

[54] **HOT AIR COOKING OVEN**

[75] Inventors: **Kazumi Tamada**, Niwa-gun;
Tadayoshi Takase, Nishikamo-gun,
both of Japan

[73] Assignee: **Rinnai Kabushiki Kaisha**, Nogoya-
shi, Japan

[22] Filed: **Dec. 13, 1971**

[21] Appl. No.: **207,171**

[52] U.S. Cl. **126/21 A**

[51] Int. Cl. **F24c 15/16, F24c 15/32**

[58] Field of Search **126/21, 21 A, 273, 273 A;
263/19 A**

[56] **References Cited**

UNITED STATES PATENTS

3,463,138	8/1969	Lutter et al.	126/21 A
3,605,717	9/1971	Sauer	126/21 A

3,658,047 4/1972 Happel 126/21 A

Primary Examiner—Edward G. Favors
Attorney—Eric H. Waters et al.

[57] **ABSTRACT**

A hot air oven comprises a heating chamber with a partition plate at the rear thereof defining a blower chamber therebehind in which is mounted a blower, the partition plate having an opening facing the blower. A combustion chamber is below the heating chamber and mounts a burner which produces heated air which flows through a hot air duct to the heating chamber at a location proximate the opening in the partition plate so that the hot air is drawn into the blower chamber. The hot air is then forced by the blower through side openings in the blower chamber into the heating chamber. The blower chamber also has an exhaust opening for discharge of exhaust gas to the outside.

10 Claims, 3 Drawing Figures

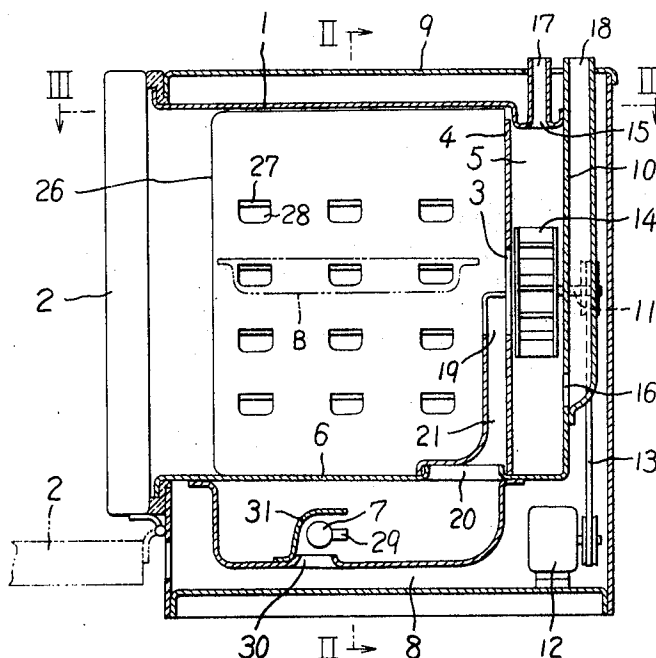


FIG. 1

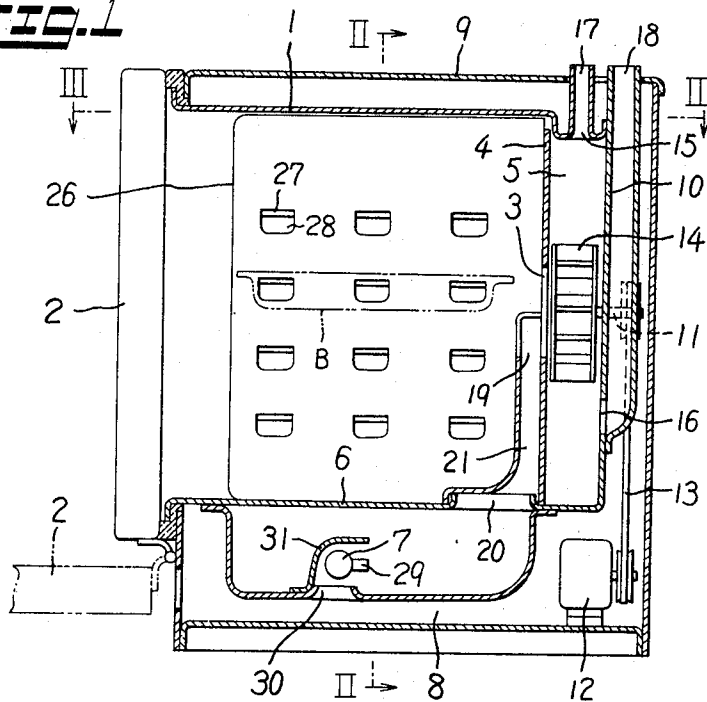
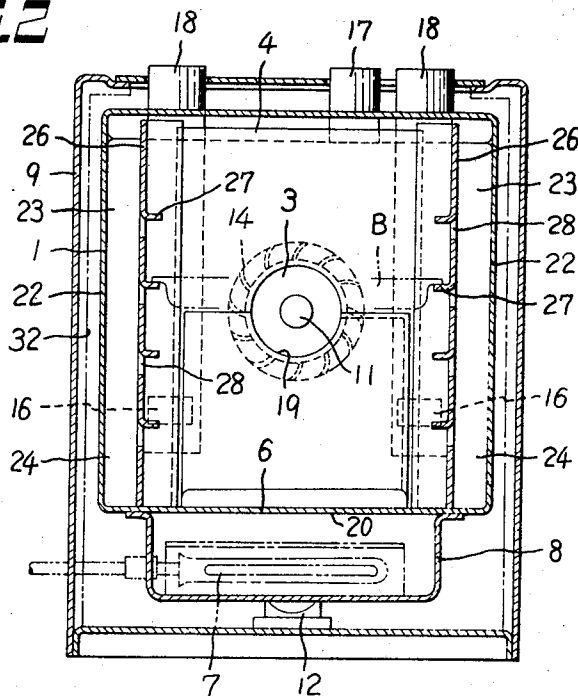


FIG. 2



INVENTOR
Kazumi Tamada
BY Tadatoshi Takase

HOT AIR COOKING OVEN

BRIEF SUMMARY OF THE INVENTION

This invention relates to a hot air type cooking device in which hot air is forcibly circulated in a heating chamber by the action of a blower so that the hot air is blown against the foodstuff to be cooked.

An object of the invention is to provide such a cooking device wherein the air heated by a burner within a combustion chamber below the heating chamber is intensively introduced into the heating chamber so that a complete combustion can be effected, the heat efficiency can be improved and the surrounding portion of the combustion chamber can be prevented from becoming overheated and thus the device can be compact.

According to this invention, a blower chamber is formed at the rear portion of the heating chamber by a partition plate having in its central portion a suction opening, a blower is mounted within the blower chamber so as to be adjacent the suction opening, and a burner is mounted within a combustion chamber formed below the heating chamber, the flame openings of the burner being directed towards a hot air duct connected to the heating chamber, so that all of the air heated by the burner is drawn to the blower through the hot air duct and the suction opening. The blower chamber is provided on its right and left sides with air conducting openings for conducting the hot air expelled by the blower into the heating chamber and also with exhaust openings for discharging exhaust gas to the exterior, the combustion chamber being provided with an air supply opening.

In further accordance with the invention, a supply air guide plate is mounted in the combustion chamber and extends upwardly at the air supply opening and is curved to overlie the burner and cover the burner from above to direct the flow of heated air to the hot air

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a sectional side view of one embodiment according to this invention,

FIG. 2 is a sectional view taken along the line II — II in FIG. 1; and

FIG. 3 is a sectional view taken along the line III — III in FIG. 1.

DETAILED DESCRIPTION

Numerical 1 denotes a heating chamber whose front surface is open and provided with a door 2 through which foodstuff can be introduced and removed from the heating chamber. A partition plate 4 is mounted at the rear of the chamber 1 and is provided at its center portion with a suction opening 3. A blower chamber 5 is formed behind plate 4, and a combustion chamber 8 containing a burner 7 is formed below a bottom plate 6 of the heating chamber 1. The chambers are encased in an outer casing 9.

A blower 14 is mounted within the blower chamber 5 and faces the suction opening 3. The blower is driven by an electric motor 12 through a belt 13. A rotating shaft 11 of motor 12 extends substantially at right angles through a rear plate 10 of the blower chamber 5. The blower chamber 5 is provided at its top with a main

exhaust opening 15 and at positions radially outwards of the periphery of the blower 14 with subsidiary exhaust openings 16. The openings 15 and 16 are provided with respective exhaust pipes 17, 18 extending outside the casing 9. Mounted in the heating chamber is a hot air duct 21, which has a curved opening 19 at its upper end coinciding with the lower edge of the opening 3, and an opening 20 at its lower end for introduction into duct 21 the hot air produced in the combustion chamber 8. Air conducting passages 23 are formed between the opposite side edges of the partition plate 4 and side walls 22 of the heating chamber 1.

Inside plates 26 are mounted in chamber 1 parallel with the side walls 22 to form hot air passages 24 therebetween, and the rear ends 25 of the plates 26, are curved inwards so as to join with the opposite side edges of the partition plate 4. Thus, right and left hot air paths are formed extending from the blower chamber 5 to the front of the heating chamber 1 as shown by arrows A.

The inside plates 26, are provided with receiving tabs 27 for supporting a cooking pan B as shown in chain lines. At least one vertical line of receiving tabs 27 is formed on each plate 26. In the illustrated embodiment three lines of tabs are provided, each line having four tabs. The tabs 27 are formed by cutting the plates to form the tabs and bending the tabs from the plate. Ventilation holes 28 are produced in plate 26 when the tabs are bent therefrom and holes 28 enable the hot air traveling along the path A to branch into the heating chamber 1. This distributed branching of the hot air into the heating chamber 1 is effective for uniform heating of the foodstuff.

The burner 7 has rearwardly directed flame openings 29 facing towards the opening 20 of the hot air duct 21 connected to the heating chamber 1. An air supply opening 30 is provided under burner 7 for introducing exterior air for combustion to the burner 7. A curved guide plate 31 is mounted at the front edge of the opening 30 and extends above the burner 7, and the plate 31 serves to direct the flow of heated air to opening 20 and duct 21. A heat insulating member 32 is mounted at any desired location between the heating chamber 1 and the outer casing 9.

When the blower 14 is operated and combustion is effected at the burner 7, the air necessary for the combustion is supplied to the burner 7 by entering the air supply opening 30 from the exterior of the combustion chamber 8 and the air flows in the direction of the flames from the flame openings 29 after being deflected by the guide plate 31. The air then flows to the opening 19 after passing through the air duct 21 from the opening 20. The hot air is drawn, together with the air within the heating chamber 1, to the rotating blower 14 through the opening 3 in the partition plate 4 and the air is then diffused, while rotating, in the blower chamber 5 and the air thereafter enters the heating chamber 1 at the front thereof after traveling along path A, that is, through the air conducting openings 23 and the hot air passages 24. Thus, the hot air is forced into the heating chamber and is then again drawn through the opening 3 into the blower chamber 5, and in this case, the hot air is drawn together with fresh hot air supplied through the hot air duct 21. This operation is successively repeated. During this opera-

tion, some circulating hot air is discharged from the main exhaust opening 15 in an amount corresponding to the amount of the fresh hot air supplied through the hot air duct 21. The opening 15 is of such size that the discharge can be effected moderately in accordance with the amount of air circulated by the blower 14. Under ordinary operating conditions, the discharge is effected only through the main exhaust opening 15 because in this case the subsidiary exhaust openings 16 are closed at their open ends by an air curtain formed by the hot air flowing along the surface of the rear surface plate 10. If the blower 14 should become stopped, due to a breakdown or the like, the air curtain disappears and accordingly the subsidiary exhaust openings 16 are now open for an exhaust operation. Then, the device operates as a natural convection type oven.

The device of the invention is of the type in which hot air is forcibly blown against the foodstuff, so that not only is a uniform heating effected but also any thin insulating layer formed around the foodstuff is broken to shorten the cooking time. Additionally as compared with a conventional indirect-heating oven, since the water content in the combustion gases fills the heating chamber, this serves to increase the heat conduction to the foodstuff and prevents the foodstuff from drying.

Additionally, in the device of the invention, the air supplied from the exterior through the air supply opening 30 flows around the burner 7 itself and forms a laminar flow in the direction of the hot air duct 21 while mixed with the hot air, so that the hot air is diffused and thereby excessive heating of the bottom plate 6 of the heating chamber 1 can be prevented and uneven heat distribution in the heating chamber 1 can be eliminated. Additionally, the hot air is intensively introduced in the heating chamber 1 to lead to a complete combustion and improve the heat efficiency. Accordingly, the combustion chamber 8 can be safely provided just below the heating chamber 1, and the device can be made compact. Moreover, the combustion chamber 1 does not require a complicated means for heat insulation and the oven can be simplified.

What is claimed is:

1. A hot air oven comprising a heating chamber, a partition plate at the rear of the heating chamber defining a blower chamber therebehind, said partition plate having a suction opening therein, a blower mounted in the blower chamber adjacent said suction opening, a

combustion chamber below the heating chamber, a burner in said combustion chamber having flame openings, said combustion chamber being provided with an air supply opening, a hot air duct connecting the combustion chamber and the heating chamber and enabling the air heated by the burner to be drawn through the hot air duct to the blower, said blower chamber being provided with left and right air conducting openings for conducting hot air expelled by the blower into the heating chamber, said blower chamber also having an exhaust opening for discharging exhaust gas to the exterior.

2. An oven as claimed in claim 1 wherein said air supply opening in the combustion chamber is directly below the burner.

3. An oven as claimed in claim 1 wherein said flame openings of the burner face towards the hot air duct.

4. An oven as claimed in claim 1 wherein said suction opening is circular and said hot air duct has an upper curved opening which is in correspondence with the lower portion of the suction opening.

5. An oven as claimed in claim 1 comprising a curved guide plate in said combustion chamber extending upwardly and over the burner in the direction of the flame openings to guide the flow of hot air to said hot air duct.

6. An oven as claimed in claim 5 wherein said guide plate is mounted in said combustion chamber at the side of the air supply opening remote from the flame openings.

7. An oven as claimed in claim 1 wherein said exhaust opening in the blower chamber is at the top of said blower chamber and constitutes a main exhaust opening, said blower chamber having at least one subsidiary exhaust opening located radially outwards of the periphery of the blower.

8. An oven as claimed in claim 1 wherein said heating chamber has side walls and inner plates disposed parallel to said side walls defining passages for the flow of hot air from the blower chamber to the heating chamber.

9. An oven as claimed in claim 8 wherein each of said inner plates has at least one vertical row of tabs for support of a cooking pan in the heating chamber.

10. An oven as claimed in claim 9 wherein said tabs are bent inwardly from said inner plates to provide apertures for branched flow of hot air into the heating chamber.

* * * * *

50

55

60

65