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(71) Applicant

De Dietrich S.A.

(Incorporated in France)

67110 - Niederbronn-les-bains, France

(72) Inventors

Jean-Pierre Bec

Jean-Charles Reymann

(74) Agent and/or Address for Service

Withers & Rogers

4 Dyer's Buildings, Holborn, London, EC1N 2JT,
United Kingdom

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US 4327274 A

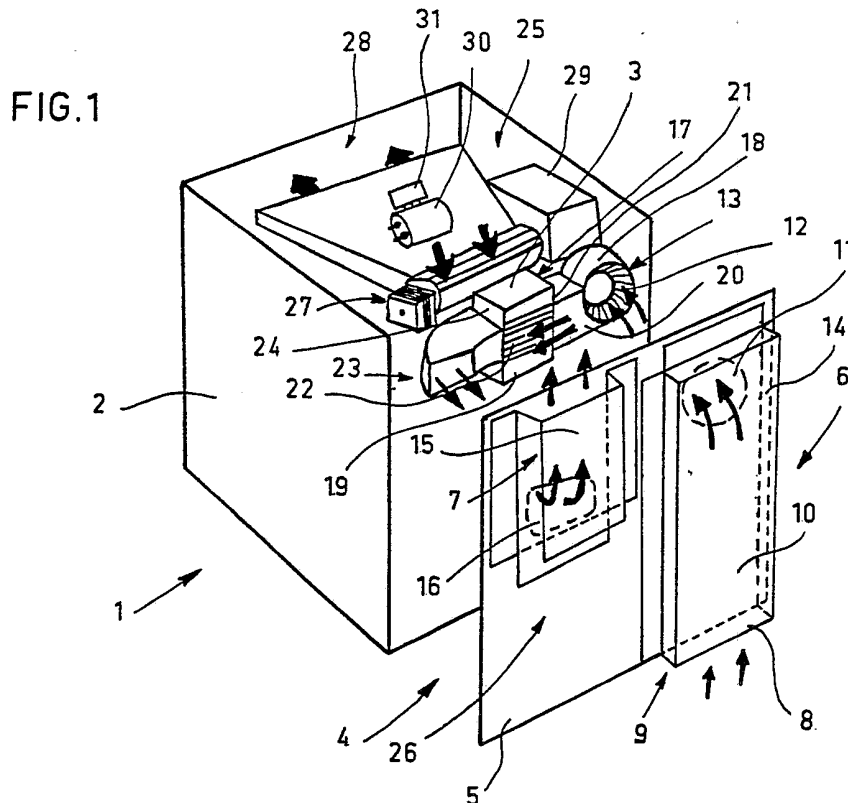
(58) Field of search

UK CL (Edition J) H5H HMB HMF HMV

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(54) **Magnetron cooling circuit for combined microwave and resistive oven**

(57) Magnetron 3 is cooled by an air flow circuit 26 that is entirely separate from the over cooling circuit 25. A rear casing 5 is divided into inlet and outlet sections 6, 7. Air entering the bottom 9 of inlet section 6 passes via opening 11 to fan 13, magnetron 3 and curved duct 23 to outlet section 7.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1982.

FIG.1

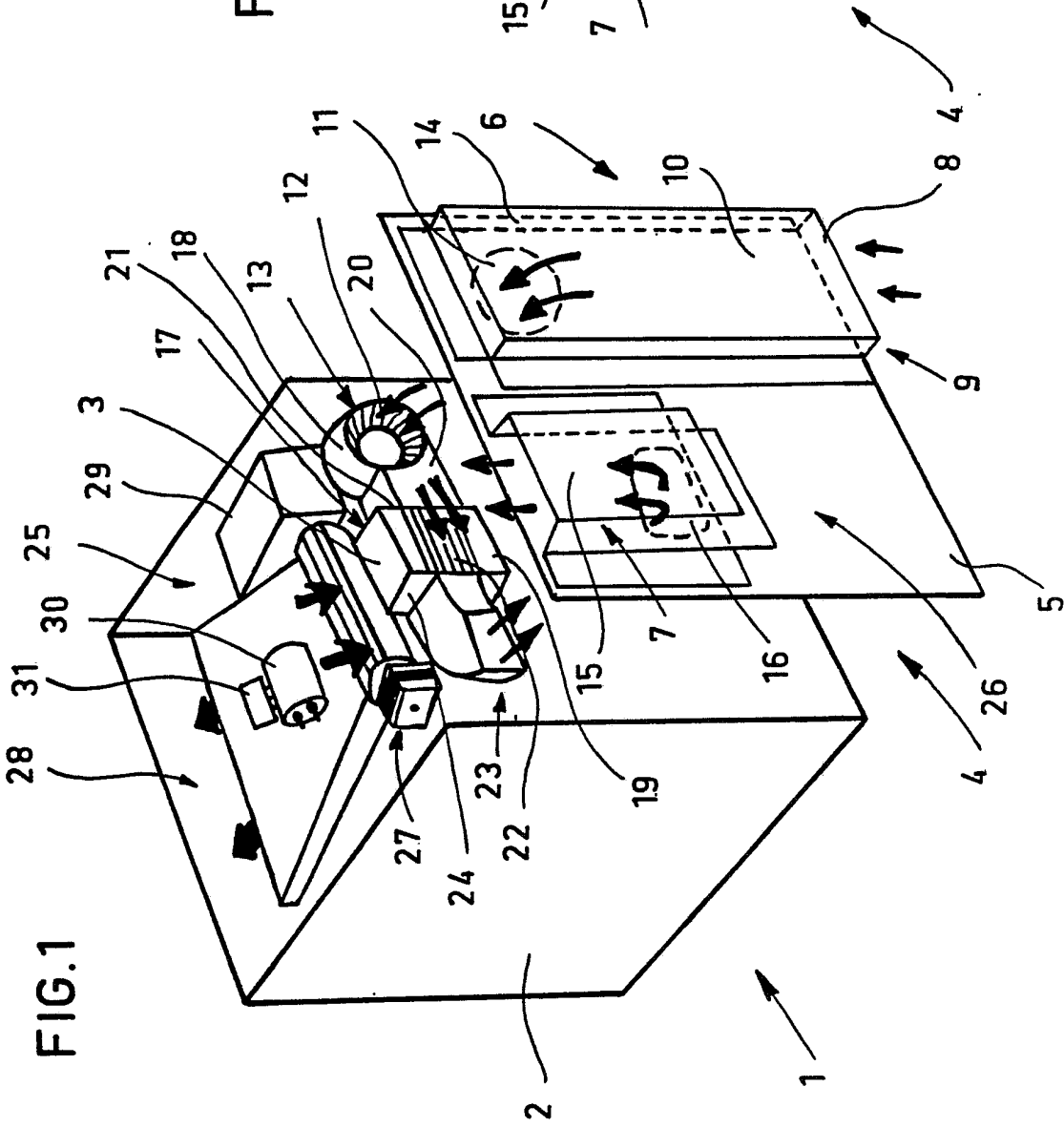
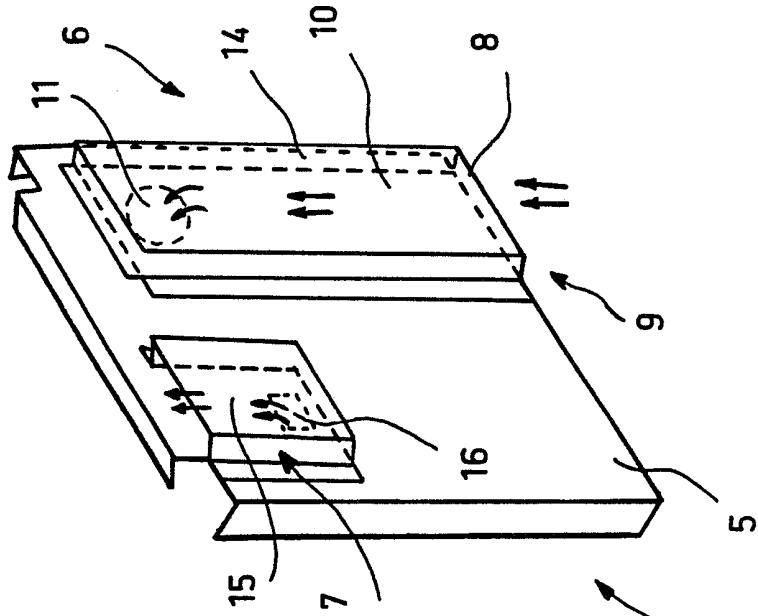


FIG.2



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Additional cooling circuit for combined domestic electric oven

The present invention relates to an additional forced air circuit for cooling the UHF generator unit and for supplying this circuit in combined domestic electric ovens, whereby a conventional heating resistance oven and a microwave oven are placed alongside each other in the same space.

Because of the poor output of the UHF generator with respect to the useful UHF power output for cooking, a not inconsiderable thermal energy is dissipated by the UHF generator unit and its supply circuit.

To prevent the overheating of the UHF generator and its supply transformer in the restricted environment inside the body of the oven, it is desirable to provide effective cooling for the complete equipment during its operation.

The need to provide such cooling is all the more important as the magnetron and associated high-voltage transformer must be located in the top upper portion of the equipment on constructional grounds.

Various cooling circuits have been proposed for and applied to cooking equipment.

First of all there is a circuit the inlet of which is formed by auxiliary openings at the front on either side of the central evacuation opening.

These openings communicate via two channels with the rear housing containing the magnetron and its transformer together with a separate turbine which is peculiar to this cooling circuit.

The fresh air sucked in from the front is blown by the turbine into the general evacuation circuit for the hot air which opens out at the front. The cooling output of this type of circuit has proved to be poor however because of the loop form of the ventilation path.

Moreover the housewife or more generally the user has to suffer the flow of hot air leaving the front of the equipment at a high rate of flow.

This installation and its connections also involves a further difficulty in connection with its construction.

With the generator unit in the same position, another type of circuit conveys the air to an independent turbine along a vertical chimney formed in the adjacent lateral surface. The air is sucked in by the turbine and injected into the housing peculiar to the UHF unit after which it returns to the main turbine to be evacuated outside the oven by the main turbine and the circuit for expelling the hot air from the enclosed space.

This internal arrangement and configuration reduce the useful space determined by standardised external overall

dimensions.

In addition the main cooling circuit is disturbed by this additional load.

The object of the present invention is to eliminate these various disadvantages.

It is designed to cool the magnetron through the rear of the oven independently of the oven cooling circuit thus creating two independent circuits.

With the total separation of the cooling circuits it is possible to eliminate the reactions of one circuit on another and their mutual disturbance.

To achieve this object, the invention relates to an additional cooling circuit for combined domestic electric ovens combining the conventional and microwave methods of cooking, characterised in that it comprises a ventilation interface placed next to a motor-cooled UHF unit comprising on both sides members and inlet and outlet components for the flow of cooling air coming from and evaluated to the outside by the ventilation interface, the latter being formed by the rear casing wall of the oven.

The additional circuit according to the invention has the following advantages:

- . advantages associated with the complete independence of the cooling circuits
- . ease of construction
- . elimination of the expulsion of air at a high rate of flow to the front
- . this additional cooling increases and improves the cooling of the adjacent parts of the oven located at the rear.

The technical characteristics and other advantages are recorded in the following description prepared by way of example on a non-restrictive basis and covering an embodiment of the invention with reference to the drawings in which:

- . Figure 1 is a simplified perspective view of the oven as seen from the rear showing the cooking circuit according to the invention as a cut away view;

- . Figure 2 is a schematic view in perspective of the rear casing wall.

The inventive concept consists of making the oven cooling circuit and the UHF generator cooling circuit independent.

More particularly, this independence is achieved with a ventilation interface with the outside atmosphere in the form of inlet and expulsion compartments for the air

formed in the rear wall of the oven and by the formation with the UHF generator body of a functional cooling unit, the inlet of which is connected with the inlet compartment and the outlet of the expulsion compartment.

The cooling circuit according to the invention applies more particularly to a domestic electric oven 1 of the combined type, i.e. having in a single heating space 2 conventional cooking resistances and heating terminal members of a microwave oven in particular a waveguide connected to a UHF generator for example a magnetron 3 arranged in the rear upper section.

In accordance with the general inventive concept, a ventilation interface 4 is formed at the rear of the oven 1 with an adapted casing wall 5, comprising two vertical compartments which are for preference placed next to each other for the intake 6 and expulsion 7 of the cooling air. The inlet compartment 6 is provided at its lower part with a transverse opening 8 forming a low inlet 9 for fresh air and at the upper part of its longitudinal wall 10 facing the oven with a communication opening 11. The vertical inlet compartment 6 establishes communication between the low inlet 9 for fresh air and an inlet 12 of a cooling turbine 13 designed to evacuate the heat dissipated into the UHF generator 3.

The inlet compartment 6 and expulsion compartment 7 are produced in a simple manner in the form of covers or

casings 14 and 15 respectively attached to the rear casing wall 5 (Fig. 2). Naturally any other embodiment is possible within the framework of the present invention.

The expulsion compartment 7 is open at the upper section for the evacuation of the air to the outside atmosphere and comprises a lower lateral opening 16 which receives the flow of air to be evacuated.

The turbine 13 together with the UHF generator body forms a compact motor-cooled generator unit 17. In fact the casing 18 of the turbine 13 is connected to the block 19 housing the magnetron 3 via an expulsion duct 20 opening out onto one of its lateral surfaces 21 in such a way as to cool the magnetron 3 with a transverse flow of air along the longitudinal fins 22 with which its body is provided so as to achieve a better dissipation of the heat.

An angle piece 23 fitted to its opposite lateral surface provides the mechanical continuation of the compact unit 17 and for the return of the flow of air towards the rear in the evacuation compartment 7 so as to evacuate it upwards.

The angle piece 23 gives out to the lower lateral opening 16 of the evacuation compartment 7. This forms the terminal ventilation connection with the outside atmosphere on the oven for the evacuation of the flow of

cooling air conveying outside the dissipated heat of the magnetron 3 through its body 24 during its operation.

As shown in Fig . 1, the separation of the two cooling circuits can be seen very clearly, i.e. on the one hand a main circuit 25 peculiar to the oven, as indicated by thick arrows and on the other hand a specialised cooling circuit 26 peculiar to the UHF generator 3 indicated by groups of two arrows in juxtaposition.

The main circuit 25 conventionally comprises an extraction turbine 27 with radial fins which blows the air extracted from the buffer volume between the casing and the oven proper in a flat duct 28 giving out onto the front surface of the oven as indicated by the arrows.

To supply the UHF generator 3, it requires a high-voltage transformer 29, its condenser 30 and a thread-straightening component 31.

These components with a smaller heat dissipation are arranged at the upper part of the oven in the space swept by the fresh air let in by depression through the slit formed under the control panel in accordance with an earlier patent of the applicants, outside the specialised cooling circuit.

It is clearly understood that the invention described above is independent of detail variations and

modifications as well as of additions, omissions and changes which do not involve an inventive step.

CLAIMS

1. Additional cooling circuit for combined domestic electric oven combining in the same apparatus the conventional method of cooking and the microwave method of cooking with the aid of a UHF generator arranged at the upper rear portion of the equipment, characterised in that a complete independence of the cooling circuit (26) peculiar to the UHF generator is achieved in relation to the main cooling circuit (25) by means of a ventilation interface (4) placed alongside a motor-cooled UHF unit (17) comprising a UHF generator unit and on both sides members and inlet and outlet components for the flow of cooling air connected directly to the ventilation interface for the intake and evacuation to the outside of the cooling air by the said interface.
2. Circuit according to claim 1, characterised in that the ventilation interface (4) is formed by the rear casing wall (5).
3. Circuit according to claims 1 and 2, characterised in that the ventilation interface (4) comprises two vertical compartments for the intake (6) and evacuation (7) of the cooling air which ensure a ventilation connection between the outside and the motor-cooled UHF unit (17).

4. Circuit according to claim 3, characterised in that the intake compartment (6) is open in its lower portion to let in the fresh air and is provided at the upper portion of its longitudinal wall (10) facing the oven with an opening (11) for communicating with the inlet of the motor-cooled unit (17).

5. Circuit according to claim 3, characterised in that the evacuation compartment (7) is open at its upper portion and is provided in its wall facing the oven with a lower lateral opening (15) providing for the communication of the ventilation with the inlet of the motor-cooled unit (17).

6. Circuit according to claim 1, characterised in that the motor-cooled UHF unit (17) comprises a turbine (13), the UHF generator unit (19) and an angle piece (23) which provides for the connection of the ventilation to the evacuation compartment and in that the turbine and the angle piece are connected to the UHF unit (19) on each of its lateral walls so as to constitute a compact unit.

7. Circuit according to claim 1, characterised in that the other members of the UHF generator unit, in particular the high-voltage transformer, its condenser and the filter are arranged at the upper part of the oven in the vicinity of the flat duct (28) for evacuating the air onto the front surface.