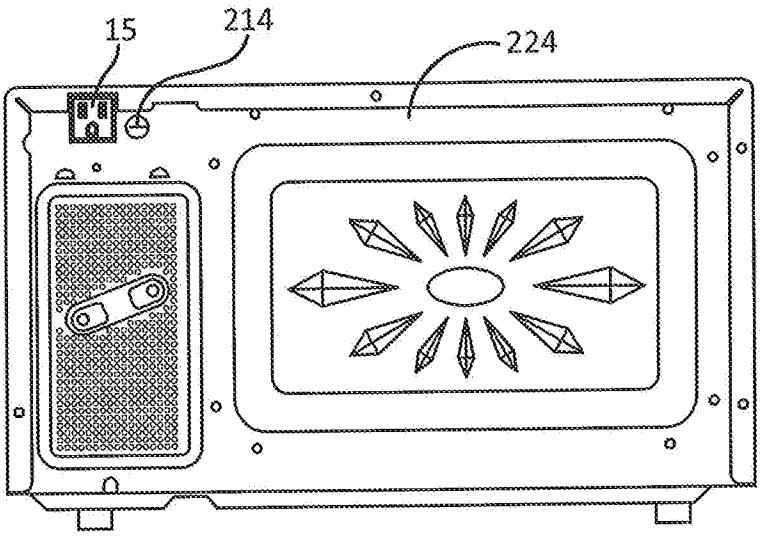


FIGURE 21

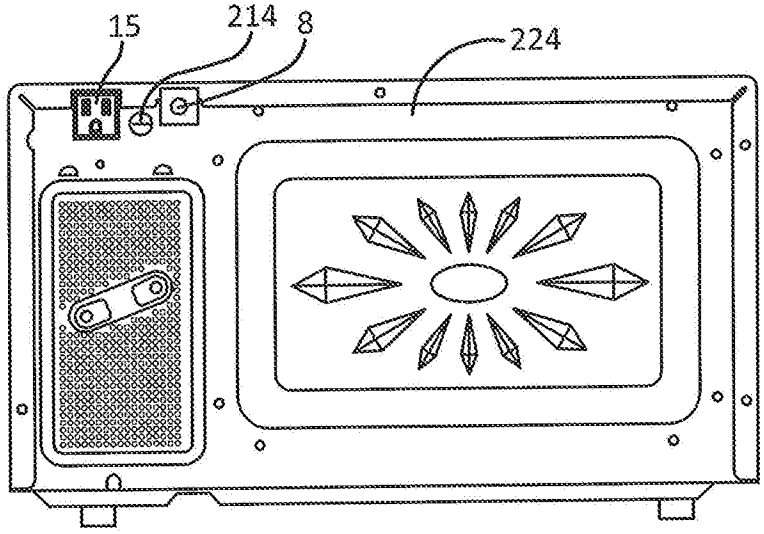


FIGURE 22

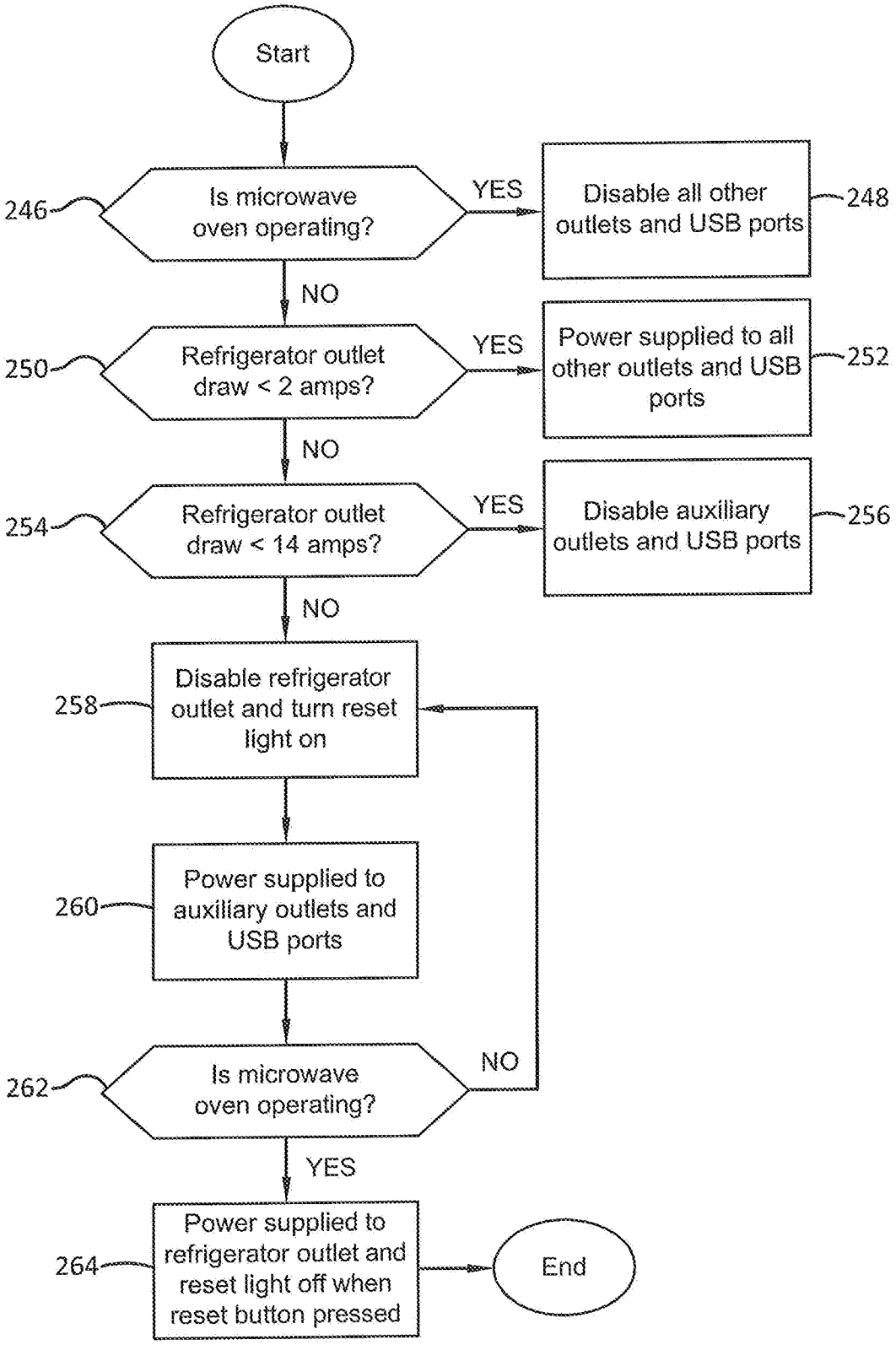

Start
246
Is microwave oven operating?
YES
Disable all other outlets and USB ports
248
NO
250
Refrigerator outlet draw < 2 amps?
YES
Power supplied to all other outlets and USB ports
252
NO
254
Refrigerator outlet draw < 14 amps?
YES
Disable auxiliary outlets and USB ports
256
NO
258
Disable refrigerator outlet and turn reset light on
260
Power supplied to auxiliary outlets and USB ports
262
Is microwave oven operating?
NO
YES
264
Power supplied to refrigerator outlet and reset light off when reset button pressed
End

FIGURE 23

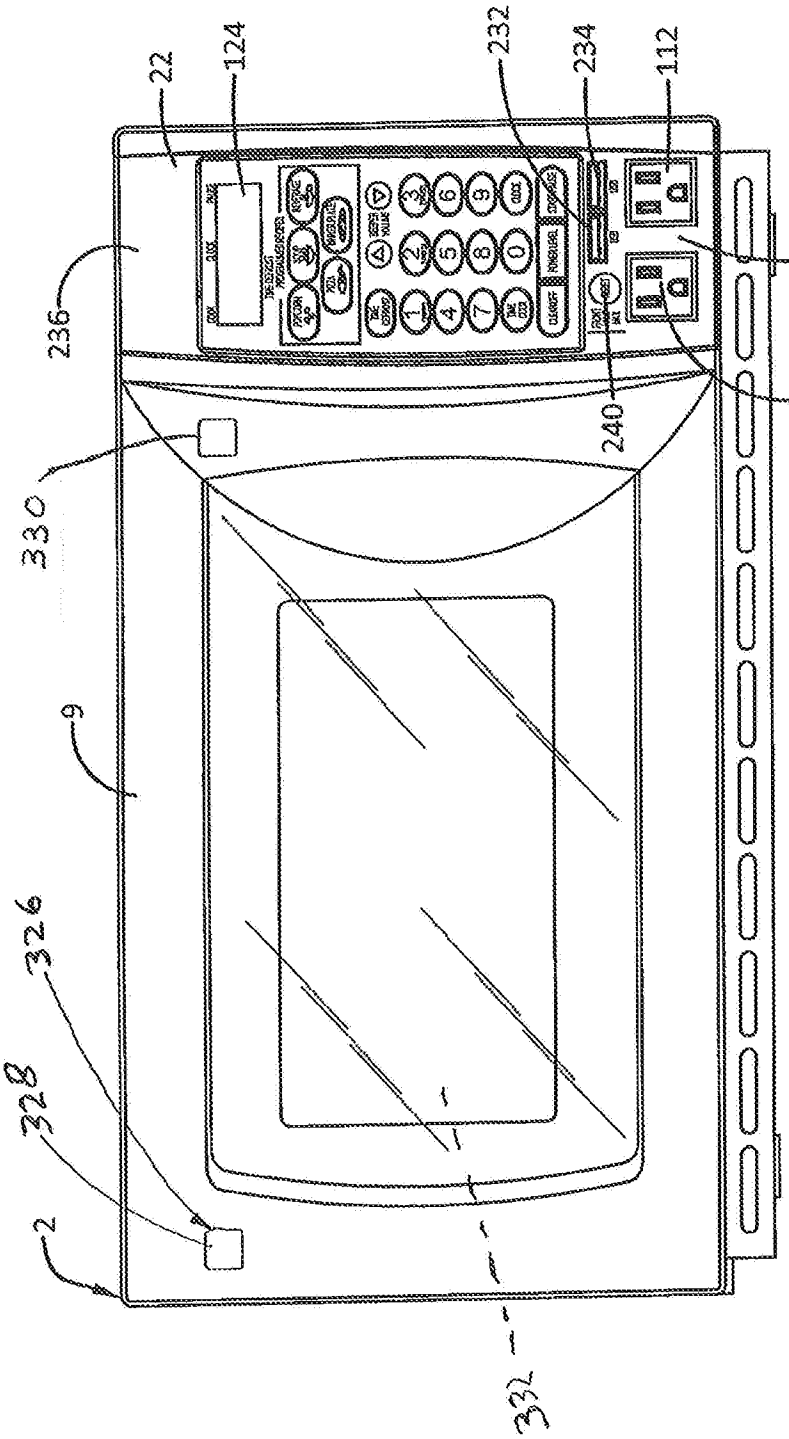


FIGURE 24

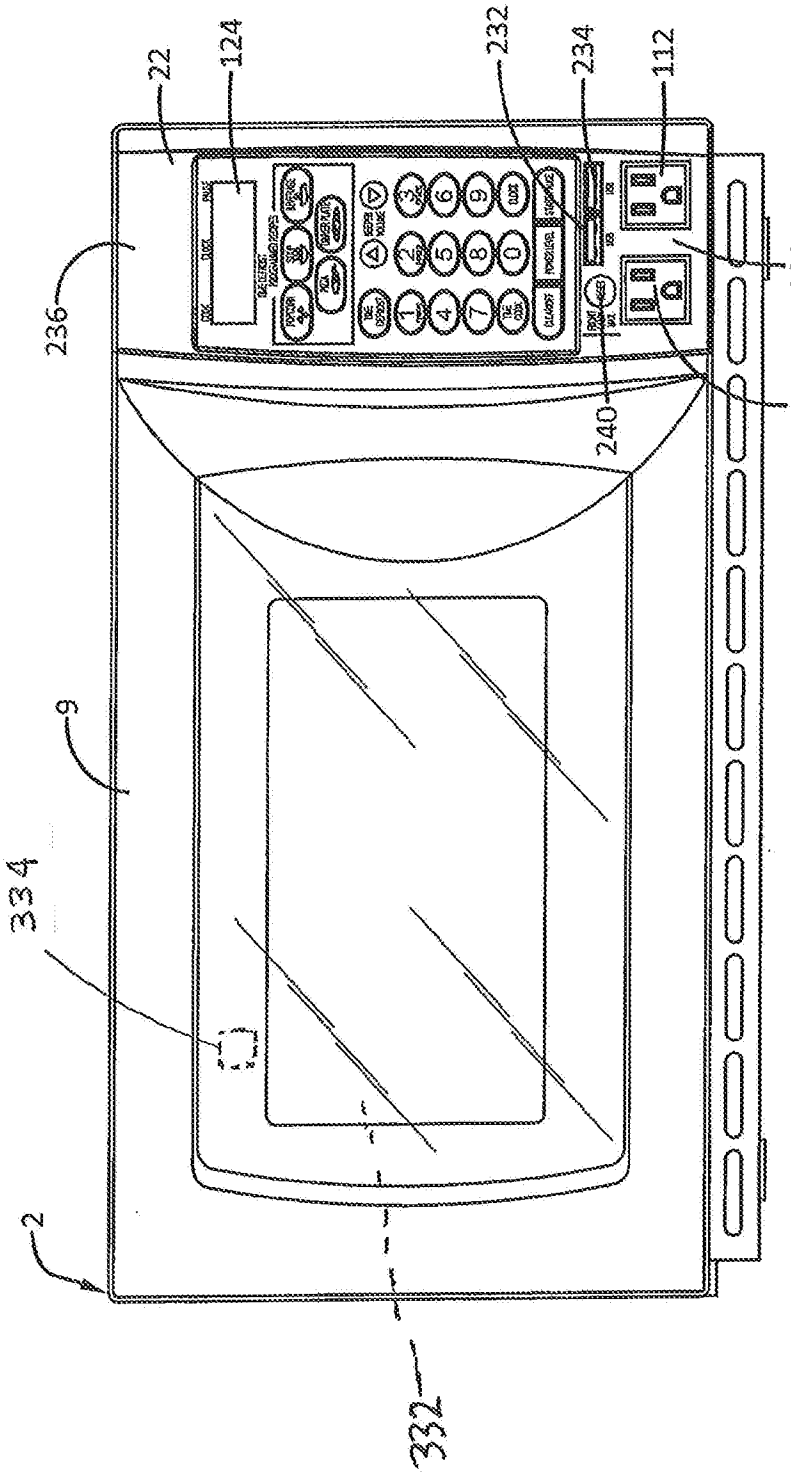


FIGURE 2 S

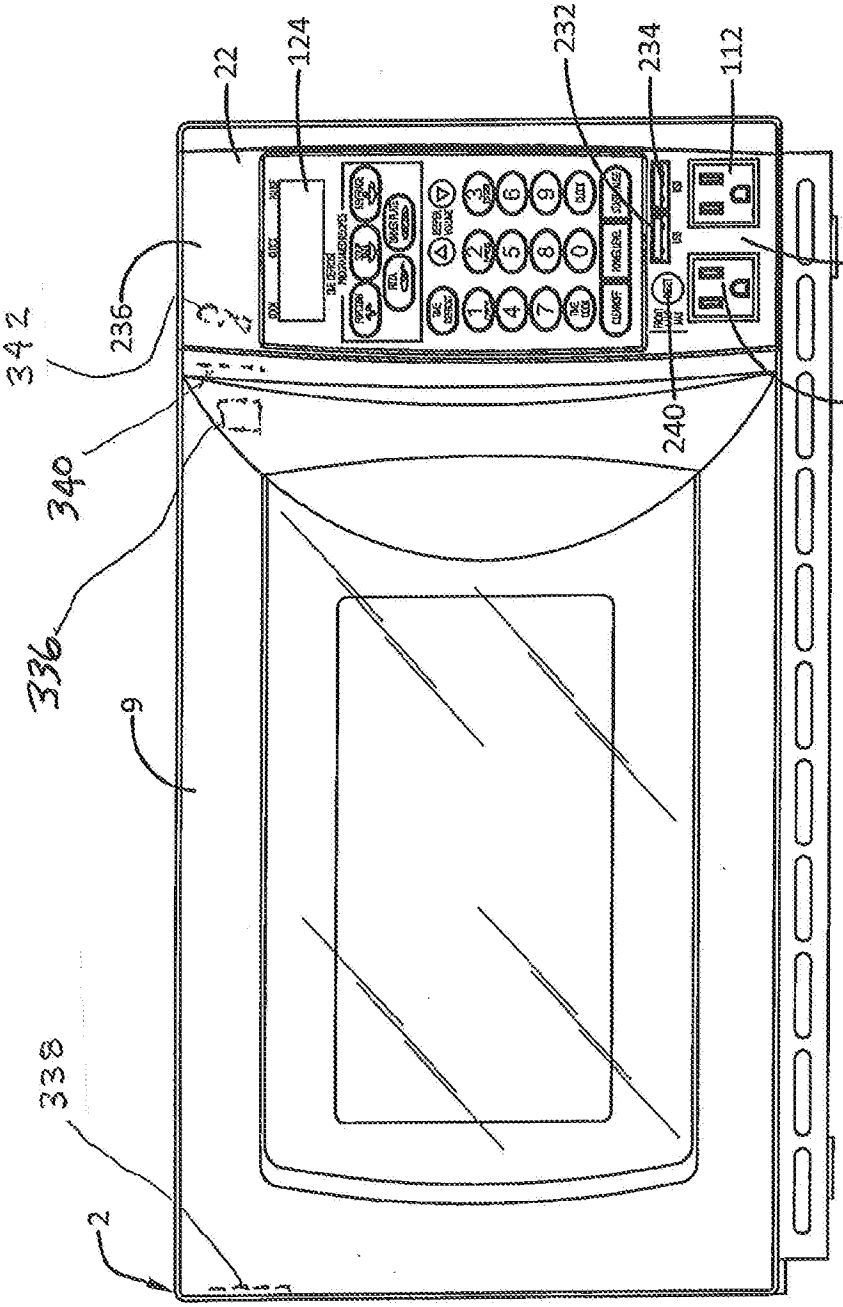


FIGURE 26

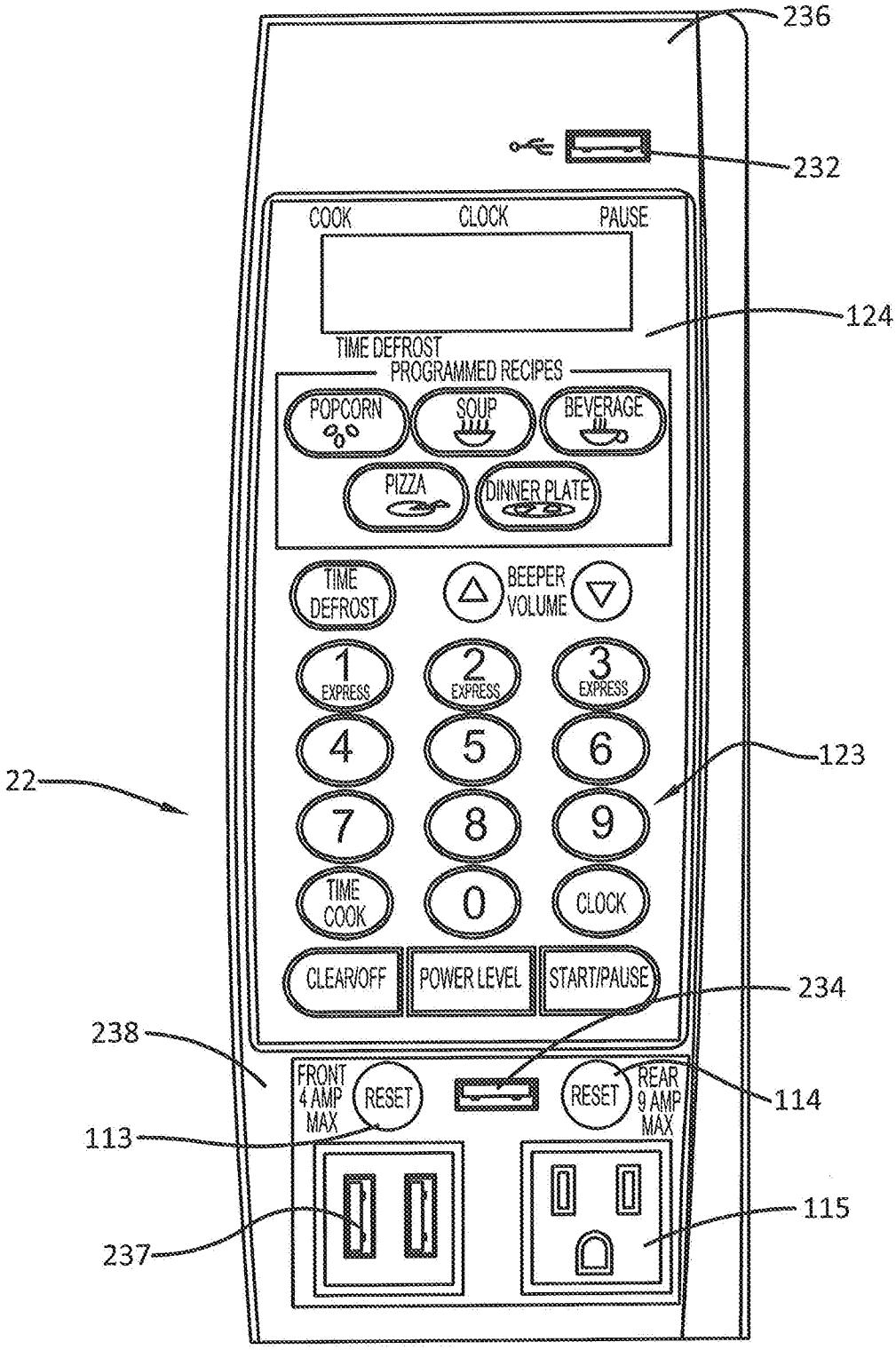

236
232
COOK
CLOCK
PAUSE
124
TIME DEFROST
PROGRAMMED RECIPES
POPCORN
SOUP
BEVERAGE
PIZZA
DINNER PLATE
TIME DEFROST
BEEPER VOLUME
1 EXPRESS
2 EXPRESS
3 EXPRESS
4
5
6
123
22
7
8
9
TIME COOK
0
CLOCK
CLEAR/OFF
POWER LEVEL
START/PAUSE
234
238
FRONT 4 AMP MAX
RESET
RESET
REAR 9 AMP MAX
114
113
115
237

FIGURE 27

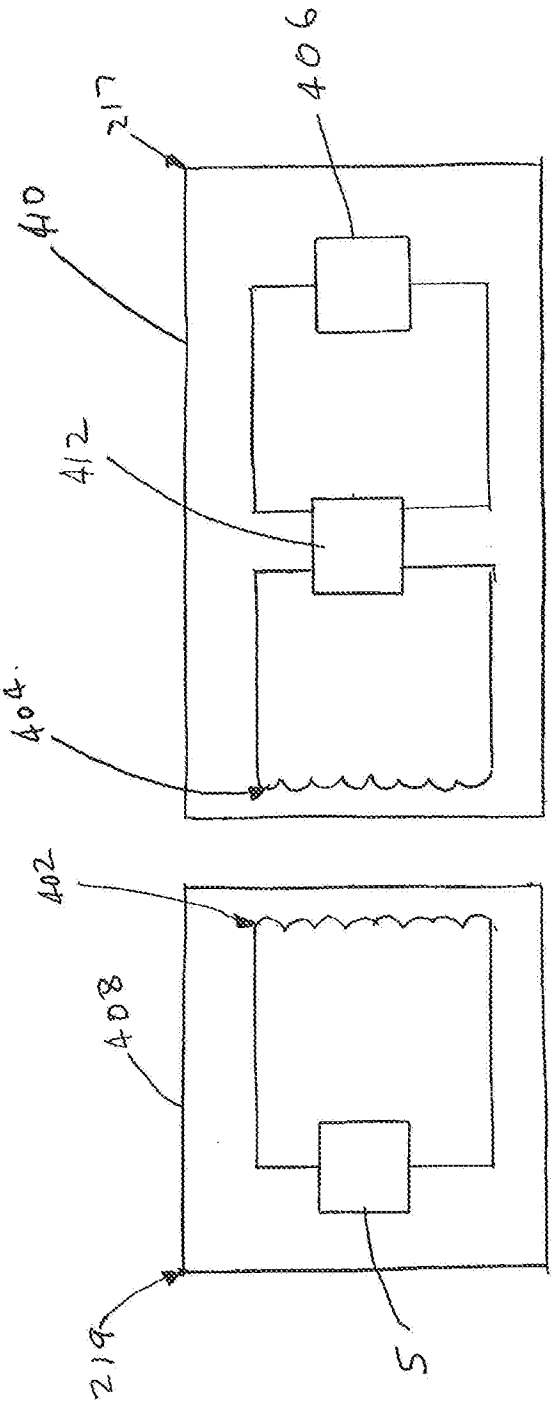


FIGURE 28

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	INT-1001 CIP 2 C
	Application Number	
Title of Invention	MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Gregory	Allan Thomas	Hall	

Residence Information (Select One) US Residency ● Non US Residency Active US Military Service

City	Country of Residence	
Guelph		CA

Mailing Address of Inventor:

Address 1	345 West Acres Drive
Address 2	

City	State/Province	Postal Code	Country	
Guelph	ON	N1H 7B3	CA	

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Philip		Emma	

Residence Information (Select One) ● US Residency ○ Non US Residency Active US Military Service

City	State/Province	Country of Residence	
Topsfield	MA	US	

Mailing Address of Inventor:

Address 1	19 Ridgeview Road
Address 2	

City	State/Province	Postal Code	Country	
Topsfield	MA	01983	US	

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	INT-1001 CIP 2 C
	Application Number	
Title of Invention	MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET	

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	07733		
Email Address	iplaw@walkerandjocke.com	Add Email	Remove Email

Application Information:

Title of the Invention	MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET		
Attorney Docket Number	INT-1001 CIP 2 C	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	25	**Suggested Figure for Publication (if any)**	1

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☒ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	07733		

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	INT-1001 CIP 2 C
	Application Number	
Title of Invention	MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET	

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	15135883	2016-04-22
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
15135883	Continuation in part of	14262290	2014-04-25
Prior Application Status	Patented		Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14262290	Continuation in part of	12317632	2008-12-23	8742304	2014-06-03

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12317632	Claims benefit of provisional	61009419	2007-12-28

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	INT-1001 CIP 2 C
	Application Number	
Title of Invention	MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET	

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☒ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	INT-1001 CIP 2 C
	Application Number	
Title of Invention	MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☒ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☒ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	INT-1001 CIP 2 C
	Application Number	
Title of Invention	MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	Intirion Corporation		
Mailing Address Information For Applicant:			
Address 1	10 Walpole Park South		
Address 2			
City	Walpole	**State/Province**	MA
Country	US	Postal Code	02081
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	INT-1001 CIP 2 C
	Application Number	
Title of Invention	MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Ralph E. Jocke/			Date (YYYY-MM-DD)	2017-05-19
First Name	Ralph	Last Name	Jocke	Registration Number	31029

Additional Signature may be generated within this form by selecting the Add button. Add

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	INT-1001 CIP 2 C
	Application Number	
Title of Invention	MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
15/600,118	05/19/2017	3742	800	INT-1001 CIP 2 C	20	3

CONFIRMATION NO. 4190

FILING RECEIPT

7733
WALKER & JOCKE
231 SOUTH BROADWAY STREET
MEDINA, OH 44256

OC000000091670824

Date Mailed: 05/31/2017

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Gregory Allan Thomas Hall, Guelph, CANADA;
Philip Emma, Topsfield, MA;

Applicant(s)

Intirion Corporation, Walpole, MA;

Power of Attorney: The patent practitioners associated with Customer Number 07733

Domestic Priority data as claimed by applicant

This application is a CON of 15/135,883 04/22/2016 PAT 9664436
which is a CIP of 14/262,290 04/25/2014 PAT 9657974
which is a CIP of 12/317,632 12/23/2008 PAT 8742304
which claims benefit of 61/009,419 12/28/2007

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: No

Permission to Access Search Results: No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 05/25/2017

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/600,118**

Projected Publication Date: Request for Non-Publication Acknowledged

Non-Publication Request: Yes

Early Publication Request: No
**** SMALL ENTITY ****
Title

MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET

Preliminary Class

219

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: Yes

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/600,118	05/19/2017	Gregory Allan Thomas Hall	INT-1001 CIP 2 C

CONFIRMATION NO. 4190

7733
WALKER & JOCKE
231 SOUTH BROADWAY STREET
MEDINA, OH 44256

INFORMAL NOTICE

OC000000091670825

Date Mailed: 05/31/2017

INFORMATIONAL NOTICE TO APPLICANT

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  Gregory Allan Thomas Hall
  Philip Emma

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/aabranyos/

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 15/600,118

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	730		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

Amended Application Data Sheet

Attorney Docket Number: INT -1001 CIP 2 C

Application Number: 15/600,118

Title of Invention: Multiple Linked Appliance with Auxiliary Outlet

Domestic Benefit / National Stage Information

Prior Applicant Status:	Pending
Application Number:	
Continuity Type:	Continuation in part of
Prior Application Number:	15/135,883
Filing or 371(c) Date:	2016-04-22

Prior Application Status:	Pending
Application Number:	15/135,883
Continuity Type:	Continuation in part of
Prior Application Number:	14/262,290
Filing or 371(c) Date:	2014-04-25

Prior Application Status:	Patented
Application Number:	14/262,290
Continuity Type:	Continuation in part of
Prior Application Number:	12/317,632
Filing or 371(c) Date:	2008-12-23
Patent Number:	8,742,304
Issue Date:	2014-06-03

Prior Application Status:	Expired
Application Number:	12/317,632
Continuity Type:	Claims benefit of provisional
Prior Application Number:	61/009,419
Filing or 371(c) Date:	2007-12-28

Prior Application Status:	Pending
Application Number:	
Continuity Type:	Continuation in part of
Prior Application Number:	15/135,873
Filing or 371(c) Date:	2016-04-22

Prior Application Status:	Pending
Application Number:	
Continuity Type:	Continuation in part of
Prior Application Number:	15/180,978
Filing or 371(c) Date:	2016-06-13

Signature:	/Ralph E. Jocke/
Date:	2017 -08-01
First Name:	Ralph
Last Name:	Jocke
Registration Number:	31,029

Electronic Acknowledgement Receipt

EFS ID:	29949213
Application Number:	15600118
International Application Number:	
Confirmation Number:	4190
Title of Invention:	MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET
First Named Inventor/Applicant Name:	Gregory Allan Thomas Hall
Customer Number:	7733
Filer:	Ralph E. Jocke/Allison McDermott
Filer Authorized By:	Ralph E. Jocke
Attorney Docket Number:	INT-1001 CIP 2 C
Receipt Date:	03-AUG-2017
Filing Date:	19-MAY-2017
Time Stamp:	10:03:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Supplemental Response or Supplemental Amendment	Amended_ADS.pdf	12375 e78061058f2e97524617a4b73f567132c3aa62b9	no	2

Warnings:

Information:	
Total Files Size (in bytes):	12375

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

7733 7590 07/23/2019

WALKER & JOCKE
231 SOUTH BROADWAY STREET
MEDINA, OH 44256

EXAMINER
NGUYEN, HUNG D

ART UNIT	PAPER NUMBER
3761	

DATE MAILED: 07/23/2019

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/600,118	05/19/2017	Gregory Allan Thomas Hall	INT-1001 CIP 2 C	4190

TITLE OF INVENTION: MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	10/23/2019

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

7733 7590 07/23/2019

WALKER & JOCKE
231 SOUTH BROADWAY STREET
MEDINA, OH 44256

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/600,118	05/19/2017	Gregory Allan Thomas Hall	INT-1001 CIP 2 C	4190

TITLE OF INVENTION: MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	10/23/2019

EXAMINER	ART UNIT	CLASS-SUBCLASS
NGUYEN, HUNG D	3761	219-679000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required) ❑ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/600,118	05/19/2017	Gregory Allan Thomas Hall	INT-1001 CIP 2 C	4190

7733 7590 07/23/2019

WALKER & JOCKE
231 SOUTH BROADWAY STREET
MEDINA, OH 44256

EXAMINER	
NGUYEN, HUNG D	
ART UNIT	PAPER NUMBER
3761	

DATE MAILED: 07/23/2019

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice Requiring Inventor's Oath or Declaration	Application No. 15/600,118	Applicant(s) Gregory Allan Thomas Hall	
	Examiner NGUYEN, HUNG D	Art Unit 3761	

This notice is an attachment to the Notice of Allowability (PTOL-37), or the Notice of Allowability For A Design Application (PTOL-37D).

An inventor's oath or declaration in compliance with 37 CFR 1.63 or 1.64 executed by or with respect to each inventor has not yet been submitted.

An oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each inventor (for any inventor for which a compliant oath, declaration, or substitute statement has not yet been submitted) MUST be filed no later than the date on which the issue fee is paid. See 35 U.S.C. 115(f). Failure to timely comply will result in ABANDONMENT of this application.

A properly executed inventor's oath to declaration has not been received for the following inventor(s):

If applicant previously filed one or more oaths, declarations, or substitute statements, applicant may have received an informational notice regarding deficiencies therein.

The following deficiencies are noted:

INFORMAL ACTION PROBLEMS

- A properly executed inventor's oath or declaration has not been received for the following inventor(s): **Gregory Allan Thomas Hall** and **Philip Emma**.
  Applicant may submit the inventor's oath or declaration at any time before the Notice of Allowance and Fee(s) Due, PTOL-85, is mailed.

Questions relating to this Notice should be directed to the Application Assistance Unit at 571-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 15/600,118	Applicant(s) Hall et al.	
	Examiner HUNG D NGUYEN	Art Unit 3761	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to 5/19/2017.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-20 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file areply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/HUNG D NGUYEN/
Primary Examiner, Art Unit 3761

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Priority

2. The claim to priority as a CON of 15/135,883, now USPN 9,664,436 filed on April 22, 2016, which is a CIP of 14/262,290, now USPN 9,657,974, filed on April 25, 2014, which is CIP of 12/317,632, now USPN 8,742,304, filed on December 23, 2018, which claims benefit to 61/009,419, filed on December 28, 2017.

Allowable Subject Matter

3. The following is an examiner's statement of reasons for allowance: allowance of claims 1-19 is indicated because the prior art of record does not show of fairly suggest "a determination based on the stored data that the current level of transmitted radiation from the at least one sensor emitter that reaches the at least one sensor receiver has fallen by at least a threshold amount from the initial transmissivity level during the current cooking session, due to smoke in the cooking interior area" incorporated with all other limitations as claimed in claim 1; "wherein the smoke sensor is configured to be reset after ending the current cooking session prior to the set end time based on sensing the smoke indicative of the dangerous condition, to enable the microwave oven to receive cooking power in a next subsequent cooking session responsive at least in part to the smoke sensor no longer sensing the smoke indicative of the dangerous condition" incorporated with all other limitations as claimed in claim 9; and "wherein in the control circuit is configured to reset after ending the current cooking session prior to the set end time due to sensing the dangerous condition, to enable cooking power to

again be available to the microwave oven in a next subsequent cooking session responsive at least in part to the smoke sensor no longer sensing the dangerous condition" incorporated with all other limitations as claimed in claim 17.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. St. Louis (US Pat. 4,763,015) discloses an appliance/refrigerator power controller. Benett (US Pat. 4,847,722) discloses a refrigerator and microwave oven and overdemand interrupt circuit. Benett et al. (US Pat. 4,880,954) discloses a combined refrigerator and microwave oven with timed overload protection. Bone (US Pat. 5,521,359) discloses a system for coordinate operation of microwave oven with a second appliance. Shone et al. (US Pub. 2003/0106892) discloses a microwave oven with humidity sensor. Chun (US Pub. 2004/0060932) discloses a microwave oven and method of controlling the same. Choi (US Pub. 2008/0000650) discloses a cooking appliance. Ando et al. (JP 5-240447) discloses a microwave oven. Furukawa et al. (JP 2001-33043) disclose an electronic instrument.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUNG D NGUYEN whose telephone number is (571)270-7828. The examiner can normally be reached on Mon-Fri 9AM - 9PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tu Hoang can be reached on (571)272-4780. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/HUNG D NGUYEN/
Primary Examiner, Art Unit 3761
7/18/2019

HUNG D. NGUYEN
Primary Examiner
Art Unit 3761

Notice of References Cited	Application/Control No. 15/600,118	Applicant(s)/Patent Under Reexamination Hall et al.	
	Examiner HUNG D NGUYEN	Art Unit 3761	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-4763015-A	08-1988	St. Louis; Raymond F.	H02J3/14	307/126
*	B	US-4847722-A	07-1989	Bennett; Robert P.	F25D23/12	219/679
*	C	US-4880954-A	11-1989	Bennett; Robert P.	F25D23/12	219/679
*	D	US-5521359-A	05-1996	Bone; Charles A.	H05B6/68	219/485
*	E	US-20030106892-A1	06-2003	Shon, Jong-Chull	H05B6/642	219/757
*	F	US-20080000650-A1	01-2008	Choi; Sung Ho	A62C3/006	219/679
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N	JP 5-240447-A	09-1993	JP	ANDO, YUJI	
	O	JP 2001-33043-A	02-2001	JP	FURUKAWA, KIMIHIKO	
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/600,118	Hall et al.
	Examiner	**Art Unit**
	HUNG D NGUYEN	3761

CPC						
Symbol					**Type**	**Version**
F25D	/	23	/	12	F	2013-01-01
H05B	/	6	/	666	I	2013-01-01
H05B	/	6	/	68	I	2013-01-01

CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/HUNG D NGUYEN/ Primary Examiner, Art Unit 3761	18 July 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	24

U.S. Patent and Trademark Office

Part of Paper No.: 20190718A

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/600,118	Hall et al.
	Examiner	**Art Unit**
	HUNG D NGUYEN	3761

INTERNATIONAL CLASSIFICATION				
CLAIMED				
H05B	/	6	/	64

NON-CLAIMED				
H05B	/	6	/	66
H05B	/	6	/	68

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**
219	679

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					
219	715	717	720			

NONE (Assistant Examiner) (Date)	**Total Claims Allowed:** 20	
/HUNG D NGUYEN/ Primary Examiner, Art Unit 3761 (Primary Examiner) 18 July 2019 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 24

U.S. Patent and Trademark Office

Part of Paper No.: 20190718A

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/600,118	Hall et al.
	Examiner	**Art Unit**
	HUNG D NGUYEN	3761

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	10	10	19	19										
2	2	11	11	20	20										
3	3	12	12												
4	4	13	13												
5	5	14	14												
6	6	15	15												
7	7	16	16												
8	8	17	17												
9	9	18	18												

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	20	
/HUNG D NGUYEN/ Primary Examiner, Art Unit 3761	18 July 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	24

U.S. Patent and Trademark Office

Part of Paper No.: 20190718A

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/600,118	Hall et al.
	Examiner	Art Unit
	HUNG D NGUYEN	3761

CPC - Searched*		
Symbol	Date	Examiner
H05B6/645,666,68,806; F25D23/12; F25B29/005	07/18/2019	HN

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
219	482,483,485,488,678,679,695,697,702,715,716,717, 718,719,720,721,722,723,756,757,760,761	07/18/2019	HN

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Inventor search	07/18/2019	HN
East search with text	07/18/2019	HN

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
219	679, 715, 717, 720	07/18/2019	HN

/HUNG D NGUYEN/ Primary Examiner, Art Unit 3761	

Bibliographic Data

Application No: 15/600,118

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /HUNG D NGUYEN/ Examiner's Signature | Initials

Title: MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
05/19/2017	219	3761	INT-1001 CIP 2 C
RULE			

APPLICANTS

Intirion Corporation, Walpole, MA, UNITED STATES

INVENTORS

Gregory Allan Thomas Hall Guelph, CANADA

Philip Emma Topsfield, MA, UNITED STATES

CONTINUING DATA

This application is a CON of 15135883 04/22/2016 PAT 9664436

15135883 is a CIP of 14262290 04/25/2014 PAT 9657974

14262290 is a CIP of 12317632 12/23/2008 PAT 8742304

12317632 has PRO of 61009419 12/28/2007

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

05/25/2017

**** SMALL ENTITY ****

STATE OR COUNTRY

CANADA

ADDRESS

WALKER & JOCKE
231 SOUTH BROADWAY STREET
MEDINA, OH 44256
UNITED STATES

FILING FEE RECEIVED

$800

(19)日本国特許庁（ＪＰ）　(12) **公開特許公報（Ａ）**　(11)特許出願公開番号

特開平5－240447

(43)公開日　平成5年(1993)9月17日

(51)Int.Cl.[5]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
Ｆ２４Ｃ　7/02	３５５　Ｐ	9141－3L		
	３２５　Ｄ	9141－3L		
Ｈ０５Ｂ　6/68	３３０　Ｂ	8815－3K		

審査請求　未請求　請求項の数13(全 14 頁)

(21)出願番号　特願平4－39882

(22)出願日　平成4年(1992)2月26日

(71)出願人　000005049
シャープ株式会社
大阪府大阪市阿倍野区長池町22番22号

(72)発明者　安藤　有司
大阪府大阪市阿倍野区長池町22番22号　シャープ株式会社内

(72)発明者　戎崎　利幸
大阪府大阪市阿倍野区長池町22番22号　シャープ株式会社内

(72)発明者　上井　康彦
大阪府大阪市阿倍野区長池町22番22号　シャープ株式会社内

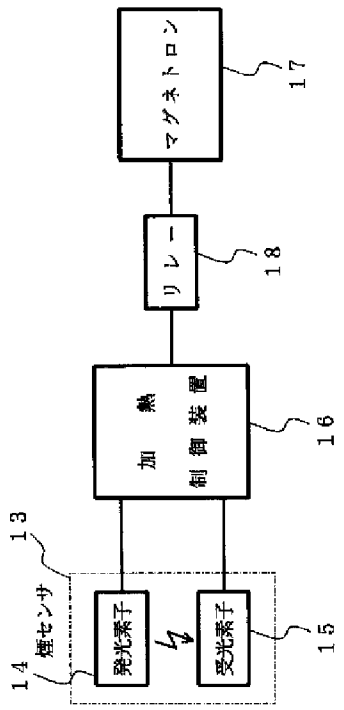
(74)代理人　弁理士　岸本　瑛之助

(54)【発明の名称】　電子レンジ

(57)【要約】

【目的】　異常燃焼状態をはやくかつ正確に検知して加熱を制御できるようにする。

【構成】　発光素子14と受光素子15を有する煙センサ13で煙を検知することによって燃焼状態を検知し、煙センサ13で検知した煙量が所定の燃焼検知レベル以上になったときにリレー18を制御してマグネトロン17による加熱を停止する



1

【特許請求の範囲】

【請求項１】煙センサで煙を検知することによって燃焼状態を検知する燃焼検知手段、およびこの燃焼検知手段の出力が所定の燃焼検知レベル以上になったときに加熱を停止する加熱制御手段を備えている電子レンジ。

【請求項２】燃焼検知手段の煙センサが、排気ダクトに設けられた発光素子と受光素子を備えている請求項１の電子レンジ。

【請求項３】燃焼検知手段の煙センサが、加熱室内に設けられた複数組の発光素子と受光素子を備えている請求項１の電子レンジ。

【請求項４】燃焼検知手段の煙センサが、加熱室内を照明するランプの光を受光する受光素子を備えている請求項１の電子レンジ。

【請求項５】加熱室内の食品の仕上がり状況を認識する仕上がり状況認識手段、燃焼状態を検知する燃焼検知手段、ならびに仕上がり状況認識手段および燃焼検知手段の出力に基づいて加熱を制御する加熱制御手段を備えている電子レンジ。

【請求項６】仕上がり状況認識手段が、加熱室内の湿度を検知する湿度センサ、加熱室内の温度を検知する温度センサおよび加熱開始前に設定された全加熱時間中の経過時間を計時する計時手段の少なくとも１つよりなる請求項５の電子レンジ。

【請求項７】仕上がり状況認識手段が、ヒータの温度制御用のサーミスタよりなる温度センサを含んでいる請求項６の電子レンジ。

【請求項８】燃焼検知手段が、排気ダクト内の煙を検知する煙センサおよび排気ダクト内の温度を検知する温度センサの少なくとも１つよりなる請求項５の電子レンジ。

【請求項９】燃焼検知手段が、排気ダクトに設けられた発光素子と受光素子よりなる煙センサを含んでいる請求項８の電子レンジ。

【請求項１０】燃焼検知手段の出力が所定の燃焼検知レベル以上になったときに加熱制御手段が加熱を停止するようになされている請求項５の電子レンジ。

【請求項１１】仕上がり状況認識手段の出力に応じて燃焼検知レベルが変えられるようになされている請求項１０の電子レンジ。

【請求項１２】仕上がり状況認識手段が加熱開始前に設定された全加熱時間中の経過時間を計時する計時手段を含んでおり、加熱開始から所定時間が経過するまでは燃焼検知レベルを低くするようになされている請求項１１の電子レンジ。

【請求項１３】仕上がり状況認識手段が食品の通常の加熱中と認識している間は、燃焼検知レベルを高くするようになされている請求項１１の電子レンジ。

【発明の詳細な説明】

【０００１】

2

【産業上の利用分野】この発明は、電子レンジ、とくに使用者の誤使用による燃焼に対する安全制御機能を有する電子レンジに関する。

【０００２】

【従来の技術】この種の電子レンジとして、従来、加熱室の天板上にサーモカットまたは温度ヒューズなどからなる温度センサが設けられ、このセンサの部分の温度が所定値以上になれば加熱を停止するようになったものが知られている（たとえば特開平１－１１５０８５号公報参照）。

【０００３】

【発明が解決しようとする課題】上記のような従来の電子レンジでは、加熱室から天板を介して伝達される熱を温度センサで検知しているので、被加熱物の発火、燃焼を検知するのに時間がかかり、燃焼を検知したときには加熱室内がかなり高温になっていて、加熱室や加熱室内のトレーなどの部品が熱により損傷するおそれがあった。

【０００４】一方、電子レンジの利用拡大とともに使用者の電子レンジ利用方法も多岐にわたっており、従来のような温度センサだけでは、正常使用による通常の加熱状態と誤使用による異常燃焼状態の判別が困難になっている。このため、通常の加熱状態であるのに加熱が停止したり、逆に、異常燃焼状態であるのに加熱が停止しなかったりすることがある。後の場合、異常燃焼状態を検知したときには加熱室内より発火していて、製品に対するダメージが大きくなったり、使用者の対応によっては火災に至ることもあった。従来のように温度センサによって燃焼を検知する場合、とくに問題となるのは、ヒータ加熱機能を有する電子レンジの場合である。この場合、通常のヒータ加熱時の加熱室内温度が最大４５０℃付近まで上がるため、異常燃焼の検知が非常に困難である。すなわち、燃焼検知温度を加熱室内温度４５０℃に相当する温度より低い温度に設定すると通常のヒータ加熱状態においても加熱が停止することがあるため、加熱室内温度４５０℃に相当する温度より高い温度に設定する必要があるが、このような設定では、高周波加熱時の異常燃焼検知が遅くなってしまう。また、高周波加熱だけの電子レンジにおいても、燃焼検知温度があまり低すぎると通常加熱状態において加熱が停止することがあるため、余裕をみて燃焼検知温度を少し高めに設定することになるが、これでは、上記同様、被加熱物が発火してからの急激な温度上昇によってしか燃焼を検知を検知することができない。

【０００５】この発明の目的は、上記の問題を加熱し、異常燃焼状態をはやくかつ正確に検知して加熱を制御できる安全な電子レンジを提供することにある。

【０００６】

【課題を解決するための手段】第１の発明による電子レンジは、煙センサで煙を検知することによって燃焼状態

を検知する燃焼検知手段、およびこの燃焼検知手段の出力が所定の燃焼検知レベル以上になったときに加熱を停止する加熱制御手段を備えているものである。

【０００７】燃焼検知手段の煙センサが、排気ダクトに設けられた発光素子と受光素子を備えていることがある。

【０００８】燃焼検知手段の煙センサが、加熱室内に設けられた複数組の発光素子と受光素子を備えていることがある。

【０００９】燃焼検知手段の煙センサが、加熱室内を照明するランプの光を受光する受光素子を備えていることがある。

【００１０】第２の発明による電子レンジは、加熱室内の食品の仕上がり状況を認識する仕上がり状況認識手段、燃焼状態を検知する燃焼検知手段、ならびに仕上がり状況認識手段および燃焼検知手段の出力に基づいて加熱を制御する加熱制御手段を備えているものである。

【００１１】仕上がり状況認識手段が、加熱室内の湿度を検知する湿度センサ、加熱室内の温度を検知する温度センサおよび加熱開始前に設定された全加熱時間中の経過時間を計時する計時手段の少なくとも１つよりなることがある。

【００１２】仕上がり状況認識手段が、ヒータの温度制御用のサーミスタよりなる温度センサを含んでいることがある。

【００１３】燃焼検知手段が、排気ダクト内の煙を検知する煙センサおよび排気ダクト内の温度を検知する温度センサの少なくとも１つよりなることがある。

【００１４】燃焼検知手段が、排気ダクトに設けられた発光素子と受光素子よりなる煙センサを含んでいることがある。

【００１５】燃焼検知手段の出力が所定の燃焼検知レベル以上になったときに加熱制御手段が加熱を停止するようになされていることがある。

【００１６】仕上がり状況認識手段の出力に応じて燃焼検知レベルが変えられるようになされていることがある。

【００１７】仕上がり状況認識手段が加熱開始前に設定された全加熱時間中の経過時間を計時する計時手段を含んでおり、加熱開始から所定時間が経過するまでは燃焼検知レベルを低くするようになされていることがある。

【００１８】仕上がり状況認識手段が食品の通常の加熱中と認識している間は、燃焼検知レベルを高くするようになされていることがある。

【００１９】

【作用】第１の発明によれば、燃焼検知手段が煙センサで煙を検知することによって燃焼状態を検知するので、発煙の段階で被加熱物の燃焼状態をいちはやく検知して、加熱を停止することができる。

【００２０】燃焼検知手段の煙センサが排気ダクトに設けられた発光素子と受光素子を備えている場合、加熱室から排気ダクトに流れる煙が発光素子と受光素子の間を遮ることによってこれが検知される。

【００２１】燃焼検知手段の煙センサが、加熱室内に設けられた複数組の発光素子と受光素子を備えている場合、煙が発光素子と受光素子の間を遮ることによってこれが検知されるとともに、加熱室内の食品の状況も認識できる。

【００２２】燃焼検知手段の煙センサが、加熱室内を照明するランプの光を受光する受光素子を備えている場合、煙がランプからの光を遮ることによってこれが検知される。

【００２３】第２の発明の電子レンジによれば、仕上がり状況認識手段と燃焼検知手段の出力に基づいて加熱が制御されるので、食品の仕上がり状況に応じて、燃焼状態をいちはやくかつ正確に検知して、加熱を停止することができる。

【００２４】加熱の進行とともに、食品に含まれる水分が蒸発するため、湿度センサでこの湿度を検出することによって食品の仕上がり状況を認識することができる。

【００２５】ヒータによる加熱を行なう場合、ヒータ近傍においてサーミスタで加熱室内の温度を間接的に検知することによって温度制御が行なわれ、このサーミスタまたは他の温度センサの出力によって食品の仕上がり状況を認識することができる。

【００２６】使用者によって全加熱時間が設定される場合または食品の重量情報などによって加熱開始初期の段階で全加熱時間が自動的に設定される場合など、加熱の経過時間を計時することによって食品の仕上がり状況を認識することができる。

【００２７】煙センサで排気ダクト内の煙を検知することにより、または温度センサで排気ダクト内の温度を検知することにより、燃焼状態を検知することができる。

【００２８】燃焼検知手段が、排気ダクトに設けられた発光素子と受光素子よりなる煙センサを含んでいる場合、煙が発光素子と受光素子の間を遮ることによってこれが検知される。

【００２９】燃焼検知手段の出力が所定の燃焼検知レベル以上になったときに加熱制御手段が加熱を停止するようになされていることにより、燃焼検知手段の出力に基づいて加熱を制御することができる。

【００３０】仕上がり状況認識手段の出力に応じて燃焼検知レベルが変えられるようになされていることにより、食品の仕上がり状況に応じて燃焼状態をいちはやくかつ正確に検知することができる。

【００３１】加熱の初期においては本来は燃焼が生じることがなく、このような加熱初期に燃焼検知レベルを低くすることにより、小さな異常燃焼も確実に検知することができる。

【００３２】仕上がり状況認識手段が食品の通常の加熱

5

中と認識している間は、燃焼検知レベルを高くすることにより、通常の加熱状態を異常燃焼状態と誤認して加熱を停止することがない。

【００３３】

【実施例】以下、図面を参照して、この発明のいくつかの実施例について説明する。なお、これらの実施例において、共通する部分には同一の符号を付している。

【００３４】図１および図２は、この発明の１実施例を示している。図１は電子レンジの全体概略斜視図であり、図２はその電気的構成の主要部を示すブロック図である。

【００３５】図１において、電子レンジの外殻を構成する筐体(1) 内に加熱室（オーブン庫）(2) が設けられ、加熱室(2) 内の下部にターンテーブル(3) が設けられている。加熱室(2) の前面開口部に、扉(4) が設けられている。筐体(1) の頂板(5) と加熱室(2) の天板(6) との間に、左右の側板(7)(8)によって区画された排気ダクト(9) が設けられている。天板(6) の前部に加熱室(2) とダクト(9) を連通する多数の排気パンチング穴(10)が形成され、筐体(1) の後板(11)上部にダクト(9)と外部を連通する排気ルーバ(12)が形成されている。なお、図１では、筐体(1)の頂板(5) の一部を切欠いて示している。

【００３６】排気ダクト(9) の後部に、燃焼検知手段を構成する煙センサ(13)が設けられている。煙センサ(13)は、一方の側板(7) に取付けられた発光ダイオードなどの発光素子(14)と、これと対向するように他方の側板に取付けられたフォトトランジスタなどの受光素子(15)とからなる。煙センサ(13)は、発光素子(14)と受光素子(15)の間に存在する煙量を受光素子(15)で検出することによってダクト(9) 内の煙量を検出し、これによって加熱室(2) 内の燃焼状態を検知するものである。図３に示すように、発光素子(14)と受光素子(15)の間の煙量が多くなるにつれて受光素子(15)の出力が小さくなり、受光素子(15)の出力によって煙量を検出することができる。

【００３７】図２に示すように、加熱制御手段を構成する加熱制御装置(16)に、煙センサ(13)の発光素子(14)および受光素子(15)が接続されるとともに、高周波加熱用のマグネトロン(17)への通電を制御するためのリレー(18)が接続されている。加熱制御装置(16)は、たとえばマイクロコンピュータなどによって構成されている。

【００３８】マグネトロン(17)による高周波加熱中、制御装置(16)は発光素子(14)に電圧を印加してこれを発光させるとともに、受光素子(15)の出力から排気ダクト(9) 内の煙量を検出し、これに基づいて次のようにリレー(18)を制御することにより、加熱を制御する。受光素子(15)で検出された煙量（検出煙量）が所定の燃焼検知レベルより小さい場合は、リレー(18)をオン（励磁）状態に保持する。これにより、マグネトロン(17)への通電が継続されて、加熱が継続される。検出煙量が燃焼検知

6

レベル以上になると、リレー(18)をオフ（消磁）状態に切替える。これにより、マグネトロン(17)への通電が停止して、加熱が停止する。通常の加熱状態では、排気ダクト(9) 内の煙量は少なく、燃焼検知レベル以上になることがないので、加熱が継続される。加熱室(2) 内の食品が燃焼するなどして煙が発生すると、排気ダクト(9) 内の煙量が多くなり、これが燃焼検知レベル以上になったときに、上記のように加熱が停止して、発火が防止される。

【００３９】なお、さらに安全性を高める上で必要であれば、上記の煙センサ(13)の他に従来のような温度センサを加え、この温度センサの出力が所定値以上になったときにも加熱を停止するようにしてもよい。このようにすれば、煙センサ(13)に万一異常が生じたような場合でも、燃焼を検知して加熱を停止することができ、二重の安全装置となる。

【００４０】煙センサは、上記実施例のものに限らず、適宜変更可能である。

【００４１】図４および図５は、上記と異なる実施例を示している。この実施例の場合、煙センサの構成が上記実施例と異なっている。

【００４２】加熱室(2) の天板(6) の一部に多数の照明光透過用パンチング穴(20)が形成されており、その上に、穴(20)を通して加熱室(2) 内を照明するランプ(21)が設けられている。そして、天板(6) の上にランプ(21)の光を受光する受光素子(22)が設けられており、これによって煙センサ(23)が構成されている。加熱室(2) 内に煙が発生すると、これがパンチング穴(20)を通ってランプ(21)と受光素子(22)の間を流れ、この部分の煙量が受光素子(22)によって検出される。他は、上記実施例の場合と同様である。

【００４３】図６～図８は、さらに上記と異なる実施例を示している。この実施例の場合、煙センサの構成がさらに上記実施例と異なっている。

【００４４】煙センサ(25)は、加熱室(2) 内に設けられた複数組たとえば３組の発光素子(26)と受光素子(27)を備えている。発光素子(26)は加熱室(2) の一方の側板(28)の前後中央部の下部および上部ならびに後部の下部に取付けられ、受光素子(27)は他方の側板(29)にそれぞれ対応する発光素子(26)と対向するように取付けられている。また、加熱室(2) の天板(6) の上に従来と同様の温度センサ(30)が設けられており、この温度センサ(30)ならびに各組の発光素子(26)および受光素子(27)が加熱制御装置(31)に接続されている。

【００４５】各組の対応する発光素子(26)と受光素子(27)によって、これらの間に存在する加熱室(2) 内の煙量を検出することができる。ターンテーブル(3) 上にのせられた食品の一部が対応する発光素子(26)と受光素子(27)の間に介在すると、その受光素子(27)の出力が低くなり、３組の発光素子(26)と受光素子(27)によって食品の

状況たとえば高さや個数などを認識することができる。そして、少なくとも１組の発光素子(26)と受光素子(27)の間に食品が介在していない場合は、その受光素子(27)の出力によって加熱室(2) 内の煙量を検知し、前記同様に加熱制御を行なうことができる。また、全組の発光素子(26)と受光素子(27)の間に食品が介在する場合は、全組の受光素子(27)の出力が低くなって煙を検知することができなくなるので、温度センサ(30)を用いて従来と同様の加熱制御を行なう。なお、少なくとも１組の発光素子(26)と受光素子(27)の間に食品が介在していない場合でも、安全性を高めるために、受光素子(27)の出力による加熱制御と温度センサ(30)による加熱制御を同時に行なうようにしてもよい。

【００４６】図９および図１０は、さらに上記と異なる実施例を示している。

【００４７】図９に示すように、排気ダクト(9) に、前述の煙センサ(13)の他に、湿度センサ(33)が設けられている。この湿度センサ(33)は、排気ダクト(9) 内の湿度を検知することによって加熱室(2) 内の食品の仕上がり状況を認識するものであり、仕上がり状況認識手段を構成している。また、この場合は、図１０に示すように、マイクロコンピュータなどを使用した調理制御装置(34)の中に加熱制御手段(35)や加熱開始前に設定された全加熱時間中の経過時間を計時する計時手段(36)などが含まれており、煙センサ(13)の発光素子(14)および受光素子(15)ならびに湿度センサ(33)が加熱制御手段(35)に接続されている。なお、計時手段(36)も、仕上がり状況認識手段を構成することができる。また、加熱室(2) 内にはヒータ加熱用のヒータ(37)が設けられており、このヒータ(37)も通電制御用のリレー(38)を介して加熱制御手段(35)に接続されている。そして、加熱制御手段(35)は、煙センサ(13)の受光素子(15)と湿度センサ(33)の出力に基づいてマグネトロン(17)およびヒータ(37)の加熱制御を行なうようになっている。

【００４８】ヒータ加熱機能を有する電子レンジの場合、通常でも、たとえば魚や肉を焼くことによって煙が発生することがあり、排気ダクト内の煙量を検知するだけでは、通常の加熱による煙と異常燃焼による煙とを判別することは困難である。また、高周波加熱においても、たとえば燻製の製造のように、利用技術の拡大とともに煙が発生する通常の利用方法が開発されてきており、煙の検知だけで対応することは困難である。

【００４９】通常の加熱による煙と異常燃焼による煙とを判別して、異常燃焼が生じたときにのみ加熱を停止するように、この実施例では、湿度センサ(33)により認識された食品の仕上がり状況によって燃焼検知レベルを変え、煙センサ(13)の検出煙量がこの燃焼検知レベル以上になったときに加熱を停止するようになっている。

【００５０】次に、上記の加熱制御手段(35)による加熱制御の１例を説明する。

【００５１】この場合、湿度センサ(33)の出力が所定値以上の間は、検出煙量がどのように大きくなっても加熱を停止しない。すなわち、燃焼検知レベルを無限大に設定する。そして、湿度センサ(33)の出力が所定値より小さくなれば、燃焼検知レベルを適当な値に設定し、検出煙量がこの燃焼検知レベル以上になったときに加熱を停止する。通常の加熱中は、食品より蒸気が出ているため、湿度センサ(33)の出力が高くなっている。したがって、この間は、上記のように検出煙量がどのように大きくなっても加熱を停止しないようにすることにより、通常の加熱による煙を検知して加熱を停止してしまうことを防止することができる。加熱が進行して食品中の水分がなくなると、湿度センサ(33)の出力は低くなる。このようになると、異常燃焼が生じる可能性があるので、上記のように燃焼検知レベルを適当に設定して加熱制御を行なうことにより、燃焼による煙を検知して加熱を停止することができる。

【００５２】次に、図１１のフローチャートを参照して、上記の制御動作をさらに詳しく説明する。

【００５３】調理スタートキーが押されると、全加熱時間Ｔを設定し（ステップ１）、燃焼検知レベルＫａ を設定する（ステップ２）。操作キーなどを用いて使用者により全加熱時間が設定される場合は、これをそのまま全加熱時間Ｔに設定する。また、食品の重量情報から全加熱時間Ｔを自動的に設定することもできる。次に、湿度センサ(33)の出力から湿度を検出して、これを初期値Ｓｏ として設定し（ステップ３）、加熱を開始する（ステップ４）。次に、加熱経過時間ｔを計時し（ステップ５）、経過時間ｔが全加熱時間Ｔより大きくなったかどうかを調べる（ステップ６）。経過時間ｔが全加熱時間Ｔ以下であれば、ステップ７に進み、湿度センサ(33)の出力から湿度を検出して、湿度検出値Ｓを求める。そして、湿度検出値Ｓが湿度初期値Ｓｏ 以上であるかどうかを調べ（ステップ８）、そうであれば、ステップ５に戻る。ステップ８において湿度検出値Ｓが初期値Ｓｏ より小さければ、ステップ９に進み、煙センサ(13)の受光素子(15)の出力から煙量を検出して、煙量検出値Ｋを求める。次に、煙量検出値Ｋが燃焼検知レベルＫａ より大きいかどうかを調べ（ステップ10）、そうでなければ、ステップ５に戻る。ステップ10において煙量検出値Ｋが燃焼検知レベルＫａ より大きければ、ステップ11に進んで、加熱を停止し、処理を終了する。また、ステップ６において経過時間ｔが全加熱時間Ｔより大きければ、ステップ11に進む。

【００５４】湿度検出値Ｓが初期値Ｓｏ 以上である間は、ステップ５、６、７、８が繰返され、煙センサ(13)による異常燃焼検知は行なわれない。そして、この間に経過時間ｔが全加熱時間Ｔより大きくなれば、ステップ６からステップ11に進んで、正常に加熱を停止する。また、ステップ５～８が繰返されている間に湿度検出値Ｓ

Petitioner Ex 1003, Page 121 of 210
9/27/2016, EAST Version: 3.3.1.2

が初期値Ｓo より小さくなると、ステップ８からステップ９に進み、煙センサ(13)による異常燃焼検知が行なわれるようになる。このようになっても、煙検出値Ｋが燃焼検知レベルＫa より大きくならない限り、ステップ５、６、７、８、９、10が繰返される。そして、この間に経過時間ｔが全加熱時間Ｔより大きくなっても、ステップ６からステップ11に進んで、正常に加熱を停止する。ステップ５～10が繰返されている間に、煙検出値Ｋが燃焼検知レベルＫa より大きくなると、ステップ10からステップ11に進み、異常燃焼状態として加熱を停止する。

【００５５】次に、図１２を参照して、上記の加熱制御手段(35)による加熱制御の他の１例を説明する。図１２は、加熱経過時間ｔによる湿度検出値Ｓと煙量検出値Ｋの変化を示している。

【００５６】この場合、加熱開始から湿度検出値Ｓが一定のレベル切替え値Ｓ1 以下である間（時点ｔ1 までの間）は、低い燃焼検知レベルＡを用いて燃焼検知を行なう。これにより、本来は燃焼が生じることのない加熱初期において、小さな異常燃焼も確実に検知することができる。湿度検出値Ｓがレベル切替え値Ｓ1 より大きくなると、燃焼検知レベルＡからこれより大きい燃焼検知レベルＢに切替える。また、湿度検出値Ｓが一定の加熱確認値Ｓ2 （＞Ｓ1 ）より大きくなると、燃焼検知レベルを無限大にし、煙センサ(13)による異常燃焼検知を行なわない。したがって、湿度検出値Ｓがレベル切替え値Ｓ1 より大きくて燃焼確認値Ｓ2 以下の間（時点ｔ1 から時点ｔ2 までの間）は燃焼検知レベルＢで燃焼検知を行ない、湿度検出値Ｓが加熱確認値Ｓ2 より大きくなった時点ｔ2 以降は燃焼検知を行なわない。燻製を作ったり、ヒータ加熱で魚などを焼いたりしている正常な加熱状態の場合、煙が発生するが、これを検知して加熱を停止することは避けなければならない。この場合、食品の正常な加熱によって発生する蒸気のために湿度検出値Ｓが高くなるので、上記のように湿度検出値Ｓが加熱確認値Ｓ2 より大きいときには正常な加熱状態であると判断して燃焼検知を行なわないようにすることにより、正常な加熱による煙を検知して加熱を停止することがなくなる。

【００５７】次に、図１３のフローチャートを参照して、上記の制御動作をさらに詳しく説明する。

【００５８】調理スタートキーが押されると、全加熱時間Ｔを設定し（ステップ101 ）、燃焼検知レベルＡ、Ｂを設定し（ステップ102 ）、レベル切替え値Ｓ1 、加熱確認値Ｓ2 を設定し（ステップ103 ）、加熱を開始する（ステップ104 ）。次に、加熱経過時間ｔを計時し（ステップ105 ）、経過時間ｔが全加熱時間Ｔより大きくなったかどうかを調べる（ステップ106 ）。経過時間ｔが全加熱時間Ｔ以下であれば、ステップ107 に進み、煙センサ(13)の受光素子(15)の出力から検出した煙量検出値Ｋが燃焼検知レベルＡより大きいかどうかを調べる。煙量検出値Ｋがレベル Ａ以下であれば、ステップ108 に進み、湿度センサ(33)の出力から検出した湿度検出値Ｓがレベル切替え値Ｓ1 より大きいかどうかを調べ、そうでなければ、ステップ105 に戻る。ステップ108 において湿度検出値Ｓがレベル切替え値Ｓ1 より大きければ、ステップ109 に進んで、加熱経過時間ｔを計時し、経過時間ｔが全加熱時間Ｔより大きくなったかどうかを調べる（ステップ110 ）。経過時間ｔが全加熱時間Ｔ以下であれば、ステップ111 に進んで、湿度検出値Ｓが加熱確認値Ｓ2 より大きいかどうかを調べ、そうであれば、ステップ109 に戻る。ステップ111 において湿度検出値Ｓが加熱確認値Ｓ2 以下であれば、ステップ112に進んで、煙量検出値Ｋが燃焼検知レベルＢより大きいかどうかを調べ、そうでなければ、ステップ109 に戻る。ステップ112 において煙量検出値Ｋがレベル Ｂより大きければ、ステップ113 に進んで、加熱を停止し、処理を終了する。ステップ107 において煙検出値Ｋがレベル Ａより大きい場合、ステップ106 または110 において経過時間ｔが全加熱時間Ｔより大きい場合は、ステップ113 に進む。

【００５９】湿度検出値Ｓがレベル切替え値Ｓ1 以下である間は、ステップ105 、106 、107 、108 が繰返され、レベル Ａを用いた燃焼検知が行なわれる。そして、この間に、経過時間ｔが全加熱時間Ｔより大きくなれば、ステップ106 からステップ113 に進んで、正常に加熱を停止し、煙検出値Ｋがレベル Ａより大きくなると、ステップ107 からステップ113 に進み、異常燃焼状態として加熱を停止する。ステップ105 ～108 が繰返されている間に、湿度検出値Ｓがレベル切替え値Ｓ1 より大きくなると、ステップ108 からステップ109 に進み、湿度検出値Ｓが加熱確認値Ｓ2 以下である間は、ステップ109 、110 、111 、112 が繰返され、レベル Ｂを用いた燃焼検知が行なわれる。そして、この間に、経過時間ｔが全加熱時間Ｔより大きくなれば、ステップ110 からステップ113 に進んで、正常に加熱を停止し、煙検出値Ｋがレベル Ｂより大きくなると、ステップ112 からステップ113 に進み、異常燃焼状態として加熱を停止する。また、ステップ109 ～112 が繰返されている間に湿度検出値Ｓが加熱確認値Ｓ2 より大きくなると、ステップ111 からステップ109 に戻って、ステップ109 ～111 が繰返され、燃焼検知が行なわれないようになる。そして、この間に、経過時間ｔが全加熱時間Ｔより大きくなれば、ステップ110 からステップ113 に進んで、正常に加熱を停止する。

【００６０】上記実施例では、食品の仕上がり状況認識手段として湿度センサを使用しているので、食品の加熱状況を直接認識することができる。しかしながら、仕上がり状況認識手段は、湿度センサに限らず、たとえばヒータの温度制御用のサーミスタなどの温度センサ、全加

熱時間中の加熱経過時間を計時する計時手段などを用いることもできる。ヒータの温度制御用のサーミスタなどの温度センサは、センサ近傍の温度を検出することによって加熱室内の温度を間接的に検出することができる。また、加熱室内の温度は加熱の進行とともに徐々に上昇し、ある時点で飽和する。したがって、温度センサの出力から食品の加熱の状況すなわち仕上がり状況を認識することができる。燃焼検知手段として温度センサを使用して図１２および図１３のような加熱制御を行なう場合、温度によって燃焼検知レベルの切替えを行なうようにする。また、燃焼検知手段として加熱経過時間の計時手段を使用して図１２および図１３のような加熱制御を行なう場合、加熱経過時間によって燃焼検知レベルの切替えを行なうようにする。

【００６１】燃焼検知手段を構成する煙センサは、上記実施例のものに限らず、適宜変更可能である。また、燃焼検知手段は、煙センサに限らず、たとえばヒータの温度制御用のサーミスタなどの温度センサなどを用いることもできる。

【００６２】

【発明の効果】第１の発明の電子レンジによれば、上述のように、発煙の段階で被加熱物の燃焼状態をいちはやく検知して加熱を停止することができ、したがって、被加熱物の発火を未然に防止することができ、発火による加熱室や部品の損傷や火災を確実に防止することができる。

【００６３】燃焼検知手段の煙センサが加熱室内を照明するランプの光を受光する受光素子を備えていれば、発光素子を別に設ける必要がなく、コストダウンが可能である。

【００６４】第２の発明の電子レンジによれば、上述のように、食品の仕上がり状況に応じて燃焼検知を行なうので、通常の加熱状態で加熱を停止することなく、微小な異常燃焼もいちはやく検知して加熱を停止することができ、したがって、電子レンジの安全性が高まり、しかも使用制限が少なくなる。

【図面の簡単な説明】

【図１】この発明の１実施例を示す電子レンジの一部切欠き斜視図である。

【図２】図１の電子レンジの電気的構成の主要部を示すブロック図である。

【図３】排気ダクト内の煙量と煙センサの受光素子の出力の関係を示すグラフである。

【図４】この発明の他の実施例を示す電子レンジの一部切欠き斜視図である。

【図５】図４の電子レンジの電気的構成の主要部を示すブロック図である。

【図６】この発明のさらに他の実施例を示す電子レンジの一部切欠き正面図である。

【図７】図６の電子レンジの一部切欠き側面図である。

【図８】図６の電子レンジの電気的構成の主要部を示すブロック図である。

【図９】この発明のさらに他の実施例を示す電子レンジの一部切欠き斜視図である。

【図１０】図９の電子レンジの電気的構成の主要部を示すブロック図である。

【図１１】図９の電子レンジにおける加熱制御の１例を示すフローチャートである。

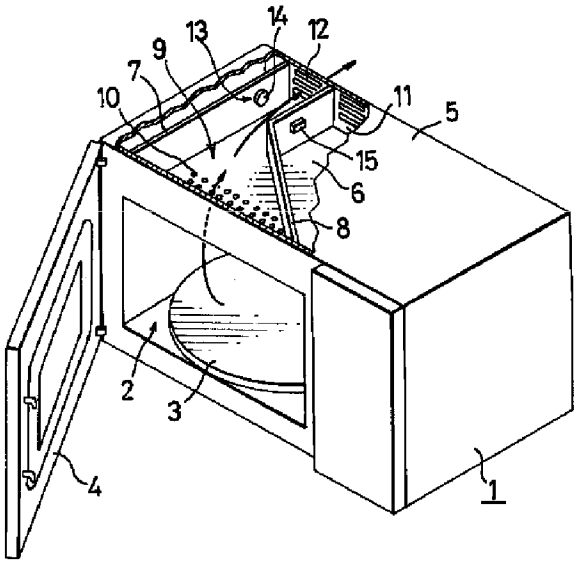
【図１２】加熱経過時間と湿度検出値および煙量検出値との関係を示すグラフである。

【図１３】図９の電子レンジにおける加熱制御の他の１例を示すフローチャートである。

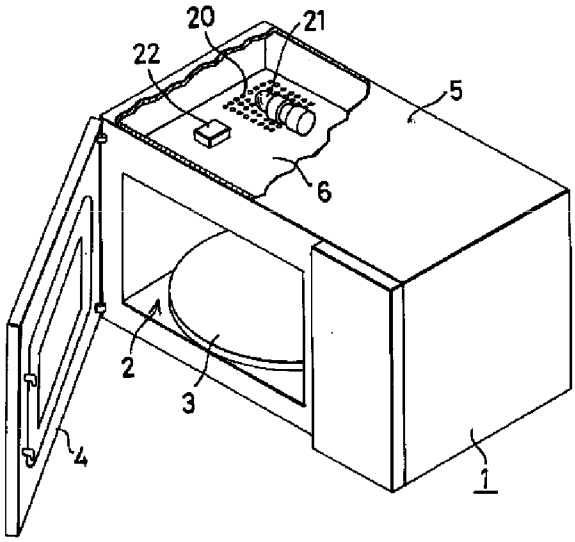
【符号の説明】

(2)	加熱室
(9)	排気ダクト
(13)	煙センサ
(14)	発光素子
(15)	受光素子
(16)	加熱制御装置
(21)	ランプ
(22)	受光素子
(23)	煙センサ
(25)	煙センサ
(26)	発光素子
(27)	受光素子
(30)	温度センサ
(31)	加熱制御装置
(33)	湿度センサ
(35)	加熱制御手段
(36)	計時手段
(37)	ヒータ

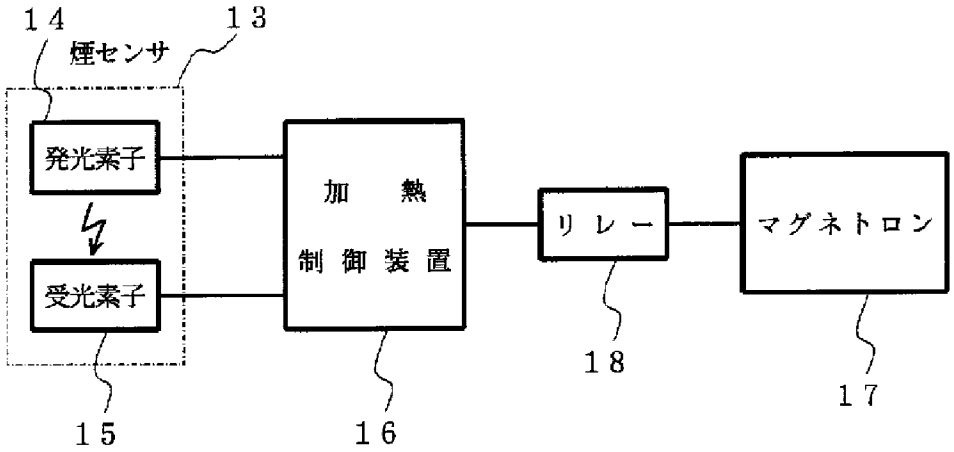
【図1】


14
12
13
9
7
10
11
5
15
6
8
2
3
4
1

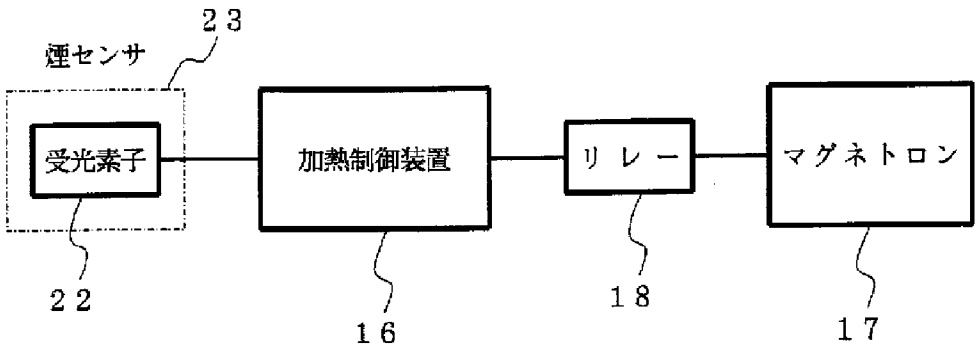
【図4】


20
21
22
5
6
2
3
4
1

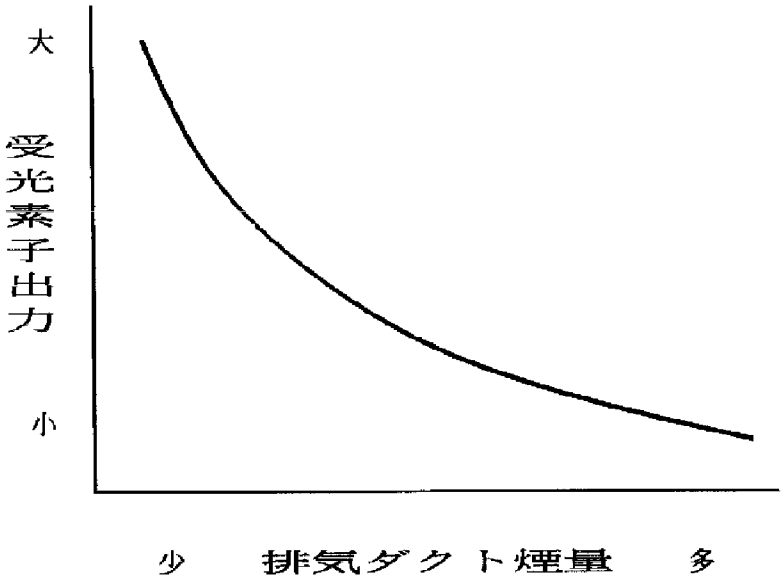
【図2】


14
煙センサ
13
発光素子
受光素子
加　熱
制 御 装 置
リ レ ー
マグネトロン
15
16
18
17

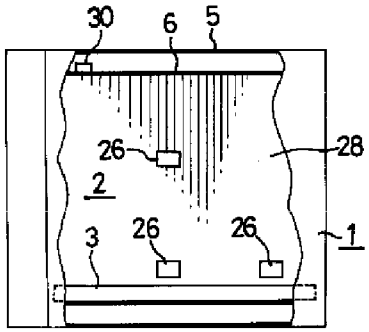
【図5】


23
煙センサ
受光素子
加熱制御装置
リ レ ー
マグネトロン
22
16
18
17

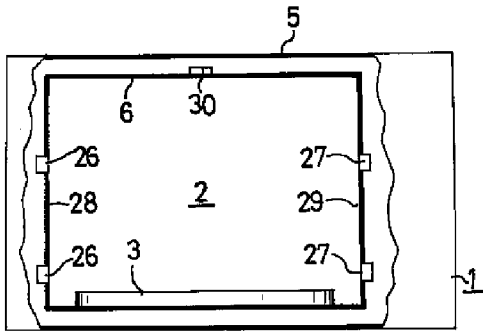
【図3】


大
受光素子出力
小
少　排気ダクト煙量　多

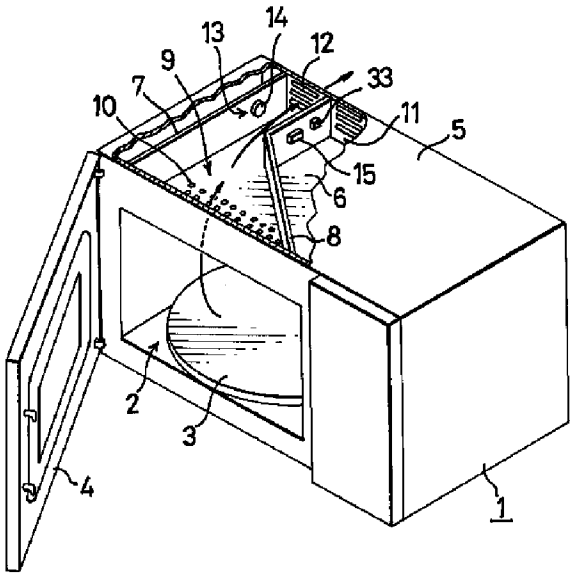
【図7】


30
6
5
26
28
2
3
26
26
1

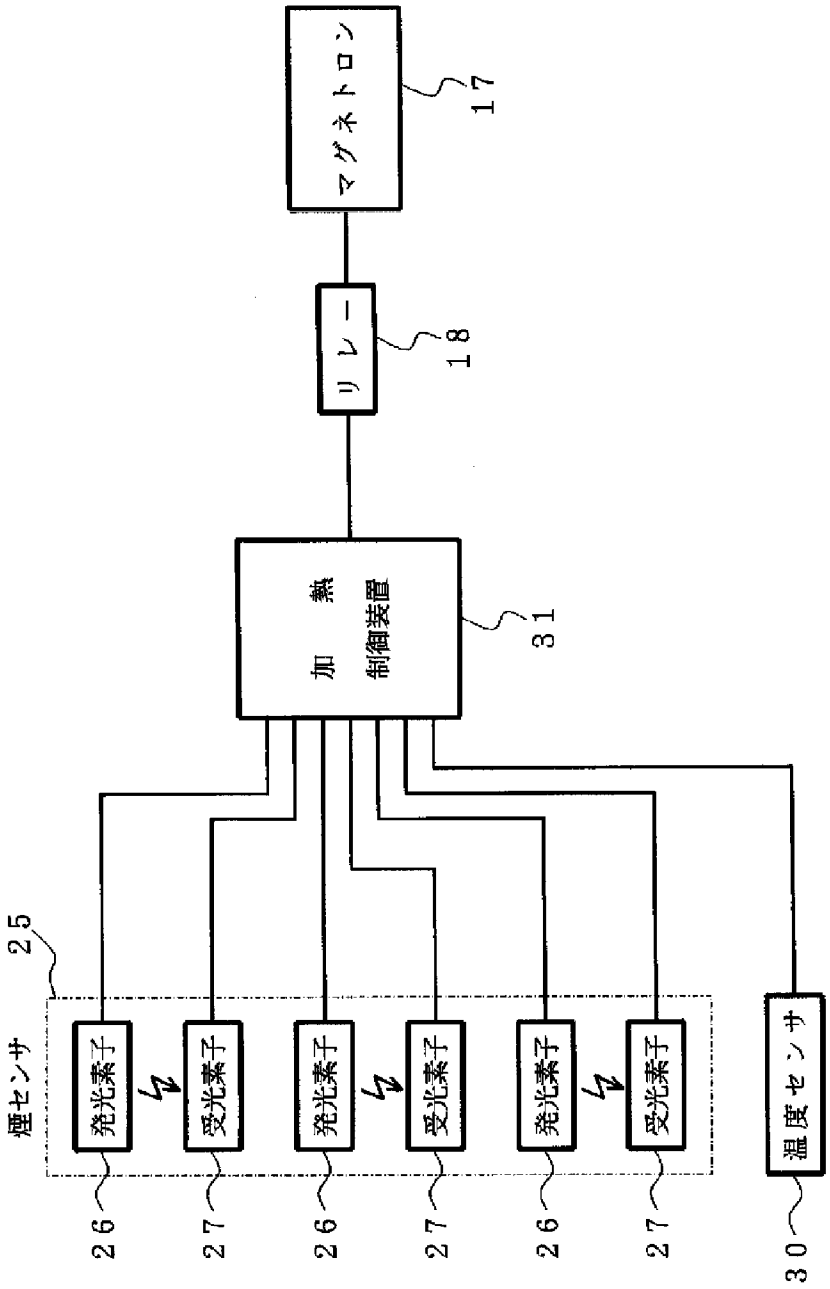
【図6】


5
6
30
26
27
28
2
29
26
3
27
1

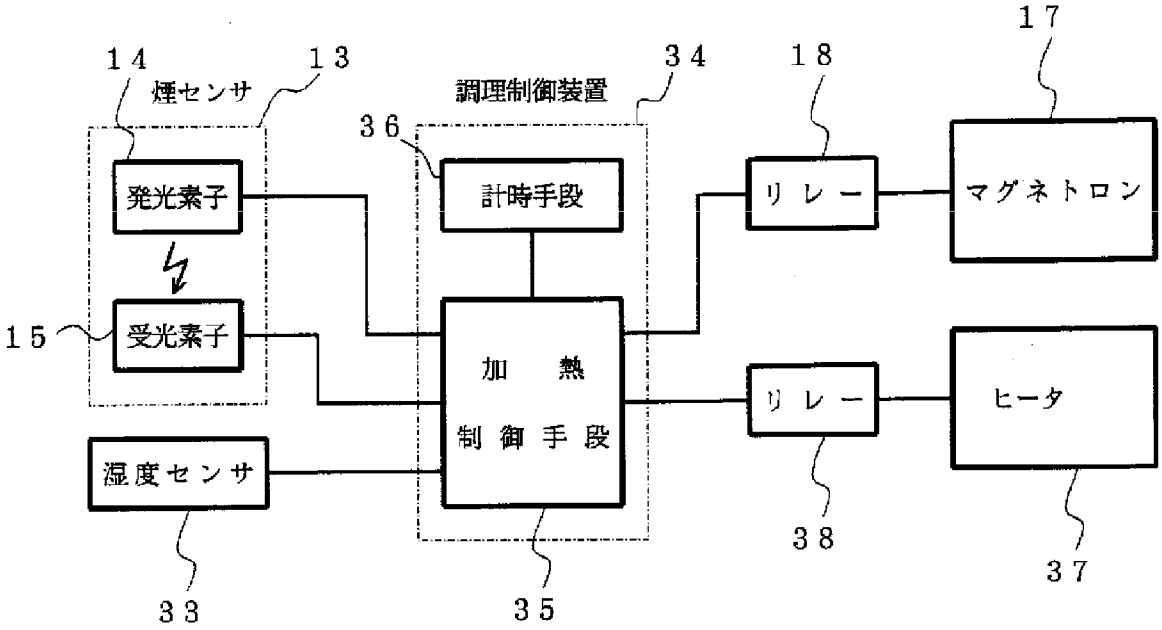
【図9】


13
14
9
12
7
33
10
11
5
15
6
8
2
3
4
1

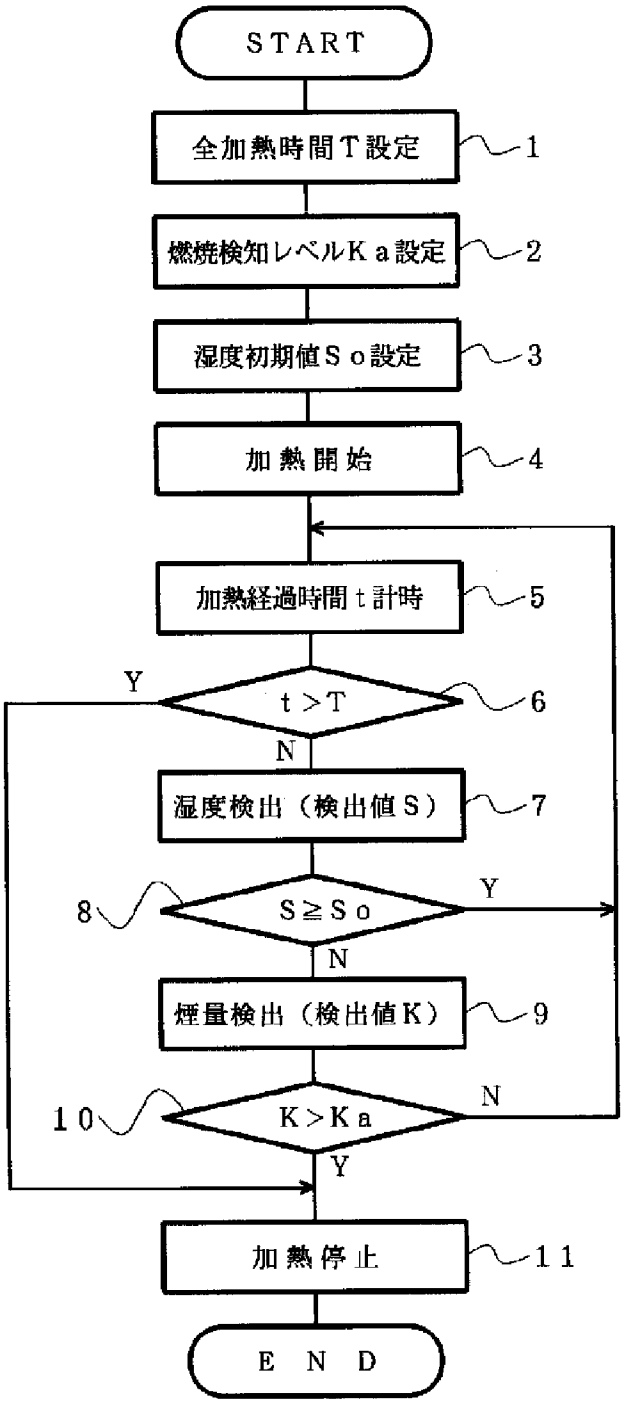
【図8】


マグネトロン
17
リレー
18
加熱制御装置
31
煙センサ
25
発光素子
受光素子
発光素子
受光素子
発光素子
受光素子
温度センサ
26
27
26
27
26
27
30

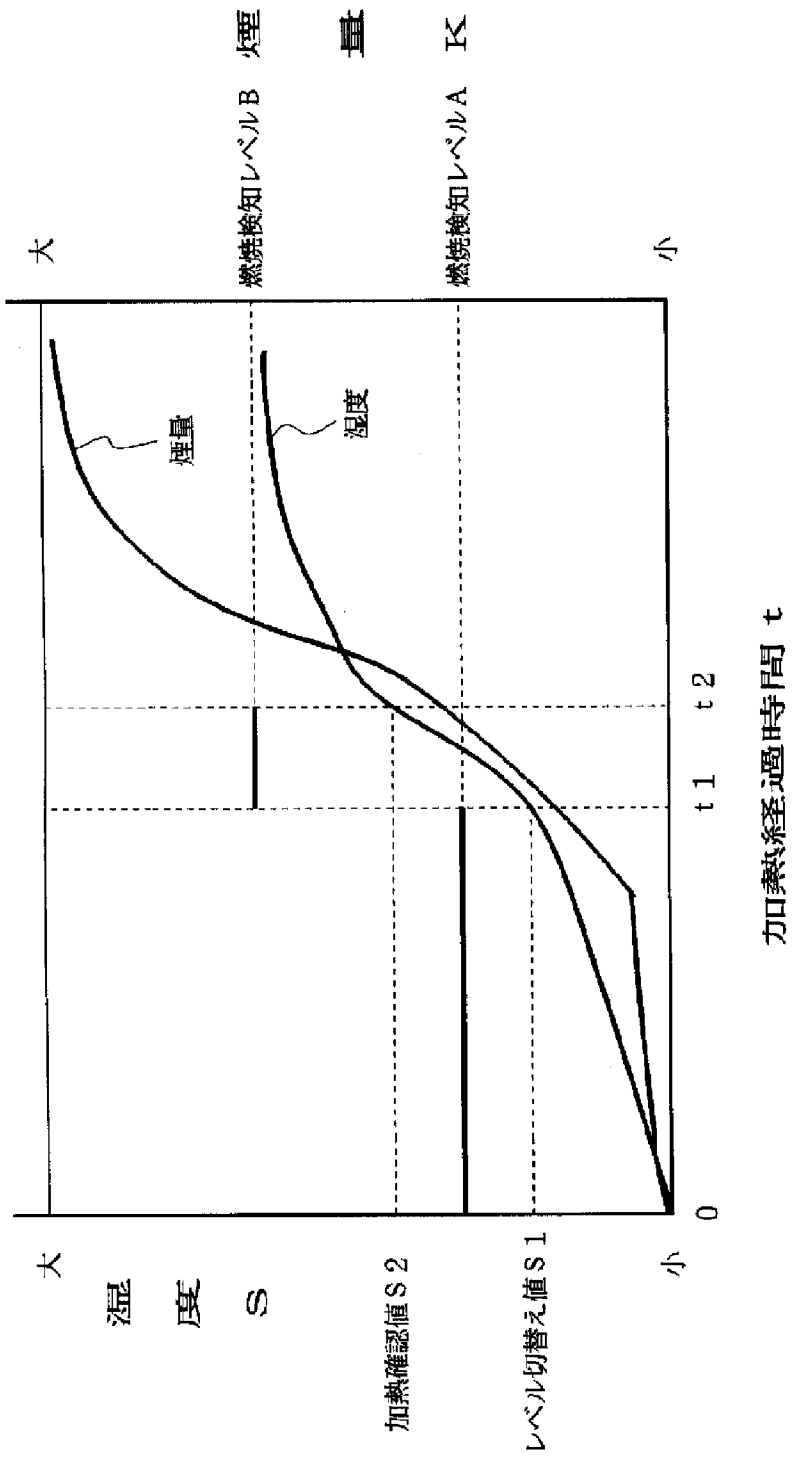
【図10】


14
煙センサ
13
34
調理制御装置
18
17
36
発光素子
計時手段
リレー
マグネトロン
15
受光素子
加熱制御手段
リレー
ヒータ
湿度センサ
38
37
33
35

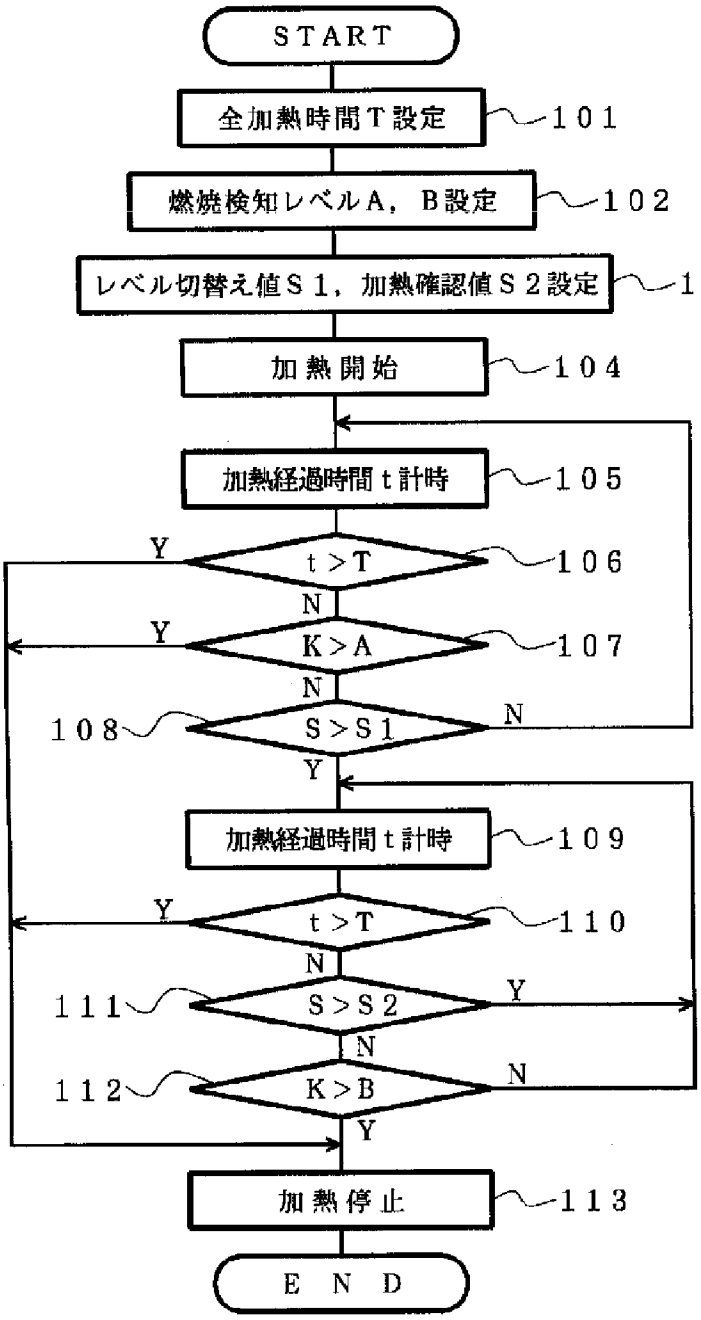
【図１１】


START
全加熱時間Ｔ設定
1
燃焼検知レベルＫａ設定
2
湿度初期値Ｓｏ設定
3
加熱開始
4
加熱経過時間ｔ計時
5
Y
t＞T
6
N
湿度検出（検出値Ｓ）
7
8
S≧So
Y
N
煙量検出（検出値Ｋ）
9
10
K＞Ka
N
Y
加熱停止
11
E N D

【図12】


煙量　K
大
小
燃焼検知レベルB
燃焼検知レベルA
煙量
湿度
湿度　S
大
小
加熱確認値S2
レベル切替え値S1
0
t1
t2
加熱経過時間 t

【図13】


START
全加熱時間T設定
101
燃焼検知レベルA，B設定
102
レベル切替え値S1，加熱確認値S2設定
103
加熱開始
104
加熱経過時間t計時
105
t＞T
106
Y
N
K＞A
107
Y
N
108
S＞S1
N
Y
加熱経過時間t計時
109
t＞T
110
Y
N
111
S＞S2
Y
N
112
K＞B
N
Y
加熱停止
113
E N D

PAT-NO: JP405240447A

DOCUMENT-IDENTIFIER: **JP 05240447 A**

TITLE: **MICROWAVE OVEN**

PUBN-DATE: September 17, 1993

INVENTOR-INFORMATION:
NAME
ANDO, YUJI
EBISAKI, TOSHIYUKI
UEI, YASUHIKO

ASSIGNEE-INFORMATION:

NAME	COUNTRY
SHARP CORP	N/A

APPL-NO: JP04039882

APPL-DATE: February 26, 1992

INT-CL (IPC): F24C007/02, F24C007/02 , H05B006/68

US-CL-CURRENT: 219/707, 219/716

ABSTRACT:

PURPOSE: To perform rapid and accurate sensing of an abnormal combustion state and improve the safety by a method wherein a combustion detecting means containing a smoke sensor which detects a combustion state is provided and when an output therefrom is adjusted to a given combustion detecting level, control of the stop of heating is carried out.

CONSTITUTION: A smoke sensor 13 comprising a light emitting element 14, such as a light emission diode, and a light receiving element 15, such as a photo transistor, is arranged to the rear part of a discharge duct 9 provided so as to interconnect the top plate of a heating chamber, formed in the casing of a **microwave oven,** and the top plate of the casing. Based on an output signal from the smoke sensor 13, energization to a magnetron 17 through a relay 18 is controlled by a heating control device 16. Namely, when an amount of smoke detected by the light receiving element 15 is below a given combustion detection level, the relay 18 is held in an ON-state. Meanwhile, when an amount of **detected smoke** exceeds a combustion **detection** level because of a food in the heating chamber being burnt, the relay 18 is brought into an **OFF**-state and energization to the magnetron 17 is stopped.

COPYRIGHT: (C)1993,JPO&Japio

FULL CONTENTS

[Claim(s)]
[Claim 1]A microwave oven provided with a heating control means which suspends heating when it becomes more than a combustion detecting means which detects a combustion state by detecting smoke with a smoke sensor, and combustion detection levels predetermined in an output of this combustion detecting means.
[Claim 2]A microwave oven of Claim 1 with which a smoke sensor of a combustion detecting means is provided with a light emitting device provided by exhaust duct and a photo detector.
[Claim 3]A microwave oven of Claim 1 with which a smoke sensor of a combustion detecting means is provided with two or more sets of light emitting devices provided in a heat chamber, and a photo detector.
[Claim 4]A microwave oven of Claim 1 provided with a photo detector in which a smoke sensor of a combustion detecting means carries out light reception of the light of a lamp which illuminates inside of a heat chamber.
[Claim 5]A microwave oven provided with a result situation-recognition means to recognize a result situation of foodstuffs in a heat chamber, a combustion detecting means which detects a combustion state, and a heating control means which is finished and controls heating based on an output of a situation-recognition means and a combustion detecting means.
[Claim 6]A microwave oven of Claim 5 with which a result situation-recognition means consists of at least one of the time measuring means which clock elapsed time in all the cooking time set up before a humidity sensor which detects humidity in a heat chamber, a temperature sensor with which temperature in a heat chamber is detected, and a heating start.
[Claim 7]A microwave oven of Claim 6 with which a result situation-recognition means contains a temperature sensor consisting of a thermistor for temperature control of a heater.
[Claim 8]A microwave oven of Claim 5 which consists of at least one of the temperature sensors with which a combustion detecting means detects temperature in a smoke sensor which detects smoke in an exhaust duct, and an exhaust duct.
[Claim 9]A microwave oven of Claim 8 containing a smoke sensor with which a combustion detecting means consists of a light emitting device provided by exhaust duct and a photo detector.
[Claim 10]A microwave oven of Claim 5 currently made as [suspend / a heating control means / when an output of a combustion detecting means becomes more than predetermined combustion detection levels / heating].
[Claim 11]A microwave oven of Claim 10 currently made as [change / according to an output of a result situation-recognition means / combustion detection levels].
[Claim 12]A microwave oven of Claim 11 currently made as [make / combustion

detection levels / until a result situation-recognition means contains a time measuring means which clocks elapsed time in all the cooking time set up before a heating start and predetermined time passes since a heating start / low].
[Claim 13]A microwave oven of Claim 11 currently made as [make / combustion detection levels / high] while a result situation-recognition means recognizes it as under the usual heating of foodstuffs.

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention relates to a microwave oven, especially the microwave oven which has a safety-control function to combustion by a user's misuse.
[0002]
[Description of the Prior Art]As this kind of a microwave oven, conventionally, the temperature sensor which consists of a thermostat cut or a thermal cutout on the top plate of a heat chamber is provided, and if the temperature of the portion of this sensor becomes beyond a predetermined value, what came to suspend heating is known (for example, refer to JP,H1-115085,A).
[0003]
[Problem to be solved by the invention]Since the heat transmited via a top plate from a heat chamber is detected with the temperature sensor in the above conventional microwave ovens, Detecting ignition of a heated thing and combustion takes time, when combustion is detected, the inside of a heat chamber is an elevated temperature considerably, and there was a possibility that parts, such as a tray in a heat chamber or a heat chamber, might be damaged with heat.
[0004]On the other hand, the user's microwave oven utilizing methods are also various with use expansion of the microwave oven, and distinction of the usual heated state by normal use and the abnormal combustion state by misuse is difficult only with a temperature sensor like before. For this reason, although it is the usual heated state, heating may stop, or conversely, although it is an abnormal combustion state, heating may not stop. In the next case, when an abnormal combustion state was detected, it had ignited from the inside of a heat chamber, and the damage to a product might enlarge and it might result in the fire depending on a user's correspondence. When detecting combustion with a temperature sensor like before, it is a case of the microwave oven which has a heater heating function to become especially a problem. In this case, in order that the degree of heat chamber internal temperature at the time of the usual heater heating may go up to near a maximum of 450 degree C, detection of abnormal combustion is dramatically difficult. Namely, since heating may stop also in the usual heater heating state when combustion detection temperature is set as a temperature lower than the

temperature equivalent to the degree of heat chamber internal temperature of 450 degrees C, it is necessary to set to a temperature higher than the temperature equivalent to the degree of heat chamber internal temperature of 450 degrees C but, and, In such setting out, the abnormal-combustion detection at the time of high frequency induction heating will become slow. Since heating may usually stop in a heated state also in the microwave oven of only high frequency induction heating when combustion detection temperature is too low not much, will see a margin and combustion detection temperature will somewhat be set up more highly, but. Now, detection is [combustion] detectable only by the rapid temperature rise after a heated thing ignites like the above.

[0005]The object of this invention heats the above-mentioned problem, and there is in already providing ** and the safe microwave oven which detects correctly and can control heating about an abnormal combustion state.

[0006]

[Means for solving problem]The microwave oven by first invention is provided with the heating control means which suspends heating when it becomes more than the combustion detecting means which detects a combustion state by detecting smoke with a smoke sensor, and combustion detection levels predetermined in the output of this combustion detecting means.

[0007]The smoke sensor of the combustion detecting means may be provided with the light emitting device and photo detector which were provided by the exhaust duct.

[0008]The smoke sensor of the combustion detecting means may be provided with two or more sets of light emitting devices and the photo detector which were provided in the heat chamber.

[0009]The smoke sensor of the combustion detecting means may be provided with the photo detector which carries out light reception of the light of the lamp which illuminates the inside of a heat chamber.

[0010]The microwave oven by second invention is provided with a result situation-recognition means to recognize the result situation of the foodstuffs in a heat chamber, the combustion detecting means which detects a combustion state, and the heating control means which is finished and controls heating based on the output of a situation-recognition means and a combustion detecting means.

[0011]A result situation-recognition means may consist of at least one of the time measuring means which clock the elapsed time in all the cooking time set up before the humidity sensor which detects the humidity in a heat chamber, the temperature sensor which detects the temperature in a heat chamber, and the heating start.

[0012]The result situation-recognition means may contain the temperature sensor consisting of the thermistor for the temperature control of a heater.

[0013]A combustion detecting means may consist of at least one of the temperature sensors which detect the temperature in the smoke sensor which

detects the smoke in an exhaust duct, and an exhaust duct.
[0014]The combustion detecting means may contain the smoke sensor consisting of the light emitting device provided by the exhaust duct and a photo detector.
[0015]It may be made as [suspend / a heating control means / when the output of a combustion detecting means becomes more than predetermined combustion detection levels / heating].
[0016]It may be made as [change / according to the output of a result situation-recognition means / combustion detection levels].
[0017]The result situation-recognition means contains the time measuring means which clocks the elapsed time in all the cooking time set up before the heating start, and it may be made as [make / combustion detection levels / low] until predetermined time passes since a heating start.
[0018]While the result situation-recognition means recognizes it as under the usual heating of foodstuffs, it may be made as [make / combustion detection levels / high].
[0019]
[Function]According to the first invention, since a combustion state is detected when a combustion detecting means detects smoke with a smoke sensor, the combustion state of a heated thing can be promptly detected in the stage of emitting smoke, and heating can be suspended.
[0020]This is detected when the smoke sensor of the combustion detecting means is provided with the light emitting device and photo detector which were provided by the exhaust duct, and the smoke which flows into an exhaust duct from a heat chamber interrupts between a light emitting device and photo detectors.
[0021]While this is detected when the smoke sensor of the combustion detecting means is provided with two or more sets of light emitting devices and the photo detector which were provided in the heat chamber, and smoke interrupts between a light emitting device and photo detectors, the situation of the foodstuffs in a heat chamber can also be recognized.
[0022]This is detected when the smoke sensor of the combustion detecting means is provided with the photo detector which carries out light reception of the light of the lamp which illuminates the inside of a heat chamber, and smoke interrupts the light from a lamp.
[0023]Since heating is controlled based on the output of a result situation-recognition means and a combustion detecting means according to the microwave oven of a second invention, according to the result situation of foodstuffs, a combustion state can be detected promptly and correctly and heating can be suspended.
[0024]Since the moisture contained in foodstuffs evaporates with advance of heating, the result situation of foodstuffs can be recognized by detecting this humidity with a humidity sensor.

[0025]When performing heating with a heater, by detecting the temperature in a heat chamber indirectly with a thermistor [near the heater], temperature control is performed and the result situation of foodstuffs can be recognized with the output of this thermistor or other temperature sensors.
[0026]When all the cooking time is set up by the user, or when all the cooking time is automatically set up in the stage in early stages of a heating start by the weight information of foodstuffs, etc., the result situation of foodstuffs can be recognized by clocking the elapsed time of heating.
[0027]A combustion state is detectable detecting the smoke in an exhaust duct with a smoke sensor, or by detecting the temperature in an exhaust duct with a temperature sensor.
[0028]This is detected when the combustion detecting means contains the smoke sensor consisting of the light emitting device provided by the exhaust duct and a photo detector, and smoke interrupts between a light emitting device and photo detectors.
[0029]By being made as [suspend / a heating control means / when the output of a combustion detecting means becomes more than predetermined combustion detection levels / heating], heating is controllable based on the output of a combustion detecting means.
[0030]By being made as [change / according to the output of a result situation-recognition means / combustion detection levels], a combustion state is promptly and correctly detectable according to the result situation of foodstuffs.
[0031]Originally in the early stages of heating, combustion does not arise, and it can also detect small abnormal combustion reliably by making combustion detection levels low in early stages of such heating.
[0032]While the result situation-recognition means recognizes it as under the usual heating of foodstuffs, by making combustion detection levels high, the usual heated state is taken for an abnormal combustion state, and heating is not suspended.
[0033]
[Working example]Hereinafter, with reference to Drawings, it describes about some working examples of this invention. In these working examples, the same code is given to the common portion.
[0034]Fig.1 and Fig.2 show one working example of this invention. Fig.1 is the whole microwave oven outline perspective view, and Fig.2 is a block diagram showing the principal part of the electric composition.
[0035]In Fig.1, a heat chamber (oven warehouse) (2) is provided in the housing (1) which constitutes the coat of a microwave oven, and the turntable (3) is provided by the lower part in a heat chamber (2). The door (4) is provided by the front opening of the heat chamber (2). The exhaust duct (9) partitioned by the right and left side board (7) and (8) between the top plating (5) of a housing (1) and the top plate (6) of a heat chamber (2) is provided. The many exhaust air punching holes (10) which

communicate the front part of a top plate (6) in a heat chamber (2) and a duct (9) are formed, and the exhaust louver (12) which communicates the backboard (11) upper part of a housing (1) in a duct (9) and outside is formed. In Fig.1, notch ****** of some top plating (5) of a housing (1) is carried out.

[0036]The smoke sensor (13) which constitutes a combustion detecting means at the rear part of an exhaust duct (9) is provided. A smoke sensor (13) consists of light emitting devices (14), such as a light emitting diode attached to one side board (7), and photo detectors (15), such as a photo-transistor attached to the side board of another side so that it might oppose with this. By detecting the smoke density which exists between a light emitting device (14) and a photo detector (15) with a photo detector (15), a smoke sensor (13) detects the smoke density in a duct (9), and detects the combustion state in a heat chamber (2) by this. The output of a photo detector (15) becomes small as are shown in Fig.3 and the smoke density between a light emitting device (14) and a photo detector (15) increases, and the output of a photo detector (15) can detect smoke density.

[0037]As shown in Fig.2, while the light emitting device (14) and photo detector (15) of a smoke sensor (13) are connected to the heating control device (16) which constitutes a heating control means, the relay (18) for controlling the energization to the magnetron for high frequency induction heating (17) is connected. The heating control device (16) is constituted by the microcomputer etc., for example.

[0038]While a control device (16) applies voltage to a light emitting device (14) and makes this emit light, [during the high frequency induction heating by a magnetron (17)] [a control device] Heating is controlled by detecting the smoke density in an exhaust duct (9) from the output of a photo detector (15), and controlling a relay (18) as follows based on this. When the smoke density (detection smoke density) detected with the photo detector (15) is smaller than predetermined combustion detection levels, a relay (18) is held in the ON (excitation) state. Thereby, the energization to a magnetron (17) is continued and heating is continued. If detection smoke density becomes more than combustion detection levels, a relay (18) will be changed to an OFF (demagnetization) state. Thereby, the energization to a magnetron (17) stops and heating stops. In the usual heated state, there is little smoke density in an exhaust duct (9), and since it does not become more than combustion detection levels, heating is continued. When the foodstuffs in a heat chamber (2) burn, smoke occurred, the smoke density in an exhaust duct (9) increases and this becomes more than combustion detection levels, heating stops as mentioned above and ignition is prevented.

[0039]A temperature sensor like before other than the above-mentioned smoke sensor (13) is added, and also when the output of this temperature sensor becomes beyond a predetermined value, it may be made to suspend heating, as long as it is required when improving safety further. Even if abnormalities should arise in a smoke sensor (13) when doing in this way, combustion can be detected, heating can

be suspended and it becomes a double safeguard.
[0040]A smoke sensor can be changed as appropriate not only in the thing of the above-mentioned working example.
[0041]Fig.4 and Fig.5 show a different working example from the above. In the case of this working example, the composition of the smoke sensor differs from the above-mentioned working example.
[0042]The many punching holes for an illumination-light penetration (20) are formed in some top plates (6) of a heat chamber (2), and the lamp (21) which illuminates the inside of a heat chamber (2) through a hole (20) on it is provided. And the photo detector (22) which carries out light reception of the light of a lamp (21) is provided on the top plate (6), and the smoke sensor (23) is constituted by this. If smoke occurs in a heat chamber (2), this will flow through punching holes (20) between a lamp (21) and a photo detector (22), and the smoke density of this portion will be detected with a photo detector (22). Others are the same as that of the case of the above-mentioned working example.
[0043]Fig.6 - Fig.8 show a further different working example from the above. In the case of this working example, the composition of the smoke sensor differs from the above-mentioned working example further.
[0044]The smoke sensor (25) is provided with two or more sets, for example, 3 sets, of light emitting devices (26) provided in the heat chamber (2), and a photo detector (27). A light emitting device (26) is attached to the lower part of one side-board (28) order central part of a heat chamber (2), and the lower part rear in an upper row, and the photo detector (27) is attached so that it may oppose with the light emitting device (26) respectively corresponding to the side board (29) of another side. The temperature sensor (30) same on the top plate (6) of a heat chamber (2) as usual is provided, and the light emitting device (26) and photo detector (27) of this temperature sensor (30) and each class are connected to the heating control device (31).
[0045]With the light emitting device (26) to which each class corresponds, and a photo detector (27), the smoke density in the heat chamber (2) which exists among these is detectable. If it interposes between the light emitting device (26) and photo detector (27) in which some foodstuffs carried on the turntable (3) correspond, The output of the photo detector (27) becomes low, and it can recognize the number, the situation, for example, the height, of foodstuffs, etc. with the light emitting device (26) and photo detector (27) whose number is three. And when foodstuffs do not interpose between at least 1 set of light emitting devices (26), and a photo detector (27), with the output of the photo detector (27), the smoke density in a heat chamber (2) can be detected, and heating control can be performed to the above-mentioned appearance. Since the output of the photo detector (27) of all the groups becomes low and it becomes impossible to detect smoke when foodstuffs interpose between the light emitting device (26) of all the groups, and a photo

detector (27), the same heating control as usual is performed using a temperature sensor (30). Even when foodstuffs do not interpose between at least 1 set of light emitting devices (26), and a photo detector (27), in order to improve safety, it may be made to perform heating control by the output of a photo detector (27), and heating control by a temperature sensor (30) simultaneously.

[0046]Fig.9 and Fig.10 show a further different working example from the above.

[0047]As shown in Fig.9, the humidity sensor (33) other than the above-mentioned smoke sensor (13) is provided by the exhaust duct (9). This humidity sensor (33) is an exhaust duct (9). It is a heat chamber (2) by detecting inner humidity. A result situation of inner foodstuffs is recognized.

A result situation-recognition means is constituted.

In this case, as shown in Fig.10, the time measuring means (36) etc. which clock the elapsed time in all the cooking time set up before the heating control means (35) and the heating start are contained in the cooking control device (34) which uses a microcomputer etc., The light emitting device (14), photo detector (15), and humidity sensor (33) of the smoke sensor (13) are connected to the heating control means (35). A time measuring means (36) can constitute a result situation-recognition means. The heater for heater heating (37) is provided in the heat chamber (2), and this heater (37) is connected to the heating control means (35) via the relay for energization control (38). And a heating control means (35) performs heating control of a magnetron (17) and a heater (37) based on the photo detector (15) of a smoke sensor (13), and the output of a humidity sensor (33).

[0048]In the case of the microwave oven which has a heater heating function, it is difficult to distinguish the smoke by the usual heating, and the smoke by abnormal combustion only by smoke occurring and usual detecting the smoke density in an exhaust duct by roasting a fish and meat, for example. Also in high frequency induction heating, it is difficult to develop the usual utilizing method which smoke generates with expansion of use art, for example like smoke-dried manufacture, and to correspond only by detection of smoke.

[0049]So that heating may be suspended, only when the smoke by the usual heating and the smoke by abnormal combustion are distinguished and abnormal combustion arises, [this working example] Heating is suspended, when combustion detection levels are changed and the detection smoke density of a smoke sensor (13) becomes by the result situation of the foodstuffs recognized by the humidity sensor (33) more than these combustion detection levels.

[0050]Next, one example of the heating control by the above-mentioned heating control means (35) is described.

[0051]In this case, the output of a humidity sensor (33) will not suspend heating, however detection smoke density may enlarge between beyond a predetermined value. That is, combustion detection levels are set up infinitely. And if the output of a humidity sensor (33) becomes smaller than a predetermined value, combustion

detection levels are set as a suitable value, and heating will be suspended when detection smoke density becomes more than these combustion detection levels. During the usual heating, since the steam has come out from foodstuffs, the output of the humidity sensor (33) is high. Therefore, it can prevent detecting the smoke by the usual heating and suspending heating in the meantime by making it not suspend heating, however detection smoke density may enlarge as mentioned above. If heating advances and the moisture in foodstuffs is lost, the output of a humidity sensor (33) will become low. Since abnormal combustion may arise if it becomes such, by setting up combustion detection levels suitably as mentioned above, and performing heating control, the smoke by combustion can be detected and heating can be suspended.

[0052]Next, with reference to the flow chart of Fig.11, the above-mentioned control action is described in more detail.

[0053]If the cooking start key is pressed, all the cooking time T will be set up (Step 1), and the combustion detection levels Ka will be set up (Step 2). When all the cooking time is set up by the user using an operation key etc., this is set as all the cooking time T as it is. All the cooking time T can also be automatically set up from the weight information of foodstuffs. Next, humidity is detected from the output of a humidity sensor (33), this is set up as the initial value So (Step 3), and heating is started (Step 4). Next, the heating elapsed time t are clocked (Step 5), and it is investigated whether the elapsed time t enlarged from all the cooking time T (Step 6). If the elapsed time t are less than all the cooking time T, it will proceed to Step 7, humidity will be detected from the output of a humidity sensor (33), and the humidity detection value S will be calculated. And it investigates whether the humidity detection value S is beyond the humidity initial value So (Step 8), and if that is right, it will return to Step 5. If the humidity detection value S is smaller than the initial value So in Step 8, it will proceed to Step 9, smoke density will be detected from the output of the photo detector (15) of a smoke sensor (13), and the smoke density detection value K will be calculated. Next, it investigates whether the smoke density detection value K is larger than the combustion detection levels Ka (Step 10), otherwise, returns to Step 5. If the smoke density detection value K is larger than the combustion detection levels Ka in Step 10, it will proceed to Step 11, heating will be suspended, and processing will be ended. If the elapsed time t are larger than all the cooking time T in Step 6, it will proceed to Step 11.

[0054]While the humidity detection value S is beyond the initial value So, Steps 5, 6, 7, and 8 are repeated and abnormal-combustion detection by a smoke sensor (13) is not performed. And if the elapsed time t enlarge from all the cooking time T in the meantime, it will proceed to Step 11 from Step 6, and will suspend heating normally. If the humidity detection value S becomes smaller than the initial value So while Steps 5-8 are repeated, it will proceed to Step 9 from Step 8, and abnormal-combustion detection by a smoke sensor (13) will come to be performed. Even if it

becomes such, unless the smoke detection value K enlarges from the combustion detection levels Ka, Steps 5, 6, 7, 8, 9, and 10 are repeated. And even if the elapsed time t enlarge from all the cooking time T in the meantime, it proceeds to Step 11 from Step 6, and suspends heating normally. If the smoke detection value K enlarges from the combustion detection levels Ka while Steps 5-10 are repeated, it will proceed to Step 11 from Step 10, and will suspend heating as an abnormal combustion state.

[0055]Next, with reference to Fig.12, one example of everything but the heating control by the above-mentioned heating control means (35) is described. Fig.12 shows change of the humidity detection value S by the heating elapsed time t and the smoke density detection value K.

[0056]In this case, a heating start to the humidity detection value S is the fixed level change value S1. While being the following (up to the point in time t1), combustion detection is performed using low combustion detection-levels A. Thereby, originally in the early stages of heating which combustion does not produce, small abnormal combustion is also reliably detectable. If the humidity detection value S enlarges from the level change value S1, it will change from combustion detection-levels A to larger combustion detection-levels B than this. If the humidity detection value S enlarges from the fixed heating check value S2 (>S1), combustion detection levels will be made infinite and abnormal-combustion detection by a smoke sensor (13) will not be performed. Therefore, the humidity detection value S is larger than the level change value S1, and it is the combustion verification value S2. Time t2 of performing combustion detection by combustion detection-levels B between the followings (from the point in time t1 to the point in time t2), and the humidity detection value S enlarging from the heating check value S2 Combustion detection is not performed henceforth. In the case of the normal heated state which makes smoking or is broiling the fish etc. by heater heating, smoke occurs, but detecting this and suspending heating must avoid. In this case, since the humidity detection value S becomes high for the steam which occurs by normal heating of foodstuffs, By judging that the humidity detection value S is a heated state normal when larger than the heating check value S2 as mentioned above, and being made not to perform combustion detection, detecting the smoke by normal heating and suspending heating is lost.

[0057]Next, with reference to the flow chart of Fig.13, the above-mentioned control action is described in more detail.

[0058]If the cooking start key is pressed, all the cooking time T will be set up (Step 101), combustion detection-levels A and B will be set up (Step 102), the level change value S1 and the heating check value S2 will be set up (Step 103), and heating will be started (Step 104). Next, the heating elapsed time t are clocked (Step 105), and it is investigated whether the elapsed time t enlarged from all the cooking time T (Step 106). If the elapsed time t are less than all the cooking time T,

it will proceed to Step 107 and it will be investigated whether the smoke density detection value K detected from the output of the photo detector (15) of a smoke sensor (13) is larger than combustion detection-levels A. If the smoke density detection value K is below the level A, it will proceed to Step 108, and will investigate whether the humidity detection value S detected from the output of the humidity sensor (33) is larger than the level change value S1, otherwise, will return to Step 105. If the humidity detection value S is larger than the level change value S1 in Step 108, it will proceed to Step 109, the heating elapsed time t will be clocked, and it will be investigated whether the elapsed time t enlarged from all the cooking time T (Step 110). If the elapsed time t are less than all the cooking time T, it will proceed to Step 111 and will investigate whether the humidity detection value S is larger than the heating check value S2, and if that is right, it will return to Step 109. In Step 111, the humidity detection value S is the heating check value S2. If it is the following, it will proceed to Step 112, and will investigate whether the smoke density detection value K is larger than combustion detection-levels B, otherwise, will return to Step 109. If the smoke density detection value K is larger than the level B in Step 112, it will proceed to Step 113, heating will be suspended, and processing will be ended. In Step 107, in the smoke detection value K, when larger than the level A, in Step 106 or 110, the elapsed time t proceed to Step 113, when larger than all the cooking time T.

[0059]The humidity detection value S is the level change value S1. While being the following, Step 105, 106, 107, and 108 are repeated and combustion detection using the level A is performed. And if the elapsed time t enlarge from all the cooking time T, it will proceed to Step 113 from Step 106, heating will be suspended normally and the smoke detection value K will enlarge from the level A in the meantime, it will proceed to Step 113 from Step 107, and will suspend heating as an abnormal combustion state. If the humidity detection value S enlarges from the level change value S1 while Step 105-108 is repeated, It proceeds to Step 109 from Step 108, and the humidity detection value S is the heating check value S2. While being the following, Step 109, 110, 111, and 112 are repeated and combustion detection using the level B is performed. And if the elapsed time t enlarge from all the cooking time T, it will proceed to Step 113 from Step 110, heating will be suspended normally and the smoke detection value K will enlarge from the level B in the meantime, it will proceed to Step 113 from Step 112, and will suspend heating as an abnormal combustion state. If the humidity detection value S enlarges from the heating check value S2 while Step 109-112 is repeated, it will return from Step 111 to Step 109, Step 109-111 will be repeated, and combustion detection will become as [perform / ****]. And if the elapsed time t enlarge from all the cooking time T, it will proceed to Step 113 from Step 110, and will suspend heating normally in the meantime.

[0060]In the above-mentioned working example, since the humidity sensor is used

as a result situation-recognition means of foodstuffs, the heating situation of foodstuffs can be recognized directly. However, the time measuring means etc. which clock the heating elapsed time not only a humidity sensor but in temperature sensors, such as a thermistor for the temperature control of a heater for example, and all the cooking time can also be used for a result situation-recognition means. Temperature sensors, such as a thermistor for the temperature control of a heater, can detect the temperature in a heat chamber indirectly by detecting the temperature near the sensor. The temperature in a heat chamber rises gradually with advance of heating, and is saturated at a certain time. Therefore, it can recognize from the output of a temperature sensor, the situation, i.e., the result situation, of heating of foodstuffs. When performing Fig.12 and heating control like Fig.13 as a combustion detecting means using a temperature sensor, it is made to change combustion detection levels with temperature. When performing Fig.12 and heating control like Fig.13 as a combustion detecting means using the time measuring means of heating elapsed time, it is made to change combustion detection levels by heating elapsed time.

[0061]The smoke sensor which constitutes a combustion detecting means can be changed as appropriate not only in the thing of the above-mentioned working example. Temperature sensors, such as not only a smoke sensor but a thermistor for the temperature control of a heater for example, etc. can also be used for a combustion detecting means.

[0062]

[Effect of the Invention]According to the microwave oven of a first invention, as mentioned above, the combustion state of a heated thing can be promptly detected in the stage of emitting smoke, and heating can be suspended, therefore ignition of a heated thing can be prevented beforehand, and the damage and the fire of a heat chamber or parts by ignition can be prevented reliably.

[0063]If the smoke sensor of the combustion detecting means is provided with the photo detector which carries out light reception of the light of the lamp which illuminates the inside of a heat chamber, it is not necessary to provide a light emitting device independently, and can cut down the cost.

[0064]Since combustion detection is performed as mentioned above according to the result situation of foodstuffs according to the microwave oven of a second invention, Without suspending heating by the usual heated state, minute abnormal combustion can also be detected promptly, and heating can be suspended, therefore the safety of a microwave oven increases, and, moreover, restriction of use decreases.

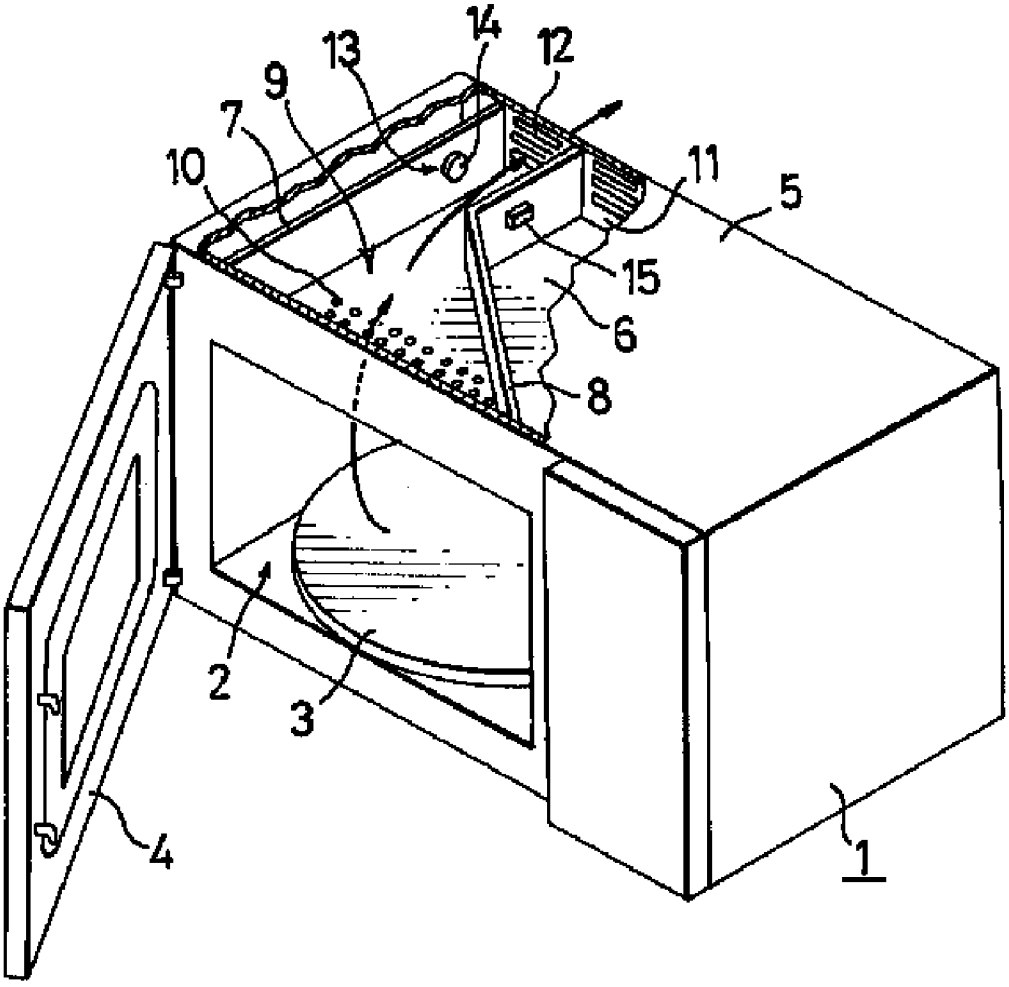
[Brief Description of the Drawings]

[Drawing 1]It is a partial notch perspective view of the microwave oven in which one

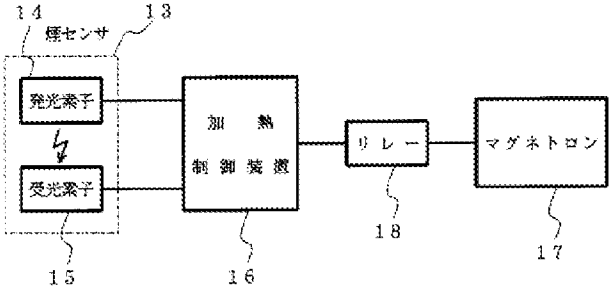
working example of this invention is shown.
[Drawing 2]It is a block diagram showing the principal part of the electric composition of the microwave oven of Fig.1.
[Drawing 3]It is a graph which shows the relation between the smoke density in an exhaust duct, and the output of the photo detector of a smoke sensor.
[Drawing 4]It is a partial notch perspective view of the microwave oven in which other working examples of this invention are shown.
[Drawing 5]It is a block diagram showing the principal part of the electric composition of the microwave oven of Fig.4.
[Drawing 6]It is a partial notch front view of the microwave oven in which the yet another working example of this invention is shown.
[Drawing 7]It is a partial notch side view of the microwave oven of Fig.6.
[Drawing 8]It is a block diagram showing the principal part of the electric composition of the microwave oven of Fig.6.
[Drawing 9]It is a partial notch perspective view of the microwave oven in which the yet another working example of this invention is shown.
[Drawing 10]It is a block diagram showing the principal part of the electric composition of the microwave oven of Fig.9.
[Drawing 11]It is a flow chart which shows one example of the heating control in the microwave oven of Fig.9.
[Drawing 12]It is a graph which shows the relation between heating elapsed time, a humidity detection value, and a smoke density detection value.
[Drawing 13]It is a flow chart which shows one example of everything but the heating control in the microwave oven of Fig.9.
[Explanations of letters or numerals]
(2) Heat chamber
(9) Exhaust duct
(13) Smoke sensor
(14) Light emitting device
(15) Photo detector
(16) Heating control device
(21) Lamp
(22) Photo detector
(23) Smoke sensor
(25) Smoke sensor
(26) Light emitting device
(27) Photo detector
(30) Temperature sensor
(31) Heating control device
(33) Humidity sensor
(35) Heating control means

(36) Time measuring means
(37) Heater

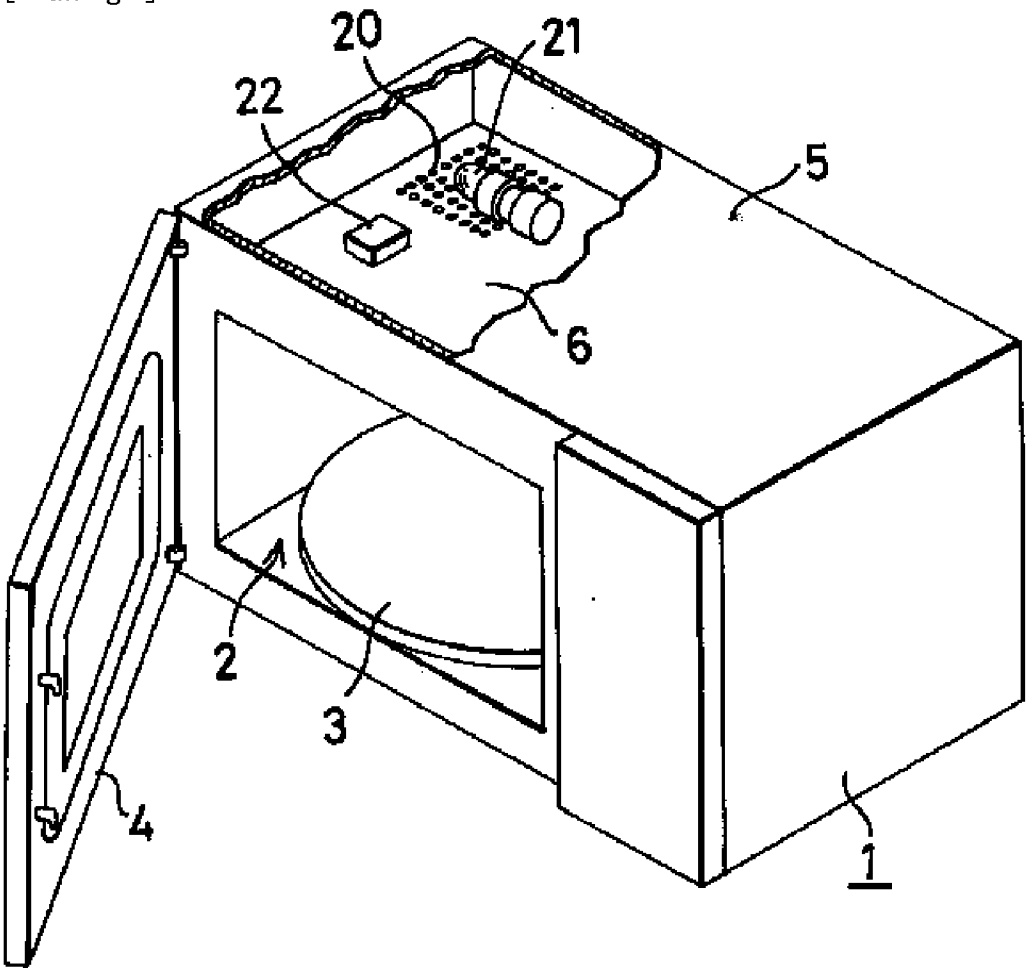
[Drawing 1]



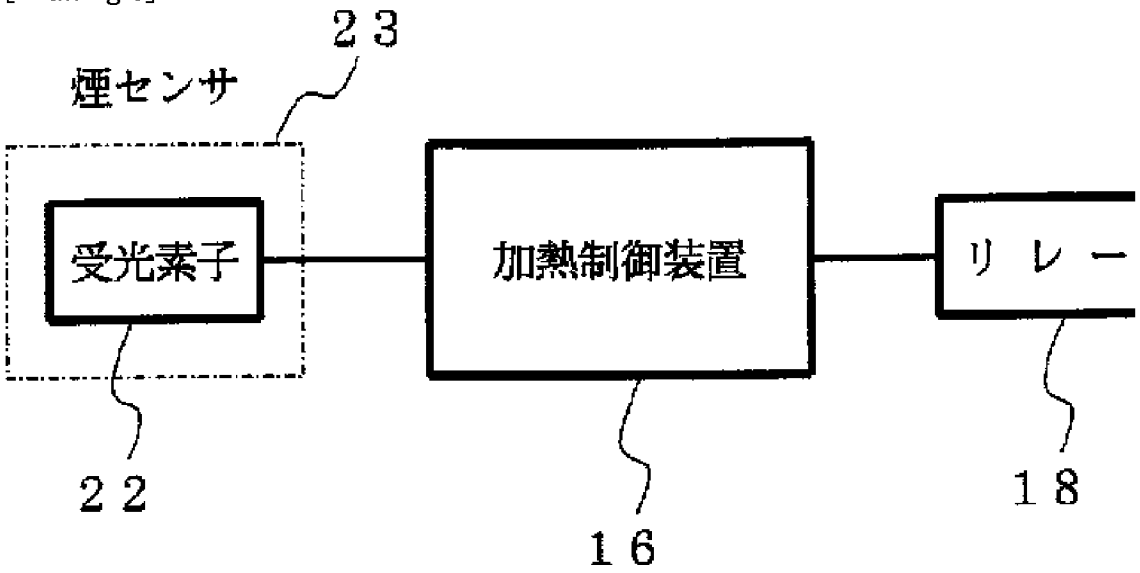
[Drawing 2]



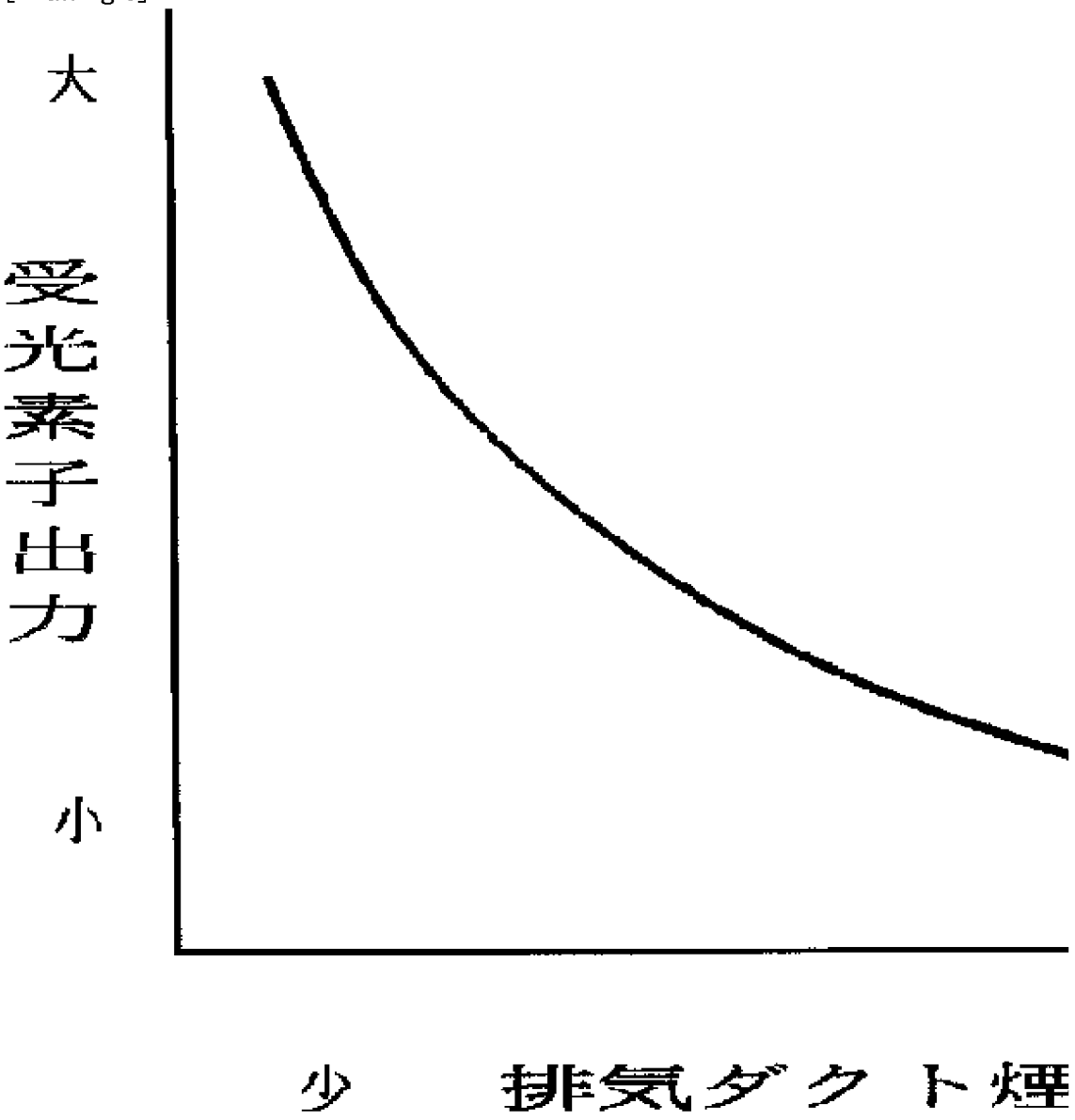
[Drawing 4]



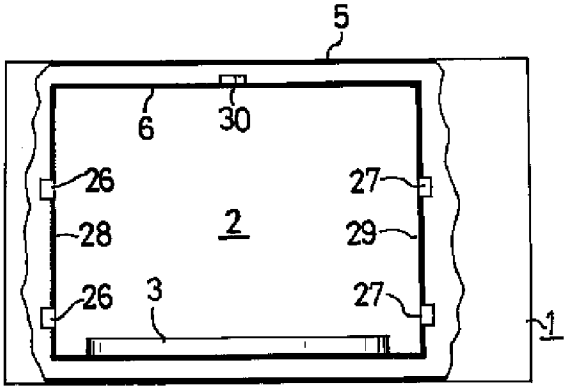
[Drawing 5]



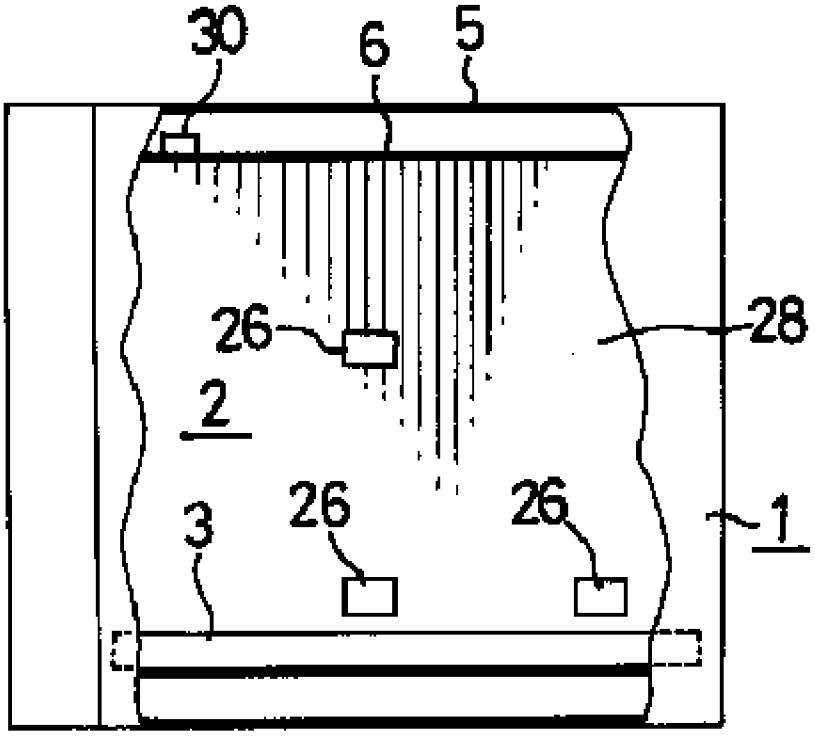
[Drawing 3]



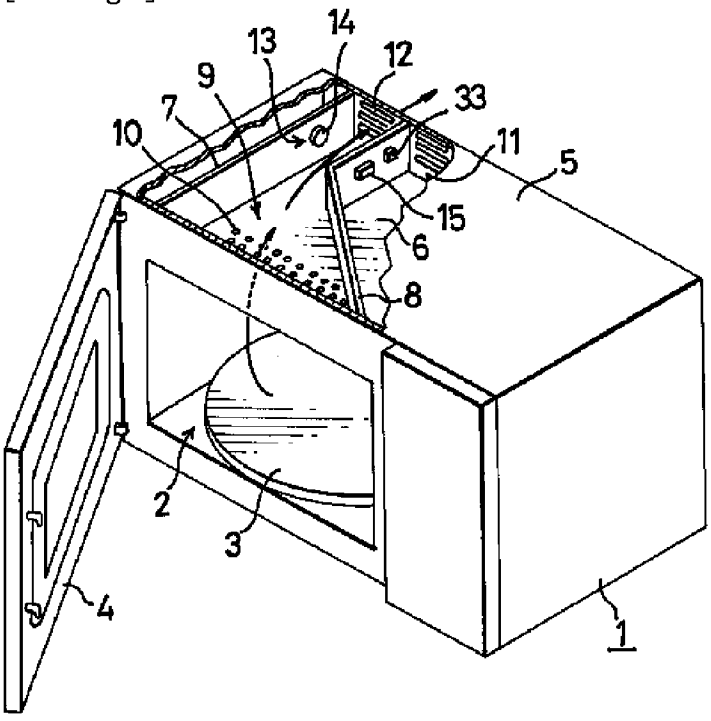
[Drawing 6]



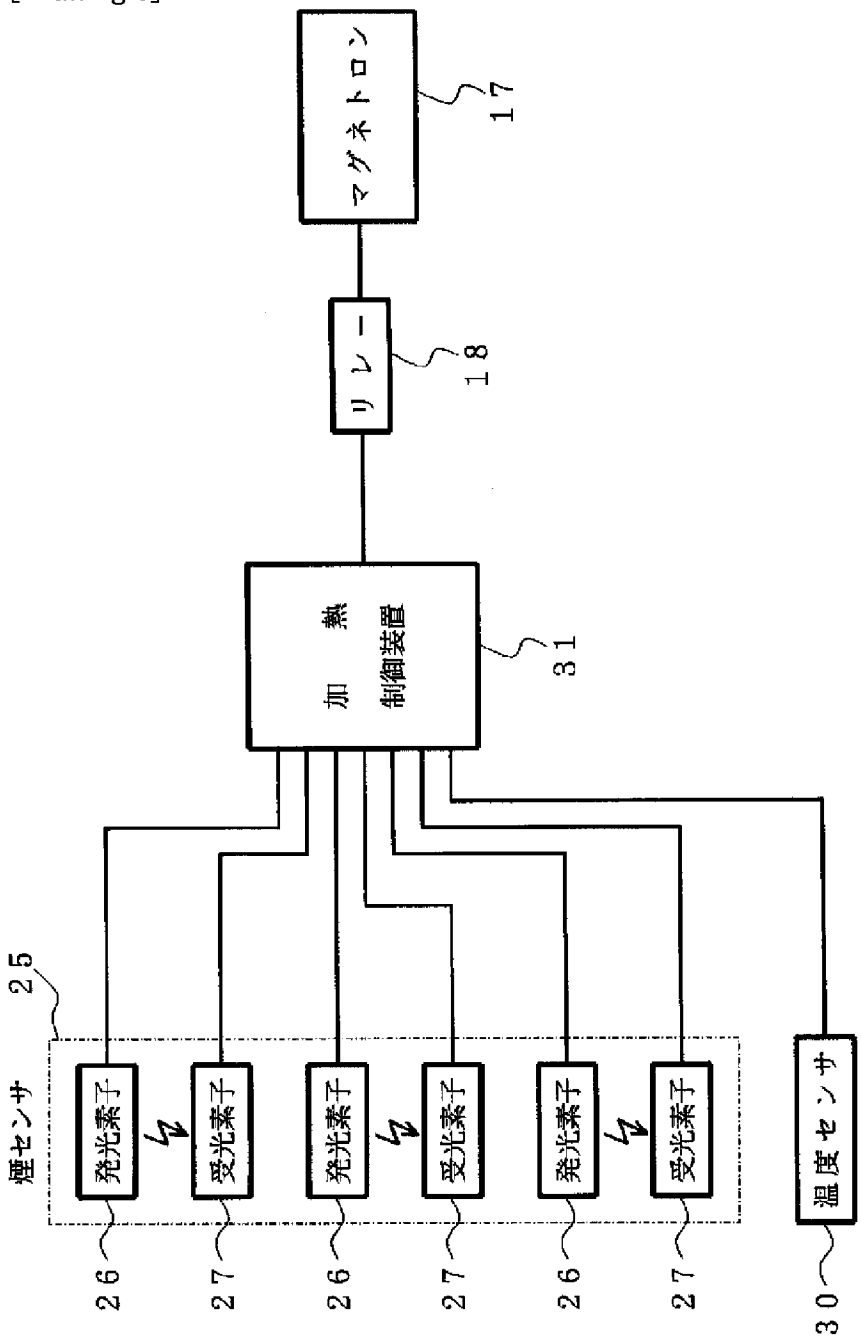
[Drawing 7]



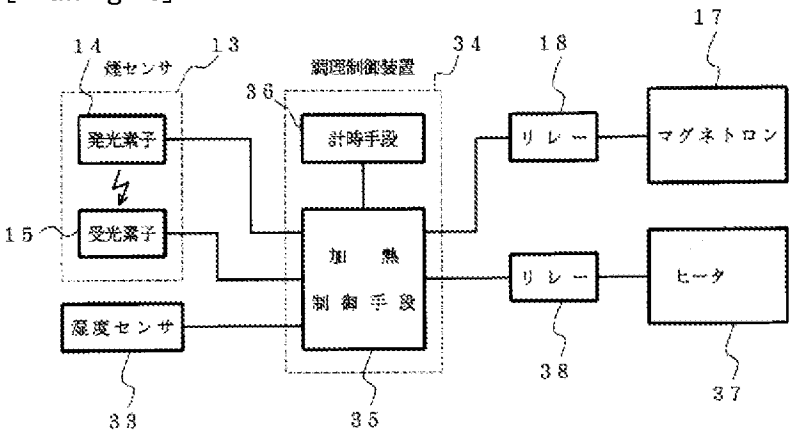
[Drawing 9]



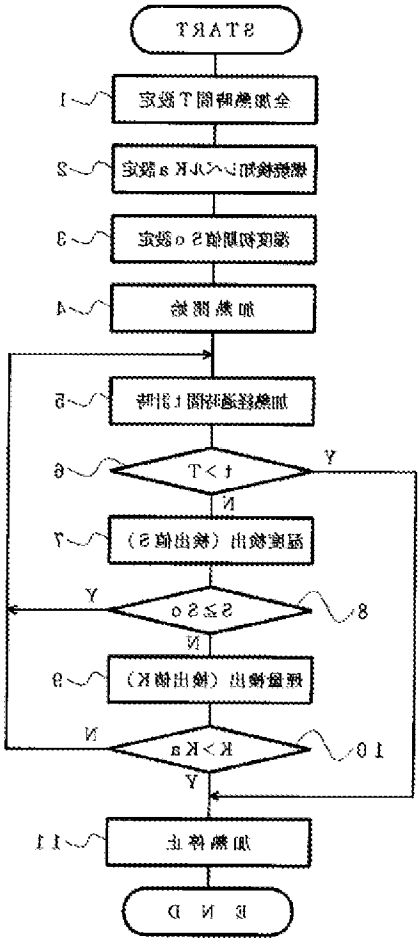
[Drawing 8]


マグネトロン
17
リレー
18
加熱制御装置
31
煙センサ
25
発光素子
受光素子
発光素子
受光素子
発光素子
受光素子
温度センサ
26
27
26
27
26
27
30

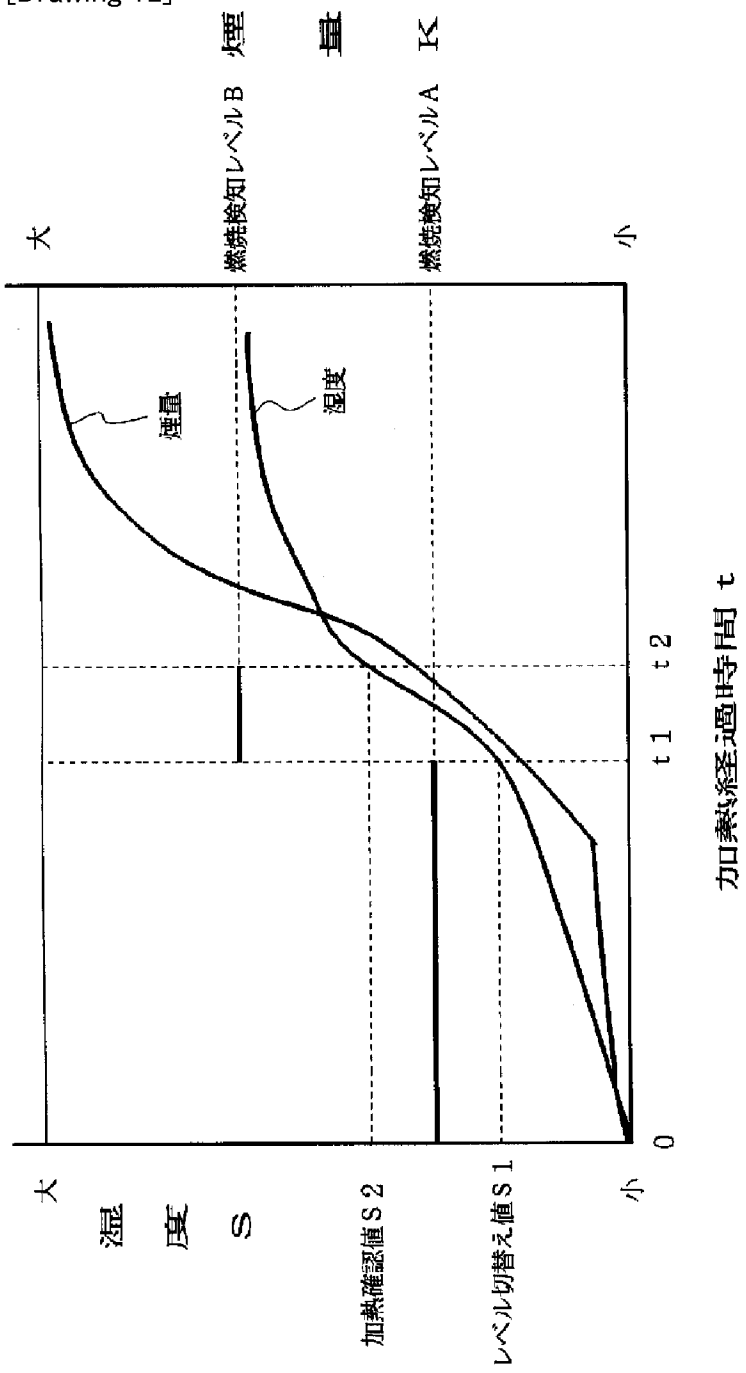
[Drawing 10]



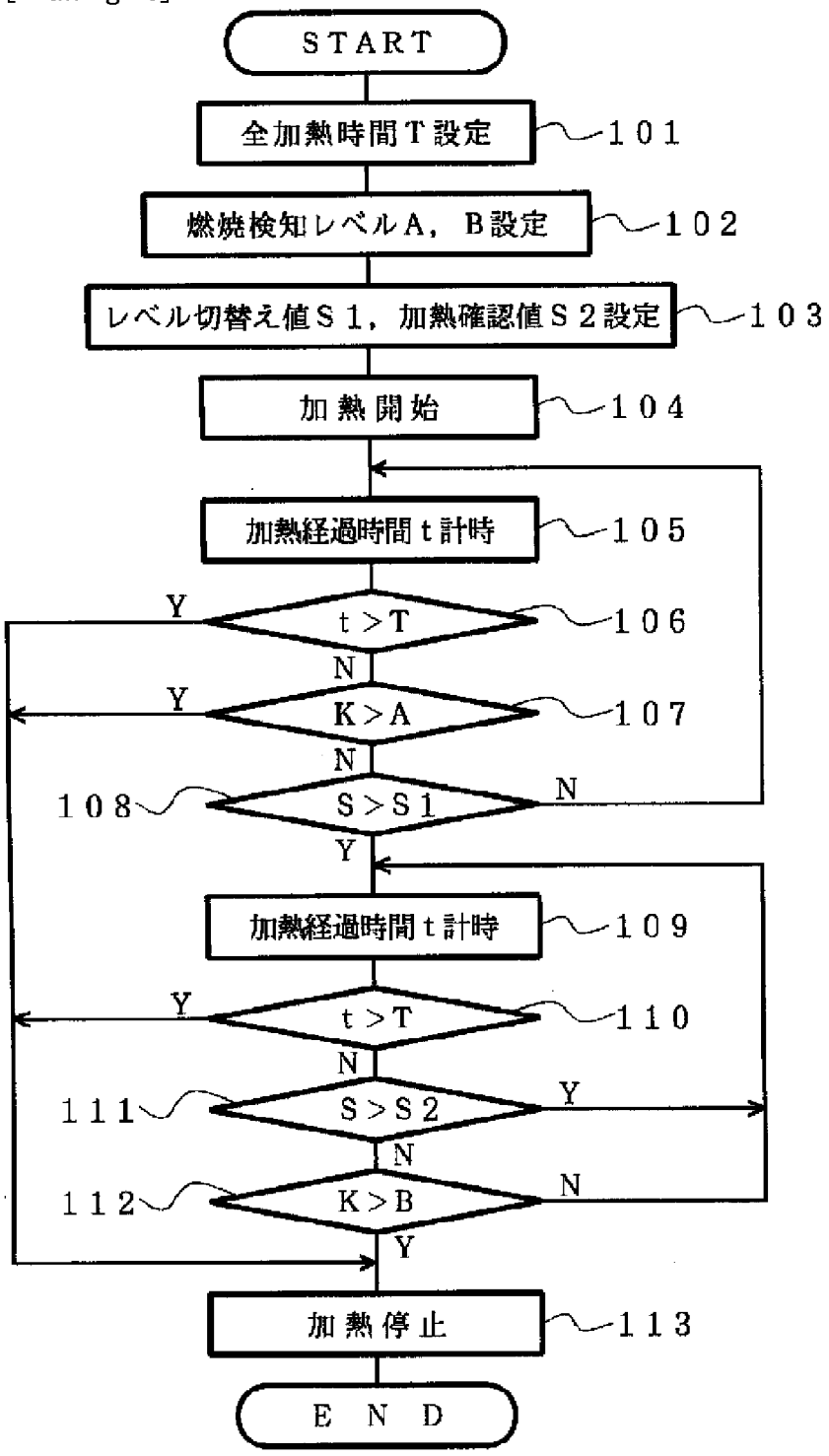
[Drawing 11]



[Drawing 12]


煙量
大
燃焼検知レベルB
燃焼検知レベルA
小
煙量
K
煙量
湿度
大
湿度
S
加熱確認値S2
レベル切替え値S1
小
0
t1
t2
加熱経過時間 t

[Drawing 13]


START
全加熱時間T設定
101
燃焼検知レベルA，B設定
102
レベル切替え値S1，加熱確認値S2設定
103
加熱開始
104
加熱経過時間t計時
105
t>T
106
Y
N
K>A
107
Y
N
108
S>S1
N
Y
加熱経過時間t計時
109
t>T
110
Y
N
111
S>S2
Y
N
112
K>B
N
Y
加熱停止
113
END

[Translation done.]

(19)日本国特許庁（ＪＰ）　(12)**公開特許公報（Ａ）**　(11)特許出願公開番号
特開2001－33043
（P2001－33043A）
(43)公開日　平成13年２月９日(2001.2.9)

(51)Int.Cl.[7]	識別記号	Ｆ Ｉ	テーマコード(参考)
Ｆ２４Ｃ　7/02	３５５	Ｆ２４Ｃ　7/02	３５５Ａ　３Ｋ０８６
Ａ４７Ｊ　27/00	１０９	Ａ４７Ｊ　27/00	１０９Ｚ　３Ｌ０８６
			１０９Ｐ　４Ｂ０５５
Ｆ２４Ｃ　7/08	３４５	Ｆ２４Ｃ　7/08	３４５Ｚ　５Ｇ４３５
Ｇ０９Ｆ　9/00	３６２	Ｇ０９Ｆ　9/00	３６２

審査請求　未請求　請求項の数４　ＯＬ　（全 10 頁）　最終頁に続く

(21)出願番号　特願平11－207350

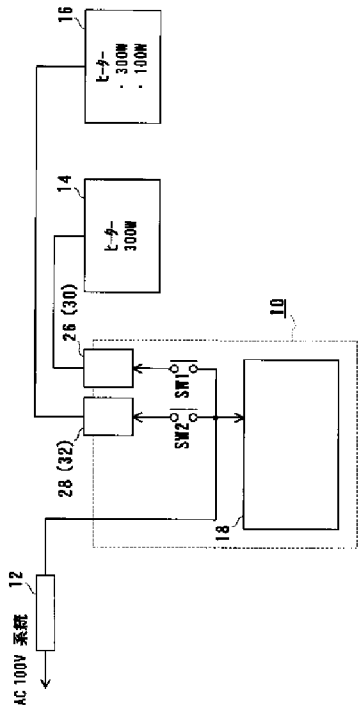
(22)出願日　平成11年７月22日(1999.7.22)

(71)出願人　000001889
三洋電機株式会社
大阪府守口市京阪本通２丁目５番５号
(72)発明者　古川　公彦
大阪府守口市京阪本通２丁目５番５号　三洋電機株式会社内
(72)発明者　川畑　透
大阪府守口市京阪本通２丁目５番５号　三洋電機株式会社内
(74)代理人　100090181
弁理士　山田　義人

最終頁に続く

(54)【発明の名称】　電気機器

(57)【要約】
【構成】　この電子レンジ１０は、所定の電流容量の専用ブレーカ１２を介して商用交流電源ＡＣ１００Ｖに接続される電子レンジ本体１８に表示部２２、および操作部２４に設けた優先設定スイッチにより優先順位を設定できる２個のサービスコンセント２６、２８を備え、このコンセントにそれぞれ接続されたトースター１４とコーヒーメーカー１６を設定された優先順位に基づき電子レンジ本体１８との合計消費電力量をブレーカ容量以内にマイクロコンピュータ３４で制御すると共に、表示部２２に電子レンジ本体１８およびトースター１４とコーヒーメーカー１６の使用状態等をそれぞれ表示する。
【効果】　この発明によれが、優先順位を設定したサービスコンセント２６、２８にそれぞれ接続されるトースター１４およびコーヒーメーカー１６は、優先順位に基づき運転制御され、定格電流以上の電流は流れず専用ブレーカ１２が落ちることはない。



1

【特許請求の範囲】
【請求項１】商用電源から所定の電流容量の専用ブレーカを介して電力線に接続される電気機器本体、
前記電気機器本体に設けられかつ優先順位を設定可能な複数のサービスコンセント、および前記各コンセントに接続される複数の外部電気機器を備え、
前記各コンセントに設定された優先順位に基づいて前記外部電気機器を含む前記電気機器本体の消費電力を前記ブレーカの電流容量以内に制御することを特徴とする、電気機器。
【請求項２】前記優先順位は、「優先」「連続」を含む、請求項１記載の電気機器。
【請求項３】前記電気機器本体に表示部をさらに設け、前記表示部に前記電気機器本体および前記各コンセントの使用状況を表示することを特徴とする、請求項１または２記載の電気機器。
【請求項４】前記電気機器本体は、電子レンジ本体を含む、請求項１ないし３のいずれかに記載の電気機器。
【発明の詳細な説明】
【０００１】
【産業上の利用分野】この発明は電気機器に関し、特にたとえば商用電源に専用ブレーカを介して接続される電気機器本体に複数のサービスコンセントを設けて他の外部電気機器の使用も可能とした電気機器に関する。
【０００２】
【従来の技術】一般家庭用商用電源は、電力会社との契約により電流容量が定められているが、その電流容量は、配線の容量の関係もあり、電力負荷である電子レンジ、電気温水器、エアコン等の電気機器の全てを同時に使用した場合の容量に設定してあることは稀である。また、大容量の電気機器を新に購入した場合、電流容量がオーバーすることがある。
【０００３】従って、総負荷電力を考えずに同時に複数の電気機器を使用すると契約電流以上の電流が流れてブレーカが落ち停電することになる。そのために、一般家庭では人が、ブレーカが落ちないように負荷配分を勘や経験で判断して使用したい電気機器以外の機器の運転を一時的に停止させる手間が必要となる。
【０００４】一方、台所で使用される加熱調理器としては、例えば電子レンジ、トースター、電気ポット、炊飯器あるいはコーヒーメーカーなど多くのものがり、これらは、家事の能率を良くするために一箇所にまとめて設置されることが多い。
【０００５】ところが、複数の加熱調理器を設置した場所の近くにある電源コンセントの数が少ないと、２口あるいは３口のタップを差し込んで１つの電源コンセントに複数の電気機器を接続する所謂たこ足配線が行われることとなる。
【０００６】また、一般家庭に設けられる電源コンセントは定格電流１５Ａのものが通常であるため、１つの電

2

源コンセントに接続された複数の加熱調理器を同時に使用すると、それらの消費電力によっては、電源コンセントの定格電流をオーバーした電流が流れることがある。
【０００７】
【発明が解決しようとする課題】これを回避するには、電源コンセントに対し、複数の加熱調理器のうち、使用する加熱調理器の電源プラグだけ差し込むようにすればよいが、これえではその都度電源プラグを抜き差ししなければならないという煩わしさがあり、使用勝手が悪くなるという問題がある。
【０００８】それゆえに、この発明の主たる目的は、１つの電源コンセントに対して例えば加熱調理器とその他の外部電気機器とが接続できるようにすると共に、電源コンセントに定格電流を越えた電流が流れないようにすることができる電気機器、例えば加熱調理器を提供することである。
【０００９】
【課題を解決するための手段】この発明は、商用電源から所定の電流容量の専用ブレーカを介して電力線に接続される電気機器本体、この電気機器本体に設けられかつ優先順位を設定可能な複数のサービスコンセント、およびこれらの各コンセントに接続される複数の外部電気機器を備え、各コンセントに設定された優先順位に基づいて外部電気機器を含む電気機器の消費電力をブレーカの電流容量以内に制御することを特徴とする、電気機器である。
【００１０】
【作用】専用ブレーカに接続される電気機器本体、例えば電子レンジ本体に複数のサービスコンセントを設け、このコンセントに設定される優先順位に基づいて各コンセントに接続される外部電気機器、例えばトースターとコーヒーメーカーの動作をブレーカ容量以内で制御する。
【００１１】
【発明の効果】この発明によれば、電気機器本体に設けた複数のサービスコンセントに接続される電気機器は、各コンセントに設定された優先順位に基づいて運転されるから、負荷配分を判断する必要はなく、またブレーカが落ちることもない。
【００１２】この発明の上述の目的，その他の目的，特徴および利点は、図面を参照して行う以下の実施例の詳細な説明により一層明らかとなろう。
【００１３】
【実施例】以下にこの発明の一実施例の電気機器として、加熱調理器の代表である電子レンジについて説明する。
【００１４】図１に示すこの発明を実施した電子レンジ１０は、所定の電流容量の専用ブレーカ１２を介して商用交流電源ＡＣ１００Ｖに接続されると共に、この電子レンジ１０には後述のサービスコンセントが設けられ

て、外部電気機器として、例えばトースター１４、コーヒーメーカー１６等が適宜接続されて電子レンジ１０と併用または単独で使用することができる。

【００１５】この電子レンジ１０は、図２に示されるように電子レンジ本体１８とこの本体の前面開口を開閉する扉体２０およびこの扉体２０の開放側の本体前面に上下に配置される表示部２２とスタートボタンや優先設定スイッチ等を備える操作部２４を含み、さらに本体１８の側面には、外部電気機器として上述のトースター１４およびコーヒーメーカー１６を接続するために優先設定スイッチ等により優先順位が設定される２個のサービスコンセント２６および２８を設けている。そして、これらの各コンセント２６と２８での電力消費量を測定するために電力計３０、３２を電子レンジ１０に内蔵させる。この電力計３０、３２は電流計で代用することも可能である。また、サービスコンセント２６および２８には出力を制御するスイッチＳＷ１とＳＷ２を備えている。

【００１６】電子レンジ本体１８の消費電力は後述する動作モードにより既知であるので、予めデータとしてＲＯＭに記憶しておくか、電流計測装置（図示せず）が内蔵可能であればその値を採用する。

【００１７】そして、電子レンジ１０の電源コンセントのみが専用ブレーカ１２（定格電流１５Ａ）を経由して商用交流電源ＡＣ１００Ｖに接続される。また、専用ブレーカ１２の動作時間は遅延型であり、定格電流１５Ａを越える電流値は、超過量が少ないうちは直ちに遮断されることはなく、所定時間、例えば１秒程度経過の後切断される。

【００１８】サービスコンセント２６に接続されるトースター１４は、途中で電源がオフするとパンの焼き具合にムラが発生するので、極力中断はさせないものとし、その消費電力は加熱開始から終了まで同じであり、３００Ｗとする。従って、この場合は後述する「優先１」がサービスコンセント２６に設定されていることになる。

【００１９】一方、サービスコンセント２８に接続されるコーヒーメーカー１６は、３００Ｗのドリップ用ヒーターと１００Ｗの保温用ヒーターを備えている。そして、ドリップ開始時には、この２本のヒーターが動作し、ドリップ終了時には、ドリップ用ヒーターは動作停止、保温用ヒーターのみ動作する。電源のオフにより、保温用ヒーターも動作を停止する。なお、コーヒーメーカー１６の場合には、動作の途中で電源がオフしても、動作が中断するだけであり、コーヒーの入れ具合に大きな影響はない。従って、この場合は後述する「優先１」よりも優先順位が低い「優先２」がサービスコンセント２８に設定されていることになる。

【００２０】次に、図３に示す電子レンジ１０の表示部２２について説明する。

【００２１】この表示部２２は前述のように電子レンジ１０の前面部に設けられて、レンジ部、コンセント１およびコンセント２の各状態を示すもので、表示体としてはＬＥＤまたは液晶により構成されるものである。

【００２２】すなわち、レンジ部は、出力や動作時間を表示する。また、コンセント１およびコンセント２はそれぞれのサービスコンセント２６および２８の優先状態（優先１，優先２、連続）と電力を表示する。

【００２３】図３の図示では以下の各状態をそれぞれ表示している。

【００２４】レンジ部は出力８００Ｗで電子レンジが調理中、コンセント１は優先１で、トースターが３００Ｗ消費中、コンセント２は優先２で、コーヒーメーカーが消費電力無しここで、電子レンジ１０の調理動作モードについて説明する。

【００２５】この電子レンジ１０の出力は、低出力２００Ｗ、高出力８００Ｗの２段切替が可能で、その時の消費電力はそれぞれ４００Ｗと１４００Ｗとする。また、調理中は加熱が中断されると調理の質が低下するので、極力中断させない。さらに、出力に合わせて入力が変化するインバータ式電子レンジを想定している。

【００２６】なお、電子レンジ１０が調理動作中でなくとも、電子レンジ１０の待機電力は常時発生し、電力消費となる。

【００２７】次に、電子レンジの表示及び設定について説明する。

１．電子レンジ本体は表示部２２に以下の情報を表示する。

【００２８】①コンセント１及び２の現状の消費電力
②コンセント１及び２は、現状の設定状態を「優先１」「優先２」「連続」の３通りで表示

２．コンセント１、２は、以下の設定が可能である。

【００２９】①各々は、「優先１」→「優先２」→「連続」→「優先１」…とサイクリックに切替えられる。

【００３０】②「優先１」が選択された場合、他方が「優先１」の場合、「優先２」に切替えられる。

【００３１】③「優先２」が選択された場合、他方が「優先２」の場合、「優先１」に切替えられる。

【００３２】④「連続」が選択された場合、他方は影響を受けない。３．コンセント１、２は設定状態により、以下のオン・オフ制御が行われる可能性があるものとする。

【００３３】①「優先２」に設定されたコンセントは、「優先１」に設定されたコンセントのオン・オフ状態に関係なく遮断される可能性がる。

【００３４】②「優先１」に設定されたコンセントは、「優先２」がオフの場合にのみ遮断される可能性がある。

【００３５】③「連続」に設定されたコンセントは、基本的には遮断されない。なお、例外として、単独での消費電力が専用ブレーカ１２の電流容量を越えた場合のみ

遮断される。

【００３６】以上により、遮断される優先度は、以下の通りとなる。

【００３７】「連続」＞「優先１」＞「優先２」の順に、遮断されない。

【００３８】また、遮断されたコンセントを通電させる場合、以下の２通りの方法がある。

【００３９】１）自動的に通電させる。

【００４０】２）手動で通電させる。例えば、通電可能であることを知らせ、ユーザーのボタン操作で通電する。

【００４１】なお、いずれの場合も実現は容易であり、本実施例では全て１）で説明する。

【００４２】優先順位の設定についてホームネットワークが使用できる場合、手動設定ではなく回線接続時に自動的に設定される。

【００４３】計時機能と連動表示について電子レンジに計時機能（カレンダー）がある場合、以下の処理が可能である。

【００４４】１）コンセント毎の消費電力量の積算表示、及び月間積算電力量の表示また、本機能を実現させるために、以下の機能を備えるものとする。

【００４５】１）月度の変更の検出装置
２）現在の積算電力量を指定されたメモリに保存
３）積算電力量のリセット装置
４）電力量への表示切替え機能及び表示月度選択機能

ここで、図４に示す制御ブロック図について概要を説明すると、電子レンジ本体１８に設けられて全体の動作を制御するマイクロコンピュータ３４、これにより電子レンジ１０のマグネトロン３６の出力制御およびトースター１４やコーヒーメーカー１６の各ヒーターの制御が行われる。また、電子レンジ本体１８の前面に位置する操作部２４に設けられるスタートボタンや優先設定スイッチなどのキー入力部３８および電子レンジ１０、トースター１４およびコーヒーメーカー１６の使用状態等を表示する表示部２２もマイクロコンピュータ３４に接続され、さらにＲＯＭを含むメモリー４０、終了報知等を行うブザー４２および異常温度等を検出する温度センサー４４も接続されている。なお、マグネトロン３６およびトースター１４とコーヒーメーカー１６にはＡＣ１００Ｖの電源より必要な電力がマイクロコンピュータ３４の制御の下にに供給されるが、後者のトースター１４とコーヒーメーカー１６にはそれぞれＳＷ１と電力計３０およびＳＷ２と電力計３２を介して制御される。

【００４６】次に、この実施例における電子レンジ１０の基本動作を図５に示すフローチャートに基づき説明する。

【００４７】先ず、電源ＳＷをＯＮしてスタートし、ステップＳ１で２個のサービスコンセント２６、２８の優先順位および消費電力（パワー）を含めて現状判断を行う。

【００４８】つぎに、ステップＳ３でその判断結果に従って電子レンジ１０がＯＮ可能か否かをマイクロコンピュータ３４により判断する。その結果、“ＹＥＳ”であればステップＳ５で各コンセントや電子レンジに必要な電力量と定格電力との比較によって、使用状態モードまたは電力モードを判別し、さらに、ステップＳ７でこの電力モードに応じたフラグをマイクロコンピュータ３４にセットする。そして、ステップＳ９で所定の調理を実行して一連の動作を終了することになる。

【００４９】一方、ステップＳ３において、その結果が“ＮＯ”の場合、つまり、その電子レンジ１０をＯＮすると専用ブレーカ１２が遮断されると予想される場合、ステップＳ１１で待機状態となり、この状態をステップＳ１３で電子レンジ本体１８の表示部２２に待機表示し、さらにステップＳ１５で一定時間経過するとステップＳ１に戻り、ここで改めて現状判断を行うことになる。

【００５０】さて、コンセントと電子レンジの制御は、以下の方針に基づき行われる。

【００５１】①コンセントと電子レンジの合計消費電力（予測値を含む）が専用ブレーカの電流容量を越える場合、コンセントを優先順位に基づきオフする、もしくは電子レンジによる調理を始めない。

【００５２】②電子レンジが調理中にコンセントにより外部消費電力が増加した場合、コンセントの優先順位を判定して電子レンジの出力を下げるか、外部コンセントを遮断する。

【００５３】③電子レンジが調理中にコンセントの消費電力が減少し、かつ遮断中のコンセントがある場合、このコンセントは復帰させる。

【００５４】④電子レンジが調理終了時、遮断中のコンセントがある場合、調理終了の後にこのコンセントは復帰させる。

【００５５】そして、コンセントと電子レンジの制御は、以下の流れに基づき行われる。

【００５６】各判定部はインターバルタイマ等で定期的な短い時間に、各判定部の先頭から実行されるものとする。なお、この制御動作については、後述の図６～図８に示すフローチャートで説明する。

【００５７】１．調理待機状態・調理を行っていない場合（図６参照）いずれの場合においても、アラームが発生した時点で判定処理を終了する。

【００５８】１）どちらか一方のコンセントの消費電力Ｑ１、Ｑ２と電子レンジの自己消費電力（待機電力）Ｐ１の合計消費電力がブレーカ容量Ｍを越える場合、容量を越えるコンセントを遮断してアラームを発生させる。

【００５９】２）両方のコンセントの消費電力Ｑ１、Ｑ２と電子レンジの自己消費電力（待機電力）Ｐ１の合計消費電力がブレーカ容量Ｍを越える場合、以下の順で処

理を行う。

【００６０】①コンセントが「連続」「連続」の組み合わせの場合、最後に負荷が増大したコンセントを遮断し、アラームを発生させる。

【００６１】②「優先２」のコンセントがある場合、それを遮断してアラームを発生させる。

【００６２】「優先２」のコンセントが無い場合、「優先１」のコンセントを遮断してアラームを発生させる。

【００６３】３）上記のいずれの条件にも当てはまらず、遮断中のコンセントがある場合は、一定時間後に通電させる。２．調理開始指令が入力された場合（図７参照）いずれの場合においても、アラームが発生した時点で判定処理を終了する。

【００６４】１）両方のコンセントの消費電力Ｑ１，Ｑ２と、電子レンジの調理時推定消費電力Ｐ２の合計予定消費電力がブレーカ容量Ｍを越えない場合、指令通りの調理を行う。

【００６５】２）両方のコンセントＱ１，Ｑ２と、電子レンジの調理時推定消費電力Ｐ２の合計予定消費電力がブレーカ容量Ｍを越える場合、以下の順に処理を行う。

【００６６】①コンセントが「連続」「連続」の組み合わせの場合、アラームを発生し調理を行わない。

【００６７】②「優先２」がある場合、これを遮断することで合計予定消費電力がブレーカ容量を下回る場合には、「優先２」を遮断して指令通りの調理を行うと共に、アラームを発生させる。

【００６８】③「優先１」がある場合、これを遮断することで合計予定消費電力がブレーカ容量を下回る場合には、「優先１」を遮断して指令通りの調理を行うと共に、アラームを発生させる。

【００６９】④コンセントの組み合わせが「優先１」「優先２」の場合、両方のコンセントを遮断して指令通りの調理を行うと共に、アラームを発生せる。

【００７０】⑤コンセントの組み合わせが「連続」「優先１」もしくは「連続」「優先２」であり、「連続」以外を遮断しても合計予定消費電力がブレーカ容量を下回らない場合、調理は行わずアラームを発生させる。３．調理中の場合（図８および図９参照）いずれの場合においても、アラームが発生した時点で判定処理を終了する。

【００７１】１）両方のコンセントの消費電力Ｑ１，Ｑ２と、電子レンジの調理電力Ｐ３の合計消費電力がブレーカ容量Ｍを越えない場合、指令通りの調理を継続させる。

【００７２】２）両方のコンセントの消費電力Ｑ１、Ｑ２が増加し、電子レンジの調理電力Ｐ３との合計消費電力がブレーカ容量Ｍを越える場合、以下の順で処理を行う。

【００７３】①コンセントが「連続」「連続」の組み合わせの場合、以下の処理を行う。

【００７４】①－１）電子レンジの出力を低下させることが可能であり、これにより合計消費電力がブレーカ容量を下回る場合、出力を低下して調理を継続すると共に、アラームを発生させる。

【００７５】①－２）電子レンジの出力を低下させることが可能であるが、低下させた場合でも合計消費電力がブレーカ容量を下回らない場合、調理を中断すると共に、アラームを発生させる。

【００７６】②「優先２」がある場合、これを遮断することで合計消費電力がブレーカ容量を下回る場合、「優先２」を遮断して調理を継続すると共に、アラームを発生させる。

【００７７】③「優先１」がある場合、これを遮断することで合計消費電力がブレーカ容量を下回る場合、「優先１」を遮断して調理を継続すると共に、アラームを発生させる。

【００７８】④コンセントの組み合わせが「優先１」「優先２」の場合、調理は継続させるが両方のコンセントを遮断しアラームを発生させる。

【００７９】⑤コンセントの組み合わせが「連続」「優先１」もしくは「連続」「優先２」であり、「連続」以外を遮断しても合計消費電力がブレーカ容量を下回らない場合、以下の処理を行う。

【００８０】⑤－１）電子レンジの出力を低下し、かつ「連続」以外を遮断することにより合計消費電力がブレーカ容量を下回る場合、出力を低下して調理を継続すると共に、「連続」以外を遮断しアラームを発生させる。

【００８１】⑤－２）電子レンジの出力を低下し、かつ「連続」以外を遮断しても合計消費電力がブレーカ容量を下回らない場合、調理を中断すると共にアラームを発生させる。

【００８２】３）遮断中のコンセントと通電中のコンセントがあり、通電中のコンセントの消費電力が低下して合計消費電力が低下した場合、遮断中のコンセントは遮断から一定時間経過後に通電させ、アラームを発生させる。４．調理終了時いずれの場合においても、アラームが発生した時点で判定処理を終了する。

【００８３】１）遮断中のコンセントがある場合、所定時間経過後に通電させ、アラームを発生させる。

【００８４】２）遮断中のコンセントが無い場合、状態は変わらない。

【００８５】以上説明した制御動作を図６～図９に示すフローチャートに従い説明する。

【００８６】先ず、電子レンジ１０が、調理待機状態・調理を行っていない場合で、いずれか一方のサービスコンセントの消費電力Ｑ１、Ｑ２と電子レンジの待機電力Ｐ１の合計消費電力がブレーカ容量Ｍを越える場合を「モード１」とすると、図６の（ａ）に示すように、ステップＳ１でマイクロコンピュータ３４によりスイッチＳＷ１またはＳＷ２のいずれかを開いて容量を越えるコ

ンセントを遮断し、ステップＳ３でブザー４２によりアラームを発生して判定処理を終了する。

【００８７】次に、両コンセントの消費電力Ｑ１、Ｑ２および電子レンジ１０の待機電力Ｐ１の合計消費電力がブレーカ容量Ｍを越える場合を「モード２」とすると、同じく図6の（ｂ）に示すように、ステップＳ１でマイクロコンピュータによりコンセントの優先順位の組み合わせが「連続」「連続」か否かを判断し、その結果が“ＹＥＳ”であれば、ステップＳ３で最後に負荷が増大したコンセントを遮断し、ステップＳ５でブザーによりアラームを発生して判定処理を終了する。そして、ステップＳ１で判断結果が“ＮＯ”であれば、ステップＳ７で「優先２」があるか否かを判断し、その結果が“ＹＥＳ”であれば、ステップＳ９で当該コンセントを遮断してステップＳ５に進む。ステップＳ７でその判断結果が“ＮＯ”であれば、ステップＳ１１で「優先１」のコンセントを遮断してステップＳ５に進む。

【００８８】図7は、電子レンジ１０に調理開始指令が入力された場合の「モード３」におけるフローチャートで、先ず、ステップＳ１でマイクロコンピュータ３４により両方のコンセントの消費電力Ｑ１、Ｑ２と電子レンジの調理時推定消費電力Ｐ２の合計消費電力がブレーカ容量Ｍを越えるか否かを判断し、その結果が“ＹＥＳ”であれば、ステップＳ３で指令通りの調理を実行する。

【００８９】そして、ステップＳ１での判断結果が“ＮＯ”であれば、以後は両方のコンセントの優先順位がどのように設定されているかにより動作の流れが変わる。すなわち、ステップＳ５でコンセント設定が「連続」「連続」かを判断し、その結果が“ＹＥＳ”であれば、ステップＳ７で調理せず、ステップＳ９でブザーによりアラームを発生させて終了する。また、ステップＳ５での判断結果が“ＮＯ”であれば、ステップＳ１１でコンセント設定が「連続」「優先１」かを判断し、その結果が“ＹＥＳ”であれば、ステップＳ１３で「優先１」を遮断するときの総電力をマイクロコンピュータで演算してステップＳ１５でブレーカ容量以下か否かを判断する。その結果が“ＹＥＳ”であればステップＳ１６で「優先１」を遮断してステップＳ３で指示通りの調理を実行する。ステップＳ１５の判断結果が“ＮＯ”であればステップＳ７に進み調理はされない。

【００９０】一方、ステップＳ１１の判断結果が“ＮＯ”であれば、ステップＳ１７でコンセント設定が「連続」「優先２」かを判断し、その結果が“ＹＥＳ”であれば、ステップＳ１９で「優先２」を遮断するときの総電力を演算してステップＳ２０でクレーカ容量以下か否かを判断し、その結果が“ＹＥＳ”であればステップＳ２２で「優先２」を遮断してステップＳ３で指示通りの調理を行う。ステップＳ２０の判断結果が“ＮＯ”の場合、ステップＳ７に進み調理は行わない。

【００９１】そして、ステップＳ１７の判断結果が、“ＮＯ”であればコンセント設定は「優先１」「優先２」であるから、ステップＳ２１で優先順位の低い「優先２」を遮断するときの総電力を演算して、ステップＳ２３でブレーカ容量以下か否かを判断する。その結果“ＮＯ”であれば、ステップＳ２５で「優先１」「優先２」を共に遮断してステップＳ３に進み指示通りの調理を行う。また、ステップＳ２３における判断結果が“ＹＥＳ”であれば、ステップＳ２６で「優先２」を遮断してステップＳ３で指示通りの調理を実行する。

【００９２】図8は電子レンジ１０の調理中の場合における動作を示すフローチャートである。

【００９３】先ず、調理を開始してステップＳ１において、両方のコンセントの消費電力Ｑ１、Ｑ２と電子レンジ１０の調理電力Ｐ３の合計消費電力がブレーカ容量Ｍを越えていないかをマイクロコンピュータ３４で判断し、その結果が“ＹＥＳ”であれば、ステップＳ３で指示通りの調理を実行する。ステップＳ１における判断結果が“ＮＯ”であれば、両コンセントの優先順位の設定状態により以後の流れが変わる。

【００９４】即ち、ステップＳ５でコンセント設定が「連続」「連続」か否かを判断し、その結果が“ＹＥＳ”であれば、ステップＳ７で電子レンジ出力低下時の総電力の演算を行い、ステップＳ９でブレーカ容量以下か否かを判断する。その結果“ＹＥＳ”であれば、ステップＳ１０で電子レンジの出力を低下し、ステップＳ１１で調理を継続し、“ＮＯ”であればステップＳ１３で調理を中断する。また、ステップＳ５におけるコンセント設定「連続」「連続」かの判断結果が“ＮＯ”であれば、ステップＳ１５でコンセント設定が「連続」「優先１」か否かを判断し、その結果が“ＹＥＳ”であればステップＳ１７で「優先１」を遮断するときの総電力を演算し、さらにステップＳ１９でブレーカ容量以下か否かを判断する。その結果“ＹＥＳ”であれば、ステップＳ２０で「優先１」を遮断してステップＳ２１に進み調理を継続する。ステップＳ１９の判断結果が“ＮＯ”の場合は、図９の③へ進む。

【００９５】そして、ステップＳ１５の判断結果が“ＮＯ”の場合、さらにステップＳ２３でコンセント設定が「連続」「優先２」か否かを判断し、その結果が“ＹＥＳ”であればステップＳ２５で「優先２」を遮断するときの総電力を演算してステップＳ２６でブレーカ容量以下か否かを判断する。その結果が“ＹＥＳ”であればステップＳ２８で「優先２」を遮断してステップＳ３０で調理を継続し、結果が“ＮＯ”であれば図９の④へ進むことになる。

【００９６】また、ステップＳ２３の判断結果が“ＮＯ”であれば、コンセント設定は「優先１」「優先２」であるから、ステップＳ２７で優先順位の低い「優先２」を遮断するときの総電力を演算してステップＳ２９でブレーカ容量以下か否かを判断する。その結果“ＹＥ

Ｓ”であれば、ステップＳ３０で「優先２」を遮断し、ステップＳ３１で調理を継続する。ステップＳ２９の判断結果が“ＮＯ”であれば、ステップＳ３３で「優先１」「優先２」を共に遮断してステップＳ３５で調理を継続する。

【００９７】次に、図９に示す図８から続く一連の動作の流れについて説明すると、先ず、図８のステップＳ１９における判断結果が“ＮＯ”の場合、図９のステップＳ３７で電子レンジの出力低下および「優先１」遮断時の総電力を演算して、ステップＳ３９でブレーカ容量以下か否かを判断する。その結果“ＹＥＳ”であれば、ステップＳ４１で電子レンジの出力低下と「優先１」を遮断してステップＳ４３で調理を継続する。また、ステップＳ３９の判断結果が“ＮＯ”の場合はステップＳ４５で調理を中断する。

【００９８】一方、図８のステップＳ２６における判断結果が“ＮＯ”の場合、図９のステップＳ４７で電子レンジの出力低下および「優先２」遮断時の総電力を演算して、ステップＳ４９でブレーカ容量以下か否かを判断する。その結果“ＹＥＳ”であれば、ステップＳ５１で電子レンジの出力低下と「優先２」を遮断してステップＳ５３で調理を継続する。そして、ステップＳ４９の判断結果が“ＮＯ”の場合はステップＳ５５で調理を中断する。

【００９９】また、上述の電子レンジの調理終了後、または、各コンセントへの接続される外部電気機器使用後、総電力量が減少すれば、変更前の状態、すなわち優先順位に基づく電気機器を制御する前の状態に戻す。

【０１００】なお、電子レンジ本体１８に優先順位が設定できる２個のサービスコンセント２６、２８を設けた実施例について説明したが、サービスコンセントが３個以上の場合にもこのサービスコンセントに接続される他の外部電気機器を含めて同様の制御を行うことができる。また、トースターの変わりに炊飯器を接続し、コーヒーメーカーの変わりに電気ポットを接続しても同様に制御できるものである。

【図面の簡単な説明】

【図１】この発明の一実施例である電子レンジの全体構成を示す概略図である。

【図２】図１に示す電子レンジの外観を示す斜面図である。

【図３】図２の表示部を示す説明図である。

【図４】図１に示す電子レンジの制御ブロック図である。

【図５】この実施例における電子レンジの基本動作を示すフローチャートである。

【図６】（ａ）および（ｂ）は電子レンジの調理待機状態・調理を行っていない場合のフローチャートである。

【図７】電子レンジに調理開始指令が入力された場合のフローチャートである。

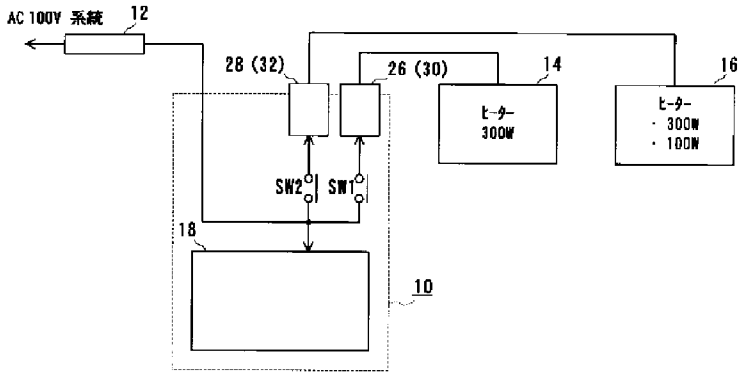
【図８】電子レンジが調理中の場合のフローチャートである。

【図９】図８における動作の流れの一部を示すフローチャートである。

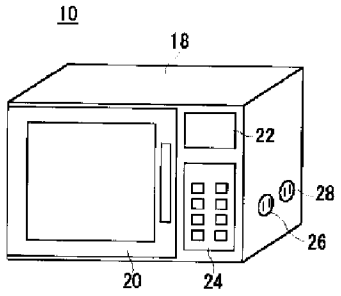
【符号の説明】

１０　…電子レンジ
１２　…専用ブレーカ
１４　…トースター
１６　…コーヒーメーカー
１８　…電子レンジ本体
２２　…表示部
２４　…操作部
２６、２８　…サービスコンセント（コンセント１とコンセント２）
３０、３２　…電力計１と電力計２
３４　…マイクロコンピュータ
３６　…マグネトロン
３８　…キー入力部
４０　…メモリー
４２　…ブザー
４４　…温度センサー

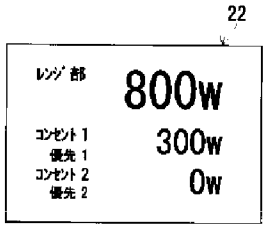
【図１】



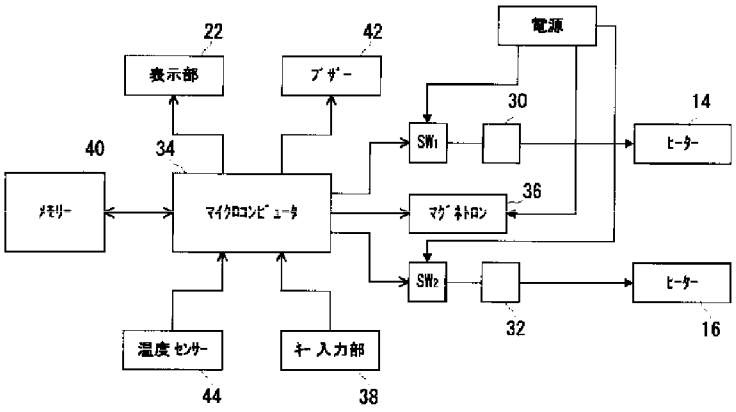
【図２】



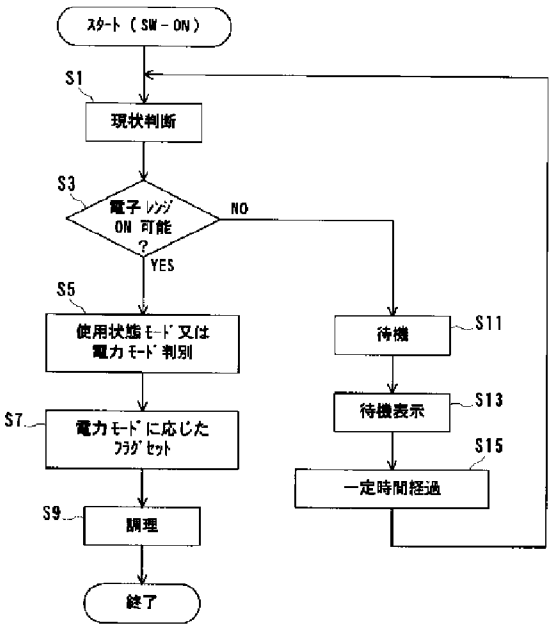
【図３】


22
ﾚﾝｼﾞ部
800w
ｺﾝｾﾝﾄ 1
優先 1
300w
ｺﾝｾﾝﾄ 2
優先 2
0w

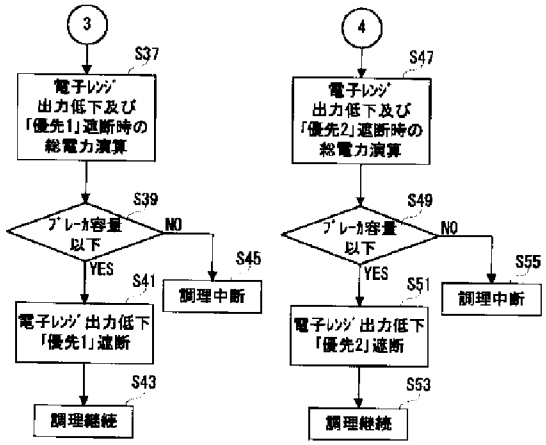
【図４】


22
表示部
42
ﾌﾞｻﾞｰ
電源
30
14
SW1
ﾋｰﾀｰ
40
34
ﾒﾓﾘｰ
ﾏｲｸﾛｺﾝﾋﾟｭｰﾀ
ﾏｸﾞﾈﾄﾛﾝ
36
SW2
ﾋｰﾀｰ
32
16
温度ｾﾝｻｰ
ｷｰ入力部
44
38

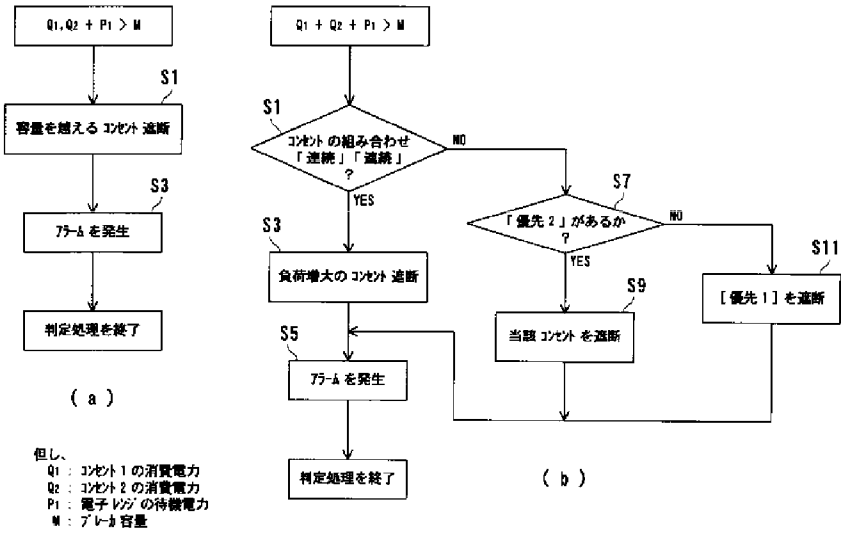
【図５】


ｽﾀｰﾄ（SW－ON）
S1
現状判断
S3
電子ﾚﾝｼﾞ ON 可能 ?
NO
YES
S5
使用状態ﾓｰﾄﾞ又は 電力ﾓｰﾄﾞ判別
S7
電力ﾓｰﾄﾞに応じた ﾌﾗｸﾞｾｯﾄ
S9
調理
終了
待機
S11
待機表示
S13
S15
一定時間経過

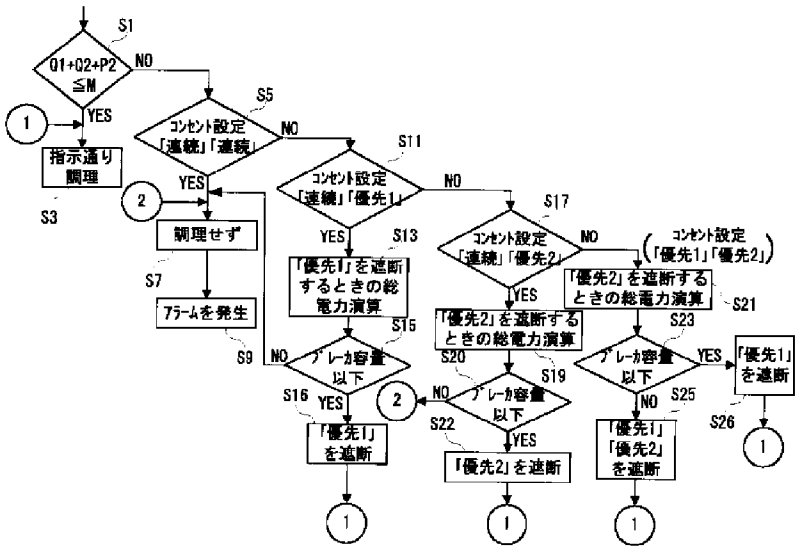
【図９】


3
S37
電子ﾚﾝｼﾞ 出力低下及び 「優先1」遮断時の 総電力演算
S39
ﾌﾞﾚｰｶ容量 以下
NO
YES
S45
調理中断
S41
電子ﾚﾝｼﾞ出力低下 「優先1」遮断
S43
調理継続
4
S47
電子ﾚﾝｼﾞ 出力低下及び 「優先2」遮断時の 総電力演算
S49
ﾌﾞﾚｰｶ容量 以下
NO
YES
S55
調理中断
S51
電子ﾚﾝｼﾞ出力低下 「優先2」遮断
S53
調理継続

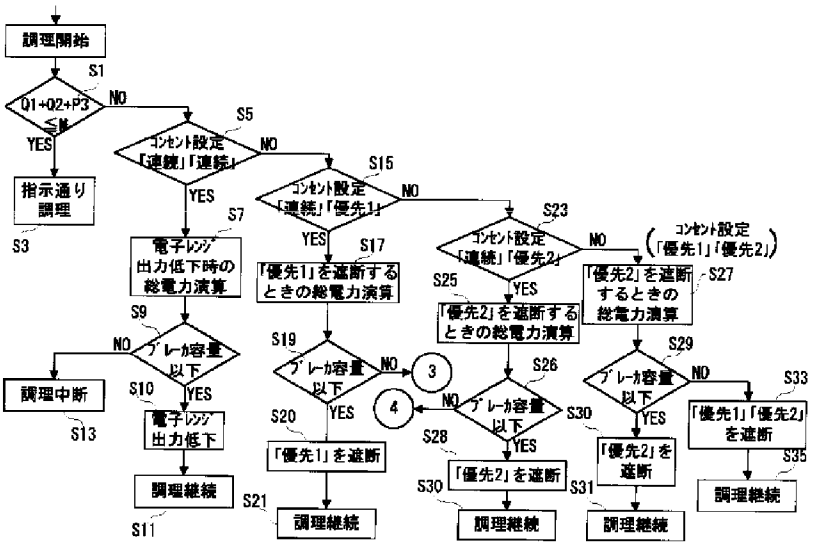
【図６】


Q1,Q2 + P1 > M
S1
容量を越える コンセント 遮断
S3
アラーム を発生
判定処理を終了
（ａ）
但し、
Q1 ： コンセント１の消費電力
Q2 ： コンセント２の消費電力
P1 ： 電子レンジ の待機電力
M ： ブレーカ 容量
Q1 + Q2 + P1 > M
S1
コンセント の組み合わせ 「連続」「連続」 ？
NO
YES
S7
「優先２」があるか ？
NO
YES
S11
［優先１］を遮断
S3
負荷増大の コンセント 遮断
S9
当該 コンセント を遮断
S5
アラーム を発生
判定処理を終了
（ｂ）

【図７】


S1
Q1+Q2+P2 ≦M
NO
YES
1
S5
コンセント設定 「連続」「連続」
NO
YES
S11
コンセント設定 「連続」「優先1」
NO
YES
S17
コンセント設定 「連続」「優先2」
NO
YES
コンセント設定 「優先1」「優先2」
指示通り 調理
S3
2
調理せず
S7
アラームを発生
S9
「優先1」を遮断するときの総電力演算
S13
ブレーカ容量 以下
NO
YES
S15
S16
「優先1」を遮断
1
「優先2」を遮断するときの総電力演算
S19
ブレーカ容量 以下
NO
YES
S20
S22
「優先2」を遮断
1
「優先2」を遮断するときの総電力演算
S21
ブレーカ容量 以下
NO
YES
S23
S25
「優先1」「優先2」を遮断
1
「優先1」を遮断
S26
1

【図８】



フロントページの続き

(51)Int.Cl.[7]	識別記号	ＦＩ	テーマコード（参考）
Ｈ０５Ｂ　6/68	３３０	Ｈ０５Ｂ　6/68	３３０Ｚ

Ｆターム(参考)　3K086 AA05 AA10 BA08 BA10 CA20
CB11 CC11 CC12 CD04 CD11
CD26 DA12 DB16 DB17 EA08
EA12 FA04
3L086 AA01 BB20 CB20 CC30 DA30
4B055 AA01 AA09 BA06 BA42 CA01
CA61 CA65 CA66 CA71 CB27
CC10 CC13 CC17 CD02 CD34
CD35 CD41 CD51 GA04 GB29
GB44 GC16 GC35 GC36 GC38
GD02
5G435 AA00 CC06 CC07 DD00 EE46
EE49 GG31 LL03

PAT-NO: JP02001033043A

DOCUMENT-IDENTIFIER: **JP 2001033043 A**

TITLE: ELECTRIC INSTRUMENT

PUBN-DATE: February 9, 2001

INVENTOR-INFORMATION:

NAME	COUNTRY
FURUKAWA, KIMIHIKO	N/A
KAWABATA, TORU	N/A

ASSIGNEE-INFORMATION:

NAME	COUNTRY
SANYO ELECTRIC CO LTD	N/A

APPL-NO: JP11207350

APPL-DATE: July 22, 1999

INT-CL (IPC): F24C007/02, A47J027/00 , F24C007/08 , G09F009/00 , H05B006/68

ABSTRACT:

PROBLEM TO BE SOLVED: To prevent current from flowing over a rating and eliminate a shutoff of an exclusive breaker by a method wherein the operation of a toaster and a coffee maker, which are connected respectively to service outlets whose precedence is set, is controlled based on the precedence.

SOLUTION: A **microwave oven** 10 is equipped with **two** pieces of service outlets 26, 28, capable of setting a precedence in a **microwave oven** main body 18 connected to a commercial **power** supply AC 100 V through an exclusive breaker 12 having a predetermined current capacity by the precedence setting switches provided in the indicating unit 22 and the operating unit 24 of the **microwave oven** main body 18. In this case, a toaster 14 and a coffee maker 15 connected respectively to the outlets are controlled by a microcomputer so that the total power consumption of the **microwave oven** main body 18, the toaster 14 and the coffee maker 16 is controlled within a breaker capacity based on the set precedence while the use conditions or the like of the **microwave oven** main body 18, the toaster 14 and the coffee maker 16 are indicated in the indicating unit.

COPYRIGHT: (C)2001,JPO

Disclaimer:
Translation from English to other languages is performed by GoogleTranslate function. Since this function is based on machine translation, the translation result might be inaccurate. The JPO and the INPIT are not responsible for any damage that may be caused by the use of this function or the translation result.

Select Language

Disclaimer:
This English translation is produced by machine translation and may contain errors. The JPO, the INPIT, and those who drafted this document in the original language are not responsible for the result of the translation.

Notes:
1. Untranslatable words are replaced with asterisks (****).
2. Texts in the figures are not translated and shown as it is.

Translated: 05:36:34 JST 04/11/2013
Dictionary: Last updated 03/14/2013 / Priority:

FULL CONTENTS

[Claim(s)]
[Claim 1]A main part of an electric appliance connected to a power line via an exclusive breaker of predetermined current capacity from commercial power, Two or more service receptacles which are provided by the aforementioned main part of an electric appliance, and can set up a priority, And an electric appliance which is provided with two or more external electric appliances connected to each aforementioned electric socket, and is characterized by controlling power consumption of the aforementioned main part of an electric appliance which contains the aforementioned external electric appliance based on a priority set as each aforementioned electric socket within current capacity of the aforementioned breaker.
[Claim 2]The electric appliance according to claim 1 in which the aforementioned priority includes "priority" and "continuation."
[Claim 3]The electric appliance according to claim 1 or 2 which provides a display part further on the aforementioned main part of an electric appliance, and is characterized by displaying the aforementioned main part of an electric appliance, and an operating condition of each aforementioned electric socket on the aforementioned display part.
[Claim 4]The electric appliance according to any one of claims 1 to 3 in which the aforementioned main part of an electric appliance contains a main part of a microwave oven.

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention provides two or more service receptacles about an electric appliance on the main part of an electric appliance especially connected to commercial power via an exclusive breaker, and relates to the electric appliance which also enabled use of other external electric appliances.
[0002]
[Description of the Prior Art]Although current capacity is provided by a contract with an electric power company in commercial power for home use, the current capacity of having set to the capacity at the time of there being a relation of the capacity of wiring and using simultaneously all the electric appliances, such as a microwave oven, an electric water heater, an air-conditioner, etc. which are power load, is rare. When a mass electric appliance is newly purchased, current capacity

may exceed.
[0003]Therefore, when two or more electric appliances are used simultaneously, without considering the total load power, the current beyond contract current will flow, and a breaker will fall and fail for power. Therefore, the time and effort which stops temporarily operation of apparatus other than the electric appliance for which people want to judge and use load distribution by intuition or experience so that a breaker may not fall is needed in an ordinary home.
[0004]On the other hand, as a cooking machine used in kitchen, in order that ** and these may improve efficiency of housekeeping, many things, such as a microwave oven, a toaster, an electric pot, a rice cooker, or an electric coffee percolator, collect into one place, and it is installed in many cases, for example.
[0005]However, when there are few power receptacles near the place in which two or more cooking machines were installed, what is called octopus wiring that inserts the tap of two lots or three lots, and connects two or more electric appliances to one power receptacle will be performed.
[0006]When the power receptacle provided by the ordinary home uses simultaneously two or more cooking machines which the thing of the amperage rating 15A usually came out, and were connected to one power receptacle for a certain reason, the current which exceeded the amperage rating of the power receptacle depending on those power consumption may flow.
[0007]
[Problem to be solved by the invention]Although what is necessary is to insert only the power source plug of the cooking machine used among two or more cooking machines to a power receptacle in order to avoid this, be absorbed, there is troublesomeness that a power source plug must be then taken out and inserted each time, and there is a problem that a use kitchen worsens.
[0008]So, enable it to connect a cooking machine and other external electric appliances as opposed to one power receptacle, and. [the main purpose of this invention] It is providing the electric appliance the current beyond amperage rating can be prevented from flowing into a power receptacle, for example, a cooking machine.
[0009]
[Means for solving problem]The main part of an electric appliance by which this invention is connected to a power line via the exclusive breaker of predetermined current capacity from commercial power, Two or more service receptacles which are provided by this main part of an electric appliance, and can set up a priority, And it is an electric appliance which is provided with two or more external electric appliances connected to each of these electric sockets, and is characterized by controlling the power consumption of the electric appliance which contains an external electric appliance based on the priority set as each electric socket within the current capacity of a breaker.
[0010]
[Function]Two or more service receptacles are provided on the main part of an electric appliance connected to an exclusive breaker, for example, the main part of a microwave oven, and operation of the external electric appliance connected to each electric socket based on the priority set as this electric socket, for example, a toaster, and an electric coffee percolator is controlled within breaker capacity.
[0011]
[Effect of the Invention]According to this invention, since the electric appliance connected to two or more service receptacles provided on the main part of an electric appliance is operated based on the priority set as each electric socket, it is not necessary to judge load distribution and, and a breaker does not fall.
[0012]The above-mentioned purpose of this invention, the other purposes, the characteristics, and an advantage will become still clearer by the detailed description of the following working examples performed with reference to Drawings.
[0013]

[Working example]It describes as an electric appliance of one working example of this invention below about the microwave oven which is the representation of a cooking machine.
[0014][the microwave oven 10 which carried out this invention shown in Fig.1] It is connected to commercial-alternating-current-power AC100V via the exclusive breaker 12 of predetermined current capacity, and. The below-mentioned service receptacle is provided by this microwave oven 10, the toaster 14, the electric coffee percolator 16, etc. are suitably connected as an external electric appliance, for example, and it can be used by the microwave oven 10, concomitant use, or independent.
[0015]This microwave oven 10 contains the display part 22 arranged up and down in the door 20 which opens and closes the front opening of the main part 18 of a microwave oven, and this main part as shown in Fig.2, and the body front by the side of opening of this door 20, and the operating part 24 provided with a start button, a priority configuration switch, etc., Furthermore, in the side surface of the main part 18, in order to connect the above-mentioned toaster 14 and the electric coffee percolator 16 as an external electric appliance, the two service receptacles 26 and 28 to which a priority is set by a priority configuration switch etc. are provided. And in order to measure the power consumption in each of these electric socket 26 and 28, the wattmeters 30 and 32 are made to build in the microwave oven 10. These wattmeters 30 and 32 can also substitute an ammeter. The service receptacles 26 and 28 are equipped with the switches SW1 and SW2 which control an output.
[0016]By the operational mode mentioned later, since the power consumption of the main part 18 of a microwave oven is known, it is previously memorized to ROM as data, or if an electric current measuring device (not shown) can be built in, it will adopt the value.
[0017]And only the power receptacle of the microwave oven 10 is connected to commercial-alternating-current-power AC100V via the exclusive breaker 12 (amperage rating 15A). The operating time of the exclusive breaker 12 is a delayed type, and while the current value exceeding the amperage rating 15A has few excess amounts, it is not intercepted promptly, and it is disconnected after predetermined time, for example, an about [1 second] lapse.
[0018]Since unevenness will occur in the grilling condition of a bread if a power supply turns off on the way, the toaster 14 connected to the service receptacle 26 shall not carry out discontinuation as much as possible, and the power consumption is the same from a heating start to an end, and it sets it to 300W. Therefore, the "priority 1" mentioned later in this case will be set as the service receptacle 26.
[0019]On the other hand, the electric coffee percolator 16 connected to the service receptacle 28 is provided with the heater for drips of 300W, and the heater for incubation of 100W. And at the time of a drip start, these two heaters operate and the heater for drips operates only an operation stop and the heater for incubation at the time of the end of a drip. By OFF of a power supply, the heater for incubation also suspends operation. Even if a power supply turns off in the middle of operation, in the case of the electric coffee percolator 16, operation is only interrupted, coffee puts into it, and there is no big influence in condition in it. Therefore, the low-priority "priority 2" will be set as the service receptacle 28 from the "priority 1" mentioned later in this case.
[0020]Next, it describes about the display part 22 of the microwave oven 10 shown in Fig.3.
[0021]This display part 22 is provided by the front part of the microwave oven 10 as mentioned above, shows each state of a range part, the electric socket 1, and the electric socket 2, and is constituted by LED or the liquid crystal as a display body.
[0022]That is, a range part displays an output and operating time. The electric socket 1 and the electric socket 2 display the priority state (the priority 1, the priority 2, continuation) and electric power of each service receptacle 26 and 28.
[0023]In the graphic display of Fig.3, each following state is displayed, respectively.
[0024]with the output 800W, a microwave oven is a range part, the electric socket 1 is the priority 1, under 300W consumption and as for the electric socket 2, a toaster is the priority 2 and power

consumption has no electric coffee percolator -- here, it describes about the cooking operational mode of the microwave oven 10.
[0025]Two-step switching of the low-power output 200W and the high power 800W is possible for the output of this microwave oven 10, and power consumption at that time is set to 400W and 1400W, respectively. Since the quality of cooking will be deteriorated during cooking if heating is interrupted, you do not make it interrupted as much as possible. The inverter type microwave oven from which an input changes in accordance with an output is assumed.
[0026]in addition -- the microwave oven 10 is cooking -- even if not working, it always generates and the standby power requirement of the microwave oven 10 serves as power consumption.
[0027]Next, it describes about a display and setting out of a microwave oven.
1. The main part of a microwave oven displays the following information on the display part 22.
[0028]** The power consumption ** electric sockets 1 and 2 of the actual condition of the electric sockets 1 and 2 are three kinds, "the priority 1", the "priority 2", and "continuation", about the present established state, and the following setting out is possible for the display 2. electric sockets 1 and 2.
[0029]** Each is cyclically changed to "priority 1" -> "priority 2" -> "continuation" ->"the priority 1" --.
[0030]** When "the priority 1" is chosen and another side is "the priority 1", it changes to "the priority 2."
[0031]** When "the priority 2" is chosen and another side is "the priority 2", it changes to "the priority 1."
[0032]** Another side is not affected by influence when "continuation" is chosen. 3. As for the electric sockets 1 and 2, the following on-off control shall be performed by the established state.
[0033]** a possibility that the electric socket set as "the priority 2" will be intercepted regardless of the ON OFF state of the electric socket set as "the priority 1" -- **.
[0034]** The electric socket set as "the priority 1" may be intercepted only when "the priority 2" is OFF.
[0035]** The electric socket set as "continuation" is not intercepted fundamentally. As an exception, only when independent power consumption exceeds the current capacity of the exclusive breaker 12, it is intercepted.
[0036]By the above, the priority intercepted becomes as follows.
[0037]"Continuation" > "the priority 1" It is not intercepted in order of > "the priority 2."
[0038]When making the intercepted electric socket energize, there are the following two kinds of methods.
[0039]1) Make it energize automatically.
[0040]2) Make it energize manually. For example, it tells that it can energize and energizes by a user's button grabbing.
[0041]In any case, realization is easy and it is altogether described by this example 1.
[0042]When a home network can be used about setting out of a priority, it is automatically set up at the time of not manual setting but a line connection.
[0043]a time check -- it is a time check to a microwave oven about a function and an interlocking display -- the following processings are possible when there is a function (calendar).
[0044]1) In order to realize the integration display of the amount of used electricity for every electric socket, the display of month-long integral power consumption, and this function, it shall have the following functions.
[0045]1) the memory which had the integral power consumption of the detection device 2 present of change of the degree of moon specified -- the display change function to reset device 4 electric energy of preservation 3 integral power consumption, and a display moon degree function preselection capability -- here, If an outline is described about the control block diagram shown in Fig.4, The output control of the magnetron 36 of the microwave oven 10 and control of each heater

of the toaster 14 or the electric coffee percolator 16 are performed by the microcomputer 34 and this which are provided by the main part 18 of a microwave oven, and control the whole operation. The display part 22 which displays the condition of use etc. of the key input sections 38, such as a start button and a priority configuration switch, and the microwave oven 10 and the toaster 14 which are provided by the operating part 24 which is placed at the front face of the main part 18 of a microwave oven, and the electric coffee percolator 16 is also connected to the microcomputer 34, The thermo sensor 44 which detects the buzzer 42, abnormal temperature, etc. which perform the memory 40 which furthermore contains ROM, end information, etc. is also connected. although electric power more nearly required for the magnetron 36 and the toaster 14, and the electric coffee percolator 16 than the power supply of AC100V is boiled and supplied under control of the microcomputer 34, It is controlled by the latter toaster 14 and the electric coffee percolator 16 via SW1, the wattmeter 30, and SW2 and the wattmeter 32, respectively.

[0046]Next, the basic motion of the microwave oven 10 in this working example is described based on the flow chart shown in Fig.5.

[0047]First, the power supply SW is turned on and started and actual condition judgments including the priority and power consumption (power) of the two service receptacles 26 and 28 are made at Step S1.

[0048]Next, it is judged with the microcomputer 34 whether according to the decision result, the microwave oven 10 can be turned on at Step S3. As a result, if it is "YES", by comparison with electric energy and rated power required for each electric socket or a microwave oven at Step S5, condition-of-use mode or power mode will be distinguished, and the flag according to this power mode will be further set to the microcomputer 34 at Step S7. And predetermined cooking will be performed by step S9 and a series of operations will be ended.

[0049]When the result is "NO", on the other hand in Step S3, a jam, When it is expected that the exclusive breaker 12 will be intercepted if the microwave oven 10 is turned on, When it will be in a waiting state at Step S11, this state is indicated by standby at Step S13 at the display part 22 of the main part 18 of a microwave oven and fixed time lapse is further carried out at Step S15, it will return to Step S1 and an actual condition judgment will be made anew here.

[0050]Now, control of an electric socket and a microwave oven is performed based on the following plans.

[0051]** When the sum total power consumption (a predicted value is included) of an electric socket and a microwave oven exceeds the current capacity of an exclusive breaker, turn off an electric socket based on a priority, or don't begin cooking by a microwave oven.

[0052]** When external power consumption increases by an electric socket while the microwave oven cooked, judge the priority of an electric socket, and lower the output of a microwave oven, or intercept an external electric socket.

[0053]** When the power consumption of an electric socket decreases and there is an electric socket under interception while a microwave oven cooks, return this electric socket.

[0054]** When the electric socket under interception has a microwave oven at the time of the end of cooking, return this electric socket after the end of cooking.

[0055]And control of an electric socket and a microwave oven is performed based on the following flows.

[0056]Each judgment part shall be performed from the head of each judgment part with an interval timer etc. at periodical short time. About this control action, it describes with the flow chart shown in below-mentioned Fig.6 - Fig.8.

[0057]1. When a cooking waiting state and cooking are omitted (refer to Fig.6) and it is generated by alarm in the case of which, end decision processing.

[0058]1) When the sum total power consumption of the power consumption Q1 of one of electric sockets and the self-power consumption (standby power requirement) P1 of Q2 and a microwave oven exceeds the breaker capacity M, intercept the electric socket exceeding capacity and

generate alarm.
[0059]2) When the sum total power consumption of the power consumption Q1 of both electric sockets and the self-power consumption (standby power requirement) P1 of Q2 and a microwave oven exceeds the breaker capacity M, process in following order.
[0060]** When an electric socket is the combination of "continuation" and "continuation", intercept the electric socket to which load finally increased, and generate alarm.
[0061]** When there is an electric socket of "the priority 2", intercept it and generate alarm.
[0062]When there is no electric socket of "the priority 2", the electric socket of "the priority 1" is intercepted and alarm is generated.
[0063]3) When it is applied to neither of the above-mentioned conditions and there is an electric socket under interception, make it energize after fixed time. 2. When cooking start instructions are input (refer to Fig.7), and it is any, and generated by alarm, end decision processing.
[0064]1) When the sum total schedule power consumption of the presumed power consumption P2 does not exceed the breaker capacity M at the time of the power consumption Q1 of both electric sockets, Q2, and cooking of a microwave oven, perform cooking as an instruction.
[0065]2) When the sum total schedule power consumption of the presumed power consumption P2 exceeds the breaker capacity M at the time of both electric sockets Q1, Q2, and cooking of a microwave oven, process in following order.
[0066]** When an electric socket is the combination of "continuation" and "continuation", don't cook by generating alarm.
[0067]** When sum total schedule power consumption is less than breaker capacity by intercepting this when there is "the priority 2", intercept "the priority 2", perform cooking as an instruction, and generate alarm.
[0068]** When sum total schedule power consumption is less than breaker capacity by intercepting this when there is "the priority 1", intercept "the priority 1", perform cooking as an instruction, and generate alarm.
[0069]** When the combination of an electric socket is "the priority 1" and the "priority 2", intercept both electric sockets and perform cooking as an instruction, and it is generating **** about alarm.
[0070]** The combination of an electric socket is "continuation", the "priority 1", or "continuation" and the "priority 2", and even if it intercepts except "continuation", when sum total schedule power consumption is not less than breaker capacity, don't perform cooking but generate alarm. 3. When it is generated [in under cooking (refer to Fig.8 and Fig.9)] by alarm in the case of which, end decision processing.
[0071]1) When the sum total power consumption of the power consumption Q1 of both electric sockets, Q2, and the cooking electric power P3 of a microwave oven does not exceed the breaker capacity M, make cooking as an instruction continue.
[0072]2) When the power consumption Q1 of both electric sockets and Q2 increase and sum total power consumption with the cooking electric power P3 of a microwave oven exceeds the breaker capacity M, process in following order.
[0073]** When an electric socket is the combination of "continuation" and "continuation", perform the following processings.
[0074]** It is possible to make the output of -1 microwave oven be deteriorated, when sum total power consumption is less than breaker capacity by this, are deteriorated about an output, continue cooking, and generate alarm.
[0075]** Although it is possible to make the output of -2 microwave oven be deteriorated, when it is made to be deteriorated and sum total power consumption is not less than breaker capacity, interrupt cooking, and generate alarm.
[0076]** When sum total power consumption is less than breaker capacity by intercepting this when there is "the priority 2", intercept "the priority 2", continue cooking, and generate alarm.

[0077]** When sum total power consumption is less than breaker capacity by intercepting this when there is "the priority 1", intercept "the priority 1", continue cooking, and generate alarm.
[0078]** When the combination of an electric socket is "the priority 1" and the "priority 2", although it is made to continue, cooking intercepts both electric sockets and generates alarm.
[0079]** The combination of an electric socket is "continuation", the "priority 1", or "continuation" and the "priority 2", and even if it intercepts except "continuation", when sum total power consumption is not less than breaker capacity, perform the following processings.
[0080]** When sum total power consumption is less than breaker capacity by being deteriorated about the output of -1 microwave oven, and intercepting except "continuation", are deteriorated about an output, continue cooking, and intercept except "continuation" and generate alarm.
[0081]** Even if it is deteriorated about the output of -2 microwave oven and intercepts except "continuation", when sum total power consumption is not less than breaker capacity, interrupt cooking and generate alarm.
[0082]3) There are an electric socket under interception and an electric socket under energization, and when the power consumption of the electric socket under energization is deteriorated and sum total power consumption is deteriorated, make the electric socket under interception energize after fixed time lapse from interception, and it generates alarm. 4. When it is generated by alarm at the time of the end of cooking in the case of which, end decision processing.
[0083]1) When there is an electric socket under interception, make it energize after specified time elapse, and generate alarm.
[0084]2) When there is no electric socket under interception, a state does not change.
[0085]The control action described above is described according to the flow chart shown in Fig.6 - Fig.9.
[0086][first the case where the microwave oven 10 omits a cooking waiting state and cooking] If the case where the power consumption Q1 of one of service receptacles and the sum total power consumption of the standby power requirement P1 of Q2 and a microwave oven exceed the breaker capacity M is made into "the mode 1", As shown in (a) of Fig.6, the electric socket which opens either of the switch SW1 or SW2 with the microcomputer 34 at Step S1, and exceeds capacity is intercepted, alarm is generated at the buzzer 42 at Step S3, and decision processing is ended.
[0087]Next, if the case where the power consumption Q1 of both electric sockets, Q2, and the sum total power consumption of the standby power requirement P1 of the microwave oven 10 exceed the breaker capacity M is made into "the mode 2", Judge with a microcomputer whether the combination of the priority of an electric socket is "continuation" and "continuation" at Step S1, and as similarly shown in (b) of Fig.6, if the result is "YES", The electric socket to which load finally increased at Step S3 is intercepted, alarm is generated at a buzzer at Step S5, and decision processing is ended. And it judges whether if a decision result is "NO" at Step S1, there is "the priority 2" at Step S7, and if the result is "YES", the electric socket concerned will be intercepted by step S9, and it will proceed to Step S5. If the decision result is "NO" at Step S7, the electric socket of "the priority 1" will be intercepted at Step S11, and it will proceed to Step S5.
[0088]Fig.7 is a flow chart in the "mode 3" when cooking start instructions are input into the microwave oven 10, First, it judges whether the sum total power consumption of the presumed power consumption P2 exceeds the breaker capacity M with the microcomputer 34 at Step S1 at the time of cooking of the power consumption Q1 of both electric sockets, and Q2 and a microwave oven, and if the result is "YES", cooking as an instruction will be performed at Step S3.
[0089]And if the decision result in Step S1 is "NO", a flow of operation will change henceforth by how the priority of both electric sockets is set up. That is, electric socket setting out will judge whether they are "continuation" and "continuation" at Step S5, and if the result is "YES", it does not cook at Step S7, but by step S9, alarm will be generated at a buzzer and it will end. If the decision result in Step S5 is "NO", electric socket setting out will judge whether they are "continuation" and the "priority 1" at Step S11, and if the result is "YES", The total electric power

when intercepting "the priority 1" at Step S13 is calculated with a microcomputer, and it is judged at Step S15 whether it is below breaker capacity. If the result is "YES", "the priority 1" will be intercepted at Step S16, and cooking as instructed will be performed at Step S3. If the decision result of Step S15 is "NO", it will proceed to Step S7 and cooking will not be carried out.

[0090]On the other hand, if the decision result of Step S11 is "NO", electric socket setting out will judge whether they are "continuation" and the "priority 2" at Step S17, and if the result is "YES", The total electric power when intercepting "the priority 2" at Step S19 is calculated, and it judges whether it is below KUREKA capacity at Step S20, and if the result is "YES", "the priority 2" will be intercepted at Step S22, and cooking as instructed will be performed at Step S3. When the decision result of Step S20 is "NO", it proceeds to Step S7 and cooking is not performed.

[0091]And if the decision result of Step S17 is "NO", since electric socket setting out is "the priority 1" and the "priority 2", it will calculate the total electric power when intercepting the low-priority "priority 2" at Step S21, and will judge whether it is below breaker capacity at Step S23. If it is "NO" as a result, both "the priority 1" and the "priority 2" will be intercepted at Step S25, it will proceed to Step S3, and cooking as instructed will be performed. If the decision result in Step S23 is "YES", "the priority 2" will be intercepted at Step S26, and cooking as instructed will be performed at Step S3.

[0092]Fig.8 is a flow chart which shows the operation in the case of being during cooking of the microwave oven 10.

[0093]First, it is judged with the microcomputer 34 whether cooking is started and the sum total power consumption of the power consumption Q1 of both electric sockets and the cooking electric power P3 of Q2 and the microwave oven 10 is over the breaker capacity M in Step S1, If the result is "YES", cooking as instructed will be performed at Step S3. If the decision result in Step S1 is "NO", future flows will change according to the established state of the priority of both electric sockets.

[0094]That is, it judges whether electric socket setting out is "continuation" and "continuation" at Step S5, and if the result is "YES", the total electric power at the time of microwave oven loss of power will be calculated at Step S7, and it will be judged by step S9 whether it is below breaker capacity. If it is "YES" as a result, it will be deteriorated about the output of a microwave oven at Step S10, and cooking will be continued at Step S11, and cooking will be interrupted for Step S13 if it is "NO." If the decision result of electric socket setting out "continuation" in Step S5 and "continuation" is "NO", It judges whether electric socket setting out is "continuation" and the "priority 1" at Step S15, and if the result is "YES", the total electric power when intercepting "the priority 1" at Step S17 will be calculated, and it will be further judged at Step S19 whether it is below breaker capacity. If it is "YES" as a result, "the priority 1" will be intercepted at Step S20, it will proceed to Step S21, and cooking will be continued. When the decision result of Step S19 is "NO", it proceeds to ** of Fig.9.

[0095]And when the decision result of Step S15 is "NO", it is further judged at Step S23 whether electric socket setting out is "continuation" and the "priority 2", If the result is "YES", the total electric power when intercepting "the priority 2" at Step S25 will be calculated, and it will be judged at Step S26 whether it is below breaker capacity. If the result is "YES", "the priority 2" will be intercepted at Step S28, and cooking will be continued at Step S30, and if a result is "NO", it will proceed to ** of Fig.9.

[0096]If the decision result of Step S23 is "NO", since electric socket setting out is "the priority 1" and the "priority 2", it will calculate the total electric power when intercepting the low-priority "priority 2" at Step S27, and will judge whether it is below breaker capacity at Step S29. If it is "YES" as a result, "the priority 2" will be intercepted at Step S30, and cooking will be continued at Step S31. If the decision result of Step S29 is "NO", both "the priority 1" and the "priority 2" will be intercepted at Step S33, and cooking will be continued at Step S35.

[0097]Next, if it describes about flowing into operation of a subsequent series from the Fig.8 shown

in Fig.9,First, when the decision result in Step S19 of Fig.8 is "NO", the loss of power of a microwave oven and the total electric power at the time of the "priority 1" interception are calculated at Step S37 of Fig.9, and it is judged at Step S39 whether it is below breaker capacity.If it is "YES" as a result, the loss of power of a microwave oven and the "priority 1" will be intercepted at Step S41, and cooking will be continued at Step S43. Cooking is interrupted for Step S45 when the decision result of Step S39 is "NO."

[0098]On the other hand, when the decision result in Step S26 of Fig.8 is "NO", the loss of power of a microwave oven and the total electric power at the time of the "priority 2" interception are calculated at Step S47 of Fig.9, and it is judged at Step S49 whether it is below breaker capacity.If it is "YES" as a result, the loss of power of a microwave oven and the "priority 2" will be intercepted at Step S51, and cooking will be continued at Step S53. And cooking is interrupted for Step S55 when the decision result of Step S49 is "NO."

[0099]After external electric appliance using [the end of cooking of an above-mentioned microwave oven, or / which is connected] it to each electric socket, if the total electric energy decreases, it will return to the state before change, i.e., the state before controlling the electric appliance based on a priority.

[0100]Although described about the working example which provided the two service receptacles 26 and 28 which can set a priority to the main part 18 of a microwave oven, also when a service receptacle is three or more pieces, same control including other external electric appliances connected to this service receptacle can be performed. Even if a rice cooker is connected to a change of a toaster and it connects an electric pot to a change of an electric coffee percolator, it is controllable similarly.

[Brief Description of the Drawings]

[Drawing 1]It is a schematic diagram showing the entire configuration of the microwave oven which is one working example of this invention.

[Drawing 2]It is a slope figure showing the appearance of the microwave oven shown in Fig.1.

[Drawing 3]It is an explanatory view showing the display part of Fig.2.

[Drawing 4]It is a control block diagram of the microwave oven shown in Fig.1.

[Drawing 5]It is a flow chart which shows the basic motion of the microwave oven in this working example.

[Drawing 6](a) And (b) is a flow chart in the case of omitting a cooking waiting state and cooking of a microwave oven.

[Drawing 7]It is a flow chart when cooking start instructions are input into a microwave oven.

[Drawing 8]It is a flow chart when a microwave oven is cooking.

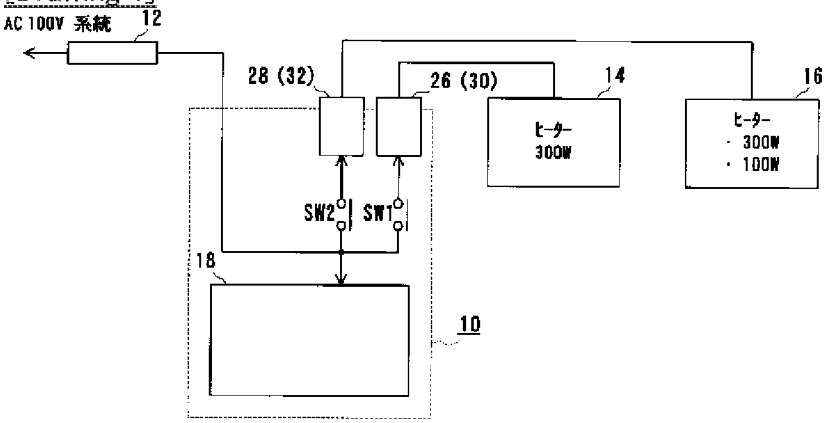
[Drawing 9]It is a flow chart which shows a part of flow of the operation in Fig.8.

[Explanations of letters or numerals]

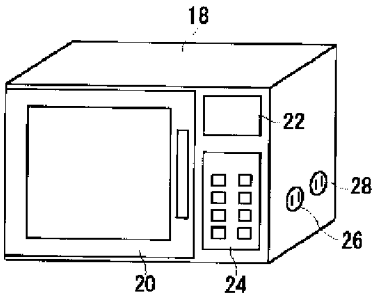
10 -- Microwave oven
12 -- Exclusive breaker
14 -- Toaster
16 -- Electric coffee percolator
18 -- Main part of microwave oven
22 -- Display part
24 -- Operating part
26 and 28 -- Service receptacle (the electric socket 1 and the electric socket 2)
30 and 32 -- The wattmeter 1 and wattmeter 2
34 -- Microcomputer
36 -- Magnetron

38 -- Key input section
40 -- Memory
42 -- Buzzer
44 -- Thermo sensor

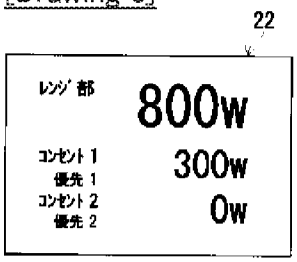
[Drawing 1]



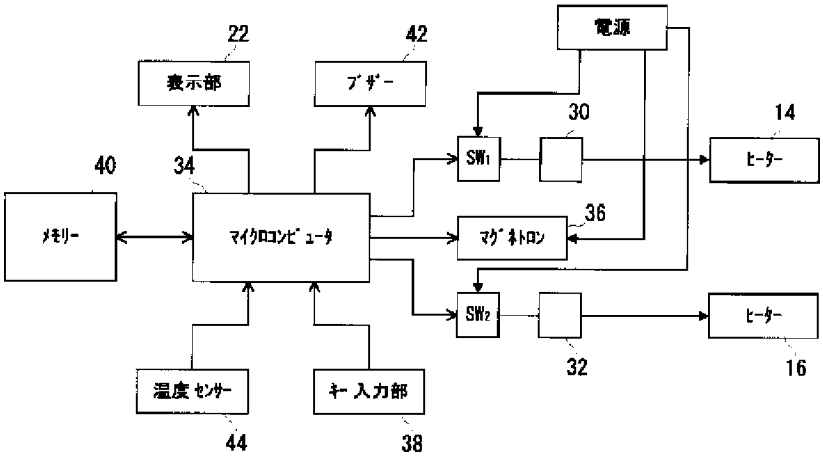
[Drawing 2]



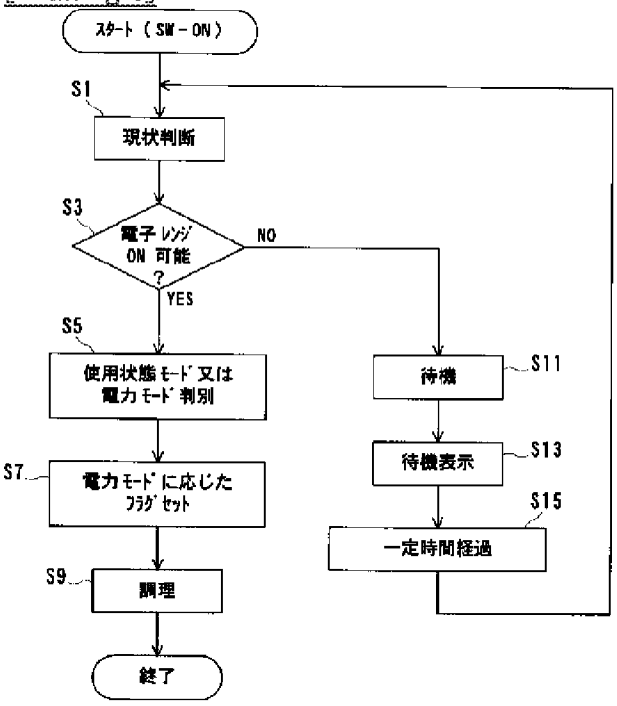
[Drawing 3]



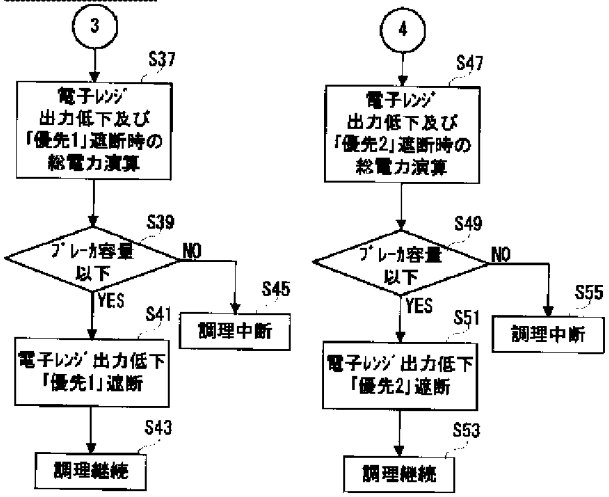
[Drawing 4]



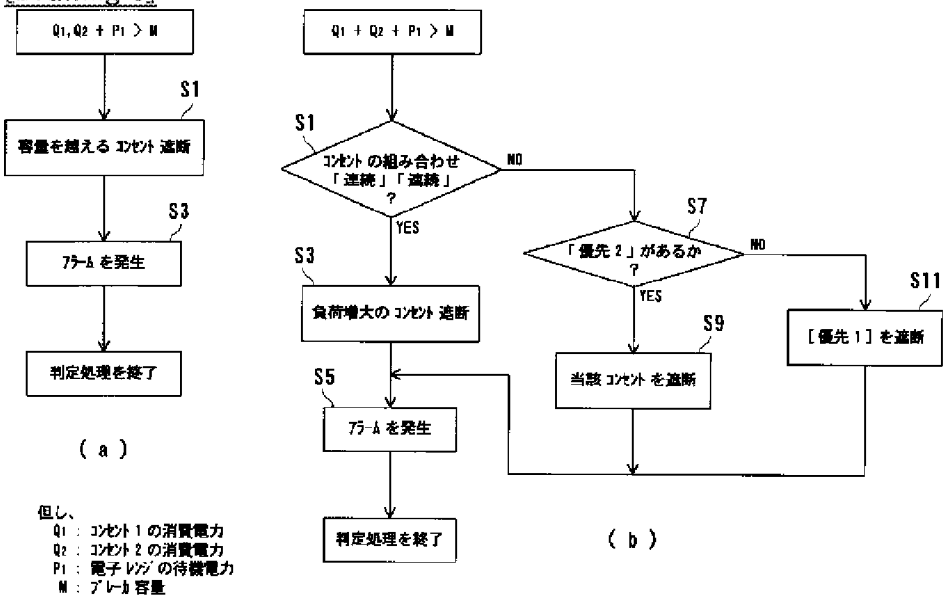
[Drawing 5]



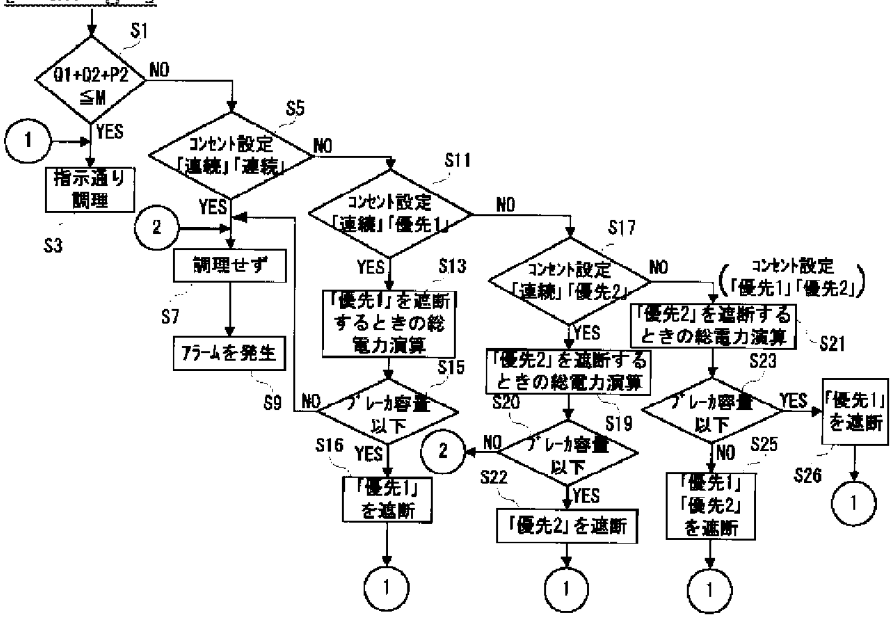
[Drawing 9]



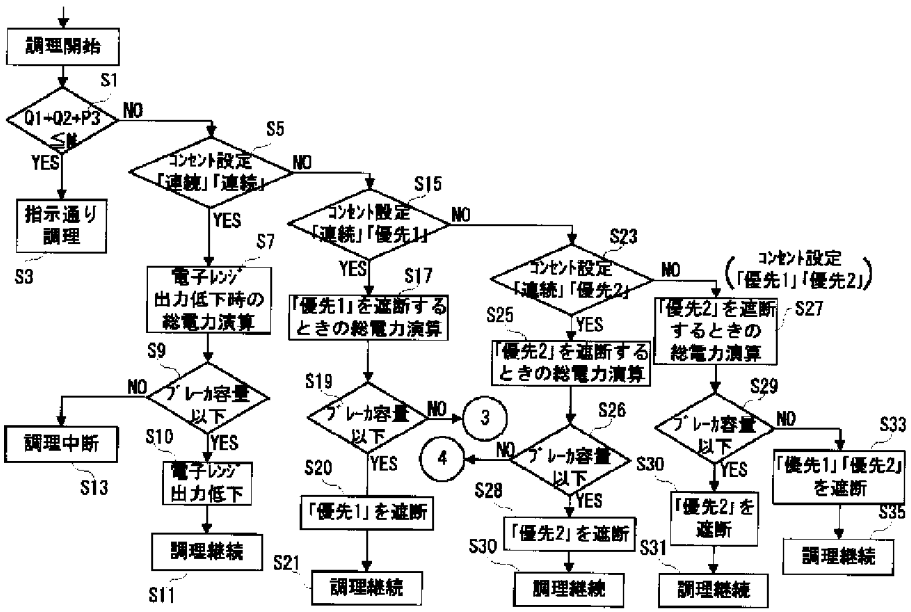
[Drawing 6]



[Drawing 7]



[Drawing 8]



[Translation done.]

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	500	((("HALL") near3 ("Gregory")) OR (("EMMA") near3 ("Philip"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	WITH	ON	2019/07/18 11:31
S12	9599	(219/482,483,485,488,678,679,695,697,702,715,716,717,718,719,720,721,722,723,756,757,760,761).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/07/18 15:09
S13	3860	S12 and (microwave oven)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2019/07/18 15:10
S14	39	S13 and (smok$3 (detect$3 or sens$3))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2019/07/18 15:11
S16	12533	(H05B6/645,666,68,806 or F25D23/12 or F25B29/005).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2019/07/18 15:19
S17	53	S16 and (smok$3 (detect$3 or sens$3))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2019/07/18 15:20
S18	11	S16 and ((infrared or infra-red or infra$1red) emitt$3 receiv$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2019/07/18 15:48
S19	14	S13 and ((infrared or infra-red or infra$1red) emitt$3 receiv$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2019/07/18 15:49
S20	311	(microwave oven) and ((infrared or infra-red or infra$1red) emitt$3 receiv$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2019/07/18 15:51
S21	193	(microwave oven) and refrigerator and ((infrared or infra-red or infra$1red) emitt$3 receiv$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2019/07/18 15:52
S22	564	(microwave oven) and refrigerator and ((emit$4 receiv$3) (sens$3 or detect$3))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	WITH	ON	2019/07/18 16:35

			IBM_TDB			
S23	86	S16 and ((emit$4 receiv$3) (sens$3 or detect$3))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2019/07/18 16:56
S24	6	(microwave oven) and refrigerator and (smok$3 (detect$3 or sens$3)((emit$4 receiv$3) (sens$3 or detect$3)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2019/07/18 17:04
S25	6	(microwave oven) and (smok$3 (detect$3 or sens$3)((emit$4 receiv$3) (sens$3 or detect$3))) and (memory or storage)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2019/07/18 17:05
S31	92	(microwave oven) and (air (flow or passage)) and (((emit$4 receiv$3) (sens$3 or detect$3))) and (memory or storage)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2019/07/18 17:19
S32	70	(microwave oven) and (air (flow or passage)) and (power control$4) and (((emit$4 receiv$3) (sens$3 or detect$3))) and (memory or storage)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2019/07/18 18:22

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S33	2	(microwave oven) and (air (flow or passage)) and (power control$4) and (smok$3 (detect$3 or sens$3)((emit$4 receiv$3) (sens$3 or detect$3))) and (memory or storage)	US-PGPUB; USPAT	WITH	ON	2019/07/18 18:32
S34	2	(microwave oven) and (air (flow or passage)) and (smok$3 (detect$3 or sens$3) ((emit$4 receiv$3) (sens$3 or detect$3))) and (memory or storage)	US-PGPUB; USPAT	WITH	ON	2019/07/18 18:35
S35	2	(microwave oven) and (power control$4) and (air (flow or passage)) and (smok$3 (detect$3 or sens$3)((emit$4 receiv$3) (sens$3 or detect$3)))	US-PGPUB; USPAT	WITH	ON	2019/07/18 18:37
S36	2	(microwave oven) and (power control$4) and (air (flow or passage)) and (smok$3 (detect$3 or sens$3)((emit$4 receiv$3) (sens$3 or detect$3))) and (compar$4 radiat$3)	US-PGPUB; USPAT	WITH	ON	2019/07/18 18:37

7/ 18/ 2019 6:39:13 PM
D:\ EAST\ Workspaces\ 15600118.wsp

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	**Gregory Allan Thomas Hall**	)	
Serial No.:	**15/600,118**	)	Art Unit **3761**
Filed:	**May 19, 2017**	)	Primary Examiner **Hung D. Nguyen**
Conf. No.:	**4190**	)	
Title:	**Multiple Link Appliance With Auxiliary Outlet**	)	

Mail Stop Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Amendment Pursuant to 37 CFR § 1.312

Sir:

Applicant hereby requests to amend the Application after mailing of the Notice of Allowance pursuant to 37 CFR § 1.312.

Amendments to the Claims begin on Page 2.

Remarks begin on Page14.

In the Claims

Kindly amend the claims as follows:

1. (currently amended) Apparatus comprising:

a microwave oven,

wherein the microwave oven includes:

a radiation emitting microwave element,

a microwave housing, wherein the microwave housing bounds a cooking interior area, wherein the radiation emitting microwave element is operative to irradiate the cooking interior area,

wherein an air passage extends between the cooking interior area and an exterior of the housing,

at least one power control circuit, wherein the at least one power control circuit is operative to cause

electrical power to be selectively delivered to the microwave element,

wherein the microwave oven further includes at least one sensor emitter and at least one sensor receiver configured to receive radiation from the at least one sensor emitter, wherein the at least one sensor emitter and the at least one sensor receiver ~~extends~~ extend in the air passage such that air from at least a portion of the cooking interior area extends intermediate of the at least one sensor emitter and the at least one sensor receiver,

at least one safety circuit, wherein the at least one safety circuit is in operative connection with the at least one sensor emitter, the at least one sensor receiver, and the microwave element,

wherein the at least one safety circuit is operative to cause

the at least one sensor emitter to emit sensor radiation and the at least one sensor receiver to sense sensor radiation from the at least one sensor emitter while the microwave element operates during a current cooking session,

data to be stored in a memory associated with the at least one ~~sensor~~ safety circuit corresponding to an initial transmissivity level of transmitted radiation from the at least one sensor emitter that reaches the at least one sensor receiver early in the current cooking session,

comparison of a current level of transmitted radiation during the current cooking session that reaches the at least one sensor receiver, and the initial transmissivity level,

a determination based on the stored data that the current level of transmitted radiation from the at least one sensor emitter that reaches the at least one sensor receiver has fallen by at least a threshold amount from the initial transmissivity level during the current cooking session, due to smoke in the cooking interior area,

responsive at least in part to the determination, the microwave element to no longer be supplied with electrical power to prematurely end the current cooking session,

wherein the at least one safety circuit is configured to reset after the premature end of the current cooking session responsive to the at least one sensor circuit, so that the at least one sensor circuit is operative to cause the radiation emitting microwave element to be allowed to be supplied with electrical power during a next subsequent cooking session.

2. (original) The apparatus according to claim 1

wherein the microwave oven housing includes a fan, wherein the fan is operative to cause air from the cooking interior area to move through the air passage.

3. (original) The apparatus according to claim 1 and further including

a power supply outlet, wherein the power supply outlet is provided on the microwave oven,

wherein the power supply outlet is configured to receive an electrical connection to an appliance having lower power requirements than power requirements of the microwave oven,

wherein the at least one power control circuit is operative to cause

electrical power to be selectively delivered to the microwave element and the power supply outlet, wherein the power supply outlet does not operate to supply power therefrom when the microwave element draws cooking power.

4. (original) The apparatus according to claim 1 and further comprising:

a power supply outlet provided on the microwave oven wherein the power supply outlet is in operative connection with the at least one power control circuit,

a refrigerator configured to be connected to the power supply outlet,

wherein the refrigerator includes a refrigerator housing, wherein the refrigerator housing bounds a cooled refrigerator interior area, wherein the refrigerator housing is in a fixed operative connection with the microwave housing, wherein the refrigerator includes a refrigerant compressor, wherein the refrigerant compressor is operative to compress refrigerant material, wherein the refrigerant is operative to cause cooling of the cooled refrigerator interior area,

wherein the at least one power control circuit is configured to:

disable refrigerator operation by not supplying electrical power to the compressor when the microwave element draws cooking power;

enable refrigeration operation by supplying electrical power to the compressor when the microwave element does not draw cooking power.

5. (original) The apparatus according to claim 4

wherein the microwave oven includes a USB port, wherein the USB port is in operative connection with the at least one power control circuit,

wherein the USB port is not operative when the microwave element draws cooking power.

6. (original) The apparatus according to claim 4

wherein the microwave oven includes an inductance charging pad, wherein the inductance charging pad is in operative connection with the at least one power control circuit,

wherein the inductance charging pad is not operative when the microwave element draws cooking power.

7. (currently amended) The apparatus according to claim 4 and further including

a wireless interface, wherein the wireless interface is in operative connection with the at least one power control circuit,

wherein the wireless interface is operative to transmit signals indicative of a condition of at least one of the microwave oven and the refrigerator, to a wireless mobile device.

8. (currently amended) The apparatus according to claim 4 and further including

a temperature sensor, wherein the temperature sensor is operative to sense a temperature corresponding to temperature in the cooking interior area,

wherein the temperature sensor is in operative connection with the at least one ~~sensor~~ safety circuit,

wherein the at least one power control circuit is operative to cause the microwave element to no longer be supplied with cooking power to prematurely end the current cooking session responsive at least in part to

the determination, and

the temperature being sensed above a temperature level during the current cooking session.

9. (original) Apparatus comprising:

a microwave oven configured to be connected to a source of electrical power and having a control circuit, wherein the control circuit is configured to control operation of the microwave oven;

a smoke sensor, wherein the smoke sensor is positioned in an air passage that extends between a cooking area inside the microwave oven and air outside the microwave oven, wherein the smoke sensor is in operative connection with the control circuit, wherein the smoke sensor is configured to cause cooking power to the microwave oven to be withdrawn prior to a set end time of a current cooking session upon the smoke sensor sensing smoke indicative of a dangerous condition; and

wherein the smoke sensor is configured to be reset after ending the current cooking session prior to the set end time based on sensing the smoke indicative of the dangerous condition, to enable the microwave oven to receive cooking power in a next subsequent cooking session responsive at least in part to the smoke sensor no longer sensing the smoke indicative of the dangerous condition.

10. (original) The apparatus according to claim 9 and further comprising:

a power supply outlet on the microwave oven,

wherein the power supply outlet is in operative connection with the control circuit,

a refrigerator,

wherein the refrigerator is electrically connected with the power supply outlet,

wherein the control circuit is operative to

withdraw electrical power from the refrigerator when the microwave oven draws cooking power,

deliver electrical power to the refrigerator when the microwave oven does not draw cooking power.

11. (original) The apparatus according to claim 10, wherein the smoke sensor includes at least one of

a photosensor,

a motion sensor,

an ionization sensor,

a VOC sensor,

a sensor including a radiation emitter and a radiation receiver.

12. (original) The apparatus according to claim 10

wherein the microwave oven includes a USB port, wherein the USB port is in operative connection with the control circuit,

wherein the control circuit causes the USB port not to be operative when the microwave oven draws cooking power.

13. (original) The apparatus according to claim 10

wherein the microwave oven includes an inductance charging pad,

wherein the inductance charging pad is in operative connection with the control circuit,

wherein the control circuit causes the inductance charging pad not to be operative when the microwave oven draws cooking power.

14. (original) The apparatus according to claim 10

and further including a wireless interface, wherein the wireless interface is in operative connection with the control circuit,

wherein the wireless interface is operative to transmit signals indicative of a condition of at least one of the microwave oven and the refrigerator to a wireless mobile device.

15. (original) The apparatus according to claim 10 and further including

a temperature sensor, wherein the temperature sensor is operative to sense a temperature corresponding to temperature in the cooking area,

wherein the temperature sensor is in operative connection with the smoke sensor,

wherein the control circuit is operative to cause cooking power to the microwave oven to be withdrawn prior to the set end time of the current cooking session, responsive to the smoke sensor sensing smoke indicative of the dangerous condition and the temperature being sensed above a temperature level during the cooking session.

16. (currently amended) The apparatus according to claim 10

wherein the smoke sensor includes a sensor emitter and a sensor receiver, wherein the sensor receiver is configured to receive radiation output from the sensor emitter,

a sensor circuit, wherein the sensor circuit is in operative connection with the sensor emitter, the sensor receiver and the control circuit,

wherein the sensor circuit is operative to cause

the sensor emitter to emit radiation and the sensor receiver to sense radiation from the sensor emitter while the microwave oven operates during a current cooking session,

data to be stored in a memory associated with the sensor circuit corresponding to an initial transmissivity level of transmitted radiation from the sensor emitter that reaches the sensor receiver early in the current cooking session,

comparison of a current level of transmitted radiation that reaches the sensor receiver during the current cooking session, and the initial transmissivity level,

a determination based on the stored data, that the current level of transmitted radiation from the sensor emitter that reaches the sensor receiver has fallen by at least a threshold amount from the initial transmissivity level during the current cooking session, wherein the determination corresponds to smoke indicative of the dangerous condition,

wherein cooking power to the microwave oven is withdrawn prior to the set end time of the current cooking session responsive at least in part to the determination.

17. (currently amended) Apparatus comprising:

a microwave oven configured to be connected to a source of electrical power and having a control circuit to control operation of the microwave oven, wherein the microwave oven includes an interior cooking area, wherein the microwave oven includes an air passage that extends between the cooking area and outside the microwave oven,

a ~~smoker~~ smoke sensor, wherein the smoke sensor is positioned in the air passage, wherein the smoke sensor is configured to cause cooking power to be withdrawn from the microwave oven prior to a set end time of a current cooking session responsive at least in part to the smoke sensor sensing at least one change in an amount of smoke sensed by the smoke sensor, which at least one change corresponds to a dangerous condition, and

wherein ~~in~~ the control circuit is configured to reset after ending the current cooking session prior to the set end time due to sensing the dangerous condition, to enable cooking power to again be available to the microwave oven in a next subsequent cooking session responsive at least in part to the smoke sensor no longer sensing the dangerous condition.

18. (original) The apparatus according to claim 17 and further comprising:

a power supply outlet on the microwave oven,

a refrigerator configured to be connected to the source of electrical power by connection to the power supply outlet, wherein the refrigerator includes a compressor,

wherein the control circuit is operative to cause

electrical power to be unavailable to the compressor, when the microwave oven demands cooking power,

electrical power to be available to the compressor when the microwave oven does not demand cooking power.

19. (original) The apparatus according to claim 18, wherein the smoke sensor includes at least one of

a radiation emitter and radiation receiver,

a photosensor,

a motion sensor,

an ionization sensor,

a VOC sensor.

20. (currently amended) The apparatus according claim 18, wherein the microwave oven further includes at least one output device including at least one of

a USB port,

an inductance charging pad,

an auxiliary electrical outlet,

wherein the at least one output device is in operative connection with the control circuit, and wherein the control circuit is operative to cause the at least one output device to be inoperative when the microwave oven demands cooking power.

REMARKS

Claim Status

Claims 1, 7 – 8, 16 – 17 and 20 are requested to be amended herein. Claims 1 – 20 remain pending.

The Proposed Amendments Do Not Change The Scope Of The Allowed Claims

The acknowledgment by the Office that originally filed claims 1 – 20 recite allowable subject matter is appreciated by the Applicant.

The original claims requested to be amended herein contain minor grammatical and typographical errors. Correcting these errors in accordance with the proposed amendments will not change the scope of the claims. Entry of this amendment is respectfully requested.

Conclusion

Entry of the proposed amendments after the mailing of the Notice of Allowance is requested. The undersigned will be happy to discuss any aspect of the Application by telephone at the Office's convenience.

Respectfully submitted,

/Ralph E. Jocke/
Ralph E. Jocke, Reg. No. 31,029
Walker & Jocke Co., LPA
231 South Broadway
Medina, OH 44256
(330) 721-0000
Customer No. 07733

Electronic Acknowledgement Receipt

EFS ID:	36777718
Application Number:	15600118
International Application Number:	
Confirmation Number:	4190
Title of Invention:	MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET
First Named Inventor/Applicant Name:	Gregory Allan Thomas Hall
Customer Number:	7733
Filer:	Ralph E. Jocke/Allison McDermott
Filer Authorized By:	Ralph E. Jocke
Attorney Docket Number:	INT-1001 CIP 2 C
Receipt Date:	08-AUG-2019
Filing Date:	19-MAY-2017
Time Stamp:	11:53:36
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Amendment_Pursuant.pdf	50134 3eb60cca21e2249b551d9c52f0f4370300e93aad	yes	14

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment after Notice of Allowance (Rule 312)	1	1
	Claims	2	13
	Applicant Arguments/Remarks Made in an Amendment	14	14
Warnings:			
Information:			
	Total Files Size (in bytes):	50134	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	Multiple Linked Appliance with Auxiliary Outlet

As a below named inventor, I hereby declare that:

This declaration is directed to:
- The attached application, or
- X United States application or PCT international application number 15/600,118 filed on May 19, 2017.

The above-identified application was made or authorized to be made by me.

I believe I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby state that I have reviewed and understand the contents of the above-identified application including the claim(s).

I acknowledge the continuous duty to disclose to the U.S. Patent and Trademark Office information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Gregory Allan Thomas Hall Date: August 2, 2019

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	Multiple Linked Appliance with Auxiliary Outlet

As a below named inventor, I hereby declare that:

This declaration is directed to: X The attached application, or United States application or PCT international application number 15/600,118 filed on May 19, 2017.

The above-identified application was made or authorized to be made by me.

I believe I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby state that I have reviewed and understand the contents of the above-identified application including the claim(s).

I acknowledge the continuous duty to disclose to the U.S. Patent and Trademark Office information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

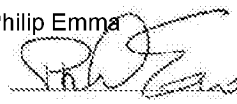
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor Philip Emma Date: August 2. 2019

Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed.

Electronic Acknowledgement Receipt

EFS ID:	37012920
Application Number:	15600118
International Application Number:	
Confirmation Number:	4190
Title of Invention:	MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET
First Named Inventor/Applicant Name:	Gregory Allan Thomas Hall
Customer Number:	7733
Filer:	Ralph E. Jocke/Allison McDermott
Filer Authorized By:	Ralph E. Jocke
Attorney Docket Number:	INT-1001 CIP 2 C
Receipt Date:	29-AUG-2019
Filing Date:	19-MAY-2017
Time Stamp:	11:21:35
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Oath or Declaration filed	Declaration_Hall.pdf	122867 94301fea8972ce193bc7e336a08e9746b3df ec66	no	1

Warnings:

Information:					
2	Oath or Declaration filed	Declaration_Emma.pdf	261469 55777f6d7407ef1cbad39cb81c4d574be03047d2	no	1
Warnings:					
Information:					
			Total Files Size (in bytes):	384336	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/600,118	05/19/2017	Gregory Allan Thomas Hall	INT-1001 CIP 2 C	4190

7733 7590 09/10/2019

WALKER & JOCKE
231 SOUTH BROADWAY STREET
MEDINA, OH 44256

EXAMINER	
NGUYEN, HUNG D	

ART UNIT	PAPER NUMBER
3761	

MAIL DATE	DELIVERY MODE
09/10/2019	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Response to Rule 312 Communication	Application No.	Applicant(s)	
	15/600,118	Hall et al.	
	Examiner	Art Unit	AIA (FITF) Status
	HUNG D NGUYEN	3761	Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

1. ☑ The amendment filed on 08 August 2019 under 37 CFR 1.312 has been considered, and has been:

a) ☑ entered.

b) ☐ entered as directed to matters of form not affecting the scope of the invention.

c) ☐ disapproved because the amendment was filed after the payment of the issue fee.

Any amendment filed after the date the issue fee is paid must be accompanied by a petition under 37 CFR 1.313(c)(1) and the required fee to withdraw the application from issue.

d) ☐ disapproved. See explanation below.

e) ☐ entered in part. See explanation below.

/HUNG D NGUYEN/
Primary Examiner, Art Unit 3761

Docket No. INT-1001 CIP C 2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	**Gregory Allan Thomas Hall**	)	
		)	Art Unit
Serial No.:	**15/600,118**	)	**3761**
Filed:	**May 19, 2017**	)	Primary Examiner
		)	**Hung D. Nguyen**
Conf. No.:	**4190**	)	
Title:	**Multiple Link Appliance With Auxiliary Outlet**	)	

Mail Stop Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Amendment Pursuant to 37 CFR § 1.312

Sir:

Applicant hereby requests to amend the Application after mailing of the Notice of Allowance pursuant to 37 CFR § 1.312.

Amendments to the Claims begin on Page 2.

Remarks begin on Page14.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

7733 7590 07/23/2019
WALKER & JOCKE
231 SOUTH BROADWAY STREET
MEDINA, OH 44256

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/600,118	05/19/2017	Gregory Allan Thomas Hall	INT-1001 CIP 2 C	4190

TITLE OF INVENTION: MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	10/23/2019

EXAMINER	ART UNIT	CLASS-SUBCLASS
NGUYEN, HUNG D	3761	219-679000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 RALPH E. JOCKE
2 WALKER & JOCKE
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: INTIRION CORPORATION

(B) RESIDENCE: (CITY and STATE OR COUNTRY): WALPOLE, MA

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

☒ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date 10/17/2019

Typed or printed name RALPH JOCKE Registration No. 31,029

PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Petitioner Ex 1003, Page 204 of 210

Electronic Patent Application Fee Transmittal

Application Number:	15600118
Filing Date:	19-May-2017
Title of Invention:	MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET
First Named Inventor/Applicant Name:	Gregory Allan Thomas Hall
Filer:	Ralph E. Jocke/Allison McDermott
Attorney Docket Number:	INT-1001 CIP 2 C

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	2501	1	500	500

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**500**

Electronic Acknowledgement Receipt

EFS ID:	37488554
Application Number:	15600118
International Application Number:	
Confirmation Number:	4190
Title of Invention:	MULTIPLE LINKED APPLIANCE WITH AUXILIARY OUTLET
First Named Inventor/Applicant Name:	Gregory Allan Thomas Hall
Customer Number:	7733
Filer:	Ralph E. Jocke/Allison McDermott
Filer Authorized By:	Ralph E. Jocke
Attorney Docket Number:	INT-1001 CIP 2 C
Receipt Date:	18-OCT-2019
Filing Date:	19-MAY-2017
Time Stamp:	11:31:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$500
RAM confirmation Number	E20190HB32550007
Deposit Account	100637
Authorized User	Allison McDermott

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.19 (Document supply fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Issue_Fee_Transmittal.pdf	80830 fa62eb371206968c711210d72d14b9093e1a87e1	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30488 890d158915a14dfc55f3fc460cd5adb6a26ec1fe	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	111318		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/600,118	12/03/2019	10495374	INT-1001 CIP 2 C	4190

7733 7590 11/13/2019

WALKER & JOCKE
231 SOUTH BROADWAY STREET
MEDINA, OH 44256

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 335 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Intirion Corporation, Walpole, MA;
Gregory Allan Thomas Hall, Guelph, CANADA;
Philip Emma, Topsfield, MA;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

AO 120 (Rev. 08/10)

TO:	Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Western District of Texas - Waco Division on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
6:22-cv-00459		Western District of Texas - Waco Division

PLAINTIFF	DEFENDANT
Intirion Corporation	College Products, Inc.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	11,274,876	3/15/2022	Intirion Corporation
2	10,495,374	12/3/2019	Intirion Corporation
3	9,791,206	10/17/2017	Intirion Corporation
4	9,657,974	5/23/2017	Intirion Corporation
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director **Copy 3—Upon termination of action, mail this copy to Director**
Copy 2—Upon filing document adding patent(s), mail this copy to Director **Copy 4—Case file copy**