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(54) **COOKING OVEN**

KOCHOFEN

FOUR AU CUISSON

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(56) References cited:
**EP-A1- 0 031 156 EP-A1- 0 855 559
EP-A1- 1 457 740 EP-A1- 2 040 005
EP-A1- 2 282 128 EP-A1- 2 287 533
EP-A2- 0 889 672 WO-A1-2014/044767
DE-A1- 4 016 525 DE-A1-102010 028 219
JP-A- S5 267 846 US-A- 5 801 362**

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Description

[0001] The present invention relates to a cooking oven, in particular a domestic electrical oven.

[0002] Domestic cooking ovens usually comprise a housing with a cooking cavity which delimits inside a cooking space for accommodating the food to be cooked. The cooking cavity has an access opening which can be closed by means of a door hinged to the housing.

[0003] In order to heat the cooking space, the cooking cavity is provided, at its lower and upper walls, with heating elements typically formed by electrical resistors.

[0004] In order to obtain a preferably uniform distribution of the heat in the cooking space, the electrical cooking ovens comprise an air circulation system in the cooking cavity. Typically, such an air circulation system comprises an impeller operated by an electrical motor in flow communication with the cooking cavity so as to be able to generate an air circulation in the cooking space.

[0005] In order to avoid the overheating of electrical or electronic components of the oven as well as burns to the user during use of the cooking oven, it is known to cool such thermally sensitive components and/or a grip zone of the door by means of a cooling air stream.

[0006] For such purpose, the ovens of the prior art may comprise a fan placed in a cooling compartment arranged over the cooking cavity and which can be operated to suck ambient air, e.g. through an intake opening formed in a rear wall of the housing, and to direct it towards the thermally sensitive components and/or through a horizontal slot of the front wall of the oven in the anterior front zone (grip zone) of the oven door.

[0007] Traditionally, the cooling of the thermally sensitive components of the oven is activated when the oven is switched on and remains on for the entire operating time of the oven until it is switched off. This ensures fully safe operation of the oven and avoids undesired overheating at the cost of a permanent consumption of electrical energy.

[0008] The ventilating of the cooking space may be turned on or off by the user as a function of the cooking recipe. Once on, the ventilating of the cooking space remains permanently on until it is switched off manually regardless of the operation of the heating resistors of the oven. Thereby, the ventilating of the cooking space also implies a permanent consumption of electrical energy.

[0009] More recently, intermittent cooling systems have been suggested provided with a sophisticated control to optimize the cooling of thermally sensitive components or cooking parameters of particular food.

[0010] Compared with the traditional ovens, the more sophisticated ventilating control systems also comply with the energy saving needs but require more complex electronic or electrical controllers which, in turn, are costly and subjected to fault and malfunctioning. Furthermore, even renouncing permanent ventilating of the oven the residual risk of overheating cannot be excluded. WO2014/044767A1 describes a method for operating a

cooking oven with a synchronized pulsed heating and hot air ventilation, wherein the minimum ventilation power can be zero. US 5801362 discloses a cooking oven forming the closest state-of-the-art for the invention.

[0011] It is the object of the present invention to suggest a cooking oven, in particular of the domestic electrical type having features to better conciliate the needs of:

- reducing the energy consumption of the oven,
- simplifying and reducing the oven fan control system costs,
- maintaining or increasing the anti-overheating safety of the oven.

Such an object is reached by a cooking oven, in particular of the electrical household oven type, comprising a housing (2), a cooking cavity (3) formed in the housing (2) and closeable by a door (5), heating means (6, 6') placed in thermal exchange relationship with the cooking cavity (3), ventilating means placed in the housing (2) and having one or more electrical fans (7, 8; 7', 8') adapted to blow air on one or more thermally sensitive areas of the oven (1), a control system (10) connected to the heating means (6, 6') and to the ventilating means and having a temperature detector (12) associated with the cooking cavity (3), wherein the control system is configured to activate and deactivate the heating means (6, 6') depending on a temperature detected by the temperature detector (12), **characterized in that** the control system (10) automatically activates and deactivates at least one of said one or more fans (7, 8; 7', 8') while activating and deactivating the heating means (6, 6').

[0012] In other words, the control system automatically switches on the fan together with switching on the heating means and automatically switches the fan off together with switching off the heating means so that the fan is actuated intermittently in a synchronized manner with the actuation of the heating means.

[0013] Thereby, each step of heating of the cooking cavity is automatically and permanently accompanied by the ventilation of the thermally sensitive region of the oven (e.g. cooking cavity and/or thermally sensitive components, door) thus effectively avoiding the risk of overheating. Furthermore, during all periods in which the heating of the cooking cavity is deactivated and there can be no further increase of the thermal energy accumulated therein, the ventilation of the thermally sensitive region to which the fan is associated is deactivated and the respective consumption of electrical energy is canceled out.

[0014] Finally, the joint switching of the heating means and of the electrical fan makes the control system simpler and more robust because both functions can be managed with the same electrical control circuit.

[0015] In order to better understand the invention and appreciate its advantages, some non-limitative embodiments will be described below with reference to the fig-

ures, in which:

figures 1, 2, 3 show by way of example trends of temperature (Figure 1), electrical power absorption of the heating means (Figure 2) and electrical power absorption of the ventilating means (Figure 3) in an oven of the prior art,

figures 4, 5, 6 show by way of example trends of temperature (Figure 4), electrical power absorption of the heating means (Figure 5) and electrical power absorption of the ventilating means (Figure 6) in an oven according to the invention,

figure 7 shows a circuit diagram of a heating and ventilating control system of an oven of the prior art, figures 8, 9, 10 show circuit diagrams of the heating and ventilating control system of an oven according to embodiments of the invention,

figure 11 shows an oven according to an embodiment of the invention.

[0016] With reference to the figures, a cooking oven 1 comprises a housing 2, in which a cooking cavity 3 is formed intended to accommodate the food to be cooked.

The cooking cavity 3 has an access opening 4 which can be closed by means of a door 5 hinged to the housing 2.

[0017] The oven 1 further comprises a heating system of the cooking cavity 3, e.g. one or more electrical resistors 6, 6' arranged outside and/or inside the cooking cavity 3.

[0018] A ventilating system with one or more recirculation and/or ventilating and/or cooling impellers 7, 7', which can be operated by electrical motors 8, 8' mixes the air inside the cooking cavity 3 to suck and exhaust cooking fumes and/or for cooling thermally sensitive components of the oven 1, such as for example the door 5 and/or the electrical or electronic components 9.

[0019] The oven 1 further comprises a control system 10 connected and configured to control the heating means 6, 6' and the ventilating means 7, 7' and having a user interface 11 for selecting operating parameters and for indicating operating conditions of the oven 1.

[0020] According to the invention, the control system 10 comprises a temperature detector 12 associated with the cooking cavity 3 and is configured to activate and deactivate the heating means 6, 6' according to a temperature detected by the temperature detector 12 and a desired temperature selected by means of the user interface 11.

[0021] The ventilating means comprise a first electrical fan 7', 8' positioned in a cooling compartment 13 formed, for example, over the cooking cavity 3 which can be operated to suck ambient air through an intake opening 14 in a wall of the housing 2, and to direct it as a first stream 14 (cooling stream) towards the heat sensitive components 9 placed inside the housing 2 and/or in a grip region 15 of the door 5 of the oven 1.

[0022] According to the invention, the control system 10 automatically activates and deactivates the first elec-

trical fans 7', 8' together with activating and deactivating the heating means 6, 6', regardless of the settings and/or cooking program selections made by the user.

[0023] Figure 8 shows a circuit diagram of the control system 10, in which the first fan 7', 8' and the heating means (electrical resistor 6) are connected to one another in parallel to form a single heating and ventilating unit 17 which is connected in series both to an on-off switch 18 of the oven 1 and to a switch 19 controlled by the temperature detector 12 (thermostat 19, 12) or controlled as a function of the temperature detected by the temperature detector 12.

[0024] The ventilating means may comprise a second electrical fan 7, 8 in flow communication with the cooking cavity 3 so as to be able to generate a second air stream 16 (heat distribution stream) in the cooking cavity 3.

[0025] According to the invention, the control system 10 allows the selection of a cooking program with air circulation in the cooking cavity 3, and when the cooking program with air circulation in the cooking cavity 3 is selected, the control system 10 automatically activates and deactivates the second electrical fan 7, 8 together with activating and deactivating the heating means 6, 6'.

[0026] Figure 9 shows a circuit diagram of the control system 10, in which the first fan 7', 8', the second fan 7, 8 and the heating means (electrical resistor 6) are connected to one another in parallel to form a single heating and ventilating unit 17 which is connected in series to an on-off switch 18 of the oven 1 and to a switch 19 controlled by the temperature detector 12 (thermostat 19 or 12) or controlled as a function of the temperature detected by the temperature detector 12.

[0027] The control system 10 may also allow the selection of a cooking program without air circulation in the cooking cavity 3, and, when the cooking program without air circulation in the cooking cavity 3 is selected, the control system 10 keeps the second electrical fan 7, 8 automatically deactivated, regardless of the operation of the heating means 6, 6'.

[0028] Figure 10 shows a circuit diagram of the control circuit 10 in which the first fan 7', 8', the second fan 7, 8 and the heating means (electrical resistor 6) are connected to each other in parallel to form a single heating and ventilating unit 17 which is connected in series both to an on-off switch 18 of the oven 1 and to a switch 19 controlled by the temperature detector 12 (thermostat 19, 12) or controlled as a function of the temperature detected by the temperature detector 12 and in which a circuit branch 21 of the second fan 7, 8 in the heating and ventilating unit 17 comprises a third switch 20 which allows the connection and disconnection of the second fan 7, 8 in the heating and ventilating unit 17.

[0029] In an embodiment, the heating means 6, 6', 6'' can comprise one or more lower heating elements 6 arranged at a lower wall of the cooking cavity 3, one or more upper heating elements 6' arranged at an upper wall of the cooking cavity 3, as well as optionally one or more rear heating elements 6'' arranged at the rear wall

of the cooking cavity 3,
and the control system 10 is configured to allow the selection of programs or cooking modes and to set the cooking mode as a function of the cooking programs selected by the user, said cooking modes comprising one or more of the following:

- A)** using only the rear heating element 6" (if provided), not using the lower 6 and upper 6' heating elements (if provided), with ventilating of the cooking cavity 3 by means of the second electrical fan 7, 8,
- B)** using only the upper heating element 6' (if provided), not using the lower 6 and rear 6" heating elements (if provided), without or with ventilating of the cooking cavity 3 by means of the second electrical fan 7, 8,
- C)** using only the lower heating element 6 (if provided), not using the upper 6' and rear 6" heating elements (if provided), without or with ventilating of the cooking cavity 3 by means of the second electrical fan 7, 8,
- D)** using the lower 6 and upper 6' heating elements (if provided), not using the rear heating element 6" (if provided), without or with ventilation of the cooking cavity 3 by means of the second electrical fan 7, 8.

[0030] In mode **A)** the control system 10 operates the second electrical fan 7, 8 in:

- energy saving mode, by automatically activating and deactivating the second electrical fan 7, 8 together with activating and deactivating the rear heating element 6", or
- standard mode, by activating the second electrical fan 7, 8 in a continuous manner.

[0031] In mode **B)** with ventilating of the cooking cavity 3, the control system 10 operates the second electrical fan 7, 8 in:

- energy saving mode, by automatically activating and deactivating the second electrical fan 7, 8 together with activating and deactivating the upper heating element 6", or
- standard mode, by operating the second electrical fan 7, 8 in a continuous manner.

[0032] In mode **C)** with ventilating of the cooking cavity 3, the control system 10 operates the second electrical fan 7, 8 in:

- energy saving mode, by automatically activating and deactivating the second electrical fan 7, 8 together with activating and deactivating the lower heating element 6", or
- standard mode, by operating the second electrical fan 7, 8 in a continuous manner.

[0033] In mode **D)** with ventilating of the cooking cavity 3, the control system 10 operates the second electrical fan 7, 8 in:

- energy saving mode, by activating and deactivating the second electrical fan 7, 8 together with activating and deactivating the upper lower 6 and upper 6" heating elements, or
- standard mode, by activating the second electrical fan 7, 8 in a continuous manner.

[0034] With reference to the aforesaid operating modes A), B), C), D), one criterion for choosing energy saving mode or standard mode is the necessary and/or predicted/estimated electrical power absorption to execute the cooking program or the cooking mode selected by the user.

[0035] In an advantageous embodiment, in energy saving mode, the control system 10 automatically activates and deactivates the first 7', 8' and second 7, 8 electrical fans together with activating and deactivating the heating means.

[0036] The oven according to the invention has many advantages. Each step of heating of the cooking cavity 3 is automatically and permanently accompanied by the ventilating of the thermally sensitive region of the oven 1, thus effectively avoiding the risk of overheating. Furthermore, during all periods in which the heating of the cooking cavity 3 is deactivated and there can be no further increase of the thermal energy accumulated therein, the ventilation of the thermally sensitive region is deactivated and the respective consumption of electrical energy is canceled out.

[0037] Finally, the joint switching of the heating means and of the ventilating means of the oven 1 makes the control system simpler and more robust because both functions can be managed with the same electrical control circuit.

[0038] Obviously, those skilled in art may make further changes and variants to the heating oven according to the present invention all without departing from the scope of protection of the invention, as defined in the claims.

Claims

1. A cooking oven (1), comprising a housing (2), a cooking cavity (3) formed in the housing (2) and closable by a door (5), heating means (6, 6') placed in thermal exchange relationship with the cooking cavity (3), ventilating means placed in the housing (2) and having a first electrical fan (7', 8') which sucks ambient air through an intake opening (14) in a wall of the housing (2) and directs said ambient air as a first cooling stream (14) towards thermally sensitive electric or electronic components (9) placed inside the housing (2) and/or into a grip region (15) of the door (5),

a control system (10) connected to the heating means (6, 6') and to the ventilating means and having:

- a user interface (11) for selecting operating parameters and for indicating operating conditions of the oven (1), and
- a temperature detector (12) associated with the cooking cavity (3),

wherein the control system is configured to activate and deactivate the heating means (6, 6') according to a temperature detected by the temperature detector (12) and a desired temperature selected by means of the user interface (11), **characterized in that** the control system (10) is configured to activate and deactivate the first electrical fan (7', 8') together with the respective activation and deactivation of the heating means (6, 6'), wherein the joint activation and joint deactivation of the first electrical fan (7', 8') and the heating means (6, 6') by the control system (10) is made regardless of cooking program selections made by the user.

2. The cooking oven (1) according to claim 1, wherein the first fan (7', 8') and the heating means (6) are connected to each other in parallel to form a single heating and ventilating unit (17) which is connected in series both to a switch (19) controlled depending on the temperature detected by the temperature detector (12) and to an on-off switch (18) of the oven (1).
3. The cooking oven (1) according to one of the preceding claims, wherein:

- the ventilating means comprise a second electrical fan (7, 8) in flow communication with the cooking cavity (3) such as to be able to generate a second air stream (16) in the cooking cavity (3),
- the control system (10) allows the selection of a cooking program with air circulation in the cooking cavity (3), and
- when the cooking program with air circulation in the cooking cavity (3) is selected, the control system (10) is configured to activate and deactivate the second electrical fan (7, 8) automatically together with the respective activation and deactivation of the heating means (6, 6').

4. The cooking oven (1) according to claim 3, wherein the first fan (7', 8'), second fan (7, 8) and heating means (6) are connected to each other in parallel to form a single heating and ventilating unit (17) which is connected in series both to a switch (19) controlled depending on the temperature detected by the temperature detector (12) and to an on-off switch (18) of the oven (1).

5. The cooking oven (1) according to claim 3 or 4, wherein the control system (10) allows the selection of a cooking program without air circulation in the cooking cavity (3), in which the control system (10) keeps the second electrical fan (7, 8) automatically deactivated, regardless of the operation of the heating means (6, 6').

6. The cooking oven (1) according to claim 5, wherein the first fan (7', 8'), the second fan (7, 8) and the heating means (6) are connected to each other in parallel to form a single heating and ventilating unit (17) which is connected in series both to a switch (19) controlled depending on the temperature detected by the temperature detector (12) and to an on-off switch (18) of the oven (1), and wherein an electrical circuit branch (21) connecting the second fan (7, 8) in the heating and ventilating unit (17) comprises a third switch (20) allowing the connection and disconnection of the second fan (7, 8) in the heating and ventilating unit (17).

7. The cooking oven (1) according to claim 3, wherein the control system (10) is configured to establish different cooking modes depending on the cooking programs selected by the user, wherein:

- in a power saving mode, the control system (10) activates and deactivates the second electrical fan (7, 8) automatically together with the respective activation and deactivation of the heating means (6, 6', 6''), and
- in a standard mode, the control system (10) activates the second electrical fan (7, 8) continuously without interruptions.

8. The cooking oven (1) according to claim 7, wherein, in said power saving mode, the control system (10) is configured to activate and deactivate the first (7', 8') and second electrical fan (7, 8) automatically together with the respective activation and deactivation of the heating means.

9. Method of operating a cooking oven (1) according to claim 3 or 4, comprising:

- using the control system (10) for selecting a cooking program without air circulation in the cooking cavity (3), and
- when the cooking program without air circulation in the cooking cavity (3) is selected, using the control system (10) for keeping the second electrical fan (7, 8) automatically deactivated, regardless of the operation of the heating means (6, 6').

Patentansprüche

1. Garofen (1), umfassend ein Gehäuse (2), einen Garraum (3), welcher in dem Gehäuse (2) gebildet ist und durch eine Tür (5) verschließbar ist, Heizmittel (6, 6'), welche in thermischer Austauschbeziehung mit dem Garraum (3) platziert sind, Ventilationsmittel, welche in dem Gehäuse (2) platziert sind und ein erstes elektrisches Gebläse (7', 8') aufweisen, welches Umgebungsluft durch eine Einlassöffnung (14) in einer Wand des Gehäuses (2) ansaugt und die Umgebungsluft als einen ersten Kühlstrom (14) in Richtung thermisch sensitiver Elektrik- oder Elektronikkomponenten (9), welche innerhalb des Gehäuses (2) platziert sind, und/oder in einen Griffbereich (15) der Tür (5) leitet, ein Steuerungssystem (10), welches mit den Heizmitteln (6, 6') und den Ventilationsmitteln verbunden ist und aufweist:
 - eine Benutzerschnittstelle (11) zum Auswählen von Betriebsparametern und zum Anzeigen von Betriebszuständen des Ofens (1), und
 - einen Temperaturdetektor (12), welcher dem Garraum (3) zugeordnet ist, wobei das Steuerungssystem dazu eingerichtet ist, die Heizmittel (6, 6') gemäß einer Temperatur, welche durch den Temperaturdetektor (12) erfasst wird, und einer gewünschten Temperatur zu aktivieren und zu deaktivieren, welche mittels der Benutzerschnittstelle (11) ausgewählt ist, **dadurch gekennzeichnet, dass** das Steuerungssystem (10) dazu eingerichtet ist, das erste elektrische Gebläse (7', 8') zusammen mit der entsprechenden Aktivierung und Deaktivierung der Heizmittel (6, 6') zu aktivieren und zu deaktivieren, wobei die gemeinsame Aktivierung und die gemeinsame Deaktivierung des ersten elektrischen Gebläses (7', 8') und der Heizmittel (6, 6') durch das Steuerungssystem (10) unabhängig von einer durch den Benutzer getätigten Garprogramm-Auswahl durchgeführt wird.
2. Garofen (1) nach Anspruch 1, wobei das erste Gebläse (7', 8') und die Heizmittel (6) parallel miteinander verbunden sind, um eine einzige Heiz- und Ventilationseinheit (17) zu bilden, welche sowohl mit einem Schalter (19), welcher in Abhängigkeit der durch den Temperaturdetektor (12) detektierten Temperatur gesteuert wird, und einem Ein-Aus-Schalter (18) des Ofens (1) in Reihe verbunden ist.
3. Garofen (1) nach einem der vorhergehenden Ansprüche, wobei:
 - die Ventilationsmittel ein zweites elektrisches Gebläse (7, 8) in Strömungskommunikation mit dem Garraum (3) umfassen, um in der Lage zu sein, einen zweiten Luftstrom (16) in dem Garraum (3) zu erzeugen,
 - das Steuerungssystem (10) die Auswahl eines Garprogramms mit einer Luftzirkulation in dem Garraum (3) erlaubt, und
 - wenn das Garprogramm mit Luftzirkulation in dem Garraum (3) ausgewählt ist, das Steuerungssystem (10) dazu eingerichtet ist, das zweite elektrische Gebläse (7, 8) automatisch zusammen mit der entsprechenden Aktivierung und Deaktivierung der Heizmittel (6, 6') zu aktivieren und zu deaktivieren.
4. Garofen (1) nach Anspruch 3, wobei das erste Gebläse (7', 8'), das zweite Gebläse (7, 8) und die Heizmittel (6) parallel miteinander verbunden sind, um eine einzige Heiz- und Ventilationseinheit (17) zu bilden, welche sowohl mit einem Schalter (19), welcher in Abhängigkeit der durch den Temperaturdetektor (12) detektierten Temperatur gesteuert wird, und einem Ein-Aus-Schalter (18) des Ofens (1) in Reihe verbunden ist.
5. Garofen (1) nach Anspruch 3 oder 4, wobei das Steuerungssystem (10) die Auswahl eines Garprogramms ohne Luftzirkulation in dem Garraum (3) erlaubt, in welchem das Steuerungssystem (10) das zweite elektrische Gebläse (7, 8) automatisch deaktiviert lässt, unabhängig von dem Betrieb der Heizmittel (6, 6').
6. Garofen (1) nach Anspruch 5, wobei das erste Gebläse (7', 8'), das zweite Gebläse (7, 8) und die Heizmittel (6) parallel miteinander verbunden sind, um eine einzige Heiz- und Ventilationseinheit (17) zu bilden, welche sowohl mit einem Schalter (19), welcher in Abhängigkeit der durch den Temperaturdetektor (12) detektierten Temperatur gesteuert wird, und einem Ein-Aus-Schalter (18) des Ofens (1) in Reihe verbunden ist, und wobei eine elektrische Schaltungsverzweigung (21), welche das zweite Gebläse (7, 8) in der Heiz- und Ventilationseinheit (17) verbindet, einen dritten Schalter (20) umfasst, welcher die Verbindung und Trennung des zweiten Gebläses (7, 8) in der Heiz- und Ventilationseinheit (17) erlaubt.
7. Garofen (1) nach Anspruch 3, wobei das Steuerungssystem (10) dazu eingerichtet ist, verschiedene Gar Modi in Abhängigkeit des durch den Benutzer ausgewählten Garprogramms zu schaffen, wobei:
 - in einem Energiespar-Modus, das Steuerungssystem (10) das zweite elektrische Gebläse (7, 8) automatisch zusammen mit der entsprechenden Aktivierung und Deaktivierung der Heizmittel (6, 6', 6'') aktiviert und deaktiviert, und
 - in einem Standard-Modus das Steuerungssystem (10) das zweite elektrische Gebläse (7, 8)

kontinuierlich ohne Unterbrechungen aktiviert.

8. Garofen (1) nach Anspruch 7, wobei in dem Energiespar-Modus das Steuerungssystem (10) dazu eingerichtet ist, das erste (7', 8') und das zweite elektrische Gebläse (7, 8) automatisch zusammen mit der entsprechenden Aktivierung und Deaktivierung der Heizmittel zu aktivieren und zu deaktivieren. 5
9. Verfahren zum Betreiben eines Garofens (1) nach Anspruch 3 oder 4, umfassend: 10
 - Verwenden des Steuerungssystems (10) zum Auswählen eines Garprogramms ohne Luftzirkulation in dem Garraum (3), und 15
 - wenn das Garprogramm ohne Luftzirkulation in dem Garraum (3) ausgewählt ist, Verwenden des Steuerungssystems (10), um das zweite elektrische Gebläse (7, 8) automatisch deaktiviert zu lassen, unabhängig von dem Betrieb der Heizmittel (6, 6'). 20

Revendications

1. Four (1) de cuisson, comprenant une enveloppe (2), une cavité de cuisson (3) formée dans l'enveloppe (2) et pouvant être fermée par une porte (5), des moyens de chauffage (6, 6') placés en relation d'échange thermique avec la cavité de cuisson (3), des moyens de ventilation placés dans l'enveloppe (2) et ayant un premier ventilateur (7', 8') électrique qui aspire l'air ambiant par l'intermédiaire d'une ouverture d'admission (14) dans une paroi de l'enveloppe (2) et dirige ledit air ambiant comme un premier flux de refroidissement (14) vers des composants électriques ou électroniques thermosensibles (9) placés à l'intérieur de l'enveloppe (2) et/ou dans une région de préhension (15) de la porte (5), un système de commande (10) connecté aux moyens de chauffage (6, 6') et aux moyens de ventilation et ayant : 25
 - une interface utilisateur (11) permettant de sélectionner des paramètres de fonctionnement et permettant d'indiquer des conditions de fonctionnement du four (1), et 30
 - un détecteur de température (12) associé à la cavité de cuisson (3), 35
 dans lequel le système de commande est configuré pour activer et désactiver les moyens de chauffage (6, 6') selon une température détectée par le détecteur de température (12) et une température souhaitée sélectionnée au moyen de l'interface utilisateur (11), **caractérisé en ce que** le système de commande (10) est configuré pour activer et désactiver le premier ventilateur (7', 8') électrique conjointement 40
 - les moyens de ventilation comprennent un second ventilateur (7, 8) électrique en communication d'écoulement avec la cavité de cuisson (3) de sorte à pouvoir générer un second flux d'air (16) dans la cavité de cuisson (3), 45
 - le système de commande (10) autorise la sélection d'un programme de cuisson avec circulation d'air dans la cavité de cuisson (3), et 50
 - lorsque le programme de cuisson avec circulation d'air dans la cavité de cuisson (3) est sélectionné, le système de commande (10) est configuré pour activer et désactiver le second ventilateur (7, 8) électrique automatiquement conjointement avec l'activation et la désactivation respectives des moyens de chauffage (6, 6'). 55

avec l'activation et la désactivation respectives des moyens de chauffage (6, 6'), dans lequel l'activation commune et la désactivation commune du premier ventilateur (7', 8') électrique et des moyens de chauffage (6, 6') par le système de commande (10) est faite sans tenir compte de sélections de programme de cuisson faites par l'utilisateur.

2. Four (1) de cuisson selon la revendication 1, dans lequel le premier ventilateur (7', 8') et le moyen de chauffage (6) sont connectés l'un à l'autre en parallèle pour former une seule unité de chauffage et de ventilation (17) qui est connectée en série à la fois à un interrupteur (19) commandé en fonction de la température détectée par le détecteur de température (12) et à un interrupteur marche-arrêt (18) du four (1).
3. Four (1) de cuisson selon une des revendications précédentes, dans lequel :
 - les moyens de ventilation comprennent un second ventilateur (7, 8) électrique en communication d'écoulement avec la cavité de cuisson (3) de sorte à pouvoir générer un second flux d'air (16) dans la cavité de cuisson (3),
 - le système de commande (10) autorise la sélection d'un programme de cuisson avec circulation d'air dans la cavité de cuisson (3), et
 - lorsque le programme de cuisson avec circulation d'air dans la cavité de cuisson (3) est sélectionné, le système de commande (10) est configuré pour activer et désactiver le second ventilateur (7, 8) électrique automatiquement conjointement avec l'activation et la désactivation respectives des moyens de chauffage (6, 6').
4. Four (1) de cuisson selon la revendication 3, dans lequel le premier ventilateur (7', 8'), le second ventilateur (7, 8) et le moyen de chauffage (6) sont connectés les uns aux autres en parallèle pour former une seule unité de chauffage et de ventilation (17) qui est connectée en série à la fois à un interrupteur (19) commandé en fonction de la température détectée par le détecteur de température (12) et à un interrupteur marche-arrêt (18) du four (1).
5. Four (1) de cuisson selon la revendication 3 ou 4, dans lequel le système de commande (10) autorise la sélection d'un programme de cuisson sans circulation d'air dans la cavité de cuisson (3), dans lequel le système de commande (10) maintient le second ventilateur (7, 8) électrique automatiquement désactivé, sans tenir compte du fonctionnement des moyens de chauffage (6, 6').
6. Four (1) de cuisson selon la revendication 5, dans

lequel le premier ventilateur (7', 8'), le second ventilateur (7, 8) et le moyen de chauffage (6) sont connectés les uns aux autres en parallèle pour former une seule unité de chauffage et de ventilation (17) qui est connectée en série à la fois à un interrupteur (19) commandé en fonction de la température détectée par le détecteur de température (12) et à un interrupteur marche-arrêt (18) du four (1), et dans lequel une branche de circuit électrique (21) connectant le second ventilateur (7, 8) dans l'unité de chauffage et de ventilation (17) comprend un troisième interrupteur (20) autorisant la connexion et la déconnexion du second ventilateur (7, 8) dans l'unité de chauffage et de ventilation (17).

7. Four (1) de cuisson selon la revendication 3, dans lequel le système de commande (10) est configuré pour établir des modes de cuisson différents en fonction des programmes de cuisson sélectionnés par l'utilisateur, dans lequel :
- dans un mode d'économie d'énergie, le système de commande (10) active et désactive le second ventilateur (7, 8) électrique automatiquement conjointement avec l'activation et la désactivation respectives des moyens de chauffage (6, 6', 6''), et
 - dans un mode standard, le système de commande (10) active le second ventilateur (7, 8) électrique de manière continue sans interruptions.
8. Four (1) de cuisson selon la revendication 7, dans lequel, dans ledit mode d'économie d'énergie, le système de commande (10) est configuré pour activer et désactiver le premier (7', 8') et le second ventilateur (7, 8) électrique automatiquement conjointement avec l'activation et la désactivation respectives des moyens de chauffage.
9. Procédé de fonctionnement d'un four (1) de cuisson selon la revendication 3 ou 4, comprenant :
- l'utilisation du système de commande (10) pour sélectionner un programme de cuisson sans circulation d'air dans la cavité de cuisson (3), et
 - lorsque le programme de cuisson sans circulation d'air dans la cavité de cuisson (3) est sélectionné, l'utilisation du système de commande (10) pour maintenir le second ventilateur (7, 8) électrique automatiquement désactivé, sans tenir compte du fonctionnement des moyens de chauffage (6, 6').

FIG. 1

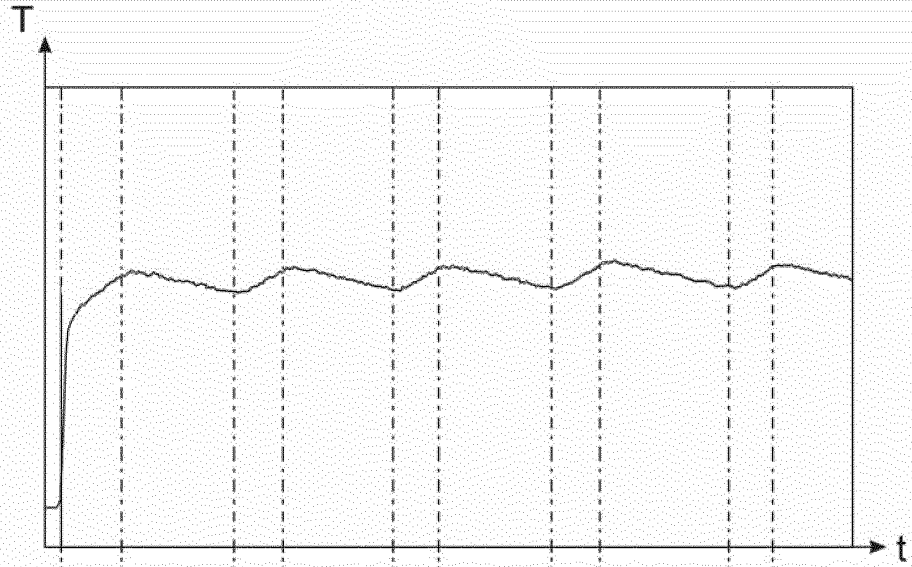


FIG. 2

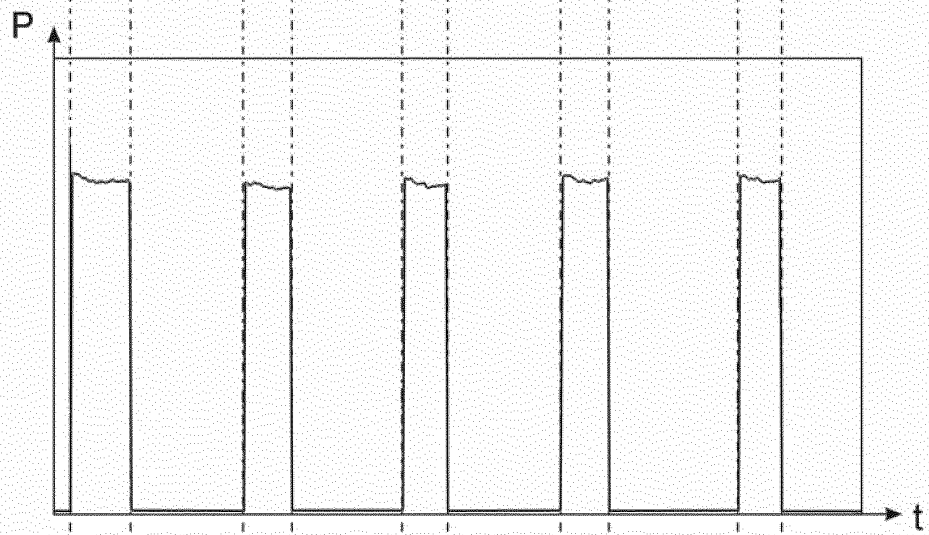


FIG. 3

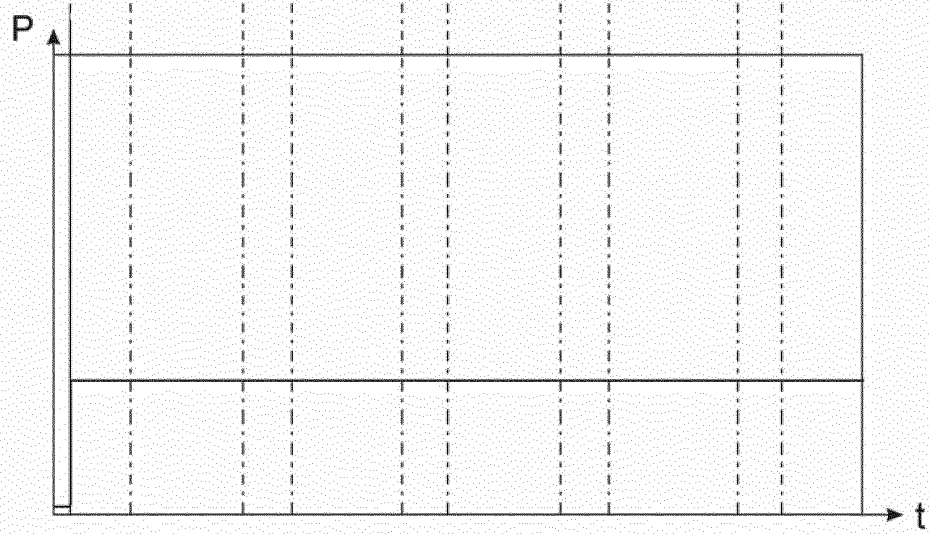


FIG. 4

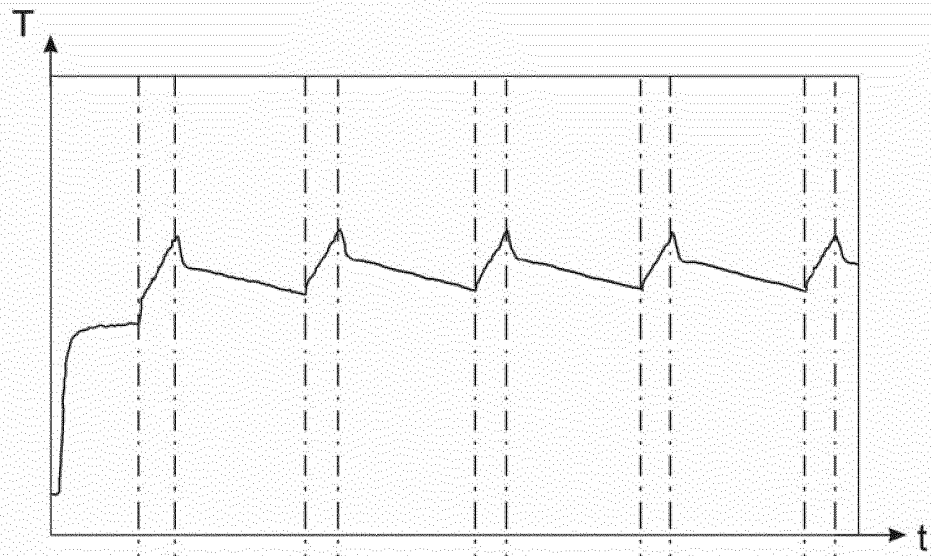


FIG. 5

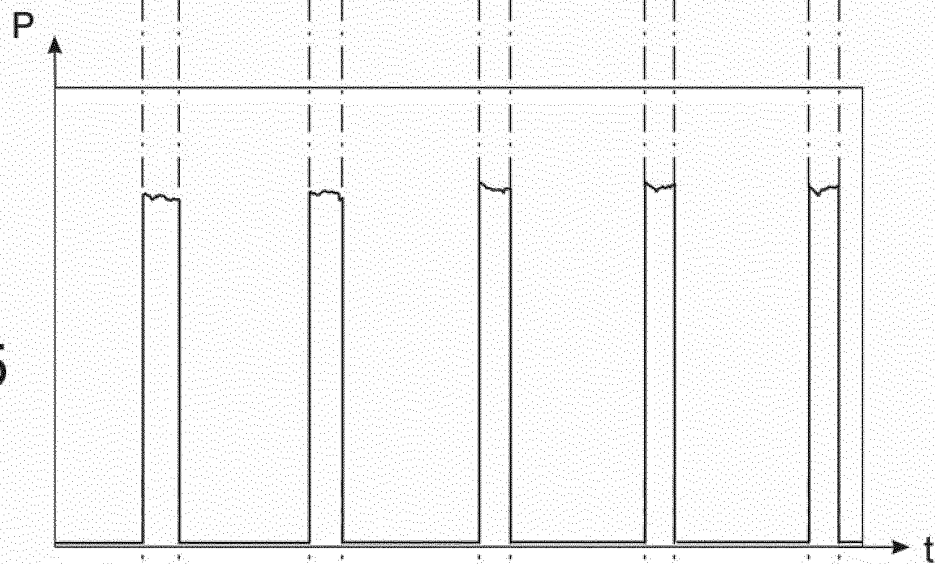


FIG. 6

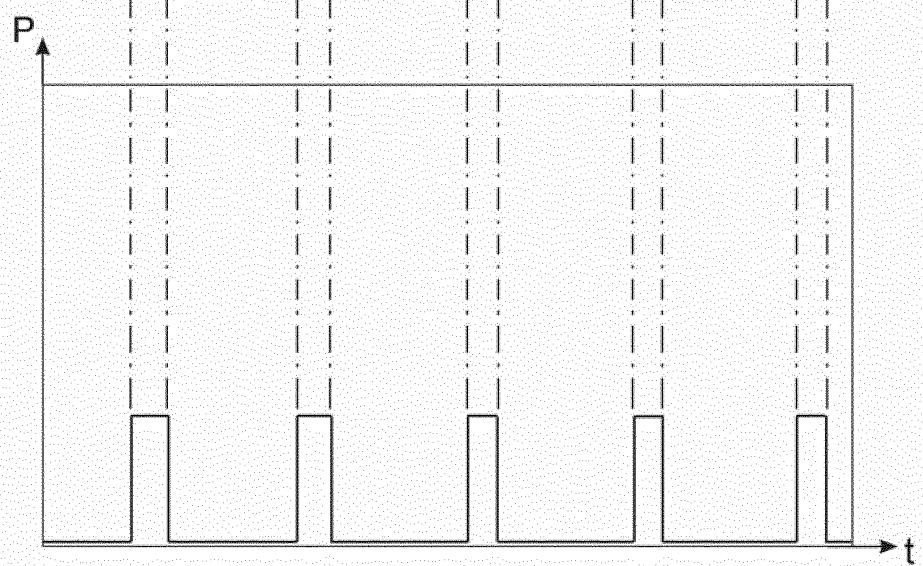


FIG. 7

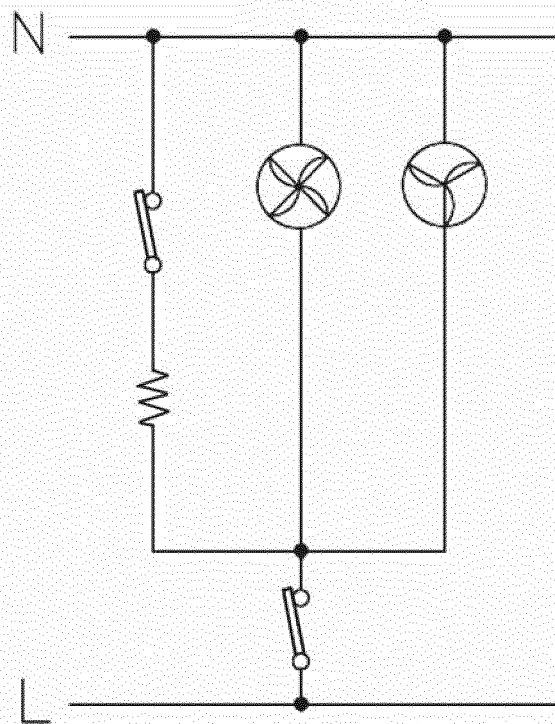


FIG. 8

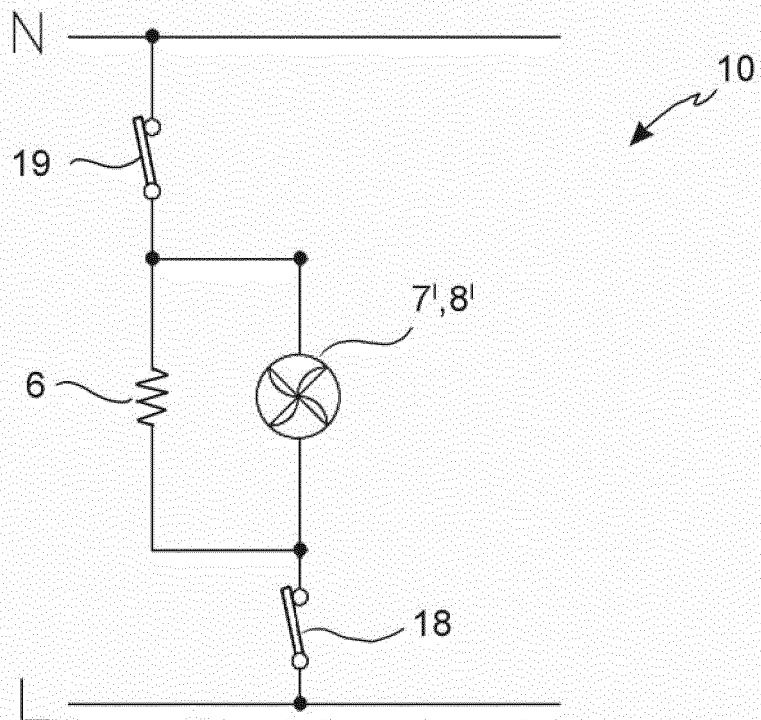


FIG. 9

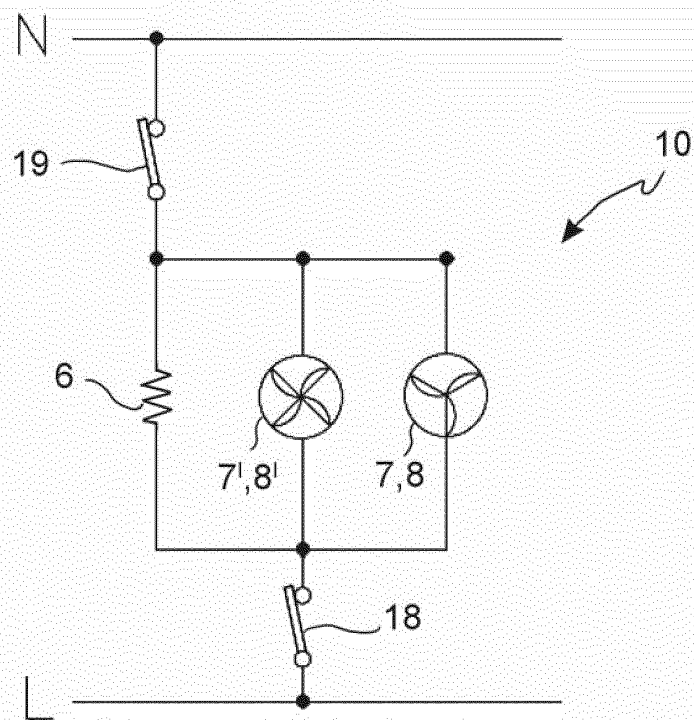
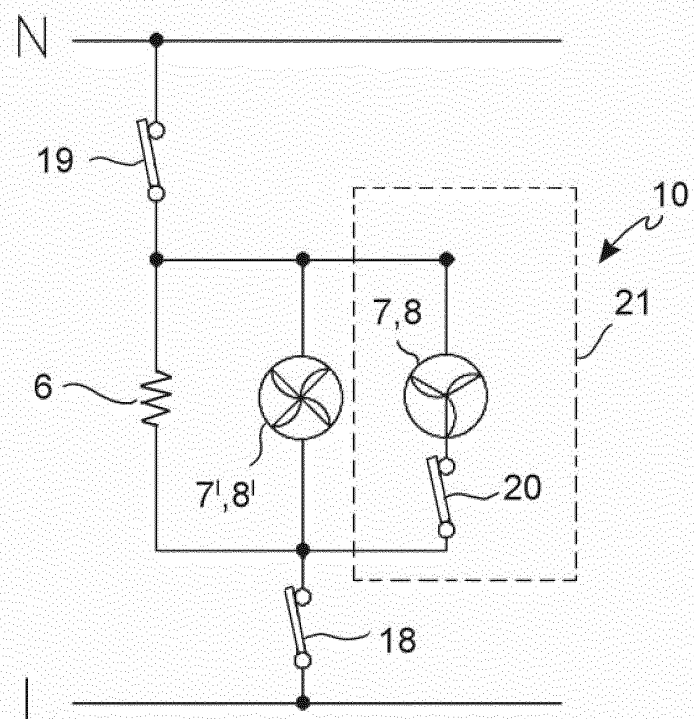


FIG. 10



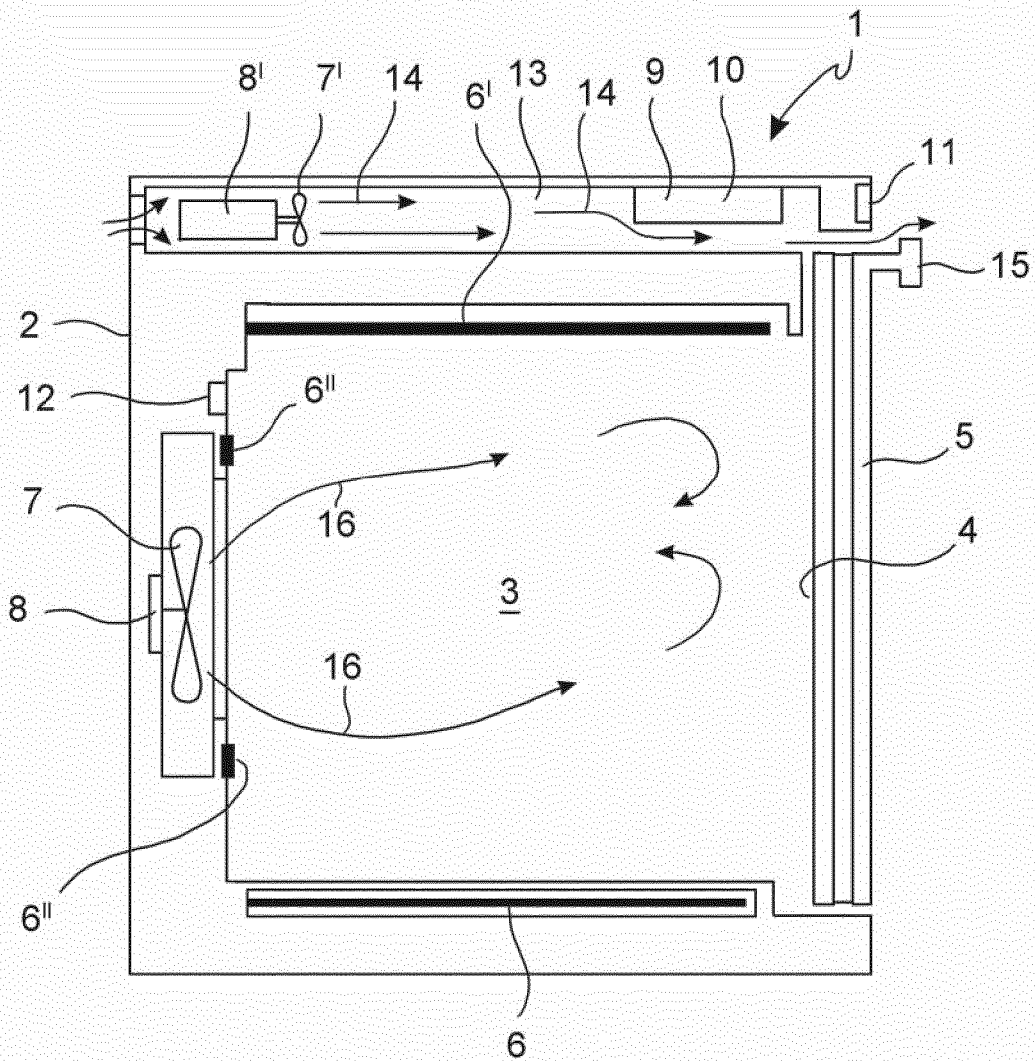


FIG. 11

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2014044767 A1 [0010]
- US 5801362 A [0010]