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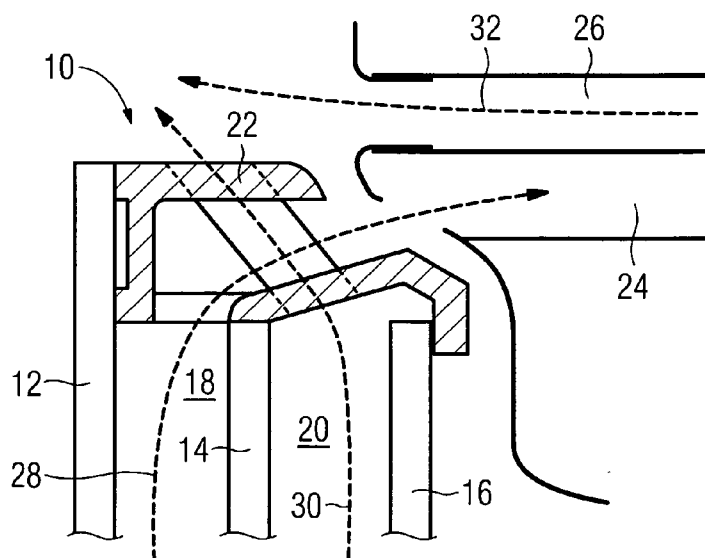
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(54) Title: A VENTED OVEN DOOR FOR A DOMESTIC COOKING OVEN

FIG 2



(57) Abstract: The present invention relates to a vented oven door for a domestic cooking. The oven door (10) comprises at least three glass panels (12, 14, 16). The inner space of the oven door (10) is subdivided into at least two door channels (18, 20) by the at least three glass panels (12, 14, 16). At least one upper opening of at least one outer door channel (18) is connected or connectable to a suction (24) of a cooling channel with air moving means in a closed state of the oven door (10). At least one upper opening of at least one inner door channel (20) is connected or connectable to the ambient on the one hand and an exhaust (26) of the cooling channel on the other hand in the closed state of the oven door (10), so that air from the inner door channel (20) is entrained by the air from the exhaust (26). Further, the present invention relates to a corresponding cooking oven.

DescriptionA vented oven door for a domestic cooking oven

- 5 The present invention relates to a vented oven door for a domestic cooking oven. Further, the present invention relates to a domestic cooking oven with a vented oven door according to the preamble of claim 7.
- 10 The vented oven door of the cooking oven allows low temperatures at the outer side of the oven door, so that there is no danger of being burnt for the user of the cooking oven. The heat transfer from an inner glass panel being in contact with the oven cavity to an outer glass panel being in contact with the ambient
15 is a combination of three different heat transfer modes. There is heat radiation from the surfaces of the inner glass panel, heat convection within the inner space of the oven door and heat conduction within the glasses of the glass panels.
- 20 When a door channel inside the oven door is connected to a cooling channel, then a forced convection cools down the glass panels. The cooling channel sucks cool air from the ambient through the inner space of the oven door. For example, the cooling channel may be arranged on the top wall of the oven cavity and the
25 cool air streams upwards through the inner space of the oven door.
- EP 1 972 855 A1 discloses a cooking oven with an air cooled oven door. The oven door includes an inner and outer door channel.
- 30 The inner door channel is connected to the suction side of air moving means, so that an air flow rises through said inner door channel to a suction duct of the air moving means. Then the air stream is blown out by the air moving means, wherein said air stream passes an upper end of the outer door channel without
35 passing through the outer door channel.

However, the hot surfaces of the glass panel being in direct with the oven cavity are cooled down, so that also the oven cavity is undesirably cooled down. This results in low cooking performances and high energy consumption.

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It is an object of the present invention to provide an improved vented oven door for a domestic cooking oven, which allows an efficient cooling down of the oven door and prevent high energy consumption.

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The object of the present invention is achieved by the vented oven door for a domestic cooking oven according to claim 1.

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The present invention relates to the vented oven door for the domestic cooking oven, wherein:

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- the oven door comprises at least three glass panels,
- the inner space of the oven door is subdivided into at least two door channels by the at least three glass panels,
- at least one upper opening of at least one outer door channel is connected or connectable to a suction of a cooling channel with air moving means in a closed state of the oven door, and
- at least one upper opening of at least one inner door channel is connected or connectable to the ambient on the one hand and an exhaust of the cooling channel on the other hand in the closed state of the oven door, so that air from the inner door channel is entrained by the air from the exhaust.

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The main idea of the present invention is the forced heat convection in the outer door channel of the oven door on the one hand and the entrainment of the air stream from the inner door channel by the air stream from the cooling channel on the other hand. Additionally, the air stream from the inner door channel is driven by the natural heat convection flow due to the temperature gradient. This constellation allows an intensive cooling process in the outer portion of the oven door and prevents

an intensive cooling down of the inner side of oven door, so that energy can be saved.

According to a preferred embodiment of the present invention the oven door comprises a door cap defining at least one upper opening of the outer door channel. In a similar way, the oven door may comprise a door cap defining at least one upper opening of the inner door channel. The door cap is producible by low costs.

Preferably, at least one of the door channels is aligned along a vertical direction. Further, at least one of the door channels may span nearly the complete width of the oven door. This contributes to an efficient cooling down.

For example, the glass panels are arranged plane-parallel. Alternatively, the glass panels may be slanted, so that the cross section of the door channels can vary.

The object of the present invention is further achieved by a domestic cooking oven according to claim 7.

The domestic cooking oven according to the present invention comprises a vented oven door and a cooling channel with air moving means, at least one suction and at least one exhaust, the cooking oven comprises at least one oven door as described above.

Preferably, the cooling channel is arranged on a top wall of an oven cavity.

Novel and inventive features of the present invention are set forth in the appended claims.

The present invention will be described in further detail with reference to the drawings, in which

FIG 1 illustrates a schematic sectional side view of an upper portion of a vented oven door for a domestic oven according to a preferred embodiment of the present invention, and

FIG 2 illustrates the schematic sectional side view of the upper portion of the vented oven door with pictured air-streams according to the preferred embodiment of the present invention.

FIG 1 illustrates a schematic sectional side view of an upper portion of a vented oven door 10 for a domestic oven according to a preferred embodiment of the present invention. In FIG 1 the oven door 10 is a closed state.

The oven door 10 includes an outer glass panel 12, a central glass panel 14 and an inner glass panel 16. In this example, the outer glass panel 12, the central glass panel 14 and the inner glass panel 16 are arranged plane-parallel to each other. An outer door channel 18 is arranged between the outer glass panel 12 and the central glass panel 14. In a similar way, an inner door channel 20 is arranged between the central glass panel 14 and the inner glass panel 16. The outer door channel 18 and the inner door channel 20 are aligned along vertical directions within the oven door 10. Preferably, the outer door channel 18 and the inner door channel 20 span nearly the complete width of the oven door 10.

A door cap 22 is arranged on the upper side of the oven door 10. The structure of the door cap 22 defines the upper openings of the outer door channel 18 and the inner door channel 20. The upper opening of the outer door channel 18 is substantially directed to the inner side of the oven door 10. In contrast, the upper opening of the inner door channel 20 is directed to the outer side of the oven door 10 and to the ambient.

A cooling channel with air moving means is arranged on the top wall of the oven cavity. A suction 24 and an exhaust 26 of the cooling channel are arranged above an opening of the oven cavity. In the closed state of the oven door 10 the suction 24 of the cooling channel is arranged besides the upper end of said oven door 10. Further, the exhaust 26 of the cooling channel is arranged above the upper end of the oven door 10 in the closed state of said oven door 10. Preferably, the suction 24 and the exhaust 26 of the cooling channel span nearly the complete width of the oven door 10.

In the closed state of the oven door 10 the upper opening of the outer door channel 18 is connected to the suction 24 of the cooling channel. This structure results in forced heat convection. Air from the ambient is sucked by the air moving means upwards through the outer door channel 18, so that in particular an outer portion of the oven door is cooled down.

In contrast, the upper opening of the inner door channel 20 is connected to the ambient on the one hand and to the exhaust 26 of the cooling channel on the other in the closed state of the oven door 10. This constellation results in an entrainment of the air from the inner door channel 20 by the air stream from the exhaust 26. Thus, the air from the inner door channel 20 is entrained to the ambient.

The more intensive heat convection occurs in the outer door channel 18 than in the inner door channel 20. This allows an efficient cooling down of the oven door 10 on the one hand and prevents an intensive cooling down of the inner side of the oven door 10.

FIG 2 illustrates the schematic sectional side view of the upper portion of the vented oven door 10 with pictured airstreams 28, 30 and 32 according to the preferred embodiment of the present invention. FIG 2 clarifies the runs of the airstreams 28, 30 and

32 form the oven door 10 and in the cooling channel. FIG 2 shows the same sectional side view of the upper portion of the oven door 10 as in FIG 1.

5 An outer air stream 28 from the outer door channel 18 runs into the suction 24 of the cooling channel. Said outer air stream 28 is driven by the air moving means of the cooling channel, so that forced heat convection occurs in the outer door channel 18.

10 An inner air stream 30 from the inner door channel 20 runs into the ambient, wherein said inner air stream 30 is entrained by a cooling air stream 32 from the exhaust 26. Said cooling air stream 32 is driven by the air moving means of the cooling channel.

15 In this constellation more heat convection occurs in the outer door channel 18 than in the inner door channel 20. This allows the efficient cooling down of the oven door 10 on the one hand and prevents the intensive cooling down of the inner side of
20 oven door 10.

A simplified variation of the present invention would be an oven door without the outer door channel 18. The oven door according to said variation includes only the central glass panel 14, the
25 inner glass panel 16, the inner channel 20 and optionally the door cap 22. The cooling effect will be obtained by the entrainment of the inner air stream 30 and by the natural convection flow in the inner channel 20.

30 Although illustrative embodiments of the present invention have been described herein with reference to the accompanying drawings, it is to be understood that the present invention is not limited to that precise embodiment, and that various other changes and modifications may be affected therein by one skilled
35 in the art without departing from the scope or spirit of the invention. All such changes and modifications are intended to be

included within the scope of the invention as defined by the appended claims.

List of reference numerals

	10	oven door
	12	outer glass panel
5	14	central glass panel
	16	inner glass panel
	18	outer door channel
	20	inner door channel
	22	door cap
10	24	suction
	26	exhaust
	28	outer air stream
	30	inner air stream
	32	cooling air stream

15

Claims

1. A vented oven door for a domestic cooking oven, wherein:
 - the oven door (10) comprises at least three glass panels
5 (12, 14, 16),
 - the inner space of the oven door (10) is subdivided into at least two door channels (18, 20) by the at least three glass panels (12, 14, 16),
 - at least one upper opening of at least one outer door
10 channel (18) is connected or connectable to a suction (24) of a cooling channel with air moving means in a closed state of the oven door (10), and
 - at least one upper opening of at least one inner door
15 channel (20) is connected or connectable to the ambient on the one hand and an exhaust (26) of the cooling channel on the other hand in the closed state of the oven door (10), so that air from the inner door channel (20) is entrained by the air from the exhaust (26).
- 20 2. The vented oven door according to claim 1, characterized in, that the oven door (10) comprises a door cap (22) defining at least one upper opening of the outer door channel (18).
- 25 3. The vented oven door according to claim 1 or 2, characterized in, that the oven door (10) comprises a door cap (22) defining at least one upper opening of the inner door channel (20).
4. The vented oven door according to any one of the preceding
30 claims, characterized in, that at least one of the door channels (18, 20) is aligned along a vertical direction.
- 35 5. The vented oven door according to any one of the preceding claims,

characterized in, that
at least one of the door channels (18, 20) span nearly the
complete width of the oven door (10).

- 5 6. The vented oven door according to any one of the preceding
claims,
characterized in, that
the glass panels (12, 14, 16) are arranged plane-parallel.
- 10 7. A domestic cooking oven comprising a vented oven door and a
cooling channel with air moving means, at least one suction
(24) and at least one exhaust (26),
characterized in, that
the cooking oven comprises at least one oven door (10) ac-
15 cording to any one of the claims 1 to 6.
8. The domestic cooking oven according to claim 7,
characterized in, that
the cooling channel is arranged on a top wall of an oven cav-
20 ity.

FIG 1

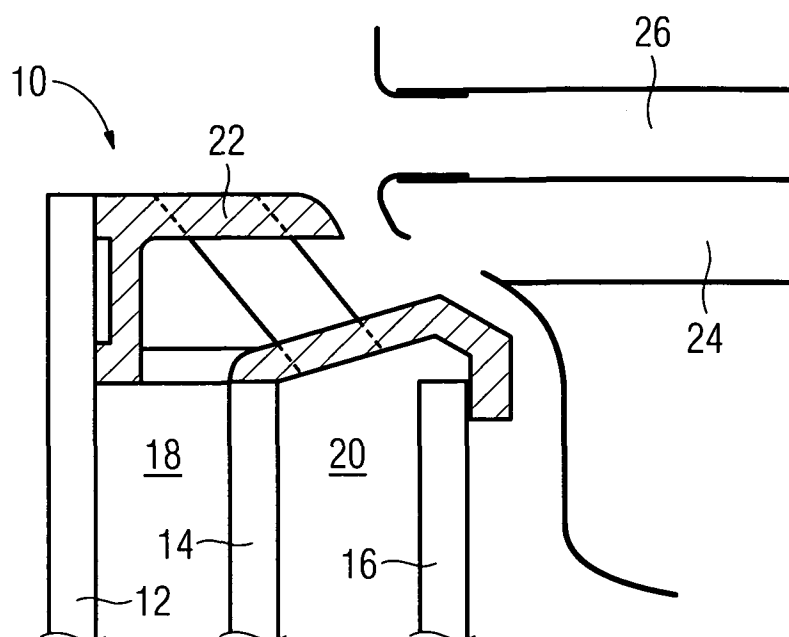
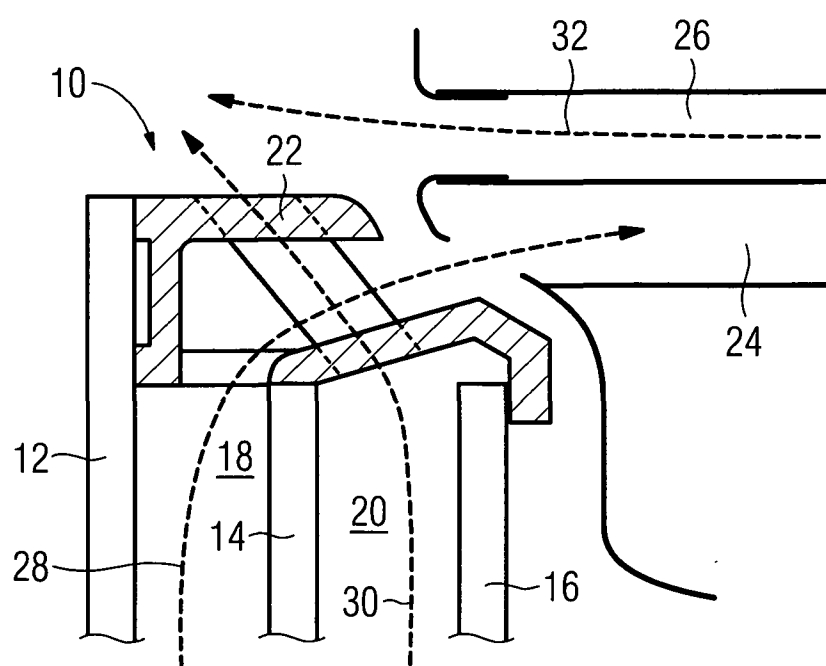


FIG 2



INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
INV. F24C15/00 F24C15/04
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F24C

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	US 2005/076900 A1 (WALTHER CHRISTOPH [DE] ET AL) 14 April 2005 (2005-04-14) paragraphs [0029], [0032], [0045], [0055]; figures 1-3	1-8
Y	JP 3 013732 A (MATSUSHITA ELECTRIC IND CO LTD) 22 January 1991 (1991-01-22) abstract; figure 1	1-8
A	US 5 918 589 A (VALLE MIGUEL A [US] ET AL) 6 July 1999 (1999-07-06) figures	1
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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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