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(54) **Convection oven**

(57) A convection oven comprises a containment structure (2) having a lower supporting base (3), inside which there is a cooking chamber (4) having an access opening (5). A door (7) is mounted on the containment structure (2) and can move between a closed position in which it closes the opening (5) and an open position (5) in which it allows access to the cooking chamber (4). Means (8) for heating the cooking chamber (4) are con-

nected to a first lateral wall (9) of the cooking chamber (4). Moreover, on one side the width of the cooking chamber (4) is substantially constant along a direction extending from the opening (5) to a rear wall (10) of the cooking chamber (4), whilst on the other side the heating means (8) are at least partly mounted on a first lateral wall (9) of the cooking chamber (4) and project cantilever-style into the cooking chamber (4).

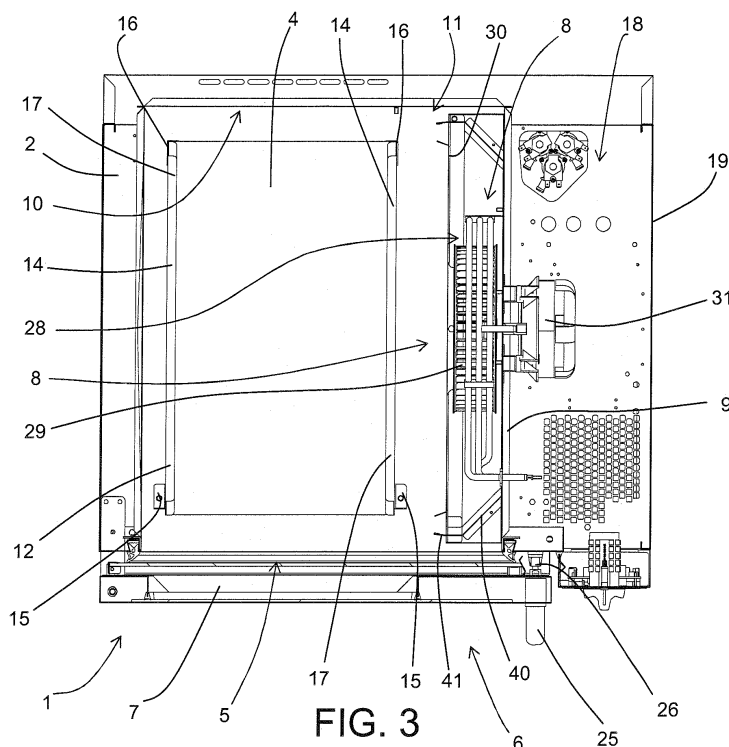


FIG. 3

Description

[0001] The present invention relates to a convection oven which may be either of the gas or electric type.

[0002] In more detail, the present invention is for the type of convection ovens which, at present, comprise a cooking chamber that has a niche separated by a flat panel from the rest of the chamber, designed for cooking food, and in which the heating means are inserted. The chamber is closed by a door mounted at an opening which has a transit cross-section substantially matching that of the portion of the chamber designed to house the food.

[0003] Consequently, when the user opens such conventional ovens, he finds himself in front of a compartment with a constant cross-section (having the shape of a parallelepiped) which, on one side, has a removable panel allowing access to the niche housing the heating means.

[0004] Between the above-mentioned niche and the outer lateral wall of the oven there is a service compartment housing all of the oven operating equipment, as well as part of the heating means if necessary (such as the fan motor, etc.).

[0005] Therefore, according to the prior art the cooking chamber consists of a complex volume, usually formed by joining two parallelepipeds, a larger one designed to constitute the zone for housing the food and a smaller one designed to constitute the niche for the heating means.

[0006] This is usually achieved by producing, at the front zone of the oven, a vertical wall extending parallel with the front face of the oven and which has the function of delimiting the front of the niche for the heating means, and allowing the niche covering panel to be fixed in place.

[0007] However, this known technology has several disadvantages.

[0008] First, the cooking chamber is particularly complicated and expensive to produce.

[0009] That is the case either if the chamber is produced by assembling bent plates, or by forming.

[0010] In the former case, since, as indicated, the chamber consists of a complex volume, it is delimited by a relatively large number of panels between which there are therefore many joints which must be produced in such a way as to guarantee the seal during use of the oven. Processing times are therefore relatively long with a consequent increase in production costs.

[0011] In contrast, in the latter case, the presence of the niche makes the chamber asymmetrical meaning that at least two different dies are needed (with the consequent costs), one for the lower part and one for the upper part.

[0012] Second, in conventional ovens, access to the heating means is relatively awkward and complicated.

[0013] In addition, even oven cleaning is relatively laborious at the less easy to reach edges of the niche.

[0014] In this situation, the technical purpose which

forms the basis of the present invention is to provide a convection oven which overcomes the above-mentioned disadvantages.

[0015] In particular, the present invention has for a technical purpose to provide a convection oven which is easy to produce and inexpensive.

[0016] The present invention also has for a technical purpose to provide a convection oven which allows easy access to the heating means.

[0017] The present invention has for another technical purpose to provide a convection oven which is easy to clean.

[0018] The technical purpose specified and the aims indicated are substantially achieved by a convection oven as described in the claims herein.

[0019] Further features and advantages of the present invention are more apparent in the detailed description below, with reference to a preferred, non-limiting embodiment of a convection oven, illustrated in the accompanying drawings, in which:

- Figure 1 is a front view of a convection oven made in accordance with the present invention;
- Figure 2 is an axonometric view, partly in cross-section, of the oven of Figure 1;
- Figure 3 is a top view of the oven of Figure 2;
- Figure 4 is an enlarged detail of the oven of Figure 3;
- Figure 5 shows the oven of Figure 3 with its various parts in a different operating condition; and
- Figure 6 illustrates an alternative embodiment of a detail of the oven of Figure 3.

[0020] With reference to the accompanying drawings, the numeral 1 denotes as a whole a convection oven in accordance with the present invention.

[0021] The convection oven 1 comprises a containment structure 2 having a lower supporting base 3 in which a cooking chamber 4 is made, having an access opening 5 at a front face 6 of the containment structure 2. Moreover, a door 7 is mounted on the containment structure 2 and can move between a closed position in which it closes the opening 5 for access to the cooking chamber 4 (Figure 3) and an open position 5 in which it allows access to the cooking chamber 4 through the opening 5 (Figure 5). In accordance with the present invention, the width of the cooking chamber 4 is substantially constant along a horizontal direction (perpendicular to the door 7 when the door is in the closed position) extending from the opening 5 to a rear wall of the cooking chamber 4. It should be noticed that the phrase substantially constant width means except for small differences due for example to particular shaping (presence of bulges, recesses, etc.) of the lateral walls of the chamber. For example, the lateral walls defining the width of the chamber may have formed areas, stiffening ribs, etc., with a depth of even several centimetres, without the width of the cooking chamber 4 being considered substantially not constant, for the purposes of the present

invention.

[0022] Moreover, the oven comprises means 8 for heating the cooking chamber 4, the heating means being connected to a first lateral wall 9 of the cooking chamber 4. In particular, in accordance with the present invention, the heating means 8 are at least partly mounted on the first lateral wall 9 of the cooking chamber 4 and project cantilever-style into the cooking chamber 4.

[0023] Therefore, advantageously, the heating means 8 are positioned in such a way that their projection over the rear wall 10 of the cooking chamber 4 at least partly overlaps the projection of the cooking chamber 4 opening 5 over the rear wall 10.

[0024] In other words, in the embodiment illustrated, the first lateral wall 9 on which the heating means 8 are mounted extends mainly in such a way that it is flat from the opening 5 to the rear wall 10 of the cooking chamber 4.

[0025] Advantageously, as shown in Figures 3 and 5, the cooking chamber 4 has a working volume 11 for housing the products to be cooked (equal to the difference between the overall volume of the chamber and the volume occupied by the heating means 8), whose transversal horizontal dimension (perpendicular to the first lateral wall 9) is less than the longitudinal horizontal dimension (that is to say, that parallel with the first lateral wall 9 and extending from the opening 5 to the rear wall 10).

[0026] The oven also comprises a rack 12 for supporting a plurality of baking pans or grills 13, mounted in the cooking chamber 4 working volume 11, and which comprises two side units 14 positioned opposite one another on the two sides of the cooking chamber 4 working volume 11, parallel with the first lateral wall 9. Each side unit 14 comprises a front upright 15 and a rear upright 16 between which there extends a plurality of longitudinal horizontal guides 17 on which the baking pans or grills 13 can be inserted.

[0027] Advantageously, the rack 12 is a standard size. In this case, thanks to the fact that the cooking chamber 4 is longer than it is wide, the same oven can be used with baking pans/grills 13 of two different standard sizes: a first size having dimensions equal to those of the entire rack 12 which may be inserted in the oven according to its main direction of extension, and a second size in which the main dimension is equal to the width of the rack 12, whilst the smaller dimension is equal to half the length of the rack 12.

[0028] As shown in Figures 2, 3 and 5, the convection oven also comprises a service compartment 18 made between the first lateral wall 9 of the cooking chamber 4 and a second lateral wall 19 of the containment structure 2. The service compartment 18 houses all of the oven operating equipment (of the known type and therefore not illustrated).

[0029] Moreover, advantageously, as shown in Figures 1 and 2, the door 7 has a transparent zone 20 to allow observation of the inside of the cooking chamber 4. The transparent zone 20 is positioned in such a way that it is longitudinally aligned with the inner part of the

cooking chamber 4 which does not include the heating means 8, that is to say, it is aligned with the part corresponding to the working volume 11 of the chamber 4 occupied by the rack 12. In addition, as shown in Figures 4 and 5, the door 7 has a main outer structure 21 fitted with a fixed sheet of glass 22, as well as an inner sheet of glass 23 connected to the outer structure in such a way that it is removable by rotation. The inner sheet of glass 23 is rotatably connected to the main structure 21 of the door 7 close to the zone where the door is connected to the containment structure 2, whilst on the opposite side it can be selectively fixed to the outer structure of the door 7 by means of a specific locking element 24 (of the spring type in the accompanying drawings).

[0030] Finally, as shown in Figures 2 and 4, the door 7 is fitted with an opening 5 handle 25 associated with a lock 26, and when it is in the closed position it interacts with suitable seals 27 integral with the containment structure 2 to hermetically seal the cooking chamber 4.

[0031] As Figures 3 and 5 show, the heating means 8 comprise a heating element 28 and a fan 29, operatively connected to it, both mounted on the first lateral wall 9 of the cooking chamber 4, and a covering structure 30 removably mounted on the first lateral wall 9, around the heating element 28 and the fan 29.

[0032] In particular, in the embodiment illustrated the fan 29 is a centrifugal fan 29 designed to suck in air centrally and distribute it radially, driven by a motor 31 located in the service compartment 18.

[0033] In turn, the heating element 28 comprises a plurality of tubular exchange elements 32 positioned around the fan 29. Said exchange elements 32 extend along circular stretches substantially coaxial with the fan 29 (a known solution). Moreover, the exchange elements 32 are positioned in a plurality of planes substantially parallel with the first lateral wall 9, in such a way that they evenly give onto the entire lateral surface of the fan 29.

[0034] Figure 6 (showing a radial section of a detail of the heating element 28) illustrates an alternative embodiment of the exchange elements 32. In this case, there are two or more concentric layers of exchange elements 32 positioned along two or more circular stretches with different radii. Moreover, the exchange elements 32 of one layer are positioned so that they are lying in planes different to those of the exchange elements 32 of the other layer to create channels for the air with maximised heat exchange. In other words, the exchange elements 32 are positioned in such a way that they follow a single circle for each plane in which they lie.

[0035] Finally, in the embodiment illustrated the exchange elements 32 are hollow pipes for conveying the combustion fumes produced by a gas burner, not illustrated (it is a gas oven). However, in other cases, they may also consist of electric resistors. In the embodiment illustrated the heating means 8 covering structure 30 is box-shaped with an open face towards the lateral wall 9. In other embodiments it may be mainly C-shaped, extending practically from the base wall 33 to the upper wall

34 of the cooking chamber 4.

[0036] The covering structure 30 also has through-holes/slits 35 which, together with suitable inner panels 40 and outer panels 41 which act as deflectors (preventing air from colliding with the door and the rear wall of the oven), allow air to circulate between the fan 29 and the working volume 11 of the cooking chamber 4. In the accompanying drawings, the slits 35 and the inner panels 40 and outer panels 41 extend mainly vertically.

[0037] Further passages for the air can be created between the covering structure 30 and the inner walls of the cooking chamber 4.

[0038] Advantageously, the covering structure 30 can be at least partly rotated relative to the first lateral wall 9, between an operating position in which it is close to the first lateral wall 9 and encloses the heating element 28 and the fan 29 (Figure 3), and a home position in which it is rotated towards the inside of the cooking chamber 4 and allows access to the heating element 28 and the fan 29 (Figure 5).

[0039] In the accompanying drawings, this is achieved by hinging the part of the covering structure 30 closest to the rear wall 10 about a vertical axis, and fitting the part closest to the opening 5 with selective locking means (such as screws or other means).

[0040] As shown in Figure 2, the covering structure 30 also preferably has a pipe 36 having a first free end (not illustrated) and a second end 37 which can be connected to a water supply nozzle 38 mounted on the first lateral wall 9, allowing use of the oven 1 for steaming.

[0041] In accordance with the present invention, the second end 37 of said pipe 36 and the nozzle 38 centre themselves relative to one another and connect to each other following rotation of the covering structure 30 from the home position to the operating position. In particular, in the embodiment illustrated the second end 37 of the pipe 36 is female, whilst the nozzle 38 is male.

[0042] Finally, at the service compartment 18 the containment structure 2 has a control panel 39 made on the front face 6 and positioned at the side of the door 7 when the door is in the closed position.

[0043] Operation of the oven, described above in structural terms, is similar to that of prior art ovens and is immediately derived from what is described above.

[0044] The present invention brings important advantages.

[0045] First, the convection oven made in accordance with the present invention is easier to produce and less expensive than conventional ovens, since the cooking chamber has a simple shape without niches.

[0046] Second, thanks to the positioning of the heating means cantilever-style in the cooking chamber, access to them for maintenance is much simpler. Access is simpler still when the rotating covering structure illustrated in Figure 5 is used.

[0047] Moreover, the convection oven disclosed is easy to clean, since there is easy access to all parts of the cooking chamber.

[0048] It should also be noticed that the present invention is relatively easy to produce and even the cost linked to implementation of the invention is not very high.

[0049] The invention described above may be modified and adapted in several ways without thereby departing from the scope of the inventive concept.

[0050] All details of the invention may be substituted by other technically equivalent elements and, in practice, all of the materials used, as well as the shapes and dimensions of the various components, may be any according to requirements.

Claims

1. A convection oven comprising:

a containment structure (2) having a lower supporting base (3);

a cooking chamber (4) made in the containment structure (2) and having an access opening (5) at a front face (6) of the containment structure (2);

a door (7) mounted on the containment structure (2) and able to move between a closed position in which it closes the opening (5) and an open position (5) in which it allows access to the cooking chamber (4) through the opening (5);

means (8) for heating the cooking chamber (4), the heating means being connected to a first lateral wall (9) of the cooking chamber (4);

the convection oven being **characterised in that** the cooking chamber (4) has a substantially constant width along a direction extending from the opening (5) to a rear wall (10) of the cooking chamber (4), and **in that** the heating means (8) are at least partly mounted on a first lateral wall (9) of the cooking chamber (4) and project cantilever-style

into the cooking chamber (4).

2. The convection oven according to claim 1, **characterised in that** the first lateral wall (9) extends mainly in such a way that it is flat from the opening (5) to the rear wall (10).

3. The convection oven according to claim 1 or 2, **characterised in that** the heating means (8) comprise a heating element (28) and a fan (29), operatively connected to it, both mounted on the first lateral wall (9), and a covering structure (30) removably mounted on the first lateral wall (9) around the heating element (28) and the fan (29).

4. The convection oven according to claim 3, **characterised in that** the covering structure (30) is box-shaped with one open face or mainly C-shaped.

5. The convection oven according to claim 3 or 4, **characterised in that** the covering structure (30) can be at least partly rotated relative to the first lateral wall (9), between an operating position in which it is close to the first lateral wall (9) and encloses the heating element (28) and the fan (29), and a home position in which it is rotated towards the inside of the cooking chamber (4) and allows access to the heating element (28) and the fan (29). 5
6. The convection oven according to any of the claims from 3 to 5, **characterised in that** the covering structure (30) also has a pipe (36) having a first free end and a second end (37) which can be connected to a water supply nozzle (38) mounted on the first lateral wall (9). 10
7. The convection oven according to claims 5 and 6, **characterised in that** the second end (37) and the nozzle (38) centre themselves relative to one another and connect to each other following rotation of the covering structure (30) from the home position to the operating position. 15
8. The convection oven according to any of the claims from 3 to 7, **characterised in that** the heating element (28) comprises a plurality of tubular exchange elements (32) positioned around the fan (29) along circular stretches coaxial with the fan (29). 20
9. The convection oven according to claim 8, **characterised in that** the exchange elements (32) are positioned in a plurality of planes substantially parallel with the first lateral wall (9). 25
10. The convection oven according to claim 8 or 9, **characterised in that** the exchange elements (32) are positioned along two or more circular stretches with different radii, lying in different planes. 30
11. The convection oven according to claim 10, **characterised in that** the exchange elements (32) are positioned in such a way that they follow a single circle for each plane in which they lie. 35
12. The convection oven according to any of the claims from 3 to 11, **characterised in that** the covering structure (30) has inner panels (40) and/or outer panels (41) which act as air deflectors. 40
13. The convection oven according to any of the foregoing claims, **characterised in that** the cooking chamber (4) has a working volume (11) for housing products to be cooked whose transversal horizontal dimension, perpendicular to the first lateral wall (9), is less than the longitudinal horizontal dimension, parallel with the first lateral wall (9). 45
14. The convection oven according to claim 13, **characterised in that** the cooking chamber (4) also comprises a rack (12) for supporting a plurality of baking pans or grills (13), the rack being mounted in the working volume (11). 50
15. The convection oven according to any of the foregoing claims, **characterised in that** it also comprises a service compartment (18) made between the first lateral wall (9) of the cooking chamber (4) and a second lateral wall (19) of the containment structure (2). 55
16. The convection oven according to claim 15, **characterised in that** the containment structure (2) also has a control panel (19) made on the front face (6) at the service compartment (18), and positioned at the side of the door (7) when the door is in the closed position.
17. The convection oven according to any of the foregoing claims, **characterised in that** the door (7) has a transparent zone (20) for allowing observation of the inside of the cooking chamber (4).
18. The convection oven according to claim 17, **characterised in that** the transparent zone (20) is positioned in such a way that it is longitudinally aligned with the inner part of the cooking chamber (4) which does not include the heating means (8).
19. The convection oven according to any of the foregoing claims, **characterised in that** the door (7) has a main outer structure (21) and an inner sheet of glass (23) connected to the outer structure in such a way that it is removable by rotation.

Amended claims in accordance with Rule 137(2) EPC.

1. A convection oven comprising:
 - a containment structure (2) having a lower supporting base (3);
 - a cooking chamber (4) made in the containment structure (2) and having an access opening (5) at a front face (6) of the containment structure (2);
 - a door (7) mounted on the containment structure (2) and able to move between a closed position in which it closes the opening (5) and an open position (5) in which it allows access to the cooking chamber (4) through the opening (5);
 - means (8) for heating the cooking chamber (4), the heating means being connected to a first lateral wall (9) of the cooking chamber (4);
 - the cooking chamber (4) having a substantially constant width along a direction extending from

the opening (5) to a rear wall (10) of the cooking chamber (4), and the heating means (8) being at least partly mounted on a first lateral wall (9) of the cooking chamber (4) and projecting cantilever-style into the cooking chamber (4); the heating means (8) comprising a heating element (28) and a fan (29), operatively connected to it, both mounted on the first lateral wall (9), and a covering structure (30) removably mounted on the first lateral wall (9) around the heating element (28) and the fan (29); the convection oven being

characterised in that the covering structure (30) comprises through-holes/slits (35) and inner and outer panels (40, 41) acting as air deflectors for circulating air between the fan (29) and a working volume (11) of the cooking chamber (4).

2. The convection oven according to claim 1, **characterised in that** the first lateral wall (9) extends mainly in such a way that it is flat from the opening (5) to the rear wall (10).
3. The convection oven according to claim 1, **characterised in that** the covering structure (30) is box-shaped with one open face or mainly C-shaped.
4. The convection oven according to claim 1, 2 or 3, **characterised in that** the covering structure (30) can be at least partly rotated relative to the first lateral wall (9), between an operating position in which it is close to the first lateral wall (9) and encloses the heating element (28) and the fan (29), and a home position in which it is rotated towards the inside of the cooking chamber (4) and allows access to the heating element (28) and the fan (29).
5. The convection oven according to any of the claims 1, 2, 3 and 4, **characterised in that** the covering structure (30) also has a pipe (36) having a first free end and a second end (37) which can be connected to a water supply nozzle (38) mounted on the first lateral wall (9).
6. The convection oven according to claims 4 and 5, **characterised in that** the second end (37) and the nozzle (38) centre themselves relative to one another and connect to each other following rotation of the covering structure (30) from the home position to the operating position.
7. The convection oven according to any of the previous claims, **characterised in that** the heating element (28) comprises a plurality of tubular exchange elements (32) positioned around the fan (29) along circular stretches coaxial with the fan (29).

8. The convection oven according to claim 7, **characterised in that** the exchange elements (32) are positioned in a plurality of planes substantially parallel with the first lateral wall (9).
9. The convection oven according to claim 7 or 8, **characterised in that** the exchange elements (32) are positioned along two or more circular stretches with different radii, lying in different planes.
10. The convection oven according to claim 9, **characterised in that** the exchange elements (32) are positioned in such a way that they follow a single circle for each plane in which they lie.
11. The convection oven according to any of the foregoing claims, **characterised in that** the working volume (11) for housing products to be cooked has a transversal horizontal dimension, perpendicular to the first lateral wall (9), less than the longitudinal horizontal dimension, parallel with the first lateral wall (9).
12. The convection oven according to claim 11, **characterised in that** the cooking chamber (4) also comprises a rack (12) for supporting a plurality of baking pans or grills (13), the rack being mounted in the working volume (11).
13. The convection oven according to any of the foregoing claims, **characterised in that** it also comprises a service compartment (18) made between the first lateral wall (9) of the cooking chamber (4) and a second lateral wall (19) of the containment structure (2).
14. The convection oven according to claim 13, **characterised in that** the containment structure (2) also has a control panel (19) made on the front face (6) at the service compartment (18), and positioned at the side of the door (7) when the door is in the closed position.
15. The convection oven according to any of the foregoing claims, **characterised in that** the door (7) has a transparent zone (20) for allowing observation of the inside of the cooking chamber (4).
16. The convection oven according to claim 15, **characterised in that** the transparent zone (20) is positioned in such a way that it is longitudinally aligned with the inner part of the cooking chamber (4) which does not include the heating means (8).
17. The convection oven according to any of the foregoing claims, **characterised in that** the door (7) has a main outer structure (21) and an inner sheet of glass (23) connected to the outer structure in such a way that it is removable by rotation.

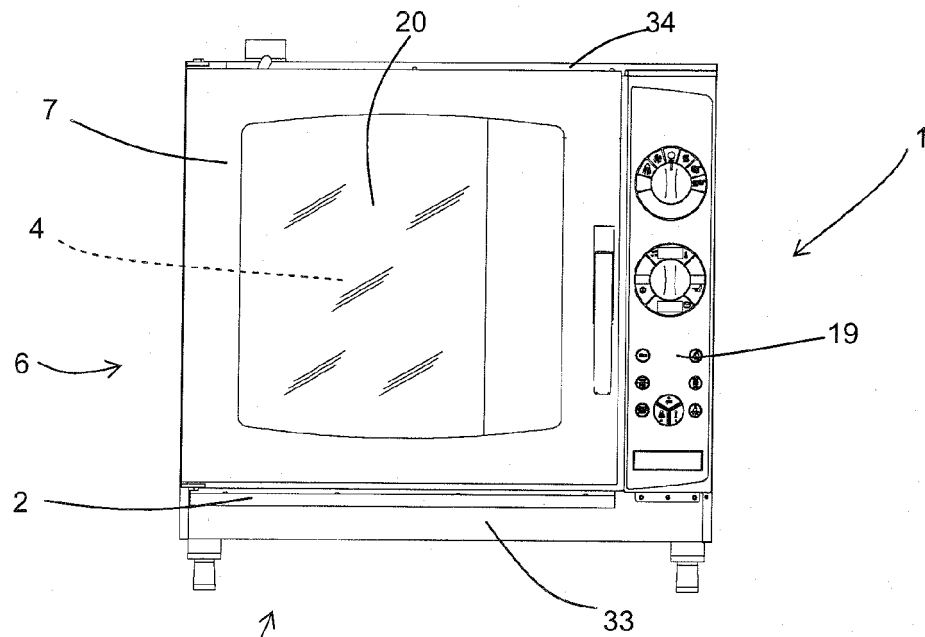


FIG. 1

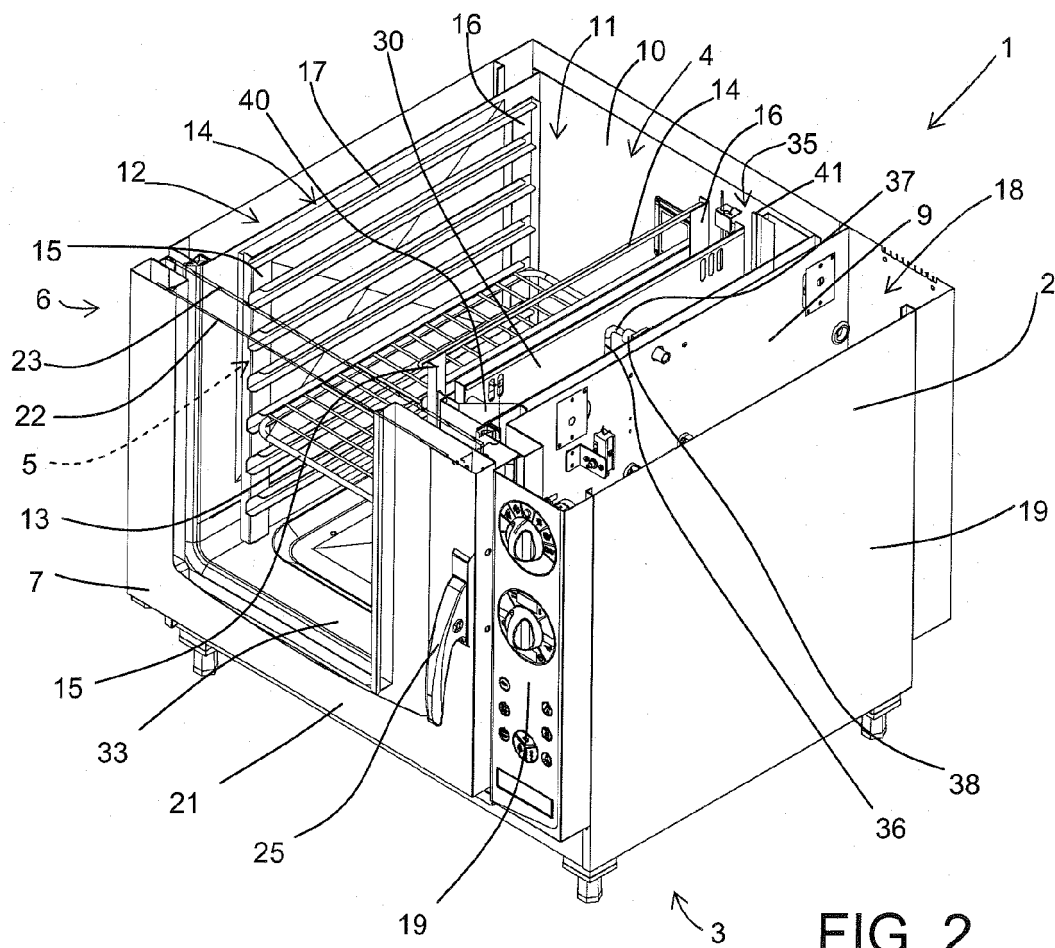
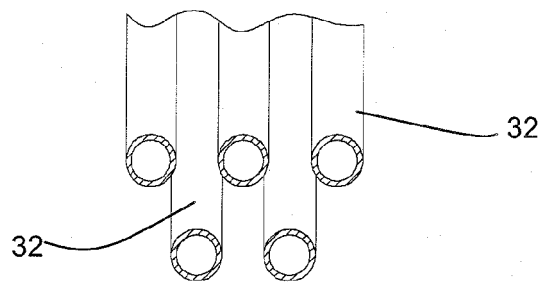
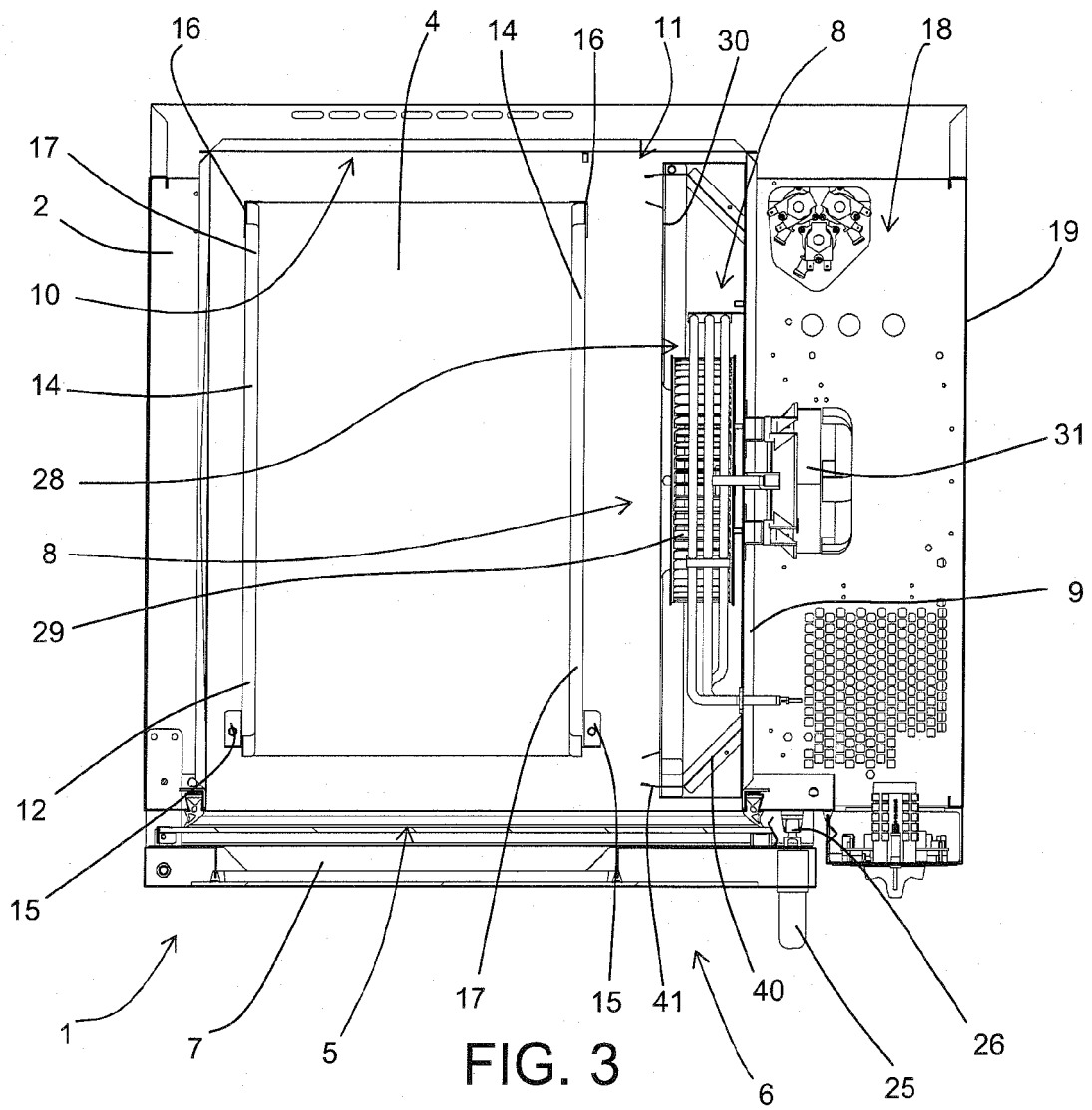


FIG. 2



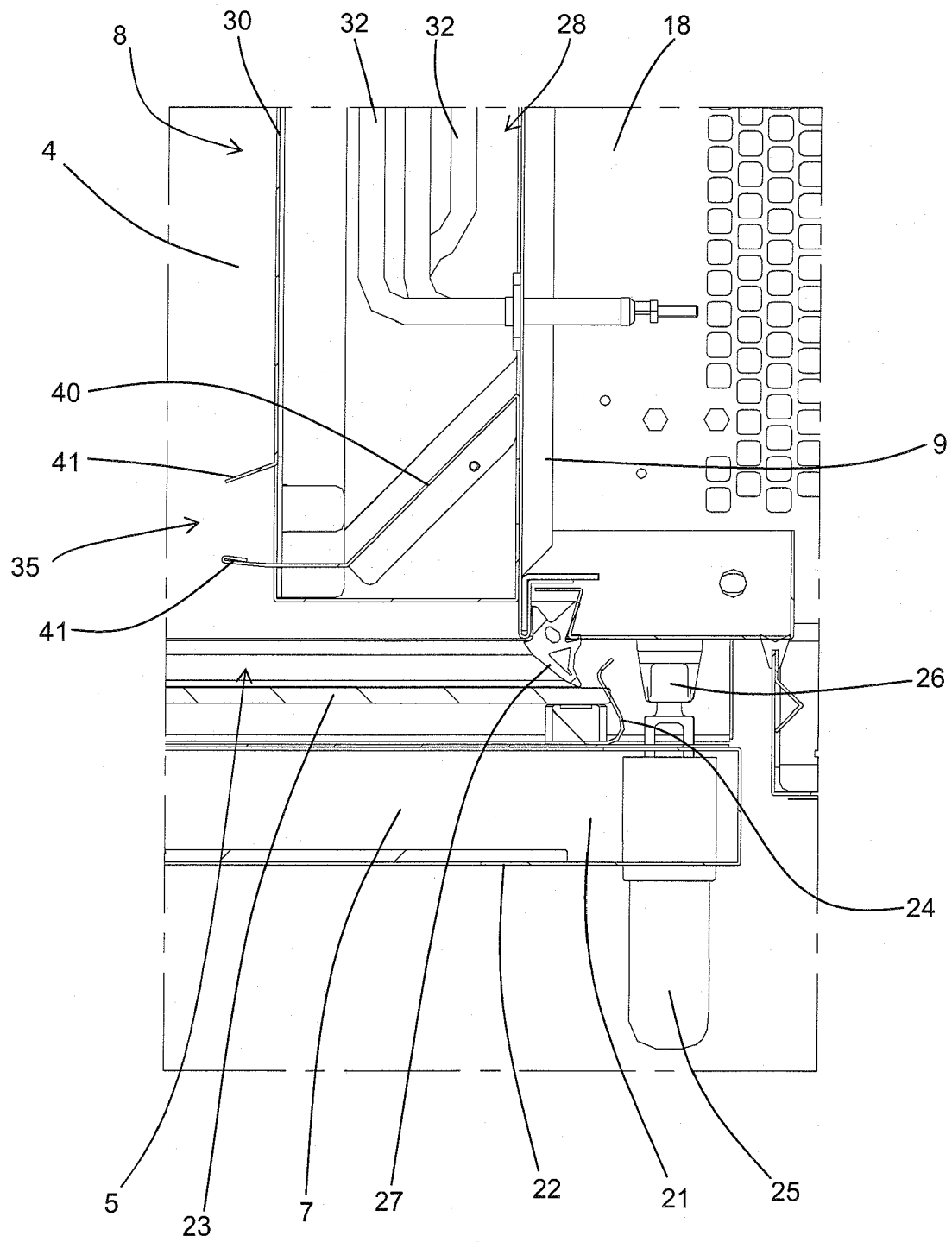


FIG. 4

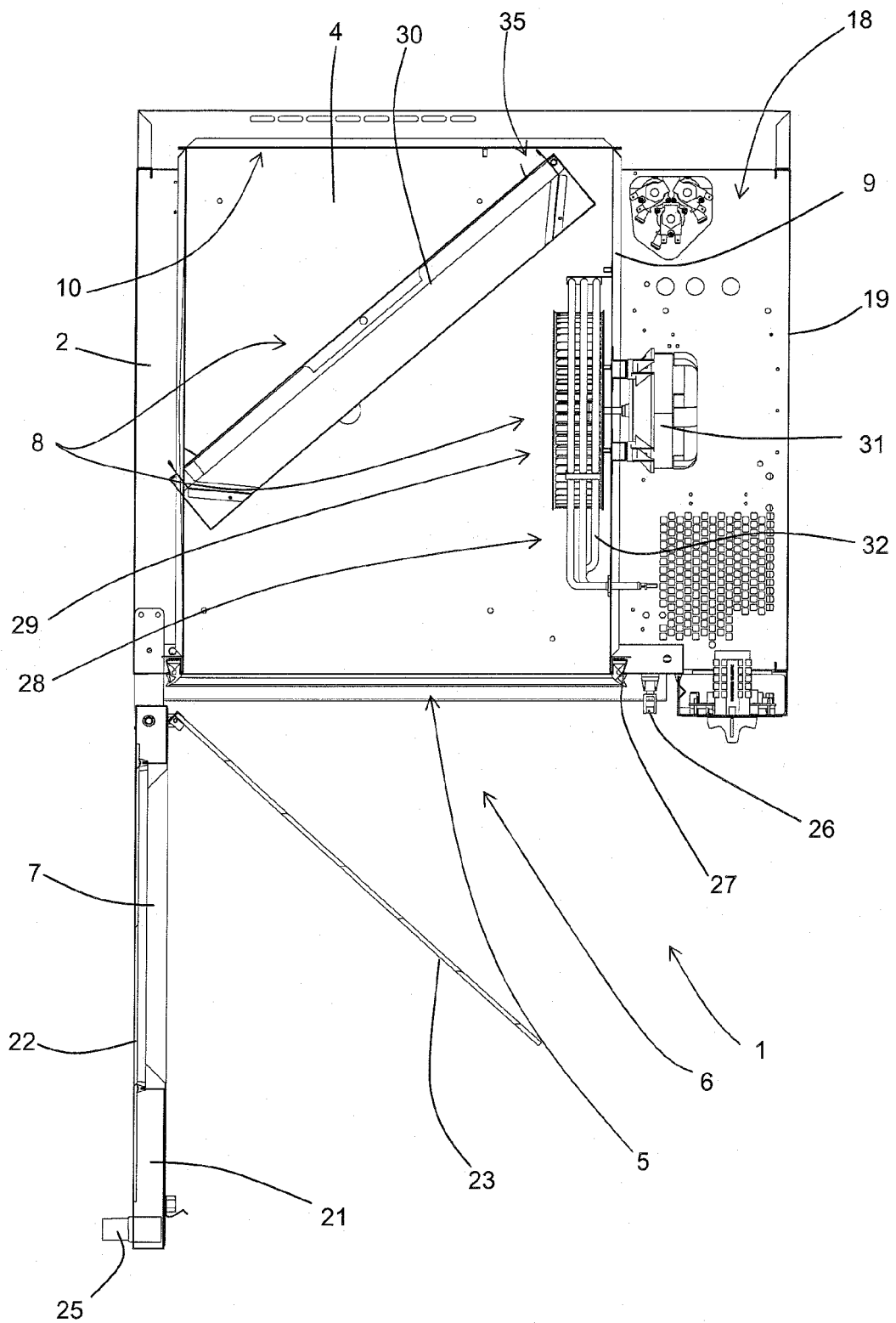


FIG. 5



EUROPEAN SEARCH REPORT

Application Number
EP 08 15 2816

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Place of search Munich		Date of completion of the search 17 October 2008	Examiner Merkt, Andreas
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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