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(71) Applicant: **Electrolux Appliances Aktiebolag**
105 45 Stockholm (SE)

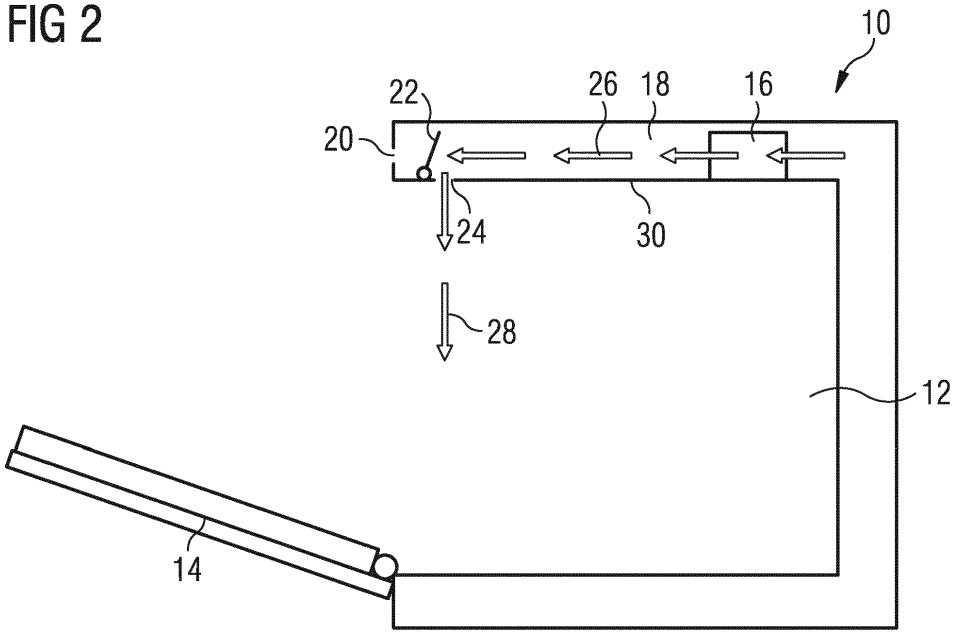
(72) Inventor: **Verdoliva, Valerio**
47122 Forli (IT)

(74) Representative: **Electrolux Group Patents**
AB Electrolux
Group Patents
105 45 Stockholm (SE)

(54) A COOKING OVEN WITH AN OVEN CAVITY AND AN OVEN DOOR

(57) The present invention relates to a cooking oven (10) including an oven cavity (12) and an oven door (14) for opening and closing a front opening of said oven cavity (12). The cooking oven (10) comprises at least one air duct (18) enclosing at least partially the oven cavity (12), wherein at least a part of the air duct (18) extends above a top wall (30) of the oven cavity (12). The cooking oven (10) comprises at least one fan (16) for generating an air stream (26) within the air duct (18) or at the air duct (18) and at least one ventilation flap (22) for deflecting downwards the air stream (26) leaving the air duct (18) above the oven cavity (12). The at least one opening (24) is formed in a front portion of the top wall (30) of the oven cavity (12), wherein said opening (24) connects the air duct (18) to the oven cavity (12). The opening (24) is closed by the ventilation flap (22) in the closed state of the oven door (14) and opened by the ventilation flap (22) in the opened state of the oven door (14), so that an air curtain (28) is formed within a front portion of the oven cavity (12) in the opened state of the oven door (14).

FIG 2



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Description

[0001] The present invention relates to a cooking oven including an oven cavity and an oven door for opening and closing a front opening of said oven cavity according to the preamble of claim 1.

[0002] A conventional cooking oven requires some time to obtain the necessary temperature inside the oven cavity. When the oven door is opened by the user, then a temperature drop is occurred in the oven cavity. Said temperature drop disturbs the cooking process. Further, the temperature drop increases the cooking time and the energy consumption.

[0003] EP 2 180 259 A1 discloses a cooking oven with airflow control devices. An air duct encloses the oven cavity. An air inlet of said air duct is arranged below a front opening of the oven cavity. An air outlet of the air duct is arranged above the front opening of the oven cavity. When the front opening of the oven cavity is closed by an oven door, then the air from the air duct is blown out through the air outlet. However, when the oven door is opened, then the air from the air duct is deflected downwards, so that an airflow thermal barrier is formed in the area in front of the opened oven cavity.

[0004] It is an object of the present invention to provide a cooking oven with an improved air curtain, which allows a reduced temperature drop within the oven cavity, when the oven door is opened.

[0005] The object of the present invention is achieved by the cooking oven according to claim 1.

[0006] According to the present invention at least one opening is formed in a front portion of the top wall of the oven cavity, wherein said opening connects the air duct to the oven cavity, and wherein the opening is closed by the ventilation flap in the closed state of the oven door and opened by the ventilation flap in the opened state of the oven door, so that an air curtain is formed within a front portion of the oven cavity in the opened state of the oven door.

[0007] The core of the present invention is the opening in the front portion of the top wall of the oven cavity, which is openable and closable in dependence of the opened and closed states, respectively, of the oven door. The opening connects the air duct to the oven cavity, so that the air curtain is formed inside the oven cavity in the opened state of the oven door. Since the air curtain is formed inside the oven cavity, a relative big thermal barrier between the oven cavity and the front area of said oven cavity is obtained by a relative small flow rate of the air stream. The ventilation flap has a double function. On the one hand the ventilation flap closes the opening in the closed state. On the other hand the ventilation flap deflects downwardly the air stream from the air duct into the oven cavity in the opened state.

[0008] In particular, the air duct includes at least one air outlet connecting said air duct to the surroundings of the cooking oven. The air outlet of the air duct is especially used, if the air curtain is deactivated.

[0009] Preferably, the air outlet is arranged above the front opening of the oven cavity and at a front side of the cooking oven. A conventional air channel for cooling the oven cavity may be used for generating the air curtain.

[0010] According to a preferred embodiment of the present invention the air outlet is at least partially closed by the ventilation flap in the opened state of the oven door and opened by the ventilation flap in the closed state of the oven door. In this case, the ventilation flap has a triple function. Besides the closing of the opening in the top wall and the deflecting of the air stream, the ventilation flap closes and opens the air outlet of the air duct.

[0011] Further, the air duct may include at least one air inlet connecting said air duct to the surroundings of the cooking oven.

[0012] For example, the air inlet is arranged below the front opening of the oven cavity and at a front side of the cooking oven.

[0013] Moreover, at least one further opening may be formed in a front portion of a bottom wall of the oven cavity, wherein said further opening connects the air duct to the oven cavity.

[0014] In particular, the further opening is closed by a further ventilation flap in the closed state of the oven door and opened by said further ventilation flap in the opened state of the oven door, so that the air curtain is sucked through the further opening into the air duct.

[0015] Alternatively or additionally, the air curtain or at least a part of said air curtain exhausts through a gap between the opened oven door and the front opening of the oven cavity.

[0016] According to the preferred embodiment of the present invention the air stream in the air duct and the air curtain within the front portion of the oven cavity form a closed air circuit in the opened state of the oven door.

[0017] In contrast, the air stream in the air duct may form an open air circuit in the closed state of the oven door.

[0018] Further, at least one fan may be arranged within the air duct and above the top wall of the oven cavity. The conventional air channel for cooling the oven cavity may be used for the present invention.

[0019] Preferably, the actuation of the ventilation flap and/or the further ventilation flap is automatically controlled by the opening and closing of the oven door.

[0020] For example, the actuation of the ventilation flap and/or the further ventilation flap may be mechanically performed by at least one spring element.

[0021] According to another example, the actuation of the ventilation flap and/or the further ventilation flap may be performed by an electric and/or electromagnetic drive unit.

[0022] Novel and inventive features of the present invention are set forth in the appended claims.

[0023] The present invention will be described in further detail with reference to the drawing, in which

FIG 1 illustrates a schematic sectional side view of a

cooking oven according to a preferred embodiment of the present invention, wherein an oven door is in a closed state, and

FIG 2 illustrates a schematic sectional side view of the cooking oven according to the preferred embodiment of the present invention, wherein the oven door is in an opened state.

[0024] FIG 1 illustrates a schematic sectional side view of a cooking oven 10 according to a preferred embodiment of the present invention, wherein an oven door 14 is in a closed state.

[0025] The cooking oven 10 includes an oven cavity 12. A front opening of said oven cavity 12 is closable by the oven door 14. In FIG 1 the oven door 14 is in the closed state. A fan 16 is arranged inside an air duct 18. In this example, the fan 16 is arranged above the oven cavity 12. The air duct 18 encloses at least partially the oven cavity 12. In this example, the air duct 18 extends below a bottom wall of the oven cavity 12, behind a rear wall of the oven cavity 12 and above a top wall 30 of the oven cavity 12. The cross-section of the air duct 18 extends substantially over the whole width of the oven cavity 12, at least above the top wall 30 in the front portion of the oven cavity 12. Alternatively, the cooking oven 10 includes two or more parallel air ducts 18. The air duct 18 includes an air outlet 20 arranged above the front opening of the oven cavity 12. In the closed state of the oven door 14 the air outlet 20 is arranged above said oven door 14.

[0026] At least one opening 24 is formed in the top wall 30 of the oven cavity 12. The air duct 18 and the oven cavity 12 are connected via said opening 24. The at least one opening 24 is openable and closable by at least one ventilation flap 22. The opening 24 is closed by the ventilation flap 22, when the oven door 14 is in the closed state. The one or more openings 24 extend substantially over the whole width of the top wall 30 of the oven cavity 12.

[0027] The fan 16 generates an air stream 26 inside the air duct 18. The air stream 26 is provided for cooling down the environment of the oven cavity 12. The air stream 26 enters the air duct 18 through one or more air inlets. For example, the air inlet may be arranged below the oven door 14 and at the front side of the cooking oven 10. Alternatively or additionally, the air inlet may be arranged at the rear side of the cooking oven 10. The air stream 26 leaves the air duct 18 through the air outlet 20.

[0028] FIG 2 illustrates a schematic sectional side view of the cooking oven 10 according to the preferred embodiment of the present invention, wherein the oven door 14 is in an opened state.

[0029] When the oven door 14 is in the opened state, then the opening 24 is opened by the ventilation flap 22. Further, the air outlet 20 is partially or completely closed by said ventilation flap 22, when the oven door 14 is in the opened state. Moreover, the ventilation flap 22 acts as a deflecting plate for the air stream 26, so that said air stream leaves the air duct 18 through the opening 24 and streams vertically downwards within a front portion of the oven cavity 12. Thereby, an air curtain 28 is formed within the front portion of the oven cavity 12, when the oven door 14 is opened. The air curtain 28 insulates the thermal state of the oven cavity 12, when the oven door 14 is opened. The air curtain 28 provides a shield for the oven cavity 12.

[0030] Optionally, one or more further openings are formed in the bottom wall of the oven cavity 12. Preferably, the at least one further opening in the bottom wall of the oven cavity 12 is arranged vertically below the at least one opening 24 formed in the top wall 30 of said oven cavity 12. The one or more further openings are provided that the air curtain 28 enters the air duct 18 again. Thus, the air stream 26 including the air curtain 28 forms a closed cycle, when the oven door 14 is opened. Alternatively, the air curtain 28 may leave the cooking oven 10 through a gap between the oven door 14 and the front opening of said oven cavity 12.

[0031] The air curtain 28 inside the oven cavity 12 has the advantage that the temperature inside the oven cavity 12 is maintained, when the oven door 14 is opened. Thereby energy and cooking time are saved. Another advantage of the air curtain 28 inside the oven cavity 12 is that a sudden temperature drop is prevented, which would have a bad impact for same cooking recipes. A further advantage is that the air curtain 28 inside the oven cavity 12 avoids that the user is exposed to the hot vapour when the oven door 14 is opened.

[0032] Although an illustrative embodiment of the present invention has been described herein with reference to the accompanying drawing, 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 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

[0033]

10	cooking oven
12	oven cavity
14	oven door
16	fan
18	air duct
20	air outlet
22	ventilation flap
24	opening
26	air stream
28	air curtain
30	top wall

Claims

1. A cooking oven (10) including an oven cavity (12) and an oven door (14) for opening and closing a front opening of said oven cavity (12), wherein:

   - the cooking oven (10) comprises at least one air duct (18) enclosing at least partially the oven cavity (12),
   - at least a part of the air duct (18) extends above a top wall (30) of the oven cavity (12),
   - the cooking oven (10) comprises at least one fan (16) for generating an air stream (26) within the air duct (18) or at the air duct (18), and
   - the cooking oven (10) comprises at least one ventilation flap (22) for deflecting downwards the air stream (26) leaving the air duct (18) above the oven cavity (12),

   characterised in that
   at least one opening (24) is formed in a front portion of the top wall (30) of the oven cavity (12), wherein said opening (24) connects the air duct (18) to the oven cavity (12), and wherein the opening (24) is closed by the ventilation flap (22) in the closed state of the oven door (14) and opened by the ventilation flap (22) in the opened state of the oven door (14), so that an air curtain (28) is formed within a front portion of the oven cavity (12) in the opened state of the oven door (14).

2. The cooking oven (10) according to claim 1,
   characterised in that
   the air duct (18) includes at least one air outlet (20) connecting said air duct (18) to the surroundings of the cooking oven (10).

3. The cooking oven (10) according to claim 2,
   characterised in that
   the air outlet (18) is arranged above the front opening of the oven cavity (12) and at a front side if the cooking oven (10).

4. The cooking oven (10) according to claim 2 or 3,
   characterised in that
   the air outlet (18) is at least partially closed by the ventilation flap (22) in the opened state of the oven door (14) and opened by the ventilation flap (22) in the closed state of the oven door (14).

5. The cooking oven (10) according to any one of the preceding claims,
   characterised in that
   the air duct (18) includes at least one air inlet connecting said air duct (18) to the surroundings of the cooking oven (10).

6. The cooking oven (10) according to claim 5,
   characterised in that
   the air inlet is arranged below the front opening of the oven cavity (12) and at a front side of the cooking oven (10).

7. The cooking oven (10) according to any one of the preceding claims,
   characterised in that
   at least one further opening is formed in a front portion of a bottom wall (30) of the oven cavity (12), wherein said further opening connects the air duct (18) to the oven cavity (12).

8. The cooking oven (10) according to any one of the preceding claims,
   characterised in that
   the further opening is closed by a further ventilation flap in the closed state of the oven door (14) and opened by said further ventilation flap in the opened state of the oven door (14), so that the air curtain (28) is sucked through the further opening into the air duct (18).

9. The cooking oven (10) according to any one of the preceding claims,
   characterised in that
   the air curtain (28) or at least a part of said air curtain (28) exhausts through a gap between the opened oven door (14) and the front opening of the oven cavity (12).

10. The cooking oven (10) according to any one of the claims 1 to 8,
    characterised in that
    the air stream (26) in the air duct (18) and the air curtain (28) within the front portion of the oven cavity (12) form a closed air circuit in the opened state of the oven door (14).

11. The cooking oven (10) according to any one of the claims 1 to 8,
    characterised in that
    the air stream (26) in the air duct (18) forms an open air circuit in the closed state of the oven door (14).

12. The cooking oven (10) according to any one of the preceding claims,
    characterised in that
    at least one fan (16) is arranged within the air duct (18) and above the top wall (30) of the oven cavity (12).

13. The cooking oven (10) according to any one of the preceding claims,
    characterised in that
    the actuation of the ventilation flap (22) and/or the further ventilation flap is automatically controlled by the opening and closing of the oven door (14).

14. The cooking oven (10) according to any one of the preceding claims,
characterised in that
the actuation of the ventilation flap (22) and/or the further ventilation flap is mechanically performed by at least one spring element.

15. The cooking oven (10) according to any one of the preceding claims,
characterised in that
the actuation of the ventilation flap (22) and/or the further ventilation flap is performed by an electric and/or electromagnetic drive unit.

FIG 1

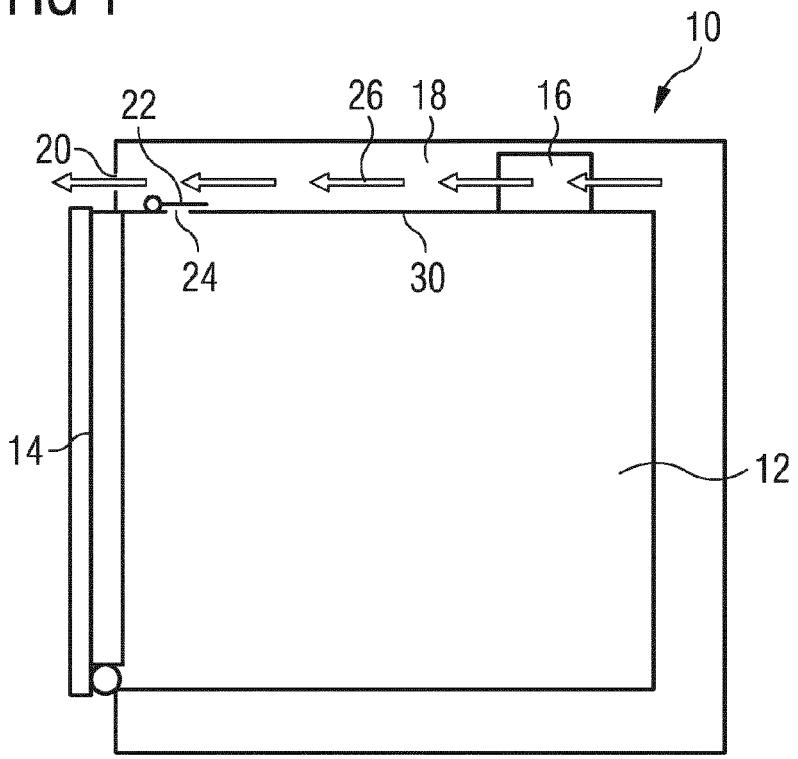
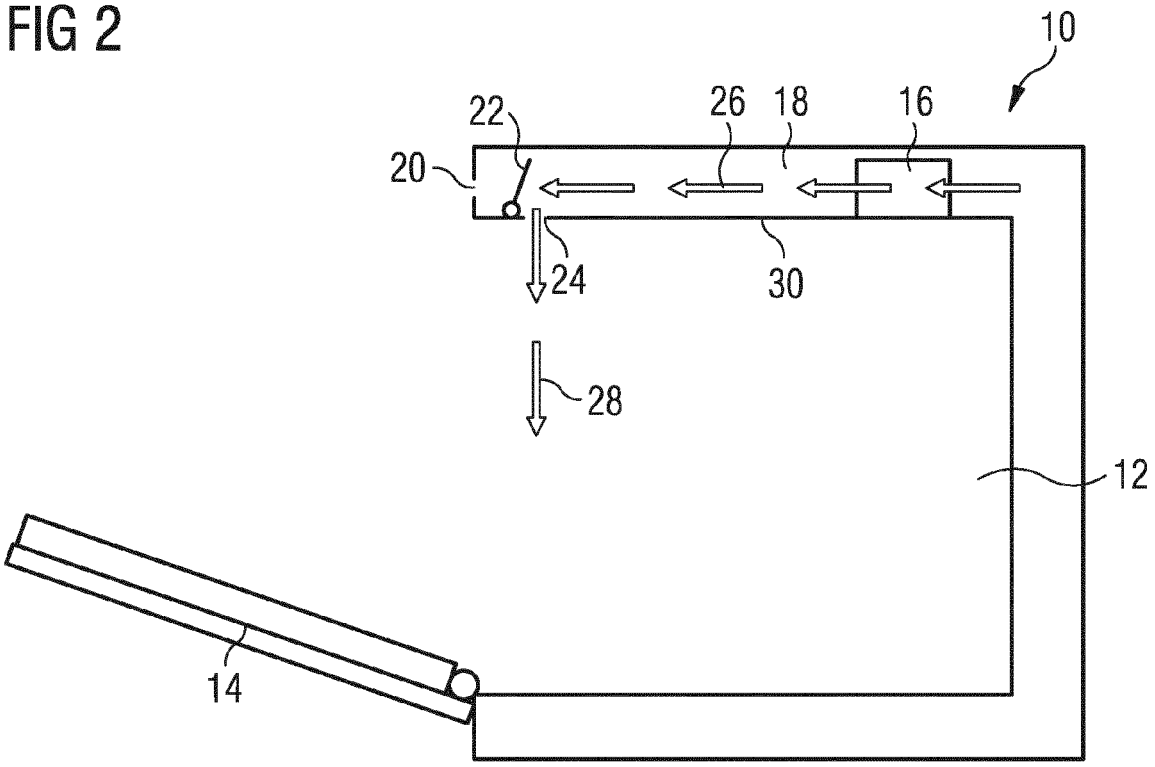


FIG 2



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EUROPEAN SEARCH REPORT

Application Number
EP 15 16 6866

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9 November 2015	Makúch, Milan

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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