



(11) **EP 3 722 679 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
17.11.2021 Bulletin 2021/46

(51) Int Cl.:
F24C 15/32 ^(2006.01) **F24C 15/36** ^(2006.01)
F24C 14/00 ^(2006.01)

(21) Application number: **19425028.8**

(22) Date of filing: **10.04.2019**

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

PROFESSIONELLER KOCHOFEN MIT DAMPFERZEUGER

FOUR DE CUISSON PROFESSIONNEL COMPORTANT UN GÉNÉRATEUR DE VAPEUR

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

(43) Date of publication of application:
14.10.2020 Bulletin 2020/42

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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 $>100^{\circ}\text{C}$ 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] There are also more complex ovens like those disclosed in DE 10256889A1 and IT PN20100017A1 that have three different heating devices, one for heating the air inside the cooking chamber, one for generating steam directly inside the cooking chamber by spraying water as described above, and one for generating steam indirectly outside the cooking chamber in a boiler. This structure results in a double water supply line with double valves and is quite bulky and expensive.

[0008] Somewhat simpler oven structures are disclosed in EP 1617148A1 and KR 20050056054A wherein the steam is generated only directly inside the cooking chamber, however not through the above-described spraying method but rather by having a dedicated resistance immersed in a water tray that is filled through a water supply line. Although dispensing with the outside boiler makes these ovens less bulky and expensive, they still require a specific water tray to be mounted inside the cooking chamber behind the deflector, which requires space and labour.

[0009] 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 through a specific resistor located in a tray arranged behind the deflector and fed with water through a suitable diffuser, as in EP 1617148A1 and KR 20050056054A, but with the tray being integrated into the deflector. 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.

[0010] An important advantage of the above-mentioned oven is the reduction in the number and complexity of its components, since the steam generator inside the cooking chamber is much simpler than an external boiler and does not require a separate water tray to be arranged in 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.

[0011] 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.

[0012] 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.

[0013] Inside the cooking chamber there is a tray 6, arranged in such a position as to receive the water fed through duct 4, and 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.

[0014] 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.

[0015] 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.

[0016] 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 present invention concerns tray 6 being integrated into the deflector as shown in figures 5 and 6.

[0017] 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).

[0018] 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. 3×2 KW for resistor 1, 2×1 KW for resistor 7), there can be more than one fan, the deflector 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, whilst remaining in the scope of the invention as defined by the claims.

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), a tray (6) located inside the cooking chamber in a position to receive the water fed through said duct (4), 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, and a deflector (9) mounted on the rear wall (2) so as to protect a user from contact with said cooking resistor (1) and second resistor (7), **characterized in that** the tray (6) is integrated in said 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).
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 any of the previous claims, **characterized in that** the deflector (9) has an octagonal shape and a plurality of slots (10) formed in the side walls.
4. 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 (9) protecting a user also from contact with said fan (3).
5. Oven according to the previous claim, **character-**

ized in that the cooking resistor (1) has a circular shape and the fan (3) is mounted within said circular shape, preferably coaxial thereto.

6. 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.
7. Oven according to claims 2 and 6, **characterized in that** the diffuser (8) is mounted in the center of the fan (3).

Patentansprüche

1. Professioneller elektrischer Kochofen, umfassend eine Garkammer, einen Kochwiderstand (1), der an der Rückwand (2) der besagten Garkammer befestigt ist, ein Wasserversorgungsrohr (4), das sich aus der besagten Rückwand (2) heraus erstreckt, einen Trog (6), der innerhalb der Garkammer an einer Stelle angeordnet ist, um das durch das besagte Rohr (4) zugeführte Wasser aufzunehmen, einen zweiten Widerstand (7), der sich in den besagten Trog (6) erstreckt, derart, dass das meiste von dem besagten zweiten Widerstand (7) in das Wasser eintaucht, wenn der Trog (6) gefüllt ist, und ein Ablenkblech (9), das an der Rückwand (2) befestigt ist, um einen Benutzer vor einem Kontakt mit dem besagten Kochwiderstand (1) und dem zweiten Widerstand (7) zu schützen, **dadurch gekennzeichnet, dass** der Trog (6) in dem besagten Ablenkblech (9) integriert ist, welches eine feste Bodenwand (11) aufweist sowie eine erhöhte rückwärtige Kante (12), derart, dass der untere Bereich des Ablenklechs (9) Wasser enthalten und den zweiten Widerstand (7) aufnehmen kann.
2. Ofen gemäß Anspruch 1, **dadurch gekennzeichnet, dass** er zusätzlich einen Diffusor (8) umfasst, welcher derart befestigt ist, dass er den Auslauf des Wasserversorgungsrohrs (4) umgibt, wobei der besagte Diffusor (8) eine zylindrische Form aufweist mit einer Mehrzahl von umlaufenden Rillen (8a), die an der Innenseite eingeformt sind, bevorzugt mit einem konstanten Abstand, und mit einer Mehrzahl von radialen Durchgangslöchern (8b), die entsprechend zu den besagten umlaufenden Rillen (8a) ausgeformt sind, bevorzugt entlang des gesamten Umfangs des Diffusors (8).
3. Ofen gemäß einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Ablenkblech (9) eine achteckige Form aufweist sowie eine Mehrzahl von Schlitzten (10) in den Seitenwänden.

4. Ofen gemäß einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** er zusätzlich einen in der Garkammer angeordneten Ventilator (3) für eine erzwungene Konvektion der Luft umfasst, wobei das Ablenkblech (9) einen Benutzer auch vor einem Kontakt mit dem besagten Ventilators (3) schützt.

5. Ofen gemäß dem vorhergehenden Anspruch, **dadurch gekennzeichnet, dass** der Kochwiderstand (1) eine runde Form aufweist und der Ventilator (3) innerhalb der besagten runden Form befestigt ist, bevorzugt coaxial dazu

6. Ofen gemäß dem vorhergehenden Anspruch, **dadurch gekennzeichnet, dass** das Wasserversorgungsrohr (4) vor dem Kochwiderstand (1) verläuft und innerhalb der besagten runden Form endet, bevorzugt coaxial dazu.

7. Ofen gemäß den Ansprüchen 2 und 6, **dadurch gekennzeichnet, dass** der Diffusor (8) in dem Zentrum des Ventilators (3) befestigt ist.

Revendications

1. Four de cuisson électrique professionnel comprenant une chambre de cuisson, une résistance de cuisson (1) montée sur la paroi arrière (2) de ladite chambre de cuisson, un conduit d'alimentation en eau (4) s'étendant à partir de ladite paroi arrière (2), un plateau (6) positionné à l'intérieur de la chambre de cuisson dans une position pour recevoir l'eau fournie par ledit conduit (4), une seconde résistance (7) qui s'étend dans ledit plateau (6) de sorte que la majeure partie de ladite seconde résistance (7) est immergée dans l'eau lorsque le plateau (6) est rempli, et un déflecteur (9) monté sur la paroi arrière (2) afin de protéger un utilisateur du contact avec ladite résistance de cuisson (1) et une seconde résistance (7), **caractérisé en ce que** le plateau (6) est intégré dans ledit déflecteur (9) qui a une paroi inférieure pleine (11) et a un bord arrière relevé (12) de sorte que la partie inférieure du déflecteur (9) peut contenir de l'eau et loger la seconde résistance (7).
2. Four selon la revendication 1, **caractérisé en ce qu'il** comprend en outre un diffuseur (8) monté afin d'entourer la sortie du conduit d'alimentation en eau (4), ledit diffuseur (8) ayant une forme cylindrique avec une pluralité de rainures circonférentielles (8a) formées intérieurement, de préférence avec un pas constant, et une pluralité de trous débouchants radiaux (8b) réalisés en correspondance desdites rainures circonférentielles (8a), de préférence le long de tout le périmètre du diffuseur (8).

3. Four selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le déflecteur (9) a une forme octogonale et une pluralité de fentes (10) formées dans les parois latérales.
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4. Four selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'il** comprend en outre un ventilateur (3) placé dans la chambre de cuisson pour la convection forcée de l'air, le déflecteur (9) protégeant un utilisateur également du contact avec ledit ventilateur (3).
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5. Four selon la revendication précédente, **caractérisé en ce que** la résistance de cuisson (1) a une forme circulaire et le ventilateur (3) est monté dans ladite forme circulaire, de préférence coaxial par rapport à cette dernière.
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6. Four selon la revendication précédente, **caractérisé en ce que** le conduit d'alimentation en eau (4) passe en face de la résistance de cuisson (1) et se termine à l'intérieur de ladite forme circulaire, de préférence avec une section d'extrémité coaxiale par rapport à ce dernier.
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7. Four selon les revendications 2 et 6, **caractérisé en ce que** le diffuseur (8) est monté dans le centre du ventilateur (3).

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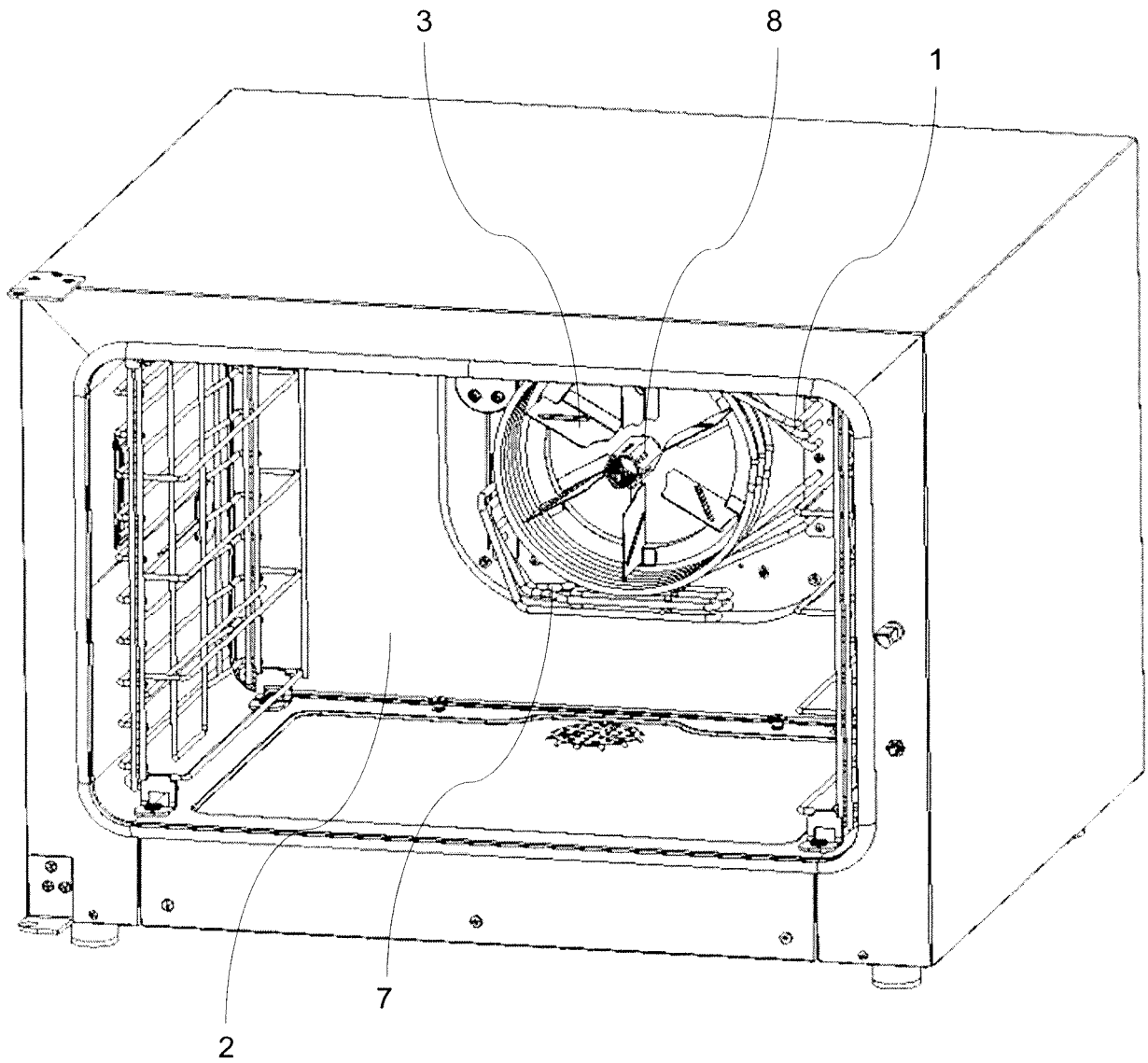


Fig.1

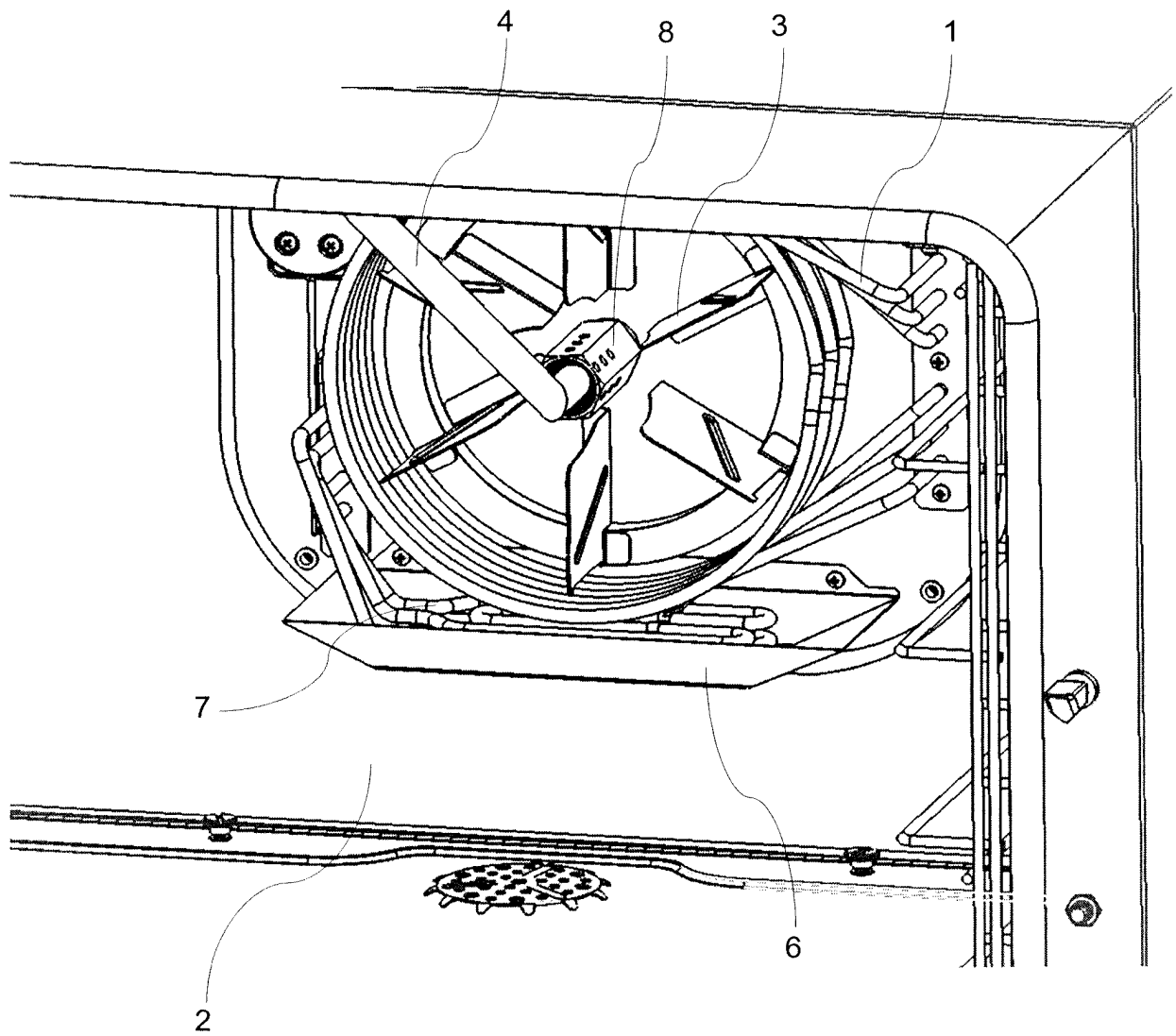


Fig.2

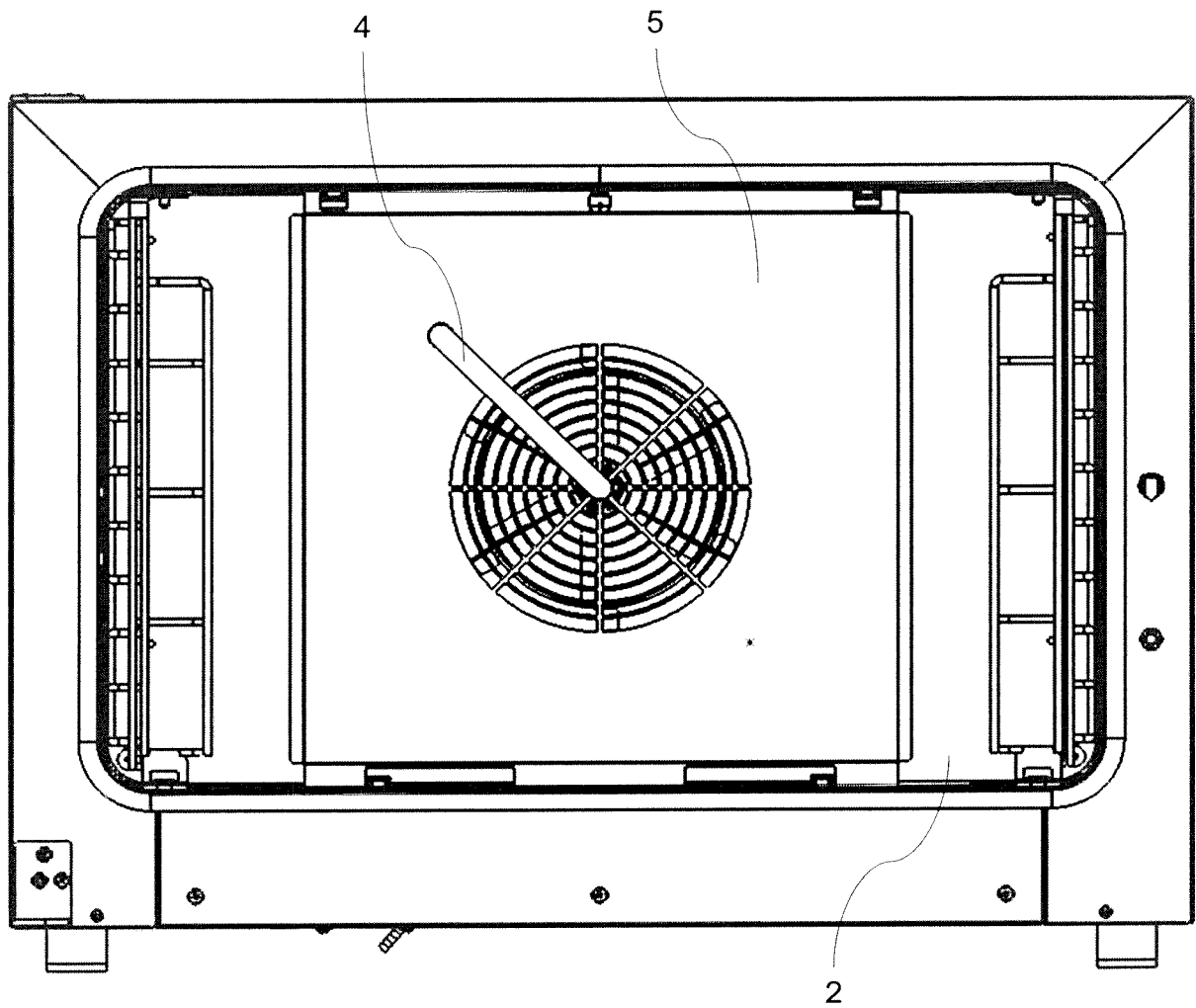


Fig.3

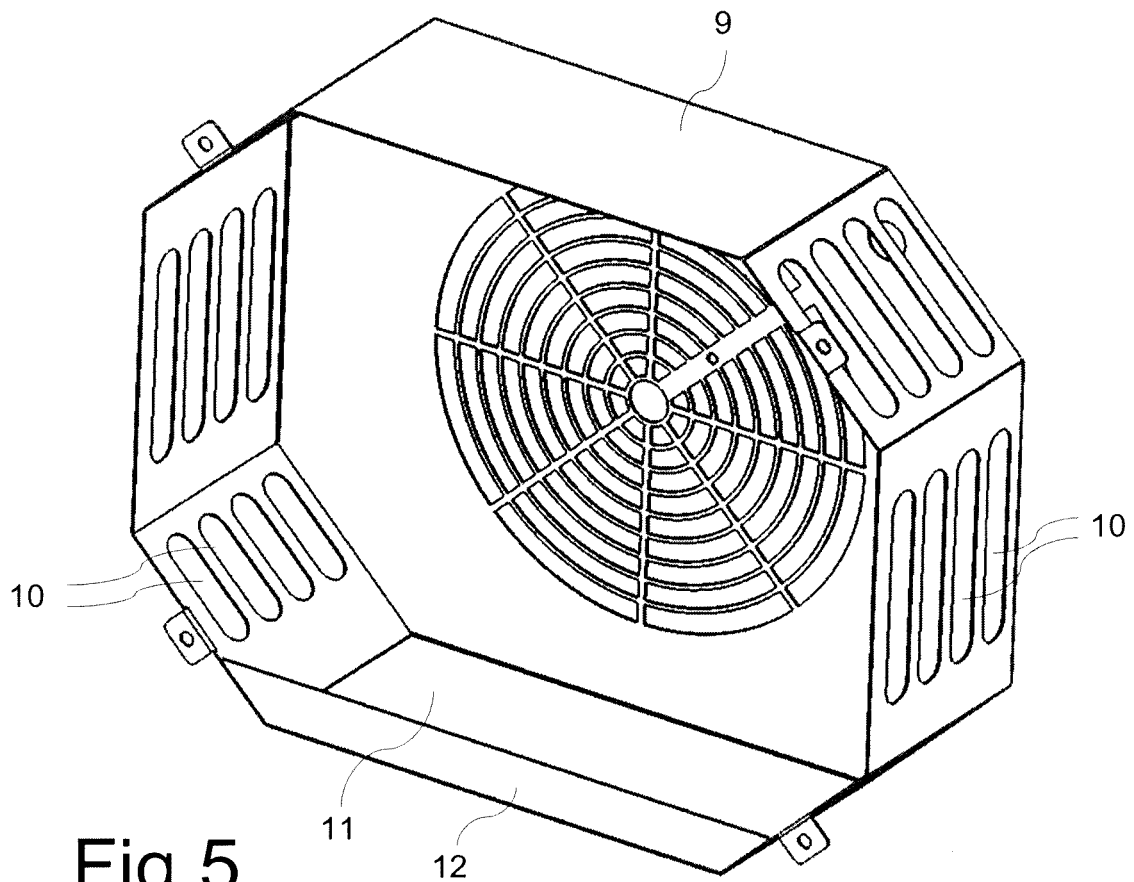


Fig.5

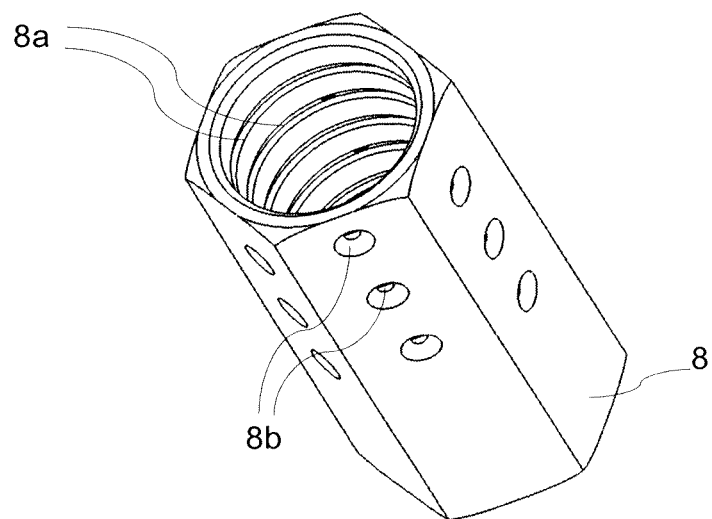


Fig.4

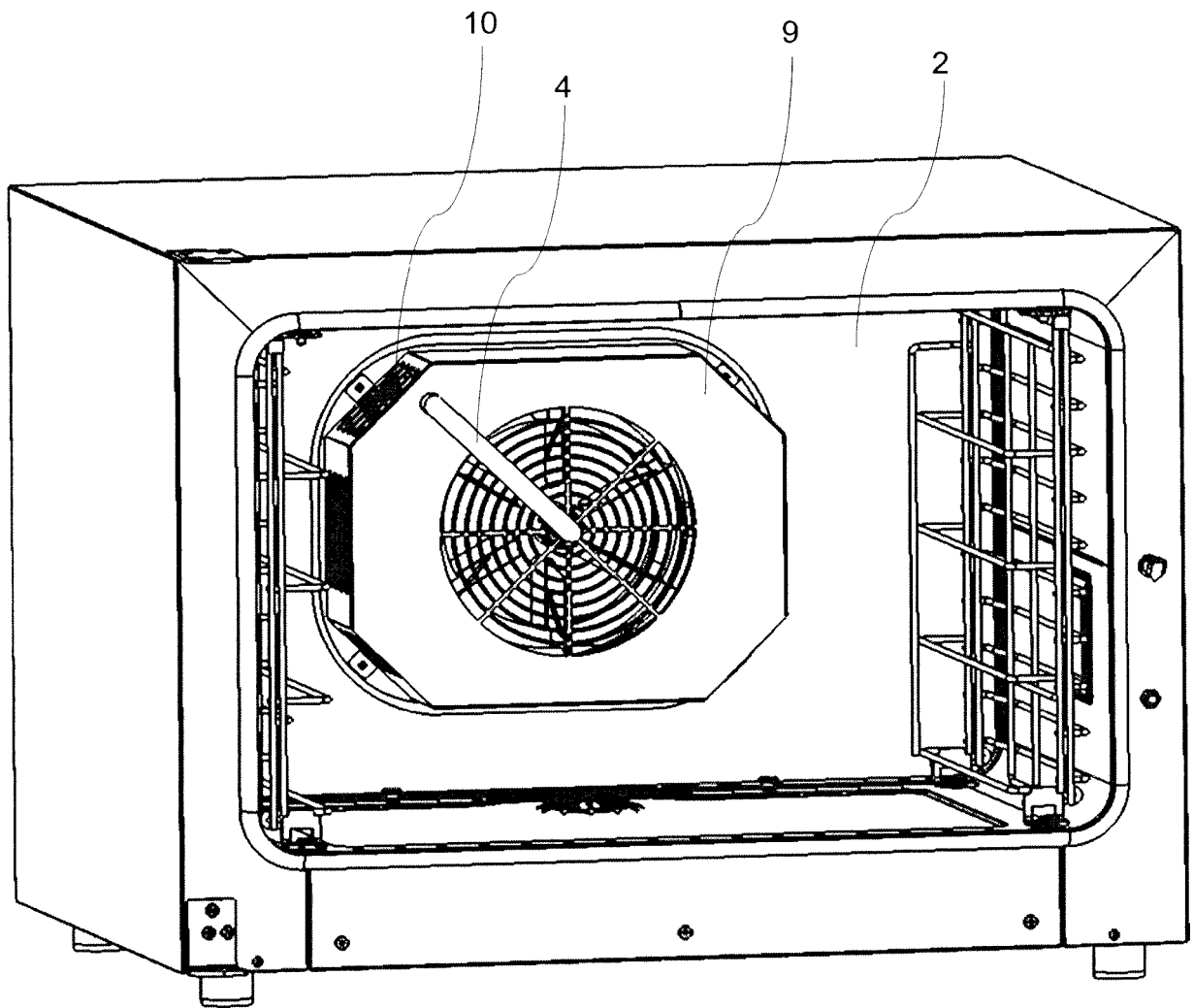


Fig.6

REFERENCES CITED IN THE DESCRIPTION

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