

(19)



(11)

EP 2 126 475 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

12.07.2017 Bulletin 2017/28

(51) Int Cl.:

F24C 15/32 ^(2006.01)

(21) Application number: **07857664.2**

(86) International application number:

PCT/EP2007/064031

(22) Date of filing: **17.12.2007**

(87) International publication number:

WO 2008/080808 (10.07.2008 Gazette 2008/28)

(54) **A COOKING APPLIANCE**

GARGERÄT

APPAREIL DE CUISSON

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE
SI SK TR**

(30) Priority: **29.12.2006 TR 200607682**

(43) Date of publication of application:

02.12.2009 Bulletin 2009/49

(73) Proprietor: **Arçelik Anonim Sirketi**

34950 Istanbul (TR)

(72) Inventors:

- **SERABATIR, Davut Ayhan**
34950 Istanbul (TR)
- **KARAER, Erol**
34950 Istanbul (TR)

(56) References cited:

WO-A-2005/066549 DE-A1-102004 047 993
FR-A- 2 871 556 GB-A- 2 136 110
JP-A- 58 160 744 US-A- 5 468 935
US-A1- 2005 139 202

EP 2 126 475 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The present invention relates to a cooking appliance that enables the cooking process to be performed effectively.

[0002] At least one heater and a fan are provided in cooking appliances wherein the cooking process is performed by way of convection. The cooking appliance framework is divided into two partitions by a separator. The heater and the fan are disposed in the compartment between the rear wall of the framework and the separator, and a cooking chamber is formed in the other compartment wherein the food to be cooked is placed. The air heated by the heater is activated by the fan and delivered into the cooking chamber through the holes arranged on the separator and food is cooked by means of heat transfer interaction of the air with the food to be cooked. In state of the art, on the separator, blowing holes are arranged that deliver the air activated by the fan into the cooking chamber and suction holes that re-aspirate the air delivered to the cooking chamber into the volume between the separator and the rear wall of the framework. However, since the hot air activated by the fan circulates uncontrollably between the separator and the rear wall until delivering into the cooking chamber, it is subjected to turbulence effects and corner losses. As a result, the flow rate of the circulating air decreases, hence the efficiency of the cooking process is reduced. On the other hand, flow related noise is created since the flow is not homogeneous.

[0003] In order to solve these problems encountered during the cooking process, implementations are developed such as positioning the blowing and suction holes so that air flow is directed, disposing guide plates between the separator and the rear wall or forming the separator such that flow is directed.

[0004] In the state of the art German Patent Application No DE2004047993, a cooking device is explained. This cooking device comprises a separator having suction holes at the center and asymmetrically arranged blowing holes at the sides of these suction holes.

[0005] In the state of the art United States of America Patent Application No US2005139202 and the Great Britain Patent No GB2109920, the explanation is given for distributor units that direct the air activated by the fan to the blowing openings disposed on the side of the separator.

[0006] In another state of the art German Patent No DE19831087 and European Patent No EP1209421, mention is made about directing of air by shaping the separator.

[0007] However, in these state of the art, shaping the separator for directing the air results in the food and oil residues to easily hold on to the side of the separator that is in direct contact with the cooking chamber and causes this surface easier to get dirty but harder to clean. Moreover, since there is no clearly defined path for the air to follow, problems such as the above mentioned turbu-

lence, corner losses and creation of noise cannot be entirely prevented.

[0008] French Patent Application FR 2 871 556 A discloses an oven with a flat rear wall at the outside of which a heater and a fan are located.

[0009] International Patent Application WO 2005/066549 A discloses an oven in which a heater and a fan are located between a flat rear wall and a separator that is shaped by deep drawing.

[0010] Japanese Patent Document JP 58 160744 A discloses an oven in which a heater and a fan are located on the top wall of the cooking chamber.

[0011] The aim of the present invention is the realization of a cooking appliance wherein hot air is directed effectively.

[0012] In the cooking appliance realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, the rear wall of the framework is shaped to direct the flow of air activated by the fan until received into the cooking chamber.

[0013] In the preferred embodiment of the present invention, the shaping is maintained by drawn in regions on the rear wall to create a path for the air to flow more freely which is made by using the deep drawing process. By shaping the rear wall, a fan housing on the side facing inside the cooking appliance wherein the fan is seated and channels are formed that extend sideways from this housing that direct the air activated by the fan for delivering into the cooking chamber.

[0014] The channels are preferably positioned at regular intervals around the fan. Thus the air is distributed to the entirety of the cooking chamber.

[0015] The separator comprises more than one suction hole for aspirating the air from the cooking chamber and more than one blowing hole for blowing the air activated by the fan into the cooking chamber.

[0016] In the preferred embodiment of the present invention, at least one blowing hole is arranged on the separator corresponding to each channel disposed on the rear wall. Thus, the air following the path formed by a channel passes to the cooking chamber from the blowing hole corresponding to that channel. Consequently, the path followed by the air is clearly defined, starting from being aspirated behind the separator until blowing into the cooking chamber again and corner losses are prevented.

[0017] In an embodiment of the present invention, the channels get narrower from the fan towards the blowing holes. Thus, the air activated by the fan flows to the blowing holes by gradually gaining speed.

[0018] In an embodiment of the present invention, the separator is configured as a flat plate. In this embodiment, only the channels formed on the rear wall are used for directing the air, that is, a deflecting surface is not formed on the separator. By means of this embodiment, the separator being in direct contact with the cooking chamber and thus the cooking appliance can be used for a longer time without the need for cleaning and is cleaned easily

when spoiled since an unshaped flat plate will not get dirty easily.

[0019] In another embodiment of the present invention, the separator is configured to match the shape of the rear wall for providing more effective directing. Thus, problems such as decrease in efficiency due to turbulence and corner losses and noise are prevented.

[0020] In another embodiment of the present invention, flaps are disposed inside the channels for controlling the flow of air inside the channels. Thus, if desired, air can be blown by flowing only from the selected channels.

[0021] In another embodiment of the present invention, a heater is disposed in each channel.

[0022] Thus air can be heated before reaching the blowing holes, that is, just before blowing into the cooking chamber and hence a more efficient cooking process is performed.

[0023] The cooking appliance realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

Figure 1 - is the schematic side view of a cooking appliance.

Figure 2 - is the front view of an embodiment of the present invention.

Figure 3 - is the outside perspective view of the rear wall in an embodiment of the present invention.

Figure 4 - is the inside perspective view of the rear wall and the fan in an embodiment of the present invention.

Figure 5 - is the front view of the separator in an embodiment of the present invention.

[0024] The elements illustrated in the figures are numbered as follows:

1. Cooking appliance
2. Framework
3. Rear wall
4. Cooking chamber
5. Separator
6. Heater
7. Fan
8. Suction hole
9. Blowing hole
10. Channel
11. Flap
12. Fan housing

[0025] The cooking appliance (1) comprises a framework (2), a cooking chamber (4) disposed inside this framework (2) wherein food to be cooked is placed, at least one fan (7) for activating the air, and at least one heater (6) disposed inside the framework (2) for heating the air and a separator (5) that separates the cooking chamber (4) from the volume containing the fan (7) and the heater (6) (Figure 1).

[0026] The framework (2) comprises a rear wall (3) that

is shaped for directing the flow of the activated air (Figure 3). In the preferred embodiment of the present invention, the rear wall (3) is shaped by deep drawing process.

[0027] In an embodiment of the present invention, the rear wall (3) comprises a circular fan housing (12) at the center thereof that is formed by deep drawing process. The fan (7) is disposed inside this fan housing (12). The rear wall (3) furthermore comprises channels (10), again formed by deep drawing process, that extend outwards from the fan housing (12) matching the rotation direction of the fan (7) and direct the air from the fan (7) towards the cooking chamber (4). These channels (10) serve as flow routes defining the path wherein the air activated by the fan (7) flows.

[0028] The channels (10) are preferably positioned at regular intervals around the fan (7). Thus the air is distributed homogeneously into the cooking chamber (4).

[0029] The cooking appliance (1) furthermore comprises more than one suction hole (8) disposed on the separator (5) for aspirating the air from the cooking chamber (4) and more than one blowing hole (9) again arranged on the separator (5) for blowing the air activated by the fan (7) into the cooking chamber (4). In the preferred embodiment of the present invention, the blowing holes (9) are arranged such that at least one blowing hole (9) corresponds to each channel (10) situated on the rear wall (3) (Figure 2).

[0030] The suction holes (8) are preferably disposed in the portion of the area on the separator (5) that is swept by the fan (7). The suction holes (8) are formed in various numbers and shapes and in various combinations on the separator (5) (Figure 2).

[0031] In the cooking appliance (1) of the present invention, when the heater (6) and the fan (7) are in the active position, as the heater (6) heats the air in the vicinity, the fan (7) activates the air heated by the heater (6). The air activated by the fan (7) flows along the channels (10) disposed on the rear wall (3) and is directed towards the blowing holes (9) and is blown from the blowing holes (9) into the cooking chamber (4). After the hot air enters the cooking chamber (4) the thermal energy contained therein is left on the cold surfaces in the cooking chamber (4) and passes through the suction holes (8) due to the suction effect created by the fan (7) and is delivered into the region of the fan (7) to be blown again.

[0032] In an embodiment of the present invention, the channels (7) formed on the rear wall (3) are configured to get narrower from the fan (7) towards the blowing holes (9). Thus the air moves towards the blowing holes (9) by gaining speed (Figure 3).

[0033] In an embodiment of the present invention, directing of air is maintained only by means of the channels (10) formed on the rear wall (3). Thus, a shaping or forming an additional guiding surface on the separator (5) in direct contact with the cooking chamber (4) that will speed up spoiling and make cleaning harder is not required. Accordingly, the cooking appliance (1) can be used for a longer time without the need for cleaning and can be

cleaned easily when spoiled.

[0034] In another embodiment of the present invention, the separator (5) is configured to match the shape of the framework (2) for assisting in directing of air. Thus the problems such as decrease in efficiency due to turbulence and corner losses and noise are prevented (Figure 5).

[0035] In another embodiment of the present invention, the cooking appliance (1) comprises flaps (11) disposed at the inlet of the channels (10) for controlling the flow of air activated by the fan (7) to the channels (10). Thus the air can be blown by flowing in only the selected channels (10), that is; the upper or lower part of the cooking chamber (4) can be heated more as preferred (Figure 4).

[0036] In another embodiment of the present invention, a heater (6) is disposed in each channel (10). Thus the air can be heated before reaching the blowing holes (9), that is just before being blown into the cooking chamber (4), providing a more efficient cooking process (Figure 4).

[0037] By using the cooking appliance (1) of the present invention, the cooking chamber (4) can be heated efficiently. By means of the present invention, the time and energy consumed in the cooking process is minimized.

Claims

1. A cooking appliance (1) comprising

- a framework (2),
- a cooking chamber (4) disposed inside this framework (2) wherein food to be cooked is placed,
- at least one fan (7) for activating the air,
- at least one heater (6) disposed in the framework (2) for heating the air,
- a separator (5) that separates the cooking chamber (4) from the volume containing the at least one fan (7) and the at least one heater (6),

wherein

- the framework (2) has a rear wall (3) that is shaped such that the flow of the activated air can be directed,
- the separator (5) comprises more than one suction hole (8) for aspirating the air from the cooking chamber (4) and more than one blowing hole (9) for blowing the air activated by the at least once fan (7) into the cooking chamber (4),
- the rear wall (3) comprises channels (10) that deliver the air from the at least one fan (7) to the blowing holes (9) **characterized in that** the channels (10) get narrower from the at least one fan (7) towards the blowing holes (9).

2. A cooking appliance (1) as in Claim 1, **characterized**

by the rear wall (3) that is formed by deep drawing.

3. A cooking appliance (1) as in Claim 1 or 2, **characterized by** the rear wall (3) comprising a circular fan housing (12) almost at the center wherein the at least one fan (7) is disposed and channels (10) that extend outwards from the fan housing (12) matching the rotation direction of the at least one fan (7) and directing the air from the at least one fan (7) towards the cooking chamber (4) to be received therein.
4. A cooking appliance (1) as in any one of the above claims, **characterized by** the rear wall (3) comprising channels (10) that are positioned at regular intervals around the at least one fan (7).
5. A cooking appliance (1) as in any one of the above claims, **characterized by** the separator (5) comprising at least one blowing hole (9) aligned with each channel (10).
6. A cooking appliance (1) as in any one of the above claims, **characterized by** the separator (5) that is configured to match the shaping of the framework (2) for assisting the directing of the air.
7. A cooking appliance (1) as in any one of the above claims, **characterized by** channels (10) that comprise flaps (11) disposed at the inlets thereof for controlling the airflow.
8. A cooking appliance (1) as in any one of the above claims, **characterized in that** said at least one heater (6) is disposed in each channel (10).

Patentansprüche

1. Kochwerkzeug (1) umfassend

- einen Rahmen (2)
- einen Kochkammer (4) in diesem Rahmen (2), in den die Lebensmittel, die gekocht werden, eingelegt werden,
- mindestens ein Gebläse (7) zum Aktivieren der Luft,
- mindestens ein Heizgerät (6) in dem Rahmen (2) zum Beheizen der Luft,
- eine Trennwand (5), die den Kochkammer (4) vom Raum, der mindestens ein Gebläse (7) und mindestens ein Heizgerät (6) beinhaltet, trennt,

wobei hier

- der Rahmen (2) eine hintere Wand (3) aufweist, die für das Ausrichten des aktivierten Luftstrom gestaltet ist,
- die Trennwand (5) mehr als eine Ansaugöff-

nung (8) zum Ansaugen der Luft aus dem Kochkammer (4) und mehr als eine Blasöffnung (9) zum Blasen der Luft mittels mindestens eines Gebläses (7) in den Kochkammer (4) umfasst,
- die hintere Wand (3) Kanäle (10) umfasst, die die Luft aus mindestens einem Gebläse (7) in die Blasöffnungen (9) liefern,

dadurch gekennzeichnet dass die Kanäle (10) von dem genannten Gebläse (7) ausgehend in Richtung zu den Blasöffnungen (9) verjüngen.

2. Kochwerkzeug (1) nach Anspruch 1 **gekennzeichnet durch** die hintere Wand (3), die durch Tiefziehen gefertigt ist.

3. Kochwerkzeug (1) nach Anspruch 1 oder 2 **gekennzeichnet durch** die hintere Wand (3), die ein kreisförmiges Lüftergehäuse (12) umfasst, in welchen einen Lüfter (7) eingesetzt ist und ausserdem darin sich Kanäle (10) befinden, die aus dem Lüftergehäuse (12) ausgehend mindestens mit der Drehrichtung des Lüfters (7) anpassend nach aussen erstrecken und die Luft mindestens aus dem Lüfter (7) in Richtung zum Kochkammer (4) führen

4. Kochwerkzeug (1) nach einem der vorhergehenden Ansprüche **gekennzeichnet durch** die hintere Wand (3), die Kanäle (10) umfasst, die um mindestens einen Lüfter (7) in regelmäßigen Abständen positioniert sind.

5. Kochwerkzeug (1) nach einem der vorhergehenden Ansprüche **gekennzeichnet durch** eine Trennwand (5), die mindestens eine Blasöffnung (9) umfasst, die mit jedem Kanal (10) ausgerichtet ist

6. Kochwerkzeug (1) nach einem der vorhergehenden Ansprüche **gekennzeichnet durch** eine Trennwand (5), die konfiguriert ist, um die Geometrie des Rahmens (2) anzupassen und so das Orientieren der Luft unterstützen zu können.

7. Kochwerkzeug (1) nach einem der vorhergehenden Ansprüche **gekennzeichnet durch** Kanäle (10), die Flügel (11) umfassen, um den Luftstrom steuern zu können.

8. Kochwerkzeug (1) nach einem der vorhergehenden Ansprüche **gekennzeichnet durch** Einsetzen mindestens eines genannten Heizgeräts (6) in jeden Kanal (10).

Revendications

1. Appareil de cuisson (1) comprenant

- un cadre (2),
- une chambre de cuisson (4) disposée à l'intérieur de ce cadre (2) dans laquelle sont placés des aliments à cuire,
- au moins un ventilateur (7) pour activer l'air,
- au moins un dispositif de chauffage (6) disposé dans le cadre (2) pour chauffer l'air,
- un séparateur (5) qui sépare la chambre de cuisson (4) du volume contenant au moins un ventilateur (7) et au moins un dispositif de chauffage (6),

où

- le cadre (2) a une paroi arrière (3) qui est formée de telle sorte que l'écoulement de l'air activé puisse être dirigé,
- le séparateur (5) comprend plus d'un trou d'aspiration (8) pour aspirer l'air de la chambre de cuisson (4) et plus d'un trou de soufflage (9) pour souffler l'air activé par au moins un ventilateur (7) dans la chambre de cuisson (4)
- la paroi arrière (3) comprend des canaux (10) qui délivrent l'air d'au moins un ventilateur (7) aux trous de soufflage (9), **caractérisé en ce que** les canaux (10) sont plus étroits par rapport au moins un ventilateur (7) vers les trous de soufflage (9).

2. Un appareil de cuisson (1) selon la revendication 1, **caractérisé par** la paroi arrière (3) qui est formée par l'emboutissage profond.

3. Un appareil de cuisson (1) selon la revendication 1 ou 2, **caractérisé par** la paroi arrière (3) comprenant un boîtier de ventilateur circulaire (12) presque au centre dans lequel l'au moins un ventilateur (7) est disposé et des canaux (10) qui s'étendent vers l'extérieur depuis le boîtier du ventilateur (12) correspondant au sens de rotation d' au moins un ventilateur (7) et dirigeant l'air d' au moins un ventilateur (7) vers la chambre de cuisson (4) à être reçue dans celui-ci.

4. Appareil de cuisson (1) selon l'une quelconque des revendications précédentes, **caractérisé par** la paroi arrière (3) comprenant des canaux (10) qui sont positionnés à intervalles réguliers autour d' au moins un ventilateur (7).

5. Appareil de cuisson (1) selon l'une quelconque des revendications précédentes, **caractérisé par** le séparateur (5) comprenant au moins un trou de soufflage (9) aligné avec chaque canal (10).

6. Appareil de cuisson (1) selon l'une quelconque des revendications précédentes, **caractérisé par** le séparateur (5) qui est configuré pour correspondre à

la mise en forme du cadre (2) pour aider à diriger l'air.

7. Appareil de cuisson (1) selon l'une quelconque des revendications précédentes, **caractérisé par** des canaux (10) qui comprennent des rabats (11) disposés à leurs entrées pour commander le flux d'air. 5
8. Un appareil de cuisson (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit au moins un dispositif de chauffage (6) est disposé dans chaque canal (10). 10

15

20

25

30

35

40

45

50

55

[Fig.]
Figure 1

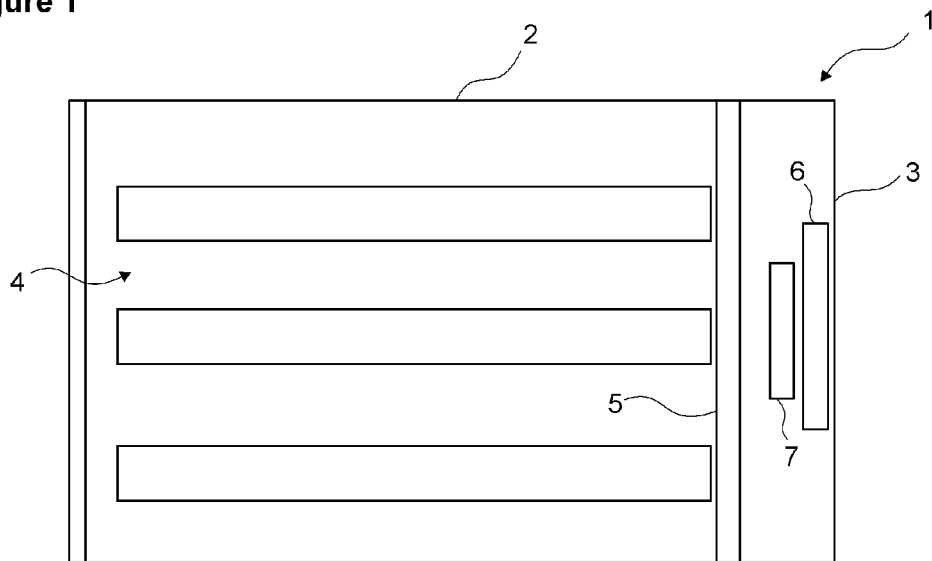
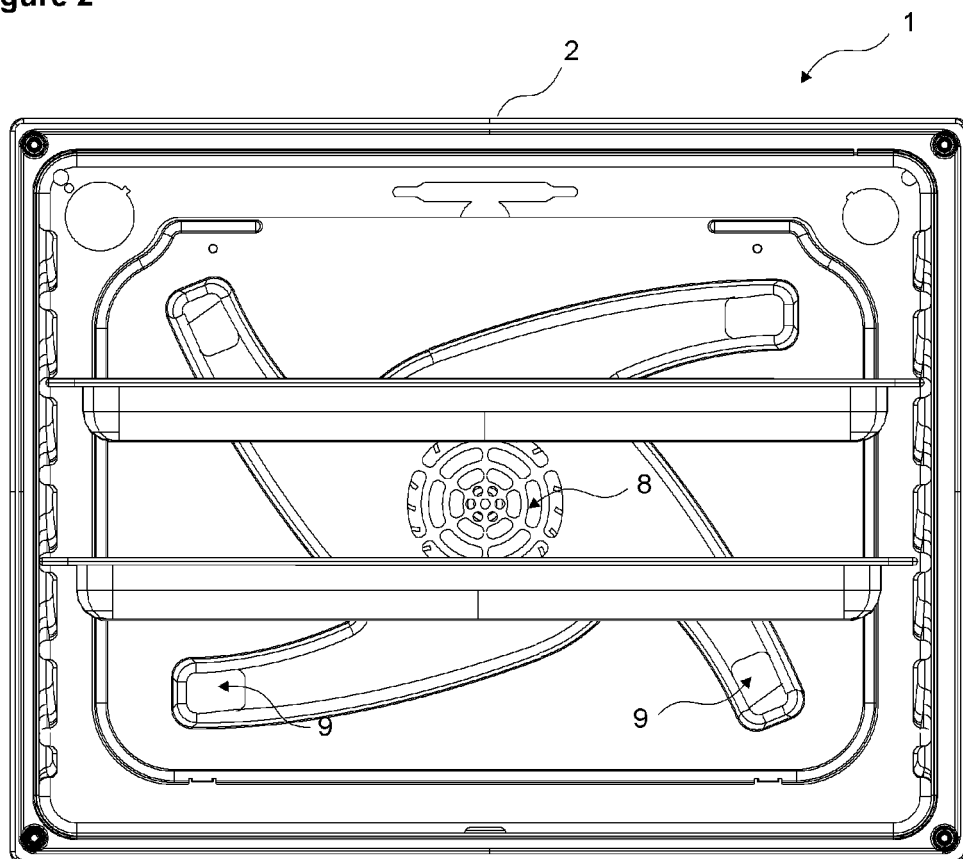


Figure 2



[Fig.]
Figure 3

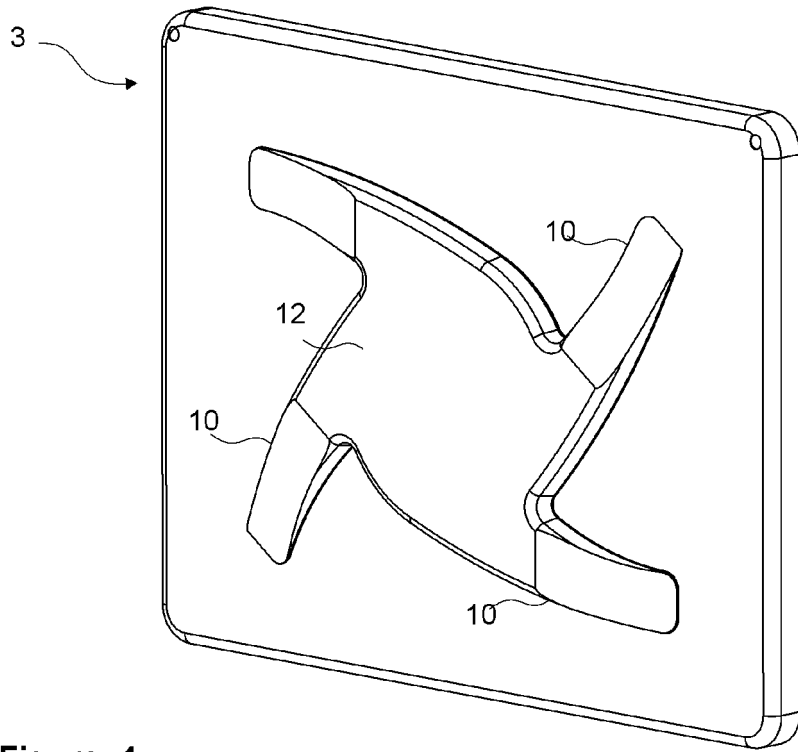
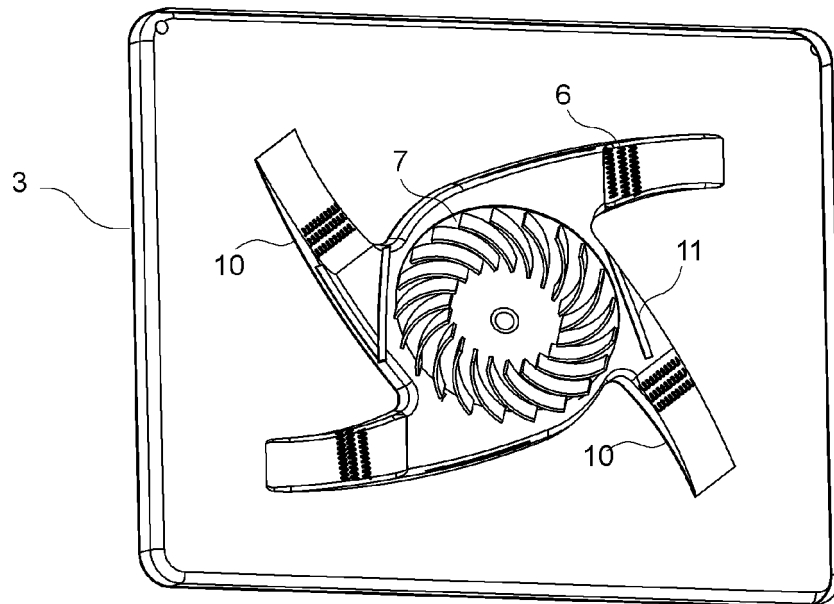
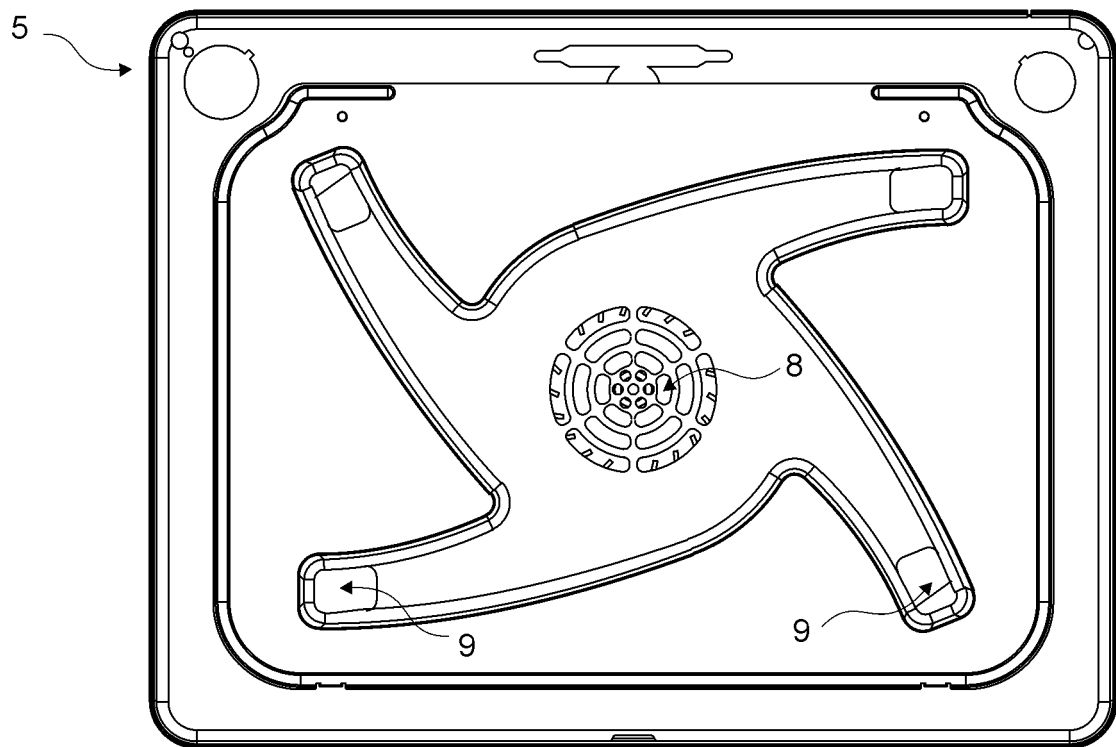


Figure 4



[Fig.]
Figure 5



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- DE 2004047993 [0004]
- US 2005139202 A [0005]
- GB 2109920 A [0005]
- DE 19831087 [0006]
- EP 1209421 A [0006]
- FR 2871556 A [0008]
- WO 2005066549 A [0009]
- JP 58160744 A [0010]