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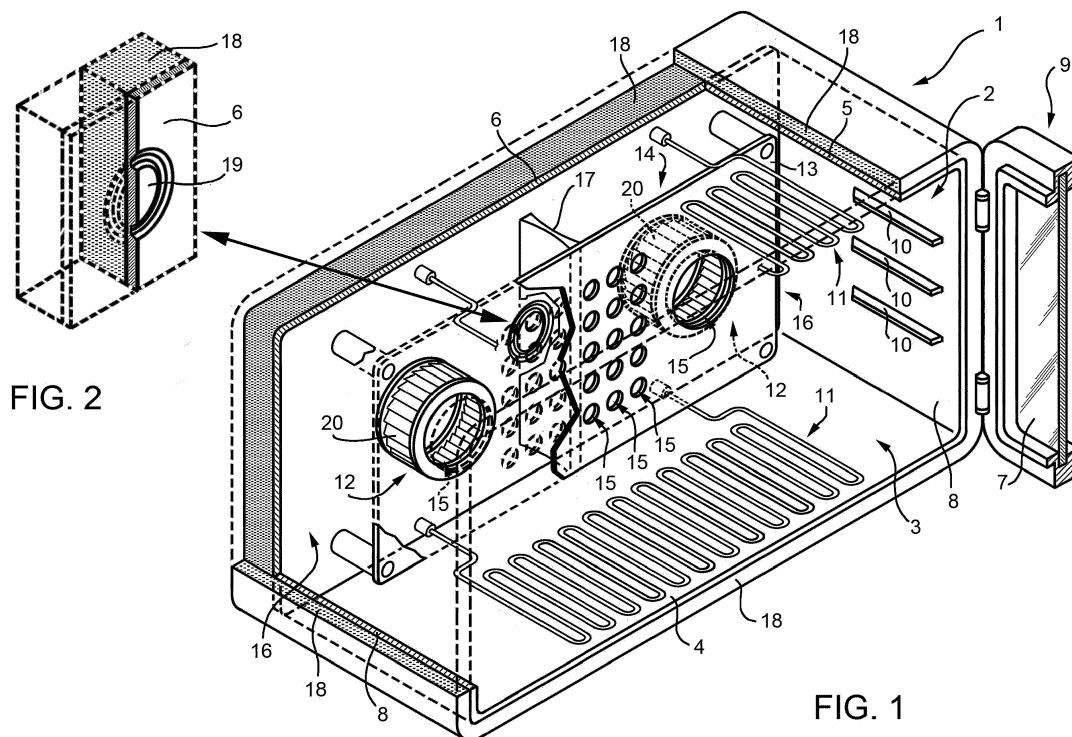
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(54) **DOMESTIC VENTILATED OVEN**

(57) A domestic ventilated oven for cooking food has a muffle (2) housing a cooking compartment (3); heating elements (11) associated to the muffle (2) to heat the air in the muffle (2); at least one fan (12) for circulating air in the muffle (2); a partition (13), which is arranged in the muffle (2) for separating a housing space (14) from the

cooking compartment (3); and a control device (22) provided with a control unit (23) for varying the rotation speed of the fan (12). The muffle (2) has pre-weakened portions (19), which are designed for being easily removed and allowing the mounting of respective fans (12).



## Description

**[0001]** The present invention relates to a domestic ventilated oven.

**[0002]** Generally, a domestic ventilated oven comprises a muffle housing a cooking compartment in which hot air circulates thanks to a fan for levelling the temperature inside the muffle and, consequently, improving the cooking of food.

**[0003]** An object of the present invention is to provide a domestic ventilated oven able to ensure a greater uniformity of temperature and extremely versatile.

**[0004]** According to the present invention, it is provided a domestic ventilated oven for cooking food, the oven comprising:

- a muffle defining a cooking compartment and comprising a rear wall;
- heating elements associated to the muffle to heat the air in the muffle;
- at least a fan for circulating the air in the muffle;
- a partition arranged in the muffle for separating a housing space from the cooking compartment;
- the housing space being comprised between the rear wall and the partition, being designed for partially housing the fan and having a plurality of openings connecting the housing space and the cooking compartment; and
- a control device comprising a control unit for varying the fan rotation speed.

**[0005]** It is thus possible a free regulation of the air circulating in the cooking compartment. As a result, the oven is more versatile and able to ensure a good cooking of the food under different operating conditions.

**[0006]** In particular, between the free edge of the partition and the muffle there is a gap connecting the cooking compartment and the housing space. The shape of the openings and the position and the size of the gap are quite relevant for determining the air convective motions in the cooking compartment.

**[0007]** In particular, each fan comprises an impeller arranged in the housing space and a variable speed electric motor. The impeller is arranged in the housing space, while the electric motor is arranged out of the muffle and has a variable speed to control the convective motions of the hot air in the muffle.

**[0008]** In particular, the control device comprises a manual control for selectively varying the fan rotation speed. In accordance with this operating mode, the operating parameters of the oven can be manually controlled based on the experience.

**[0009]** Alternatively, the control device is designed to vary the fan rotation speed based on at least one operating parameter of the oven including the mass in the oven and the temperature of the oven. The mass has a considerable influence on the convective motions in the muffle, because it takes up space and deflects the air

flows. The temperature in the muffle has an important role because the higher the temperature, the less the uniformity of the temperature.

**[0010]** In particular, the control device is designed to reverse the rotation of the fan. The inversion of the rotation of the fan allows inverting the convective motions and increasing the turbulence.

**[0011]** Furthermore, the control device is designed for cyclically reversing the rotation of the fan at given times. In this way, the turbulence is further increased.

**[0012]** In particular, the control device is designed to vary the fan rotation speed during cooking. This automatic cooking mode can be useful when it is necessary to pass from a ventilated cooking mode to a cooking mode in the absence of ventilation, or vice versa.

**[0013]** In accordance with the present invention, the ventilated oven is designed to house a plurality of fans; in particular, the muffle has pre-weakened portions that can be easily removed to allow the mounting of respective fans. This allows providing different configurations of the same oven.

**[0014]** In accordance with one embodiment of the present invention, the oven comprises at least two fans arranged side by side in said housing space. More fans ensure greater uniformity and can be synchronously or asynchronously controlled. An increase in the number of fans increases the versatility of the oven.

**[0015]** Further characteristics and advantages of the present invention will become apparent from the following description of a non-limiting embodiment with reference to the figures of the accompanying drawings, wherein:

- Figure 1 is a perspective view, with parts in section and parts removed for clarity's sake, of a domestic ventilated oven for cooking food made in accordance with the present invention;
- Figure 2 is a perspective view, on an enlarged scale and parts removed for clarity's sake, of a detail of Figure 1; and
- Figures 3 to 5 are plan views, with parts in section and parts removed for clarity's sake, of three configurations of the domestic ventilated oven object of the present invention.

**[0016]** Figure 1 indicates with the reference number 1 a domestic ventilated oven for cooking food.

**[0017]** The oven 1 comprises a muffle 2, which defines a cooking compartment 3 and comprises a bottom wall 4, an upper wall 5, a rear wall 6, a front wall 7 opposite the rear wall 6 and two mutually opposite side walls 8. In the example shown, the front wall 7 is defined by a door 9 hinged to a side wall of the muffle 2. In the example shown, the side walls 8 are provided with guides 10 designed to support some shelves, not shown in the attached figures.

**[0018]** The oven 1 comprises heating elements 11 associated with the muffle 2 to heat the air in the muffle 2,

i.e. in the cooking compartment 3. In the example shown, the heating elements 11 comprise an electrical resistor arranged close to the bottom wall 4 and an electric resistance arranged at the upper wall 5.

**[0019]** The oven 1 comprises two fans 12 arranged in the muffle 2 for circulating air in the muffle 2 and a partition 13, which is arranged in the muffle 2 to define a housing space 14, which is comprised between the rear wall 6 and the partition 13 and has a plurality of openings 15 connecting the housing space 14 and the cooking compartment 3. The fans 12 are arranged side by side and, at least partially, in the housing space 14.

**[0020]** The cooking compartment 3 and the housing space 14 are connected through the openings 15 and a gap 16, which extends between the edge of the partition 13 and the muffle 3. In fact, the partition 13 is smaller than the rear wall 6 and the cross section of the muffle 2 parallel to the rear wall 6.

**[0021]** In this case, the oven 1 has a deflector 17 arranged in the housing space 14 to separate the air flows generated by the fans 12.

**[0022]** The muffle 2 is insulated with insulating material 18 arranged around the muffle 2 to prevent any heat dispersion toward the outside.

**[0023]** The oven 1 is designed to house up to three fans 12. For this purpose, the muffle 2 is designed to house three evenly aligned fans 12 and has pre-weakened portions 19 that can be easily removed. Figure 2 shows an enlargement of the rear wall 6 of the muffle 2 in which a pre-weakened portion 19 is formed.

**[0024]** Each fan 12 is a fan able to operate both as a centrifugal fan, i.e. with central suction and radial delivery to create convective motions in the muffle 2 such as those indicated by the arrows in the Figures 3-5, and as a centripetal fan, to create convective motions opposed to those shown in Figures 3 to 5.

**[0025]** With reference to Figures 3 to 5, each fan 12 comprises an impeller 20 and a reversible, variable speed electric motor 21. The impeller 20 is predominantly centrifugal, but with the possibility of conveying air in a centripetal direction when it is rotated in the opposite direction.

**[0026]** With reference to Figure 3, the oven 1 comprises a single fan 12 and a control device 22, which has the function of controlling only the fan 12, or rather the rotation speed of the fan 12. The control device 22 comprises a control unit 23 and a manual control 24 to freely set the rotation speed of the fan 12. The control device 22 provides, beside the manual adjustment mode, also the automatic adjustment of the rotation speed of the fan 12. For this purpose, the control device 22 is designed to vary the rotation speed of the fan 12 based on at least one operating parameter of the oven comprising the mass in the muffle 2 and the temperature T of the oven 1.

**[0027]** A temperature sensor 25 acquires the temperature T and transmits a signal correlated to the temperature T to the control unit 23, which sets the fan rotation speed 12 by means of an algorithm based on the tem-

perature signal T. The control unit 23 provides the adjustment of the rotation speed of the fan 12 based on the mass in the muffle 2 or the type of food in the muffle 2. This information is provided to the control unit 23 through an interface 26. Based on the information acquired by the interface 26, the control unit 23 can set the rotation speed of the fan 12 by selecting one among a plurality of possible options:

- constant speed for the whole cooking time;
- variable speed during the cooking time;
- alternation between working times and rest times of the fan 12;
- alternation between operating times of the fan 12 in centrifugal mode and in centripetal mode.

**[0028]** With reference to Figures 4 and 5, when the oven 1 comprises more than one fan 12, each fan 12 can be independently set or all fans 12 can be synchronously set. In the embodiment of Figure 5, the oven 1 is provided with three fans 12, horizontally aligned to level the temperature inside the cooking compartment 3.

**[0029]** Finally, it is evident that the domestic ventilated oven described here may be subject to modifications and variations without departing from the scope of the appended claims.

## Claims

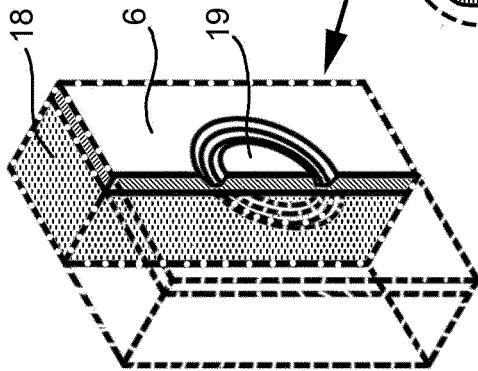
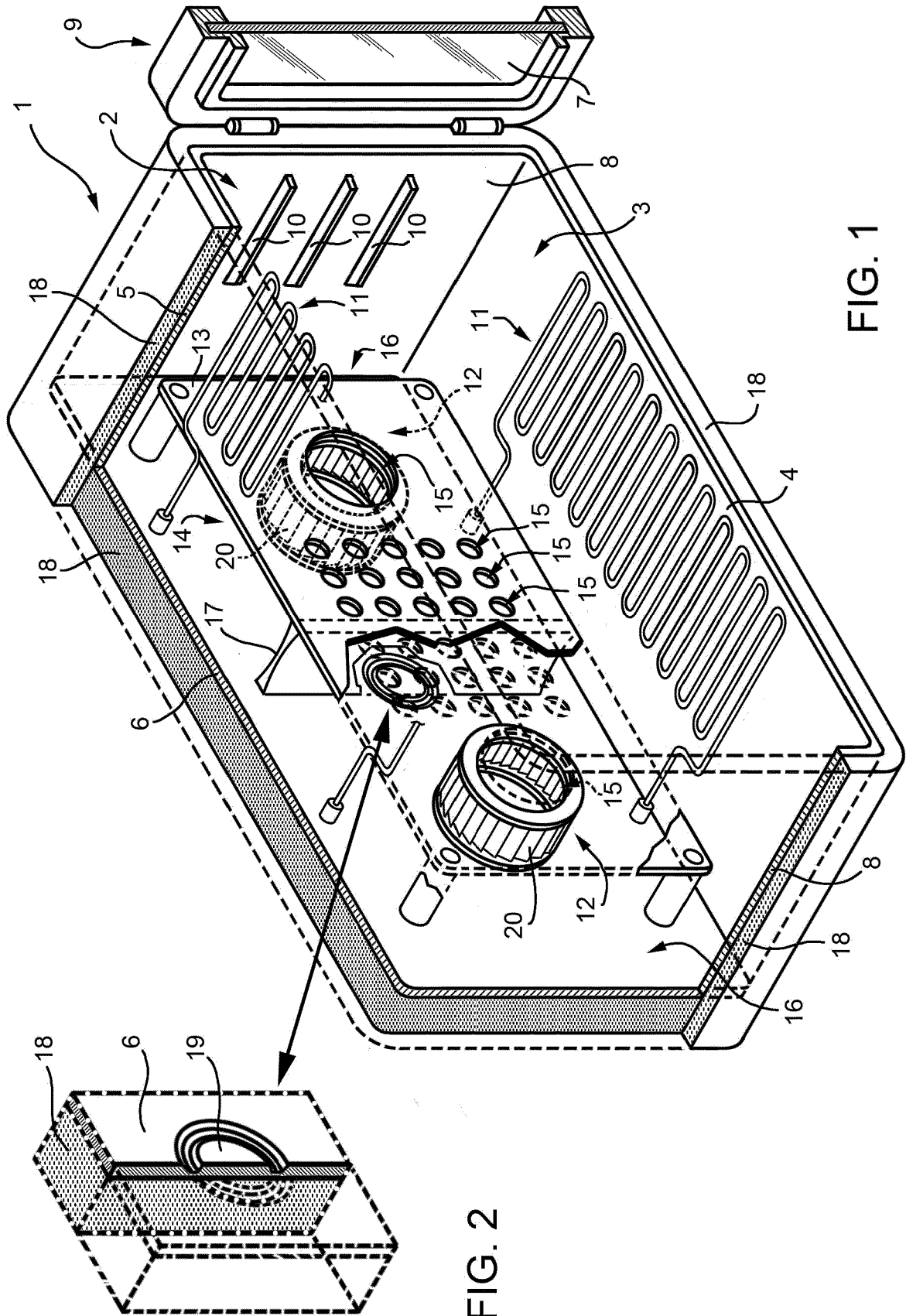
1. A domestic ventilated oven for coking food, the oven (1) comprising:
  - a muffle (2) defining a cooking compartment (3) and comprising a rear wall (6);
  - heating elements (11) associated to the muffle (2) for heating the air in the muffle (2);
  - at least a fan (12) for circulating the air in the muffle (2);
  - a partition (13), which is arranged in the muffle (2) for dividing a housing space (14) from the cooking compartment (3);
  - the housing space (14) being comprised between the rear wall (6) and the partition (13), designed for partially housing the fan (12) and having a plurality of openings (15) for connecting the housing space (14) and the cooking compartment (3); and
  - a control device (22) comprising a control unit (23) for varying the rotational speed of the fan (12).
2. An oven according to Claim 1, wherein a gap (16) connecting the cooking compartment (3) and the housing space (14) is arranged between the free edge of the partition (13) and the muffle (3).
3. An oven according to Claim 1 or 2, wherein each fan

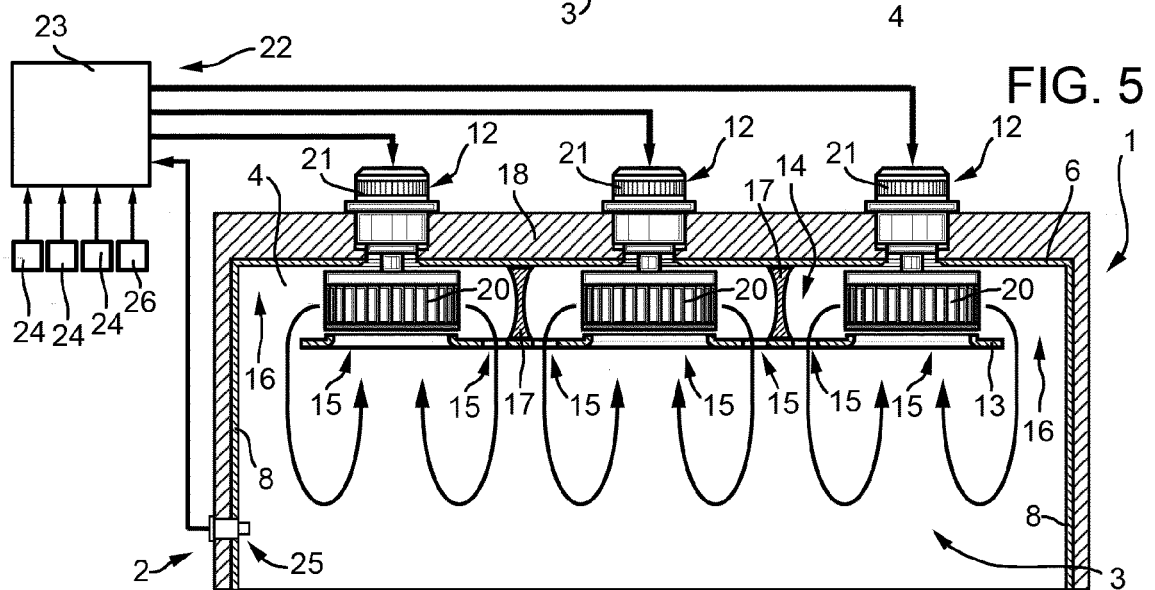
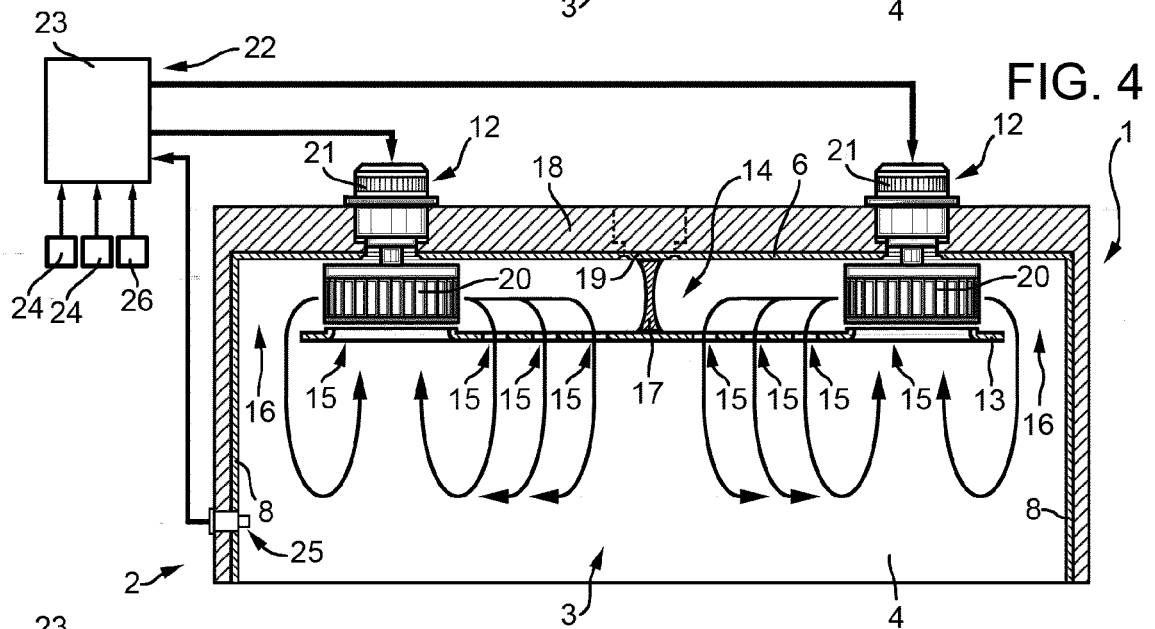
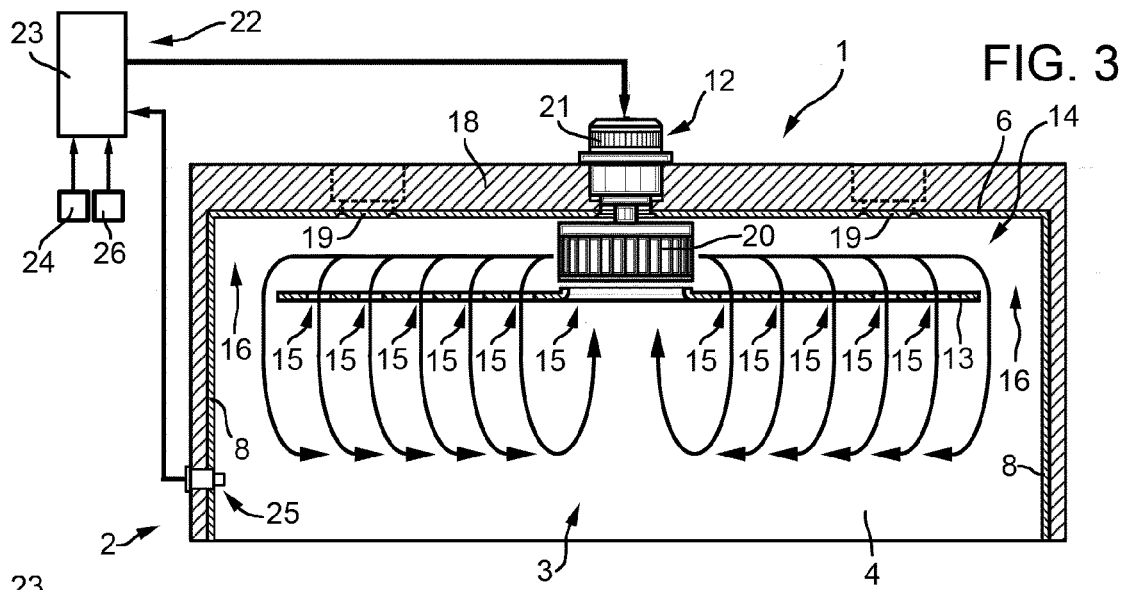
(12) comprises an impeller (20) arranged in the housing space (14) and a variable speed electric motor (21).

4. An oven according to any one of the preceding claims, wherein the control device (22) comprises a manual control (24) for selectively varying the rotational speed of the fan (12). 5
5. An oven according to any one of the preceding claims, wherein the control device (22) is designed for varying the rotational speed of the fan (12) based on at least one operating parameter of the oven including the mass in the muffle (2) and the temperature (T) in the muffle (2). 10 15
6. An oven according to any one of the preceding claims, wherein the control device (22) is designed for inverting the rotation of the fan (12). 20
7. An oven according to any one of the preceding claims, wherein the control device (22) is designed for cyclically inverting the rotation of the fan (12) at given times. 25
8. An oven according to any one of the preceding claims, wherein the control device (22) is designed for varying the rotational speed of the fan (12) when cooking. 30
9. An oven according to any one of the preceding claims, designed for housing a plurality of fans (12).
10. An oven according to claim 9, wherein the muffle (2) has pre-weakened portions (19), which are designed for being easily removed and allowing the mounting of respective fans (12). 35
11. An oven according to any one of the preceding claims, comprising at least two fans (12) partially arranged side by side in said housing space (14). 40
12. An oven according to Claim 10, wherein the control unit (23) is designed for synchronously or asynchronously controlling the fans (12). 45
13. An oven according to Claim 1, wherein said three fans (12) are centrifugal fans. 50

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Application Number  
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Place of search The Hague		Date of completion of the search 15 March 2017	Examiner Verdoodt, Luk
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