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(54) **PROFESSIONAL COOKING OVEN WITH STEAM GENERATOR**

(57) A professional electric cooking oven includes a cooking resistor (1) mounted on the rear wall (2) of the cooking chamber, a water supply duct (4), a deflector that protects a user from contact with the cooking resistor (1), a tray (6) placed in a position to receive the water fed through the duct (4) and a second resistor (7) that extends into the tray (6) so that most of the second resistor (7) is immersed in water when the tray (6) is filled, the deflector protecting a user also from contact with the second resistor (7).

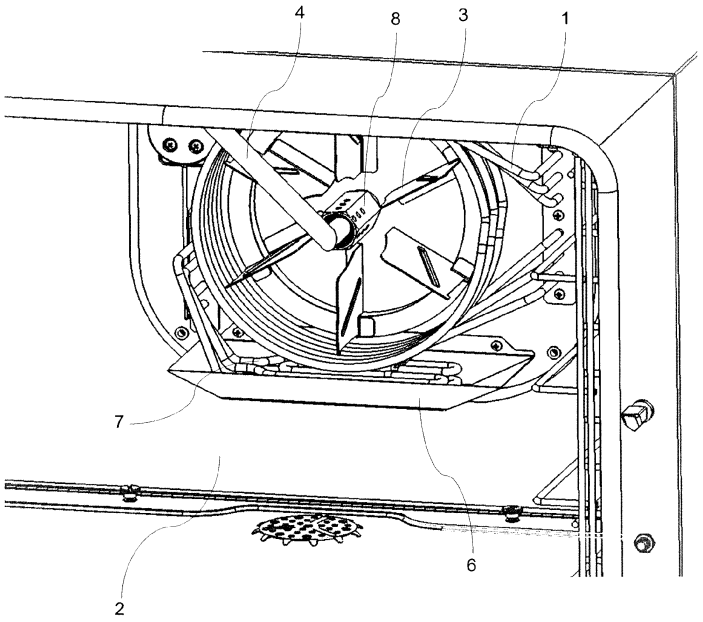

Fig.2

EP 3 722 679 A1

Description

[0001] This invention concerns professional ovens for cooking food or semi-finished food products, and in particular an electric oven equipped with a steam generator device. It is known that there are mainly three types of professional electric cooking ovens, namely static ovens, convection ovens and convection ovens with steam generators, with progressively increasing performance and costs.

[0002] In static ovens the temperature is regulated only by the operating time of an electric resistor, placed in the cooking chamber behind a deflector, which heats the air in the cooking chamber where the circulation takes place by natural convection. The thermal action is simple and rudimentary, since the food does not come into direct contact with the electric resistor but reaches the cooking temperature through the action of the surrounding superheated air. The structural simplicity of the static oven does not allow to act in the cooking chamber with other parameters, such as ventilation and steam, to achieve more sophisticated heat treatments of food.

[0003] In convection ovens there is a fan, also placed behind the deflector and preferably inside a circular electric resistor, which causes a forced convection motion of the air inside the cooking chamber. The dynamically forced air distributes the thermal energy better, causing greater penetration into the food, thus obtaining significant advantages compared to static cooking:

- greater efficiency and uniformity of the cooking action, with lower cooking times and temperatures, and consequently a lower weight loss of the food;
- the possibility of handling different foods at the same time, since forced air convection prevents the mixing of smells and flavours in the cooking chamber;
- energy saving associated with a qualitatively superior result.

[0004] In convection ovens with steam generator, the user has the possibility to activate the steam function to create an even wider range of cooking, and the steam can also be used for regeneration and maintenance cycles of already cooked foods.

[0005] In this type of oven the steam can be generated directly or indirectly: in the first case by nozzles that spray water particles directly on the electric resistor and thanks to the fan that distributes the steam evenly in the cooking chamber, while in the second case by means of an autonomous steam generator (boiler) located inside the structure of the oven but outside the cooking chamber, in which the steam is injected through pipes from the boiler.

[0006] In the first case, the generation of steam is linked to the functioning of the cooking resistor, whereby these ovens cannot cook only with steam, and furthermore the result is a superheated steam that reaches temperatures >100°C and is more aggressive than saturated steam, so it can give rise to peripheral oxidation, especially of leafy vegetables. In the second case, the oven can also cook only with steam and at a lower temperature, since the functioning of the cooking resistor is not required to generate steam, and the boiler allows to operate at steam saturation with a steam that remains at a constant temperature of about 100°C and is less aggressive for the food, thus avoiding oxidation phenomena.

[0007] Professional ovens are also usually equipped with a cooking chamber washing system consisting of a number of nozzles and/or sprayers fed by a washing pump that delivers a washing/rinse fluid (i.e. water and detergent or water only), as well as a drain pump that draws away the fluid that flows from the cooking chamber through suitable drain openings. It is therefore clear that a professional oven that offers the best performance also has a rather complex and expensive structure, both in terms of production and maintenance, for the high quantity and variety of its components.

[0008] The purpose of this invention is therefore to provide an oven that is free from such drawbacks. This purpose is achieved with an oven equipped with a device that generates steam directly inside the cooking chamber but without using the cooking resistor, generating saturated steam through a specific resistor located in a tray arranged behind the deflector and fed with water through a suitable diffuser. In the following we will make specific reference to a convection oven, but it is clear that what is being said can also be applied to a static oven.

[0009] A first important advantage of this oven is to improve the performance of the steam generator in terms of speed and energy efficiency, because the saturated steam is generated directly inside the cooking chamber instead of coming from a device external to it as a traditional boiler, whereby the steam does not pass through the supply pipes where it cools down and disperses heat outside the cooking chamber.

[0010] A second notable advantage of this oven is the possibility to use the steam generating resistor also for cooking when the tray is empty, given the position in which it is located, so as to obtain a reduction in energy consumption thanks to the better efficiency of the system. For example, a 6 KW cooking resistor can be used to immediately bring the oven to temperature and then a 2 KW steam resistor can be used to maintain the temperature during cooking, thus obtaining lower power jumps when the oven thermostat switches the resistor on and off.

[0011] Another significant advantage of the oven in question derives from the possibility to load the tray with a mixture of water and detergent (or only with water) that is vaporized to perform the washing of the cooking chamber using vapours of washing/rinsing fluid. In this way, it is possible to increase the coverage of the surface affected by the cleaning by reaching all the points of the cooking chamber, even the most difficult to reach with nozzles/sprinklers such as behind the deflector.

[0012] Still another important advantage of the above-

mentioned oven is the reduction in the number and complexity of its components, since the traditional and expensive washing system described above can be simplified, and the steam generator inside the cooking chamber is much simpler than the external boiler and does not require connections with the cooking chamber. In this way, with the same performances, a considerable economic saving is obtained both in the production phase and in the maintenance of the oven.

[0013] Further advantages and characteristics of the oven according to the present invention will be evident to those skilled in the art from the following detailed description of an embodiment thereof with reference to the annexed drawings, in which:

Fig. 1 is a frontal perspective view of the oven with some components removed for greater clarity;
Fig.2 is a partial enlarged view of the oven of Fig. 1 with the addition of a couple of components;
Fig.3 is a frontal view of the oven of Fig.2 with the addition of the deflector;
Fig.4 is a magnified perspective view of the water diffuser;
Fig.5 is a rear perspective view of a variant of the deflector; and
Fig.6 is a frontal perspective view of the oven with the deflector of Fig.5.

[0014] Referring to figures 1-3, there is seen that an oven according to the invention traditionally includes a cooking resistor 1, mounted on the rear wall 2 of the cooking chamber, having preferably a circular shape so as to receive inside it a fan 3, preferably coaxial thereto, to realize the forced convection of the air heated by resistor 1. A duct 4 to supply the water used to generate the steam extends from the rear wall 2 and passes in front of resistor 1 to end inside it, with an end section also preferably coaxial thereto. A square deflector 5 mounted on the rear wall 2 protects the user from contact with resistor 1 and fan 3, and is provided with holes for the passage of duct 4 so that the section of duct 4 parallel to the rear wall 2 remains in front of deflector 5.

[0015] The main novel aspect of this oven lies in the presence inside the cooking chamber of a tray 6, arranged in such a position as to receive the water fed through duct 4, and of a second resistor 7 that extends into said tray 6 so that most of resistor 7 is immersed in water when tray 6 is filled. In this way, resistor 7 can be used to generate saturated steam directly inside the cooking chamber, which steam is then distributed by fan 3, as mentioned above.

[0016] Note that since the water fed through duct 4 is not used to generate superheated steam by spraying it on the cooking resistor 1, duct 4 does not have a spray nozzle on its outlet. However, it is preferable that the water is not simply delivered from duct 4 directly into tray 6, whereby the present oven preferably includes a diffuser 8 which is mounted so as to surround the outlet of duct 4, being preferably mounted in the centre of fan 3.

[0017] This diffuser 8, as better illustrated in Fig.4, has a cylindrical shape with a plurality of circumferential grooves 8a formed internally, preferably with a constant pitch, and a plurality of radial holes 8b made in correspondence of said grooves 8a preferably along the entire perimeter of diffuser 8. Thanks to this structure, diffuser 8 performs a controlled release of the water supplied by duct 4 distributing it in tray 6 even while diffuser 8 rotates with fan 3.

[0018] In the embodiment shown in Fig.2, tray 6 is a separate component mounted on the rear wall 2 same as the other components 1, 3, 5 and 7, tray 6 being preferably in a centered position with respect to fan 3. However, the tray could also be integrated into the deflector as shown by the variant illustrated in figures 5 and 6.

[0019] In this case, deflector 9 has an octagonal shape, instead of a square shape like deflector 5, with a number of slots 10 formed in the side walls. On the contrary, the bottom wall 11 is solid and has a raised rear edge 12 so that the lower portion of deflector 9 can contain water and perform the same function as tray 6 (resistor 7 being obviously housed in this lower portion).

[0020] It is clear that the embodiment of the oven according to the invention described and illustrated above is only an example susceptible to numerous variations. In particular, both the cooking resistor 1 and the steam resistor 7 can be composed of multiple units (e.g. 3 x 2 KW for resistor 1, 2 x 1 KW for resistor 7), there can be more than one fan, the diffuser 5/9 can have other shapes, and the relative arrangement and configuration of components 1, 3, 4, 6 and 7 can vary depending on specific construction requirements.

Claims

1. Professional electric cooking oven comprising a cooking chamber, a cooking resistor (1) mounted on the rear wall (2) of said cooking chamber, a water supply duct (4) extending from said rear wall (2) and a deflector (5; 9) mounted on the rear wall (2) so as to protect a user from contact with said cooking resistor (1), **characterized in that** it further includes a tray (6), located inside the cooking chamber in a position to receive the water fed through said duct (4), and a second resistor (7) that extends into said tray (6) so that most of said second resistor (7) is immersed in water when the tray (6) is filled, said deflector (5; 9) protecting a user also from contact with the second resistor (7).

2. Oven according to claim 1, **characterized in that** it further includes a diffuser (8) mounted so as to surround the outlet of the water supply duct (4), said diffuser (8) having a cylindrical shape with a plurality of circumferential grooves (8a) formed internally, preferably with a constant pitch, and a plurality of

through radial holes (8b) made in correspondence of said circumferential grooves (8a), preferably along the entire perimeter of the diffuser (8).

3. Oven according to claim 1 or 2, **characterized in that** the tray (6) is integrated in the deflector (9) which has a solid bottom wall (11) and has a raised rear edge (12) such that the lower portion of the deflector (9) can contain water and accommodate the second resistor (7).

4. Oven according to the previous claim, **characterized in that** the deflector (9) has an octagonal shape and a plurality of slots (10) formed in the side walls.

5. Oven according to any of the previous claims, **characterized in that** it further includes a fan (3) placed in the cooking chamber for the forced convection of the air, the deflector (5; 9) protecting a user also from contact with said fan (3).

6. Oven according to the previous claim, **characterized in that** the cooking resistor (1) has a circular shape and the fan (3) is mounted within said circular shape, preferably coaxial thereto.

7. Oven according to the previous claim, **characterized in that** the water supply duct (4) passes in front of the cooking resistor (1) and ends inside said circular shape, preferably with an end section coaxial thereto.

8. Oven according to claims 2 and 7, **characterized in that** the diffuser (8) is mounted in the center of the fan (3).

9. Method of operation of an oven according to any of the previous claims, including a step of heating the oven by activating the cooking resistor (1) up to a set cooking temperature and then deactivating the cooking resistor (1), **characterized in that** the maintenance of said cooking temperature is obtained by activating and deactivating the second resistor (7).

10. Method of operation of an oven according to any of claims 1 to 8, including a phase of washing of the cooking chamber with a washing/rinse fluid, **characterized in that** said washing phase is performed using vapours of washing/rinse fluid obtained by loading the tray (6) with a mixture of water and detergent or only water and activating the second resistor (7).

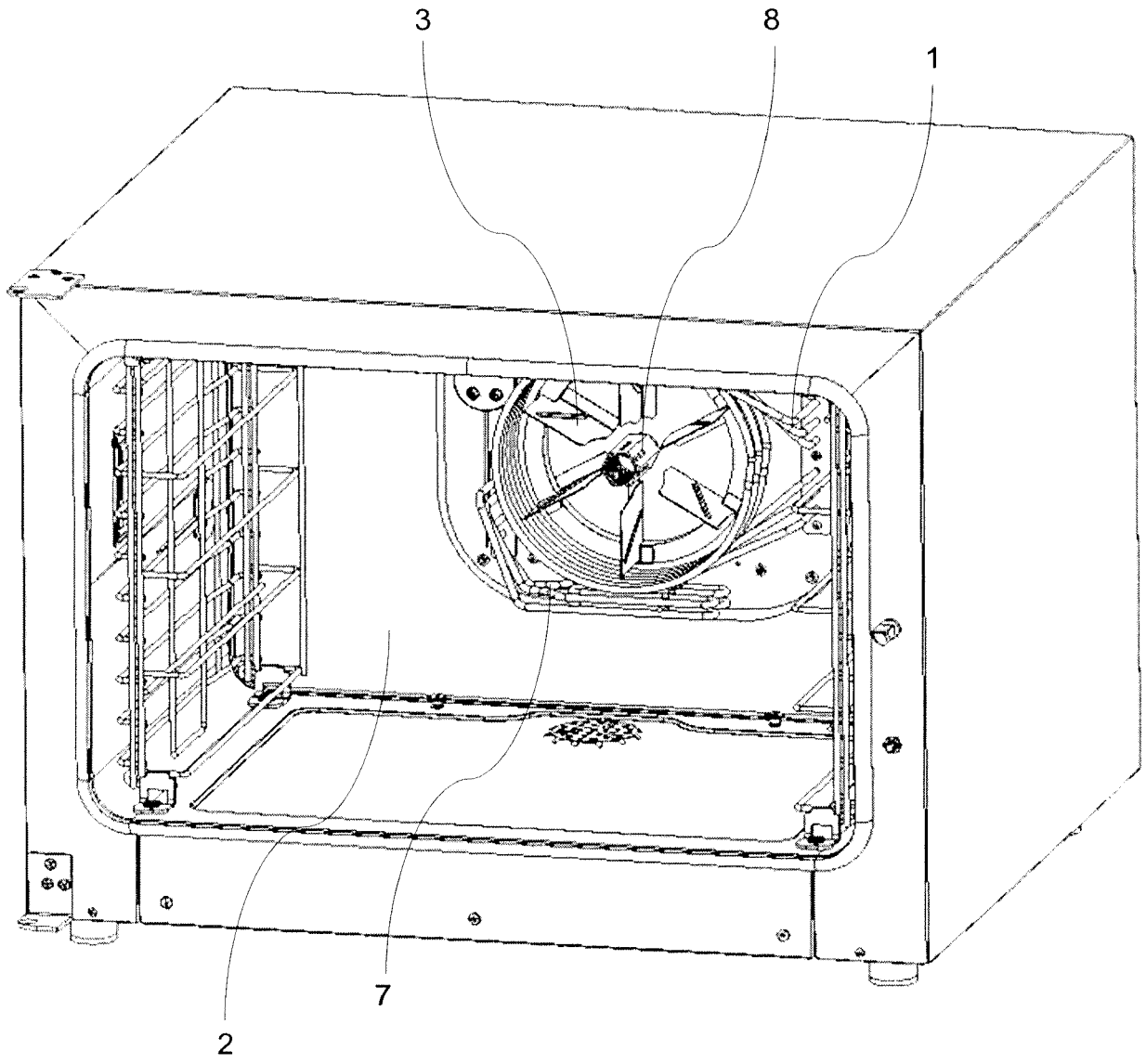

Fig.1

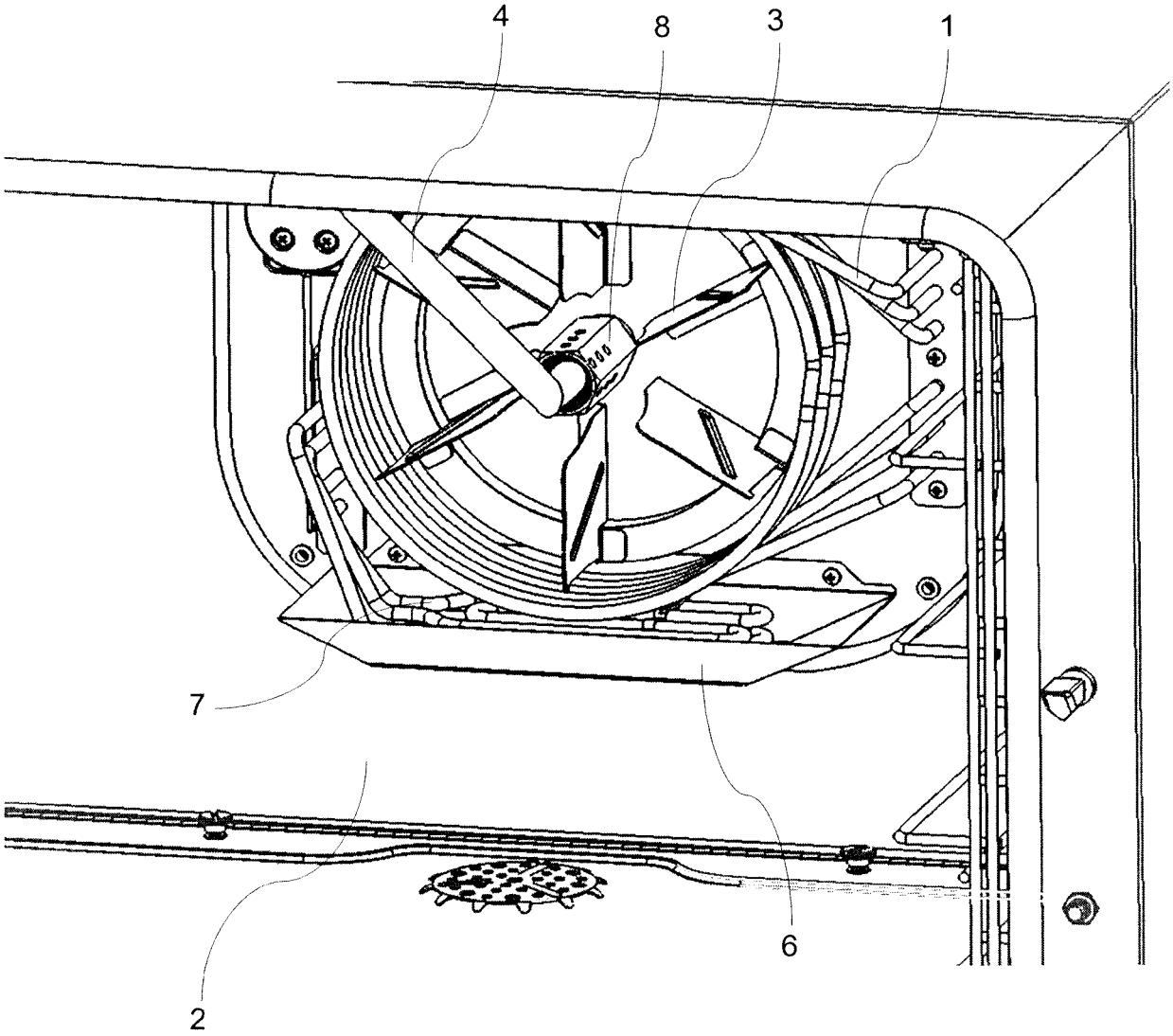

Fig.2

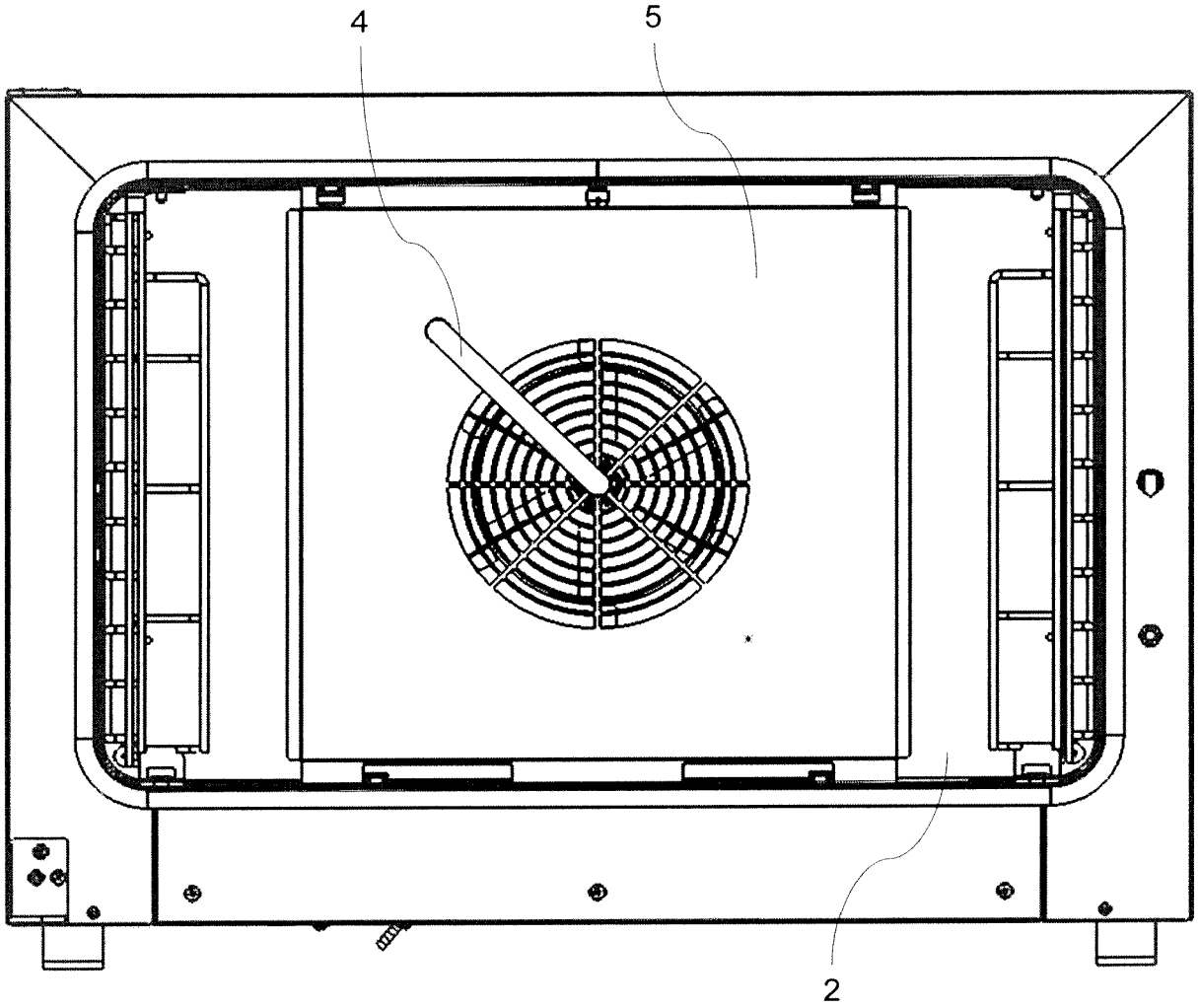

Fig.3

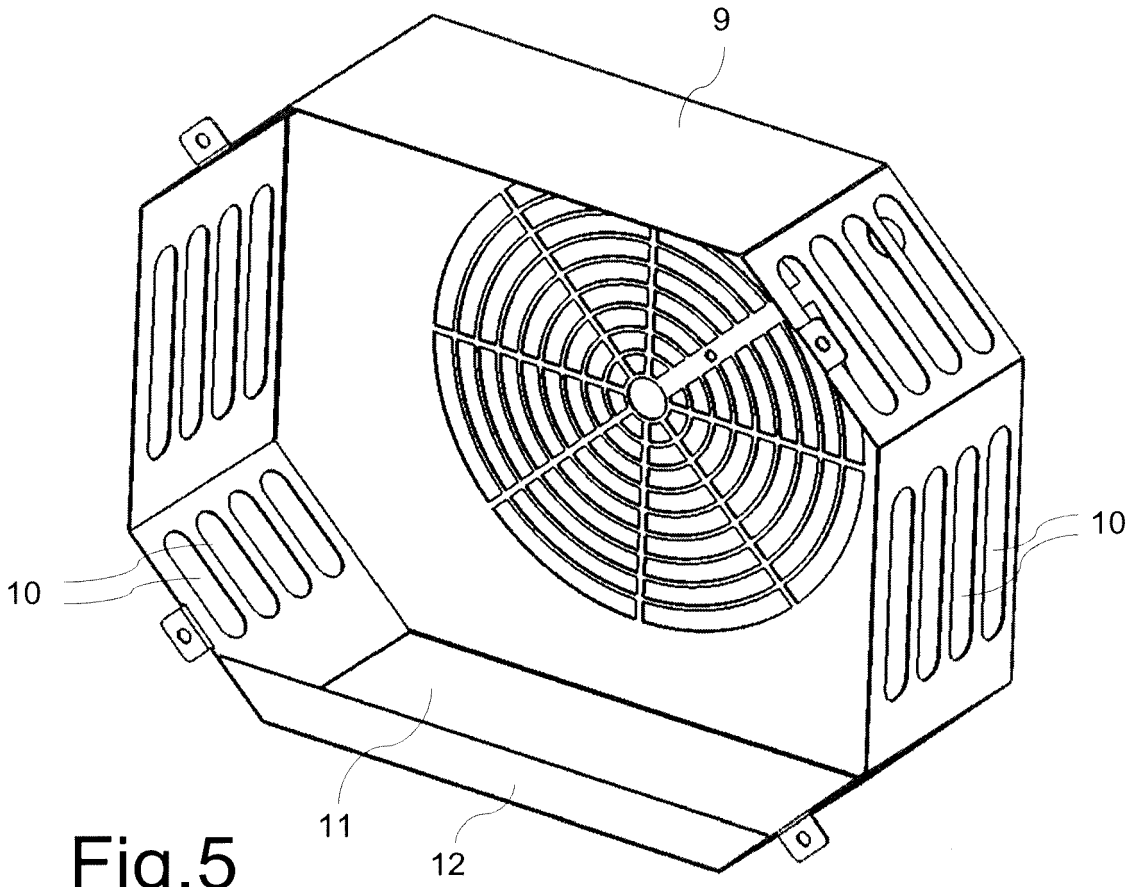

Fig.5

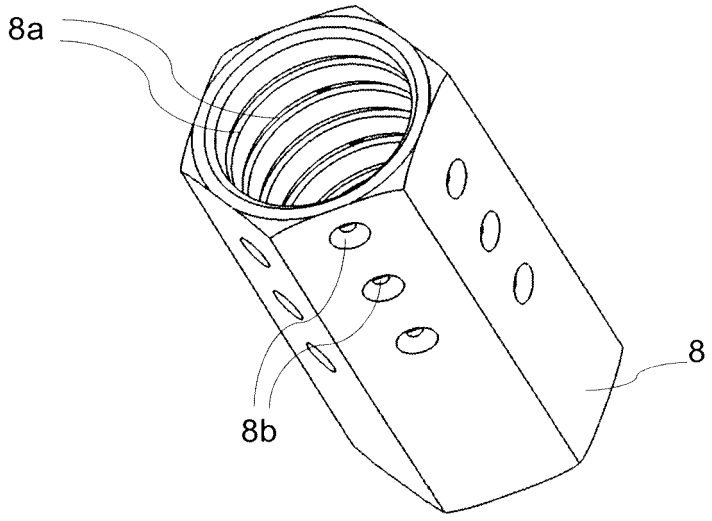

Fig.4

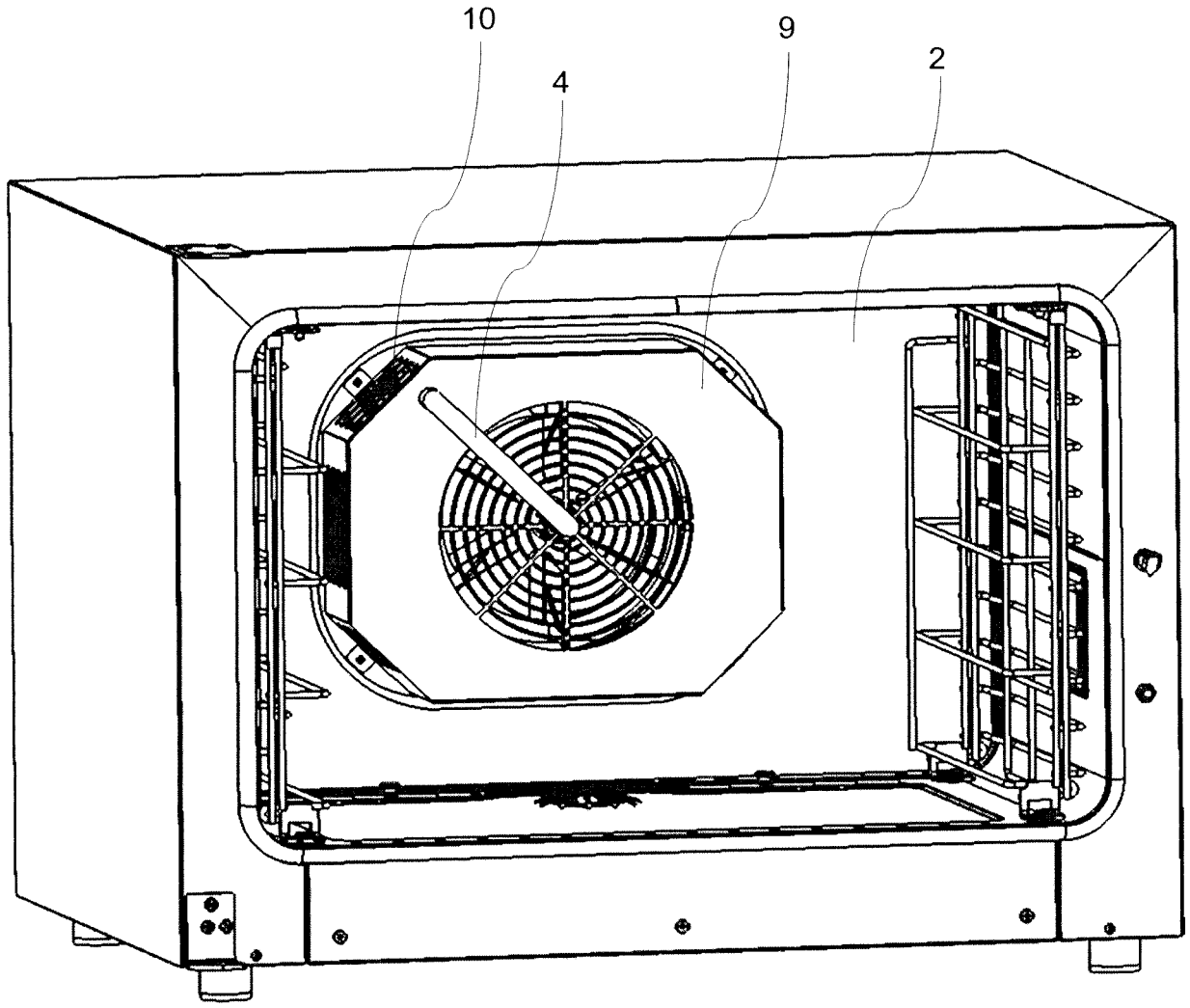

Fig.6

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EUROPEAN SEARCH REPORT

Application Number
EP 19 42 5028

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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	23 September 2019	Jalal, Rashwan

CATEGORY OF CITED DOCUMENTS

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