APPLICATION FOR A PATENT (CONVENTION OR NON CONVENTION)

We, SANYO ELECTRIC CO., LTD., of 18, 2-chome, Morigushi-shi, Osaka-fu, Japan, and TOTTORI SANYO ELECTRIC CO., LTD., of 14, Yoshikata, Tottori-shi, Japan,

hereby apply for the grant of a Patent for an invention entitled

"HIGH FREQUENCY-GAS COMBINED COOKING APPARATUS"

which is described in the accompanying complete specification.

The application is a Convention application and is based on the application(s) for patent or similar protection made in Japan


in Japan

The address for service is care of DAVIES & COLLISON, Patent Attorneys, of Little Collins Street, Melbourne, in the State of Victoria, Commonwealth of Australia.

Dated this 17th day of July, 1979

K. W. Rimington

(a member of the firm of DAVIES & COLLISON for and on behalf of the Applicant)

To: THE COMMISSIONER OF PATENTS
Davies & Collison, Melbourne and Canberra.
DECLARATION IN SUPPORT OF CONVENTION OR NON-CONVENTION APPLICATION FOR A PATENT OR PATENT OF ADDITION

49142179

(The declaration shall be made by the applicant, or, if the applicant is a body corporate, by a person authorized by the body corporate to make the declaration on its behalf.)

In support of the Application made for a patent, for an invention entitled

HIGH FREQUENCY-GAS COMBINED COOKING APPARATUS

We HIDEO OZU and SHINICHI NISHIURA, of
18, 2-chome, Keihan-hondori, Morishashi-shi, Osaka-fu, Japan and 14, Yoshikata, Tottori-shi, Japan, respectively

do solemnly and sincerely declare as follows:

1. (a) We are the applicant(s) for the patent
or (b) We are authorized by Sanyo Electric Co., Ltd. and Tottori Sanyo Electric Co., Ltd., respectively

the applicant(s) for the patent to make this declaration on their behalf.

2. (a) We are the actual inventor(s) of the invention
or (b) See Over

We are the actual inventor(s) of the invention and the facts upon which the applicant(s) are entitled to make the application are as follows:

Contract between the applicants and inventors dated on July 9, 1979, whereby the applicants are the assignees of the said actual inventors.

(Paragraphs 3 and 4 apply only to Convention applications).

3. The basic application as defined by Section 141 of the Act was made in Japan on July 31, 1978
by Sanyo Electric Co., Ltd. and Tottori Sanyo Electric Co., Ltd.

4. The basic application referred to in paragraph 3 of this Declaration was the first application made in a Convention country in respect of the invention the subject of the application.

Declared at Osaka this 9 day of July, 1979

Sanyo Electric Co., Ltd. Tottori Sanyo Electric Co., Ltd.

HIDEO OZU, the Managing Director SHINICHI NISHIURA
and manager of the managing director patent department
Claim 1. A high frequency-gas combined cooking apparatus comprising;

- an outer case having an openable lid plate for closing an opening formed in one side thereof;
- a cooking chamber formed within said outer case,
- an openable door for closing the front opening of said cooking chamber in a heat-tight and electric wave-tight manner,
- a high frequency oscillator for supplying high frequency electric waves to said cooking chamber,
- a gas combustion chamber formed under said cooking chamber and provided with gas burners for supplying gas combustion heat to said cooking chamber,
- a housing chamber defined by said outer case and the side walls of said gas combustion chamber and of said cooking chamber, and adapted to be communicated with the outside of said outer case by the removal of said lid plate, and
- an operation panel disposed on the front surface of said outer case at the front side of said housing chamber,
characterized in that a plurality of housing spaces are formed in said housing chamber, and one of said plurality of housing spaces is formed at the lower portion of said housing chamber at the position corresponding to said gas combustion chamber, whereby a gas supply unit mainly comprising a gas cock, gas supply electromagnetic valves and gas nozzles facing to said gas burners is disposed in said lower housing space, and an electric unit including electric control means and a high voltage transformer for the high frequency oscillator is disposed in one of other housing spaces of said plurality of housing spaces.
Application Number: 4914279
Lodged:

Complete Specification Lodged:
Accepted:
Published:

Priority:

Related Art:

Name of Applicant: SANYO ELECTRIC CO., LTD. and TOTTORI SANYO ELECTRIC CO., LTD.

Address of Applicant: 18,2-chome, Keihan-hondori, Morigushi-shi, Osaka-fu, Japan and 14, Yoshikata, Tottori-shi, Japan, respectively

Actual Inventor(s): TORASHIRO UEDA, YOSHIHITO TAGA, KAZUMI HORIKE, NORIO MORIMOTO, TGUOAKI HATA, RYOJI HATANO and HIROIKI DEGUUCHI

Address for Service: DAVIES & COLLISON, Patent Attorneys, 1 Little Collins Street, Melbourne, 3000

Complete specification for the invention entitled:
"HIGH FREQUENCY-GAS COMBINED COOKING APPARATUS"

The following statement is a full description of this invention, including the best method of performing it known to us:-

- 1 -
Background of the Invention

There has conventionally been known a cooking apparatus in which high frequency electric waves and heat produced by an electric heater are supplied to the cooking chamber. In such a cooking apparatus, however, a small-capacity electric heater may
only be used because the allowable electric power is small. The heat produced by such electric heater is therefore useful only in putting a scorching mark onto food to be cooked, and is not sufficient to roast the food.

There has therefore been proposed a high frequency-gas combined cooking apparatus in which gas combustion heat having a large capacity of calory and high frequency electric waves are supplied to the cooking chamber. Such combined cooking apparatus may perform cooking very efficiently and quickly by supplying to the cooking chamber gas combustion heat and high frequency electric waves either separately or at the same time.

On the other hand, in such a high frequency-gas combined cooking apparatus, gas and electricity as sources of cooking power should be converted into gas combustion heat and high frequency electric waves, respectively, and such converted gas combustion heat and high frequency electric waves should be supplied to the cooking chamber in a good timing according to the kind of cooking or preference of the user. The control device of such a cooking apparatus therefore becomes complicated and requires many component parts, so that the replacement and adjustment of such component parts become complicated.

Furthermore, it is desired in such a cooking apparatus to put together all operational parts in one place, and in such a case it is also desired to put together all related control means in one place. However, when all related control means are put together in one place, the control device inevitably becomes more complicated, resulting in an arrangement that the component parts for supplying gas combustion heat and the component parts for supplying high frequency electric waves are mixingly disposed. Such arrangement then provokes a great difficulty in the replacement
and adjustment of respective parts, because the gas technics are different from the electric technics in the technological field and therefore gas supply parts are replaced and adjusted by a gas engineer and electric parts are replaced and adjusted by an electric engineer.

**Objects of the Invention**

It is an object of the present invention to provide a high frequency-gas combined cooking apparatus in which the gas supply unit mainly comprising a gas cock, gas supply electromagnetic valves and gas nozzles is disposed distinctly separately from the electric unit including electric control means and a high voltage transformer for the high frequency oscillator.

It is another object of the present invention to provide a high frequency-gas combined cooking apparatus in which an opening is formed in one side of the outer case, and an openable lid plate is disposed for closing this opening, and various component parts are housed in the housing chamber adapted to be communicated with the outside of the outer case by the removal of said lid plate, thereby to facilitate the replacement and adjustment operation of such component parts.

It is a further object of the present invention to provide a high frequency-gas combined cooking apparatus in which the gas nozzles and the gas burners may be mounted and removed in an easier way.

**Brief Description of the Drawings**

The present invention will be further described by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of a high frequency-gas combined cooking apparatus according to the present invention, with the lid plate removed therefrom;

Fig. 2 is a vertical section view of the cooking apparatus
in Fig. 1;

Fig. 3 is a horizontal section view of main portions of the gas supply unit.

Fig. 4 is a perspective view of gas nozzles and gas burners removed from the outer case, and

Fig. 5 is a perspective view of the gas nozzles and the gas burners removed from each other.

**Detailed Description of the Preferred Embodiments**

In the drawings showing an embodiment of a high frequency-gas combined cooking apparatus according to the present invention, an outer case 1 is provided in the lateral side thereof with an opening 2, which is closed by a removable or openable lid plate 3. This lid plate 3 is removably attached to the outer case 1 by screws or pivoted to the outer case 1 by hinge means. A cooking chamber 4 is formed within the outer case 1. An openable door 5 is disposed for closing the front opening of the cooking chamber 4 in a heat-tight and electric wave-tight manner.

A gas combustion chamber 6 is formed under the cooking chamber 4 in the outer case 1 and is provided with gas burners for supplying gas combustion heat to the cooking chamber 4. A housing chamber 7 is defined by the outer case 1 and the side walls of the gas combustion chamber 6 and of the cooking chamber 4. This housing chamber 7 will be communicated with the outside of the outer case 1 by removing the lid plate 3.

An operation panel 8 is disposed on the front surface of the outer case 1 at the front side of the housing chamber 7. Disposed on this operation panel 8 are a cooking temperature setting thermostat 9, a gas combustion heating timer 10, a high frequency heating timer 11, a select switch 12, a start button 13 and a cooking chamber illumination lamp switch 14. A gas cock lever 15 is disposed at the lower portion of the operation panel 8.
A lower housing space 7a is provided in the housing chamber 7 at the position corresponding to the gas combustion chamber 6. Disposed in this lower housing space 7a is a gas supply unit mainly comprising a gas cock 16, gas supply electromagnetic valves 17a and 17b and gas nozzles 18a and 18b.

An upper housing space 7b is provided in the housing chamber 7 at the position corresponding to the cooking chamber 4. Disposed in this upper housing space 7b are a high frequency oscillator 19 for supplying high frequency electric waves to the cooking chamber 4 and a blower motor 20 for cooling the high frequency oscillator 19. Disposed on the support stand 21 are a high voltage transformer 22, a high voltage condenser 23 and an electric control box 24 containing electric control means.

A diaphragm 25 is disposed between the gas combustion chamber 4 and the housing chamber 7, and an opening 26 is formed in the diaphragm 25 at the lower portion thereof.

A gas burner 27 is inserted into the gas combustion chamber 6 from the lower housing space 7a through the opening 26 and comprises an ignition burner 27a and a main burner 27b, the bases of which are fixed to and supported by a support plate 28.

An air control damper of the main burner 27b is generally designated by 29. A fixing plate 30 having a L-shape section is fixed to the bottom plate of the housing chamber 7. The support plate 28 is removably attached to this fixing plate 30 by screws 31.

The ignition nozzle 18a of the ignition burner 27a and the main nozzle 18b of the main burner 27b are fixedly mounted to a mounting plate 32.

Turned pieces 33 projecting forwardly from the support plate 28 are formed integrally with the support plate 28 at both lateral sides thereof. By screws 35, the mounting plate 32
is removably attached to the support pieces 34 formed as the front surfaces of the turned pieces 33. With the mounting plate 32 attached to the support plate 28, the ignition nozzle 18a and the main nozzle 18b face to the ignition burner 27a and the main burner 27b, respectively.

The ignition nozzle 18a and the main nozzle 18b are formed at one ends of gas supply pipes 36a and 36b, respectively, in a unitary construction therewith, and these gas supply pipes 36a and 36b are integrally fixed to the mounting plate 32. Joint means 37a and 37b are formed at the other ends of the gas supply pipes 36a and 36b, respectively. These joint means 37a and 37b are removably attached to the cocks of the gas supply electromagnetic valves 17a and 17b, respectively, by screws 38.

A gas combustion heat supply chamber 39 is formed with the rear side of the cooking chamber 4 centrally concaved. This supply chamber 39 is communicated with the gas combustion chamber 6, thereby to supply gas combustion heat to the cooking chamber 4 through this supply chamber 39.

A circulator fan 40 is rotatably disposed in the supply chamber 39 and is driven by a motor 41 disposed outside the supply chamber 39. Gas combustion heat in the gas combustion chamber 6 is agitated and supplied to the cooking chamber 4 by the rotation of the fan 40.

An exhaust pipe 42 is disposed at the upper portion of the supply chamber 39 and is communicated with exhaust ports 43 formed in the top surface of the outer case 1.

Above the cooking chamber 4, a high frequency irradiation chamber 44 is formed as partitioned by a heat-resisting electric wave permeable member 45 such as a heat-resisting glass. High frequency electric waves are supplied to this chamber 44 from the
high frequency oscillator 19 through an opening formed in the lateral side of the chamber 44. A stirrer 46 is rotatably disposed in the high frequency irradiation chamber 44.

An impeller 48 is rotatably disposed in a rotating drive chamber 47 disposed above the high frequency irradiation chamber 44 and at the outside of the cooking chamber 4. This impeller 48 is integrally coupled to the stirrer 46 by a coupling shaft 49. Thus, air from a blower motor 20 cools the high frequency oscillator 19 and is then supplied to the rotating drive chamber 47 to rotate the impeller 48 and subsequently the stirrer 46, thereby to stir the high frequency electric waves supplied to the high frequency irradiation chamber 44 from the high frequency oscillator 19.

A smoke collecting chamber 50 is formed between the exhaust pipe 42 and the exhaust ports 43. The cooling air supplied to the rotating drive chamber 47 is discharged to the smoke collecting chamber 50, in which such cooling air is mixed with exhaust gas from the exhaust pipe 42, and then discharged from the exhaust ports 43.

As described hereinbefore, the high frequency-gas combined cooking apparatus according to the present invention comprises the outer case 1 having the openable or removable lid plate 3 for closing the opening 2 formed in one lateral side of the outer case 1, the cooking chamber 4 formed within the outer case 1, the openable door 5 for closing the front opening of the cooking chamber 4 in a heat-tight and electric wave-tight manner, the high frequency oscillator 19 for supplying high frequency electric waves to the cooking chamber 4, the gas combustion chamber 6 formed under the cooking chamber 4 and provided with the gas burners 27a and 27b for supplying gas combustion heat.
to the cooking chamber 4, the housing chamber 7 defined by the outer case 1 and the side walls 25 of the cooking chamber 4 and of the gas combustion chamber 6, and adapted to be communicated with the outside of the outer case 1 by removing the lid plate 3, and the operation panel 8 disposed on the front surface of the outer case 1 at the front side of the housing chamber 7. The gas supply unit mainly comprising the gas cock 16, the gas supply electromagnetic valves 17a and 17b and the gas nozzles 18a and 18b facing to the gas burners 27a and 27b, is disposed in the lower housing space 7a in the housing chamber 7 at the position corresponding to the gas combustion chamber 6, and the electric unit including the electric control means and the high voltage transformer 22 for the high frequency oscillator are disposed in the upper housing space 7b in the housing chamber 7 at the position corresponding to the cooking chamber 4. Accordingly, the removal of the lid plate 3 alone permits the housing chamber 7 to be communicated with the outside of the outer case 1, thereby to facilitate the handling of the various component parts disposed in the housing chamber 7.

Furthermore, the gas supply unit and the electric unit are disposed generally separately in the lower space and the upper space in the housing chamber, respectively, so that a gas engineer may perform a replacement or adjustment operation on the gas component parts without taking the electric component parts into special consideration, and an electric engineer may perform a replacement or adjustment operation on the electric component parts without taking the gas component parts into special consideration, and such replacement and adjustment may therefore be performed very easily.

It is further noted that according to the present invention,
the gas nozzles 18a and 18b and the gas burners 27a and 27b necessary to be replaced and adjusted relatively often are removably disposed in the housing chamber 7 to be communicated with the outside of the outer case 1 merely by removing the lid plate 3, thereby to facilitate such replacement and adjustment operation.

Moreover, since the gas nozzles 18a and 18b are formed integrally with the joint means 37 and 37b for the gas supply electromagnetic valves 17a and 17b disposed in the housing chamber 7, these gas nozzles 18a and 18b may be removed with the operation of the screws 38 and 35 alone.

The gas burners 27a and 27b may be handled in an easier way because the gas burners 27a and 27b are inserted into the gas combustion chamber 6 through the opening 26 in the diaphragm 25 between the gas combustion chamber 6 and the housing chamber 7, and the bases of these gas burners 27a and 27b are removably disposed in the housing chamber 7.

It is also to be noted that the gas burners 27a and 27b together with the gas nozzles 18a and 18b may be removed by the operation of the screws 31 and 38 alone, since the gas nozzles 18a and 18b are removably attached to the gas burners 27a and 27b.

It is a matter of course that the housing spaces formed in the housing chamber 7 are not limited to two housing spaces vertically partitioned from each other, but may separately be formed so as to house the gas supply unit and the electric unit respectively in a manner generally separated from each other.
The claims defining the invention are as follows:

1. A high frequency-gas combined cooking apparatus comprising:
   - an outer case having an openable lid plate for closing an opening formed in one side thereof,
   - a cooking chamber formed within said outer case,
   - an openable door for closing the front opening of said cooking chamber in a heat-tight and electric wave-tight manner,
   - a high frequency oscillator for supplying high frequency electric waves to said cooking chamber,
   - a gas combustion chamber formed under said cooking chamber and provided with gas burners for supplying gas combustion heat to said cooking chamber,
   - a housing chamber defined by said outer case and the side walls of said gas combustion chamber and of said cooking chamber, and adapted to be communicated with the outside of said outer case by the removal of said lid plate, and
   - an operation panel disposed on the front surface of said outer case at the front side of said housing chamber,
   - characterized in that a plurality of housing spaces are formed in said housing chamber, and one of said plurality of housing spaces is formed at the lower portion of said housing chamber at the position corresponding to said gas combustion chamber, whereby a gas supply unit mainly comprising a gas cock, gas supply electromagnetic valves and gas nozzles facing to said gas burners is disposed in said lower housing space, and an electric unit including electric control means and a high voltage transformer for the high frequency oscillator is disposed in one of other housing spaces of said plurality of housing spaces.
2. A high frequency-gas combined cooking apparatus as set forth in Claim 1, wherein said gas nozzles are removably disposed in said housing chamber.

3. A high frequency-gas combined cooking apparatus as set forth in Claim 1, wherein said gas burners are removably disposed in said housing chamber.

4. A high frequency-gas combined cooking apparatus as set forth in Claim 2, wherein joint means for said gas supply electromagnetic valves disposed in said housing chamber are formed integrally with said gas nozzles, and said joint means are removably attached to said electromagnetic valves and said gas nozzles are removably disposed in said housing chamber.

5. A high frequency-gas combined cooking apparatus as set forth in Claim 3, wherein said gas burners are inserted into said gas combustion chamber through an opening in a diaphragm between said gas combustion chamber and said housing chamber, and the bases of said gas burners are removably disposed in said housing chamber.

6. A high frequency-gas combined cooking apparatus as set forth in Claim 3, wherein said gas nozzles are removably attached to said gas burners.

7. The steps or features disclosed herein or any combination thereof.

Dated this 18th day of July, 1979
SANYO ELECTRIC CO., LTD. and TOTTORI SANYO ELECTRIC CO., LTD.
by their Patent Attorneys
DAVIES & COLLISON.
DRAWINGS
Fig. 2 is a vertical section view of the cooking apparatus.
apparatus
frequency heating timer 11, a select switch 12, a select
and a cooking chamber illumination lamp switch 14. A gas cock
lever 15 is disposed at the lower portion of the operation panel 8.
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