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(54) **Kitchen oven with improved cooking**

(57) Kitchen oven (1) intended for the steam cooking of dishes, of particularly simple and economically feasible structure, comprising: a cooking compartment (2), at the lower end defined by a bottom surface (3); heating means intended to raise the internal temperature of said cooking compartment (2); a bottom plate (5) having a central depression (5a) integrally formed with it and extending all the way to the proximity of the lateral perimeter of the bottom surface (3); a separator (6) that obstructs said central depression (5a) from above and separates it from the cooking compartment (2), said separator (6) helping to define said substantially continuous and planar bottom surface (3), said separator comprising communication holes (6a) between the central depression (5a) and the cooking compartment (2); said heating means being located directly below said central depression (5a).

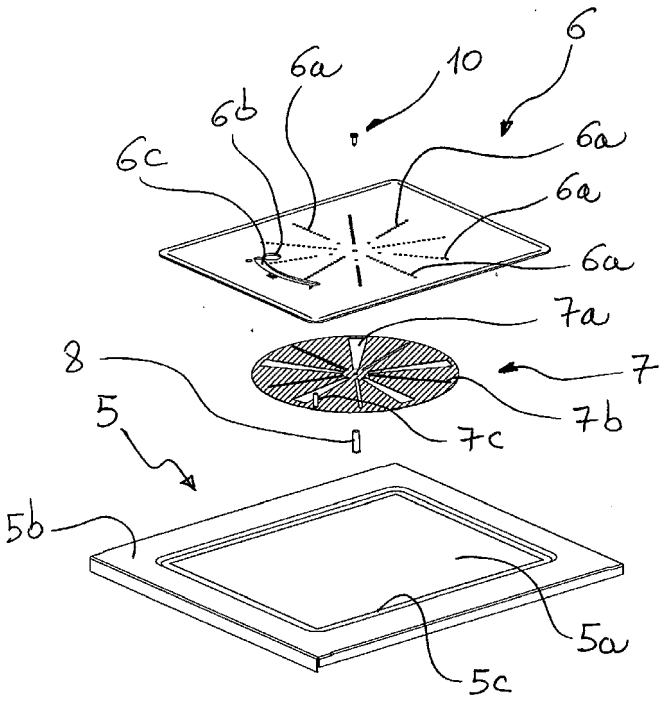

FIG. 4

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Description

Field of application

[0001] The present invention refers to the field of kitchen ovens intended for the cooking of food, and is in particular concerned with an oven for cooking for domestic applications intended for the cooking of dishes placed in its cooking compartment.

Prior art

[0002] For a long time the market for household electrical appliances has been offering devices that, in addition to traditional food preparation, also present the possibility of introducing steam into the cooking chamber.

[0003] This steam allows for a considerable improvement in the quality of the cooking of the food.

[0004] Ovens that present the possibility of introducing steam into the cooking chamber generally comprise complexly structured electromechanical systems that allow for the production of steam and its flow regulation in the cooking chamber. Such systems comprise at least a pressurizable water tank, means for heating the water that are separate from the main heating means of the oven, as well as conduits and means for moving the water vapor produced in the tank.

[0005] The structural complexity of the steam production systems implies considerable costs in planning and production of ovens having this additional functionality,

[0006] Moreover, ovens with integrated steam function known from prior art often prove to be fairly difficult to use because they require that the end user learns how to program the steam function.

[0007] Last but not least, the maintenance of such ovens with steam production requires more attention than that of traditional ventilated ovens, as well as having higher costs in case repairs are needed.

[0008] The technical problem that lies at the basis of the present invention is therefore that of creating an oven that improves the cooking of food by using, in addition to the traditional cooking system, a steam generating system inside the cooking chamber, without involving a notable increase in production costs compared to the production of ovens without steam generating systems, that is easy and instantaneous to use and whose required maintenance is extremely low, in the context of a simple and rational constructive solution.

Summary of the invention

[0009] The above-mentioned technical problem is solved by a kitchen oven comprising a cooking compartment, at the lower end defined by a bottom surface, and heating means able to raise the temperature in said cooking compartment to levels that are sufficiently high to cook food, moreover comprising a bottom plate having a central depression integrally formed with it and extending all the way to the proximity of the lateral perimeter of the bottom surface; a separator that obstructs said central depression from above and separates it from the cooking compartment, said separator helping to define said substantially continuous and planar bottom surface, said separator comprising communication holes between the central depression and the cooking compartment, said heating means being located directly beneath said central depression.

[0010] A skilled person will immediately recognize how the central depression of the bottom plate, functioning as water tank, in effect allows for the creation of steam that exits through the holes and that invests the food that is placed in the cooking compartment.

[0011] This modified bottom plate can easily be produced by means of traditional molding processes. Moreover, if its thickness is kept limited (in other words, if the central depression has a depth that is less than 30 mm), it can also substitute the bottom plates of traditional commercially available ovens without having to redesign the production and assembly lines currently in use.

[0012] Moreover it is stressed that there is an advantage to having a bottom surface that is continuous and planar, because it makes it possible to perform cleaning operations easily, given that there are no ridges or other protuberances, nor depressions in which dirt as a result of cooking grease or other residual substances could accumulate.

[0013] Advantageously the oven according to the invention can moreover comprise obstruction means of said communication holes that can be operated by a user to allow for the adjustment of the inflow of steam into the cooking compartment.

[0014] In particular these obstruction means are selectively configurable to allow for the opening, the partial obstruction or the complete obstruction of said communication holes.

[0015] These obstruction means are preferably of a mechanical type and operable by a user without the need to remove said separator. This solution presents the advantage of allowing an easy and intuitive disposition of the traditional cooking operations with the addition of steam, so as to comply with the needs of users that may be less versed in the use of electronic equipment.

[0016] The obstruction means can be configured as a regulator disk that is rotatably associated below said separator in correspondence with a hinging point, said regulator disk being able to at least occupy a position of complete obstruction, in which said communication holes are completely obstructed by the regulator disk, and an open position, in which said communication holes are placed in correspondence with the apertures in the regulator disk. A skilled person will immediately perceive the inherent advantage of this embodiment, in which it is possible to integrate the entire system of regulation in the bottom wall, so that traditional ovens can easily be reconfigured by means of simple substitution of this element.

[0017] Advantageously the oven can comprise a knob

solidly attached to the regulator disk and placed through a slot in the separator so that it protrudes inside the cooking compartment, said knob being able to slide inside said slot between a first end position, corresponding to the open position of the regulator disk, and a second end position, corresponding to a position of complete obstruction of the regulator disk. Said knob can advantageously be located in proximity to the oven door, so that it is easily accessible for the user.

[0018] The communication holes can be aligned along a plurality of radial lines that depart from the hinging point and said apertures can be radial slits that can selectively be aligned with said radial lines. This configuration advantageously combines the requirement of obstructing the holes by means of the regulator disk and the need for a uniform distribution of the steam inside the cooking chamber.

[0019] A further advantage is that said radial slits may have two different widths that allow the regulator disk to vary between an open position, in which all communication holes find themselves opposite respective radial apertures, and a position of partial obstruction, in which only the radial apertures with greater width remain in a position opposite respective communication holes.

[0020] Of particular convenience is the visual identification, by means of a numerical or similar indicator, of a position of said knob corresponding to the position of partial obstruction of said regulator disk.

[0021] The radial slits can alternately be of larger and of smaller width.

[0022] A central support of the separator can be applied in correspondence with the hinging point.

[0023] The separator can moreover also contain at least one refill hole, with a diameter that is greater than the one of the communication holes, to allow water to be added to the interior of the central depression. This refill hole can also be selectively obstructable by means of the obstruction means.

[0024] The previously mentioned bottom plate can moreover comprise a flat peripheral portion integrally formed with said central depression, said peripheral portion helping together with the separator to define the substantially continuous and planar bottom surface, which is particularly advantageous for the previously mentioned reasons.

[0025] The central depression can moreover comprise a lowered perimeter edge with respect to the peripheral portion which is intended to receive in abutment a corresponding perimeter edge of the separator.

[0026] Further characteristics and advantages will become clear from the following detailed description of a preferred but non-exclusive embodiment of the present invention, with reference to the enclosed figures, given by way of non-limiting example.

Brief description of the drawings

[0027]

Figure 1 shows a perspective view of an oven according to the present invention;

Figure 2 shows a front view of the oven of Figure 1 with the door removed;

Figure 3 shows a cross-sectional view along the line III-III of Figure 2;

Figure 4 shows an exploded view of the bottom plate of the oven of Figure 1;

Figures 5A-5E show a rear view of the steam regulation system of the oven of Figure 1, in various positions of use,

Detailed description

[0028] With reference to the enclosed figures 1-3, the number 1 generically identifies a kitchen oven according to the present invention, able to cook food in an optimal fashion with the help of steam generated directly inside the oven's interior.

[0029] The term kitchen oven means in particular in the present patent an oven intended for the cooking or otherwise for the preparation of food and dishes, independent of its intended industrial or domestic use. The latter is in any case to be considered as the preferred one and it is to this use that the specific embodiment described hereafter refers,

[0030] It should be noted that the kitchen oven 1 is represented in figures 1 and 2 according to a normal operational configuration; in the following description the positions and orientations, both relative and absolute, of the various elements that form the oven, defined by means of terms such as upper and lower, above and below, horizontal and vertical or other equivalent terms, are always to be interpreted with reference to this configuration,

[0031] The kitchen oven 1 comprises a main body that on the inside defines a cooking compartment 2 intended for the introduction of food that is to be heated or cooked.

[0032] The cooking compartment 2, substantially parallelepiped, is delimited at the lower end by a bottom surface 3 with a rectangular perimeter from which three lateral walls 9b rise up that connect it to an upper wall 9a. The fourth lateral face of the cooking compartment 2 is defined by an openable door 11.

[0033] The kitchen oven comprises a bottom plate 5 that is obtained from a single metal plate formed by molding. This bottom plate 5 has a flat peripheral portion 5b that surrounds a central depression 5a, also integrally formed with the bottom plate 5, which, as will become clear from the following description, defines a water basin.

[0034] To cover the central depression 5a a separator 6 is placed, which will be better described in the following.

[0035] Underneath said central depression 5a creating

the basin, without the interposition of further elements, heating means are located that in the specific embodiment described here take the form of an electric heating element (not visible in the figures).

[0036] This electric heating element is positioned in such a way that it lightly touches the lower wall of the central depression 5a.

[0037] The central depression 5a, in the example of a rectangular shape and with a flat bottom surface, presents a moderate depth, preferably less than 30 mm, and in size is extended up and in proximity to the three lateral walls 6b and the oven door 11. In correspondence with its external profile the central depression 5a presents a difference in height that creates a perimetrical flat shoulder that forms a peripheral border 5c that is also flat, of moderate and uninterrupted width, preferably between 5 and 20 mm, and having a depth between 1 and 5 mm.

[0038] On said peripheral border 5c rests a corresponding portion of the perimetrical edge of the separator 6, advantageously formed by a metal plate that separates the central depression 5a from the cooking compartment 2. The separator 6, in the illustrated example in addition to being peripherically supported by the peripheral border 5c of the central depression 5a, is held by a support 8 that in the specific embodiment takes the form of a pin protruding from the center of the bottom of the central depression 5a to which it is welded.

[0039] A threaded hole that longitudinally traverses said pin 8 allows for the stable attachment of the separator 6 by means of an apposite screw 10. This fixation system of the separator 6 to the bottom plate 5 is evidently described only by way of example; it can be eliminated or replaced by other equivalent technical solutions that will be evident to a person skilled in the art.

[0040] The thickness of the separator 6 is equal to the height difference between the peripheral border 5c of the central depression 5a and the peripheral portion 5b of the bottom plate 5, so that the separator 6 and the peripheral portion 5b of the bottom plate 5 together form a flat, uninterrupted and uniform bottom surface 3.

[0041] On the separator 6 there is a plurality of communication holes 6a, grouped in ten series of holes aligned along equiangular lines radiating from a central point.

[0042] In practice the basin formed by the central depression 5a is in communication with the cooking compartment 2 through the communication holes 6a, where the plane of the bottom plate of the cooking compartment is uniform.

[0043] Associated with the separator 6 are regulation means for the steam exiting through the holes 6a. These regulation means can be operated directly by the user accessing the cooking compartment 2 of the oven 1.

[0044] In the preferred illustrated embodiment these regulation means are in the form of a regulator disk 7 rotatably associated with the separator 6 and located below the separator itself.

[0045] The regulator disk 7 permits the holes 6a to be selectively obstructed, so that all the holes 6a or only part of them can be obstructed or all of them left open, depending on the quantity of steam one wishes to let into the cooking compartment 2 in order to improve the oven preparation of the food.

[0046] In particular the regulator disk 7 comprises two series of elongated apertures 7a, 7b in a radial direction, a first series 7a having a greater width than a second series 7b. In the illustrated example the regulator disk 7 presents each aperture of greater width 7a alternating with a respective aperture of smaller width 7b. In figures 5A-5D five apertures with greater width 7a are visible (in the shape of angular sectors with increasing widths in the direction away from the central point) and five apertures of smaller width 7b (in the shape of an elongated aperture of invariable width).

[0047] Figures 5A-5D show the back of the separator 6 so as to better understand the various positions of the regulator disk 7 with respect to the separator 6 to which it is rotatably attached.

[0048] By means of rotation the regulator disk 7 can be placed in four alternative positions with respect to the holes: an open position, a position of partial obstruction, a position of total obstruction and a position for adding water. In the open position (Fig. 5C) each of the apertures 7a, 7b is placed below a corresponding series of holes, and as a result none of the communication holes 6a of the separator 6 will be obstructed, thereby permitting a larger quantity of steam to enter the cooking compartment 2. The position of partial obstruction (Fig. 5B) is created by rotating the regulator disk 7 a number of degrees away from the open position, After this rotation the apertures of smaller width 7b will no longer be aligned with the series of holes to which they corresponded, whereas the apertures of greater width 7a remain in communication with the series of holes associated with them. As a result one half of the series of holes of the separator will be obstructed, the other half open. Lastly, effecting a further rotation of the regulator disk 7 the latter will be brought in a position of full obstruction (Fig. 5A), where all the apertures are not aligned with the holes with which they corresponded before. In this latter position all communication holes 6a of the separator are therefore completely obstructed, so that no steam can enter the cooking compartment 2.

[0049] In addition to the positions just described it is possible to have a further position, illustrated in figure 5D, in which all communication holes 6a are obstructed, while only the refill hole 6b is made accessible through one of the apertures of greater width 7a of the regulator disk 7.

[0050] Solidly attached to the regulator disk 7 is a knob 7c that allows an external operator to control the disk, This knob 7c protrudes through a curved slot 6c of the separator 6, so that it projects vertically from the plane of the separator 6, thereby being easily accessible to an operator. The slot 6c, advantageously located in proximity to the openable door of the oven 1, is shaped as a

circumferential arc and it defines at its extremities two end stops for the knob 7c.

[0051] In the illustrated example, when the knob 7c is placed at a first extremity of the slot 6c, e.g. the one of figure 5C, the regulator disk 7 is rotated so that the apertures 7a, 7b are brought in correspondence with the holes 6a so that they place the basin formed by the depression 5a in communication with the cooking compartment 2 of the oven 1 (Fig. 5C); when, on the other hand, the knob 7c is moved to the center of the slot 6c, the regulator disk 7 is rotated so that the apertures 7b are moved away from the holes 6a and only the (wider) apertures 7a remain in correspondence with the series of holes 6a of the separator 6, so that only half of the holes 6a will place the basin formed by the depression 6a in communication with the cooking compartment 2 of the oven 1 (Fig. 5B); lastly, moving the knob 7c further along the slot 6c until it is placed in a blocked position by the second end stop, the one of 5A, the regulator disk 7 undergoes a rotation that also distances the (wider) apertures '7a from the holes 6a, so that all the holes 6a of the separator 6 are obstructed by the regulator disk, thereby totally separating the basin formed by the depression 5a from the cooking compartment 2 of the oven 1, preventing the steam from reaching the cooking compartment and allowing the oven to function without steam also with water present in the depression 5a.

[0052] One will note that the separator 6 furthermore presents the refill hole 6b, advantageously placed in the area in proximity to the openable door of the oven. This refill hole 6b, whose function is that of permitting the underlying basin formed by the central depression 5a to be filled with water, can also selectively be obstructed by the regulator disk 7 described above.

[0053] Whenever one wishes to refill the basin formed by the depression 5a with new water, the knob 7c is placed in a different position between the center of the slot 6c and the extremity of Fig, 5A.

[0054] From an operational point of view, when one wishes to use the oven for cooking with the auxiliary use of steam, water is poured into the basin formed by the depression 5a through the refill hole 6b. This water fills the central depression 5a and is available for cooking with the auxiliary use of steam. Then, placing the regulator disk 7 in one of the two positions of partial or complete opening of the communication holes 6a of the separator 6, when boiling temperature is reached the water will evaporate and enter the cooking compartment 2. When one wishes to interrupt the formation of steam inside the oven, one only needs to move the knob to rotate the steam regulator disk 7 and completely close the holes 6a of the separator 6.

[0055] In practice an extremely versatile system of steam regulation is available inside the cooking compartment that is easy to use and efficacious.

[0056] From the description above one will apprehend that the oven according to the present invention meets with needs and overcomes the drawbacks discussed in the introductory part of the present description with reference to the prior art.

[0057] In fact the kitchen oven 1 can be used to improve cooking, in that the realization of the system that allows steam to be generated inside the cooking compartment is extremely efficacious and manufactured with facility.

[0058] Furthermore it presents total control by the end user also in terms of the regulation of the steam that is to be generated.

[0059] The oven according to this realization is extremely versatile because when the holes of the separator are blocked, the oven is entirely identical to a traditional oven without steam function.

[0060] Obviously a person skilled in the art will be able, in view of meeting with specific contingencies and specifications, to apply numerous modifications and variations, which will nevertheless be within the scope of protection of the invention as defined by the following claims.

Claims

1. Kitchen oven (1) comprising a cooking compartment (2), at the lower end defined by a bottom surface (3), and heating means intended to raise the temperature inside said cooking compartment (2) to levels that are sufficient for cooking food that is placed in it, **characterized in that** it further comprises: a bottom plate (5) having a central depression (5a) integrally formed with it and extending all the way to the proximity of the lateral perimeter of the bottom surface (3); a separator (6) that obstructs said central depression (5a) from above and separates it from the cooking compartment (2), said separator (6) comprising communication holes (6a) between the central depression (5a) and the cooking compartment (2); wherein said separator (6) helps to define said substantially continuous and planar bottom surface (3), said heating means comprising heating elements located directly below said central depression (5a).

2. Kitchen oven (1) according to claim 1, wherein said bottom wall (5) further comprises a flat peripheral portion (5b) that is integrally formed with said central depression (5a), said peripheral portion (5b) helping to define with the separator (6) the substantially continuous and planar bottom surface (3).

3. Kitchen oven (1) according to claim 1 or 2, wherein said central depression (5a) comprises a perimetrical edge (5c) that is lowered with respect to the peripheral portion (5b) and intended to receive in abutment a corresponding portion of the perimetrical edge of the separator (6).

4. Kitchen oven (1) according to one of the preceding claims, wherein said central depression (5a) has a

depth that is less than 30 mm.

5. Kitchen oven (1) according to one of the preceding claims, wherein said separator (6) has a refill hole (6b) for introducing water into the depression (5a).

6. Kitchen oven (1) according to one of the preceding claims, further comprising steam regulation means (7) able to obstruct at least partially said communication holes (6a), said regulation means being directly manually adjustable by an operator.

7. Kitchen oven (1) according to claim 6, wherein said regulation means comprise a regulator plate (7) associated with said separator (6), said regulation plate (7) being movable with respect to the holes (6a) of said separator (6) between a closing position wherein it isolates the depression (5a) from the cooking compartment (2) of the oven (1) and an open position wherein it allows the holes (6a) of the separator (6) to place the depression (5a) in communication with the cooking compartment (2) of the oven (1).

8. Kitchen oven (1) according to claim 7, wherein said regulation plate comprises a regulator disk (7) rotatably associated with said separator (6), said regulator disk (7) being able to occupy at least a position of full obstruction, wherein said communication holes (6a) are completely obstructed by the regulator disk (7), and an open position in which said communication holes (6a) are left free to place the depression (5a) in communication with the cooking compartment (2) of the oven (1).

9. Kitchen oven (1) according to claim 8, wherein said regulator disk (7) has apertures (7a, 7b) shaped and placed in such a manner to selectively permit the opening and closing of the communication holes (6a) of the separator (6).

10. Kitchen oven (1) according to claim 9, wherein with said regulator disk (7) means are associated for rotating the disk with respect to the communication holes (6a) of the separator (6),

11. Kitchen oven (1) according to claim 10, wherein said rotation means comprise a knob (7c) that is solidly attached to the regulator disk (7) and that sticks out from a slot (6c) made in said separator (6) so as to protrude inside the cooking compartment (2), said knob (7c) being slidable inside said slot (6c) between a first end stop position, corresponding to the open position of the communication holes (6a), and a second end stop position, corresponding to the position of complete obstruction of the communication holes (6a).

12. Kitchen oven (1) according to claim 11, wherein said apertures (7a, 7b) of the regulator disk (7) are shaped and placed in such a way that when the knob is placed in a central position with respect to said first and second end stop positions, half of the communication holes (6a) will be obstructed while the remaining half will be left open to place the depression (5a) in communication with the cooking compartment (2).

13. Kitchen oven (1) according to claim 12, wherein said communication holes (6a) are aligned along a plurality of radial lines that depart from a central point and said apertures (7a, 7b) are elongated apertures that can selectively be aligned radially with said lines.

14. Kitchen oven (1) according to claim 13, wherein said apertures (7a, 7b) present at least two different widths, in order to permit the regulator disk (7) to evolve from an open position, in which all communication holes (6a) face respective apertures (7a, 7b) to a position of partial obstruction, in which only the apertures (7a) with greater width remain facing the respective communication holes (6a).

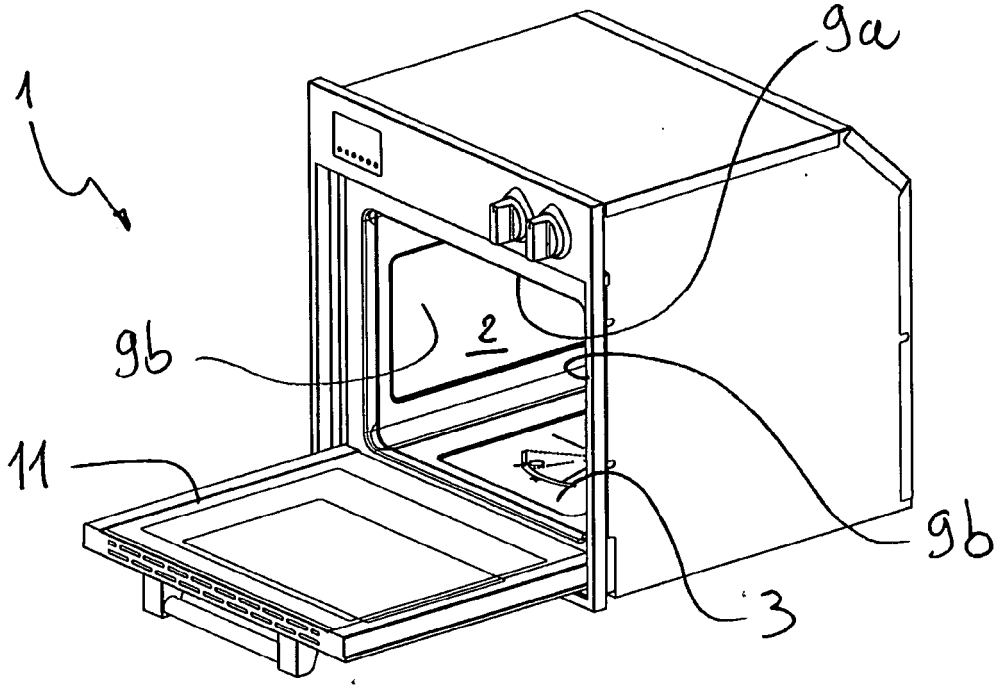

FIG. 1

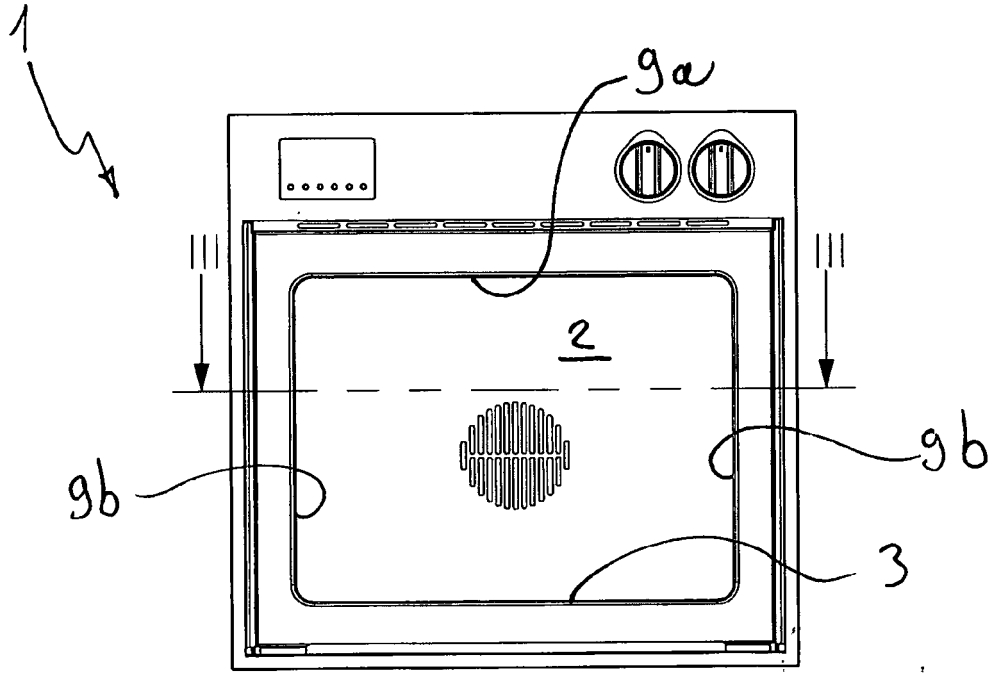

FIG. 2

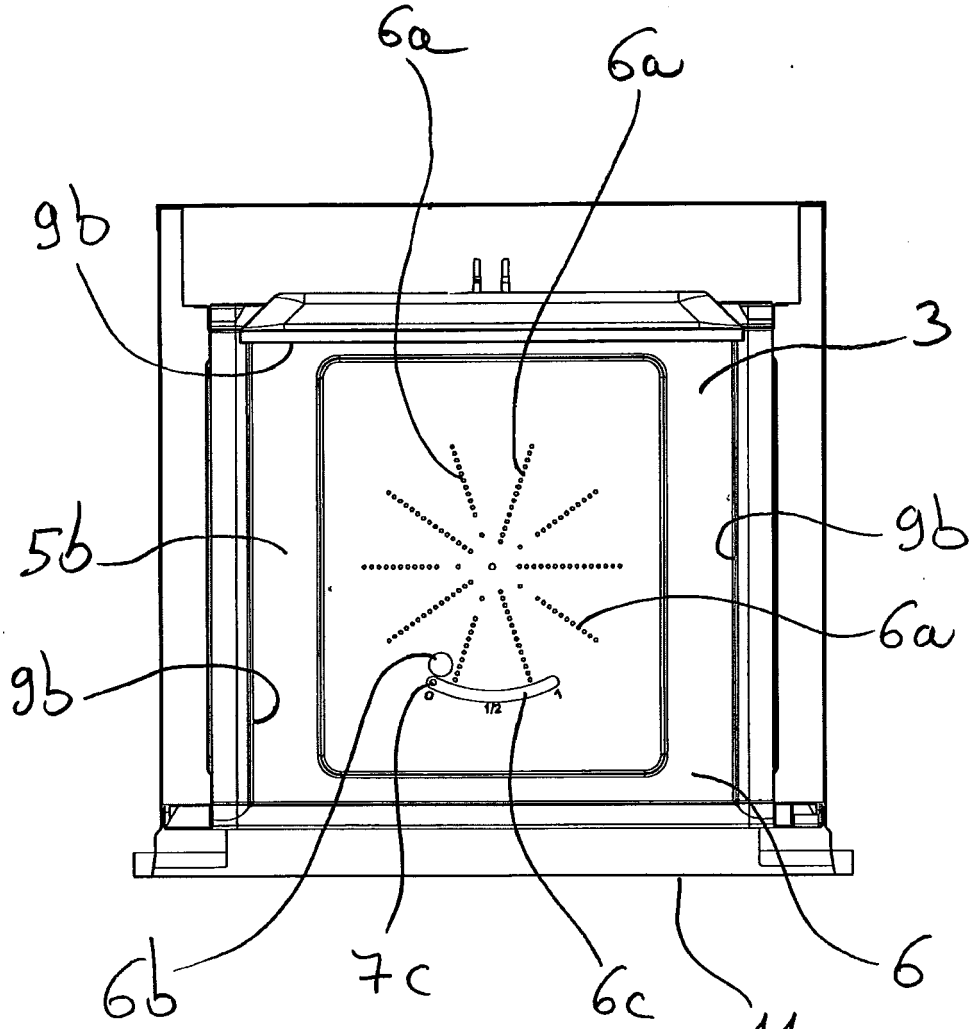

FIG. 3

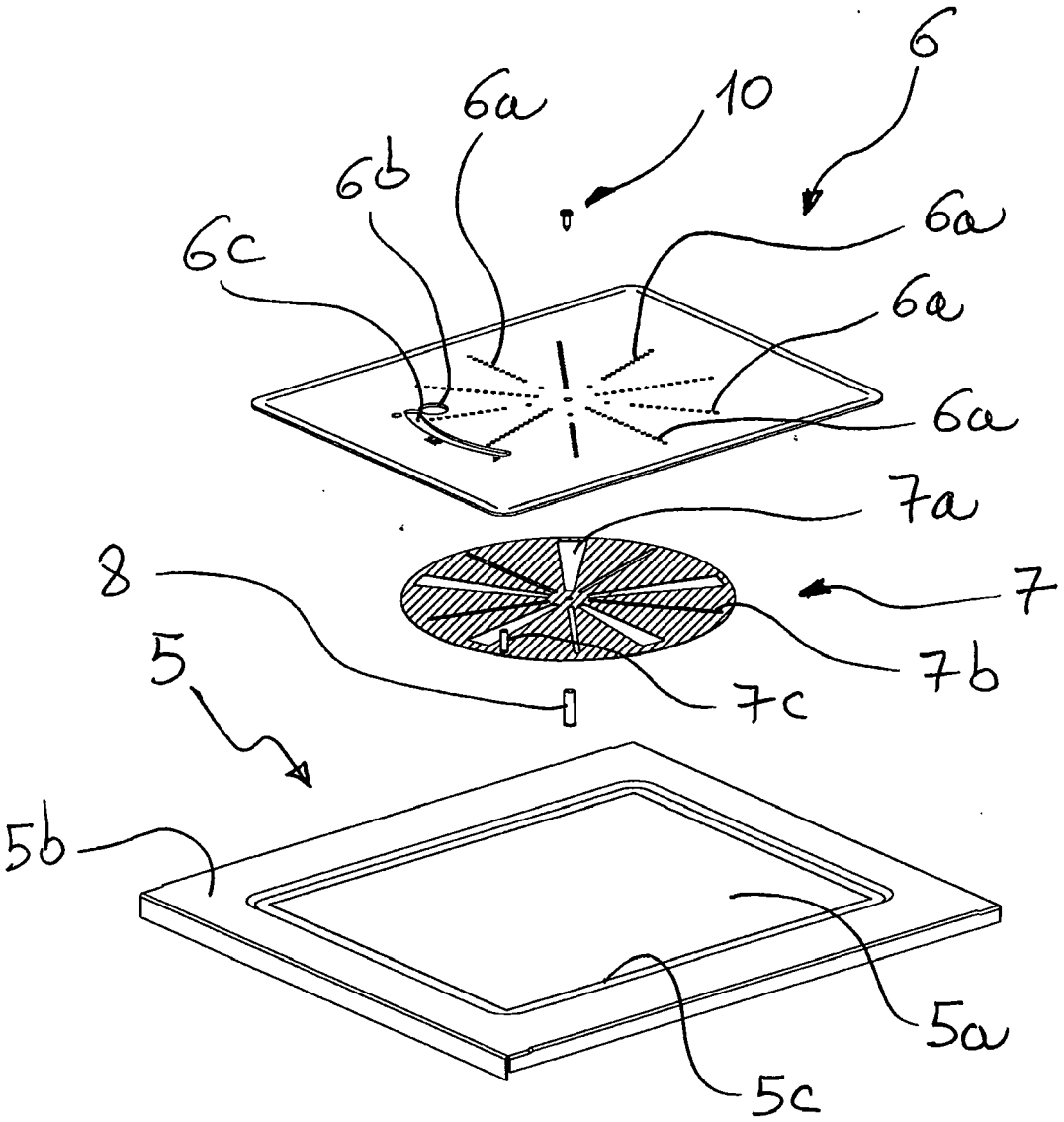

FIG. 4

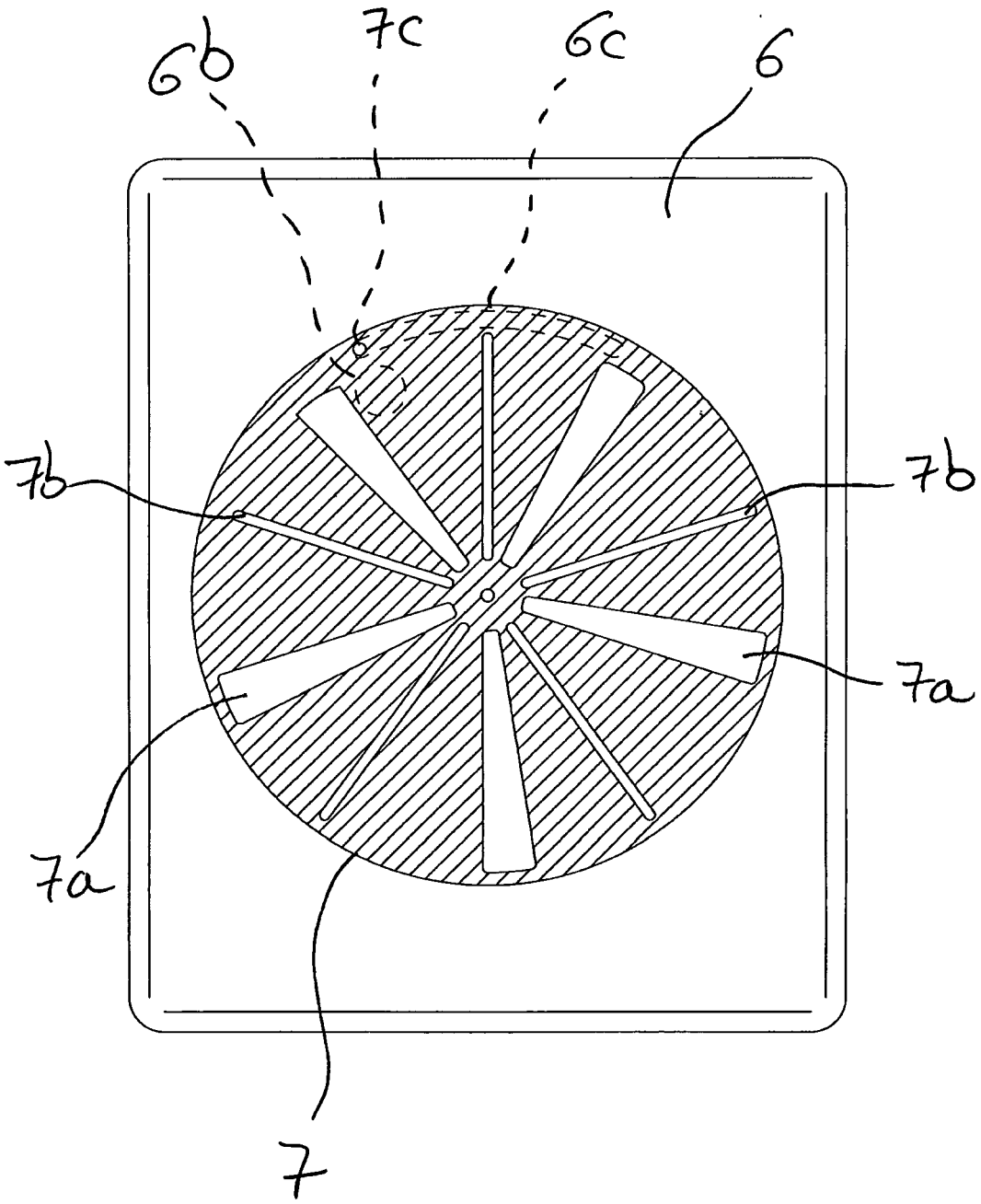

FIG. 5A

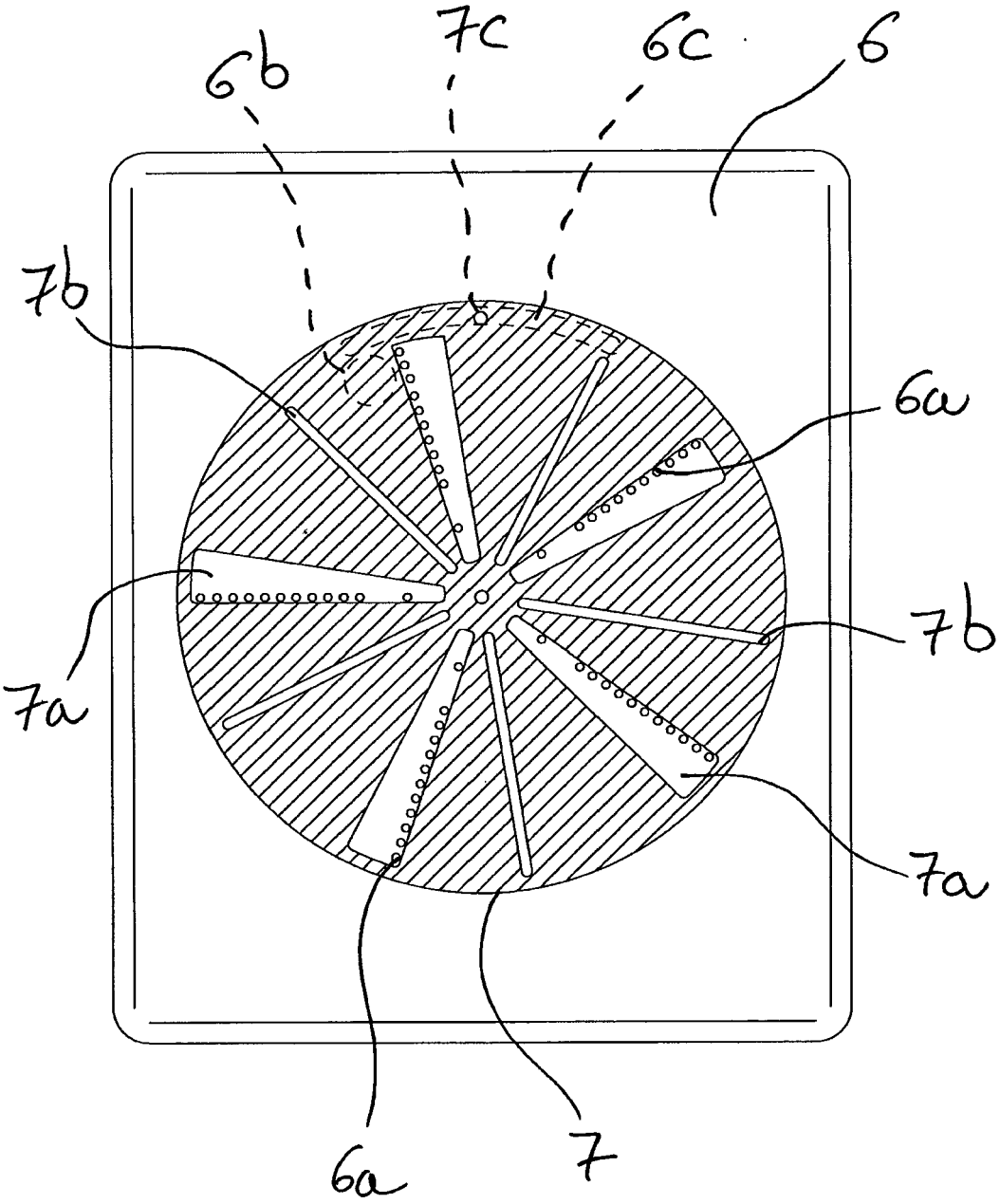

FIG. 5B

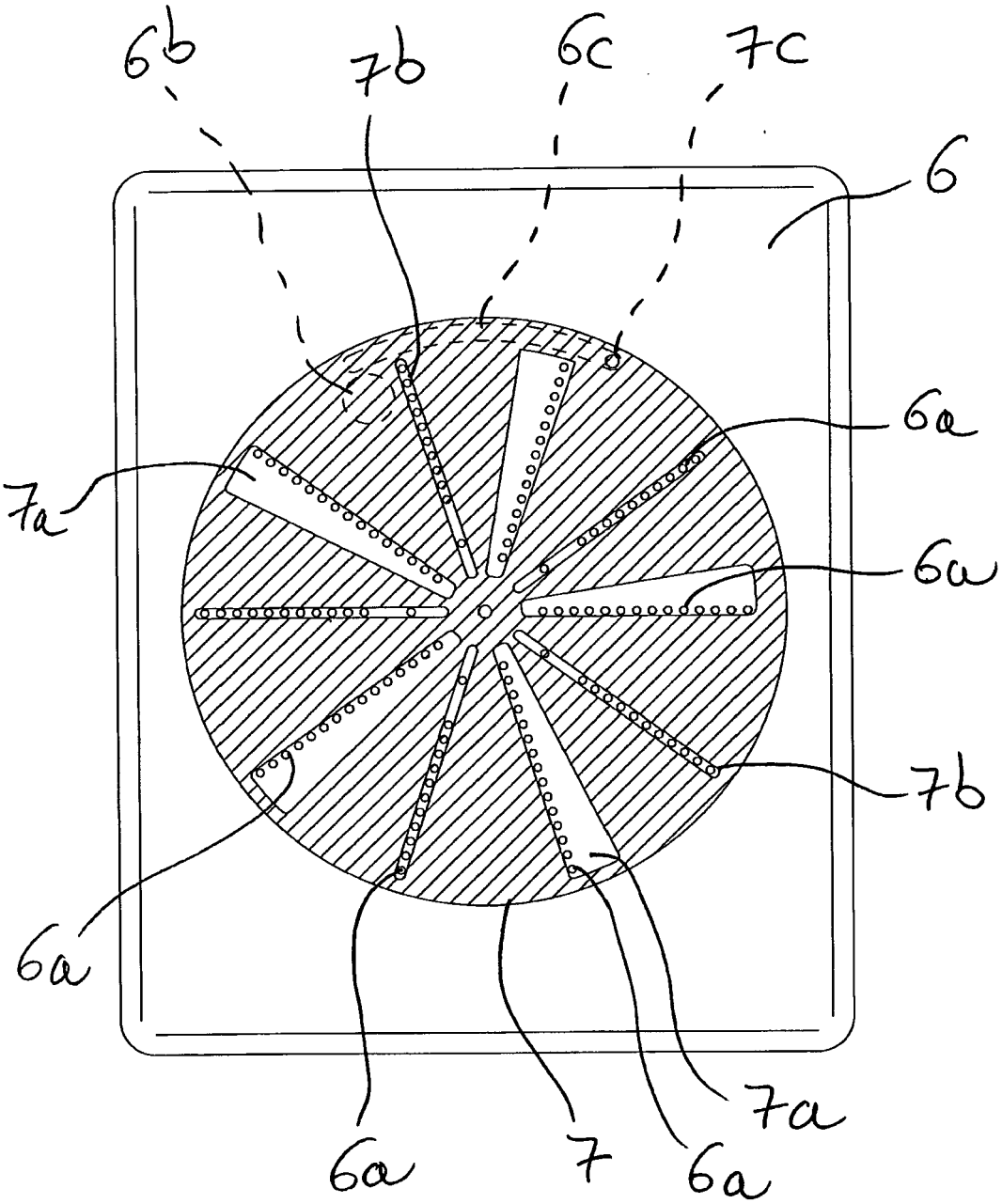

FIG. 5C

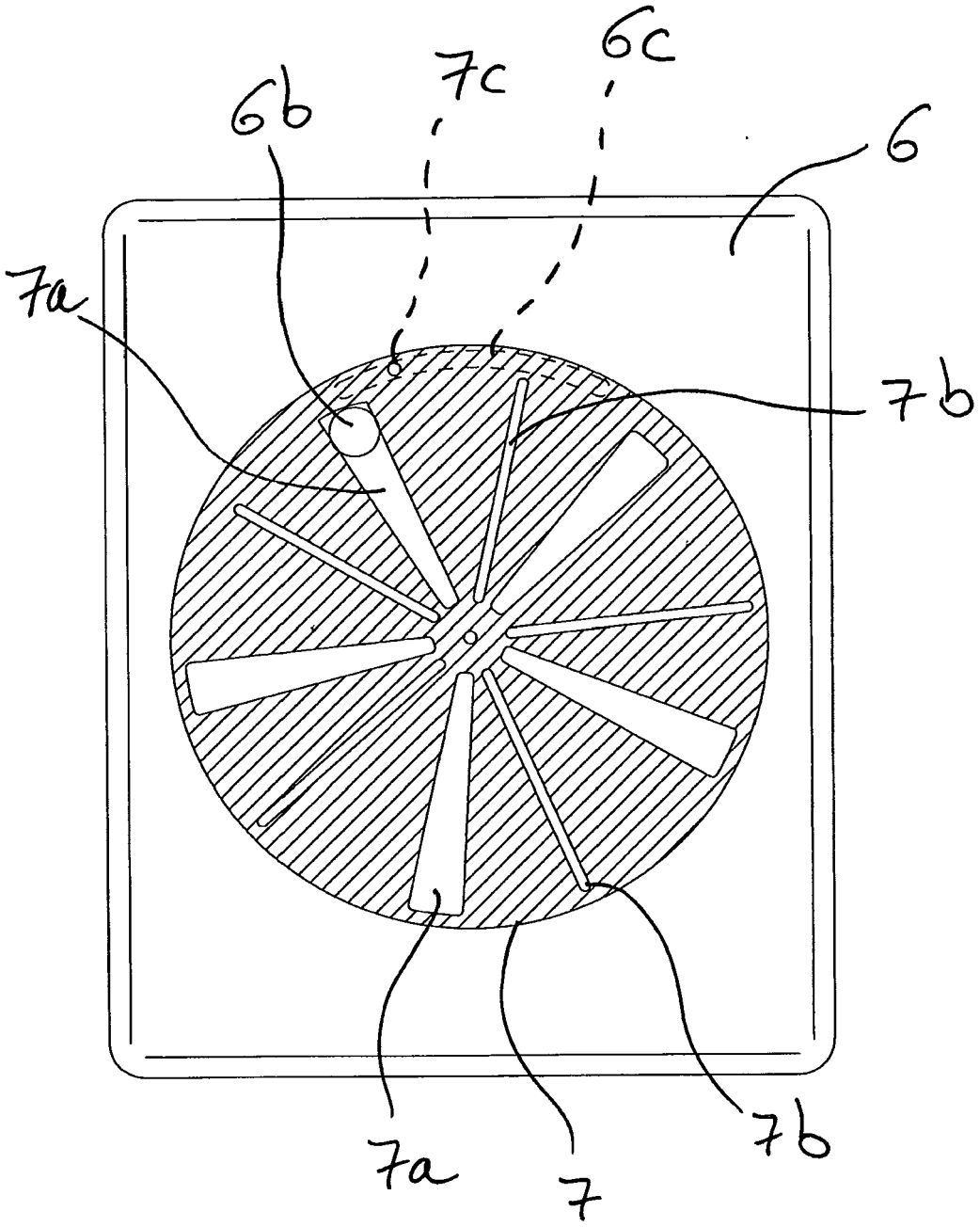

FIG. 5D

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EUROPEAN SEARCH REPORT

Application Number
EP 11 42 5183

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 088 378 A2 (SAMSUNG ELECTRONICS CO LTD [KR]) 12 August 2009 (2009-08-12) * claim 10; figure 2 * -----	1-5	INV. F24C15/32
X	US 2006/081592 A1 (WILLIAMS RAFE T [US] ET AL) 20 April 2006 (2006-04-20) * figures 2,4 * -----	1	
A	JP 6 217880 A (SHARP KK) 9 August 1994 (1994-08-09) * abstract; figures 2-5 * -----	6-14	

TECHNICAL FIELDS SEARCHED (IPC)

A21B
F24C
H05B
A47J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 January 2012	Adant, Vincent

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1

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